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 aims to provide planners and policy makers with a better understanding about potential impacts of land policy on the shaping of hybrid rural-urban development patterns and their effects on resilience enhancement of urban systems. It 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, is likely to bring more positive impacts regarding resilience enhancement to the urban system than the modernised scheme, which promotes large-landholdings. 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.

Introduction
The concept of resilience has recently been the focus of various disciplines, including spatial planning. It is considered an essential quality for managing urban systems to cope with 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.

This article argues that hybrid rural-urban development patterns, which feature a diversity of qualities, are likely 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 different land policy applied in the region that shapes the spatial development patterns of the BMR.
The article is divided into four sections. The first section describes the changes of land policy from 1782 to 2010. In the second section, the hybrid rural-urban development patterns in two selected areas, namely Khlongluang and Western-nonthaburi, are compared. Both areas are associated with hybrid rural-urban development patterns, yet with distinctive spatial characteristics. The comparison focuses on investigating the impacts of different policies applied to each area on the spatial transformation of the areas. This 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 third section examines the effects on resilience enhancement created by different spatial characteristics in the two selected areas, based on three parameters in connection with the four sets of spatial characteristics. 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 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. This aims to provide planners and policy makers with a better understanding about potential impacts of land policy on resilience enhancement of urban systems.

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

This section describes the changes in land policy from 1782-2010, by emphasising the aspects of land policy in terms of land tenure regarding ownership type and landholding size. The customary land policy in operation in Thailand was underpinned by the context of a subsistence society that promotes small-landholdings. It was based on the concept of occupancy-by-use, which had been employed since the early period of settlement in the region (around the seventeenth century). The policy revealed that all the land within the kingdom was subject to His Majesty’s permission to occupy. Yet all prai (commoners), faht (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 promoted smallholdings

Meanwhile, this customary land policy had been overlaid by modernised development schemes, started in the mid of the nineteenth century. The land tenure system was changed from the occupancy-by-use model to the title deeds system, introduced by the Ministry of Agriculture in 1902 (DOL, 2011). In addition to that, the state launched new development policies aiming to promote farming in unoccupied areas. This was influenced by the free trade agreements started in 1855 (Peleggi, 2007), which dramatically increased the demand for land to support agricultural export. 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. 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. Largeholdings promotion and landlordism was strengthened by the land policy in the second phase (1880s-1900s). 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). Khlongluang is a good example of the results of this land policy. In addition, in 1902 the occupancy-by-use model was replaced by the title deeds system. This new system allowed largeholdings and landlordism to take place more easily in new development areas.

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.

Apart from the spatial transformation of unoccupied areas into cultivated areas, the BMR has also experienced a enormous urban expansion, particularly into the unattended swampy lowlands close to the existing city centre (Ouyyanont, 2000), significantly as a result of the increased monetisation of the peasant economy. This was a result of rapid economic growth after World-War II,1 with the shift from an export-agricultural-oriented economy towards a more service and manufacturing-oriented economy.

After the economic bubble burst in 1997, the Thai government introduced the reoriented development approach, based on the philosophy of sufficiency economy.2 This reoriented approach generated a

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

2 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
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).

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. The consequences generated by diverse spatial development patterns on the degree of resilience enhancement are then explained in the next section. The differences of hybrid rural-urban development patterns are investigated in relation to four sets of characteristics elaborated below, which are argued as significant affecting the degree of resilience enhancement of the area. The term ‘hybrid rural-urban development pattern’ 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. 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, which is distinct from that experienced by western countries during their urbanisation processes. The two selected areas were swamp areas and left unattended before the modernisation period. They 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.

2.1 Land tenure: 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 for more details). 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)\(^3\). 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 for more details). 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). This was due to subdivision of the plot through family inheritance over generations (Askew, 2000).

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

Agricultural uses in both areas were 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 share and spatial characteristics. In Western-nonthaburi, residential uses mixed with orchards (yellow areas in Figure 2) were predominant, with a minor share of industrial uses, whereas the share of industrial and commercial uses and public facilities (such as universities and research institutes) 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.

\(^3\) This refers to the limit of landholding size introduced in the revised land policy in 1936 as mentioned earlier.
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.

The diversity of responses to the economic structural changes (from an agricultural-based to a more manufacturing and service-based economy) 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 parcellled 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.

Figure 3  Aerial maps showing examples of development patterns in Western-nonthaburi (above) and Khlongluang (below) in 2010
Source: Google Maps (2010)
2.3 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.

2.4 Speed of change

As shown in various studies on land use changes in the two selected areas (Nabangchang and Wonghancho, 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 sets of 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 characteristics

Absorability and retaining capability

Absorability 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, and as a result, 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.

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.

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.

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. 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. 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.

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4 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 that promotes smallholdings on resilience enhancement.

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

The analysis 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 as summarised in Table 1. These differences are results of the diverse land development policies applied to each of the two selected areas, particularly during their reclamation period.

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Western-nonthaburi</th>
<th>Khlongluang</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land tenure (ownership and</td>
<td>Predominant by smallholdings owned by individual households</td>
<td>Predominant by largeholdings owned by capitalist-landlords</td>
</tr>
<tr>
<td>landholding size)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land use (function)</td>
<td>Individual housing mixing with orchards, small-scale housing estates, minor share</td>
<td>Large-scale development projects, including housing estates, industries,</td>
</tr>
<tr>
<td></td>
<td>of small-scale industries</td>
<td>public facilities and farming</td>
</tr>
<tr>
<td>Diversity and scale of mixed-use</td>
<td>Fine degree of mixed-use with high degree of diversity</td>
<td>Large-scale mixed-use with low degree of diversity</td>
</tr>
<tr>
<td>Human-nature interaction</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>and independency</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speed of change</td>
<td>Slow</td>
<td>Fast</td>
</tr>
</tbody>
</table>
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, which creates a higher opportunity of the urban system to recover from changes. In addition, small-scale of agricultural practices mixing with residential units is likely to enhance human-nature interaction and independency, as it is more likely to enable learning and adaptation of the urban system than the large-scale mixing patterns. It provides early warning signals for loss of ecosystem resilience and 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 summary, evidence suggests that the customary land policy, which promotes smallholdings, 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. 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.

References


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