Chapter 5
Satoyama Landscapes in Tokyo

Lidia Sasaki

Abstract Tokyo is well known for its modern urban landscapes, but in the suburbs and the broader metropolitan area, "islands" of traditional rural landscapes still survive, although under increasing pressure from urbanization. The present study aims to introduce the traditional Japanese *satoyama* landscapes and to examine not only the vital role they played in the development of Japanese rural communities but also their continued relevance in the contemporary context of global environmental change. The first part of the study, based on extensive literature review, explores various definitions of *satoyama* and *satoyama* landscapes, and identifies their key features and the range of ecosystem services and benefits these multi-functional landscapes used to provide to Japanese rural communities. After briefly exploring the historical context of *satoyama* development, the study examines the demographic, socio-economic, and cultural processes that led to the decline of *satoyama* during the past decades. The dominant forces identified are the process of suburbanization, on the one hand, and the abandonment of rural land management on the other. The second part of the study focuses on recent approaches to the conservation and revival of *satoyama* landscapes: first, the grassroots citizen movements for the management and alternative use of *satoyama* landscapes; second, the national strategies and regional policies adopted so far to revitalize these multifunctional rural spaces. The study uses examples from the western fringe of the Tokyo metropolitan area, where a network of *satoyama* landscapes survive and are locally preserved. These are communities where a combination of local policies and citizen involvement has resulted in the successful revival of local *satoyama* landscapes, and where alternative uses (recreation, environmental education, etc.) are promoted: positive examples with the potential for implementation in other areas. Conservation and revival of *satoyama* landscapes pose major challenges in the years to come. In the countryside, efforts to address the decline of *satoyama* landscapes need to be coordinated with broader strategies to revive rural communities throughout Japan. In the context of major urban concentrations, surviving *satoyama* landscapes represent strategical resources that could have a vital contribution to mitigating the impacts of climate change or natural disasters, making their conservation an urgent

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priority for sustainable development in the twenty-first century. The study stresses the need for increased public awareness and citizen involvement in *satoyama* conservation. At the broader level, a long-term vision and an integrated strategy, on the one hand, and cooperation at various levels, on the other, are key to *satoyama* landscapes' revival in the future.

Keywords *Satoyama* · Ecosystem services · Tokyo metropolitan area · Suburbanization · Multifunctional landscapes · Conservation

5.1 What Is *satoyama*?

Narrowly defined, the term *satoyama* (literally, "mountains surrounding villages" cf. *sato*: village; *yama*: mountain) refers to secondary woodlands and grasslands around rural settlements, traditionally used as commons to provide timber, fuel, compost, and fodder to local communities (Takeuchi et al. 2003).

In recent decades, however, the term has been used in its broader sense: "*satoyama* landscape is a mixture of forests, wet rice paddies, cultivated fields, pastures, streams, ponds and irrigation ditches, surrounding a Japanese farming village – the entire landscape necessary to supply the needs of a community" (Kobori and Primack 2003a, b). The Japanese Ministry of the Environment (MoE) defines *satoyama* as an area "consisting of secondary forests, paddies, farmlands, grasslands and irrigation ponds around settlements." It "includes about 800 million ha of secondary forests and about 700 million ha of other types of agricultural areas, accounting for up to 40% of the national territory of Japan" (Morimoto 2011).

The recent Japan *Satoyama Satoumi* Assessment (hereinafter JSSA) (2010) concisely defines *satoyama* as "a dynamic mosaic of managed socio-ecological systems producing a bundle of ecosystem services for human well-being" and adds the "traditional land […] management practices that have allowed the effective use and maintenance of these landscapes by the Japanese people" as a vital element of the *satoyama* culture (JSSA 2010).

In the Paris Declaration on the *Satoyama* Initiative (2010), the MoE proposes the broader term "socio-ecological production landscapes" (SEPLs) for such traditional landscapes, which can be found in many areas of the world. Comprehensively defined, these are "dynamic mosaics of habitats and land uses that have been shaped over the years by the interaction between people and nature in ways that maintain biodiversity and provide humans with goods and services needed for their well-being. These landscapes have proven sustainable over centuries and are considered living examples of cultural heritage" (IPSI 2010).

5.2 *Satoyama* Landscapes: Key Features

In its broader sense, therefore, the word *satoyama* is used to describe the traditional Japanese rural land-use systems and landscapes, the result of traditional land management by local rural communities over the centuries (Takeuchi 2010); cultural landscapes encompassing both the natural and cultural diversity of a region and the history of their interaction (Miyaura 2009).

Historically, self-sufficient Japanese rural communities depended largely on *satoyama*: this "mosaic of different ecosystem types" (Duraiappah and Nakamura 2012) used to provide a broad range of ecosystem services to the local communities, which developed traditional management techniques and a sustainable system for the cyclical use of natural resources within the carrying capacity and resilience of local ecosystems.

Over the centuries, intricate patterns of mosaic land use emerged, finely adjusted to the local natural conditions (landforms, climate, soils, and vegetation): paddy fields in the floodplains and on terraced slopes, dry fields on the upper flat terraces, and grasslands and forests on the uplands and on slopes (Figs. 5.1 and 5.2).

Among the various ecosystem services provided by *satoyama* are: supplying vital goods (timber, fuel, fodder, compost/fertilizer, food, and water) and regulating environmental conditions (water cycling, flood control, slope protection, soil formation, and climate control). Furthermore, the mosaic of land uses offers habitat

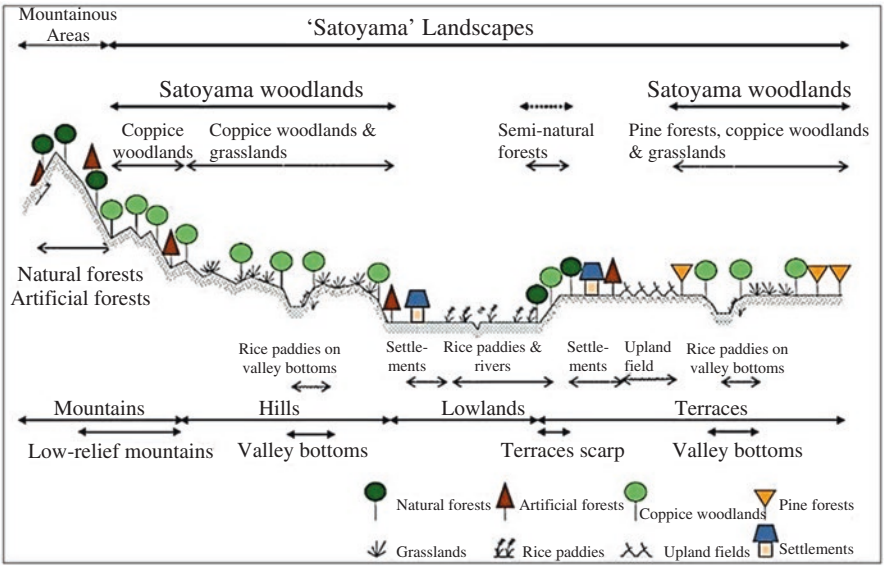

Fig. 5.1 Schematic representation of *satoyama* and *satoyama* landscapes (Yamamoto 2001)

Fig. 5.2 Typical *satoyama* landscape in Onoji, Machida City (July 2016)

for the rich biodiversity of *satoyama* landscapes, "a key element for their resiliency and proper functioning" (JSSA 2010).

This combination of goods and services supports human well-being and translates into economic benefits for communities, but *satoyama* landscapes also provide cultural and spiritual services, which have played a vital role in the emergence of Japanese people's identity (Kalland and Asquith 1997).

According to the combination of natural environmental factors and the local farming/forestry/water management systems, a diversity of *satoyama* landscape types emerged over the centuries that can be identified throughout Japan (Duraiappah and Nakamura 2012).

5.3 *Satoyama* Transition After World War II

Satoyama landscapes have been, thus, supporting sustainable human communities for centuries, but the dramatic changes that occurred during the second half of the twentieth century proved to have long-lasting negative impacts. The disintegration of the close relationship between Japanese human communities and the natural environment since the 1960s was engendered by a convergence of internal and external factors.

Among the internal factors are the advent of modern agriculture and forestry, which resulted in less dependence on and under-utilization of local *satoyama* resources. This was compounded by a general trend of rapid rural population decline and aging, generating a chain reaction whereby farmland and forest management was abandoned, resulting in the degradation of *satoyama* landscapes on a massive scale.

Modernization of the farming sector after World War II was made possible by the use of fossil fuels and chemical fertilizers, reducing dependence on and the use of *satoyama* resources. Concurrently, farmland consolidation and mono-cultural land-use for improved productivity and efficiency eliminated the small acreage mosaic land-use pattern of the original *satoyama* landscapes. This situation was exacerbated by government regulations in the 1970s to downsize rice production, resulting in the abandonment of paddy fields, the destruction of ditches and irrigation ponds, and the reduction of the overall farmland area (Kobori and Primack 2003b). In the urban fringes of major cities, abandoned paddy fields were subdivided and converted into housing estates and other suburban uses (Kikuchi 2007).

Satoyama forests faced a similar fate: after World War II, to support the country's reconstruction efforts, modern forestry was implemented: the native forests in higher mountain areas were converted into coniferous tree plantations for intensive timber production, a process which irreversibly altered the landscape. Furthermore, starting in the 1960s, the decline in rural labor, on the one hand, and the supply of cheap imported timber, on the other, resulted in the mismanagement and degradation of these plantations (JSSA 2010). In many areas, these mono-culture plantations have disrupted key ecosystem services, such as adequate water supply, flood prevention, and slope protection.

Management of most *satoyama* coppice forests (with firewood and charcoal no longer needed) was also abandoned, resulting in the unchecked succession towards dense broad-leaved evergreen forests (the potential natural vegetation in most of Japan); furthermore, in abandoned *satoyama* forests, bamboo took over, vigorously expanding and causing the decline of ecosystem services and biodiversity (Miyaura 2009). "The increase in dense woodlands can be seen as a barometer of *satoyama* landscape neglect" (Takeuchi 2010).

A major factor contributing to *satoyama* degradation is the rural socio-demographic transition, manifested in the aging and the decline of the rural population. Rural population decreased from 45% of total population in 1970 to 33% in 2010 (Ministry of the Agriculture, Forestry and Fisheries (MAFF) n.d.), but the decline in farming population has been even more drastic: from 45.2% of the total population in 1950 to 6.4% in 1990 (Tsunekawa and Bessho 2003); furthermore, in 2007, 32.4% of the farming population was over 65 years old and only 5% were under 35 years old (MAFF n.d.). Consequently, it has become increasingly difficult to cultivate and maintain rice paddies or to manage forests, which are thus being abandoned.

Concurrently, external forces started manifesting as pressures for development. Urban population growth and urbanization gained momentum in the 1960s–1980s, during Japan's period of vigorous economic growth, resulting in the rapid urban

expansion in *satoyama* areas on the outskirts of major cities. Land use changes and conversions occurred on a massive scale, mainly affecting *satoyama* woodlands, which became prime locations for "new towns" (large-scale public housing estates) and various other uses (golf courses, etc.).

The suburbanization front generally followed transportation corridors (railways and major roads) and leap-frogged to *satoyama* areas, where suitable land became available for development. Development proceeded mostly uncontrolled, with few zoning restrictions and little planning, in a typical urban sprawl pattern. Public policies to regulate urban development within designated areas, while preventing further development in *satoyama* areas, proved ineffective due to the speed and scale of development (JSSA 2010).

Vast stretches of *satoyama* were, thus, lost to urbanization. Toda (2006) estimates that about one third of *satoyama* land was lost nationwide in the three decades from 1960 to 1990, peaking in the period of rapid economic growth 1960–1970s, during which approximately 60,000 ha of *satoyama* were urbanized every year (Morimoto 2011). Kobori and Primack (2003a) report that the *satoyama* area in Yokohama decreased from 10,000 ha in 1960 to only 3000 ha in the early twenty-first century; more recently, in the Tokyo metropolitan area, approximately 1400 ha of farmland was lost in the decade 2000–2010 (Tokyo Metropolitan Government n.d.). Currently, the suburban development trend continues, although at a slower pace, proceeding mainly as infilling in areas left undeveloped during the previous waves of urbanization.

Due to such dynamic land use change around major cities, fragmented patches of (mostly abandoned) *satoyama* forest survive only in areas less accessible or unsuitable for development; some are protected by local ordinances to serve as parks or urban green belts (Kikuchi 2007).

Conversely, in the deep countryside, the situation of abandoned *satoyama* forests and farmland is rapidly deteriorating and the *satoyama* landscape itself "faces extinction" (JSSA 2010).

5.4 The Making of Tokyo's *satoyama*

Situated in central Japan, in the southern area of the broad Kanto region, Tokyo and its metropolitan area extend over four land units: the coastal plain, the uplands, the hills, and the mountains (Kaizuka 1979).

The plateaus and hills, with alternating narrow valleys and higher ground, thick layers of volcanic ash (the Kanto Loam), relatively fertile soils, and moderate climate with ample precipitation, offered favorable conditions for the early evolution of farming communities and the development of typical *satoyama* land use systems and landscapes. In the mountains on the western border of the Kanto region, the combination of cultivated river terraces and the slopes under dense forest cover has supported self-subsistent rural communities for centuries.

The origins of most *satoyama* landscapes in the Kanto region date back to the Edo/Tokugawa period, a time of rapid population growth and village expansion. Throughout the Kanto area, most of the original forests were replaced early on by secondary deciduous forests, traditionally managed as commons (*iriaichi*): coppice forests (based on the forest cycle of 10–20 years, used for production of charcoal, fuel, timber, compost, fodder, and food) and bamboo groves (providing construction materials, food, etc.). Concurrently, villages in the western Okutama Mountains were known for producing timber and charcoal for the ever-growing urban demand, and well-managed *satoyama* forests maintained a steady supply over the centuries.

Farmland, meanwhile, gradually expanded, with the typical mosaic of land uses characteristic of *satoyama* landscapes. One such example is the Musashino countryside west of the city (nowadays a green residential area), where the creation of the Tamagawa Canal in the seventeenth century provided irrigation water from the Tama River to this previously water-poor area. This enabled land reclamation, the creation of new villages, and, over time, the gradual emergence of a typical *satoyama* landscape, a rich mosaic of oak coppices and upland fields (vegetables, orchards, tea plantations, and commercial crops to supply the city markets) (Komeie 2010).

Until the end of World War II, Kanto region's *satoyama* landscapes supported sustainable local rural communities, which remained the major suppliers of farm and forest products to the expanding city of Edo (Tokyo).

5.5 *Satoyama* Transition in the Tokyo Metropolitan Area

A comparison of land use in the Kanto region between 1880 and 1990 reveals the major changes that mark the *satoyama* landscape transition. While, in 1880, forest and woodlands covered 49% of the area, in 1990, their area had declined to 17%. The situation for dry fields and rice paddies is similar, with a decline from 15% in 1880 to 8% in 1990. Conversely, built-up areas expanded from 2% to 62% over the same period (Takeuchi et al. 2003).

This situation is largely explained by the rapid urban expansion of Tokyo, especially after World War II. Kikuchi (2008a) documents the mechanism of urban sprawl and the outward movement of Tokyo's urban fringe. While, in 1976, the urban fringe was within a 30-km radius of the center, in 1997, following expansion mainly along transportation networks radiating away from central Tokyo and in areas where land became available for development (mainly *satoyama* areas), the urban fringe was pushed further out (Hachioji, in the western fringe, is located around 40 km away from the city center) (Fig. 5.3).

One typical example of the scale of development is Tama New Town on the western outskirts of Tokyo, where an area of approximately 2000 ha of *satoyama* in the Tama Hills was cleared and flattened for the construction of major public housing estates and other facilities in the 1970s–1980s.

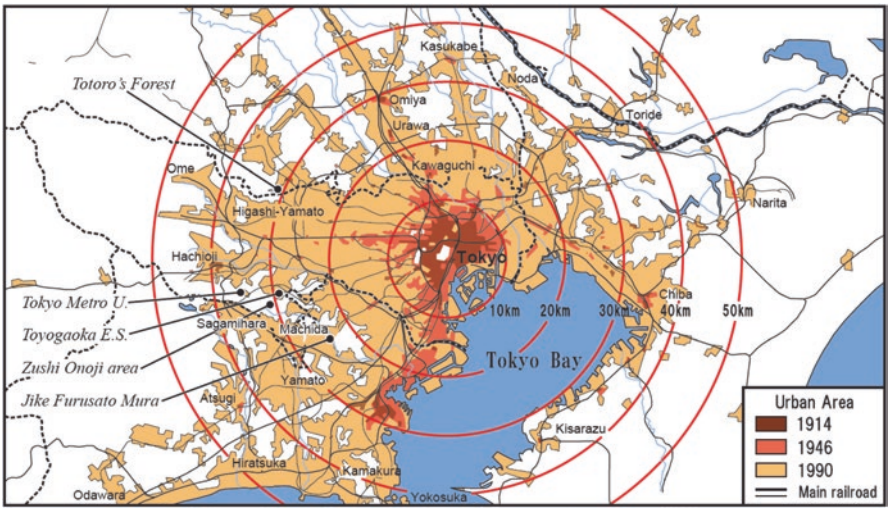

Fig. 5.3 Expansion of the Tokyo metropolitan area (Kikuchi 2008b) and location of the case studies (added by the author)

Analyzing these changes, Kikuchi (2008a) observes that "as a whole, the spatio-temporal changes of the Tokyo metropolitan urban fringe from 1976 to 1997 have been characterized by an outward movement, with local differences that depended on such factors as land conditions, transportation networks, accessibility to the metropolitan center, socioeconomic activities, infiltration of an urban lifestyle and city planning."

In some areas of the inner fringe, measures to control the urban sprawl resulted in local regulations to conserve *satoyama* farmland as "productive green land," using a preferential land tax system (on condition that the land use should remain unchanged for 30 years). On the outer fringe (Machida, Hachioji, Kodaira, and Tachikawa), areas where such measures were not taken, local farmers had to rely on various strategies to survive urban pressures, such as intensive farming (multiple cropping and greenhouses) or lower intensity, labor-saving agriculture (Kikuchi 2007); therefore, in these areas, urban farmland is fragmentarily conserved.

Conversely, *satoyama* forests on the urban fringe did not enjoy the same privileges. While farmland, considered a vital resource, was protected as productive green land, forests did not receive preferential tax status; with the change of generation, expensive inheritance taxes were levelled on forest land, forcing inheritors to sell, and thus encouraging the spiral of land use changes and further suburban development (Kikuchi 2008b).

Consequently, on the inner fringe, ex-*satoyama* forests became the prime location for large-scale residential estates, while on the outer fringe *satoyama* forests were replaced by a typical mix of undesirable uses: graveyards, garbage processing facilities, disreputable hotels, gambling parlors, etc.; meanwhile, in abandoned *satoyama* forests, illegal garbage dumping (bulky electric devices, cars, etc.) became widespread.

5.6 *Satoyama* Landscapes Conservation: Case Studies from the Tokyo Metropolitan Area

The present study is illustrated with examples from the western fringe of the metropolitan area, where a network of *satoyama* landscapes survive and where local conservation activities, combined with recreation and environmental education, have the potential to become models of multifunctional use of *satoyama* resources on the urban fringes.

The first example is the area of Sayama Hills in Tokorozawa City, on the western fringe of the metropolis (40 km from the city center), which is a green island of typical *satoyama* landscapes expanding over 3500 ha, and exceptionally well preserved, despite tremendous pressures for development since the 1970s. The area is a refuge for many species of wildlife and has a remarkably high biodiversity, but it also conserves valuable cultural heritage: 114 shrines, 235 sites of ancient villages, etc. (Kobori and Primack 2003b).

In the 1930s, two water reservoirs (Sayama Lake and Tama Lake) were created in the area; simultaneously, part of the surrounding forests, owned by the Tokyo Metropolitan Government, gained protection status.

The traditional farming system in the area was based on small-scale mixed cultivation of rice (single crop paddy fields along the floodplain), wheat, barley, potatoes, vegetables (double cropping system), and the famous Sayama tea on the higher terraces, upland fields, and gentle slopes (Fig. 5.4); traditionally, each farm had 1–1.5 ha (Kikuchi 2007).

The forests covering the hill slopes were used for firewood, charcoal, and compost production, and traditionally managed by trimming off low branches, cutting down undergrowth and, regularly raking the fallen leaves to keep the forest floor clear; since the 1970s, such activities have been neglected, resulting in uncontrolled ecological succession and ecosystem degradation (Kikuchi 2007).

With the decline in rural population, forest and farmland were put on the market; with the shift in land ownership, the area has seen a massive wave of conversions to urban uses (residential, recreational, etc.) promoted by local land use zoning regulations.

Without conservation efforts, the entire area would have been rapidly converted into residential and/or industrial projects. Since 1990, the Totoro Hometown Foundation, modelled on the British National Trust, has played a leading role in conserving the forest environment, rural land use, and *satoyama* landscapes in the area. Totoro is the benevolent forest spirit in director Hayao Miyazaki's animated movie "My Neighbor Totoro" (1988), a story set in the Sayama Hills; it became a beloved symbol of *satoyama* forest conservation activities throughout Japan.

The Foundation initiated the Totoro Hometown Fund Campaign in 1990, which proceeded in four stages. First, public donations were collected with the purpose of acquiring forest land for conservation. With these contributions, the fund has managed to acquire 40 patches of forest to date (Fig. 5.5). The recent creation of a membership system aims to provide continuous financial support for conservation activities (Totoro Hometown Foundation n.d.).

Fig. 5.4 Typical *satoyama* landscape in the Sayama Hills (Kikuchi 2008b)

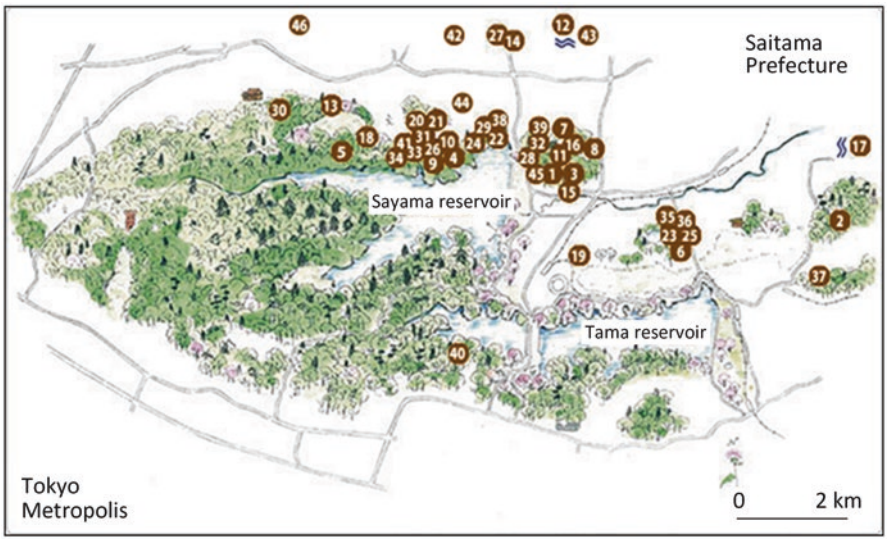

Fig. 5.5 Map of Totoro's Forest: location of conservation forest patches (sourced from the Totoro Hometown Foundation's website)

This was followed by the call to restore *satoyama* through various citizen activities, aiming to rehabilitate traditional landscapes under the guidance of local farmers. Among the farmland management activities promoted were the rehabilitation of rice paddies and water reservoirs, and rice cultivation/harvesting; meanwhile, the promoted forest management activities included planting trees, mowing grass, cutting trees/branches, and removing undergrowth.

At a later stage, researchers and residents worked together to gather information on the biodiversity, cultural historical background, and traditional land management practices of the area, ultimately producing a comprehensive inventory.

Finally, an environmental education program was implemented, providing guided tours, wildlife watching, hands-on farming experiences, and seasonal harvest events, mainly to local citizens and school children.

Participants from various backgrounds cooperate on these projects with different motivations. Urban citizens participate as a means to enjoy rural recreation, for the associated health benefits and also to help preserve the good residential environment shared by all; many of them also highlight the nostalgic feelings of belonging they experience in the countryside. For rural residents, on the other hand, such activities provide an opportunity to conserve their valuable cultural and spiritual heritage, and preserve a sense of identity. The wide cooperation on this project contributes to the diversification of local social networks, and the area "represents a node to connect rurality and urbanity" (Kikuchi 2008a) in the urban fringe.

The area is an increasingly popular destination and the number of visitors has been growing in recent years, mostly from neighboring urban/suburban communities (Fig. 5.6). Favorite activities are walking and hiking, whereby visitors also enjoy the health benefits of "forest therapy," and participating in activities organized by the local visitor center (guided walks, photography classes, etc.).

While the Foundation's activities have not stopped urban encroachment, which slowly continues in the area, this grassroots movement of *satoyama* conservation has greatly contributed to raising awareness of the issue, becoming a model for local citizens' involvement subsequently emulated by other similar groups.

Our second example of a rural community conserving traditional *satoyama* landscapes is Jike in Yokohama City, Aoba ward, on the south-western outskirts of the metropolitan area. A thriving farming community since the Edo/Tokugawa times, its traditional *satoyama* landscape combined rice paddies, ponds and irrigation canals, vegetable dry fields, orchards, and patches of coppice forests, managed according to the local know how.

Since the 1960s, population loss has been accompanied by the gradual shift to part-time farming and commuting to urban jobs; abandonment of farming in households in which the younger generation is not involved in farm management is also common (Kikuchi 2010).

These trends were reversed in the 1980s, when Yokohama City financed the restoration of irrigation infrastructure in the area and started offering tax incentives and subsidies for local farmers contributing to the conservation of the traditional landscape, under the name *Jike Furusato Mura* (Jike Hometown) Project. The project

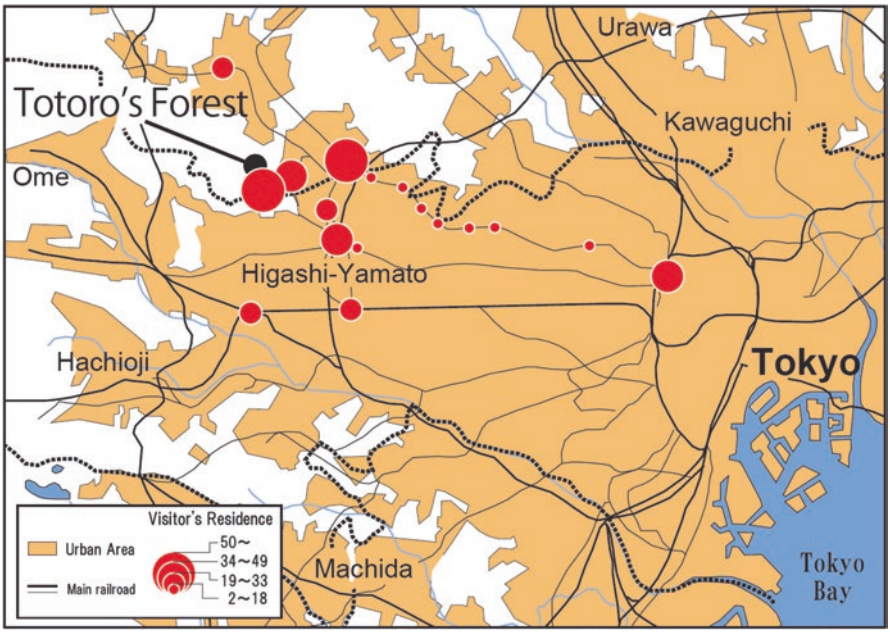

Fig. 5.6 Map of the origin of visitors to Totoro's Forest (Kikuchi 2008b)

has attracted the active involvement of volunteer groups in traditional land management and conservation activities, under the guidance of local farmers (Fig. 5.7).

Land uses reflect this trend: agricultural land use has been essentially perpetuated, with productive functions somehow diminished and farmland maintained for its complementary functions: landscape amenity, conservation of ecosystems and biodiversity, green space (as part of the green belt), cultural heritage conservation, and health-enhancing recreation opportunities (including hobby farming) (Kikuchi 2010).

The area is attracting increasing numbers of visitors, offering a diversity of recreation facilities, such as networks of marked paths, information boards, benches, parking lots, a fishing pond, etc. The visitor center *Shiki no Ie* ("House of the Four Seasons") provides information on the local *satoyama* environment and traditions, and organizes activities such as guided tours, insect- and bird-watching, photography and pottery courses, traditional cooking classes, festivals, and other events; the restaurant offers food made from local produce (Jike Furusato Mura Shiki no Ie n.d.). Visitors enjoy rural recreation through walks, nature observation, friendly exchanges with farmers, or shopping for fresh agricultural produce; they also learn about the local natural environment and rural landscapes. In this context, various patterns of partnership, collaborative actions, and interaction between farmers and urban citizens have developed, contributing to a sustainable relation between rurality and urbanity in this area (Kikuchi 2010).

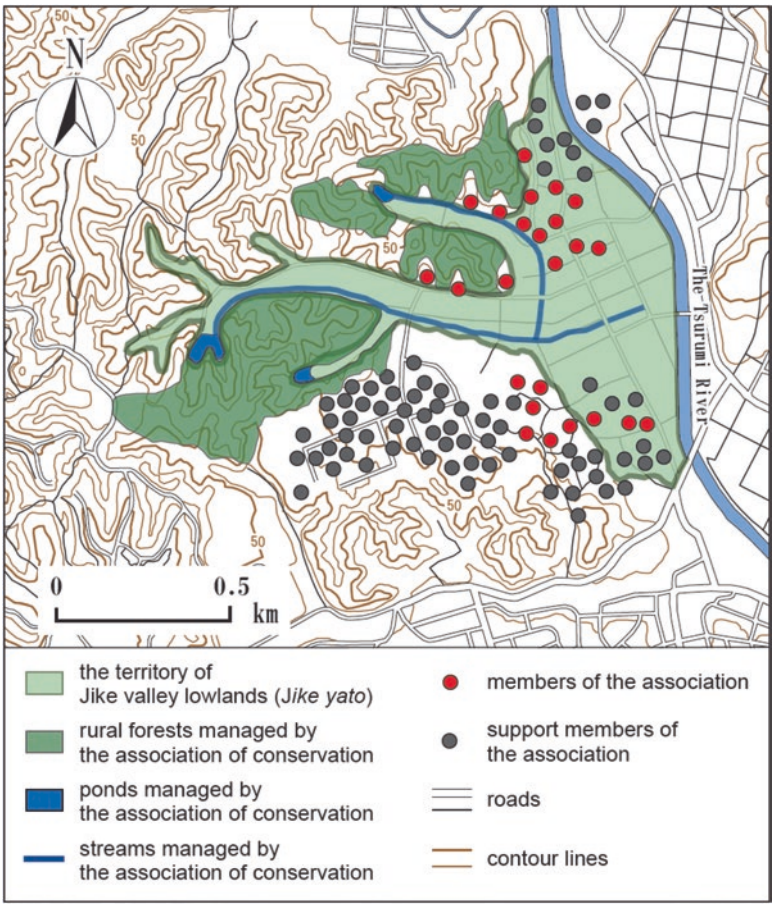

Fig. 5.7 Jike Furusato Mura: *satoyama* conservation activities (Kikuchi 2010)

Zushi Onoji Historic Environmental Conservation Area in Machida City, on the outer fringe of the metropolis, provides a third example of successful *satoyama* conservation. Lying 30 km south-west of central Tokyo in the Tama Hills, Machida is one of the rapidly growing suburban residential areas; developed since the 1970s, it has seen a 6.6-fold increase in population over the past 50 years (Machida City 2002).

Zushi Onoji area has a long history and rich rural traditions; it preserves an intricate mosaic of traditional land uses such as coppice woodlands, dry vegetable fields, rice paddies along *yato* (narrow valleys at the head of local rivers), irrigation ponds, etc., as well as a few beautifully restored old farmhouses and temples.

The area's environmental and historical value was recognized by the Tokyo Metropolitan Government in an ordinance in 1978, in which 36 ha were declared as the Zushi Onoji Historic Environmental Conservation Area. Early efforts for

conservation were hampered, however, mainly by national legislation to reduce rice acreage in the 1970s. During the 1970s and 1980s, management of farmland and forest was abandoned, resulting in uncontrolled ecological succession and deterioration of the environment (Kitagawa 2003).

The conservation efforts have been led by the local farmers, organized as a non-governmental organization, the Machida Historic Environmental Management Organization, since 1996, which was put in charge of *satoyama* management and landscape restoration work in the area, with a view to respecting traditional land management practices (Kitagawa 2003; Matsui et al. 2008).

The project's success was partly due to the implementation of tax incentives for the farmers involved, but also attributable to the broad partnership for *satoyama* conservation that includes the Tokyo Metropolitan Government, the Machida City administration, universities, researchers, and volunteers.

The ecological restoration project was effective, as indicated by the increased biodiversity of plant and wildlife species (Kitagawa 2003); consequently, the area has been recognized as one of the 100 best *satoyama* areas in Japan (Asahi Shimbun 2009).

This project's relevance is that it proved *satoyama* landscapes "are best managed following traditional procedures by local farmers" (Kitagawa 2003) (Fig. 5.8). The system works well and specialists evaluate that it has the potential to be implemented in other areas (idem).

Fig. 5.8 Zushi Onoji *satoyama* landscape (July 2016)

Acknowledging the project's accomplishments, the Machida City Master Plan (Machida City 2002) prioritizes conservation of the area and promotes management based on traditional know-how (of farming and forestry) accumulated over centuries by local farmers, for the following purposes: sustainable management within the environmental carrying capacity; the resilience of the local environment; biodiversity and traditional landscape conservation; conservation of water resources; and flood control. The plan also enforces some use restrictions: building industries and, to a lesser extent, public access and some recreation activities (Machida City 2002).

Recent developments in the area include the involvement of the NPO *Midori no Yubi* (Green Thumbs) and their footpath initiative: the group helps create local infrastructure for rural recreation, including rural paths, information boards, maps, etc.; in recent years, the footpath network has been gradually expanding and now connects the remaining *satoyama* areas in the western outskirts of the metropolitan area (Machida, Tama, and Hachioji City). Another positive recent development is the creation of the Onoji *Satoyama* Visitor Center, which has the potential to attract more visitors in the future (Machida City n.d.; NPO Midori no Yubi n.d.).

5.7 Multifunctional Use of *Satoyama* Landscapes

In many *satoyama* conservation areas, environmental education is a top priority: teachers and students from local schools are invited to study nature and biodiversity; they also participate in events for hands-on learning of traditional land management practices and traditional crafts (charcoal making and basket weaving), cooking, etc. (Koike 2014). Two examples illustrate this approach: one is Tokyo Metropolitan University (TMU); the other is an elementary school in Tama City (Tama New Town).

In Hachioji City, around 30 km west of the city center, Tokyo Metropolitan University conserves 13 ha of ex-*satoyama* coppice forest, which was in use until the late 1970s, when suburban development of the Tama New Town began. The forest is managed by the university as the Matsugi Hinata Green Conservation Area and is open to the public. It conserves diverse ecosystems, such as mixed forest on the slopes and aquatic and marshy ecosystems in the lower areas, which help maintain a high biodiversity. The inventory includes: 800 species of plants, with some rare flowering species, and various species of wildlife (insects, amphibians, birds, and eight species of mammals, among others) (TMU 2007) (Fig. 5.9).

The medium-term management plan proceeds according to detailed zoning and site-specific operations: while the western side is slowly reverting to the broadleaf evergreen forest, the potential vegetation typical for this area, other areas are managed as bamboo groves (Fig. 5.10) or maintained as coppices. The current management approach aims for the gradual transition back to the native vegetation (necessitating least human intervention).

The forest is used for educational purposes by the life sciences department, which has set several experimental areas and observation spots within the forest.

Fig. 5.9 Matsugi Hinata Green Conservation Area information board (July 2016)

Students were involved in compiling the inventory of biodiversity (TMU 2007) and continue monitoring the forest for various projects. Another recent educational program, which includes field trips to the forest, introduces *satoyama*'s natural and cultural features to international students.

Local citizens and school children are also invited for recreational and educational activities, as part of the university's outreach program. One such event, for example, combined bamboo shoots collecting with a lecture on the importance of continued *satoyama* management, contributing to raising citizen awareness of the issue.

A second example of a project combining *satoyama* conservation and environmental education can be found in Tama City (Tama New Town), on the western fringe of the metropolitan area, where Toyogaoka Elementary School is known for its progressive education for sustainable development (ESD) program, based on the school's "green resources": an ex-*satoyama* coppice forest and farmland (approximately 1 ha overall).

The coppice used to belong to the local temple, and was managed for charcoal production; with the development of Tama New Town in the 1970s, the forest was donated to the public elementary school (Fig. 5.11).

The forest is now used for environmental education (both curricular and extracurricular activities); within life science classes, students observe seasonal changes

Fig. 5.10 Matsugi Hinata Green Conservation Area on Tokyo Metropolitan University's campus (June 2016)

in the forest, learning about plant and animal life cycles, basic ecological concepts, and the importance of greenery in an urban environment (Fig. 5.12). Extracurricular activities also familiarize students with nature and develop their interest and sensibilities for nature, including art projects using forest products and active recreation (summer camp in the forest, etc.) (Sasaki 2008; Toyogaoka Elementary School n.d.).

The forest, which conserves rare flowering species and is home to a few species of wildlife (insects, birds nesting here, etc.), is managed by the school according to traditional *satoyama* management practices, with financial support from the local education board and in partnership with local community volunteers (parents, local citizens, researchers, etc.).The school also has other green educational resources (a paddy field, a vegetable plot, an orchard, and a lotus pond) where the students cultivate rice, vegetables, and fruit, learning hands-on farming skills.

In recent years, the school forest has gradually become a community forest, with organized tours for parents and local citizens, visits by children from the local nursery school, and other activities that facilitate community interaction and communication (Sasaki 2008). In recognition of its contribution to environmental education and to raising public environmental awareness, the school gained UNESCO Associated School status in 2010 (Toyogaoka Elementary School n.d.).

Fig. 5.11 Toyogaoka Elementary School forest (June 2007)

Fig. 5.12 Toyogaoka Elementary School: environmental education in the school forest (June 2007)

5.8 Perspectives on *satoyama* Conservation

Citizen movements for nature conservation in Japan started in the 1980s, on the wave of increased environmental awareness and citizen activism. Conservation activities tended to focus mainly on *satoyama* forests, where the ecological damage was becoming increasingly visible after 30 years of neglect. In the suburbs of major cities, the baby boomer generation started taking interest in the conservation of the surviving *satoyama* in their immediate surroundings.

In recent years, *satoyama* have seen renewed appreciation among urban citizens, for the multiple benefits and ecosystem services provided besides their productive uses: environmental, aesthetic, cultural, recreational, and spiritual.

In areas around large cities, conservation of ex-*satoyama* woodland and farmland is promoted as a system of management by citizen volunteer groups joining efforts with local farmers. In the early twenty-first century, Tsunekawa and Bessho (2003) estimated that there were approximatively 3000 groups engaged in *satoyama* conservation activities nationwide, with more than 20,000 volunteers involved, managing about 5% of Japan's remaining *satoyama* forests. In 2007, *satoyama* conservation activities were held at about 1000 sites, 60% of which are found around the three largest metropolitan areas (Tokyo, Osaka, and Nagoya).

While such efforts are to be commended, volunteer-based *satoyama* management cannot possibly provide for maintenance on a national scale, particularly in isolated hilly and mountainous areas, where entire *satoyama* landscapes are on the verge of ecological collapse.

Institutional approaches to *satoyama* conservation started in the late 1990s, but lack of a long-term vision and strategy, as well as of an integrative approach and cross-institutional cooperation, has hampered progress.

National efforts have been coordinated by the MoE. The "National Action Plan for the Conservation and Sustainable Use of Socio-ecological Production Landscapes (*satochi-satoyama*)" was launched in 2012, based on the principles emanating from the *Satoyama* Initiative (IPSI 2012). The plan stresses the need for a long-term vision and an integrated approach to conservation. It also proposes a new vision, whereby multifunctional *satoyama* landscapes should be "sustained through participation and cooperation of citizens in all positions, as a common natural resource that they share (i.e., "new commons" approach), to be handed down to future generations" (MOE 2012).

Priority is, therefore, given to increasing public understanding and awareness of *satoyama*'s significance and the need for its conservation, and to promoting participation by local citizens and communities (Kobori and Primack 2003a), while expanding engagement and cooperation at various levels. Specialists agree that a national effort is necessary: historically, "management of *satoyama* has traditionally built on involvement by entire communities" (Kohsaka et al. 2013); therefore, *satoyama*'s revival needs "a system of joint *satoyama* management: partnerships and improved synergies between farming and forestry households, local governments, businesses, NGOs, NPOs and urban residents" (Takeuchi 2010).

In an urban context, to support the long-term management of suburban *satoyama*, various strategies have been adopted by the Tokyo Metropolitan Government. Tokyo Vision 2020 (Tokyo Metropolitan Government 2007) proposes the ambitious goal to restore Tokyo to a beautiful city surrounded by water and greenery, and plans to create about 1500 ha of new greenery in the city. Specialists, however, highlight the need to prioritize conservation of authentic secondary environments (*satoyama*), instead of creating new artificial green spaces (Watanabe et al. 2012).

Tokyo's "Green Master Plan" (Tokyo Metropolitan Government n.d.), launched in 2007, aims to regenerate the city's rich greenery by means of replanting and also conserving existing *satoyama* areas. The plan proposes 50 sites for nature conservation (over 750 ha), mainly in the western suburbs, preserving natural, historical and cultural landscapes, including *satoyama* sites. Tokyo's Bureau of the Environment issues detailed guidelines for conservation activities (Tokyo Metropolitan Government 2015). The plan also calls for the involvement of local citizens/communities, volunteer groups, researchers, businesses and NGOs, universities, schools, and the metropolitan and local governments; however, it fails to offer concrete incentives for conservation.

Worried about the "approximately 1,400 ha of farmland which was lost in the decade 2000–2010" to suburban development, the Metropolitan Government's "10 Year Plan for Green Tokyo" (Tokyo Metropolitan Government 2007) recognizes the multiple roles that farmland plays in an urban setting and stresses the necessity for conservation. Concrete measures include, on the one hand, the creation of a system of public green areas of urban farmland, while, on the other hand, inheritance tax reductions are promoted, to enable forests to also be conserved. Furthermore, the plan proposes measures to improve forests in the mountain areas west of the city, by proper management and replanting.

The conservation and revival of *satoyama* landscapes pose major challenges in the years to come. In the countryside, a long-term vision and a comprehensive strategy to address the major decline in *satoyama* landscapes needs to be coordinated with efforts to revive rural communities throughout Japan.

In the context of major urban concentrations, surviving *satoyama* landscapes represent strategical resources that could make a vital contribution to mitigating the impacts of climate change or natural disasters. Their conservation should be an urgent priority.

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