Urbanization in 2 towns in Sichuan Province
Land Use and Land Pricing Issues

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1. Introduction and scope of this study

This short note on the urbanization of Mianyang and Suining (Sichuan Province) has been prepared as a background study for the proposed land component of the SUDP project. The objective of this note is to provide an answer to a number of questions concerning the economic justification and feasibility of the 3 land component sites in the proposed SUDP project (Pioneer Park and SEDZ in Mianyang and Xining in Suining). The questions to be answered are: (i) Is the proposed expansion of the city through the SUDP land component justified by projected demand for urban land? (ii) Does the location of the expansion is spatially and economically justified? (iii) Does the total compensation paid to farmers for their land equitably compensates current farmers' revenues and assets and is this compensation close enough to market price to prevent an uneconomical expansion of urban areas? It is expected that the methods and lessons learned through the implementation of SUDP will help streamline national policies concerning urban expansion in China.

2. Urbanization in Sichuan Province

Urbanization in China is seen as a necessary step toward economic development. Sichuan province, where Mianyang and Suining are located is less urbanized that the rest of China. In Sichuan Province the rate of urbanization in 2005 was 28% compared to China national average of 41.7% in 2004. China National development plan project that by 2025 the national rate of urbanization will be around 65%. Let us give an order of magnitude of the migration toward cities which is likely to take place in the future: in Sichuan province about 900,000 farmers would have to become urban residents to increase the rate of urbanization by just 1%.

The difference in income between urban and rural population is a powerful factor of urbanization. In China, in 2005, the per capita net annual income of farmers was Rmb 3,255 as compared with Rmb 10,500 for urban residents. In 2005 the per capita income of the urban population in Sichuan was Rmb 10,100 close to the national China average. Increasing the rate of urbanization is part of the National Government strategy to stimulate the economic development of the Western part of the country of which Sichuan province is a part. The SUDP project aims at managing this accelerated urbanization by demonstrating through a pilot urban project how transforming undeveloped rural land into fully developed urban land can be accomplished in a financially sustainable manner resulting in spatially efficient cities. The proposed project also aims at demonstrating that farmers displaced by urbanization can be equitably compensated for their land and rapidly integrated into the urban economy with sizable economic benefits to themselves, their children and the urban community.

3. The spatial development of Mianyang and Suining

The rapid modernization of Chinese cities and the increasing productivity and affluence of urban households require the recycling of the obsolete urban areas which were built more than 20 years ago. In the history of urbanization no cities have developed their economies as rapidly as Chinese cities did in the last two decades. As a result, a large part of the urban areas developed before the rapid expansion of the last 20 years is poorly adapted to the new urban economy. Older office buildings are ill adapted to the new economy because of their inefficient layout, obsolete plumbing and electricity network and lack of telecommunication network. Older apartments do not correspond to the new demand for space and modern plumbing facilities. Retail spaces are insufficient. While population densities are high in Chinese secondary cities, the floor area ratios are often low and make an uneconomic use of land.

Within a period of 20 years the economy of Chinese cities shifted from largely low productivity labor intensive activities to high productivity capital intensive manufacturing complemented by a fast expanding tertiary sector. While this shift in economic activities also occurred in all the cities of the post industrial world, what makes Chinese cities unique is the extraordinary short period during which the change is occurring.

Mianyang and Suining are typical of Chinese medium size cities developing rapidly by attracting high tech industries. These cities are attractive to high tech industries because of their benign environment, good city management, and the skilled labor produced by a performing education system.

The urban/rural dichotomy in Chinese peri-urban areas

Typical of most Chinese cities, the population of the urban area of Mianyang and Suining and its immediate surroundings is divided into two socioeconomic groups with different legal rights. The urban population has typically access to all city services while the “farmer” population has to rely on lower quality services in health and education provided by villages or rural collective.

Farmers, however, can use land provided by the rural collective to build houses or workshops or even private rental housing without having to obtain a building permit from the city. Farmers can use the land allocated or rented to them by the collective and can derive income from it whether this income come from an agricultural activity or not. While farmers can transform the use of agricultural land freely without conforming its use to the city Master Plan, they cannot sell it. They cannot either obtain credit to develop infrastructure other than minimum access roads and rudimentary storm drainage. As a result farmers’ areas at the fringe of cities are often partially developed with row houses several story high, workshops, garages and warehouses intermingled with fields still used for agriculture, mostly for growing vegetables easy to market in the city nearby. The “farmers’ areas” are developed at lower densities than the adjacent urban areas but at higher densities than normal rural areas. The non agricultural uses in the farmers’ areas are fulfilling a useful function for the development of cities by providing a legally developed urban fringe of private rental housing, and space for workshops affordable to small entrepreneurs.

Urban households on the other hands are able to buy housing from large well capitalized formal developers who themselves purchase land use rights from the Municipal government – who has a monopoly on land development and in the transfer of land use rights. Urban dwellers can rent or buy a shop or workshop in a formal urban development with full infrastructure services, but at prices which are at least double from the ones practiced in farmers' areas. The population densities in formal urban areas in medium size cities are typically between 120 and 250 people per hectare, while densities in farmers' areas close to the urban fringe are between 10 to 40 people per hectare.

In Mianyang and Suining, as in most Chinese cities, the limits between formal urban areas and farmers, while clear-cut, follows idiosyncratic contours with enclaves of farmers areas surrounded by fully developed urban areas. The closest is a farmer area from formal urban areas, the densest it is, as farmer households get a great part of their income from urban activities.

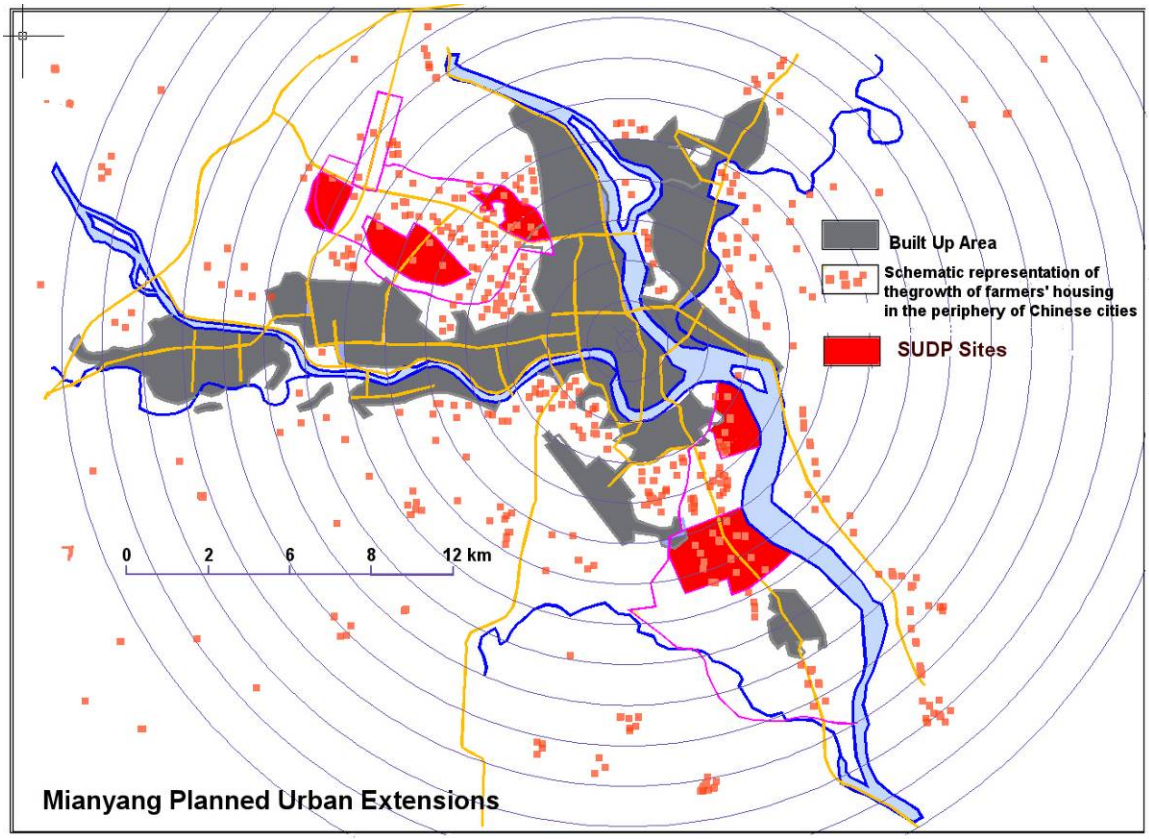

Figure 1: Map of formal urban areas and farmers area in Mianyang

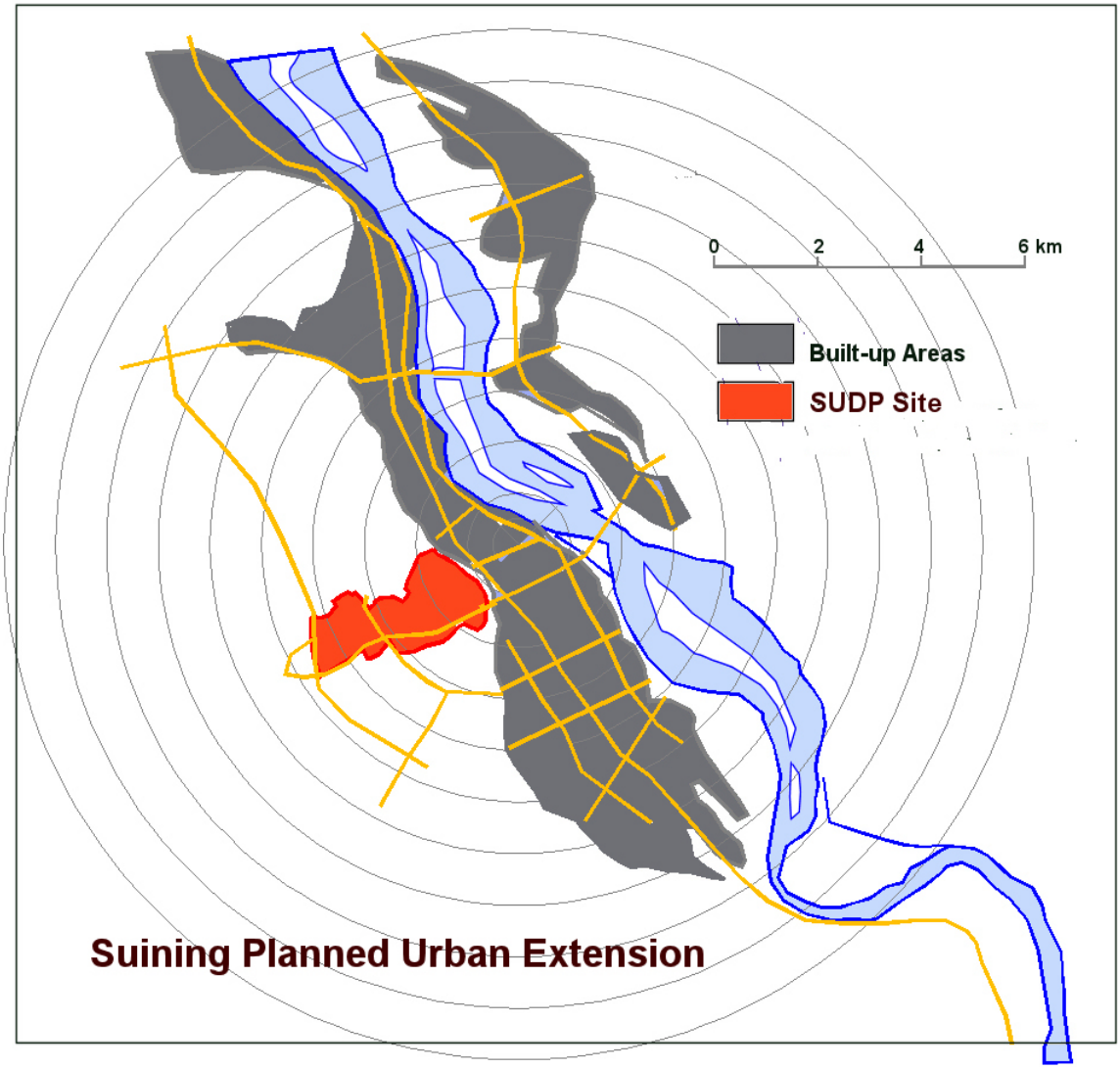

Figure 2: Map of built-up areas and project area in Suining

The linear expansion of Suining and Mianyang is typical of medium size Chinese towns.

When Chinese cities need to expand, they naturally do so at the expense of farmers' areas which are the closest to the urban areas and therefore the densest. Leap-frogging these areas could be costly, as it would mean leaving low densities unserviced enclaves inside fully serviced areas (see below "alternative pattern of land development"). This would greatly expand the length and costs of urban networks while also increasing commuting time. However, Chinese cities do not usually expand in the most economical manner from a spatial point of view, not because they want to spare semi developed farmers areas but because the lack of construction finance pushes formal development in a linear direction along already existing trunk infrastructure. The pattern of formal urban development in Mianyang and Suining illustrates this typical less than optimum approach (see Figure 1 and 2). The development in both cities follows the main intercity roads, leaving large enclaves of undeveloped land at very close distance from the city center.

The most economical way of developing urban land would be to develop land in a compact manner around the CBD as much as the topography permits. The most compact form for a city is a circle centered on its CBD. This compact form generates shorter trips, significantly save on energy[1] and decrease the capital costs of utility networks. Of course topography often prevent cities from reaching the most efficient shape, this is the case in both Mianyang and Suining where very wide rivers and hills constrain spatial development.

The development of the SUDP sites will significantly improve overall efficiency by decreasing average distance to the center as the population increases. Chinese urban planners are of course well aware of this fact and their master plans usually include compact land use centered on the CBD. However, developing areas between the radials constituted by inter-city roads requires large amount of initial capital because of the long negative cash-flow generated by large land development projects. Typically large land development projects, such as the one financed by SUDP, require advance financing to cover at least five years of negative cash flows. In the absence of advance financing cities tend to develop linearly along existing highways, by-passing areas which are closer to the city center but impossible to develop without making large primary infrastructure investments and without the availability of medium term financing.

The development of urban land in China should be financially viable, as demonstrated by SUDP, and therefore should easily attract financing in the future, if the land itself could be used as collateral and easily and transparently transferred in case of foreclosure. Under current legal practice, it is not certain that undeveloped or even developed land could be used as collateral.

Further, Chinese planners – because of their lack of experience in land markets – tend to see the development of infrastructure mostly as civil works construction or environment improvement rather than as a self financed, self contained land development operation. SUDP attempts to provide an example of self sufficient land development which should facilitate in the future Municipalities' access to medium term financing, if the collateral use of the land and the possibility of foreclosure by a third party could be made clearly legal. The research for financial viability of self contained schemes would also improve land use planning as the discipline of markets will ensure that the land developed will be at its best and higher use.

4. Demand for land in Mianyang and Suining

Because of the rapidly changing economic conditions in China demand for land is difficult to predict with accuracy. On the other hand, the homogeneity, predictability and strict application of municipal land use regulations decrease the uncertainty encountered in countries where regulations adapt more quickly to changing consumer preferences.

Five main factors contribute to the demand for land in Chinese cities: (i) demographic growth coming for migration from rural areas; (ii) new households' formation among the already urbanized population; (iii) increase in residential floor area consumption per person; (iv) growth of the service and retail sector; and (v) growth of the industrial sector.

[1] For a detailed discussion of city shape and efficiency see "The Spatial Organization of cities" Bertaud , 2004 at HTTP://alain-bertaud.com)

Of course, each factor could be further disaggregated into sub-factors. For instance, the increase in floor area consumption is related to an increase in urban income and to an increase in building industry productivity combined with variations in the price of building materials and the price of land. However, the objective here is not to model the entire urban sector but to determine with a reasonable level of confidence the likely demand for land in Mianyang and Suining during the 8 years period between 2006 and 2013 during which the land developed under the project will have been entirely sold; or in other words, whether the area of land developed under the SUDP project is likely to find users immediately after having been developed.

We will use a normative approach which is well adapted to the current situation in China and which is the only possibility considering the data currently available. For the demand for residential land – which represents the bulk of the land developed under the project – we were able to check the validity of our model by using the residential sale data between 1999 and 2003. The sale of other land categories is more erratic and more difficult to interpret as there are a large amount of demolition and land reconversion for commercial and industrial buildings.

Over all land use projection for Mianyang and Suining

The projection of land demand is based on historical data for population growth from 1999 to 2004. The base year is 2004, for which we could obtain land use data disaggregated between residential, commercial and industrial use. Community facilities are included into residential use, administrative building are included in the commercial category. The total floor space of apartments sold each year between 1999 and 2003 was used to calibrate the model. The demand for land is projected up to 2013, which corresponds to the year when all the land developed under SUDP is projected to be sold. We therefore compare the land developed under SUDP by type of use (residential, commercial and industrial use) to the land which would have to be developed to accommodate land demand in the 3 sectors (residential, commercial, industrial) in each city.

The values of the parameters and assumptions and formulas used for the projection of land demand are shown in annex 1. Table 1 summarizes the findings of the land use projection for Mianyang and Suining up to 2013.

Land Use in SUDP and demand for land

			Mianyang									
			City Wide demand						Supply provided by SUDP			
	Gross areas (including areas for roads, open space and community facilities)	unit	Built-up Area in 2006 (ha)	% of total built-up	Projected demand for the entire city between 2006 and 2013 (ha)	Projected Land use in 2013 (ha)	% of total built-up	Average Yearly Rate of growth between 2006 and 2013	Pioneer Park	Southen Economic Development Zone	Total in Mianyang SUDP	% of total demand during project period
1	Total Area	ha	5,250	100%	2,577	7,827	100%	6%	483	559	1,042	40%
2												
3	Residential	ha	3,810	73%	1,624	5,434	69%	5%	296	173	469	29%
4	Commercial, offices	ha	244	5%	313	557	7%	13%	55	186	241	77%
5	Industrial	ha	1,196	23%	640	1,836	23%	6%	132	200	332	52%
6												
7												
8			Suining									
9									Xining District			
10	Total Area	ha	4,949	100%	1,825	6,774	100%	5%	351			19%
11												
12	Residential	ha	3,983	80%	1,311	5,294	78%	4%	251			19%
13	Commercial, offices	ha	165	3%	242	407	6%	14%	101			42%
14	Industrial	ha	801	16%	272	1,073	16%	4%	-			0%

Table 1: Demand for Land in Mianyang and Suining

Overall city growth

As seen on Table 2, the average increase in the built-up area of Mianyang between 2006 and 2013 is projected to be about 2,600 ha, corresponding to an average growth rate of 6% per year. The land development growth rate is faster than the demographic rate (2.3% per year) for a number of reasons: the increase in floor consumption per households; the development of suburban areas at lower floor area ratios than the one used in the center; the increase in the proportion of areas used for services, administrative buildings and commerce; the increase in floor area consumption per person for office building and for industries, as the older overcrowded buildings in the center or close to the center are replaced with more spacious buildings in the suburbs.

The built-up area of Suining is projected to grow at 5% per year during the project period, while the commercial and office land use (which included government administrative buildings) is projected to grow at 14% per year. This is due to a massive relocation and redevelopment of office and commercial building already under way in the center of Suining. The proportion of land occupied by commercial and administrative building – 6% of total built-up – is projected to be still relatively modest in 2013 in spite of the high growth rate.

The proportion of land devoted to industries stays about constant at about 23%, in Mianyang and 16% in Suining, while the proportion of land developed for services increases from the current 5% to 13%. This evolution in land use is consistent with the evolution of the economy where market driven forces become more dominant than the normative rules used in a command economy. In the long run the proportion of industrial land should decrease in proportion of the overall land developed when markets play an increasing role[2]. However, until the practice of using "negotiated price" rather than auction to dispose of industrial land is abandoned, Chinese cities will maintain a high proportion of industrial areas.

The SUDP sites will provide about 40% of the projected demand for land in Mianyang and 19% in Suining.

[2] See "Bertaud, A. and B. Renaud. 1997. "Cities without Land Markets: Lessons of the Failed Socialist Experiment." Journal of Urban Economics. Vol. 41, No. 1, Jan.

Residential land

The calculation of the demand for land during the project period is based on the projected rate of demographic growth in the city for the project period, the current net residential floor space consumption per capita, the projected annual increase in floor space consumption per capita, the ratio between net and gross residential floor space, the average floor area ratio in new residential projects, the ratio of roads, community facilities and open space based on current projects and regulations. The details of the calculation for each city are provided in Annex 1.

The demand for residential land between 2006 and 2013 based on the above parameters is projected to be about 1,620 hectares for Mianyang and 1,300 hectares for Suining. The area of residential land put on the market under SUDP in Mianyang, 469 ha, represents about 29% of the total projected demand for residential land in the entire city of Mianyang. For Suining, the 251 hectares of residential land developed under SUDP represent 19 % of the projected demand.

Industrial land

The projection of the demand for industrial land is based on: the city demographic trend and the demographic projection contained in the master plan[3]; the projected change in the proportion of the active population, employment figures in the sector in 2004, the current and projected consumption of industrial land per worker. The practice of pricing land "at cost" or through "negotiated price" rather than using a market price as it is done for commercial and resiidential land will probably about maintain the high ratio of industrial land until the practice is discontinued.

The demand for industrial land between 2006 and 2013 based on the above parameters is projected to be about 640 hectares for Mianyang. The area of industrial land put on the market under SUDP in Mianyang, 332 ha, represents about 52% of the total projected demand for industrial land in the entire city of Mianyang between 2006 and 2013. There is no provision of industrial land in Suining under SUDP.

Commerce and office space

The projection of the demand for commercial and office space is based on the city demographic historical trend and projection and the projection of the proportion of the active population; on the share of the sector employment which is on land dedicated to the sector (a large part of the service sector, specially in retail is located on the ground floor of residential buildings and the land consumed by these establishments are counted with residential land); the evolution of consumption of floor space and land per worker.

The demand for commercial land and office space between 2006 and 2013 based on the above parameters is projected to be about 313 hectares for Mianyang and 242 ha for Suining. The area of commercial and office buildings land put on the market under SUDP in Mianyang, 241 ha, represents about 77% of the total projected demand for this

[3] The demographics projection of the master plan are rather conservative implying a decrease in the rate of historical demographic growth, and in a way contradicting the projected economic growth which historically has been always correlated with demographic growth. The demand calculated in this paper is therefore conservative, as it is based on master plan demographic projection which are lower than historical trends.

type of land use in the entire city of Mianyang between 2006 and 2013. In Suining the demand is projected to be about 242 ha of which 42% would be supplied by SUDP.

Because the projections above covers only a fraction of demand for various land use and the SUDP sites are the largest projects by far implemented by the municipal government in the 2 cities, under a lower demand scenario the projected SUDP land supply would in any case be lower than the 100% projected demand. Further, because the supply of residential land in the SUDP project is much lower than projected demand (29% in Mianyang and 19% in Suining) if excess supply appeared in industrial or commercial land, this excess area could easily be converted into residential land and easily absorbed.

5. The location of SUDP sites and spatial development policy

The pattern of development of the two cities – consisting in developing in a linear manner along rivers and inter city main roads as illustrated on Figure 1 and 2 – differs significantly from the stated objectives of the master plan. This is a very common phenomenon as master plans in most of the city of the world are notorious for being ignored for opportunistic or even often practical reasons. The SUDP project will reverse the spatial linear trend and will be a concrete step in the implementation of the master plans (see Figure 3).

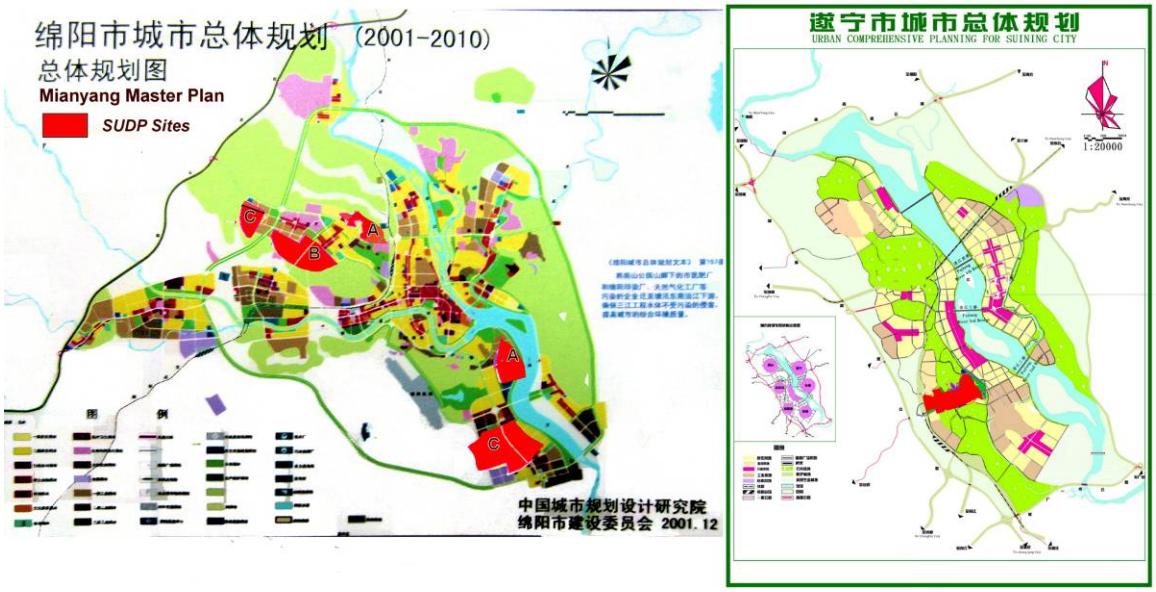

Figure 3: Mianyang and Suining Master Plans

The current spatial policy implicit in the master plan of cities like Mianyang and Suining could be summarized as follows: (i) redevelopment of older areas, and (ii) consolidation of under-used areas and agricultural enclaves within the existing urbanized radius. The location of the SUDP sites in Mianyang and Suining as shown on the maps of Figure1 and 2 illustrates this policy. Both sites are part of a consolidation in-fill strategy rather than an extension of the build-up area farther away from the city center. In Mianyang the current built-up area expands up to 14 km from the city center while the SUDP sites are between 2.5 and 7 km for SEDZ and between 3 and 9km for Pioneer Park. In Suining the built-up area expands up to 11 km from the center while the Suining

site is located between 1 and 5 km from the center. Both sites are therefore part of a consolidation of existing semi-developed rural enclaves rather than expansion of the built-up area further away from the city center.

The gross densities used in SUDP in the 2 cities (178 p/ha in Mianyang and 141 p/ha in Suining) are high by international standards and are consistent with the stated urban policy in China of maintaining compact cities with a reduced footprint.

The current consolidation policy – developing land closer from the city center than the current urban fringe – is associated with an intense urban renewal of the traditional city center. The urban renewal in the center aims at demolishing old warehouses and obsolete factories which were built mostly between 1950 and 1980 and which use the centrally located land very inefficiently. Some of these factories are relocated in the newly developed land. Some apartment housing built during the same period is also being demolished because its low living space standards and run down infrastructure does not correspond to current demand and use centrally located land inefficiently. Most of the land recovered through urban renewal is being recycled either by developing new housing, office buildings or public parks. The land use standards of the new areas make more efficient use of land by using higher floor area ratio, mixed land use in the case of apartments – the first 2 floors are often used for retail or office space – and a lower building footprint, allowing for wider sidewalks and public landscaped pedestrian space between high rise buildings. The overall spatial policy of infill and renewal should result in more compact cities, more efficient public transportation and a better urban environment because of the larger areas dedicated to pedestrians.

The urban renewal projects in the center and the consolidation of semi-urban enclaves – as the ones developed in SUDP – are two complementary components of the same strategy aiming at developing compact dense cities. This strategy compared favorably to the one used in central and eastern European cities where cities expand mostly through suburban green field development while the central city and the immediate suburbs are grossly underused by obsolete industrial land and decrepit public housing for which there is little demand.

6. alternatives spatial development models

The current spatial strategy described above, which is used in Mianyang and Suining, is not the only one possible. Indeed many cities in the world follow strategies which are much less interventionist than the one used in China. While the strategy used in Mianyang and Suining have many benefits described above they have also costs. The costs of the strategy consist mostly in the high amount of demolition and displacement of households and firms. There is a risk that an undervaluation of the assets destroyed – tangible and intangible – might results in much lower net benefits than planned. This is the reason why for both an equity and economic rationale it is necessary to measure as accurately as possible the real costs of demolition and displacements. Because of the time and resources devoted to the RAPs we are confident that the costs of the strategy have been fairly evaluated and that the net benefits of the project are positive. The RAPs contain a detailed inventory of area and quality of the land under cultivation, and area and building standards of all the buildings which would be demolished. However, it is

worthwhile exploring the possibility of alternative urban strategies which do not require the extensive use of eminent domain as is the case in the development of Chinese cities.

Alternative urban spatial strategy #1: Use of eminent domain reduced to securing main roads right of way only, development of farmers enclaves by the farmers themselves.

One obvious alternative model would be to use eminent domain solely for the development of vital infrastructure and letting developers acquire land in the areas they feel would be the most profitable to develop. This is in fact the model used in most cities in the world. In the legal context of China, without an amendment to the constitution, this would require farmers or rather village collectives to become developers or to associate with developers while retaining the land use rights they currently own. In this case developers would always have problems securing construction finance as the land use rights will be with the agricultural collective and could not be used as collateral. If the collective became developer, it is unclear if under current law it could use its land right as collateral. In addition, it is doubtful that many managers of agricultural collective would have the skills to develop land in a financially viable way. It is probable however that farmers and collective would keep building piecemeal on their parcels as they have done in the recent past, until the agricultural land is fully built upon. This type of legal but informal piecemeal development would avoid resettlements but will in the long run results in large pockets of relatively low density, low floor area ratio neighborhoods requiring a much larger urban footprint than the current strategy based on land recycling.

It should be noted that in China formal land development projects have a much higher density and higher floor area ratio than informal settlements. This is not the case in many other countries of Asia where densities in informal settlements are higher than in formal settlements.

The main drawback of the alternative land development strategy described above is the difficulty that the municipality would have in recovering the cost of the primary infrastructure it develops. Charging impact fees or development fees to land owners is always a vexing problem in cities with this type of strategy. A buoyant real estate tax is the best way to make the strategy viable. However in the case of China, the lack of experienced real estate valuers would be a major hindrance in establishing a property tax which could constitute a significant source of capital investment for municipalities in the future.

The spatial outcome of this alternative in the context of China would probably be in fact a continuation of present trends. Formal high density development will occur along main highways while “farmers’ areas” enclaves progressively densify but with a suboptimum infrastructure and land use. One of main negative spatial impact of this strategy will be on transport. The linear development along highways will create traffic congestion and concentrate pollution while the farmers’ enclaves would be poorly serviced by public transport because of their ad-hoc infrastructure.

Alternative urban spatial strategy #2: No Municipal financial risk, no use of eminent domain: the Bangalore model- high tech campus developed privately in periphery

In many cities of the world the use of eminent domain is discouraged not so much by the restricted definition of public utility but by the cumbersome and lengthy process involved when this procedure is used in urban areas where many small fragmented properties are involved.

Developers of high tech industries and services in the city of Bangalore in India have developed a strategy to solve the problem of grafting a modern infrastructure and efficient buildings suitable for high tech industries on a large traditional urban core. The Bangalore strategy consists in developing a number of private high tech "campuses" in the periphery of the city where infrastructure (power, water, sewer, storm drainage and telecom) is self sufficient. The selection of the campus sites and their area is done solely by the developers but with the agreement of the Municipal authority. The land for these campuses is privately acquired through negotiations with the individual landowners. The campuses are in fact very large condominiums practically independent from the municipality of which they are part.

The advantage of this strategy is that the infrastructure, and the amount of land required is entirely demand driven and there is no public financial risk, or hidden real costs, or a risk of oversupplying either land or infrastructure at the public expense. All the landowner who sell their property to the campus sell at market price and could stop the transaction at anytime if they are not satisfied with the price. The extension or creation of new "campuses" is fast as it is entirely in the hands of private sector companies who have an incentive to respond rapidly to demand. There is no cost to the municipality, only benefits from the property taxes and corporate taxes generated by the campuses.

The disadvantages of the strategy lay mostly in the distortion to the city structure created by the campuses. To assemble land in sufficient quantity with as few landowners as possible to reduce transaction costs it is necessary to select agricultural land relatively far from the current build-up area of the city. The various campuses become important centers of employment which are dispersed in the periphery of the city. Prestigious housing and retail tend to desert the traditional city core to "piggy-back" in areas adjacent to the campuses. This in turn lowers the value of retail and housing in and around the CBD, which as a consequence tend to deteriorate and go down-market. Finally, public transport suffers losses as the dispersion of employment in suburbs makes it difficult to maintain a high volume of transit to these areas – as most of the traffic become suburb to suburb as opposed to suburb to CBD. The change in the city spatial structure brought by the campuses accelerates motorization either through the dominant use of private cars or two or three wheelers at the expense of transit. This is turn generates more pollution and eventually traffic congestion.

In China the State is by law a monopolist developer; however this approach could be used if a financially autonomous land development agency was to be created. The demand driven advantages of the "campuses strategy", and the absence of risk for the municipality would represent significant advantages. However, in the long run, because of the distortion brought to the city spatial structure, the campus approach is to be discouraged, unless in exceptional circumstances.

7. Summary : Pros and cons of Mianyang and Suining urban spatial strategy

In the context of land ownership as defined by China's constitution and taking into account the rapid pace of economic development in Chinese cities it appear that the strategy adopted in Mianyang and Suining to expand the city will have a better outcome – in terms of the environment, the efficiency of urban land use and financial sustainability – than the alternatives strategies considered. We summarize below the pros and cons of the urban development strategy selected in Mianyang and Suining.

Pro :High Densities resulting in compact cities, improvement of the chance of maintaining a high share of transit, reduces the footprint of cities and in the long run reduces the amount of land converted from agriculture to urban; establishes a system for the direct recovery of primary infrastructure from users.

Con: complex process of resettlement, possibility and perception of unfairness and corruption, possibility of underestimating the value of farmers' housing stock and the contribution of their informal participation in the urban economy

The possible risks of the strategy can be drastically reduced by surveying and evaluating in a very detailed manner the assets of affected farmers. Establishing clear channel of communication between farmers and the municipality, making sure that a fair and independent system of audit, appeal and judicial redress exists should greatly reduce the risk of corruption. In the long run, the advantage of the Chinese approach lay in the efficient spatial structure created by the strategy.

8. Land pricing and compensation paid to farmers : Does the absence of land market distorts the spatial development of Chinese cities? The case of Mianyang and Suining

The system of compensation used to pay for land to be developed is not based on market price as there are no legal possibilities of developing a land market in China at the moment. The price paid for undeveloped land under the current Chinese compensation system reflects the rents value to the present users of the land and the replacement value of the houses they occupy. By contrast, a compensation system based on market price would reflect the future use value of the land rather than the capitalized rent under current use. An example will illustrate the difference between the 2 systems; under the Chinese compensation system the value of a farm of ,say, 200 m2 on a plot of cultivated land of 5000 m2 would be for instance equal to 30 time the value of yearly crops + the replacement value of the farm. Under a market system, the price paid will reflect a share of the anticipated rent under future use minus the cost of demolishing the farm. Under a market price system a plot of land with a view or close to a park will have a higher value than the same plot without these advantages, whatever the current value of the crops. Under a market system the price paid for undeveloped land reflects the potential future use not the current use. At the limit of urbanization the market price of land is equal to the capitalized value of agricultural rent.

The compensation system used in China, when applied fairly, insures the replacement of rents and current assets but does not provide an anticipated share of the potential profits to be derived from the land under a different use. It could be argued that it is more equitable than the market price system as it avoids the large idiosyncratic price

difference paid to farmers based on the future potential of their sites. On the other hand the compensation system may distort land use because the acquisition cost does not reflect future value. In Xining, for instance – the site to be developed in Suining – some parts of the site are located at barely 1 kilometer distance from the city center (we will call it "area A") , others parts are located at 5 kilometers from the center (area B). Two farmers owning the rights of identical plots located in location A and B would receive the same price for their land under the Chinese compensation system. However, under a market pricing system, a farmer located in site A might receive a compensation several time higher than the one received by a farmer located in site B although they had been deriving the same revenue from their land. This apparent inequity of market prices has an advantage in term of land use efficiency. Because the acquisition of land A is far more expensive than the acquisition of land B, the use of land A will have to be much more intense than the use in land B. For instance, in a market economy a high rise office building will be built on land A while individual houses will be built on land B. No such price signals and incentives exists under the Chinese compensation system, and, as a consequence, the land use might not reflect any comparative locational advantage. In economic terms this will result in a misallocation of resources and a general welfare loss. However, we will see in the analysis below that in fact compensation paid for the demolition of existing buildings might mimic market prices and to a certain extent alleviate the problems created by a lack of market pricing in land use efficiency.

Capitalization of compensation paid to farmers

The objective of the following exercise is to calculate the total compensation paid per square meter of land expropriated and to evaluate how this would differ from a market based system where compensation would be based on future use rather than current use and where existing housing would be a liability rather than an asset, as it is the case under the Chinese compensation system.

Under the compensation system established for SUDP displaced farmers receive a complex compensation package which is paid in cash, in kind and in the form of a lifetime allowance. In order to fully evaluate the economic impact of the compensation package it is necessary to convert the total compensation package into a cash equivalent and divide it by the area of the land being taken. This price paid for land could then be compared to what would be paid to farmers under a market pricing system that would reflect future use rather than current rents.

Example of compensation for land and housing in Suining for an average household

Package for a household of	3	persons	average household size: 2.91
Occupying an average of	1,161.35	m2 of land	
With a house of	125.93	m2	
Discount value	4%		

Total Compensation Package

A. Compensation for Land (Lifelong allowance)

pension	Per month	Per year	years	Capitalized	
child	120	1,440	60	32,578	
Adult 1	90	1,080	40	21,376	
Adult 2	90	1,080	40	21,376	
	300	3,600		**75,330**	Rmb

Compensation price per m2 of land

B. Compensation for house demolished

New apartment floor area	125.93	m2		
New apartment market value	1000	Rmb/m2	**125,930**	Rmb

C. Total compensation

Compensation for land (lifelong allowance)	75,330	64.86	Rmb/m2
Compensation for housing	125,930	108.43	"
Total compensation value	**201,260**	173.30	"

Table 2: capitalized farmers' compensation package in Suining

Farmers receive two types of compensation: the first one compensates the foregone income of the land they cultivated, the second one compensate for the value of the structures they built on the land allocated to them by the village collective. Table 2 illustrates how the compensation formula works in practical term for a farmer. The example of Table 2 is based on the average plot size, average floor area house size and average household's size (2.91 in Xining, rounded to 3 in this example) as calculated from the data base contained in Suining's RAP report.

The first type of compensation is a lifelong allowance paid to each member of a displaced household. This allowance is a replacement for forgone agricultural income. The rate is higher for young and older people than for working age adults. Capitalizing the flow of income over 40 years for adults and 60 years for a child, discounted at 4% per year gives a sum of Rmb 75,330 or the equivalent of 64.86 Rmb/m2 for an average plot of 1,161 m2. The agricultural output in Xining district where the SUDP project is located is evaluated at 1.42 Rmb/m2 or, when capitalized over 40 years and discounted at 4%, equivalent to a value of 28.09 Rmb/m2. For the average plot and the average household the compensation is therefore 2.3 times the agricultural land value. It should be noted that the lifelong allowance value is not based on the land area used by a household but on the household's size and the ages of its members. However to be able to evaluate the fairness

and efficiency of the compensation system used in SUDP it is necessary to evaluate the complete package.

In Suining compensation for housing can be paid in two different manners: either as a cash allowance based on the area of the house demolished and the quality of the materials or as a replacement apartment of the same size as the original house (whatever quality or materials were used to build it). The replacement apartment is to be located in the same area as the original house demolished and will benefit fully from all the infrastructure and social amenities provided by the SUDP project. In the case of our average farmer the market value of the new apartment is evaluated at 1,000[4] Rmb/m2 or about Rmb 126,000.

The new apartment given as compensation for the current dwelling will be fully owned by the farmer's household and could be resold freely at market price at any time. Considering the number of established real estate brokers in Suining, it appears that there is a very buoyant new and secondary market for apartments.

If we add the compensation constituted by the lifelong allowance and the market value of the apartment the total compensation in Suining for an average parcel and average house amount to Rmb 201,260 or 173 Rmb/m2 for an average parcel of 1, 161 m2. This is more than 6 times the agricultural price based on agricultural rent. We will see below how that price would compare to the potential market price for undeveloped land in the area. Not surprisingly all the farmers in Suining seems to have selected the replacement apartment formula over the replacement cost of their current dwelling.

We should note that in Suining the compensation package has little to do with the size of land area cultivated; indeed farmers who are not cultivating any land will be compensated the same way as the ones who are cultivating a large parcel (allowance and apartment). However, because of the land to be cultivated was originally allocated by the village collective on the basis of family size , there are not many variations on the average size of land cultivated by different households the way it would normally happen in a market economy (see Figure 2). In addition, the size of land cultivated is usually proportional to the numberof adults in the households. So households cultivating larger land holdings would receive larger compensation through more individual allowances.

[4] Real estate brokers in Suining anticipate that the new apartments in the Xining district will sell at about 1,200 rmb/m2 . We have chosen to use a more conservative value.

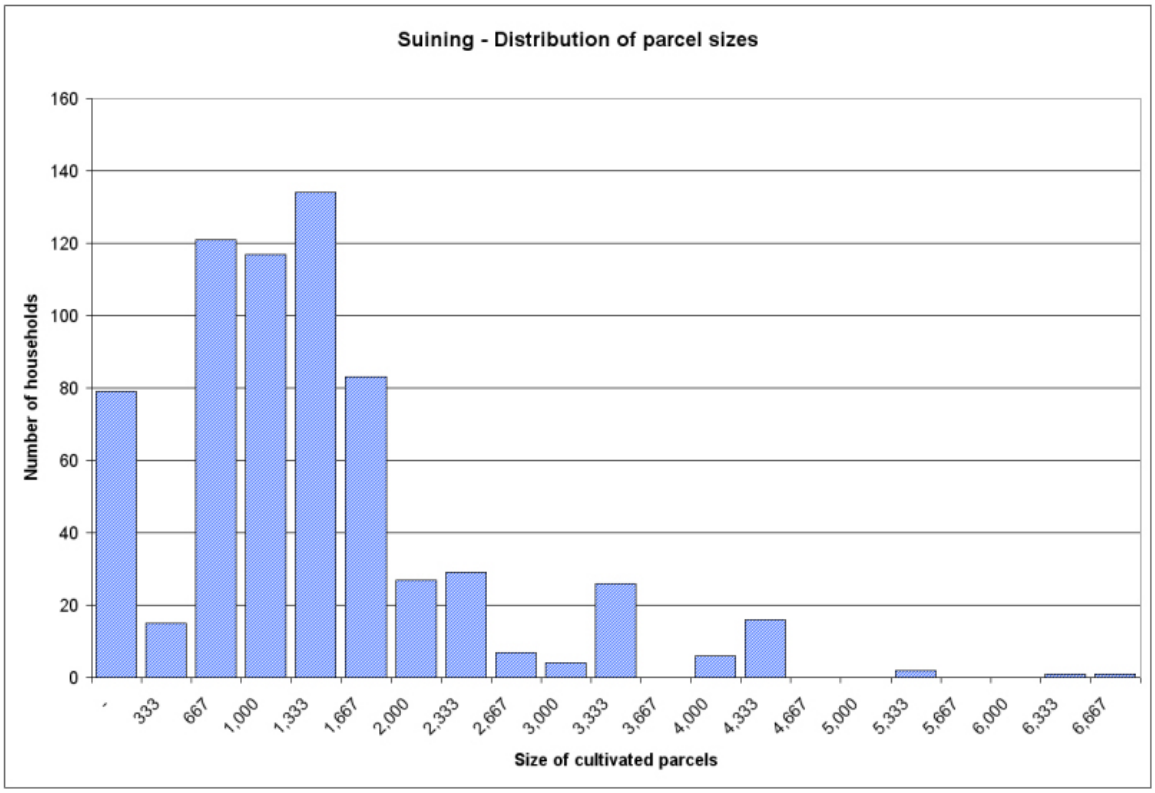

Figure 4: Distribution of farmers' parcel sizes in Suining –Xining (Data sources: Suining RAP annex)

In Mianyang the compensation option selected by farmers is different from the one selected in Suining. Instead of selecting the apartment as compensation, the great majority of households have selected to obtain a plot of land plus cash compensation for the house they occupy. The footprint of the house they built is limited to 25 m2 per person but they can build up to 4 floors. For a household of 3 this would mean a house of 300 m2. Half of it could be rented and generate revenues. A minority of older households have opted for the apartment compensation package. The total compensation in Mianyang for an average household with an average house and plot is presented in table 3.

Example of compensation for land and housing in Mianyang for an average household
(Pionneer Park)

Package for a household of	3	persons	average household size:	2.80
Occupying an average of	2,271.44	m2 of land		
With a house of	127.19	m2		
Discount value	4%			

Total Compensation Package

A. Compensation for Land (Lifelong allowance)

pension	Per month	Per year	years	Capitalized	
child	55	660	60	14,932	
Adult 1	110	1,320	40	26,126	
Adult 2	110	1,320	40	26,126	
	275	3,300		**67,184**	Rmb

B. Compensation for house demolished

Averge compensation for demolition	288.83			36,736	Rmb
Foot print land Area for resetlement	75				
Total plot area	150.00	m2			
Value of land for resetlement of land for res	291	Rmb/m2		37,064	Rmb
Total Housing compensation				**73,800**	

C. Total compensation

Compensation for land (lifelong allowance)	67,184	29.58	Rmb/m2
Compensation for housing	73,800	16.32	"
Total compensation value	**140,985**	62.07	"

Table 3: Capitalized farmers' compensation package in Pioneers' Park - Mianyang

We note that the total value of the compensation package per m2 of land in Mianyang is significantly lower than in Suining. In part, this is due to the larger average parcel size in Mianyang and in part to the selection of the land parcel plus cash rather than to the replacement apartment package. By selecting buildable land rather than apartment farmers anticipate that land value will increase in the area they build and that the possibility through their own savings of building over the years larger structures that they can rent later will increase their revenues in the long range. Examples in older parts of Pioneers' Park where farmers have been rebuilding neighborhoods on urban land given as compensation for relocation confirm that taking the plot + cash package might be a wise economic choice. The detail of the alternative compensation package in the 3 sites in the two cities is provided in Annex 1.

Having evaluated the price per square meter paid to farmers for their land, it is possible to compare this price, first, to the projected auction price of developed land and second, to a theoretical market price that this land would have fetched if there has been a possibility of land market in China.

Does the use of non market compensation for undeveloped land purchase and auction price for disposing of developed land generate windfall profits?

The land developed under in SUDP will be sold at auction reflecting market prices while undeveloped land is acquired from farmers under the administrative formulae described above. Because the sequential use of market and non market transaction on the same piece of land it is legitimate to be concerned that the municipality who fully control the land development agencies might be generating large windfall profits at the expense of the farmers. Table 4 shows in the case of SUDP this is not the case. The anticipated profit margin varies between 27% for Mianyang Pioneer Park to 17% for Suining-Xining project. It should be noted that the evaluation of the cost of development includes only the cost financed under SUDP. The difference in profit margins between the two cities reflects the highest cost of resettlements combined to a lowest ratio of salable land in Suining. A relatively large part of the land developed in Suining will be used as public parks or for buffer protection along rivers banks hence the low ratio of salable land, which significantly decreases the profit margin.

Comparison between undeveloped land costs and sale price of developed land

	Units	Mianyang PP Park	Mianyang SEDZ	Suining -Xining
Total Project area	Ha	483.33	560	351.38
Area to be acquired	Ha	483.33	435.7	262.36
Total Resetlement costs	Rmb	288,968,423	284,737,969	301,837,320
Average Resettlement costs per m2 acquired	Rmb/Ha	60	65	115
Resettlement costs per gross m2	Rmb/m2	60	51	86
Total cost of infrastructure (WB loan) Rmb/m2	"	76.8	80.2	104.0
Domestic electricity	"			
Gas network	"			
Off site infrastructure cost	"			
Landscaping of parks	"			
Leveling of salable land	"			
Building of community facitilites	"			
Total developed land cost per gross m2 (Rmb/m2)	"	137	131	190
Ratio salable land/total land		64%	68%	46.6%
Total developed land cost per net salable m2		213	193	407
Average expected price of developed land		291	240	489
Margin between cost of developed land and market price		78	47	82
Margin as a percentage of market price		27%	19%	17%

Table 4: Surplus anticipated by selling developed land at market price in SUDP project

The costs of development shown on table 4 include only the infrastructure for roads, sewers and storm-drainage together with underground concrete channels for gas electricity, water and telecommunication. A number of access roads in Mianyang are considered as sunk costs and are not included in the costs of Table 4. In addition the municipality will have to fund the building of kindergarten and primary schools from its own budget on the land reserved in the land development projects. A large part of the expected “profits” shown on table 4 will be absorbed by these additional costs.

If a land market existed in China, would the farmers obtain a higher price for their land?

This is of course a theoretical question because if the Government of China decided to modify its land ownership policy (requiring probably a constitutional amendment) it will require several years for land markets to operate efficiently. However, it is interesting to compare a market price for land based on its anticipated value under urban use with the price paid to farmers under the compensation formula described above.

The following hypothetical calculations are based on average plot size and floor area size in Suining SUDP site, and average apartment prices in different areas of the city of Suining. Ideally, calculation should be made for each individual household in the project as the difference in compensation varies greatly depending on households' sizes and current housing floor areas. The different systems – markets or compensation formula – might create a different set of winners and losers.

The theoretical calculation of the potential price of undeveloped land is based on the premises that the price of undeveloped land can be derived from observing the spatial variations in the price of housing in Suining. There is indeed a vibrant apartment market in Suining for both new and existing units. Many real estate brokers compete for business and current prices are openly published.

The theoretical model is based on the monocentric-city model initially developed by Alonso (1964), Mills (1967), Muth (1969), Wheaton (1974) and on the extension of the model developed by Brueckner (1987) and Bertaud and Brueckner (2005).

The price P per unit of floor space varies with distance *d* according to the formula :

$$P_{(d)} = P_{(0)}\, e^{-\gamma d} \qquad \text{equation (1)}$$

Where $P_{(0)}$ is the price at the center of the city and γ is the price gradient, e is the base of natural logarithms.

From the variations in price per m2 of floor space for apartments in Suining it is possible to derive the curve A shown on Figure 5 which corresponds to the above equation.

Curve B showing the variations of developed land prices L at distance *d* from the city center is derived from equation (1)

$$L_{(d)} = (P_{(d)} - K).\, F_{(d)} - J_h.P_{(d)} \qquad \text{equation (2)}$$

Where K is the cost of construction per m2, $F_{(d)}$ is the floor area ratio at distance *d* and J_h is the profit margin of the house builder. $F_{(d)}$ varies with distance *d* following the same type of negatively sloped exponential equation as P.

Curve C on Figure 5 shows the price of undeveloped land M at distance *d* is produced by the following relationship:

$$M_{(d)} = L_{(d)} (S - J_l) - I \qquad \text{equation (3)}$$

Where S is the percentage of salable land, J_l is the profit margin of the land developer and I is the cost of infrastructure per square meter.

Line N on the graph of Figure 5 represent the price of agricultural land and does not varies with distance.

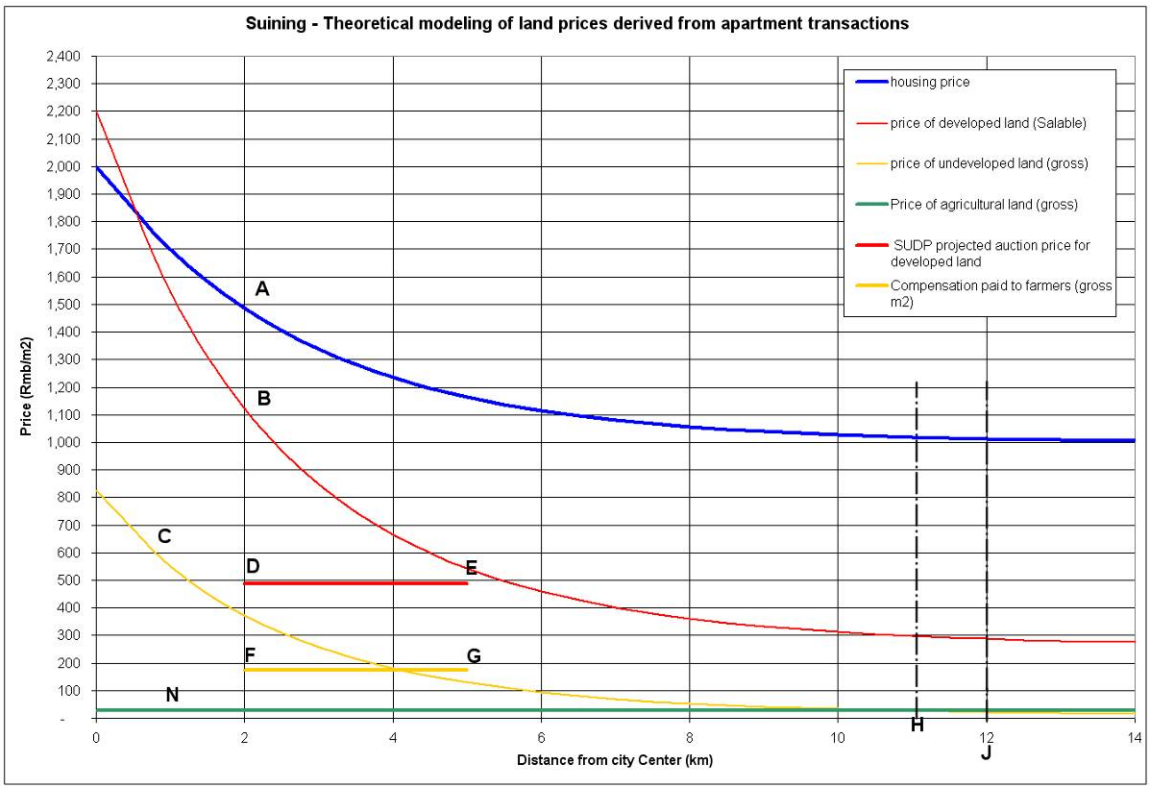

Figure 5: Theoretical representation of price gradient in a market economy using parameters from Suining housing market

The vertical line J on the graph shows the current limits of urbanization in Suining at a distance of about 12 km from the city center. The curve C, representing the market price of undeveloped land, intercepts line N at point H located at about 11 km from the city center. This implies that under current market conditions there will be no construction of formal apartments by developers beyond 11 km from the center. This is roughly confirmed by observation and by real estate brokers. New constructions beyond 10 km appear to be mostly built by farmers at lower standards or are older structures built before housing privatization.

The segment FG represents the average value of the compensation provided to farmers in Suining. F and G are located at a distance about equal to the inner and outer borders of the SUDP site. The segment FG is horizontal as the compensation does not take directly into account location. We see that on the theoretical graph the segment representing the compensation is roughly consistent with the projected market curve, although the part of the site located the closest to the city center (point F) should fetch a significantly higher price under the theoretical model.

The segment DE representing the average price expected at auction for salable developed land is significantly lower than curve B which represents the theoretical variations of developed land price in Suining under market conditions. This difference has several possible explanations. The profit margin of house builder might be larger than the one use in the model or/and the cost of construction might be also higher. A higher profit margin and/or higher cost of construction would lower curve B closer to segment DE. However, as curve C which is derived from curve B would be also lower, intercepting N at a point much closer to the city center, which is not consistent with observation.

Another possibility is that at auction, developed land will fetch a much higher price than the one projected by the SUDP preparation team.

From this theoretical exercise we can conclude that well functioning markets for land, developed land and housing would probably provide an improvement in resource allocation compared to the current hybrid system. However, it seems that the current compensation paid to farmers is not so far from the price that farmers would get from a land market. While the current system might contribute to a certain extent to misallocate resources, it may be perceived as fairer or at least more equalitarian as farmers are compensated on the basis of family size and house floor area rather than location and land area. Under the current compensation system the larger households with the smallest to average house receive comparatively more benefits than households with very large houses and large land parcels. The use of market pricing would of course reverse this situation; small land owners located in the farther part of the site would receive a fraction of the compensation received by large land owners located closer to the city center.

To be able to better document the argument between current hybrid compensation system and free land markets it will be necessary to carefully monitor the auction of land during project implementation and the transaction prices of housing. It would then be possible to build a better calibrated model to compare in a more convincing manner the outcome of land markets with the current compensation system. A case might then be built to either modify current practice or rely entirely on free markets with some safety nets built-in.

The formula used for compensating farmers might mimic the market

It is surprising that the compensation system which is based on uniform normative administrative rules results in a price for land which is not far from the one that would be obtained through markets. In fact the formula used for compensation in Mianyang and Suining might unwittingly be mimicking markets. Here is why. The largest benefit in the compensation package is for the replacement of housing. Land itself is compensated through an allowance which is not proportional to land area but to family size. Therefore households on small plots with large housing get compensated at a higher rate per square meter of land than households with a small house on a large plot. The denser are the farmer settlements the higher the compensation they obtain. Farmers, as we know, already get the larger part of their income from urban employment. We can be observe that in Mianyang and Suining areas which are closer to the city have more farmers who have constructed larger home closely clustered together than in areas which are further away. Farmers tend to cluster more densely closer to the city center in order to be closer

to jobs and to market their vegetables. They also tend to build more workshops and garages in areas which are easily accessible from the city center. The more densely clustered areas generate the higher compensation per m2 of land under the compensation system. Areas closer to the center of the city would also fetch a higher price when traded on a free market because of their location. Therefore the two systems unintentionally converge.

9. Conclusions

We have shown that the total area of land to be developed under the proposed SUDP project is consistent with expected demand in the 2 cities during the project period. The relatively high densities used in the project sites will result in a smaller urban footprint, and shorter traveling distance and shorter infrastructure network, improving overall land use efficiency. More indicators should be developed during project implementation to refine the demand projection process. In particular jobs per hectare for various use of land should be carefully monitored. Other indicators could be developed such as the relationship between average floor area consumption and average household income. Careful monitoring of the project results could evolve into the development of a systematic methodology that could be used in land development project in China.

The strategy used in Mianyang and Suining to develop land has been tested against several alternatives used in cities outside China. In the Chinese context, it appears that the benefits of the spatial land development strategies to be used in the two cities are much higher than their costs. The risk inherent to the strategies has been also evaluated and adequate measures have been taken to reduce these risks to a minimum.

Further work need to be done on the urban economic side to develop a system where greater land use efficiency could be achieved by developing a pricing system for land which, if not based on market transactions, at least mimic the market enough to procure the economic efficiency that would be expected from a fully competitive real estate market.

Annex

Mianyang PP Resettlement costs (Demolition compensation)			
	Phase 1	Phase 2	Total
Land to be acquired from Farmers (ha)	**79.28**	**404.05**	**483.33**
House demolition (m2)	51,474	219,166	270,640
Other structures demolition (m2)	8,500	36,191	44,691
Total Demolitions (m2)	59,974	255,357	315,331
People Affected	1,126	4832	5,958
Number of Households	402	1,726	2,128
House Area per Household (m2)	128.00	127.00	127.19
Land per household	1,971	2,341	2,271
Average House demolition compensation per m2	288.83	288.83	
Total House compensation cost	14,867,344	63,301,743	78,169,087
Average other structure compensation per m2	360	360	
Total Other structures demolition compensation	3,060,000	13,028,779	16,088,779
Cost of Land for resetlement	11,581,714	49,700,571	61,282,286
Capitalized average Lifetime Allowance per person	22,395	22,395	
Total capitalized cost of Lifetime allowance	25,216,555	108,211,716	133,428,271
Total compensation package	54,725,613	234,242,810	288,968,423
Total compensation package per household	136,085	135,737	135,803
Compensation Cost per m2 acquired (rmb/m2)	69.03	57.97	59.79

Suining Resettlement costs (Replacement Apartment)

	Phase 1	Phase 2	Total
Land to be acquired from Farmers (ha)	73.1	189.28	262.38
House demolition (m2)	84,119	151,850	235,968
Other structures demolition (m2)	44,186	53,147	97,334
Total Demolitions (m2)	128,305	204,997	333,302
People Affected	1,946	4,213	6,159
Number of Households	668	1,446	2,114
Current House floor Area per Household (m2)	125.93	105.00	111.61
Land per household (m2)	1,094.31	1,308.82	1,241.04
Construction cost of new Apartments	500	500	
Total Construction cost	42,059,303	75,924,928	117,984,231
Average other structure compensation per m2	300	300	
Total Other structures demolition compensation	13,255,919	15,944,235	29,200,153
Capitalized average Lifetime Allowance per person	25,110	25,110	
Total capitalized cost of lifetime allowance	48,864,201	105,788,735	154,652,936
Total compensation package	104,179,422	197,657,898	301,837,320
Total compensation package per household	155,957	136,675	142,767
Compensation Costs per m2 acquired (rmb/m2)	142.52	104.43	115.04

Suining Resettlement costs (Demolition compensation)

	Phase 1	Phase 2	Total
Land to be acquired from Farmers (ha)	73.1	189.28	262.38
House demolition (m2)	84,119	151,850	235,968
Other structures demolition (m2)	44,186	53,147	97,334
Total Demolitions (m2)	128,305	204,997	333,302
People Affected	1,946	4213	6,159
Number of Households	668	1,446	2,114
House Area per Household (m2)	125.93	105.00	111.61
Land per household	1,094	1,309	1,241
Average House demolition compensation per m2	288.83	288.83	
Total House compensation cost	24,296,019	43,858,870	68,154,889
Average other structure compensation per m2	300	300	
Total Other structures demolition compensation	13,255,919	15,944,235	29,200,153
Capitalized average Lifetime Allowance per person	25,110	25,110	
Total capitalized cost of Lifetime allowance	48,864,201	105,788,735	154,652,936
Total compensation package	86,416,138	165,591,840	252,007,978
Total compensation package per household	129,365	114,502	119,198
Compensation Cost per m2 acquired (rmb/m2)	118.22	87.49	96.05

Mianyang SEDZ Resettlement costs (Demolition compensation)			
	Phase 1	Phase 2	Total
Land to be acquired from Farmers (ha)	**81.73**	**353.34**	**435.07**
House demolition (m2)	74,545	241,557	316,102
Other structures demolition (m2)	9,386	94,340	103,726
Total Demolitions (m2)	83,931	335,897	419,828
People Affected	1,265	3656	4,921
Number of Households	452	1,306	1,758
House Area per Household (m2)	165.00	185.00	179.86
Land per household	1,809	2,706	2,476
Average House demolition compensation per m2	288.83	288.83	
Total House compensation cost	21,530,767	69,769,071	91,299,837
Average other structure compensation per m2	360	360	
Total Other structures demolition compensation	3,379,089	33,962,349	37,341,437
Cost of Land for resetlement	11,797,029	34,094,811	45,891,840
Capitalized average Lifetime Allowance per person	22,395	22,395	
Total capitalized cost of Lifetime allowance	28,329,433	81,875,421	110,204,854
Total compensation package	65,036,317	219,701,652	284,737,969
Total compensation package per household	143,954	168,262	162,013
Compensation Cost per m2 acquired (rmb/m2)	79.57	62.18	65.45

Land Use and Disposal of Land Use Rights in SUDP Land Development Component

									Disposal of Land Use rights		
		unit	Mian Yang Pioneer Park	Mianyang, Southen Economic Development Zone	Suining, Xining District	Total			Auction	Negociated Price	Transfer
1	Area (ha)	ha	483	559	351	1,393	100%		ha	ha	ha
2	Land for which land use rights will be sold	ha	292	365	146	803					
3	Ratio of salable land over total land developed		60%	65%	42%	58%					
4											
5	Residential	ha	172	103	99	374	27%		374		
6	Residential reserved for resetlement	ha	18	15	18	50	4%				50
7	Commercial, offices	ha	35	126	47	208	15%		208		
8	Industrial	ha	85	136	-	221	16%			221	
9	Roads	ha	61	104	67	233	17%				233
10	Open space parks and water bodies	ha	77	54	83	213	15%				213
11	Community facilities	ha	35	21	38	94	7%				94
12			483	559	351	1,393	Total	1,393	582	221	590
13								100%	42%	16%	42%

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