

Symbiotic Housing in Tokyo

Backgrounds

What are sustainable buildings? I prefer the definition given by Architectural Institute of Japan that “building that can moderately maintain or improve the quality of life and harmonize with the climate, tradition, culture, and the environment in the region, while conserving energy and resources, recycling materials, and reducing hazardous substances within the capacity of the local and global ecosystems throughout the building life cycle”. While this rapid rate of housing production has been an indispensable propeller of the post-war Japanese economy, it has been a source of grave problems as well. These problems include the consumption of large amounts of energy and natural resources during the whole lifecycle of housing, most of which are imported from abroad, and the mixed disposal of demolished houses.

Tokyo is a big urbanized city with a green space just 3m² per person, compared to 27m² in London and 29m² in New York. By 2015 it expected that Tokyo will be the biggest metropolis in the world with a population of 30 million. The city currently emits one per cent of the world industry output of CO₂ and the heat island effect makes the summer in the city a feat of endurance. Many houses built in the city are still demolished after only 25 years rather than reach their potential lifespan and this “scrap and build” method is extremely a waste of both energy and building materials.

The Tokyo based, Setagaya-ku Fukasawa Symbiotic Housing is the first public and environmentally sustainable symbiotic housing complex in Japan. Completed in 1997, this housing project for 70 low-income households in Tokyo gives an example of how socially and environmentally sustainable housing can be developed in one of the most densely developed cities in the world. Environmentally sensitive design ensures that energy use is reduced significantly at the same time as comfort levels are increased. Social integration and community participation are also key elements of the project, resulting in the residents' participation in the construction plan including designs for the elderly and the disabled. Costs are no higher than other public housings and the project has been awarded World Habitat Awards 2001, by Building and Social Housing Foundation.

The symbiotic housing in Tokyo

Setagaya-ku Fukasawa Symbiotic Housing has a total area of 7,388m² and it consists of five apartment buildings containing 70 dwelling units, 43 of which are for low income residents, 17 for older persons and 10 for middle income residents, while 25 parking areas are provided. Communal facilities include a day centre, a meeting hall, children's playground, gardens and flower beds. The apartments are built under careful consideration to let the sunlight and fresh air get into the rooms, while each apartment opens to at least two, often three or four directions. The building materials, furnishing materials and facilities are all selected for the low impact on the environment and the health of residents, and many of the materials are reused from demolished buildings.



One feature of this symbiotic housing is the thermal insulation system and the energy and water saving equipment. A solar collector provides sufficient energy for heating, hot water, the outdoor lamps and a public clock. Two small wind turbines circulate water in the brook. All the streets and parking areas are permeable in order to collect and save water. Rainwater is also collected in individual tanks for plant watering and in a 60m³ rainwater reservoir under the buildings. There is also a windmill outside the buildings which is used to provide electricity.



Permeable roads and windmill

Another feature of it is the large area of green space and the buffer zones function of the plants, both thermal buffer and noise buffer. 17 mature trees are preserved as well as banks of soil where bamboos grow and 160 other smaller trees are relocated. A biotope garden is created and accommodates a variety of plants, birds and insects, and produces cool air in the humid and hot summer. At the same time, the green rooftops and walls improve the urban thermal conditions as they reflect sunlight during the summer and conserve heat during the winter. Intensive monitoring has shown that the ground surface conditions improve the micro-climate in the buildings.



Green rooftops and walls

There are 20 apartments built with the purpose for wheel chair users and single elderly people, each of which has the emergency button to sound the alarm for emergency help. And the height and width of the facilities in these rooms are strictly designed under the international standard. One unit is reserved for a “life support adviser” employed by the Setagaya Ward to take care of the elderly neighbors.



Alarms for old and disabled people

The total investment of this symbiotic housing system is 17 million dollar, mainly from the government. The middle income households pay \$974 for a 75m² apartment per month, and the lower incomes pay \$487 for 72m² while the government helps them pay for the rest. No apartments are owner-occupied. Rental of a parking space costs a further \$325 per month.

Conclusion

The goal of building this symbiotic housing is to make a comfortable living environment, interrelationship with both the nature and the neighbors. It demonstrates the value of smaller independent systems of water and energy supply, and the value of living together in a close neighborhood. The application of the simple and basic principles demonstrated in this project will help to bring back a greater social and ecological balance to urban housing, both in Tokyo and far beyond. One of the limits of this project is the funding. Although the symbiotic housing costs no more than other public housing, it's hard to convince the investment companies to build such houses for the low income residents in the urban of Tokyo, where the price of land is extremely high. And it's almost impossible to get the government's support every time.

An investigation of the residents was taken after living there for several years, about the satisfactory level in the buildings and community. According to the result, most residents thought it was not bad, both because of the harmonious relationships in the neighborhood and the comfortable living conditions. The intent of the buildings is generally achieved. However, conflicts also exist between neighbors, for example, the trash collecting affairs. The trend that people in the community are getting older is also a problem which will cause new conflicts and inconvenience.

The symbiotic housing complex has attracted many attentions and debates, nationally and internationally, mainly focusing on the future condition of this housing system and the future development of sustainable public housing. What is the form of future sustainable building? The answer is still on the table.

References:

1. Japanese trend related to sustainable buildings. Motoyasu Kamata. Department of Architecture, The University of Tokyo.
2. The Longman guide to writing center theory and practice. Robert W. Barnett, Jacob S. Blumner. New York : Pearson Longman, c2008.
3. Field survey of a sustainable sanitation system in a residential house. Journal of Environmental Sciences. 2006-06.
4. Outcomes of post-design on environmentally symbiotic housing - Case analysis on recent environmentally symbiotic multiple dwelling houses in Japan. Nakamura Miwako. Journal of Architecture and Planning. 2006, No.610.
5. <http://www.iwamura-at.com/>
6. <http://www.worldhabitatawards.org/>
7. Intergrowth way of health house and environment. Zhou Wu. Shanxi Architecture. 2006-03.
8. Coexisting with Environment--Exploring the Creation of Urban Housing in the New Century. Wei Wang. Housing Science. 2003-10.
9. http://www.city.setagaya.tokyo.jp/topics/toshiseibibu/05_jyuutaku/JUUTAKU/HUKASAWA/TOPTM
10. An Introduction and analysis of Japanese Environment-symbiotic house and its design methods. Tatsuaki Tanaka, Jian Wang. Journal of Ningbo University(Natural Science & Engineering Edition). 2000-04.
11. New Conception of Housing Design in the New Century. Wei Wang. South Architecture. 2005-06.
12. Basic study on designing process of environmentally symbiotic housing. Iwamura Kazuo, Nakamura Miwako, Yajima Hiroki. Journal of Housing Research Foundation. 2006, No.32.
13. Sustainable Building Coalition. Volume 19, Issue 1. 2003-01.
14. Action for Sustainability: The 2005 World Sustainable Building. Conference in Tokyo. 2005.
15. Environment: Greener homes mean much more than planting lots of trees. Yaeko Abe. Asahi.com. 2007-09.
16. Press 2000. United Nations Human Settlements Programme.
17. Sustainability, embodied in the local context: A study on the cultural aspects of environmentally symbiotic housing in Japan. K. Iwamura. International Conference Passive and Low Energy Cooling for the Built Environment". May 2005.
18. Declaration for Environmentally Symbiotic Housing (21 Nov. 1997), Association for ESH.
19. Hasegawa, T., 2002. "Policies for Environmentally Sustainable Buildings" Mar.2002, OECD Working Party on National Environmental Policy.