



Rural-Urban Migration and Domestic Land Grabbing in China: Drivers, Impacts and Trade-offs

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Rural-urban migration and domestic land grabbing in China: drivers, impacts and trade-offs

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Abstract

Domestic land grabbing is defined as the process of land expropriation and displacement put in place by governments within their country borders to supposedly enhance development. While development-induced displacement occurs all over the world, China is responsible for a large fraction of such type of displacement and resettlement projects. Urban sprawl and land commodification for food security and agricultural modernization are the main consequences of domestic land grabbing in the country. Albeit the attention towards the implications of land grabbing and urbanization on social stability of China has recently increased, studies which try to identify the main drivers of domestic land grabbing and urbanization, as well as to look at the impacts, trade-offs and migrant views, are still rare. These aspects need further study in order to provide better insights into the relationship between rural development, urbanization and land expropriation. Drawing on a case study from a rural island in east China, this paper analyses the impacts of displacement and resettlement projects in relation to: (i) land tenure rights and compensation measures; (ii) rural workers livelihood and the *hukou* registration system; (iii) environmental degradation. Results reveal that landless people and rural areas in general are facing the risk of unemployment, food self-sufficiency problems, the mismanagement of resettlements, and environmental degradation.

1. Introduction

In China, rapid economic growth, socio-economic inequalities and environmental degradation are undermining social stability and sustainable urbanization processes (McGranahan and Tacoli, 2006). Urbanization, referring to a growth of the population living in urban areas, is usually one of the major social change in transition countries, moving from a planned to a market economy. In China rural-urban migration is the main factor explaining the increasing urban population (Goldstain, 1990; Chan, 2011) and literature identifies economic opportunity as the major driver of rapid urbanization in the country (see for instance Fan, 1996). However, to better understand internal migration in China it is also important to distinguish between forced and voluntary migration. The transition to industrialization and urbanization has been marked by forced displacement and by conversion of agricultural land into land allocated for industrial projects and urban real estate development. Within the last years some 50 million people have been internally displaced from rural to urban areas (Stanley, 2009) and it is estimated that urban sprawl due to the development of infrastructures and other projects accounts for 4 million hectares of land (Li, 2011). On the contrary, no estimations exist (yet) in relation to internally displaced people for rural development purposes, food security and agricultural modernization. This is the case in which the government is supporting migration as a formal rural development strategy to (i) boost

agricultural intensification, and (ii) to reduce rural-urban inequalities (China's 12th Five-Year Plan, 2010). In both cases, i.e. displacement due either to urban sprawl or agricultural intensification, a process of domestic land grabbing can be underlined. Domestic land grabbing is defined as the process of land expropriation put in place by governments within their country borders to supposedly enhance development (Deininger, 2011), and it is usually accompanied by displacement and resettlement projects. In China, rural-urban migration, land expropriation and displacement policies are associated with social instability and conflicts. Due to the household registration system (Hukou), rural migrant workers that have lost their land after expropriation are often excluded from social benefits and usually have access to low-wage urban jobs only (Li, 2011; Chan, 2010). Moreover, compensations to people displaced are usually no adequate and the process of determining and implementing these compensations have been described as arbitrary, ad hoc and lacking transparency, creating within the last years extensive social and political tensions (Guo, 2001; Chan, 2003). Consequently, rural migrants become at risk by increasing their social vulnerability to unemployment and food security (Chan, 2011, 2010; Matuschke, 2009). These kind of problems have surfaced quite prominently all over the world in the past two decades, and in particular, in rapidly urbanizing countries such as China. Various sources of information have reported a substantial increase in the number of conflicts related to land grabbing in China (e.g. Heurlin C. and Whiting S., 2007; The Diplomat, 2012). Albeit the attention toward the implications of land grabbing and urbanization on social stability of China has recently increased (see for instance Li, 2011), studies which try to identify the main drivers of domestic land grabbing and urbanization, as well as looking at the impacts, trade-offs and migrant views are still rare. These kind of analyses may help to achieve a better understanding of this issue for the design and implementation of a more worthwhile development strategy, trying to avoid inequality and social tensions. To fill this gap, this paper analyses the main drivers, causes and effects of rural-urban migration and domestic land grabbing. In particular, while literature on rural-urban migration highlights economic opportunity as the only ultimate driver of urbanization in China, the paper explains the role of food security as an additional driver of the rural-urban movements and it discusses how the increasing demand for workers in the industrial and services sectors, the presence of rural-urban disparities and food security problems are triggering domestic land grabbing.

Furthermore, employing empirical data derived from questionnaire surveys and in-depth interviews in a rural island nearby Shanghai, it examines both (i) the socio-economic and environmental implications of domestic land grabbing due to rural development purposes, as well as (ii) the views of migrant people who either had been or were to be displaced by urban development projects.

Surveys were realized in two different periods, 2008-2009 and 2012 in Chongming island. As 2005 the island has been included in the Shanghai Development Plan and since then various urban and rural development projects have been started, leading to the displacement of part of the population. In the first survey, 104 local

households from a rural village who were to be displaced by agricultural modernization project were interviewed to shed light on the environmental, social and economic trade-offs of domestic land grabbing. In this case empirical data have been employed to analyse the aforementioned trade-offs at multiple levels, village and household, by using a societal metabolism approach. The societal metabolism can be considered as a method which analyses the interactions between society and its material environment measuring their matter and energy exchanges. The application of the metabolic concepts to the analysis of rural systems, land grabbing and the agrarian change has received an increasing attention from a diverse range of disciplines, focusing on the farming practices as a whole set of ecological and social relations, as well as a way to specify how humans interact with non-human nature and to what effects (e.g. Schneider et al., 2010; Giampietro, 2003). According to this approach, rural systems are analysed based on their metabolic profiles determined by energy flow, human time and monetary flow. Within the second survey (2012) 45 households, who had yet to be relocated and those who had already been relocated, from a rural village and a residential area respectively, have been interviewed to shed light this time on livelihood changes, compensation measures, hukou registration system, as well as the perceptions and future expectations of local people in relation to land dispossession and displacement policies.

The rest of the paper is organized as follows. Sections 2 and 3 discuss the main facts and figures related to the urbanization process and the rural development strategy of China. Thereafter, section 4 presents a conceptualization of the link between rural-urban migration and domestic land grabbing in China and it analyses, from a qualitative perspective, its main drivers, causes and impacts. Section 5 presents the case study and the survey findings obtained. Closing remarks follow in section 6.

2. Rural-Urban migration and urbanization in China: facts and figures

China is one of the country all over the world which is urbanizing at the fastest rate.

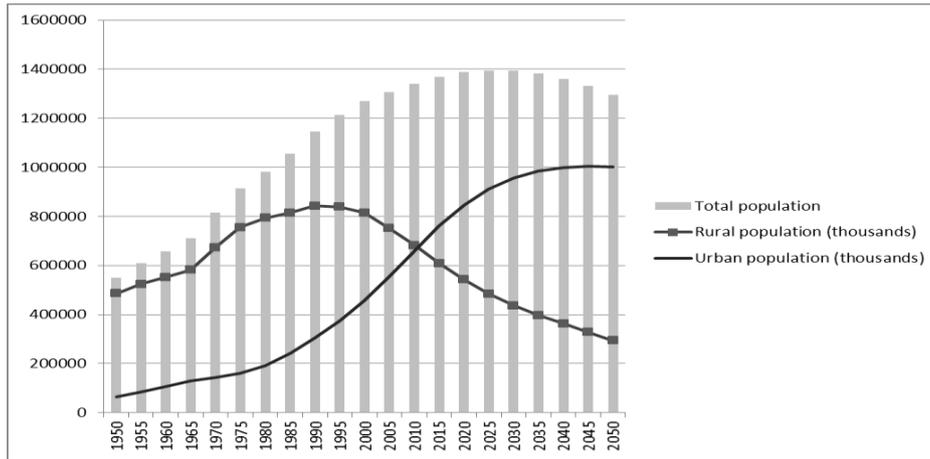


Figure 1 Rural-Urban population in China (United Nations data and projections, 2012)

According to United Nations data, the average annual growth rate of urban population in the period 2005-2010 has been around 3.44 per cent (United Nations, 2012), with a decreasing trend for the subsequent periods. From 2011 onward, China is mostly urban than rural, with a projected proportion of urban of 77 per cent in 2050 (Figure 1).

Rural-urban migration is the main factor explaining the increasing urban population, together with the reclassification of rural localities into urban centres (Goldstain, 1990; Chan, 2011). As one can see in the following table, the number of cities has constantly increased during the period 1990-2010, and it is estimated that it will further increase from 2010 onward in line with the urban population growth (Table 1).

Table 1 Urban population (in million) and number of cities (1990-2025 projected), China

Size class of cities	1990	1995	2000	2005	2010	2015	2020	2025
10 million or more								
Number of agglomerations	0	1	2	2	4	6	7	7
Population	0	10,450	24,121	28,939	55,262	87,075	110,325	120,344
5 to 10 million								
Number of agglomerations	2	2	5	7	10	9	11	17
Population	14,611	13,818	34,624	51,611	68,756	64,332	78,761	117,768
1 to 5 million								
Number of agglomerations	32	45	57	67	80	97	121	139
Population	60,024	88,116	111,756	137,060	152,186	193,162	236,440	257,270
500,000 to 1 million								
Number of agglomerations	38	54	90	117	141	173	198	218
Population	26,734	35,612	59,912	79,407	96,121	120,502	139,051	153,799
Fewer than 500,000								
Population	201,447	227,870	224,912	259,001	287,962	296,508	281,786	262,622

Source: United Nations data and projections, 2012

The process of internal migration can be acknowledged in two main types in China: "voluntary" migration and "forced" or "planned" migration (Fan, 1996; McGranahan and Tacoli, 2006). People can either choose to move ("voluntary migration") or be forced to move ("forced migration"). The former refers to the migration, not sponsored by the government, of rural people, also known as self-initiated migrants, which decide to move predominantly in search of better and most remunerable jobs than those prevailing in the countryside (Fan,

2005). In China, the major factors of voluntary rural-urban migration have been identified in literature as the fast growth of disparities in wages between rural and urban population and between different regions, as well as the increasing demand for workers in the industrial and service sectors of cities, highlighting economic opportunities as the main driving force of internal migration (Fan, 1996; Chan, 2011).

Historically, migration policy in China, based on the household registration (*hukou*) system, has been a major obstacle to migration, by preventing rural migrants without *hukou* residency rights from accessing local social benefits, such as public education, social security, pensions, insurance coverage (Chan, 2011; Chan, 2010a; United Nations, 2011). However, in the last 25 years, as a result of the economic growth and the relaxation of the controls of migrants, non-planned migrations from rural areas to cities, referred to as *non-hukou* migration or “temporarily” migrants, have been a large share of the total rural-urban migration (Zhang and Song, 2003; McGranahan and Tacoli, 2006; Fan, 1996). According to Chan et al. (2011), rural migrant workers increased from 53 million to 115 million in the period 1992-2006. Most of the migrants move from their villages to nearby towns, and about a quarter to one third go to big cities located mainly on the coast. Due to the institutional barriers of the registration system explained above, for most *non-hukou* workers social benefits are neglected and the choice of a job is limited to a low salary farm job at home and a low-level job in the city. Commonly, *non-hukou* migration is associated with vulnerable and low level livelihood conditions for migrant workers and their families (Li, 2011; Chan, 2010a).

Besides the voluntary rural-urban migration explained above, forced or planned migration represents an important aspect of Chinese urbanization, and from the beginning of Communist China to the 1970s it has been the main form of internal migration (Fan, 1996).

The term forced migration is used to describe the movements of refugees and internally displaced people (IDPs). Three types of forced migration are identified based on their causal factors: conflict, development policies and projects, and disasters. Among those types, development-induced displacement refers to people who are enforced to move as a result of policies and projects implemented to supposedly enhance development (Stanley, 2009; Robinson, 2003). The most largely diffuse include large-scale infrastructure projects such as dams, roads, ports, airports, mining and deforestation, nature conservation projects, rural development initiatives. These are the cases in which people usually remain within the border of their countries of origin and are referred to as involuntarily displaced or resettled. While development-induced displacement occurs all over the world, China and India are responsible for the large fraction of such type of displacement and resettlement projects. In the case of China, it is estimated that between 1950 and 2000 over 45 million people have been displaced from their homes due to development projects (Stanley, 2009). Development-induced rural-urban migration has been largely diffuse in combination with the undergoing rapid urbanization. In the past two decades the urban sprawl due to infrastructural projects and urban construction, has interested some 4 million

hectares of land, and around 50 million farmers were displaced and lost their farmland (Li, 2011). These numbers are expected to grow in the near future in line with the increasing number of cities and urban population growth, as showed in table 1. Many argue that the extensive use of compulsory land acquisitions has resulted in socio-economic inequalities due to insufficient compensation for the displaced population (Guo, 2001; Li, 2011). Insufficient compensation together with *hukou* restrictions and rigidity, which leads to discrimination and exclusion, make rural migrants and their families economically, socially and legally marginalized and highly vulnerable to the effects of the global economic crisis. According to Chan (2010b) in concomitance with the global financial crisis of 2008-2009, in early 2009 total unemployment of rural migrant workers is estimated to have been 23 million, about 16.4 per cent. Only 2 million out of 14 million workers returned to home villages were able to find a job (Chan, 2010b; Wang, 2010; Hsu et al., 2010). Restrictions to migration, segregation and marginalization, rural-urban disparities and livelihood vulnerability, land expropriation and insufficient compensation represent critical aspects of the rapid economic growth and urbanization. These side effects of economic growth and urbanization are seriously undermining social stability in China (Christiansen, 2009).

3. China's rural development and the urbanization strategy

Increasing the urbanization level of the Chinese society is one of the objectives of the 12th Five-Year Plan for National Economic and Social Development (FYP) (2011-2015), approved in March 2011 by the Communist Party of China's (CPC) Central Committee. This strategy has the main objective of reducing the rural-urban divide and therefore social instability. For example, the average income of urban residents in Shanghai was 1.3 times that of rural residents in 1990, and the gap expanded to 2.3 times in 2010 (Shanghai Statistical Yearbook, 2011). Due to the increasing rural-urban inequalities the government has started to boost rural development. Chinese rural development is made of two interrelated strategies: increasing urbanization and agriculture modernization and intensification (China's 12th Five-Year Plan, 2010).

The urbanization strategy will ensure an improvement of the income level of rural population through their occupation in the industrial and services sectors of cities with an estimated creation for 2015 of around 45 million of new urban jobs (Casey and Koleski, 2011). The achievement of modernization and higher productivity of the agricultural sector requires the introduction of better farming techniques, through mechanization and improved irrigation systems, as well as larger plots than those prevailing in rural areas of China (van Westen, 2011; Lohmar et al., 2009; Tan et al., 2006). The modernization of the agricultural sector is also linked to food security. Agricultural productivity growth in China has slowed in recent years (Lohmar et al., 2009). The per-capita cultivated land is far below the world average and this could create big challenges to

ensure food security for the increasing urban population (Chen, 2007). Therefore, China's agriculture is an important issue in terms of productivity as well as availability of arable land. With regard to land availability, the 12th FYP strategy aims to keep arable land at no less than 120 million ha by 2015, reducing as much as possible urban sprawl and land conversions from agricultural to non-agricultural use (Chinese Government's official web portal, 2008). Hence, the major stated reasons for the Chinese government to promote urbanization are mainly three: (i) to reduce the growing rural-urban gap; (ii) to boost agricultural productivity combining fragmented plots into ones suitable for mechanization and intensification; and (iii) to guarantee cities' food security.

4. Rural migration and domestic land grabbing: drivers, causes and impacts

From the discussions above, it follows that the land resource is a fundamental asset for supporting the economic growth and urbanization process of China. In this context, planned rural-urban migration centred on displacement and resettlement projects represent an essential vehicle to make land around the cities and agricultural land available for urban expansion as well as food security purposes. Even though urban expansion has also a negative consequence on food security. Many scholars have showed that accelerated urbanization in terms of city expansion along with economic growth have reduced dramatically the availability of agricultural land over the past two decades (Tian et al., 2002; Tan et al., 2005; Chen, 2007; Christiansen, 2009) undermining food security (Chen, 2007; Christiansen, 2009; Matuschke, 2009), as well as increasing environmental degradation and social vulnerability (Chen, 2007; Li, 2010). These aspects make land use planning in China complex and critical for both economic growth and the achievement of development goals. For what concerns the food security problem, the Chinese government plans to manage it increasing agricultural productivity through a process of agricultural modernization and intensification. However, this strategy leads to further migrations, land displacement and resettlement projects due to the necessity of merging small traditional collective plots into ones suitable for intensive and modern agricultural practices.

Taking all the above into consideration, figure 2 tries to provide a conceptualization of the main drivers and secondary causes of voluntary and forced internal migration in China, as well as how these causes and drivers lead to specific effects in terms of land use and land displacement practices.

According to that classification, while the ultimate drivers of rural-urban migration are mainly economic growth (as literature suggests, e.g. Fan, 1996, 2005) and food security, the secondary causes of it can be identified in: (i) the increasing employment opportunities in the industrial and service sectors and rural-urban wages disparities (Fan, 1996) and (ii) the modernization of the agricultural sector (van Westen, 2011; Lohmar et al., 2009).

Specifically, if we look at the effects of urbanization from a land use perspective, these can be highlighted in: (i) the expansion of cities and (ii) the land use change in rural areas, from traditional to intensive methods, for food security purposes. In both cases, a process of *domestic land grabbing* can be acknowledged. The term *land grabbing* is generally used to describe the processes of acquisitions or leasing of large portions of land that are carried out by foreigner states, transnational corporations or investors especially in developing countries, often also referred to as “foreignisation” of space or land (Cotula,2009; Zoomers, 2010; World Bank, 2010). Land grab processes are often accompanied by large-scale land expropriation and people displacement to make room for infrastructural projects, intensive agricultural productions for biofuel and food for export, or minerals extraction (GRAIN, 2008). While foreigner land grab has been largely analysed in literature within the last years and all over the world (Cotula 2009; World Bank, 2010; Borras et al., 2010, 2011; von Braun and Meinzen-Dick, 2009), domestic land grabbing processes have received little attention in terms of categorization and estimation, even though there is evidence that in some countries domestic land investors have been more important than foreigner ones (Deininger, 2011; Scheidel and Sorman, 2012).

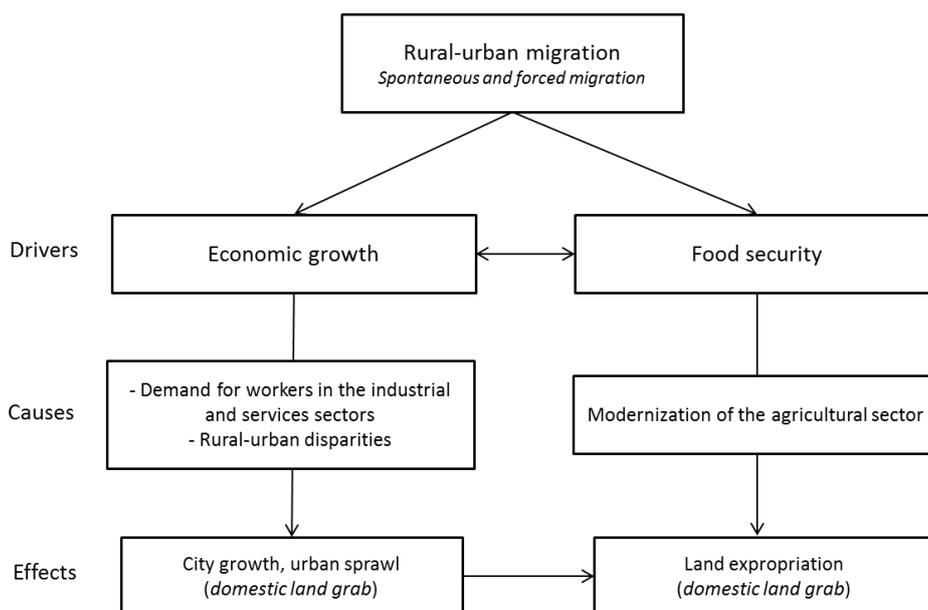


Figure 2 Rural-urban migration and domestic land grabbing in China

Generally, China is identified in literature as a foreigner land grabber and one of the major investors in Latin America, Asia and Africa mostly for biofuel and food production (von Braun and Meinzen-Dick, 2009; Grain, 2010; World Bank, 2010; Hofman, 2011; Hofman and Ho, 2012). This paper refers to domestic land grabbing as the process of land expropriation and displacement put in place by the Chinese government within its country borders for development purposes.

As explained earlier and indicated in figure 2, in China domestic land grabbing can be classified in urban sprawl, analysed in detail by Li (2011), and agricultural modernization. According to Li (2011), domestic land grabbing in China due to urban sprawl has been mainly related to the conversion of farmland to allow the building of factories, urban housing and infrastructures. It is estimated that farmland contributes to around 53 per cent of new land for urban constructions and that 182,000 ha of farmland is converted every year.

The implications of domestic land grabbing and farmland expropriation due to urbanization in China can be analysed taking into consideration the main critical aspects of the rural-urban internal migration (as specified earlier in this paper, see section 2), and specifically: (i) land tenure rights and compensation measures; (ii) rural workers livelihood and the *hukou* registration system; (iii) environmental degradation.

Land tenure, compensation measures and Hukou registration

In China, rural land is regulated under the Household Responsibility System (HRS). Through this system the land officially remains under control of collective ownership which allocates land use rights to each individual households, which, according to the Rural Land Contracting Law (RLCL), have fixed-term contracts to cultivate the land (30 year land-use contracts). This system has been defined as a "quasi-private" property rights (Kung, 2002; Mullan et al., 2011). In China land use rights are in general separated from title (Xu et al., 2009) and they can be reallocated among villagers at every moment depending on demographic changes across families or on specific governmental needs over the land (Tao et al., 2008). This practice leads to an ambiguity and insecurity and to undervalued land assets (Zhu, 2002). According to the Chinese constitution and the Land Administration Law (LAL), land can be expropriated at every moment for "public interest" in exchange of a compensation which is estimated based on the annual productivity of the land. As a consequence, since the law does not allow for the private sale of farmland, compensation results usually lower than a supposed corresponding market value (Chan, 2003). Therefore, most of the time compensation measures are insufficient or even there is evidence that no-compensations are provided (Li, 2011, Mullan et al., 2011). Furthermore, there is no a clear definition of what public interest represents, and there is evidence that most of the time land expropriated is used for non-public urban usage, such as industrial, commercial and residential projects, instead of urban infrastructural development (Cao et al., 2008).

Besides, dispossessed people in general do not have access to official mechanism which might give them the right to claim compensation received by the government (Chan, 2003).

These aspects have led to an increasing evidence of rural conflicts in different regions of the country, where people started to complain about the ongoing land expropriation in their communities (Guo, 2003; Cao et al., 2008; Channel New Asia, 2011; The Diplomat, 2012).

A study realized on the livelihood of a sample of landless peasants has also showed that most of them did not received social security after land dispossession and between them 3.5 per cent resulted without a job after dispossession (Li, 2011). As highlighted earlier, due to the *hukou* registration system rural workers in urban areas in general result economically and socially vulnerable due to the lack of social benefits and to low-wage urban jobs (see section 2 for a detailed explanation of this aspect).

Farmland expropriation, urban sprawl and environmental degradation

Finally, along with rapid urbanization and urban sprawl in China various environmental impacts have been identified in literature, such as resource scarcity, habitat loss, air pollution and land degradation (see as an example Chen, 2003; Ren, 2003; Tan et al., 2005; Xiao, 2006; Chen, 2007; Deng et al., 2009; Liu et al., 2010).

5. Urbanization strategy and domestic land grabbing: the case of Chongming island

5.1 Case study description

Chongming, with an area of 1,185 km² and a total population of 703,400 inhabitants (Shanghai Statistical Yearbook, 2011), is the third largest island in China. It is situated in the Yangtze Estuary and administrated by Shanghai's Municipal Government. By World War II a considerable population living by fishing and cultivation settled on the island. Beginning in 1959–60, extensive recuperations of mudflats areas were made, and a large area was provided with irrigation and drainage ditches, which made it possible to cultivate the land first with cotton and then for grain, fruits, vegetables for the urban market of nearby Shanghai (Chongming, 2009). Nowadays, the economic structure of Chongming is dominated by the agricultural sector which led the economy of the island with more than 50 Per cent of the total gross income produced. The rural population constitutes the 74 per cent of the total population with a number of rural households of 233,762, while rural villages account for 223 (Statistical Yearbook, 2007). The total population living merely on off-farm activities (i.e. industry or trade and services) is very low, underlining the traditional agricultural profile of the island. According to the official statistics, urban people reaches only a 26 per cent of the total population and are concentrated in 16 towns.

The land used for agriculture amount for the 82 per cent of the total land and only 4 per cent is covered by forests. Land tenure is characterised by the presence of collective ownership, even if a process of privatization through land expropriation, intensification of the agricultural sector and urban sprawl is taking place in the island. As showed in table 2 in 2007, 202 ha of farmland have been expropriated and new private plots created.

Table 2 Change in Farmland area in hectares in Chongming (2007)

	farmland beginning of year	reduced area	expropriation	collective plots	private plots
total	50,080	202.8	202.8	43,125	3,686

Source: Statistical Yearbook, 2007

From a socio-economic point of view, Chongming is currently the poorest district of Shanghai. According to the Statistical Bureau of the Shanghai Municipality (Statistical Yearbook, 2007) the average net income of the rural population is very low in comparison to the one of the urban population and the urban-rural gap is increasing over time as showed in figure 3.

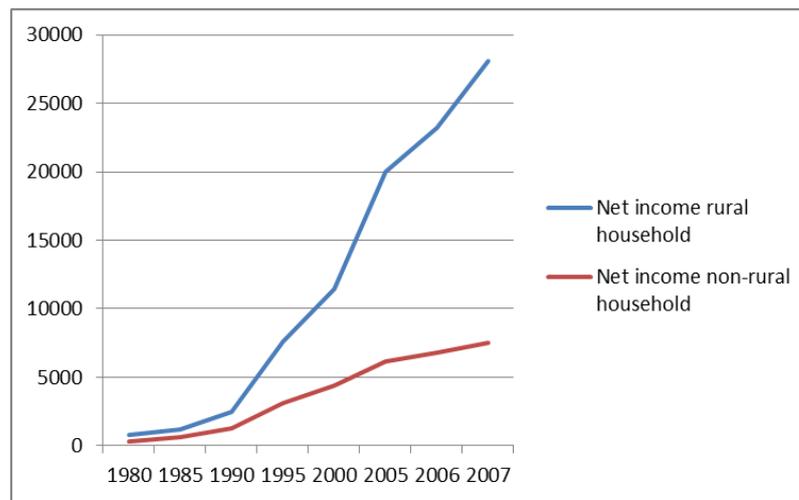


Figura 3 Rural-Urban income gap, Chongming island (Statistical Yearbook, 2007)

From an environmental point of view, the use of a massive amount of fertilizers and pesticides in the agricultural production has put great pressure on the natural resources, with a worsening in the last years of the process of soil salinization and degradation (Sino-Italian Cooperation Project, 2008).

5.1.1 Institutional context and rural development policy

The government of Shanghai has developed a comprehensive master plan for the achievement of a development of the island by the year 2020. The main purpose of the master plan is the reduction of the rural-urban income gap through increasing urbanization and intensification of the agricultural sector, in line with the general guidelines of the 12th five-year plans for rural development described in section 3 (The Master Plan of Development of Chongming, 2005-2020) (State Council of China, 2004). The implementation of the Master plan at the local level is based mainly on the process of urbanization of rural households and villages through forced migration and land expropriation. This process is linked to the realization of large agricultural areas for the

modernization and intensification of the agricultural sector especially in the eastern part of the island. The coexistence of big agricultural areas, managed by agribusiness companies, and rural villages is already present in Chongming. This is the case of the Shanghai Industrial Investment Corporation (SIIC), the largest international investment group company owned by Shanghai Municipal Government, which is managing a large agricultural area called Dongtan, located in southern east Chongming. This area represents one of the biggest agricultural areas in Chongming and one of the most important food supplies for the city of Shanghai.

Moreover, the master plan foresees the concentration of the rural population, currently living in sparsely located rural villages, in towns already present in the island which will expand through rural development projects, as well as new towns which will be located along the coast. The master plan of development of Chongming island follows the guidelines of the Chinese government which promotes the urbanization process as a strategic priority of China's economic development to facilitate economic restructuring and rapid economic growth. The idea is that the promotion of the urbanization process is needed to help more rural surplus labour forces to seek employment in non-agricultural activities and in cities and towns, serving the purpose of reducing the agricultural population, improving agricultural productivity and increasing farmers' income (Liu, 2003)

5.2 Analysis and results

5.2.1 Domestic land grabbing and agricultural intensification: economic, social and environmental trade-offs

Using the societal metabolism principles and concepts, the following sections present the analysis and comparison of the metabolism of different rural household types and land uses based on their income level, time and land use to highlight pathways of rural change linked to rural-urban migration, domestic land grabbing and agricultural modernization processes.

The societal metabolism of rural systems: methodological aspects

The societal metabolism of human societies is a concept used to characterize the processes of energy and material transformation in a society that are necessary for its continued existence (Ayres and Simonis, 1994; Fischer-Kowalski, 1998; Fischer-Kowalski and Haberl, 2007). According to this approach, social systems can be analysed in terms of energy use, material and economic flows. The societal metabolism concept has been extensively applied to the analysis of the links between social activities and resource use, becoming a key concept in sustainability science (Kuskova et al., 2008). It has also been applied in relation to a wide range of

fields of study: material and energy flow analysis (Ramos-Martìn et al., 2009; Adriaanse et al. 1997; Fischer-Kowalski, 1998; Matthews et al. 2000; Scheidel and Sorman, 2012; Iorgulescu and Polimeni, 2009; Recalde and Ramos-Martìn, 2011), industrial ecology (Ayres and Simonis, 1994), economic structural analysis (Duchin, 1998), social ecology (Schandl et al. 2004), rural studies (Grunbuhel and Schandl, 2005; Gomiero, 2001; Giampietro, 2003; Siciliano, 2012). In relation to rural studies, this approach has been commonly used for the analysis of rural systems, moving from conventional approaches, centred mainly on economic variables, toward an integrated perspective (Grunbuhel and Schandl, 2005). In this paper the societal metabolism concept is applied according to the Multi-scale Integrated Analysis of Societal and Ecosystem Metabolism (MuSIASEM) approach (Giampietro and Mayumi 2000a,b). In rural systems' analyses, the MuSIASEM approach is applied considering land, time, energy and money as the basic elements of households' decisions (Giampietro, 2003; Grunbuhel and Schandl, 2005; Pastore, 1999). This is based on the fact that every year rural households have to take two fundamental decisions: (i) how to use the land; and, in most of today rural societies, (ii) how to allocate their time between working (often choosing among off-farm and on-farm activities or a combination of both) and non-working activities. These fundamental decisions are influenced by the initial capital of the household (in terms of available technology and money for investments) and the quantity of land owned by the farmer or he has the rights to cultivate (in case for instance of collective land). Likewise, household decisions are influenced by other variables, such as: (i) the flows of money the working activities will generate, as well as those that are necessary to perform non-working activities and to satisfy family needs, and (ii) the flows of energy (endosomatic and exosomatic energy¹) which are fundamental to sustain such activities. This focus on land use and human activity (formalized as time use) is at the basis of the integrated assessment of societal metabolism of rural systems within the MuSIASEM approach, where the human activity represents the *identity of the social system* and the land use the *identity of the biophysical system* (Giampietro, 2003). For rural households, sustainability has both biophysical and socioeconomic elements, and one element cannot be sustainable without the other (Eckman, 1994).

Data collection and definition of typologies of households

Multi-variate statistical techniques (Köbrich et al., 2003; Usai et al., 2006) have been used for the purpose of the typification process based on information organized into a database. The information used for the classification has been collected in a four months field work realized from October 2008 to January 2009 and

¹ Exosomatic metabolism refers to the energy metabolized outside the human body useful for the production of goods and services, such as the energy used to move a tractor or a machine in an industry. The endosomatic metabolism refers to the energy embodied in food, which is fundamental to support the human life in terms of physiological processes (Mayumi and Gowdy, 1999).

refers to 104 rural households and 277 persons from a rural village, Hongxing village, located in southern east Chongming. Table 3 shows the 8 household typologies obtained by the application of the clustering procedure (for more information on the clustering procedure see Siciliano, 2010) and classified, based on the income generation and human time dedicated to different activities, on off-farm, on-farm and partially off-farm types (table 4). Information collected from the households has been then used to estimate the data at the level of the village. This information has been integrated with data on the use of mechanization, fertilizers, pesticides and human time for intensive agricultural productions obtained by the use of questionnaires submitted to agricultural technicians of the "Dongtan modern agricultural area" located in southern east Chongming island (Siciliano, 2012). This information has been useful to evaluate the metabolic patterns at the level of the village using land, time, energy, and monetary variables as indicated in table 5. In table 5 the "current situation" refers to the current use of the land in the village based on collective plots allocated, by the Household Responsibility System (HRS), to each individual household (see section 4 for a detailed explanation of the land tenure rights system in China). On the contrary, the "intensive agricultural system" refers to the shift of the land use toward intensive practices through land expropriation and displacement according to the Chongming master plan.

According to the clustering and to the subsequent classification procedure, the cluster with a major number of observations/households, 30 per cent c.a., has been classified as off-farm (C2) with a predominance of the realization of industrial activities. However, the sum of the households involved in agricultural activities is higher than the total number of off-farm households (51 versus 35 respectively). Only one household represented by cluster C8 shows the realization of aquaculture. This result is quite strange if we look at the official statistics of Chongming where aquaculture is an important sector in terms of income generation. Aquaculture and fishery constitute, in fact, the 31 per cent of the total agricultural gross income (CMCSB, 2008) in Chongming. However, the same statistics show a reduction of 2.4 per cent between 2006 and 2007. This result can be explained by the fact that in the island there is a further tendency toward the abandonment of aquaculture in the face of an increment of off-farm jobs.

Table 3 Information on household typologies

Clusters	C1	C2	C3	C4	C5	C6	C7	C8
No. of observations	10	26	11	8	15	6	9	1
HH size (average No. of members)	2.9	2.9	2.0	2.3	1.7	2.3	3.0	3.0
THA - Total Human Activity (h/year)	25,404	25,269	17,520	19,710	15,184	20,440	26,280	26,280
Working hours (%)								
Agriculture	13	0	16	8	18	12	0	7
Industry	6	23	0	4	0	0	7	0
Trade & Services	0	0	0	0	0	0	16	15
Aquaculture	0	0	0	0	0	0	0	4
Husbandry	0	0	0	0	0	5	0	0
Others	0	0	5	7	0	0	0	0
Households' chores	9	9	7	13	8	9	9	6
Non-working hours (%)								
Physiological overhead	44	46	45	45	48	47	45	42
Leisure & education	28	22	26	23	26	26	22	26
Total income (RMB ^a /year) comprising virtual income ^b	18,647	31,607	17,424	15,806	8,296	13,532	42,400	51,916
On farm (%)								
Agriculture	57	0	82	27	88	75	0	15
Aquaculture	0	0	0	0	0	0	0	37
Husbandry	0	0	0	1	0	20	0	0
Off-farm (%)								
Industry	43	100	0	30	0	0	48	0
Trade & Services	0	0	0	0	0	0	52	49
Others ^c (%)	0	0	17	43	12	6	0	0
Expenditures (RMB/year)	8,835	14,198	8,400	8,162	3,567	6,443	17,500	22,400
Total Available Land (ha)	1.237	0.027	1.683	0.635	0.763	0.931	0.024	1.654
Land use (ha)								
House area	0.009	0.010	0.007	0.008	0.008	0.008	0.008	0.009
Homestead area	0.018	0.017	0.015	0.016	0.016	0.013	0.016	0.018
Agricultural area	0.605	0.000	0.830	0.306	0.369	0.455	0.000	0.813
Wheat	0.023	0.000	0.091	0.073	0.012	0.067	0.000	0.067
Rice	0.031	0.000	0.094	0.073	0.021	0.056	0.000	0.133
Corn	0.273	0.000	0.297	0.074	0.151	0.128	0.000	0.080
Vegetable	0.277	0.000	0.342	0.082	0.184	0.203	0.000	0.133
Fruit	0.000	0.000	0.006	0.005	0.000	0.000	0.000	0.000
Pond	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.400
Pasture	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000
Livestock number								
Sheep	0.20	0.00	0.27	0.63	0.00	4.17	0.00	0.00
Poultry	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: own elaboration on data from Hongxing village in Chongming island, 2008.

^a RMB-Renminbi (people's money) is the Chinese currency

^b The "virtual income" entry has been evaluated based on the information collected at the household level related to the fraction of the various agricultural products auto-consumed by the household and their average market prices

^c Others: pension and military subsidies, cleaner, accounting

Table 4 Qualitative classification of household types based on the main working activities

Clusters	Classification
C1	Partially off-farm Agriculture
C2	Off-farm Industry
C3	Partially off-farm agriculture and other incomes
C4	Partially off-farm other incomes
C5	On-farm crops
C6	On-farm livestock
C7	Off-farm trade and services
C8	Partially off-farm aquaculture

Table 5 Metabolic patterns at the level of the village

	Energy flow (MJ /ha/year)	Total Human time (h/ha/year)	Working time (h/ha/year)	Non-working time (h/ha/year)	Monetary flow (t.RMB/ha/year)
Current situation village	28,947	47,680	11,269	36,411	57
Intensive agricultural system	166,515	321	321	0	15

Source: own elaboration on data from Hongxing village in Chongming island, 2008.

Assessing the impacts of urbanization policies and domestic land grabbing at the household and village levels

With the information collected at the household and village levels showed in tables 3 and 5, this section analyses: (i) the household typologies obtained with respect to two main aspects which are relevant in the discourse on urbanization, rural livelihood and rural change (see section 4), such as social vulnerability and rural-urban income gap; as well as (ii) the consequences of the introduction of intensive practices in the village in terms of energy consumption and environmental degradation. Social vulnerability refers to the "minimization of risk" related to food security, i.e. the level of self-sufficiency in the production of food (Pastore et al., 1999), as well as to the risk of unemployment due to economic crises and the instability of the labour market (as explained in detail in section 4, these aspects have been identified in literature as critical for rural migrants in China due to the *hukou* registration system as well as the low-level job in the industrial sector). Specifically, with reference to self-sufficiency it is assumed that the higher is the food self-sufficiency of the household, the lower the risk of food insecurity due to food prices instability and economic crises (Matuschke, 2009; Pastore et al., 1999). Likewise, with reference to vulnerability to unemployment, the higher is the income diversification between different working activities the lower the risk of getting unemployed (Ellis, 1998a). In literature diversification is widely understood as a form of self-insurance against risks and shocks (Barrett et al., 2001b; Scoones, 1998; Ellis, 1998a, 1998b). Therefore, it is assumed that a diversification between off-farm and on-farm activities will have a positive effect in minimizing the risk associated with economic crises and structural adjustment policies, which have a disproportionate impact on the urban poor, due to rising food prices, declining real wages and a contraction of industrial and public sector employment and reduced public expenditures on basic services and infrastructure (Wratten, 1995). Finally, the rural-urban income gap is evaluated based on the net income of the different household typologies. This indicator shows, comparing off-farm, on-farm and partially off-farm households, the influence that the urbanization of the rural population could have on reducing the rural-urban income gap. Then, to analyse the efficiency of the household typologies in producing their income, the labor productivity (LP) indicator is calculated, which is the net income generated per hour of work (Pastore et al., 1999). Table 6 shows the performances of the different household typologies with respect to the aspects explained above.

Table 6 Performances of the household types in terms of food security, income generation and productivity

HH typologies	Food self-sufficiency (%)	Income diversification	Net income (RMB/year)	Labour productivity (RMB/hour)
C1	89	very high	9,812	3.89
C2	0	very low	17,409	5.63
C3	89	low	9,024	4.58
C4	89	medium	7,644	4.30
C5	89	very low	4,729	3.12
C6	95	very low	7,089	3.77
C7	0	very low	24,900	6.84
C8	89	very high	29,516	7.74

Source: own elaboration on data from Hongxing village in Chongming island, 2008.

The environmental and economic consequences at the village level related to the introduction of intensive agricultural methods are analysed by the energy used² per ha, the use of fertilizers and pesticides and the labour productivity indicator (Table 7). From an environmental point of view, the indicators chosen reflect the impact of the use of mechanized agricultural methods on fossil energy consumption, as well as the use of fertilizers and pesticides, which is the main cause of soil degradation/salinization in Chongming island (Gullino et al., 2006; Sino-Italian Cooperation Project, 2008; Huang et al., 2008). In both cases, an increase of the indicators reflect a worsening in terms of environmental degradation. The economic aspect is analysed according to the productivity of labour, which is the monetary flow generated per hour of work. An increase of this indicator reflect a better economic performance of the system.

Table 7 Performances of the different land use systems in terms of environmental degradation, energy consumption and economic productivity

Indicators	Current situation village	Intensive agricultural system
Energy use (Mj/ha/year)	28,947	166,515
Labor productivity (RMB/hour/year)	5.05	45
Use of pesticides (kg ha ⁻¹ year ⁻¹)	5.4	7.8
Use of nitrogen (kg ha ⁻¹ year ⁻¹)	219	291

Source: own elaboration on data from Hongxing village in Chongming island, 2008.

According to the data presented in tables 6 and 7, the urbanization of the rural population at the household level is associated with a trade-off between different development objectives. It has positive impact upon household income and labour productivity; however, it has also negative impact upon social vulnerability in terms of food security and income diversification (in the case of income diversification only with reference to partially off-farm households). Likewise, at the level of the village the introduction of intensive agricultural methods, while increasing labour productivity is also associated with higher environmental degradation due to an increase in fossil energy consumption and fertilisers and pesticides use.

² Energy consumption has been calculated based on the following energy inputs: the use of fertilizers, pesticides, the use of tractors, the electricity use for housing and finally the fuel consumption for private purposes. The conversion factors used to evaluate the primary energy (fossil energy) contents per unit of inputs are those indicated in Giampietro, 2002.

5.2.2 Domestic land grabbing and urban development: compensation measures, hukou registration and livelihood changes

As stated earlier the main critical aspects of the rapid urbanization of China linked to land dispossession are related to poor compensation measures, the *hukou* registration and livelihood of landless peasants. This section provides the analysis of domestic land grabbing due to urban sprawl in relation to livelihood changes, compensation measures, *hokou* registration system, as well as the perceptions and future expectations of people already displaced or that are about to be displaced.

The analysis has been performed during a fieldwork realized in June/July 2012 by interviewing 45 households from two different places located in Chongming island: (1) 25 households from a rural village in which people are about to be displaced due to urban development and agricultural intensification; (2) 20 households from a residential area located in Chengqiao town in which people from 5 different rural villages have been already displaced between 2005 and 2010 due either to the construction of new residential areas or industrial development purposes. Table 8 shows a synthesis of the information collected and results obtained from the interviews with local people from the residential area. The results obtained highlights the main conflicting aspects of the displacement process either between resettled people and the state or between people resettled. The first one refers to the compensation measure, 70% of the people interviewed were not satisfied with the compensation they received from the government. The main reasons of complaint refer to the following aspects:

- delay in the provision of the compensation;
- disproportion between government revenues obtained from the alternative use of the land and the compensation provided to villagers;
- the rules about the compensation for demolition and land requisition are not open to the public, lacking transparency. The way the amount of compensation is calculated is unknown to villagers and considered arbitrary, since there is evidence that different compensations rules have been applied for different people depending on their authority (people that work for the government or their relatives usually receive a better treatment than the others);
- compensation is not enough since prices of commodity rise sharply especially for food.

The second aspect refers to the livelihood improvement and services provision after displacement. According to the results obtained 50% of people interviewed declared an improvement of their livelihood condition and services provision after displacement, in particular in relation to: better access to places thanks to public transport facilities; the presence of sports facilities; gas provision; the presence of recreation facilities; the provision of TV cables and the possibility to have access to higher incomes. On the contrary, 50% have

complained about the poor management of the property by the government, the lack of governmental intervention to resolve conflicts between residents, as well as the worsening of their livelihood condition due to the poor compensation received. For instance, most of the unsatisfied people were complaining about the presence of power asymmetries between residents (especially with regard to those working for the government and their relatives), as well as with regard to the use of the public green space for growing vegetables instead for gardens. At the same time, retired and unemployed people who were used to grow vegetables for self-production in their plots before displacement, were complaining about the fact that with only pensions and the poor compensation received by the government, after displacement they cannot anymore afford the increasing prices of commodity, especially for food and started to grow vegetables in the public green space of the residential area. Moreover, displacement has resulted from the analysis to have a huge impact on the employment opportunities of the displaced people. From the interviews it results in fact that a part from a 10% of people already retired before displacement took place, approximately 50% of the villagers (either men or women) that were working in agriculture or industry before displacement, have lost their job becoming unemployed and receiving a pension by the government³. On the contrary, 40% were able to maintain their work in the industry or services sectors. Finally, for what concerns the *Hukou* registration, from the interviews it resulted that the 80% of villagers were provided by the government with a new *Hukou*, passing from rural to small-town *hukou* registration. Thanks to the *Hukou* reform in towns and county-level cities, in fact, the state decided to open the urban *hukou* registration eliminating quota-control, making the change of the *hukou* registration easier especially in county-level cities and designated towns (Liu et al., 2003), such as is the case of Chengqiao town in Chongming island. Therefore, in spite of the cases documented in literature of a difficulty for rural migrant workers to have access to social benefits due to their rural *hukou* registration, this is the case in which after displacement people were provided with a urban *hukou* and therefore with all the benefits of urban residents, such as housing, education, social and medical services. The majority of people stated also that they haven't been informed reasonably early about displacement, therefore they were forced to move. There have also been complaints of the lack of any rights or participation of those displaced in the process of transition.

³ Government provides to people without job a pension of 15 years for persons over 18 years of age; and a permanent pension for women over 55 and men over 60. The amount of the pension is 960 RMB/month.

Table 8 Information on land displacement. Residential area in Chengqiao Town, Chongming island

Number of households interviewed	20
Age	between 36 and 69
Place of provenience and destination	From five different rural villages: Minxi, Yunliang, Mindong, Maoqiao, Xinzha to a residential area in Chengqiao Town
Year of migration	Between 2005-2010
Reasons of migration	Land requisition and house demolition
Type of migration	Forced migration, governmental decision
Projects implemented in the area expropriated	Residential areas (apartments); Industrial areas
Type of land tenure before expropriation	Private housing and land use contracts for agricultural plots
Type of compensation	
<i>Monetary compensation</i>	For land expropriation: between 800-12.000 RMB/mu (on average 5.123 RMB/mu)
<i>Other type of compensations</i>	Contribution for the rent of the apartment in the residential area; pensions for unemployed people; small-town <i>hukou</i>
Satisfaction about compensation	30% of the interviewed have declared to be satisfied with the compensation received; 70% have declared to be unsatisfied
Job before and after moving	10% Already retired before moving; 50% Changed from job in agriculture (especially older people) or industry to retirement or unemployment; 40% Changed from only agriculture or a mix of agriculture and industry to only industry and services or remained in the industrial sector after moving
Livelihood improvement and services provision	50% of the interviewed declared not improvement after moving; 50% of the interviewed declared improvement after moving
Apartment size	Between 61 and 120 m ²
Hukou registration	80% changed their <i>hukou</i> registration form rural <i>hukou</i> to small-town <i>hukou</i> ; 20% did not changed their rural <i>hukou</i> (they are waiting for changing)

Source: own elaboration on data from Chengqiao town residential area in Chongming island, 2012

Table 9 shows the data and information collected in Wannan village by interviewing 25 households during a field work realized in 2012. The information collected regards the main working activities of the villagers, the use of the agricultural plots, as well as their perceptions and future expectations with regard to displacement toward urban areas. From the interviews realized resulted that there is a lack of communication from the government to the villagers about the projects will be implemented in the displaced area. The villagers know that they will have to move soon but they don't know exactly when, where and what kind of alternative projects will be realized in the village. Moreover, for the majority of the villagers, approximately 52%, the perfect living location in the future would be where they are currently living. Nevertheless, 80% of the people interviewed think that displacement will improve their standard of living in terms of the access to better services and higher economic revenues. Furthermore, 60% would like to work in the industrial and services sectors, only 12% as a farmer and 28% to work partially in agriculture and partially in industry or trade and services, which corresponds approximately to the percentage of the current occupations.

Table 9 Information on Wannan rural village and land displacement projects. Perceptions and future expectations, Chongming island

Number of households interviewed	25
Age of the households members	Between 26 and 80
Place of provenience	Wannan rural village
Homestead area (house and farm)	Between 90 and 480 m ² (average of agricultural plot 0.1 hectares)
Job information	15% Off-farm industry; 40% Off-farm trade and services; 13% On-farm; 21% Partially off-farm; 11% others (retirement and unemployment)
Use of the plot	63% agriculture for self-consumption; 25% without agricultural plot; 13% agriculture for cash
Perceptions about displacement	
<i>Perceptions of future changes</i>	The majority of the interviewed are aware of the future change of the village but they do not know exactly what it will be. They think that the area will be used for either reforestation programs (economic forest) or urban constructions
<i>Opinion about displacement</i>	20% of interviewed think that displacement is not good, 80% think that displacement will improve their standard of living in terms of better services and higher economic revenues
Future expectations about job and location	
<i>job</i>	60% to work in industrial and services sectors; 12% to be a farmer; 28% to work partially in agriculture and industry or services
<i>place of living</i>	52% in the village where they are currently living; 48% in a town in Chongming island

Source: own elaboration on data from Wannan rural village in Chongming island, 2012

Summarizing, people perceive that the government will provide them with a fair compensation for the expropriation of the land, a nicer apartment than the one in which they are currently living in the village, as well as better jobs. However, having the possibility of choosing they would prefer to remain in their village, working in the industrial and services sectors even tough maintaining their agricultural plot for self-production and with an improvement of services and living conditions provided by the government.

6. Concluding remarks

Recently, the environmental and socio-economic effects of land grabbing processes have received a great deal of attention, and China has been reported as one of the main actor in land deals in various countries, such as Africa, Russia and East and Central Asia, Southeast Asia and South America (World Bank, 2010; Hofman and Ho, 2012). However, little is known about a phenomenon of domestic land grabbing induced by development and linked to urbanization strategies in the country. While there is evidence of the consequences of the land use changes due to the expansion of cities, i.e. urban sprawl, more systematic evaluations are needed to better understand to what extent urbanization policies have the potential to pace the rural change of the

migrants' home areas and affect rural livelihoods. On this matter, this paper has looked at the urbanization policy, the modernization of the agricultural sector, and the urban expansion of China as a development-induced land grabbing process. In this process, rural people are forced to move from their farmland to urban areas to make room either for intensive agricultural practices to assure cities' food security or for the realization of urban development projects (i.e. urban sprawl). According to various studies, problems of social instability are common characteristics of rural migrant workers in China, which due to a poor definition of land tenure rights and compensation measures, as well as the household registration system (*Houkou*), usually result vulnerable to food security and unemployment (Chan, 2011, 2010a; Matuschke, 2009).

Moreover, the displacement of the rural population is associated with a rural land use change passing from the presence of small peasant farms organized in small collective plots, toward big agricultural areas managed by large farm enterprises. This rural change is linked to a new *emerging rurality* in China (with much less social functions than it had before), in which rural areas are no more functional to the reproduction of rural communities, as it has been until before China entered in the global market, but serve as specialized areas for the production of food to feed the increasing urban population and to support the fast growth of the industrial and services sectors of cities. In other words, the new Chinese *rurality* emerges from a process of rural change which relies upon development-induced urbanization and domestic land grabbing, in which economic growth and food security play a fundamental role as the main ultimate drivers. In this paper, these aspects have been analysed empirically and from a local perspective, investigating the socio economic and environmental implications at the household and village levels, as well as the points of view of people already displaced or that are about to be displaced. Looking at the metabolic patterns of off-farm, on-farm and partially off-farm household typologies, as well as at the modernization of the agricultural sector in a rural island located in eastern China, results demonstrate that a trade-off exists between different development objectives, such as income generation versus environmental degradation, or food security and household vulnerability to food and industrial markets. Specifically, while the new emerging rurality aforementioned have a positive impact on the economic dimension, improving the income of households and land productivity, it also leads to higher social vulnerability as well as fossil energy consumption and environmental degradation.

Moreover, and according to the results obtained by other studies (see for instance Cao et al., 2008), the paper showed that the main critical aspects of the displacement process taking the point of view of resettled people, can be summarized as (i) the presence of arbitrary, ad hoc and inadequate compensations; (ii) the lack of support by the government especially in relation to arising conflicts between resettled people; as well as (iii) the lack of transparency, the ambiguity of the rules either before or after displacement took place; (iv) the lack of any rights or participation of those displaced in the process of transition. Finally, taking the point of view of the people which are about to be resettled, even though they have in general a very positive opinion about

displacement policies, they are also reluctant to change declaring a clear preference toward a maintenance of the status quo but with an improvement in terms of services and housing conditions.

Summarizing, results reveal that landless people and rural areas in general are facing the risk of unemployment, food self-sufficiency problems, the mismanagement of resettlements, and environmental degradation.

Based on these findings, this paper argues that to deal with the environmental and social implications of rapid urbanization and economic growth in rural areas, Chinese policy-makers should consider a better land allocation among different purposes leading to multifunctionality, to move toward a land management in which the social and environmental functions are not completely replaced by economic productivity and food security needs.

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