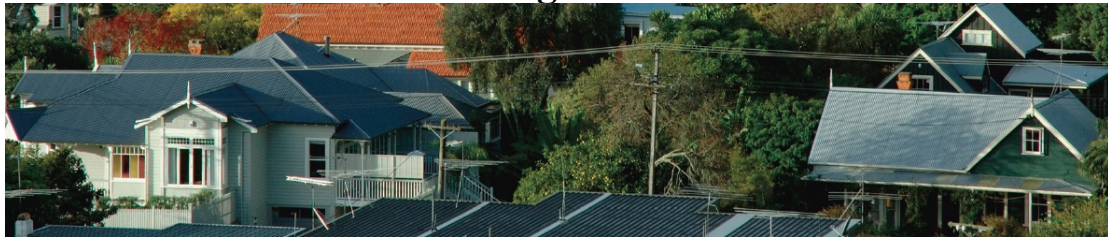


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A Sustainable Future for Housing Settlements: urban or rural?

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1. Introduction

Buildings worldwide account for over 40% of global energy consumption (Roodman & Lenssen, 1995, p.13; WBCSD, 2009, p.1) and 50% of fossil fuel is related to the servicing of buildings (Vale & Vale, 1991, p.23). The large energy consumption of modern architecture has tremendous 'side-effects', contributing to anthropogenic climate change and global warming. The domestic sector consisting of small buildings may seem of less importance than the large commercial building sector, but it in fact consumes most of the energy in the construction industry (Table i). In terms of sustainability, housing is certainly an essential area to tackle if the impact of the built environment on Nature is to be minimised. More significantly, the universality of the domestic sector where everyone lives provides greater advantages than the workplace to change values and behaviour towards sustainability. This has been phrased as 'sustainable development begins at home' (Vale & Vale, 2002). Some sustainable housing design and practices, such as the autonomous house (Vale & Vale, 2000) with its holistic approach to integrating energy, food, transport and behavioural change into

architectural concerns (Guo, et al., 2008), certainly offer the hope of reducing human ecological footprints. The ecological footprint (EF) methodology is a measure of human impact on the earth by using land, the most limited resource in the finite planet (Wackernagel & Rees, 1996, p. 9). The EF has been widely regarded as an effective, policy-informing and planning tool to promote sustainable development (Moffatt, 2000). It is visual and easy for the general public to comprehend and shows the current thinking about social progress is actually regressive in terms of sustainability (Chambers, et al., 2000, pp.1-14). According to this accounting tool, a sustainable common future can be ensured only if everyone in the world lives within the fair earth share (the average footprint) of 1.8 gha/person (GFN, 2009) to 1.9 gha/person (Paredis, et al., 2008, p.62). In order to achieve this, the current focus of sustainable housing on technical and technological solutions (Zhu & Lin, 2004; Winston & Eastaway, 2008) and policies (e.g. DOEHLG, 2007; Sheng & Mehta, 2009) within urban settings is not sufficient. Housing professionals and practitioners should think ‘outside the box’, asking the more radical question of whether housing development should be directed to a dense urban setting or to rural areas to achieve fair earth share living. This more fundamental issue will be explored through the EF methodology and concrete examples in this paper.

Country	Residential sector % of total final energy use	Commercial sector % of total final energy use
USA	17	4
UK	27	4
Australia	13	4
New Zealand	11	3
China	38	4

Table i: Comparison of energy consumption between the residential sector and the commercial sector in five countries in 1999 (source: WRI, 2006).

2. Urbanisation, housing and sustainability

Urbanisation often refers to the transformation of land from rural uses to urban uses such as housing (Brown, et al., 2005). It is also defined as a process of population concentration in which rural people migrate to urban areas (Tisdale, 1942). However, Theobald (2004) argues that a merely human demographic notion of urbanisation is inappropriate, especially when considering the EF of these areas. Cities appeared around five thousand years ago, but with very small populations living in them. Modern urbanisation occurred only in the nineteenth and twentieth centuries (Davis, 1955). Since then, it has transformed the world landscape and influenced almost every aspect of human living. Since 2007, the majority of the world population have been living in cities (UNPD, 2005). Attractions and opportunities available to urban residents were once regarded as sufficient to overtake the disadvantages of urban life (Still, 1974, p.1), but this is no longer the case in current cities (Berger, 1978, p.3). Urbanisation has created tremendous problems in modern society such as diseases like cancer (Greenberg, 1983) and obesity (Ewing, et al., 2003), crime (Shelley, 1981), unemployment (Zhang & Song, 2003), inadequate transportation and education (Berger, 1978, p.3), environmental degradation (Maiti & Agrawal, 2005), and resource depletion (Wheeler, 2004, p.1). Housing problems are just one of these urban predicaments.

Housing has been a ‘twin brother’ of urban expansion. Rapid urban growth increases the conflict between housing demand and supply, and between housing price and affordability (Leeuw, 1971 Glaeser, et al., 2006). Shaw (1997) has argued that the unsolved intensity inevitably results in housing problems. These include shortage of housing, slums, squatter settlements (Drakakis-Smith, 1981, pp. 70, 99), prevalence of dilapidated housing, poor government housing (Crothers, et al., 1995) and housing inequality (Vale & Vale, 1991, p.23). A more recent example would be the emergence of the new phenomenon of *Chengzhongcun*

(literately ‘villages encircled by the city’) in China due to the extraordinary rate of urban invasion in this country. The main reason behind this phenomenon is that rural migrants with low economic status, being excluded from the urban housing market, are forced to seek accommodation through a self-help approach, producing various types of ghetto settlements or migrant enclaves which were almost absent in China before 1978 (Zhang, et al., 2003). Like other slums and squatter settlements in developing nations, *Chengzhongcun* are associated with poor housing construction, poor living standards and social disorder. By the year of 2000, there were 277 *Chengzhongcun* with approximately a million indigenous villagers in the city of Guangzhou alone, and the number is still growing (Zhang, et al., 2003).

Despite these housing problems accompanying urbanisation, there has been a remarkable consensus that building more compact cities is one of the most significant ways to promote sustainable urban development (Breheny, 1995). This approach to sustainability has been adopted by countries like the UK (DOTE, 1993), Australia (Newman, 1992) and the United States (Chinitz, 1990), and supported by academics (Newman & Kenworth, 1989; Jenks, et al., 1996; Burton, 2000). The key argument in favour of more compact city development is that it helps reduce loss of valued land (McLaren, 1992) through building high density housing, minimises energy consumption (Robson, 1994) through less travel and creating housing with energy-saving technologies and techniques, and slows population growth. However, many findings have revealed the opposite. Contrasting to the conventional claim that the higher density development is more sustainable than the low-density development as it uses less land (Winston & Eastaway, 2008), in order to provide for their daily services the EF of compact cities actually encompasses an area many hundreds of times larger than the land they physically occupy (McGranahan & Satterhwaite, 2003; Rees 1999). Due to increased costs, many developers are reluctant to produce energy efficient forms of housing in the compact city (Boss, et al., 1993).

Studies have found that the assumption that the more compact city would lead to much less use of the private car and more walking, thus minimising fossil fuel consumption and pollution is also flawed (Gordon, et al., 1991; Bae, 1993). For instance, a report shows that the residents living in Cardiff, a reasonably compact city with a density of 43 persons/ha (Pointer, 2005, p.47) and a sound public transport system, travel more by car in a year than those of Gwynedd, a large rural area, poorly served by public transport, with a low density of 0.46 persons/ha. The EF for all modes of travel in Cardiff (0.988 ha/person) is bigger than that of Gwynedd (0.775 ha/person) (WWF Cymru, et al., 2005, pp.62-3). Another study on household consumption of energy and transport in eight residential areas in the Greater Oslo Region suggests that the central urban areas represent the highest level of leisure-time travel by plane (Holden & Norland, 2005). This is also the case of Wales, given 11,368 passenger km/year by air in Cardiff compared to 7,054 passenger km/year in Gwynedd (WWF Cymru, et al., 2005, pp.62-3). Travel by air has a very high impact on the environment and should be treated as a very occasional luxury (Vale & Vale, 2009, p.126). A single long-haul holiday is equal to a year’s motoring (Vale & Vale, 2009, p.123).

The claim that compact cities are beneficial to reducing population growth is also problematic. Scholars estimate that after the 1950s the natural growth in urban areas represents 65% of urban growth in Latin America and 75% in Africa (Latters, et al., 2002, p.8). To illustrate this, the residents in Kibera, Africa’s largest slum in Nairobi, have been reproducing second and third generation slum dwellers over the last 30 years (UN-HABITAT, 2004). Moreover, when considering sustainable housing settlements with a holistic approach, food as a crucial factor cannot simply be overlooked. It is the largest energy flow thorough any household due to the energy bound up in growing, transporting, processing and retailing it (Vale & Vale, 2003, p.53). In the city of Cardiff, food accounts for the greatest percentage of its total footprint at 24%, compared with transport (18%) and housing (3%) (Vale & Vale, 2009, p.36). A case study of Auckland suggests that the lower-density development has more potential to be sustainable because of the opportunity for food growing at home, although this would require

a change in behaviour for the residents (Ghosh, et al., 2007). Compact cities where people live in apartments are not easy places to grow vegetables in the garden (Vale & Vale, 1996). The EF for food in Gwynedd is 0.89ha/person (WWF Cymru, et al., 2005, p 28), which is 44% less than that of urbanised Cardiff (1.33ha/person) (Collins & Flynn, 2005, p.4). For housing, transport, food, energy, population growth and social stability, urbanisation shows no sign of being sustainable. Urban housing settlements may never be sustainable due to their development within the urbanised system when looked at in the context of the fair earth share.

To explore this idea further it is necessary to look at a sustainable urban settlement (BedZED) whose performance has been monitored to see what can be achieved. This will then be contrasted with a rural settlement, (Findhorn) also in the UK. These two settlements are selected for study because both have had ecological footprint assessments of the communities. These assessments cover not just the technical design of the buildings but also the behaviour of the occupants. To some extent the EF is a measure of the creation of sustainable community as it is essentially measuring the choices the occupants make, based on the values they hold.

BedZED

Completed in 2002 and located in Hackbridge, a suburb in the London Borough of Sutton, Beddington Zero Energy Development (BedZED) is the UK's largest carbon-neutral eco-community, comprising 82 homes, office space and live-work units. It is a mixed-use, mixed-tenure and high-density housing development and has been cited as a good model for sustainable housing settlements in urban areas (Wheeler & Beatley, 2004. p.303; Towers, 2005, pp.251-6). BedZED features some technological and technical solutions to environmentally friendly housing design. It is built of natural, recycled, reclaimed and local materials to reduce its embodied energy; it employs passive solar design, super insulation, double and triple glazing and high levels of thermal mass to minimise the energy demand in operation; it receives power from solar panels covering 777 square metres, has green roofs and a 130kW biomass combined heat and power (CHP) unit (Chance, 2009) to increase the use of renewable energy; it uses rainwater and treats water on site for recycling to reduce mains water consumption; it is positioned near two railway stations, two bus routes and a tram link to encourage walking cycling and use of public transport (Dawson, 2006); and it promotes green lifestyles through recycling and on-site composting and bulk purchased home deliveries of groceries and local organic food.

BedZED has also received criticism such as a lack of privacy, noise, too much run-off from the green roof and problems with the CHP system (Waite, 2005; Kirchner, 2005). As with other urban communities, BedZED has also been criticised for a lack of sense of community (Dawson, 2006). Such a sense of community is a key to improvement in the quality of life, and hence to the creation of a more sustainable way of living (Guo, et al., 2010a). The problem in a world where ever increasing numbers of people live in cities is that the fundamental sense of community is easily destroyed by rapid urbanisation (Dearling & Meltzer, 2003, pp.28-36). While attractive to mainstream developers, BedZED has reduced ecological radicalism (Dawson, 2006) due to its very nature of fitting into the urban environment within the capitalist system based on unlimited growth, which can never be sustainable.

This is more evident when viewing its EF. The EF of the BedZED residents was 3.2 gha/person according to a 2006 calculation (Tinsley & Heather, 2006, p.30) and is currently 4.67gha/person, equivalent to 2.6 planets of resources if everyone in the world lived like this (Chance, 2009; BioRegional, 2009, p.9). BedZED has managed to reduce its EF by only 0.65gha/person, compared to the average EF in Sutton (5.32gha/person) where people live an affluent way of life. BedZED is certainly better than the majority of urban housing settlements, but not adequate to be qualified as sustainable if taking the fair earth share (1.8-

1.9gha/person) into consideration. This paper maintains that it is the urban nature of BedZED that is obstructing the change in values necessary to reach a lifestyle that fits within a fair earth share of resources.

Capitalism demands and determines modern urbanisation (Bookchin, 1974, p.57; Brolin, 1976, pp.15-6). Wherever capitalism makes its geographical appearance, particular patterns and rising levels of urbanisation invariably ensue. This follows from pressures in the capitalist economic systems that lead persistently to the formation of large aggregations of physical capital and human labour on the landscape (Scott, 2007). Modern urbanisation promotes the essence of the culture of capitalism, embodied in the creation of consumers and workers for capitalist exploitation (Robbins, 1999, pp.1-62). As mentioned above, urbanisation is associated with a movement of population from rural to urban areas. In the process, farmers abandon their farmland and rural living, which is in many parts of the world linked with being self-sufficient in terms of producing for their own needs, especially food. As a consequence, these rural migrants become consumers since they no longer have the means to satisfy their own needs. Schumacher (1973, p.124) once observed that a person in an urban setting has to be wealthy to enjoy such simple things as producing his/her own food, as land in cities is simply too expensive for ordinary workers to afford. Significantly, BedZED offers its occupants little chance to grow even a small part of their own food, and as noted above, food is the major component of all EFs.

Before the emergence of capitalism and its accompanying modern urbanisation in the late 19th and early 20th centuries, people were not so much concerned with over-consumption, as with moderation. They were expected to be frugal and save their money, as spending on luxuries was regarded as wasteful; they bought only necessities and shared basic items when they could; most of them lived and worked on farms and produced much of what they consumed (Robbins, 1999, p.14). Since then, consumerism has become a way of life (Miles, 1998), even altering social status (Packard, 1959, p.16). The world has become the 'society of perpetual growth' (Gellner, 1983, p.34), dominated by consumer capitalism (Bodley, 1985, p.67) along with urbanisation. Leach (1993, p.338) has summarised the relationship between modern urbanisation with the culture of consumer capitalism, stating that consumer capitalism appears to have a nearly unchallenged hold over every aspect of American life, and that just as cities in the United States once operated as generators of consumer desire for internal markets, today America functions similarly on a global scale. The imitation of America by other countries has not gone unnoticed. Singapore, like America, has been made a 'world' city in a global setting through the expansion of consumer capitalism, as life in Singapore is not complete without shopping (Chua, 1998). This is what Chua (1998) has called 'the curse of westernisation'.

The consumer may drive the culture of capitalism, but without the labourer there would be no commodities to consume. As discussed above, the labourer has neither land nor tools, and thus the only way for him/her to survive is to sell labour. In cities within the culture of capitalism, most people produce or obtain goods no longer for their use, but for the purpose of exchange. In other words, the purpose of selling labour is not to obtain another commodity, but to get capital or money. Money has become the key element for the culture of capitalism, and as Weatherford (1977, p.11) noted, money now constitutes the focal point of modern culture in that it defines relationships between people. A society constructed on the basis of the acquisition of money will inevitably encourage the pursuit of physical gratification, competition and other 'negative' sides of human nature (Trainer, 1995, pp.134-5).

It has been increasingly realised that growth is the root cause of the unsustainability of current society and that there are 'limits to growth' (Meadows, et al., 1972). Turner (2008) has compared the past 30 years of reality with the predictions made in *The Limits to Growth*, and found that present human progress is in line with its predictions of economic and social collapse in the mid 21st century. Jackson (2009) argues that ever-increasing consumption adds

little to happiness, even impeding it, and is destroying the future of the next generations, and calls for 'prosperity without growth'. The New Economics Foundation (NEF) has recently released a report reviewing almost all the proposed models for sustainable development and concluding that change within the growth system is not possible for avoiding ecological bankruptcy (Simms, et al., 2010). To sustain the current rate of growth needs 1.3 planet Earths (GFN, 2008). It is therefore rational to think that growth has to be limited in order to achieve sustainability. However, under capitalism growth can never be stopped (Vale & Vale, 2009. p.39). Growth and consumption are day-to-day requirements of the capitalist market (Smith, 2010). Urbanisation is the product of this capitalist growth. It helps construct the consumer and the labourer, stimulate consumption and thus economic growth, and define money as the ultimate god of the human world. Housing settlements in urban areas cannot be truly sustainable because of their inclusion in the capitalist growth system.

3. Sustainability of housing settlements in rural areas

Some ecological economists have argued, "like it or not, we have to try to find sustainability with a capitalist framework and forget about alternatives" (Smith, 2010. p.42). Nevertheless, there does exist an alternative to this sort of development. Compared to urban communities, the rural has more potential to be sustainable. The EF of Gwynedd (5.28gha/person) is lower than that of Cardiff (5.59gha/person). A case study of Shanghai's EF shows that as the urbanisation level increases its EF grows dramatically to be the highest in China (Gao, et al., 2006). Cities are closely linked to the decline of ecological systems (Rees and Wackernagel, 2008). It is no wonder that the visions of many green thinkers such as Schumacher (1973) from the 1970s, the period of the emergence of the environmental movement, were often rural, what Marsh (1982) has called 'the cult of the countryside' and what Todd (1977) has named 'a revitalisation of the countryside' a changed direction away from urbanisation. Since then, many rural sustainable housing settlements have been developed worldwide, such as the New Alchemy Institute, Centre for Alternative Technology (CAT) in Wales and the Hockerton Housing Project (Guo et al., 2009a, 2010b). A rural community whose EF has been measured is Findhorn in Scotland, and this forms the second focus of this paper.

Findhorn

The Findhorn Foundation Community (FFC) is a recent rural community. It was founded as a commune in a rural area of Moray, Scotland in 1962 and has received a Best Practice designation from the UN Centre for Human Settlements. It contains 61 ecological buildings, built of natural and local materials such as local stone and straw bales and equipped with solar panels for hot water heating; passive solar design, energy efficient appliances and the 'Living Machine' sewage treatment plant are employed there; much of its electricity is supplied by four wind turbines; most food is provided by the Community Supported Agriculture Scheme based on organic farming methods and very little meat is eaten (Tinsley & George, 2006, p, 8). A local economy is implemented, using the Local Exchange Trading System that avoids the use of money in trade. Nevertheless, Findhorn is still part of modern Scotland and one of the highest components of the EF of its residents turned out to be flying (Tinsley & George, 2006, p, 17). The annual EF for air travel was 0.25gha/person with 90% of this being for leisure rather than Findhorn business. This is more than twice the average Scottish air travel EF (Tinsley & George, 2006, p, 18). In addition the part of the footprint that is related to being a citizen of the UK is at Findhorn is very slightly greater than the Scottish average and forms 51% of the total EF (Tinsley & George, 2006, p, 32).

Unlike BedZED, the FFC is claimed as a community of participation. For instance, while the residents in BedZED are troubled by the teething problems of their CHP and Living Machine systems, members of the FFC are engaged in an ongoing process of community support behaviours such as using the 'Living Machine' in a proper way (Dawson, 2006). The EF analysis suggests that elements that the residents can control and that are associated with

living in an ecologically minded community, such as the very low energy houses or growing organic food, are very successful in reducing impact. The FFC has successfully managed to reduce its EF to 2.56gha/person (Tinsley & George, 2006, p, 34), 2.11gha/person less than that of BedZED. This is a significant reduction, although not yet a fair earth share. To achieve this the EF of being a citizen of Scotland needs to be tackled in the same way. This suggests that what a community can achieve is limited unless the whole network of communities acts together at the same time. This idea is explored in the third case study of this paper, rural China from 1958 to 1978. Although to western eyes this is an unpopular choice of case study as it raises issues of suppression of individual freedom in the cause of a greater good, nevertheless these unpalatable issues have to be faced if developed countries are ever going to grapple with reducing the footprint of citizenship.

China 1958-1978

An example of rural settlements and living leading to a low EF at a national level can be seen in China from 1958 to 1978. During this period, 75%-80% of the population lived in rural areas. The Chinese model of controlling urbanisation was seen as a successful alternative approach (Ma, 1977; Murphey, 1980, pp1-4). The model of rural development was based on a belief in the necessity of collective benefits through equitable ownership of land, production means and other natural resources and fair distribution of these resources and income (O'Leary and Watson, 1982); it operated according to the principle of self-sufficiency (Zheng, 1981, p.59); it was rooted in small industries; it adopted alternative technology (Inkster, 1989; Durham, 1976, p.262-266); and it preserved the Chinese culture of living in harmony with nature (Jenkins, 2002). These features have been discussed in the West as key issues for a sustainable society (Vale & Vale, 1975, p 17; Bookchin, 1980, pp. 115-132; Trainer, 1995, pp.142-3), and resulted in the low EF of China at 1.1gha/person at that time, compared to 2.4 gha/person today (GFN, 2010). This is within the fair earth share. This result suggests that it is not possible to lower EFs of developed countries to a fair earth share simply by deciding to build sustainable communities. There is also a need for governments to decide to make sustainable populations. This was what the Chinese government, for all its faults, managed to do in this period of China's history. Based on the first author's personal interviews and conversations with the Chinese who have experienced this period of time, they felt much happier back then despite the subsequent massive improvement in material living standards. A study also shows that happiness is now falling despite China's success in economic growth (Brockmann, 2008)

Current problems

The main driving force for rural migrants to move to cities remains the pursuit of higher income and standard of living, and a 'better' life. However, affluent lifestyles enjoyed by city dwellers, especially in the developed world have a serious consequence (Table ii). From the table, it is easy to see that there is an immediate relevance between urbanisation and high EFs. In the case of China, while it is increasingly urbanised, 18% higher than Vietnam, it seems to be achieving similar levels in terms of the listed indicators. The low EF of China, smaller than the global average (2.6gha/person) (GFN, 2009), has resulted from a majority of the population living in a traditional way of life in rural areas (Guo, et al., 2009b), as lifestyles in Chinese urban settings have become very similar to those of Western cities (Peng, 2010). If China and Vietnam increase their HDI to the very high levels of New Zealand and Australia, this will require a large jump in EF. Given the high urbanisation rates of New Zealand and Australia, education would seem to be easier to achieve. However, a majority of people live in rural areas in Vietnam and China, and both countries have literacy rates over 90%. The comparison above shows that life in cities may not be much better, for a much larger environmental impact.

Country	EF ha/person	Average life expectancy in years	Adult literacy rate% population	Under- nourishment % population	Human development index	% population urbanised
Vietnam	1.3 (GFN, 2010)	74 (World Bank, 2011)	90.3 (UNDP, 2009)	13 (UN Statistics Division, 2010)	0.572 (UNDP, 2010)	28 (GHF, 2009)
China	2.3 (GFN, 2010)	73 (World Bank, 2011)	93.3 (UNDP, 2009)	10 (UN Statistics Division, 2010)	0.663 (UNDP, 2010)	46 (GHF, 2009)
New Zealand	5.2 (GFN, 2010)	80 (World Bank, 2011)	98.9 (UNDP, 2009)	<5 (UN Statistics Division, 2010)	0.907 (UNDP, 2010)	86 (GHF, 2009)
Australia	6.6 (GFN, 2010)	81 (World Bank, 2011)	99 (UNDP, 2009)	<5 (UN Statistics Division, 2010)	0.937 (UNDP, 2010)	83 (GHF, 2009)

Table ii: Comparative footprints and statistics related to Human Development Index for four countries

While rural migrants expect to be better off by moving to cities, the reality is often the opposite. A billion slum-dwellers comprising about 34% of the world's urban population often live in worse conditions than rural people (HABITAT, 2006). A survey conducted by the NEF in Europe reveals that quality of life has little to do with consumption (Simms, et al., 2010, p.21). Above a certain level of GNP per capita (approximately \$US 14,000), the relationship between well-being and monetary wealth actually disappears (Inglehart, 1999, pp.88-120). City life often appears to be unhappy. In America, the most affluent nation with 77% of people living in cities, more than half of the population suffer from mental illness in any one year (Monbiot, 2000). By 2010, depression is predicted to be the second commonest disease (WHO, 2010). While the living standard of its urban citizens increases in China, they are actually less happy than those living in the countryside. Beijing and Shanghai now have the lowest happiness index (Global Times, 2010), and the whole nation's happiness is declining (Brockmann, et al., 2008). The truth seems to be that, as claimed by the proponents of Buddhism, 'Right-livelihood' can only be achieved through the Middle Way of consumption, meaning the right amount and knowing moderation (Schumacher, 1973). It must be balanced to an amount appropriate to the attainment of quality of life rather than the purely quantitative satisfaction of unlimited desires. The Middle Way of life is often found in rural living (Guo, et al., 2009b).

The issue as to whether priority should be given to the development of large cities or rural areas is a matter of allocation of the limited natural resources. If the resources are channelled to rural areas rather than to upgrading slums, which only makes the problem worse (DFID, 2001), a new phenomenon of 'revitalisation of the countryside' could well occur. To concentrate the bulk of the resources into large cities may be the fastest path to growth in the short-term (Ma, 1981, pp.7-8). However, such a strategy will only benefit a few urban

residents, further widening the gaps already existing between city and countryside, and exacerbating the problems of over consumption. Studies show that the consumption patterns of urban middle and rich classes have become less and less sustainable (Gilbert, 1998, pp.174-202). To produce a more spatially equitable pattern of economic development, natural resources should be distributed more widely in space (Ma, 1981, pp.7-8). Sustainable development of rural areas could thus have profound implications for long-term economic development.

Based on the above discussions, to promote sustainable housing settlement, a strategy is proposed here. The key to sustainable housing is behavioural change towards sustainability (Frame & Vale, 2006; Hurley, et al., 2007; Ghosh, et al., 2007). Referring back to BedZED, research reveals the reduction in EFs of its residents through behavioural change (22% reduction) is more effective and cheaper than through the built environment changes (12% reduction) (Vale and Dixon, 2005). Lifestyle change is often tied to community living (Bahro, 1986, pp, 29, 173; Jackson, 2005, p.58) and rural communities, such as Findhorn, appear to have more potential to go beyond the capitalist growth system than the urban, such as BedZED. Part of the low EF at Findhorn came from the community growing organic produce and consuming this communally, leading to a food EF one third that of the UK average (Tinsley & George, 2006, p, 32). Strategies for promoting change in behaviour to sustainable living in the urban setting has limited success, and urban dwellers often find themselves locked into the habit of unsustainable consumption patterns (Jackson, 2005, p.103). The 'lock-in' can be easily avoided in sustainable rural communities especially in the developing world such as Yanhe Village and New Cave Dwellings in China, where the culture of living in and with nature still exist, (Guo, et al., 2009b, 2010a). When enough resources are given to such rural communities, the city loses its appeal to rural migrants, and they actually return to their villages (Guo, et al., 2010b). The best strategy to promote sustainable housing settlements might be preservation of the vernacular cultural way of life in the countryside in the developing world and acknowledging that it is the rural communities of the world, where agriculture is more like gardening than farming in terms of human input, that have the low EFs that allow those living in urbanised settings to survive.

4. Conclusion

It does not seem rational to solve housing problems within the urban setting, as urbanisation is the cause of the predicament. It may be even less sensible to think that the compact city is the solution to a common sustainable future. Such high-density development reduces neither energy consumption nor the EF by trying to promote less travel. While urbanisation as a medium serves for the capitalist market based on growth, 'sustainable' urban housing settlements such as BedZED cannot be sustainable in terms of the fair earth share, due to their very existence within the growth system. Community living in the countryside tends to have more potential for promoting behavioural change towards sustainability, which is the key to sustainable housing. Nevertheless, in developed countries there is still a limit to what can be achieved. What is needed is the recognition that urban development has to depend on the rural and what is needed is planned sustainable development for all people, not just a rush to urbanisation in the faint hope this will somehow be the solution.

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