SUSTAINABLE PLANNING FOR A RURAL COMMUNITY, BEIJING, CHINA

challenges

- Construction expansion: loss of natural resources & cultivated lands
- Threatening the eco-balance & food security
- Lane: dead ends & impaved
- Lane: narrow & occupied; emergency access blocked
- Confused & misleading way-finding; construction quality in poor

Year 1993
Year 1994
Year 1998
Year 2003
Year 2006

- Construction expansion of uncompetitive manufacturing lane: dead ends & impaved
- Hidden danger of fire disaster
- Insanitary conditions in kitchen & toilet
- Energy source: fire wood & coal
- Social security & health insurance absent
- Lack of public space
- Poor thermal insulation of walls & door/windows
- Unemployment
- School & kindergarten more to far
- Population ageing

Design thinking framework

3 basic goals:
- Environment: protecting cultivated land & natural resources, reducing pollutions...
- Economy: attracting outer investment, more physical spaces for rural development...
- Equity: improving rural living conditions...

5 major works:
- Land use planning control
- Infrastructure improving
- Public services improving
- Housing design
- Community renewal

3 task forces:
- Government officer: policy making, fiscal support, administration & coordination
- Academic + planner: making field survey & interview, building a theoretical model & a comprehensive plan as the basis of whole project
- Architect + engineer: providing relevant detail designs & professional services

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population: 1546

cultivated lands
high voltage line corridor
protected surface water area & underground water area

infrastructure

public services

investigation team: Sun Li, Qi Zhengdong, Li Hua, Huang Zheng, Xiang Xi, Pei Lei, Zhang Jingjing, Lin Tianpeng, Zhang Yanqin, Guo Lu, Li Rongxin, Wang Yue, Xia Chaoran, Zhou Wenjun

door-to-door interview

investigation team: Wang Yan, Liu Li, Ai Hui, Luo Yu, Li Rongxin, Zhang Haiqiang, Wang Sheng, Meng Fanli, Qian Chengyuan, Liu Kun, Wan Wenguang, Bai Dong, Xia Di, Sun Li, Liu Yaosen, Feng Chao, Xiao He, Lin Tianpeng

data base building

building quality

investigation team: Lv Xiaohe, Chen Yin, Qin Xiao, Liu Yaosen, Ji Wanjing, Zhang Shuo, Li Gang, Yin Lu, Wang Yan, Liu Li, Ai Hui, Luo Yu, Zhang Haiqiang, Ma Jin, Kang Huidan, Huang Min, Zhou Yajie, Yi Lingjie, Xu Bowen, Xu Lianjun

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growth boundary set, rural preservation
set construction growth boundary, natural resources & cultivated land be strictly preserved subsidy is planned to be evaluated by CVM (Contingent valuation method), & repay to the village from establishing TDTS (transfer of development rights system)

economic analysis
the planning research suggests Beijing government to increase fiscal input to the village, as compensation of preventing the village’s illegal construction for manufacturing land rent. (investigation team: Cao Wen, Zhang Lu, Lan Weijie)

details of factories located in the village

Name of factory Founding year Employee Number Area (ha) 
JINDONG plant breeding shed 1983 40 1.27
GREEN GARDEN restaurant 1997 70
ZHUXIAO painting house 2006 60,000 1
NINE STARS car repairing & service 2001 20,000 0.2
XINGPU turtles breeding shed 1996 1,000 2
XINHUA beverage shop 2003 8 4,620 0.2
FRIENDSHIP furniture factory 1997
LONGHUA commercial trade company 2004 11 0.3
HUAJINYINGWEI printery 2003 100 0.9
JINBAOLOONG garment factory 2003 130,000 0.4
BINFENNYUAN plant breeding shed 2003 3,000 0.3
XINGSHENGCHANG building material 1998
DAMEISHUNCHENG electric machine factory 2004

comparison of agriculture and manufacturing’s yearly output

<table>
<thead>
<tr>
<th></th>
<th>Output (¥)</th>
<th>Total (¥)</th>
<th>Efficiency (¥/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>61,200</td>
<td>61,200</td>
<td>4,630</td>
</tr>
<tr>
<td>Farmland growing</td>
<td>96,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal breeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td>24,500,000</td>
<td>1,700,511</td>
<td></td>
</tr>
<tr>
<td>manufacture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5 big factories in village)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NINE STARS car repairing &amp; service</td>
<td>6,820,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GUANGDA paper mill</td>
<td>71,200,000</td>
<td></td>
<td></td>
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<tr>
<td>JINBAOLOONG garment factory</td>
<td>7,750,000</td>
<td></td>
<td></td>
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<tr>
<td>CHUANGFA plastic factory</td>
<td>7,800,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HUAJINYINGWEI printery</td>
<td>2,100,000</td>
<td></td>
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</tbody>
</table>

recent yearly Income list of the village

<table>
<thead>
<tr>
<th></th>
<th>Items</th>
<th>Sources</th>
<th>Amount (¥)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Village’s income</td>
<td>Rental</td>
<td>Liujian (an individual enterprise)</td>
<td>72,800</td>
</tr>
<tr>
<td></td>
<td>XINGPU door &amp; window factory</td>
<td>20,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NINE STARS car repairing &amp; service</td>
<td>100,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GREEN GARDEN restaurant</td>
<td>56,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HUAJINYINGWEI printery</td>
<td>13,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CHUANGFA plastic factory</td>
<td>60,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DAMEISHUNCHENG electric machine factory</td>
<td>12,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BINFENNYUAN plant breeding shed</td>
<td>12,800</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tax</td>
<td>71,318</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>417,918</td>
<td></td>
</tr>
<tr>
<td>Fiscal support</td>
<td>Fiscal input from the government</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td>from government</td>
<td>Awards</td>
<td>“Garden Village Prize”</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>“Rural Industry Prize”</td>
<td>80,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Subsidy</td>
<td>For environmental improvement special</td>
<td>20,000</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>200,000</td>
<td></td>
</tr>
</tbody>
</table>
circulation improving rationalize network, adjust width & height systemize the streets connection, widening and pave the lane, both for convenient accesses & emergencies’ reach. Level up/down in height to fluently release the floods in summer

main-rooms removed: 13 households +13
wing-rooms removed: 6 households +2
store-rooms removed: 2 households +2
courtyard wall redefined: 34 house holds +6
public building removed: 2 units
for resettlements: 4 sites on unused plots

(minimum touch to the existing)

infrastructure & public services improving

baffled septic tank apply

a decentralized waste water treatment, household in charge, low cost, easy maintenance

detail design of public spaces

infrastructure system

0.25 50 100m

0.05

provision for gas releases
inspections
scum
liquid
sludge
settler
baffled tanks to direct upflow of waste water

infirmary
library & training
playground
dinning room
grocery
schoolbus station
traditioanal bazaar
w.c.
public telephone
cemetery

administration
infirmary
library & training
playground
dinning room
grocery
schoolbus station
traditioanal bazaar
w.c.
public telephone
cemetery

administration & documentation
infirmary
schoolbus station
visiting center
dining hall, also as a public meeting place
parking entrance library computer lab
basketball courts
recreation
exhibition
street garden

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a 2-storey demonstrating house is planned in our project, which occupies only 200 m², the demo house will show a more land-saving life style to the local residents and the government will fiscally support such a change in the future new house building.

average area of the local rural house sites is about 480 m² which is twice more than the relevant national regulation.

Field investigation finds that such large house sites bring low efficiency in space use and high cost in energy consumption.

approach 1: new build

approach 2: renovation on the existing

land-saving housing design

renovation with solar energy use, septic tanks, exterior insulation...

micro-spreading renewal model for the community

the whole neighborhoods start to shrink from this start points, by reducing house sites from >400 m² to <200 m² which was regulated by government regulation. More spaces will be released after the shrink, for economic development & welfare.

social fabric basically maintained in its original physical pattern

Since the renewal will spread almost 1 household by 1 household, the original spatial relationships between each house site will be basically maintained. All the moves & changes will be strictly at residents’ will, and will be encouraged by government’s subsidy repay to the residents for their changing to a more land-saving & ecological dwelling.
ventilation in winter

Sunlight from lower altitude enters the glass solar room. Warm air from both the solar room and basement will heat the interior space.

insulation materials made from straws

contextual factors in housing design

traditional building codes research

courtyards code of existing houses: size, orientation, layout of the surrounding buildings... (investigation team: Zhang Ruoxi, Ma Xiaoying, Zeng Heshuang)

details record: gateway types, brick & tile decorations... (investigation team: Dai Zhen, Hong Zhiyong, Shen Hua)

building codes applied in new design

option menu for local residents

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public participation

progress towards realization

1- construction sprawl under control: after the planning being approved, the villages’ construction growth boundaries began to be monitored by satellite imaging, which is now effectively protecting the cultivated land and natural environment from being encroached on by low-grade manufacturing.

2- public services being improved: government investments have improved the villages’ public services: setting gymnastic apparatus & excise garden, enriching books in library, adding computer & internet equipments in community classroom, building medical station & public toilets...

3- demonstrating house & sewage farm under experiments: in village Wuxiongsi, a manmade wetland sewage farm and a demonstrating house have been built as experiments to explore the proper way of infrastructure improving and rural community renewal. however, the negotiation & finance of this community renewal is very difficult and long-term, our team will continue working on this part of work in the following years...

contribute to the 5 target issues

1- quantum change and transferability: the project tries to figure out practical ways of sustainable development for China rural villages, according to current economical/social situation: to improve environmental quality by adaptable eco-techniques in low budget; to improve the village by micro-spreading renewal; to spread knowledge among villagers by public participation & training on how to build/maintain eco-facilities.

2- ethical standards and social equity: the aim is to improve rural living conditions and to narrow the gap between urban and rural lifes. public participations guarantee the policy transparency. circulation/infrastructure renewal try to be a minimum touch to the existing. all the touched households will be compensated. whether the house is new built, or eco-renovated, or stay unchanged, will be all at residents’ ownwill. entire village renewal will be in long-term for a better emotional reception. Local forces have the priority to get the job opportunities in construction.

3- ecological quality and energy conservation: construction growth boundary is set to preserve natural resources & cultivated lands. decentralized septic tanks & drainage system are built for pollution control. based on law, the area of one new house site should reduce to 200 m², with living condition improved & land-saving subsidy paid. new house has minimum outer-wall area & exterior insulation to reduce energy consumption, and has a north enclosed corridor as temperature buffer zone. Solar energy utility is encouraged by setting glass room & roof solar collectors. Vertical ventilation is achieved with cool/warm air pumped from basement. Rain is collected & trees are preserved for a better micro-climate.

4- economic performance and compatibility: budget of new house is $166/m², to match local income. an experiment house is built to find out how much the government subsidy should be to repay residents for their changing to more ecological life style. Modestly rise of FAR in community renewal creates more spaces for family-based tourism & small handicraft. environmental improvement will also attracts more outer investments.

5- contextual and aesthetic impact: the control on construction expansion & pollution promotes the traditional rural landscape. public participation & the use of local materials/techniques will preserve the vernacular aesthetic value in architecture. micro-spreading renewal model will avoid a sudden physical change in context. one-by-one phased implementation will spatially keep the most of the original social fabric in the village.