

Towards integrated urban and horticultural planning in Hanoi and Nanjing

A report of the searusyn project team

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ABSTRACT

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In an international and interdisciplinary research project, partly funded by the European Union, the possibilities were explored of having specialized horticultural production around East Asian cities benefit from urban growth. Anywhere in the world, farmers around cities have to cope with two contradictory trends. The inhabitants of the rapidly expanding cities like Hanoi and Nanjing not only enjoy eating fresh vegetables but also 'eat up' some of the most productive farmland where these vegetables are grown for new housing estates and other urban functions.

After analysing and comparing the general speed, directions and mechanisms of physical expansion in both cities over the last decade the research team focused on one pilot area in each city. In these pilot studies it became clear that, next to many farmers who were not able to make much money from agriculture and are therefore quite happy to shift to urban jobs, there is an important group of knowledgeable and ambitious market gardeners, who do make a good living out of horticulture. How could urban planners take the skills and ambitions of these people into consideration and cooperate with agricultural planners, while designing and developing urban growth? Several workshops were held and examples from Europe and other parts of the world were discussed with all stakeholders to see how productive open spaces could become an integral part of the new urban areas.

For both pilot areas different scenarios were made to make the stakeholders see the possible effect of combining urban interests with those of sustainable, specialised agricultural production that should be attractive for urban residents to encounter on a daily basis. We conclude that this project has made the planners in both cities aware of the advantages and possibilities of working together in the further expansion of Hanoi and Nanjing towards the integration of highly productive green spaces with serious farmers in the further expansion of Hanoi and Nanjing.

Keywords: agro-tourism, China, green belts, horticulture, migrant farmers, migrant labour, peri-urban agriculture, productive urban open space, rural-urban interface, safe vegetables, scenario, urban green space, urban growth, urban planning, Vietnam

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Preface

Three quotes serve well to introduce the reader to one of the final reports of the “SEARUSYN” project (acronym for **S**eeking **E**ast **A**sian **R**ural-**U**rban **S**ynergy). They are from the welcoming and concluding speeches of the two policy workshops, held in Nanjing and Hanoi during spring 2006, to mark the end of this three-year research project.

As is well known, China’s economy is increasing dramatically. Nanjing, one of the multi-function cities in the Yangtze Delta, is becoming more and more developed, as we can see that the build-up area of Nanjing is expanding outside and the population keeps growing. Meanwhile, the economy of Nanjing is booming. In addition, the speed and scale of population migration are keeping rising significantly. The ‘floating people’ and city residents are in the proportion of 1: 4. All these problems have motivated serious thinking on urban development, agricultural industry and environmental protection in Nanjing City. Practices in Europe show us that green zones inside and around metropolises not only provide necessary agricultural products but also function as ecological areas, which can promote the coordinated development between green zones, agriculture and mega-cities.

Therefore, we have established this collaborative project financed by the fifth framework program of EU. The objective of this project is to make possible policies and suggestions on the balanced development of green zones, agriculture and urban expansion in metropolises like Nanjing. This project has been focusing on the interrelation between urban expansion and agriculture development since its start in 2002. In order to seek acceptable actions by all stakeholders, a series of surveys on different topics and collective participatory approach have been designed.

Nanjing (China) and Hanoi (Vietnam) have been chosen as samples in face of rural development under the pressure from urban expansion. Through many serious researches we have developed a few perspectives on rural areas. What is more, a communication platform for all related stakeholders has been set up to make sure that they can meet together to exchange views on peri-urban land use, agricultural development and environmental protection.

In the past three years, officers from Land Resource Management Bureau, Urban Planning Department, Agriculture Department, Environmental Protection Bureau as well as Country Councils and local villagers have been interviewed. Agricultural development and urbanization pressure which the sample areas facing have been investigated. Finally we drew a conclusion that it would be in quite a good condition to develop qualified green space in peri-urban of Nanjing. Three scenarios of Suoshi Village, as a village-level sample, have been developed after careful sample selection procedure by our researchers referring to special experiences from Europe, especially The Netherlands. The project wishes that officials from Bureau of Land Resource Management, Urban Planning Department, Agriculture Department and Environmental Protection Bureau, and experts from research institutes meet together and discuss the three scenarios, which are shown on the boards around us to give everybody here an intuitionist picture on which direction Suoshi Village

would go in the coming years. By this way every interest group can express itself and exchange ideas. Researchers can get feedbacks and discuss with the stakeholders. Moreover, new thinking may be inspired from the discussion and debating. We hope this conference to provide more valuable perspectives on planning and balanced development of Nanjing city and country, as well as the green space construction with our efforts.

Prof. Qu Futian, Vice President of Nanjing Agricultural University

Green urban development is an indispensable trend of the age. Thus, how to develop urban area with green belts and agro-ecological tourism in a city's heart is a problem that must be solved by all organizations and leaders. Many lessons were learned from the development of other countries, including The Netherlands in Europe and our neighbour China. I hope that the implementation experience of friendly countries will help Vietnamese scientists and planners find a more reasonable way for urban and green belt development of Hanoi in particular, and the whole country in general.

In this workshop, we will receive the planning scenarios for developing Dong Du to become a green belt of Hanoi, as well as ideas of experts from planning and urban design fields, especially Dong Du farmers' opinions for development of their local area in the future. Hopefully, with thanks to these valuable contributions, researchers will find out the most suitable plan for building Dong Du to become a green belt.

Assoc. Prof. Tran Duc Vien, Vice Rector, Hanoi Agricultural University

Planning for Dong Du to become a green belt of Hanoi may be a small issue for the overall and long term city planning. However, it has a great meaning because Dong Du will pioneer a green agricultural model within our city's heart. The project and this workshop were very meaningful because we had help from offices related to agriculture, planning, architecture and the attendance of Dong Du farmers who will directly make our scenarios become reality.

Mr. Trinh Duy Luan, Director, Institute of Sociology, Vietnam Academy of Social Sciences

1 Introduction to the research project

Ben Kamphuis

1.1 Project background and objectives

The urban areas in East and Southeast Asia are expanding very fast at the expense of the rural area. Agro-ecological, social and economic considerations hardly play a role in the decision-making process about the form and the direction of the urban expansion. As a result fertile agricultural land is turned into residential and industrial areas and related infrastructure. Not only land, but also specific local expertise on agricultural production and marketing get lost. Such a process is, to a certain extent, inevitable but the allocation of land to various functions could be improved by means of an integrated approach that brings together farmers, policymakers, researchers and other stakeholders in rural and urban planning. The possibilities for such an integrated approach have been explored in a project in China and Vietnam under the title 'Seeking Synergy between Urban Growth, Horticulture and the Environment in Asian Metropolises'. The two metropolises concerned are Nanjing and Hanoi. The overall objective of this project with the acronym 'SEARUSYN' was:

To explore the possibilities for integrating sustainable horticulture and new urban functions in the peri-urban areas of Nanjing and Hanoi by initiating a dialogue among rural and urban stakeholders.

The specific *project objectives* can be summarized as follows:

- to create an institutional basis for policy dialogue
- to analyse the dynamics in peri-urban land use development and policies
- to assess livelihood strategies in peri-urban areas
- to determine opportunities for sustainable horticulture
- to propose strategies for integrated solutions

1.2 Project activities and phasing

The project brought together a number of scientific disciplines and fields of expertise, to conduct systems research on the 'rural-urban interface'. Various surveys have been carried out, at both municipality and village level. The project activities were divided in three phases of about one year each (Figure 1.1).

2003/04: City level analyses

During the first phase, comprehensive analyses of the developments in the peri-urban areas in Hanoi and Nanjing have been carried out in order to identify the key problems that should be addressed in the project and to select suitable case study areas:

- a. Analysis of peri-urban land use changes,
- b. Analysis of peri-urban environmental problems,
- c. Analysis of agricultural developments,
- d. Institutional and stakeholders analysis.

2004/05: Local level analyses

In the second phase, the focus of the project shifted towards the local level. The research activities in selected pilot areas (Dong Du village in Hanoi and Suoshi village in Nanjing) were preceded by a Rapid Diagnostic Appraisal (RDA) in more than just these two peri-urban settlements. This appraisal technique makes it possible to acquire up-to-date information based on interviews with local people in a very short period. After that, several research activities have been carried out, focused – as much as possible - on the two pilot areas. These activities include:

- Consultations with local stakeholders, farmers and village leaders, to jointly search for options for sustainable horticulture in the pilot area.
- Consultations with planning institutions at different levels of government to discuss possibilities for integrative planning in new urban areas in general and in the pilot areas in particular.
- Supporting surveys with respect to integrated pest management, water and soil quality, fertilizer and pesticide use, organic farming and market opportunities for specific crops.
- Surveys with respect to the influence of urbanization on horticultural development in the peri-urban area of Hanoi and Nanjing in general and on migrant farmers in Nanjing in particular.

2005/06: Integration

In the third phase, the results of the various research activities and consultations have been used for designing different scenarios for the future development of rural and urban land use in the case study areas. These scenarios have been presented and discussed in policy seminars in November 2005, as examples for integrating sustainable horticulture in new urban areas around Hanoi and Nanjing. During the final workshop the results of the different project activities have been discussed and integrated in various reports, which are available through the Internet: <http://www.searusyn.org>.

This report integrates the major results concerning the interaction between urban planning and agricultural land use in the two cities in general and in their pilot areas in particular.

1.3 Project partners

Wageningen University and Research Centre, the Netherlands:

- LEI (Agricultural Economics Research Institute),
- ALTERRA (Green World Research Institute), and
- PRI (Plant Research International)

New University of Lisbon, Portugal:

- Center of Studies for Geography and Regional Planning

Nanjing Agricultural University, China:

- College of Land Management (CLM)

Hanoi Agricultural University, Vietnam:

- Centre for Agricultural Research and Ecological Studies (CARES)

Institute of Sociology, Vietnam (part of the Vietnam Academy of Social Sciences)

1.4 Structure of the report

The main body of this report consists of two parts, one on Hanoi (Chapters 2-4) and the other on Nanjing (Chapters 5-7). This is followed by a short comparative and concluding chapter 8. Most of this final chapter could also be read as a SUMMARY of the report. Both main parts are designed in the same way. After a discussion of the city as a whole in terms of its physical and population growth over the last decade, its major agricultural changes and principles for urban planning, the focus shifts to a pilot area. After introducing this pilot area the various impacts of urbanisation on land use are discussed, followed by detailed analysis of the agricultural and environmental situation. This leads to a chapter on scenarios for the future development of these pilot areas, as constructed from interviews and working sessions with the various stakeholders, their development, explanation and policy implications.

Many authors have contributed to the various sections of this report and their names are given at the beginning of each chapter.

<p>In this abridged version of the report the chapters 2, 3, 5 and 6 have been removed. For the complete version see www.alterra.wur.nl</p>

2 Hanoi, a fast growing city

Dinh Thi Hai Van

See original document on www.alterra.wur.nl

3 Dong Du, a village in peri-urban Hanoi

Dinh Thi Hai Van

See original document on www.alterra.wur.nl

4 Scenarios for future development of Dong Du

Dinh Thi Hai Van and Nguyen Thi Hai Ninh

4.1 Farmers' expectations

In two days, 28 April and 18 May 2005, the CARES/HAU research team organised two meetings with a farmer group in Dong Du commune, Gia Lam peri-urban district, Hanoi. The purpose of the meetings, following the approach of a SWOT analysis, was:

- (1) to find out strengths (S), weaknesses (W), opportunities (O), and threats (T) that farmers in Dong Du are facing and possessing regarding agricultural/horticultural activities, specifically herb production activities; and
- (2) to make a strategic plan for the development of herb production in the area, based on the information obtained from the SWOT.

The members of the farmer group that the research team worked with, are all 10 inhabitants of the commune (7 males and 3 females) who really want to continuously work on their fields. In other words, they are the ones who want to live on agricultural activities and expect to keep agricultural land in the area. These members are vegetable and herb middlemen and safe vegetable (herb) producers (Nhuyen Vinh Quang et al., 2005).

Agricultural areas will be reduced because of high urbanisation speed in Hanoi. Peri-urban areas of Hanoi will be affected by the necessity of development. This applies equally to Dong Du. As presented in the previous Chapter, herb production plays an important role in the agricultural production, both in term of area and income of farmers. Although urbanisation occurs day by day, farmers in Dong Du wish to maintain some of their agricultural production, especially herb production. Their ideals were presented clearly at a meeting with farmers of Dong Du held on August 16 and 17, 2005. Farmers answered a question given by researchers: "What are your expectations until 2020?" After the discussion, the farmers said that they learned some lessons from neighbouring communes such as Cu Khoi and Thanh Ban and they think that if agricultural areas are lost, their job will be lost too. It means that their life will be more difficult. Therefore, they are worried about losing land. This explains farmers' wishes to maintain and improve herbs growing in Dong Du. The next question risen by researchers was "How do you wish to maintain and improve the vegetable growing industry, especially that of herbs until 2020?" The ideals of the farmers are presented as follows.

4.1.1 Establishment of specialising areas

- Propagandising and encouraging farmers to understand the necessity of *field land exchange* among farmers. This is most difficult. Currently, each household possesses fields at different locations, which makes it difficult for them to specialise in growing vegetables on a large area. But different soil qualities at different locations are an obstacle to do the land exchange. Moreover, farmers usually do not want to exchange the land they have cultivated in their own way over a long time. Participants at the meeting suggested that it would be best if local authority could play a role as arbitrator in land exchange activity

in order to make individual growers of high-value crops benefit from economies of scale and organised crop rotation to maintain soil fertility.

- *Making plans for production*: this is an important follow-up work to the land exchange. Making plans for production includes: what should be grown in what season and in what area? Currently, 50% of the herb areas in Dong Du is planted with *Eryngium* as it is sold with the highest amount and gains highest profits among herbs, 10% is planted with *Coriander*, 10% *Persicaria*, 20-30% *Perilla Nankinensis*, *Marjoram* and others. Farmers wish to maintain these proportions until 2020. When asked how different these proportions would be if Dong Du's agricultural land is reduced, 100% of participators said they want to keep it as present for herbs and reduce rice and maize area only. They said that the income from 1 sao of herbs is around 10 times higher than that of 1 sao of rice. Therefore they can use income from herbs to buy rice, maize and other food. On the other hand, they do experience higher input cost, more diseases, more hours of cultivation time than in rice and corn cultivation. Financial and technical support from the government, non governmental organizations, domestic and foreign enterprises as well as projects will be highly appreciated. They wish to obtain preferential loans for their investment in production. Participators also express their concern about soil fertility after long time cultivated with *Eryngium*. They think *Eryngium* productivity will be no longer as good as it is at present once the soil fertility decreases. Since farmers wish to keep growing *Eryngium*, they expect to have assistance from scientists to help maintain and improve soil quality through crop rotation and other means.

4.1.2 Infrastructure improvement:

- Farmers wish to have a *modern irrigation and drainage system* in Dong Du by 2020. The system will be designed as a two-level ditch where the upper level is for irrigation and the lower for drainage. The ditch will be in the centre of the two farming blocks and covered by concrete. Therefore, it can be used as one of the interior field trails as well.
- The farmers considered the provision of *clean water from drilled wells* for irrigation of importance. Each production area needs at least one drilled well. They would like a filter tank and standpipe with clean water to be set up aside each net house or production area. Pipes will be placed throughout this area with faucet in every 15 m in such a way that rain-like irrigation (*'tuoi phun mua'*) can be operated.
- They also would like to set up *net houses for safe herbs production*. Owing to different demand of water, light, temperature, moisture of different herbs, it will be easier for care, irrigation and operation if each type of herbs is grown in a separate net house fully equipped with electricity and irrigation and drainage system. Large-scale net houses need to be built. Each group of 10 households shares a net house with the average area of 1 'sao' (360 m²) per household. There have been 5 safe vegetable production groups. Households involved in safe vegetable production need supports from the Government and local authorities. The establishment of net houses benefits safe vegetable producers, collectors, and consumers differently. Safe vegetable producers gain economic benefits, consumers gain benefits about health, and collectors find it more convenient when collecting products. Allowing for crop rotation, there will be unification according to seasons on areas and types of crops among the households involved in vegetable production in net houses. To have that unification, each group needs to assign one

leader who is in charge of safe vegetable production. Currently each group has its leader already, who could either take up this technical responsibility himself, or delegate this to a more specialised person. Local people need to receive support to buy materials and equipment to build net houses. The amount of capital invested per 'sao' in a net house is 6 million VND, of which 50% consists of support (loans or grants) from organisations such as ADDA (the NGO 'Agricultural Development of Denmark Asia'), local authority, and enterprises.

- Building an *electricity system* in order to ensure supplying enough electricity to the net houses. This work is very necessary: once the electricity system is constructed, wells supplying clean water to all fields will also be built.
- Enlarging and *improving roads*, especially the road inside the blocks of land: This will make it more convenient for farmers as well as collectors.
- Improving *farmers' perception in the use and protection of the irrigation system* through local means of communications.
- Setting up a *management committee* responsible for agricultural production and finding markets for herbs.
- Similar to the net houses, *improvement of the infrastructure* needs financial support from the government, non-government organizations, projects and enterprises as well as technical support from scientists and extension workers. Contributions from local government and village community are also recommended by the participating farmers.

4.1.3 Establishment of Dong Du trademark, finding markets and price stabilisation.

- *Creating a Dong Du trademark.* Farmers wish that by 2020 Dong Du trademark will be well known domestically and overseas. It not only provides producers in Dong Du with a stable market but also encourages them to maintain a safe production for their credit.
- *Finding domestic and overseas markets.* Most of the participators agree that finding markets should be conducted by trustworthy middlemen such as collectors with extra support from the government and enterprises. By having no concerns on finding markets for their products, farmers can focus on production by orders only, which probably helps them improve vegetable quality.
- *Stabilising prices.* Farmers wish to have lower taxes and lower prices of input materials together with increasing incentives/supports for investment.

4.1.4 Preservation and processing herbs

- It is of great importance to have *preservation and processing facilities* in Dong Du with sufficient capacity and high efficiency. Their main functions are cool rooms for keeping herbs and sale of their product by kilogram without preparing bunches. Farmers said that some households don't have enough labour, especially in harvesting time, for preparing bunches for sale. They think that the station can be a big market for herbs, so that they can grow as much as possible. At present, the market facilities for herbs in Dong Du are rather limited. The market potential for herbs is presented clearly in the herb marketing report (Nguyen Thi Hai Ninh et.al., 2006).

- Providing job opportunities in these (small?) industries for local people once trained with technical training courses.
- Disseminating production skills for the off-season. Currently only experienced households are able to produce off-season herbs. Because they fear competition, the community is facing difficulties in sharing their know-how. Solutions for this problem include: 1) Providing technical training courses by relevant organisations; and 2) Local government encouraging farmers to share experiences in order to extend and improve the production capacity of the whole community.

4.1.5 Reduce environmental pollution

- *Enhance local people's environmental perception.* Disseminate knowledge about environmental protection through group meetings. Make regulations in production areas.
- *Water treatment for irrigation.* More wells need to be drilled to supply enough clean water. Currently, some production areas still use polluted water from Cau Bay river. Local people have no way to treat waste.
- *Build stabilization pond(s).* Drainage systems need to be built in order to avoid not only flooding, but also the accumulation of waste. The drainage system needs to ensure that water is drained quickly and timely. In the raining season, it is very easy to have flooding, because the drainage system is not good enough for water to run away. This flooding has bad effects on herbs such as diseases and addling (rot). It is necessary to have concerns and timely adjustments from the Agricultural Service Co-operative and Irrigation Group.

4.1.6 Enhance knowledge for agricultural production

- *Training courses* need to be organised in order to disseminate knowledge on cultivation, the way to detect pest, the suitable use of pesticide.
- *Local farmers visit safe vegetable production model demonstrations in other places in groups*, so that they can discuss among themselves what they observe.
- *Summarising meetings* need to be organised every 6 months or 1 year. Firstly, group activities need to be organised, followed by activities amongst groups. The Farmers Association organises final summarising meetings (with participation of all farmers in Dong Du).

4.2 Scenario's for integrated solutions

For this pilot area the research team has developed two possible scenarios. Scenarios are possible future situations (in 2020), based on an analysis of the current situation and assumptions for future trends in the society.

The purpose of these scenarios is to show urban planners and policy makers why it is interesting to combine different functions in a peri-urban area and what role agriculture could play in that. The scenarios are based on scientific analyses and consultations with farmers and other stakeholders, such as government institutions in the area.

In the following sections two scenarios will be described.

4.2.1 Starting points for the scenarios

The scenarios that have been designed are built upon the current situation in the pilot area and on the policy context. Both are summarized below to give indications on the practical and political support for each of these scenarios.

A. Policy context

While designing the scenarios, the major trends in the society should be taken into account. In the scenarios for Dong Du the following trends have been taken as starting point.

- Green Hanoi

After having focused mainly on quantitative aspects of reconstruction and expansion of residential and industrial areas, the Hanoi government is now shifting its attention to quality. One of the aspects is to plan more green areas, green zones in the new urban areas, for recreational and environmental purposes. Indications for this new direction in urban policies can be found in the new master plan for Hanoi. See also Section 2.4 above.

- Increasing awareness of environmental issues

Vietnam is a fast developing country and the government policy is aimed at further strengthening the economic development. The negative side effects on the environment did not get that much attention so far, but the awareness of environmental issues is increasing fast, amongst other things because of the Kyoto protocol.

- Increasing demand for safe food

The performance of the Vietnamese agriculture has improved considerably over the last years. There is sufficient food on the market and the export of food and food products is increasing. In this situation the agricultural sector needs to become more market oriented, because the demand is dictating the supply. The consumers are increasingly aware of safety aspects of food products. Consequently the demand for safe food products, in particular of fresh vegetables, is increasing. The agricultural plan of Hanoi is stimulating the development of safe vegetable production not only for the domestic market, but also for export.

- Increasing demand for tourism

Vietnam is attracting many tourists and the government policy is to foster that development. There are many attraction points in and around Hanoi and further development of attractive sites is important to keep the tourists coming to Hanoi, not only from foreign countries but also from Vietnam itself. The increasing standard of living in Vietnam makes it possible for more and more people to spend money on leisure and tourism. In addition, the residents of Hanoi themselves, the current and new ones, need opportunities for leisure and recreation.

- Peri-urban livelihood

Because the city is expanding very fast, the rural communities are under heavy pressure. The agricultural sector is losing land, more often than not with high-value crops requiring special skills, and the income of the rural population is likely to decrease accordingly. There are possibilities for off-farm jobs, but the rural population often does not have the required

education and skill. As a result the income development and the social fabric of the rural communities are under treat. The Hanoi government is aware of these developments and is searching for policy measures to improve the situation.

- Infrastructure

Highways are or will be constructed around the built-up area to connect the various new parts of Hanoi with each other, including new bridges across the Red River. One of these new bridges was recently opened next to Dong Du and new roads across farming country are on the drawing board to improve access to this bridge from the nearby districts and urban wards. The Vietnamese government intends to construct a new dyke, much closer to the Red River than the existing one, for the prevention of floods. This will open up substantial areas for various uses.

B. The current conditions in Dong Du village

The scenarios are built upon the current situation and the strong features of Dong Du for the different rural and urban functions. In this section the reasons why the different functions should be maintained or strengthened will be described as well as some negative points.

- Agriculture

Dong Du has good conditions for agriculture because:

- There is a growing demand in Hanoi for high quality fresh vegetables, which can efficiently be provided by nearby production bases such as Dong Du
- The soil quality in Dong Du is very suitable for horticulture
- The farmers are skilled in vegetable production, in particular in herbs
- There are opportunities to export vegetables, specially herbs, from Dong Du
- There are agricultural research and information institutions 'around the corner'
- Agriculture provides employment not only for enterprising and skilled younger inhabitants but also for the older ones, who can not get easy employment in other industries
- Agriculture can provide productive green spaces in urban areas
- Farmers in Dong Du want to continue farming in the area.

There are some constraints for agriculture in Dong Du:

- Agricultural land has been allocated in a dispersed way and in small portions, which adversely affects farmers who produce on a large scale.
- It is difficult to negotiate about production among households. After land is allocated to households, farmers have their own right to decide which crops to cultivate, thus in a same field area of several households, some households cultivate rice (which needs a lot of water) while other households grow *eryngium* or other herbs (which prefer far less water for irrigation than rice. Spraying pesticides by one household cultivating a crop will affect the other ones who planted different crops.
- Lack of new production techniques/skills.
- Difficulty in providing safe water for irrigation in herb area.
- Lack of local labour and great difficulty of hiring workers from outside because they do not have the appropriate skills.

- Housing

Dong Du area has also good conditions for housing.

- There is a large demand for residential areas around Hanoi
- The area is easily accessible, in particular when the new highways are ready
- The area is attractive, because of the location near the river and the available green areas.
- The price for residential land in Dong Du is lower than in the inner-city of Hanoi

- Tourism and recreation

Dong Du has good conditions for tourism and recreation.

- There is an increasing demand for tourist and recreational facilities all around Hanoi.
- Dong Du is located along the Red River and has therefore good connections with other tourism facilities in Hanoi and the surrounding areas. It is neighbour of a ceramics village, which is already on a tourist river tour
- There are interesting objects for tourists in Dong Du such as historic houses, an attractive landscape and recreational facilities (fishing ponds, restaurants, etc.).

The two scenarios developed by the research team have a different focus with respect to functions that the area will mainly serve. The first scenario is focused on strengthening the development of horticulture in the area, alongside some measures for housing and tourism. In the second scenario, the different functions are more evenly balanced, i.e. less space for agriculture and more space for housing and recreational activities. The scenarios are described in the following sections.

C. Functions of the area

Functions: (land use categories)	Scenarios	
	<i>Horticulture</i>	<i>Horticulture and urbanisation combined</i>
Agricultural production	XXXXXX	XX
Housing & local industry	XX	XXX
Leisure & tourism	X	XXX
Infrastructure	XX	XX

This table shows the functions of Dong Du commune in these two scenarios. In both scenarios, 10 ‘functional points’ were distributed over the four main land use categories. The function obtaining the most points will become the main function of this commune in the future. As to be seen, agricultural production remains the major activity of Dong Du in scenario 1, while scenario 2 focuses on developing housing and leisure. In addition, infrastructure also needs to be concerned with the aim of making better living conditions for farmers in Dong Du as well as tourists visiting in the future.

4.2.2 Scenarios

A. Scenario 1: Horticulture

Description of Dong Du as a green horticultural area in 2020

The migration of people into urban centres in search of jobs has accelerated urbanisation in developing countries. Hanoi, just like other big cities in Vietnam, is therefore expected to

expand in different directions. Together with the growth of the Hanoi population, the demand for food, including fresh vegetables is likely to increase. Moreover, a bigger city means more pollution. Therefore, the formation of environmentally sound green spaces, which include vegetable production areas inside and around the city, appears to be of great importance, as these will function as a buffer: such an area will not only form an open space for a city of tall buildings and noisy, dusty streets, but can at the same time function as a productive area, supplying vegetables and herbs for the urban population.

Dong Du, a peri-urban village about 11 km from central Hanoi and located in Gia Lam district, is already well-known for producing herb vegetables and most of its products are currently consumed by Hanoians. Its location and herbs production experience make it most suitable for being such a green zone. In an effort to contribute to the decision-making of relevant authorities in urban planning, a horticulture-oriented scenario of Dong Du in 2020 is developed and outlined in this paper.

Actions and expected results

To turn this scenario into reality, the following actions need to be taken between now and 2020:

1. Develop a horticultural production area (including orchards and herbs),
2. Provide high-quality infrastructure to cater for the city in general and for the herbs production and marketing in particular,
3. Form green parks and attached services, and
4. Upgrade the residential areas.

In the next pages the map of the future situation is given and each of the proposed actions is further explained.

Actions:

1. Develop a horticultural production area

Firstly, because horticulture is the major orientation for this area, the most critical action needed is to develop a horticultural production area including orchards and herbs. Presently, farmers still grow a lot of rice and own small pieces of land at different locations. This makes it difficult for large-scale horticultural production to be implemented. Therefore, land exchange among farmers should be facilitated to accelerate homogenous crop cultivation and simplify appropriate water provision for certain types of herbs and vegetables. Most of the agricultural area will be cultivated with herbs. The remaining small area along one side of the residential area will be cultivated with fruit trees. To protect the herbs and fruit trees from pollution, tree lines will be planted along the highways.



Figure 4.1 Horticulture scenario for Dong Du in 2020

One of the constraints the farmers in Dong Du face in vegetable production is the poor irrigation and drainage system. In response, a new irrigation system needs to be built in which canals should be designed in order to make the best use of to-be-treated water from the Cau Bay River. The production of unsafe vegetables is raising concern among consumers, especially those from the inner city of Hanoi. In order to enhance safe vegetable production, not only should the appropriate vegetable production instructions be provided but also better water management should be considered. The entire area will be supplied with clean water for both agricultural and domestic use. Water for irrigation will be treated water from the Cau Bay River and from drilled wells. Water for domestic use will be from the national water supply system. Wastewater from herbs and vegetable production in Dong Du and nearby communes (Da Ton, Cu Khoi) will be collected and treated following the international standard before being discharged into the Cau Bay River. A waste water (ww) pond will be part of the system. Waste collection facilities also need to be improved. Waste from herbs and vegetable production will be separated into organic and inorganic waste. Organic waste will be composted and inorganic waste will be collected on a daily basis by URENCO, the urban environment company.

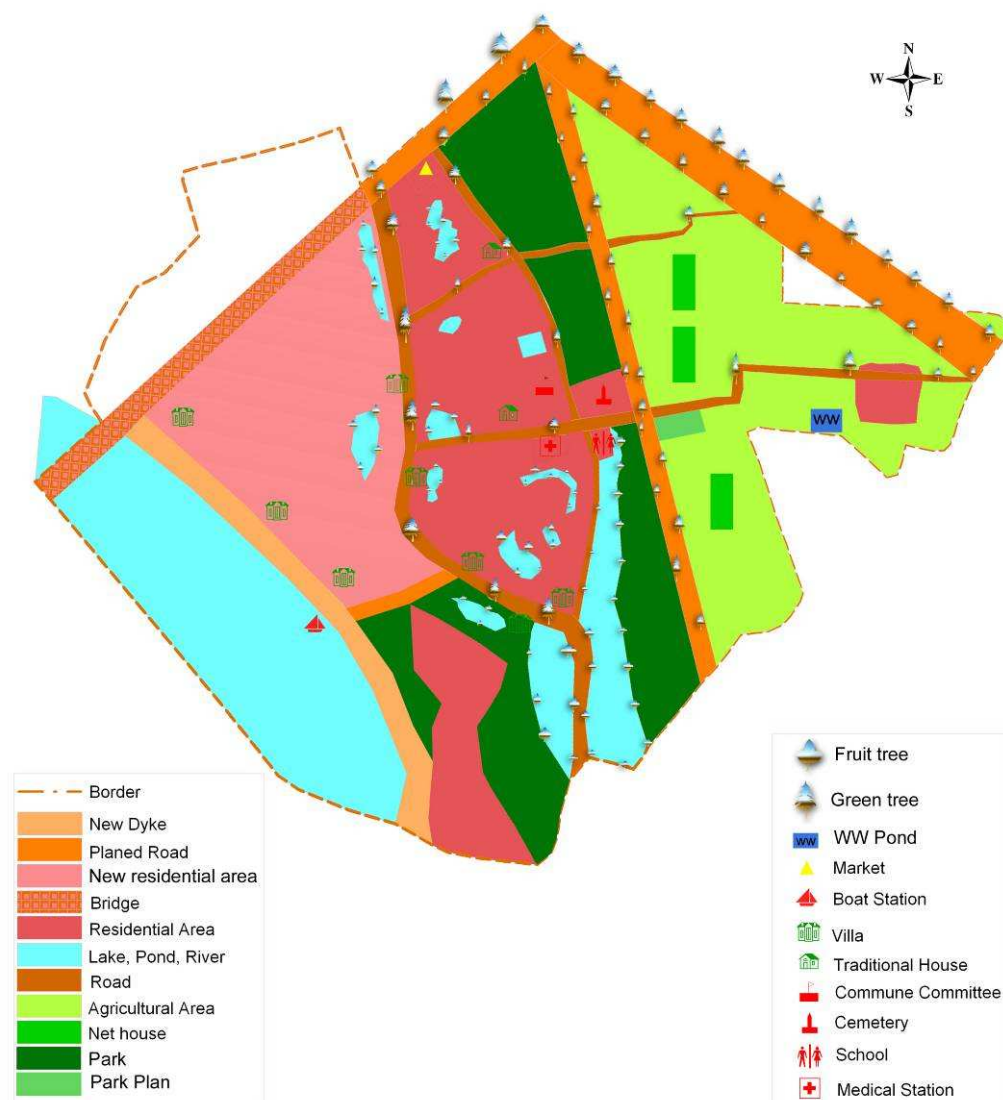


Figure 4.2 Horticulture & Urbanisation Combined scenario for Dong Du in 2020

Technical training courses on farming and marketing should be provided to accelerate herbs production and selling activities. Regular seminars for experience-sharing would be supportive. Seminars should be organised by local people and by outsiders to encourage exchange of experience among farmers.

2. Provide high-quality infrastructure

The second most important activity in stimulating herbs production is to build an advanced complete net house facility. Net houses are planned to occupy 50% of the total agricultural area in Dong Du. The remaining 50% will be cultivated with herbs, vegetables and flowers in the open space, owing to the need for green area and the suitability of certain types of vegetables.

It is of great importance to provide high quality infrastructure to support agricultural production in Dong Du. Currently, Hong Ha village is located in the out-of-dyke area

which suffers flooding every once in a while. Consequently, land is left fallow most of the year except during the spring rice season. Banana and apple might also be cultivated on this land year-round. For this reason, a new dyke bordering the Red River bank should be established to protect Hong Ha village from flooding and to make the best use of its land. This new dyke might also be used for transporting herbs of Dong Du to the markets. Inter-village roads and roads within the area should be improved to make travelling and the transport of agricultural products more convenient. Concrete roads should be 4 m wide for inter-village roads and 7 m wide for inter-commune roads. Main roads within Dong Du commune will be shouldered by shade-providing and dust-catching trees.

Herbs production and sales management can be enhanced with the set-up of a processing plant and a wholesale market. The processing plant will have capacity to process about 60% of the total amount of herbs produced in Dong Du. This is due to the increasing demand for processed vegetables in the future even though the percentage of processed vegetables and processed herb is rather low at the moment. A wholesale market will be located close to the highways and the processing plant and not far from each vegetable production area for convenient transportation. As an important part of the herbs sales management, a trademark should be created. This can be done by: (1) strictly following safe production procedures to stabilise Dong Du herbs' credibility, (2) labelling the products with legal warranty, and (3) developing strategies for advertisement. Extension services should be provided to support horticultural product sales. Setting up a group of commune members responsible for surveying market information is also helpful.

3. Form Green Park and leisure area

Because of the desire to keep Dong Du a green zone, additional green open space is recommended. Existing lakes will be surrounded with parks and provided with fishing services and restaurants to attract tourists. Likewise, ponds within the residential areas will be upgraded. These ponds can also be used for the purposes of aquaculture.

4. Upgrade residential areas

Finally, special attention should be paid to the residential areas in an attempt to improve the farmers' living conditions. Although the population of the locality is likely to increase, it is uncertain whether farmers and newcomers wish to live in apartment complexes like those found in the inner city. It is hence recommended to have houses upgraded or rebuilt following their current design. By selling parts of their residential land to people from other parts of Hanoi the farmers could generate capital to finance some of their horticultural investments. The commune leaders see to it, however, that residential densities will remain of a rural character. Within the residential areas, facilities should be completed including the water supply, public open spaces with environmental green lines around the areas and sanitation.

With this scenario a reality, Dong Du becomes a location to supply safe and fresh herbs for a greater Hanoi area. Accordingly, farmers' incomes are expected to increase. Most importantly, this area will become a green environmental zone and an open space for the city.

B. Scenario 2: Horticulture & Urbanisation combined

Description of Dong Du in 2020 as a combined area

In the urbanisation process, the urban area expands, usually overrunning rural activities in the peri-urban area, or pushing them further away. Such urbanisation causes the migration of people into the urban area in search of jobs and economic growth. This results in an increasing population density, as well as an increased demand for food. And if the people become wealthier they will generate an increased demand for vegetables, meat and fish. The denser and wealthier population also asks for more and better recreational opportunities.

Dong Du, as well as the other peri-urban villages, is affected by urbanisation. Land that used to be for agriculture will in 2020 partly be in use for urban functions such as new residential areas, new infrastructure and recreational areas. Herbs production is the specialised job of Dong Du's farmers, most of their products are supplied to Hanoians, with about 20 % for export purpose.

Scenarios for Dong Du not only depend on the strong points and constraints mentioned in the SWOT analysis (see Section 4.1), but also on the urbanisation process of some peri-urban areas of Hanoi. Therefore, scenario 2 for Dong Du will be a combined horticultural and urban area. This scenario very much suits the urbanisation process:

Dong Du is located next to Hanoi built-up area. With the current urbanisation speed, the agricultural land of some communes next to Dong Du, such as Cu Khoi, Thach Ban has already been lost for building the Thanh Tri bridge and industrial zones. Dong Du is affected by urbanisation and therefore agricultural land will be lost. But local people really would like to maintain the herbs production even though the area of agricultural land will be reduced substantially.

This scenario will also need to be inclusive of horticulture for the following reasons:

- Some people will work in the industrial zone, but some others, such as old people (over 40 years old) and some of the young people (presently in the primary and secondary school) cannot. They will depend on income from HERBS Production.
- The commune has advantages of selling its vegetable products to the big city markets because of being next to Hanoi capital.
- Soil quality is suitable for production of HERBS.
- Farmers have good experience in HERBS production.
- Products of some households in Dong Du already are exported to some European countries such as Germany and France. This means that Dong Du has export opportunities.
- Dong Du is located alongside the Red River, which has high potential for tourism development. And tourists would like the contrast of a rural, horticultural atmosphere close to the hectic of Hanoi city life.

For the above reasons, Dong Du should be the combined zone for horticulture and urbanisation to satisfy the current policy context of the Vietnamese government such as:

- to maintain traditional occupations and create jobs for local labourers.
- to develop green zones in Hanoi ('green Hanoi policy'),
- to maintain a suitable proportion of agricultural land, while allowing a certain area to be urbanised,

- to develop tourism,
- to satisfy the increasing demand for safe vegetables, and
- to increase awareness of local people on environmental problems.

Actions and expected results

In order to turn this scenario into reality, the following actions need to be taken:

1. Maintain agricultural production,
2. An area outside the present dyke will be planned into residential area, to build new good quality housing such as villas, rented houses, and upgrade the old and traditional houses,
3. Build and upgrade some places for leisure, and
4. Build a new mooring station at the new dyke for river boats carrying tourists.

In the next pages and in Figure 4.2 the future situation is depicted and each of the proposed actions is further explained.

1. Agricultural production

a. Water management:

- Providing clean water from drilled wells for irrigation is of importance. Each production area needs at least one drilled well. A filter tank and standpipe for clean water should be set up aside each net house or production area. Pipes will be placed throughout the production area with a spout every 15 m in a way that rain-like irrigation (*tuoi phun mua*) can be applied.
- Currently, wastewater of Dong Du is discharged directly into Cau Bay River. After that, farmers use this water for irrigation purpose. Actually, this water is not good enough for safe vegetable production. In order to improve water quality it is necessary to establish a stabilisation pond to collect wastewater from the residential areas. Biological treatment processes will be applied in this pond before discharging into Cau Bay River.
- In the rainy season water causes some diseases for herbs while excess water can cause a complete crop loss. Therefore, drainage canals inside fields should be improved.

b. Land exchange:

- Propagandising and encouraging farmers to understand the necessity of field land exchange among each other need to be done. Currently, each household possesses fields at different locations, which makes it difficult for them to specialise in growing vegetables on a large scale. Due to different soil quality at different locations, however, it is complicated to do the land exchange. Moreover, farmers usually do not want to exchange the land they have owned over a long time. Participants suggest that it would be best if the local authority could play a role as arbitrator in the land exchange activity. Because in this scenario the total production area will be reduced substantially, a fair and efficient land exchange will be far more urgent than in the other scenario.
- Net houses for off-season vegetable production such as cauliflower, cabbage, tomato should be set up. Owing to different demands of water, light, temperature, and moisture of different herbs, it will be easier for care, irrigation, and operation if herbs and vegetables with similar demands are grown in the same net house at the same time, which should be fully equipped with electricity and irrigation/drainage systems.

c. Fruit trees:

Fruit trees (Guava, star fruit, etc.) should be grown next to the tree rows that will be grown beside the highway to limit air and noise pollution. This has a double effect as it also increases income for local people.

2. Housing

a. Rich households

- Households that have large residential plots and the economic capacity should be encouraged to build villas instead of subdividing their plots for high-density residential development. Each villa should have a fish pond, garden with fruit trees, and bonsai. These villas should be built beside the existing fish ponds and near the new dyke.
- Some garden houses should be built on the area outside and beside the old dyke. Fruit trees will be grown such as guava, star fruit, apple, and sweet pomelo. This could be a place for tourism purposes, especially for the people from Hanoi who come to relax on the weekends.

b. Middle and poor households

- There are four traditional houses in Dong Du that were built more than 150 years ago. In order to increase income, these houses should be renovated for tourism purposes, while maintaining the same style.
- Old houses should be upgraded.
- Rented houses should be built to accommodate workers from industrial areas around Dong Du

3. Leisure

- Some ponds should be improved to be a nice place for leisure. Some Eucalyptus (Lieu) trees and stone benches should be placed around these ponds. People can walk around with their children and pets. Domestic wastewater should not be discharged into these ponds.
- As income increases, so does the demand for leisure. Hence, a tennis court, swimming pool, badminton court, foot paths, and bicycle paths will be made next to and between some small lakes located in the residential area and forming attractive recreational routes of different length.

4. Tourism

- A new dyke should be built for protection from floods for the whole area. The area outside the old dyke can establish some ecological tourism and villas as well as fruit trees and traditional plants.
- A tourist station (harbour pier) should be built on the new dyke for the tourists travelling along the Red River. Hong Ha village will be a tourist point alongside the Red River tour. Travellers can go to visit some of the new garden houses or traditional village houses, enjoy special foods in Dong Du and buy some of the local herbal delicacies as a souvenir.

4.3 The two scenarios under discussion: a policy context of the future

The scenarios for planning Dong Du to become part of a green belt surrounding Hanoi are a unique idea according to the planners who attended our policy seminar and round table discussion. They confirmed that this is suitable for Hanoi's development. In the future Dong Du will thus preserve its character to become an attractive tourism area. We can not avoid urbanisation, so we must accept it and create a good chance for farmers to earn money in a variety of ways, and increase their income to improve their standard of living. The tourism model here helps the planners and policy makers to give new solutions for the Hanoi planning project. The rural suburbs of Hanoi in the future could be developed on the basis of one of the two scenarios, especially in the context of the high speed of industrialisation and urbanisation. Under the pressure of urbanisation, farmers in Dong Du have to face challenges in livelihood, food security and even environmental pollution. For these reasons, the SEARUSYN project chose Dong Du as a pilot area representing the current situation of peri-urban in Hanoi. Naturally, the need of citizens for secure, safe and diversified food increases quickly, whereas agricultural land in the whole city decreases fast. This creates favourable conditions for Dong Du to develop specialised agriculture as part of a green belt for our city, to supply fresh food and clean air, and to develop ecological tourism.

There were different opinions: most of the people thought that scenario 1 (Horticulture) is not realistic, because Dong Du will be too much affected by urbanisation, the agricultural land will certainly be reduced. It will not be possible to maintain so much agricultural production in this area. The majority agreed with the combination of Horticulture and Urban Growth in Scenario 2. The Agenda-21 directed by the Government aims at developing Hanoi capital with some 14 km of green belt around the city. The Scenario 2, therefore, well suits the prevailing policy context.

Participants also absolutely agree with the six points through which the project summarised the context of development policies for peri-urban areas such as Dong Du, in Vietnam in general and of the Hanoi capital in particular:

- Need for consolidated green zones in Hanoi
- Concern with livelihood of farmers in peri-urban areas
- Growing demand for safe and high quality vegetable in general and herbs in particular
- Growing demand for leisure and tourist facilities
- Increasing awareness on environmental issues
- Improving the infrastructure with highways and the Red River dyke.

The project firmly established the strong and weak points of Dong Du regarding the functions of agricultural production, housing, tourism and entertainment. Basically, there is considerable appreciation among the planners for the scenarios that are recommended by the project team. Nevertheless, some participants seem to doubt if any of the two scenarios can be executed. They, thereby, require that the two scenarios should be experimented with in one of the three villages in Dong Du commune before applying for the whole commune. And the following actions need to be done with the highest priority: 1. Carrying out land exchange between households to create the special production areas for long coriander with paddy rice as the most appropriate way of crop rotation. As mentioned above, farmers in Dong Du normally grow long coriander and paddy rice in fields inside

the dyke. Cultivating long coriander (*Eryngium foetidum*) and paddy rice in separate production areas not only helps farmers intensive cultivation but also can maintain soil quality and keep the level of soil-borne diseases low.

2. There is also strong support for the recommendation of building the new Red River dyke to protect Hong Ha hamlet in the flood season so that the land here can be used all year round. It is necessary to carefully research the flood escape of Red River, but the construction of this dyke has the approval of the Ministry of Agricultural and Rural Development (Dykes and Dykes Maintenance Bureau).

Planning Dong Du necessarily has to obey general planning for the whole city, it is also necessary to pay attention to particular features of each local area.

In agreement with the researchers' point of view, peri-urban Hanoi will according to the planners have beautiful landscapes in the future that are a combination of green areas, Red River natural landscape and some new residential development in communes such as Dong Du with a dense population. Besides, there are specific characters of Vietnam rural area to be maintained. In fact, Hanoi People Committee has planned Dong Du and neighbouring communes (including Thach Ban, Bat Trang, Cu Khoi) to become a Green zone of Hanoi capital in the near future. Therefore, the planners expect to combine these scenarios with each other to give a suitable solution for Dong Du in the future. It is a combination of beautiful landscape with villas, garden houses, tourism and traditional characters that will attract tourists.

4.4 Conclusions: some indications for the future development of agriculture in peri-urban Hanoi

Horticultural production in Dong Du is quite developed, compared to other communes in surrounding areas. Among the herbs being currently planted in the area Long Coriander brings about the largest amount in total income for the farmers in Dong Du.

It is clear that, according to the local farmers, Dong Du really has the potential to maintain and develop horticultural production in the long term, especially that of herbs. The main supporting factors are:

- Many Dong Du farmers really want to continuously live on horticulture production, rather than moving to another kind of job.
- Dong Du farmers possess advanced/good skills and tradition in especially producing herbs, since they have been trained in a number of training courses and they have been in horticultural production for 20-30 years.
- Farmers are sensitive with the fluctuation of the markets and creative in the production. These help them getting sufficient benefits from their production.
- The quality of herbs and safe vegetables in Dong Du is good since soil quality in the area is good for herb production, and farmers are quite diligent. Together with the increasing demand of herbs and vegetables in markets, the production in Dong Du is very promising.

However, there are still some difficulties that the farmers are facing regarding their horticultural production. The main difficulties include:

- Agricultural land is being taken away for other purposes due to urbanisation, which shrinks the cultivation area in the area and affects the livelihoods of farmers.
- Irrigation water is seriously polluted due to wastewater discharging from nearby factories and industrial zones.
- Farmers have a number of small and scattered field plots locating in different areas that make it difficult for them to produce on a large scale.
- An unstable market and fluctuating prices of herbs will affect household income.
- Crop diseases affect quality of products.

By identifying the causes that bring about the difficulties for them, farmers have intended some solutions to overcome the difficulties. Hereafter are the main causes and potential solutions:

- Water pollution:
 - + Issue and enforce stricter regulations/sanctions.
 - + Enhance perception and knowledge for local people.
 - + Use water from drilled wells.
 - + Develop wastewater treatment system.
- Small and scattered field plots:
 - + Exchange fields among farmers
- Agricultural land loss:
 - + Reduce paddy cultivation areas and cultivate higher economic value crops.
- Unstable market and fluctuating price of herbs:
 - + Register a trademark for the products.
- Crop diseases:
 - + Open IPM (Integrated Pest Management) training courses.
 - + Use compost or manure in accordance with specifications of production.
 - + Establish a technical team to advice farmers.

Starting from the above current situation in Dong Du commune, two scenarios were built based on local farmers' thinking, scientific information and general development policy documents of the whole city. Scenario one is that Dong Du will be developed to become a horticultural area and scenario 2 will be a combined horticultural and urban area. These scenarios were presented at a policy seminar held in Hanoi with nearly 100 participants including policy makers, planners, economists, environmentalist, and architect from different organizations, institutes and universities in Hanoi. Most of participants pointed out that it was a great idea to develop Dong Du as a specialized agricultural area. If this scenario will be developed, it not only maintains traditional jobs and increases households' income in this area but also contributes to the environmental quality of Hanoi. They wished that the remaining suburbs of Hanoi would also be developed towards a growing economy and a protected environment.

The suburbs of Hanoi play a very important role in the socioeconomic development of Hanoi. They occupy nearly 80% of land area and 40% of population of our city. Every year, the suburban economy supplies high quality agricultural products, many kinds of industrial products, small scale industrial products and services for Hanoi, other provinces

and export. Agro-forestry production in the suburbs also has an important part in protecting and improving the environment and landscape of Hanoi. The suburbs of Hanoi have special advantages over other localities of the country because of their geographical location, land, labour, capital source, technological science, and conditions of technology and material facilities. This makes it possible to:

- develop agriculture and the suburban economy in the direction of ecological urban agriculture and
- invest in material facilities and technology in order to develop the suburban economy.

To enhance sustainable agricultural production, we must give priority to the green belt and fresh vegetables that meet people's need, protecting the environment, developing traditional trade villages; creating new seed and technology for agricultural production, and paying attention to the post-harvested preservation and process technology.

We should also continuously look for new markets for agricultural products. Strengthening industrialization and modernization of agriculture can go together in the suburbs (peri-urban areas) of Hanoi. So can and should urbanisation go together with rural building, befitting local culture and ecology, step by step transferring the economic and labour structure in order to increase the density of industry and agricultural services, and thereby narrowing the gap between the city proper and the suburban areas.

Building the Hanoi environment: green – clean – beautiful – civilized helps us to achieve an advanced average level of the area. We should promptly set up and carry out effectively the general project for protecting the city environment, including its surroundings, and help to improve human's living standard.

5 Nanjing, a fast growing city

Zhu Peixin and Gu Xiang

See original document on www.alterra.wur.nl

6 Suoshi - a village of Qilin Town in peri-urban Nanjing

Tan Rong, Xiao Yi, Ma Xianlei, Zhao Ke

See original document on www.alterra.wur.nl

7 Scenarios for future development of Suoshi

Li Weiwei, Panjie and Zhu Peixin

7.1 Introduction

Suoshi village is facing different choices for its future development. In this analysis, three of them have been designed and described, each of which just provided an idea but not the real plan. In fact, the potential choices are many more than these, but the idea is that the three options below show the impact of the basic choices to be made: whether or not to maintain some form of agriculture in this area which is under pressure of urbanisation, and how this could be an asset to the new urban residents. Reasonable scenarios will be based on a careful assessment of the current situation (see also Figure 6.1 on p. 86) which is summarised as follows.

Labour force

The total labour force is around 2235, in which 1435 are local residents, and around 800 are immigrants (Table 7.1).

Table 7.1. Labour force in Suoshi

Local residents	Working in agriculture	120
	Working in transportation, construction, etc	600
	Others (commercial, service, etc)	715
	Total	1435
Immigrants	Working in non- Agriculture	300
	Working in agriculture	500
	Total	800
Total labour force		2235

- Land Use

In total, the village covers an area of 6800 mu (450 ha), most of which are hills covered by woodland, 1300 mu (85 ha) is being used for agricultural production, and 470 mu (30 ha) is built-up land: (Table 7.2).

Table 7.2. Land use in Suoshi

The pattern of land use	Area	Percent
Farmland	Vegetable	770 mu 11.3
	Cereals	380 mu 5.6
	Other crops	150 mu 2.2
	Total	1300 mu 19.1
Enterprises land	72 mu	1.1
Housing lands	397 mu	5.8
Forestland and others	5031 mu	74
Total Area	6800 mu	100

- Agricultural production

Local horticulture production is mostly carried out by migrant farmers. The local residents seldom work on planting, only some older farmers (about 120) plant rice and vegetables to meet their basic food requirements. Nowadays vegetable, flower, fruit and rice production all develop very well. Vegetables account for a large percentage of planted crops and include cucumber, watermelon, tomato, eggplant, pepper, celery, water spinach, lettuce, cabbage, flowering Chinese cabbage, mustard leaf, garlic chive, mushroom etc.

A Dairy farm and the Wensha pigeon-feeding company drive the local feeding industry. The pigeon company can provide 1,000,000 pigeons to Nanjing downtown area, suburbs and the other markets nearby; some of the pigeons are exported. The dairy farm is equipped with auto milk-pumps and also works efficiently.

- Non-agriculture

Factories are mainly located near the highway for convenient transportation. They include a chemical factory, constructive materials factory, printing plant, stainless-steel production factory and a disinfectant factory.

Nowadays, the transportation industry has become the main income source. There are more than 160 trucks and cabs in the village; even many local residents possess private cars.

- Infrastructure and public service

Nihang highway and Huning expressway go through the village; the roads inside are narrow routes mainly for agriculture production. Besides, there are a primary school, library, a small square, and other recreational facilities.

7.2 Farmers' expectations

An analysis of Strengths, Weaknesses, Opportunities and Threats (SWOT) with and by the various types of farmers has led to a better insight in the opportunities and constraints for the development of horticulture in Suoshi. In order to get more specific information in Suoshi, we divided the farmers into different groups: as local farmers are seldom working at planting, they belong to a single group. For the migrant farmers who are the main strength in Suoshi's farming, we made further division, they are vegetable farmers group, horticulture farmers group and mushroom farmers group. And then we asked every farmer to give his expectations through providing them three alternatives: (1): maintain the current situation for ever, which means that the existing land contract will not change in the foreseeable period and farmers can use land like now; (2) the current situation will be changed in about ten years from now, which means that the land contract will be changed in about ten years time and farmers can't use land like now;(3) Suoshi will be urbanised next year, which means farmers will soon lose their planting land. Below is our conclusion about their expectations under these three alternatives.

7.2.1 Flower farmers' expectations

Table 7.3. SWOT analysis result of flower farmers

<p>Strengths</p> <ul style="list-style-type: none"> ■ Convenient infrastructure conditions ■ The flower-farmers are innovative, with a strong background of flower planting. ■ They are proudly self-employed. ■ The market is nearby, with convenient transportation. ■ For the herbaceous flowers, the yield is higher and easier for storage and transporting compared with other flowers. ■ The fixed investment of flower production is relatively low and it is easy to move to other places if the land acquisition takes place. 	<p>Weakness</p> <ul style="list-style-type: none"> ■ There are obstacles for the farmers to improve skill and technology. ■ Growing flowers is physically hard work. ■ The government provides little capital and technological support to farmers. ■ The competition among the flower-farmers in Suoshi is serious, leading to lower price. ■ Scale of flower production is not large enough; there is no special production organisation that can guild and organise large-scale flower production. ■ Lack of up-to-date information ■ They don't have the abilities to judge what influences will be brought by urbanisation. ■ Presently just produce low-level flowers mostly.
<p>Opportunities</p> <ul style="list-style-type: none"> ■ The demand for the flowers is increasing, a larger demand market for the flower planter. ■ The flower-farmers expect to pioneer the market with modern information technology such as Internet. ■ There are more opportunities in market access, comparing with their native town. ■ The flower-farmers want to produce high-level and precious flowers. 	<p>Threats:</p> <ul style="list-style-type: none"> ■ More flower-farmers will aggravate the competition and reduce the profits.

If the current situation can be maintained, the flower-farmers want to gain more profit by choosing the high quality seed to produce the high quality flowers with higher sales price, seize good opportunity for producing and selling flowers. If the land contract won't be changed in the next ten years, the flower-farmers want to install temperature-increasing equipment to produce more flowers in winter. If the land acquisition will take place next year the flower-farmers hope to go on planting flowers in the places nearby Nanjing. But the flower-farmers want to find a place with equally satisfactory plastic-tunnels and living conditions (convenience of electricity power, water and roads, and so on) as they now have in Suoshi.



Picture 7.1 Suoshi flower growing (inside and outside view)

7.2.2 The vegetable farmers' expectations

Table 7.4. SWOT analysis result of vegetable farmers

<p>Strengths</p> <ol style="list-style-type: none"> 1. The infrastructure condition is satisfactory. 2. They don't worry that their products will be stolen, because of the honesty and trust of the local people. 3. The vegetable price is higher than in other farming places around and also the transportation cost is relatively low. 4. Farmers have the consciousness to learn and improve skills of planting vegetables 5. They can effectively utilise the leavings of mushroom and waste of cows and pigeons as fertiliser. 	<p>Weaknesses:</p> <ol style="list-style-type: none"> 1. After a few years' planting, the soil has been polluted seriously by the pesticides and the eggs of insects. 2. The waste that hasn't been disposed well from dairy plant and pigeon plant has polluted the water seriously; besides these the water from JiuXiang River is sandy 3. The land contraction period is not long enough and sometimes not stable. 4. The scale and the height of the greenhouse provided by the Suoshi village is fixed, so, it is not suitable to plant different varieties of crops. 5. The competition of marketing becomes severe. 6. It's difficult to enlarge the production scale because the amount of farmland left is limited. 7. The capital support from government is not enough. 8. It is difficult to rotate crops or change plots with others. 9. The pesticides are no longer effectual to the insects, especially to the wireworm.
<p>Opportunities</p> <ol style="list-style-type: none"> 1. There is a stable vegetable market. 2. It's convenient to transport vegetable to the market. 3. It's easy to extend vegetable marketing. 4. The system of dealing with sewage is on the agenda; the water will be purified in the near future. 	<p>Threats</p> <ol style="list-style-type: none"> 1. The huge pressure from acquisition of land 2. The water was polluted by some upriver factories 3. There is severe competition with the vegetables from other places 4. The high quality vegetables from outside, such as green, organic and pollution free vegetables impact the local marketing of normal vegetable.

As for the vegetable farmers, if the current situation is maintained, they hope they can realise rotating or exchanging land for growing their crops easily, no longer limited by the contract. They also hope the quality of soil can be improved; and they intend to improve the quality of crops and optimise the planting structure.

If the land contract won't be changed within the next ten years they hope to obtain more capital support from government and banks and improve the quality of current vegetables and try to develop high-level breeds. In addition, they will try to improve the effect of pesticides, especially for the wireworm, at the same time, grow high-level vegetables. If the land acquisition will take place next year, they will try to find another place to go on farming.

7.2.3 Mushroom farmers' expectations

Table 7.5 SWOT analysis result of Mushroom Farmers

<p>Strengths:</p> <ul style="list-style-type: none"> ■ Demand of mushroom is large and the price is stable, so the farmers can earn much. ■ Water quality meets the requirement of production of mushroom. ■ The infrastructure is perfect and transportation is convenient. ■ The local government gives favourable policy to the farmers. ■ They don't worry about source of capital. ■ Mushrooms they produce are of high quality. 	<p>Weaknesses</p> <ul style="list-style-type: none"> ■ Farmers have not enough technology support. ■ A lot of labourers have to be put in when harvesting. ■ Mushrooms need high quality soil. Once soil of a plot has degenerated, they have to dig deeply on the spot because at present they are not allowed to take good soil from plots of others.
<p>Opportunities</p> <ul style="list-style-type: none"> ■ Production scale still can be expanded because of the increasing demand for the mushroom. ■ Production technology can meet the requirement at present. ■ Market can be expanded from traditional market to modern supermarket, even international market. The farmers have connections with supermarket. ■ Farmers have strong venture and innovation spirit. 	<p>Threats</p> <ul style="list-style-type: none"> ■ Limited capital and technology will hinder the production scale expansion. ■ Some varieties are to be reaped at the same time, so market competition will be intense at that time. ■ Sewage let off by the cattle farm affects mushroom quality more and more.

For mushroom farmers, if the current situation is maintained, they hope to produce more new varieties so they can earn more, as the farmers would not need to be afraid that their land will be taken away by anyone or that they have to pay a higher fee. Secondly, farmers dream they can realise further mechanisation in mushrooms. They will also expand their market from the traditional one to modern supermarkets, even the international market. Besides, they hope that the local government can give more support on capital, production conditions, especially allowing them to take soil from other plots. Mushroom production requires high quality soil. After 2-3 years, the soil on current lands will be low-quality, and the mushroom farmers have to move to new places. Therefore, farmers in this group don't look forward to very long-term contracts. If the land acquisition will take place next year, mushroom farmers will look for a new place. They had similar experience before when they were in other cities.

Picture 7.3 Suoshi mushroom barn

7.2.4 The local farmers' expectations

Table 7.6. SWOT analysis result of local farmers

<p>Strengths</p> <ul style="list-style-type: none"> ■ Possess the ownership of land use right ■ Perfect infrastructure ■ Competent village leaders ■ Comfortable housing conditions ■ Developed transport industry ■ They master certain skills to raise livestock and have opportunity to find jobs in pigeon and cow plants. 	<p>Weakness:</p> <ul style="list-style-type: none"> ■ Lacking skills and experiences of growing vegetables, mushroom and flowers, because originally the farmers in this area only plant rice and wheat. ■ Too worried about taking risk ■ Cannot tolerate the painstaking physical hard work of planting vegetables ■ Lack the necessary channel to strengthen communication and mutual understanding with migrant farmers.
<p>Opportunities:</p> <ul style="list-style-type: none"> ■ The expansion of the city could bring many kinds of opportunities of employment to local farmers ■ Women and old people can do part-time jobs for the migrant farmers. ■ The local farmers could obtain a certain rent by leasing lands to migrant farmers. ■ The young people have more opportunities to accept higher education and skill training. ■ They will obtain certain compensation, if their lands are required. 	<p>Threats:</p> <ul style="list-style-type: none"> ■ If their lands are acquired, the farmers will lose their life insurance ■ The pension for the land is not enough. ■ If their houses are removed, they have to rebuild or purchase new houses. ■ If they move to other place, they have to spend time and energy in rebuilding new social relations. ■ The wastes given off by local industries pollute the local environment. ■ At present, they cannot easily find a satisfactory job as mechanisation goes on and staff are cut.

On the basis of information in the interviews, we can understand local farmers' expectations as follows:

- If the current situation is maintained, on the one hand, they do not want to give up the current land use rights and go on getting income through renting land. On the other hand, they hope they can raise cattle, pigs or other livestock privately or find jobs in the nearby factories and farming enterprises.
- If the land contract won't be changed within the next ten years, they hope they can find satisfactory non-agricultural jobs, because most of their lands have been rented to the migrant farmers. Besides, as a result of the increase of corn price in these years, they hope the rent can be increased to some extent in order to ensure their food supplies.
- If the land acquisition will take place soon, they hope to obtain reasonable compensation (employment and pension) and then can find a non-agricultural job or just stay at home.

7.3 Proposed scenarios for integrated solutions

7.3.1 Introduction

On the basis of the research results about Suoshi above, we can anticipate its different development modes in the future. Both being urbanised and keeping as farmland are possible. Firstly, the Ninghang highway and Huning expressway provide a convenient traffic condition; besides, the distance to Nanjing city is only fifteen kilometres. Hence, it is possible for Suoshi to be urbanised completely and become a part of the built-up area. Secondly, Suoshi's horticulture production not only possesses high ecological value but also high economic effects, and the excellent natural conditions (soil, water, etc.) are very

suitable for agricultural production, provided that incipient pollution from local industries can soon be stopped effectively. Besides, considering the city's strategy that establishes 'Green Nanjing', it is also possible to develop Suoshi towards modern agriculture, which could also be very pleasant to look at.

On the basis of our earlier investigations about the current condition of Suoshi village (IPM report and notes of a meeting with a group of farmers on September 19th, 2005) and the visits to farmers and to leaders at different levels (village, township, district), we come up with three possible scenarios for Suoshi's future development, they are 'Tourist Horticulture Mode', 'Maximum Urbanisation Mode' and 'Combined Horticulture and Urbanisation Mode'.

7.3.2 Scenario One: Tourist Horticulture

Generally speaking, Suoshi possesses both excellent natural and cultural conditions, surrounded by hills and vegetation, along the way from Nanjing to famous scenery spots such as Yangshan Monument (about 20 km), Tangshan Hotspring (about 15 km), and a site of ancient anthropoid heritage (about 10 km). The traffic condition is favourable and convenient for the potential development of tourism with Ninghang highway and Huning expressway going across the village.

Since the adjustment of cropping structure in 1998, the vegetable, flower and other horticulture production have been making great progress. Meanwhile, the sound economic and social effects have been brought about. But, located in the fringe area of Nanjing city, this same agricultural production is also affected seriously by pressures of urbanisation and urban prosperity. One of these pressures is the demand for recreational facilities.

Considering the citizen's demand of recreational sightseeing and enjoying rural culture and living style, in this scenario, maintaining agricultural production and developing tourism will be combined. Under this scenario Suoshi will be directed towards *tourist horticulture* with the means to develop tourism on the basis of local agriculture production. Under this option, many tourists will be attracted to enjoy Suoshi's charming scenery with rural characteristics; local people's living standard will be improved with the increase of job opportunity and diversity of income sources; and the most important is that the fertile farming land will be protected under the threat of urbanization.

In order to realize this scenario the following measures may be necessary:

-For Agriculture Production

Firstly, develop tourist horticulture by adjusting the current productive distribution and cropping pattern on the basis of existing advantages (such as infrastructures, natural conditions, technology, marketing etc.) in such a way that they strengthen or create convenient conditions for tourists.

Secondly, from the perspective of the intensive cultivation and easy management, adjust parcellation and make regular distribution of vegetable, flower and mushroom lands. Besides, certain storage and handling rooms are also needed.

Thirdly, strengthen the pollution treatment and environment protection of dairy plant and pigeon farm with certain workshops open to visitors, in order to cater to the development modes of tourist agriculture in the whole village.

- Housing

Housing is very important for tourist horticulture's development. But it is extremely difficult to count clearly the number of different houses. So the number of dwellings (households) is estimated as follows: $N = R * \text{land area} / A$.

N denotes the number of households. **R** denotes the ratio of building total area to land area, which is restriction on buildings, and any real estate developer should abide by such restriction. If R is smaller than the limit, the land is not used intensively; if R is larger than the limit, the building is not very safe or uncomfortable to live. So R is controlled by the Land Management Bureau of Nanjing: for modern bungalows, R is 1.5; for normal apartments, R is 1.8. All the criteria come from the pronouncements of the Land Management Bureau of Nanjing this year when they sell the land use right of Qulin town. **A** denotes the building area per capita. In accordance with these rules of the Land Management Bureau of Nanjing, and making full use of local conditions, the scenario is planned as follows:

On the slope fields, a few 4 floors' apartment blocks will be planned for 50 households, each occupying two floors with 300 m², in order to cater for the housing and accommodation demands of the new residents and tourists respectively. On the basis of local people's living condition, part of current local farmers' houses can be converted into restaurants (about 20 rooms), hotels (about 20 rooms) and bed & breakfast places (about 10 rooms) with rural characteristics in order to increase the local farmers' jobs opportunities and meet the tourists' demands of enjoying natural living style. Then because it is easy to build infrastructure near the current residences according to the Aggregation Principle, and the transportation is convenient near to the highways. The farmlands nearby the current residences in the south of Jiuxiang River and the slope area in the north of the village will be developed into 6 floors' traditional apartments for 700 households, each with 110 m². This is to meet the demand of more citizens who want to come here to live in the long future. Finally 180 new houses for migrant farmers will be built next to their rented farmland to replace the small shacks that are now available to them.

Under this scenario and its corresponding designs, the consequences will be as follows: Firstly, adjust the present rural zoning; shift the content focusing on housing construction into supporting tourist horticulture. Then, more houses can be provided to lighten the shortage of urban housing, which would probably cater to the Master plan's expectation for more urbanization in this location. For the sake of environment protection and tourist development, we have to close some mines and factories that pollute the environment seriously. Besides, it will be needed to adjust the current regional tourism plan to connect

Suoshi with scenic spots outside the village (such as Yangshan monument) using some scenic walking trails.

- Scenery and Sightseeing

First, plant some decorative and fruit trees in the area between the entrance and the Ninghang Highway in order to attract passers-by to the tourist horticulture.

Build green noise barriers and advertisement boards along the expressway. Second is the forestation around the new bungalows and apartment blocks on the slopes.

And then establish some pedestrian corridors with grapes and other shade-providing plants, some of which would also be used by small agricultural vehicles and machines.

- Infrastructure Improvements

For the sake of storing and managing the cars of visitors, establish two parking places mainly for the tourist buses and private cars, the one nearby the entrance is for free and another next to the dairy plants is not free. Secondly, improve and beautify the existing irrigation system through repairing and cleaning ditches in order to reduce the loss of irrigation water and strengthen the sightseeing effect. At the same time beautify the existing ponds with some water plans and maybe some animals; build some lakeshore lawns around small ponds and recreational footpaths linking ponds as well as accessing forestlands to cater for people's recreational, jogging and walking use.

- Tourist Facilities

Form a commercial centre of local products by establishing special product shops and restaurants along the roads from the entrance in order to attract more tourists and get high profits. Build a new recreational square around 1000 square meters between the entrance and the commercial centre, with certain resting seats and other facilities to provide rest places for tourists. Besides, if the owners like, they can change part of their houses into certain small-scale overnight accommodation (Bed & breakfast).

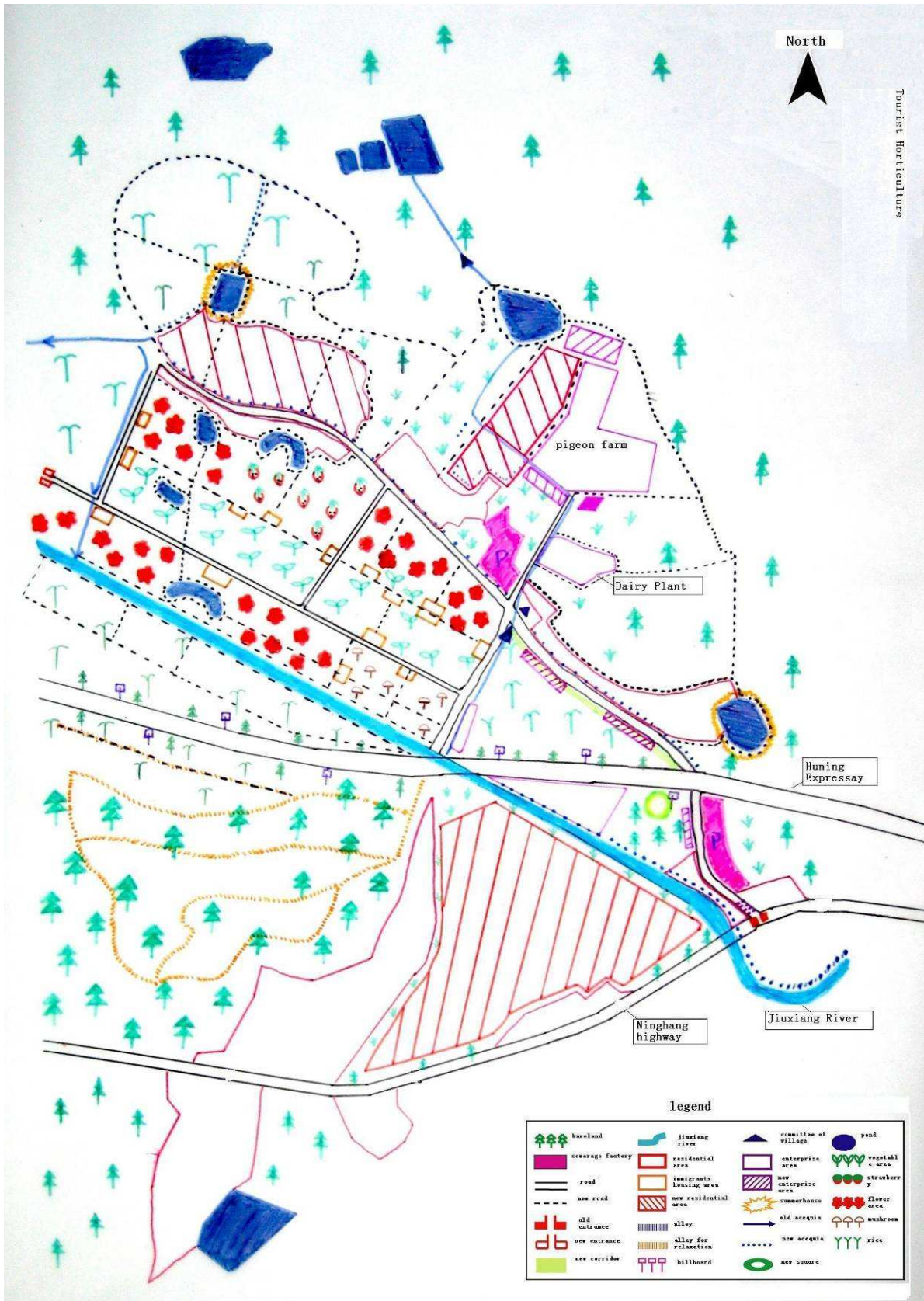


Figure 7.1 Tourist Horticulture Scenario

7.3.3 Scenario Two: Maximum Urbanization

With the rapid progress of urbanization and gradually serious shortage of urban housing, it is unavoidable that the farmlands in fringe areas will be transformed into housing areas. Suoshi is located so near to Nanjing, around 15 kilometres away to city centre, that it will probably be urbanized in the next five or ten years. Take its neighbour Chenguang village as an example, some farmlands of Chenguang have already been occupied for housing use. And what's more, according to the Master plan, the region around Suoshi will become housing land in the future. Therefore, under this scenario, most land of Suoshi will be used for apartment blocks in order to follow the trend of urbanization and alleviate the pressure of housing shortage as much as possible.

In order to realize this scenario the following measures may be necessary:

- Agriculture Production

As a limited area and hard to be used as high-rise residence, the triangle between Jiuxiang River and Huning expressway and the area opposite that will be planned as a small flower base without ugly tunnels and plastic, which can not only produce nice views from the new housing blocks, but also meet part of the growing flower demand of Nanjing's residents after the urban development. Apart from the few who can stay the most professional migrant farmers need assistance in finding alternative plots in nearby village slightly further away from the city. Keep the pigeon and dairy enterprises where they are, but with corresponding environmental and healthful improvement.

- Housing

On the whole, most of the present farmland will be used as 8 floors' high-rising residences with parking for 2100 households (each 110 m²) to cater for the rapidly rising demand of housing in urbanization. Around half of the current private residences will be improved into 4 floors' modern apartments for 200 households if the owners like, which occupy 2 floors and 300 m² each. The other half will be 4 floors' normal apartments for 400-500 households, which each 150 m². This improvement may be done by two ways. One is to demolish the present old houses, and rebuild the new ones; the other is to add a floor or two onto the present old ones. Which way to choose depends on the condition of the present houses. If the present houses are very old and shabby, the former way should be chosen, otherwise, the later way should be chosen. According to our investigation, most immigrants' houses may need to be rebuilt because they have worse condition than local farmers' houses. Besides, new houses for 600 households will be built north of the present residential areas in order to meet the demand for houses in a maximum urbanization option. For local people's shopping and working need, the east triangle between Jiuxiang River and Huning expressway will be developed into commercial and light industrial use.

Under this scenario and its corresponding measures, the final results may be as follows: firstly change the present rural land use zoning dramatically, shift the current mainly farming use into urban housing use. To a certain extent, this is in line with the municipal master plan, but with a little difference, as the small flower base will be increased. Adjust the regional tourism plan, connect Suoshi with scenic spots outside the village (such as Yangshan monument, Tangshan Hotspring, site of anthropoid, etc.) and create some scenic walking trails to realize it. New access roads will be built under the co-operation with

Chenguang village. Around 3400 new households / dwellings will be provided for urbanization. As for the local farmers, after getting their compensations for losing land, they will become citizens whose social security and job insurance will be considered under the whole urban population management.

- *Scenery and Sightseeing*

Firstly, Green belts will be designed along the two main roads to alleviate and avoid air and noise pollution and some reforestation and park development on hills is also needed. Build green belts (25-30 meters) along the Jiuxiang River and adjacent to the new residences, catering for residents' recreational and environmental demands.

- *Infrastructure Improvements*

With the improvement of the living standard, more residents demand health and sports facilities, hence, a 3000 m² sport and fitness centre will be planned in the centre of the housing area. For people's recreational and jogging and walking use, around the existing small ponds, some recreational lakeshores will be built linked by small cycling routes. A new entrance will be built under the co-operation with Chenguang village, part of the old previous narrow roads will be widened and new wider roads will be opened up around the new apartments in order to provide convenience and shortcut to residents' life and work. Open up some new recreational routes on the hillsides for residents' recreation and exercise.

7.3.4 Scenario Three: Combined Horticulture and Urbanization

Considering the contradiction of agriculture and urban expansion, this option is searching for a model to combine these two in an organic way. Firstly, certain fertile farmland needs to be protected for agriculture use especially for the horticulture, continuing to supply fresh products to the city through intensive and effective cultivation. Meanwhile, certain areas with convenient traffic and good panoramic views over this horticultural zone should be turned into housing area. The houses include not only ordinary high and low apartment blocks, but also traditional rural housing and a few modern bungalows for the high - income. Finally, a harmonious and friendly development of horticulture can be presented in the fringe area of Nanjing city.

In order to realize this scenario the following measures may be considered:

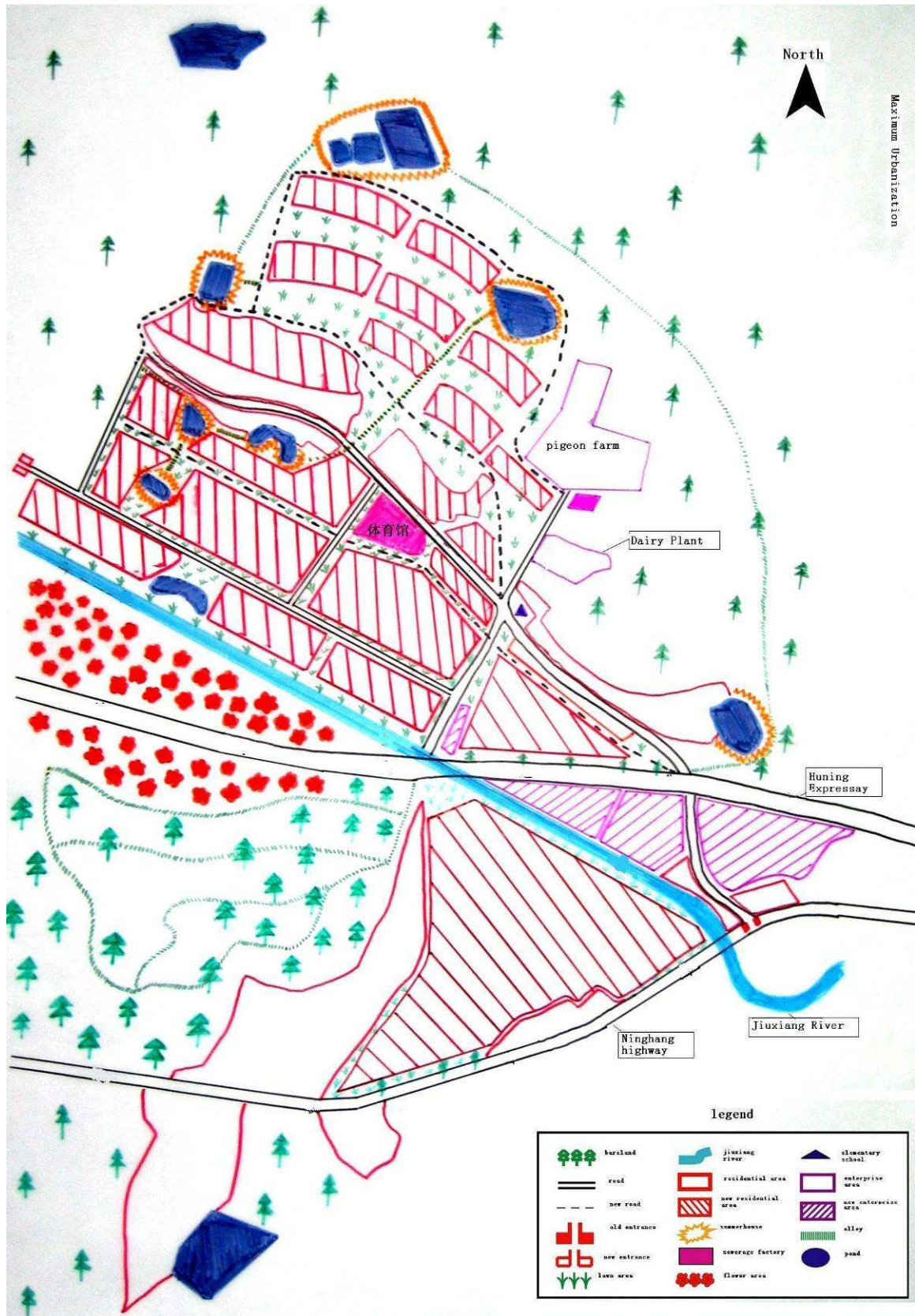


Figure 7.2. Maximum Urbanization

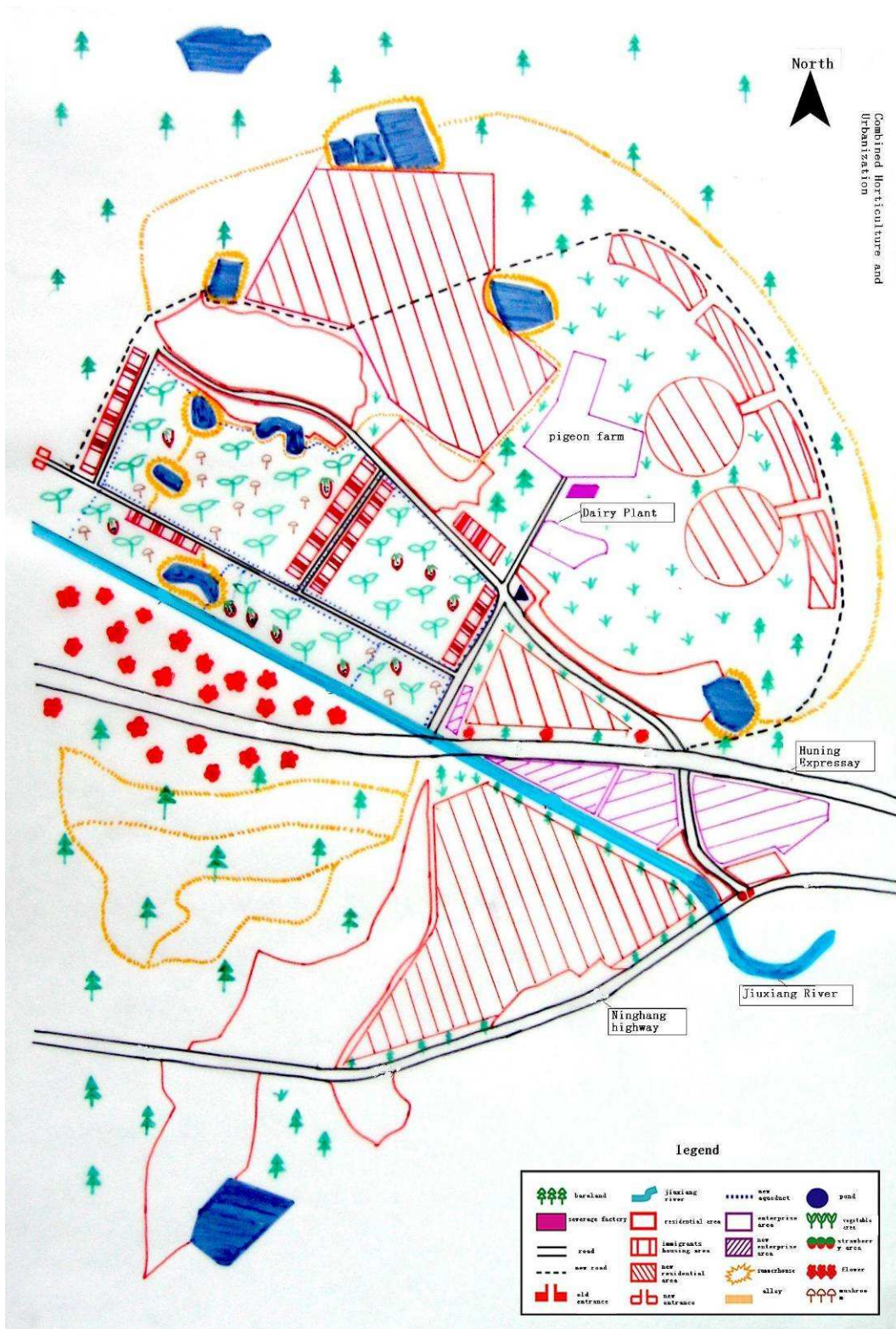


Figure 7.3 Combined Horticulture and Urbanization Scenario

- Agriculture Production

As in the second scenario, the triangle between Jiuxiang River and Huning expressway and its opposite area will be planned as flower base without ugly tunnels and plastic. The farmland north of Jiuxiang River will be used as vegetable, fruit and mushroom base (with less than 15% tunnels and plastic). Pigeon and dairy farms will be maintained and improved towards environment and health protection.

- Housing

The east triangle between Jiuxiang River and Huning expressway will be developed into commercial and light industrial use with more shopping and job opportunities for local people. Individual houses supporting 100 households' migrant farmers will be built in strips next to their fields. The farmland next to the current residences south of Jiuxiang River will be developed into 6 floors' lower apartment blocks, certain traditional bungalows and restaurants, which will together provide houses for 850 to 900 households. Some landscape-friendly apartments will also be built, including 2 floors' lower apartments for 100-150 households (300 m²/household) and 4 floors' little higher apartments for 850-900 households (150 m²/household) on foothills of lower part of the slopes immediately North of the village. The residents there can have a birds' eye view of the whole beautiful scenery at the same time of enjoying the comfortable living condition.

Under this scenario and its corresponding designs, the consequences will be as follows: First, it will be needed to change the present rural land use zoning dramatically. Nearly 70 percent present farmlands will be taken away for housing use, only keeping around 30 percent of the most productive cultivated lands for horticulture. And the municipal master plan should be changed in order to make sure that some land is kept as horticulture use and to allow some hillsides to be partly used for housing purposes, taking utmost care of landscape and nature conditions. The regional tourism plan needs to be adjusted by connecting Suoshi with scenic spots outside the village (such as Yangshan monument, Tangshan Hotspring, site of anthropoid, etc.) and by creating some scenic walking trails to realize that. Connection with the outside scenic spots and the new access road will both require cooperation with neighbouring authorities. The migrant farmers' housing condition will be improved a lot and coordinated with (well fitted in) the whole scenery. In total, an estimated 2000 new dwellings (households) for citizens and 100 for migrants will be provided.

- Scenery and Sightseeing

Promote strong forestation and scenery construction on the slopes around the new bungalows and apartment blocks as nature compensation for occupying parts of the woodland. In addition, 30 meters' green belts will be designed along the main roads to alleviate and avoid air and noise pollution.

- Infrastructure Improvements

Improve irrigation systems through integrating some narrow channels, repairing the broken channels and cleaning ditches for intensive horticulture development. Open up some new recreational routes on the hillsides. A new west entrance road will be built linked with Chengguang village, and local access roads will be opened around the new apartments to provide convenient shortcuts to the residents' life and work. Around the existing small

ponds, some recreational lakeshores will be built linked by small cycling routes through horticultural area to cater for people's recreational and jogging and walking use.

7.4 The Scenarios under discussion

Generally speaking, the posters have conveyed our philosophies and ideas to the participants clearly and visually. During the meeting with officials, leaders and experts they were all attracted by those colourful posters and showed interest in them, their suggestions and advices towards the three different scenarios are concluded respectively as follows:

- For the 'TOURIST HORTICULTURE MODE'

Firstly, under serious urbanization pressure, Suoshi's development must accord with the whole development trend of the surround area. Today, according to the strategy that establishes 'big Nanjing', the current built-up area will be enlarged through opening up a new city centre outside the present city. The new centre will attract more overheated development demands and finally the huge pressure nowadays the city centre is facing will be reduced. It is certain that Suoshi's future development should adapt to this trend, as far as the current situation is concerned, the north part of this pilot area will soon be turned into a university, industry park and residential area, hence we should change the scenario, especially the design in the north of the village.

Secondly, if this tourist horticultural mode can be realized, there should be a self-support mechanism, which means that no governments or other outside power should need to guarantee its cost. Therefore, all the economic, social and ecological effects should be considered fully, among which the economic effect is the most important as providing the precondition and necessity to the two others.

In addition, as far as the realization of this scenario depends on public investment or governmental subsidy, it's necessary to get the permission of public and fiscal authorities, or else everything is just a daydream.

- The feedback results of the 'COMBINED MODE'

First, in the future real plan the terrain and physiognomy conditions should be considered fully, and then a sound distribution of agricultural and residential could be realized.

Second, in their opinion, the residential location and distribution showed in our poster are not good enough and need to be improved, for example, the apartment buildings should not be so near to the highways. **Third**, the 30-meter's green belt is limited and may not avoid pollution effectively, may be 100 meter is possible. **Fourth**, if there are professional organisations or planners who can guide farmers to operate farming intensively, it will be more helpful for farmers to get high economic profits from the limited farmland left.

Besides, as the dairy and pigeon farm will bring a lot of pollution and destroy the whole development model, it is suggested to remove them to the outside of the main planning-area of this scenario and change the land into flower use. Finally, if the three scenarios can be compared with each other in the advantages and disadvantages, it will be easy to provide direct information to the policymaker.

For ‘the MAXIMUM URBANISATION MODE’

Firstly, when considering the problem of dairy and pigeon farms, the planner should pay much attention to two aspects: first, the environment condition if Suoshi is urbanized and transformed into a residential area completely, hence, a production process with less pollution and an effluent-treating system should be established if these farming enterprises are to be kept. Second, the issue whether the farms should be kept or removed will be decided by their future profit under this scenario.

Then, under this development model, a large number of apartment buildings, infrastructures and other public services will be established and provided, such as the children’s education and old peoples’ health and so on. Therefore, the sources of capital and other necessary supports should be thought about before making plan.

The types of housing should be various in order to cater to consumers’ different demand and tastes. Besides, green lawns and trees can provide comfortable living condition, so the plan for the green areas will very important and should be strengthened.

Finally, on the basis of current industry foundation, establish some plans and factory with less-pollution in order to provide more job opportunities and improve the economic development.

These three scenarios are combining the opportunities of Suoshi’s real conditions of nature, society and economy in different ways. They explore and emphasize different directions for future Suoshi. The differences are as follows (table 7.7):

Table 7.7. Main differences between the three scenarios

Scenario	Advantage	Disadvantage
Tourist Horticulture Mode	Store a (productive) natural park and ecological zone for Nanjing citizens	For governments, the cost to keep it as a green zone is a real burden.
The Combined Mode	As a middle and transitional pattern, it is easy to be accepted and realised.	It is a challenge to arrange these different land uses harmoniously.
The Maximum Urbanisation Mode	Lighten the huge pressure from urbanisation by providing more housing lands	Some valuable farmlands have to be lost, and farmers will loose living insurance

Picture 7.4 Suoshi horticulture landscape in winter

Picture 7.5 Suoshi leisure space in horticulture landscape

8 Comparative summary, concluding remarks, discussion and recommendations

Leo van den Berg

Any project of international scientific cooperation has to deal with conceptual confusion. In a research project about the relationship between urban and agricultural planning in societies facing extremely rapid urban growth such confusion is adamant. How is “urban” defined in China and in Vietnam and how are data about the urbanization process collected and presented? Is a comparison at all possible? And how are the various planning actors and agencies dealing with this process, both at the level of the urban agglomeration and at that of the villages at the edge of the city which are about to be transformed into new urban wards?

In this concluding chapter we bring together the main planning issues that were dealt with in the previous two city reports. We shall do so first at the city level and then at that of the two pilot areas: Suoshi village in peri-urban Nanjing and DongDu village in peri-urban Hanoi. After a discussion of our main results we end with some recommendations, both for the practice of seeking synergy between urban and agricultural planning and for further research and professional training.

8.1 Urban expansion in Hanoi and Nanjing: how much and how?

In Chapters 2 and 5 the Vietnamese and Chinese research teams presented their findings on the urban growth of the two cities: the speed, especially during the last 10-15 years and the spatial planning models and concepts that are used to provide some guidance to urban investors and agricultural producers. Some data from these chapters are brought together in the paragraphs below.

That the number of inhabitants of both cities has been growing very fast is obvious. In Nanjing Municipality (which covers almost 6600 km²; not only the city itself and many suburban towns, but also substantial rural areas) this population increased by 820 thousand from about 5 million in 1990 to close to 6 million in 2004. Somewhat comparable to this would be Hanoi province: 921 km², also including a large rural area, but not counting some important urban overspill from Hanoi into adjacent Hatay province. Between 1996 and 2004 the population of Hanoi province increased by 685 thousand: from almost 2.4 million to almost 3.1 million. Taking into account that the measurement period for Hanoi was shorter than for Nanjing and that a part of the urban expansion of Hanoi takes place in an adjacent province we can conclude that the magnitude of the problem of finding living space for their inhabitants is very similar for these two cities. But the data also show that during the last decade, both cities have been able to develop substantial new residential areas on their outskirts, resulting in less overcrowding in the inner cities.

It proved quite difficult to obtain reliable and comparable data on the amount of land that changed from agricultural to urban uses. This is illustrated by a comparison of the statistics in section 2.2 with those in section 5.2. For Nanjing the area of built-up land increased by 72 km² (from about 130 to about 200 km²) between 1990 and 2004. The Hanoi team could not find really comparable figures. The data they could use always refer to administrative units, which change their status from rural to urban, sometimes before and sometimes after substantial parts of such administrative areas became built-up: at different moments between 1990 and 2005 different rural districts (or parts of those) were declared urban districts or wards. Using such definitions, the area of 'urban districts' in Hanoi increased from 4,722 ha (47.2 km²) in 1995 to 18,572 ha (185.7 km²) in 2003. This would mean an increase by 138 km² in 8 years, almost twice as much as the 72 km² growth of 'urban' Nanjing in 14 years.

The growth of urban, built-up areas goes hand in hand with a loss of agricultural land. In Nanjing 'municipality' the area of agricultural land was 3290 km² in 1990 and had gone down to 2616 km² by 2002. Surprisingly, the planning statistics indicate that by the year 2010 this will have gone up again to at least 3100 km². The only explanation we could find for this peculiar statistic is that a lot of agricultural land has been designated as vacant: waiting for urban development. By 2010 much of this would be reclassified as agricultural. As a matter of fact, in 1996 the total 'unused' land in Nanjing municipality was calculated as 261.5 km², while this was expected to go down to 175.2 km² in 2010: a decrease by 8638 ha!

In 'Greater Hanoi' or Hanoi province the area of agricultural land decreased from 43,865 ha to 42,539 ha between 1995 and 2002. By 2010 this is expected to have gone down much faster: to about 33,000 ha.

As the cities are expanding and the prosperity of most urban residents also goes up, the use of agricultural land around both cities has shifted from staple food (mainly rice) to more precious commodities like vegetables and flowers. For instance, in Hanoi the area planted with vegetables increased between 1993 and 2003 from 6,751 to 8,808 ha, while in the same period the total agricultural land decreased from 88 to 84 thousand ha.

The gross value of agricultural produce in Nanjing was calculated as having increased tremendously, from just over 1,000 million Yuan (98 million Euro) in 1990 to about 6,500 million Yuan (634 million Euro) in 2002. Hanoi recorded a less spectacular growth in gross output money wise: of 33% between 1993 and 2002 for cultivated crops. But this figure hides a tremendous difference between low prices for a stable rice production and good prices for a rapidly increasing production of vegetables (from 90 to 145 thousand tons).

In both cities agricultural production is mainly done by small-scale, but increasingly commercial producers. For Nanjing, however, some 323 larger agricultural production enterprises were reported, which are mainly situated on industrial estates. No comparable data were available for Hanoi. Whereas in Nanjing migrant farmers constitute the main labour force (mostly self-employed) in the increasingly specialised and commercial production of high-value horticultural crops, the same is achieved around Hanoi by local

farmers. In both cities, young farmers form an important driving force of the growing horticultural sector that provides most of them with a good income.

Turning to the overall principles of spatial allocation of land for urban development we could observe that both cities initially developed on one side of a big river, whereby a combined railway and road bridge across that river greatly stimulated the economic development of these cities, including commuting settlements, traders and industries on the other side of the river. Consequently, planners in the two cities started to make provisions for proper urban expansion on both sides, including new bridges to connect the new and old urban areas. While the planning model for Hanoi very much remains that of a single, compact city, whereby new residential or commercial areas are provided around and adjacent to the existing ones, the model for Nanjing has become more of a multinuclear and linear city, with substantial areas between expanding and new built-up areas remaining 'green', which could be agricultural, forested or recreational areas.

The planning model for Hanoi includes a 'green belt' for the city as a whole as well as the more local preservation of some open space around each village that becomes part of the urban fabric. However, the planners for Hanoi are rather pessimistic about their power to stop developers from using these productive green spaces for various building projects.

8.2 Livelihoods and planning practice in two villages in the wake of urban encroachment

Two villages were selected, one in each city, where specialised horticulture is providing good jobs for several hundreds of households, but where large-scale urban development could well be 'around the corner'. The Commune of Dong Du is situated in Greater Hanoi, on the other side of the Red River. It is about 10 km by road from the city centre and about 1 km from the river. Recently a new highway bridge was completed across the Red River to connect areas South of Hanoi with those to the North-East. Access roads to this bridge cut through the Commune. The population of Dong Du (some 4000 people in 1000 households) has recently increased at a rate of 5% per annum while agricultural land and labour is slowly decreasing. Although agricultural output is increasing, its share in the total output of the commune decreased between 2004 and 2005 from 68% to 66% money wise, in favour of the industrial and construction sector. Over 90% of the households in Dong Du are involved in agriculture, but members of the household do get income elsewhere. Between 1995 and 2004 the share of agricultural income of the households decreased from 87% to 80%. Agricultural land was mainly lost to road construction. The four villages in this commune did not grow in surface area, but the population increase was accommodated by intensifying the land use within the built-up areas. Rural residential land in Vietnam is owned by the individual households and includes both the farmhouse and a garden for vegetable production or for keeping some animals. Since the villages in Dong Du experience pressure from people who like to live here, while their jobs are in town they have started selling parts of their gardens for house construction. Part of this money is invested in turning their traditional farmhouse into a modern building with 3 to 4 storeys. Outside the built-up areas farmers are seeking higher incomes from the production of more sophisticated, specialized crops. In Dong Du the focus is on herbs and on long

coriander in particular. The commune government is trying hard to organize this production in such a way that farmers can benefit from economies of scale as well as crop rotation, mainly with paddy but also with other vegetables. But this is far from easy, while many doubt whether it would be worth the effort with the likelihood of further urban and infrastructural encroachment in the near future.

There are many parallels with the Chinese village of Suoshi, some 15 km away from the Eastern City Gate of the old town of Nanjing. Not long ago, an express highway was built across the land of this village to connect Nanjing with Shanghai, but to get on this motorway the residents have to travel in either direction along the old highway for about 5 to 10 km. The village lost quite a bit of good agricultural land to this express highway and its recent widening and the development of a wooded green belt of 50-100 meters wide along it. At two places the motorway is raised to enable local traffic to cross under it. With a bit more than 1400 local inhabitants in 405 households Suoshi is smaller than Dong Du. It has about 450 ha of land at its disposal as against 350 ha in Dong Du, but only 86 ha are cultivated the rest being predominantly forested. One can therefore say that the pressure on intensive agriculture and/or on urban jobs must be higher in Suoshi than in Dong Du. The following figures illustrate that. There are 14 rural enterprises in Suoshi, employing over 1000 people, including 300 workers from other parts of China who now live in the village. Only 120 out of the 1400 local residents are actually involved in planting, while 600 work in the transport business and 30 in trade or restaurants. Most of the agricultural work in Suoshi is done by some 500 immigrant farmers: people who rent land from the village government and live in the village. In the pilot area, which only covers the central part of Suoshi village (Suoshi 'hamlet': compare Figure 6.1 with 6.2) some 50 households of immigrant farmers are involved in the intensive production of vegetables, strawberries, flowers and mushroom. Whereas the 'local farmers' are mainly engaged in the transport sector and various urban and industrial jobs these immigrant farmers pay land rent to the village government, which also covers the use of irrigation water and the frames for greenhouses and mushroom sheds. This land rent is passed on by the village government to the local farmers. While the village government has been quite active in stimulating such intensive agricultural production units (there are also a big pigeon hatchery and an intensive dairy farm in the village) it now also encourages small industrial enterprises to get established in Suoshi. But the best soils, for which an irrigation system was developed many years ago, are carefully secured for continued horticulture.

Both Dong Du and Suoshi have started developing little parks (see Figures 8.1 and 8.2) in order to make the village attractive for both its present and future residents. At the same time, local leaders and town & country planners are quite aware of (and overwhelmed by!) the magnitude of real urban development once it is decided at higher levels that these villages should be incorporated in the expanding urban fabric. This would overrule and lead to destruction of most of the present and recent investments, especially those in horticulture, irrigation and landscaping. While in Hanoi the investments in (intensified) village housing will be safe, the practice in Nanjing is to bulldoze rural housing once an area is to be prepared for urban expansion.

8.3 The scope for rural-urban synergy in the planning of urban growth

Because of the easy access to a growing market for perishable fruits, flowers and vegetables, in both pilot areas a number of farmers are now devoting their energy to the production of such commodities and derive an income out of this that is substantially higher than that from the mainstream production of staple food crops. Whereas those traditional, mainstream farmers would be quite happy with a fair compensation for the loss of agricultural land for urban growth, for the specialised professional horticultural producer it is much more important to be able to continue what they are good at. This could be on the land they are presently using, whereby urban expansion takes place around such highly productive spots. Or the urban planners and relevant authorities could provide them with alternative sites to further develop their production of fresh commodities that are so much appreciated by the urban consumers. One aspect of synergy between urban growth and sustainable agricultural production is that a fair part of the profits to be gained by turning farmland into urban space are channelled into improving the productive capacity of the market gardening sector in general and into creating productive urban open spaces as 'green lungs' for the expanding city in particular. Recent plans for both Hanoi and Nanjing have expressed a need to provide parks or green space in and between the new residential and industrial quarters. It would be ideal if not all this green space would have to be maintained as public parks with taxpayers' money. Part of such land could be used productively by specialised, 'urban' farmers while at the same time keeping its function as a provider of fresh air and recreational scenery in contrast with the hectic urban life. Not only in terms of land use, but also for streams of (organic) waste and energy, new urban areas and specialised forms of agricultural production could develop in a mutually beneficial way.

Ideas like these about rural-urban synergy, and examples of how such synergy works in other parts of the world, have been presented in various meetings and interviews with planners, farmers and administrators in both cities. The two pilot areas were thereby used to imagine how this might work out for Hanoi (see Chapter 4) or Nanjing (Chapter 7). The various brainstorming sessions resulted in two spatial scenarios for Dong Du and three for Suoshi. According to two of these scenarios (one for Suoshi and one for Dong Du) the new urban areas would leave most agricultural land alone, whereby the agricultural users would further develop their intensive production of high-value crops and enhance the quality of the area for recreation and education at the same time. On the other extreme there were two scenarios whereby a substantial urban development of the pilot areas was taken as starting point. These explored the scope for 'urban agriculture' on sections of land that are too low and swampy for easy construction. For Suoshi, also a middle- or integration scenario was explored, seeking a balance between horticultural intensification and a high-quality suburban residential environment.

It is interesting to compare the outcomes of the various scenarios in terms of numbers of added dwellings and surface areas remaining for agricultural or horticultural production (see table 8.1).

Table 8.1 Capacities of pilot areas under various scenarios

Scenario:	New housing capacity (dwellings)	Land remaining for agricultural production	Types of agriculture	Landscaping & facilities
Dong Du: Horticulture	Some, at rural density	Almost all; clean water	Safe vegetables, flowers & herb; 50% in net houses	Parks & tourist routes around existing lakes; tree planting along roads
Dong Du : Horticulture & urbanisation combined	1000 (=double present capacity: high & middle incomes)	About 50%; land exchange	Intensive horticulture (net houses), mainly herbs and quality vegetables	Tourist mooring station at Red River and tourist walking routes; irrigation standpipes every 15 m.
Suoshi: Tourist & Horticulture combined	< 1000	Almost all; reparcellation	Intensive horticulture attractive to tourists	Shops, restaurants, recreational routes
Suoshi: Maximum urbanization	3400	10% along express way	Small flower production base	3000 m ² sports hall; green belts
Suoshi: Combined horticulture & urbanization & tourist	2000	30%	Flowers, pigeons, dairy, vegetables, fruits, mushroom	Max. 15% in tunnels & plastic

Even in the maximum urbanization scenarios for these peri-urban locations the planners and researchers who are familiar with the area and developed the scenarios are reluctant to displace all agricultural activities. They consider them both economically viable and an interesting aspect of the landscape for the new (sub-) urban residents. The idea is that the investments made for horticulture and the appearance of the various crops (such as herbs, flowers and strawberries) could easily add to the quality of life in these new residential areas. They would make these areas somewhat special: different from what has been built so far. Farm access roads become part of a recreational network for the new residents through a productive landscape. And in the other extreme, maximizing the intensity of horticultural production with a minimum of urban expansion, the growers would have to restrain themselves from polluting the environment. Nearby suburban residents would require fresh air without pesticides, clean water and an attractive landscape. Only by providing these qualities, the farmers will keep their “license to produce”. This became clear during the policy seminars that were held around these scenarios. In both cities, the planners present at these seminars made it clear, that land in such locations is too expensive for traditional, mono-functional horticulture. Only by performing additional functions to the city, such as cleaning the air and the water, providing jobs as well as recreational and educational services, these producers of high-quality food and flowers would be accepted on land that would otherwise be built-up with houses or be turned into city parks. Those who can’t or don’t want to, will be told to leave, get their compensation and start somewhere else, a bit further away, until the expanding city reaches them again.

Of course, both pilot areas are small. Even under the most ‘urban’ scenario they would add only a few thousand new dwellings to the peri-urban housing stock. But just because they are so small, the city planners of both Hanoi and Nanjing showed willingness to turn these “research pilots” into “policy pilots”. This would be a great chance to demonstrate the scope for real synergy between urban growth and agricultural production.

8.4 Recommendations

Apart from the scope for real urban-rural synergy the study also demonstrated the reasons for scepticism. To carry out experiments in these two pilot areas along the lines of an integrating scenario, which has the support of both the policy makers at the city level and the farmers and village leaders at the local level, would be the best way of putting ideals into practice.

But in addition to this 'learning by doing' there are a number of fundamental questions to which answers still need to be found. These include:

- *From a land economics perspective:* how much gain or loss is obtained if peri-urban land is not completely turned into the highest possible intensity of urban uses? Are there data to convince urban developers from leaving some (very productive) farmland alone when they design project to accommodate the growing urban population, numbers of urban enterprises and need for additional roads etc.? These are good reasons for developing economic calculation models to compare purely urban development of peri-urban land with integrated rural-urban forms of development. Such models should aim at a really complete coverage of the variety of costs and benefits, including their distribution over the various stakeholders.
- *From the point of view of "urban green space":* the gain in land values from 'agricultural' to 'residential-commercial-industrial' might seem quite obvious if the demand for urban green space is not taken into consideration. As a result, many peri-urban farmers in both Nanjing and Hanoi are quite willing to have their land converted, assuming they receive fair compensation. But once the authorities come to accept that urban residents need more green space in their immediate living environment than the land economists and urban development agencies assumed the economic use of such open space becomes an important issue. Our project has demonstrated that, in this respect, adapted forms of horticulture are an interesting possibility.
- *From a public administration perspective:* planners and policy makers for urban development and those for agricultural development rarely communicate with one another. They seem to agree that where the former became active, the latter should withdraw. In our project we have sought, largely in vain, to bring these two categories of stakeholders together. But on the rare occasions at which they could tell each other about their mutual benefits, they became enthusiastic. If some of the profits from urban development of agricultural land could go into public investments for improved peri-urban agricultural production, many people would be very happy. This involves a structural, institutionalised cooperation between the main urban and agricultural stakeholders, organized at both the citywide and the very local level. In the process of this cooperation, a fair as well as efficient, practical sharing of the costs and benefits of urban development of agricultural land could be achieved.
- *From a production economics perspective:* quite a few of the producers of fresh, high-value agricultural commodities in the peri-urban areas of Hanoi and Nanjing are deriving a good income out of it, comparing favourably with that of people with a similar educational background holding urban jobs. But in order to reach such incomes they need to add investments to investments, intensifying their use of the land. Under this

trend the landscape could either become increasingly interesting, or become chaotic and industrial: with haphazard plastic tunnels, barns or piping systems. Such investments might well be the best for individual farmers at a certain moment of time, but they may well ruin the long-term prospects of producing at the same spot. It would always be wise of farmers to take consideration of the aesthetic aspects of their investments when seen in combination with those of their neighbours. It might cost more to make these joint investments attractive also for passers-by, or it might cost the same but decrease to level of production that can be obtained from them. In that case, it should be made clear what additional incomes could reach the farming families if such landscaping considerations are made. To keep one's "licence to produce" on a spot surrounded by critical suburban residents might be considered as a benefit by some producers, but as a constraint by others. Researchers should make it clear what types of urban-friendly agricultural production are really sustainable and how the non-farmers who benefit from such urban-friendly farming style are refunding these farmers for their efforts or not.

Although this study has shown that special types of agricultural production certainly have a role to play in the process of urban growth, are actually caused by it, it also shows how easily the same process can kill its babies. Much can be improved if one would combine, at the same location, a sub-optimal solution for urban development with a sub-optimal solution for agricultural production and a sub-optimal solution for parks, recreational and nature-educational facilities. The sum of such sub-optimal solutions would be more than maximizing the scope for one of these functions while finding new spaces for the other functions elsewhere. Further research will be needed before policy makers and developers can be made to really understand the benefit of combining different functions for the same piece of land. This is as much a problem in the two cities studied here as it is in other parts of the world.

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