

Biodiversity and New Urbanism in Tokyo: The Role of the Kanda River

Matthew Puntigam¹, Jared Braiterman PhD², Suzuki Makoto PhD³

¹ Research Fellow, Department of Landscape Architecture Science, Tokyo University of Agriculture (Nodai), Sakuragaoka 1-1-1, Setagaya, Tokyo, Japan, matthew.puntigam@gmail.com

² Research Fellow, Department of Landscape Architecture Science, Tokyo University of Agriculture (Nodai), Sakuragaoka 1-1-1, Setagaya, Tokyo, Japan, jared@jaredresearch.com

³ Chair and Professor, Department of Landscape Architecture Science, Tokyo University of Agriculture (Nodai), Sakuragaoka 1-1-1, Setagaya, Tokyo, Japan, makoto@nodai.ac.jp

Abstract

The Kanda River has had many roles in Tokyo and continues to redefine itself as Tokyo meets the challenges facing many large urban centers around the world. What can we learn from the Kanda River's past and how can it be used to transform the built environment to welcome biodiversity now? Taking instructive examples from Edo Japan provides a new look at how the Kanda can be used to help shape the New Urbanism that cities are embracing as they look to reinvent themselves as sustainable leaders for a post-industrial future. The Kanda River is in a unique position that has attracted environmentally minded policy interest but which has fallen short of its full potential to raise awareness and community building.

Keywords

biodiversity, new urbanism, Kanda, Tokyo, Japan, metrics, environment, grassroots, river, wildlife, satoyama, revitalization, policy

Introduction

Restoring healthy rivers is central to contemporary efforts to bring biodiversity to cities. Urban rivers connect the future of global cities with their history and culture. Rescuing rivers from concrete burial and pollution supports a variety of insects, fish, reptiles, birds, and mammals, while creating attractive new public spaces in crowded and densely built cities. Our paper focuses on the Kanda River, one of Tokyo's longest rivers, and its potential to serve as a green corridor that connects residential and commercial districts, people and nature.

Our questions include what is the best way to monitor the health of urban rivers? What are the metrics that can be used to determine how healthy rivers contribute to revitalizing cities? What are the roles of public planning and grassroots participation? How can we better connect biodiversity goals with immediate and

long-term human benefits? What is the role of culture in generating new ideas for sustainable growth?

Unlike many rivers in Tokyo today, the Kanda River is still visible from its source in western Tokyo to the point where it joins the Sumida River in the old Shitamachi area. Over the past century, the Kanda River has been channeled in concrete chutes for flood protection and incorporated into sewage treatment and storm water systems. Today the Kanda is bordered in places by pedestrian paths and thick vegetation, and in other places by the backsides of commercial and residential buildings. In a few areas, there is recreational boating, river cafes, and stocked fishponds. Some of the best views of the river are from the Chuo and Sobu Japan Railway lines.

The Role of Rivers in Bringing Nature into the City

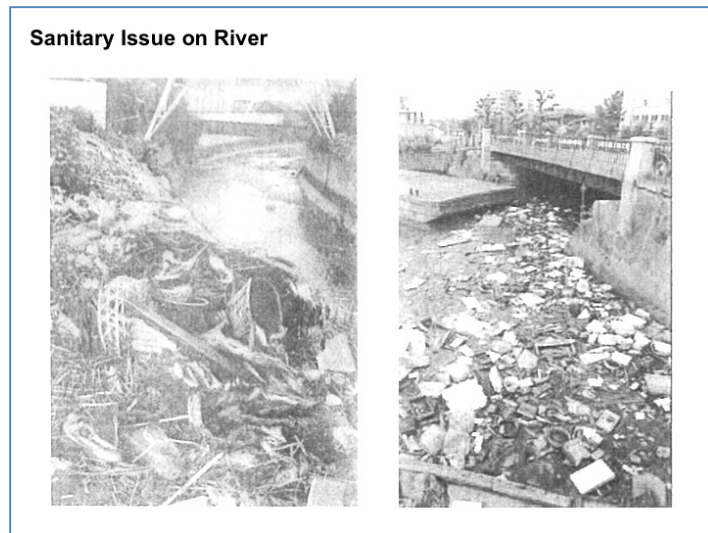
Climate change and global urbanization signal a need to transform our relationship with nature. While many people assume that nature has no place in the city, new urbanism offers a promising view, specifically, that cities can be central sites for a sustainable, post-industrial era that supports smart growth and a higher quality of life. In the industrial era, nature and city were viewed as incompatible domains. This view is no longer tenable given what we now know about carbon emissions and worldwide globalization. Already 50% of the global population now lives in cities, and African and Asian urban populations will double between 2000 and 2030. Urban biodiversity signals a new challenge to move closer to nature while building thriving cities.

New urbanism seeks to create a new relationship between master planning and popular participation. Last century's urban renewal relied on demolition and displacement, which frequently privileged real estate profit and short-term gains over the long-term needs of local residents. New urbanism transforms the imperfect built environment with the resourcefulness of existing communities. Key concepts are in-fill, participation, livable streets, re-use, context-specific planning, and the overall promotion of a new relationship between cities and nature. By fostering urban ecology and environmental activism in cities, the industrial-era polarization between city and country, people and nature, agriculture and business, begin to dissolve. In its place, new ideas about building local city eco-systems emerge, improving everyday lives with rapid environmental and human benefit. In many cases, these advantages can immediately be felt and quantified.

Throughout history, many cities were formed because of easy access to rivers and oceans. Asia saw a disproportionate emergence of mega-cities in the last century. Unfortunately, rapid urbanization was often accompanied by the degradation of these waterways. For cities that were rapidly transforming, like Tokyo, rivers and canals were seen as empty spaces that could be filled in or built over. Many of

Tokyo's historic waterways are now buried in concrete and topped with elevated freeways.

Mishima et al. provide a history of one of Tokyo's smallest rivers, the Kyobashi River, one of several waterways which connected the Edo castle to the ocean. What was once a dynamic place of transportation and commerce became neglected and a depository of debris from the Great Kanto earthquake (1923) and the firebombing of World War II. By 1959, in the rush to prepare for the 1964 Tokyo Olympics, the



Kyobashi, like many Tokyo waterways, was buried in concrete and the open space converted into an elevated freeway. Because this transformation eliminated the recent unsanitary conditions, at the time it was considered an example of a successful urban modernization.

Figure 1 Sanitary issues on Tokyo's rivers in the first half of the twentieth century¹

Rivers become easiest targets for pollution precisely because their function is to clean and sanitize, naturally taking sediments downstream to settle. With too much stress, they can quickly become unhealthy, even dangerous zones. Well kept, a healthy river is a key feature for food webs supporting biodiversity and the riparian zones they support. Insects and aquatic organisms provide food for fish and frogs, which in turn feed birds and other predators. This may continue up the food chain if living conditions support other predators. Including direct environmental merit, rivers have more potential than other water sources such as the bay because they interact with neighborhoods and geographically different areas by cutting through the city, representing a strong urban symbol of the initial arteries that brought life, commerce, and well-being to a city.

Urban Satoyama

Much of rural biodiversity results from what Japanese call *satoyama*, a balance between people and nature created through centuries of rice farming. Law and social pressures maintained the health of watersheds, and created a unique rural landscape. Unlike wilderness untouched by human activity, *satoyama* is a cultural landscape resulting from concentric rings of village, rice fields and surrounding forests, and its many edges and varied environments support greater biodiversity

than wilderness.

Central to the satoyama is common access to a clean water source. During the Edo period (1603-1868), village water-resource associations regulated water access and the construction of new irrigation canals, so as not to present any threat to supply. Rather than contaminate the rivers, the satoyama rice paddy system filtered the river and created settling pools for sediment, built with the least alteration to the natural environment and highest use of natural land features such as elevation and ponds. Rather than degrade the environment, waterways and rice paddies effectively increased the food supply for people, while providing new fresh water sources for a wide range of species, from insects to birds.



Figure 2 Satoyama in Niigata (Photo by Matthew Puntigam)

Recently, the idea of an urban satoyama is taking route as a uniquely Japanese contribution to sustainable cities. With Japanese increasingly abandoning the countryside, bringing the average age of farmers to 60, the ideal of a balance between people and nature must migrate to the city. While one might imagine that with fewer people in the countryside, there would be less environmental damage, rural abandonment is actually threatening Japan's biodiversity. According to the Environmental Ministry's "Third National Biodiversity Strategy" from 2007, reforestation endangers species that rely on the mix of woods, forests and flooded rice fields.²

Can *satoyama* and more importantly their reliance on waterways be recreated in cities?

Tokyo's Kanda River

The Kanda River stretches 25.5 km in a west to east direction, having its source in natural springs in Inokashira Lake. It continues through Suginami Ward and Nakano Ward, where it is joined by the Zempukuji River and on to Shinjuku Ward where it is joined by the Myoushouji River. It enters the Sumida River at the end of its journey, which finally empties into Tokyo Bay.

This river is unique in relation to the many other waterways in Tokyo in that it almost fully resides within and ends in the 23 wards of Tokyo, as well as having a river basin contained fully within the same area. Other systems, such as the Arakawa, Nakagawa, and Edogawa Rivers begin in the higher elevated plains north of Tokyo, and their river basins stretch into other prefectures. The area making up the 23 wards of Tokyo is traditionally bisected into the western Yamanote, and eastern Shitamachi. Originally regarded as the residential neighborhoods of the

upper class, including samurai warriors and daimyo lords, the Yamanote includes Nakano, Suginami, and Shinjuku Wards. The area east of the Imperial Palace in and around the Sumida River, where literally the city was lower, became known as the Shitamachi (“low-city”). Here the lower and middle classes, mostly merchants and artisans, lived and worked.

This bilateral class division still manifests today in hearing Tokyoite’s opinions of the personality each area has maintained. When speaking about my Shitamachi experiences to a friend, she responded, “Oh, yes, it’s normal to make a friend on the street there! They wanted to know more about you.” Like wise, upon telling the same story to another friend born in the Yamanote area, she made sure to distinguish her classy Yamanote roots from Shitamachi by affirming “We are *not* like that.”

The Kanda River thus occupies a special position both in the geographical and social landscape of Tokyo, as it unites two traditionally caste and class divided areas. Notice in Figure 3 how it also was used to irrigate rice fields in what is now part of Shinjuku Ward on the far left. The Kanda provides a unique look at Tokyo residents’ relationship with river ways, being a truly local river that has had direct contact with and changed according to the city’s needs and values. Even in Edo Tokyo, the relationship with water was well integrated in private, public and commercial life. The Tokugawa Shogunate from 1603 largely constructed the city to benefit from Tokyo’s many natural waterways for use as transport canals. This healthy network can still be seen before the Meiji Restoration in Figure 4.

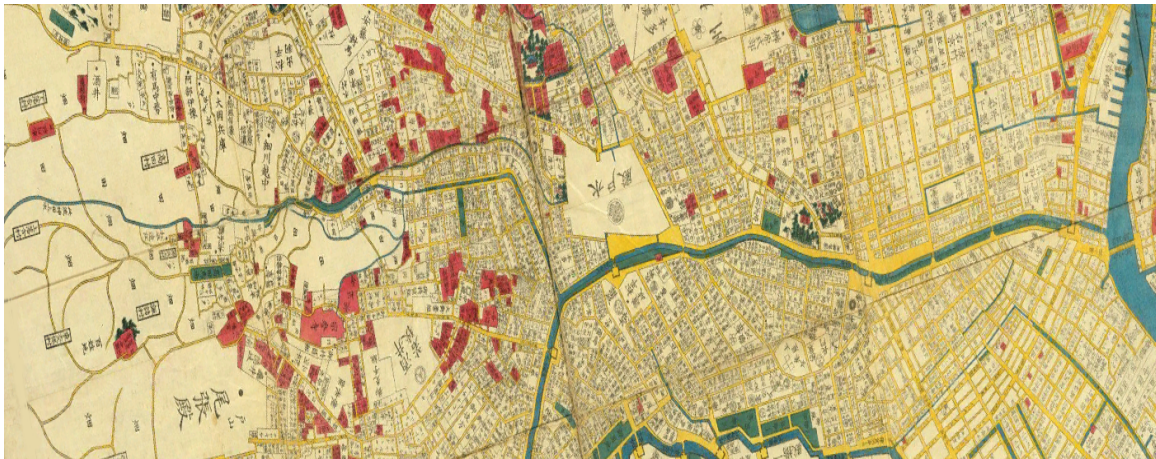


Figure 3 Kanda River passing through variety of neighborhoods, terrains, and designated land uses (1858)³

In 2001, the Tokyo Metropolitan Government concluded a 6-year investigative study on the health of 15 rivers in Tokyo, surveying the biodiversity and improvement of riverside riparian zones. These efforts were made to improve the maintenance and

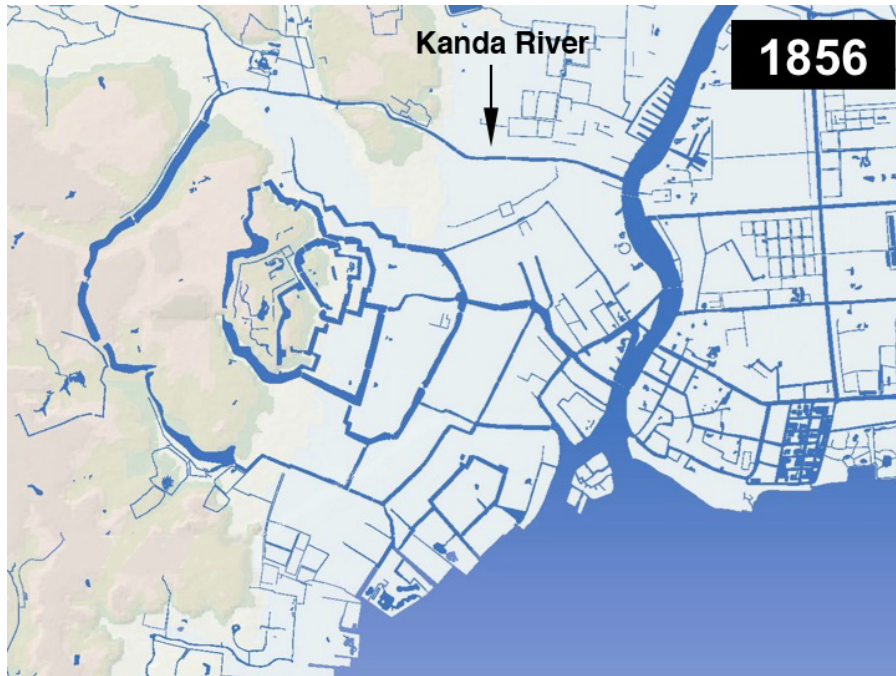


Figure 4 Map of waterways in Tokyo before end of Edo Era⁴

management of Tokyo's key rivers, while providing data for looking into SEA alternatives, and better drainage systems around and including the Arakawa River basin. The study incorporated fieldwork surveys of flora and fauna in 6 categories: amphibians/reptiles/mammals, insects, benthic river-bottom organisms, fish and shellfish, birds, and plant vegetation.⁵



Figure 5 Three areas defined by terrain affecting concentrations of terrestrial creatures⁶

Three demarcations for land creatures are specified (see Figure 5). (A) The upstream area of the Shingashi River includes meadows and higher elevation plains, which support insects and their many avian predators. (B) The bay area and eastern Tokyo is characterized by poor vegetation

and less insects supporting a smaller population of birds, due to heavy urban development. (C) A third smaller area can be seen along the Kanda River in the Suidobashi neighborhood. This area unlike the two major divisions stands apart because of the inclusion of forests in the riparian zone. Insects and birds are both supported by the higher amount of biomass in a small area.⁷



Figure 6 Visuals from each of the three demarcations outlined by the Metropolitan Government⁸

This study coincided with the first of a number of revisions of the Basic Environmental Plan in 2000, which provided a framework for including environmental considerations in decision-making policies. Part of this plan outlined by the Ministry of Land, Infrastructure, Transport, and Tourism was to revitalize urban environment infrastructure by implementing a number of measures including: (1) conserving, regenerating or creating precious natural environments in metropolitan areas, (2) creating green spaces in waterfront areas and expanding green spaces in urban areas, (3) reviving rivers and seas.⁹ Two years after this study concludes, over increased concerns about the health of the water cycle in urban areas, the Japanese government initiated revitalization designs for the Kanda river basin with the 2003 Urban Renaissance Project, and in the same year establishes guidelines for “Sound Water Cycle Planning.” The new Basic Environmental Plan prioritizes conservation and sustainability of riparian zones and water quality, community contact through access to water, regional specific plans depending on water use and water changes, and maintenance.

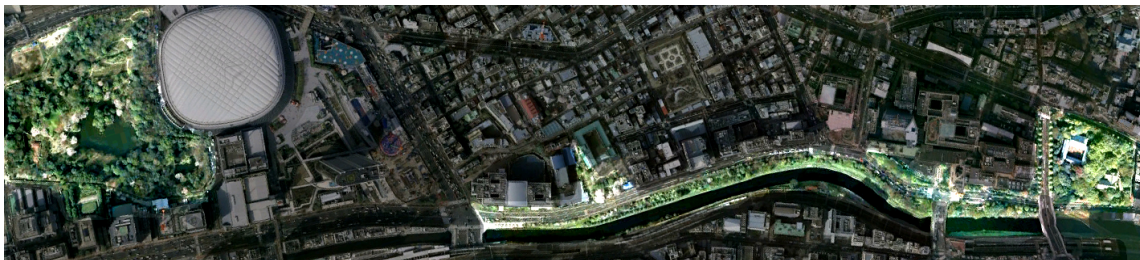


Figure 7 Suidobashi neighborhood of Kanda River showing Ochanomizu Park along riverbank, forests of Yushima Seido Temple on right and Koishikawa Korakuen on left¹⁰

In the Suidobashi section of the Kanda River (Figure 7), the survey found 260 plant species, 42 riverbed species, 9 types of fish, 291 types of insects, and 30 species of birds. Among land creatures, 2 reptiles and 3 mammal species were documented, including the small Japanese mole (*mogera imaizumii*) and red-eared slider turtle (*trachemys scripta*). Bird species which were using the nearby forest nesting habitats were the Japanese white-eye (*zosterops japonicus*), Japanese bunting (*emberiza spodocephala*), and Japanese nightingale (*cettia diphone*). The kingfisher was also spotted, widely associated with rivers and lakes and an insect/fish diet.



Figure 8 Slider turtle, the same type often sold in street booths⁷

The authors of this paper visited the Suidobashi section in March of 2010. We observed new and old-growth trees, including ornamental, native, planted, and “volunteer” species. Within a very limited horizontal space, a small urban forest is growing on a very vertical sloping hill. We noticed several gates and pathways, which were all closed to public access. Some of the best views of the hillside are from the JR train stations and tracks which occupy the other side of the river bank.

The Kanda biodiversity study gives us a thorough baseline to know what is living in the Kanda today, and what could be supported in other restored waterways. We were struck, however, by the lack of public access and involvement in this unique natural environment in the city center. The restoration work does not incorporate recreational uses which would tie area residents, workers, and shoppers to this remarkable watershed and river. Also absent are grassroots efforts to care for, maintain and contribute to the environment here. We wonder whether Tokyo will continue to monitor the health of the Kanda River, and what opportunities are being missed by not including local stakeholders and the public.

Conclusion

Biodiversity is a key indicator for the health of urban environments, with rivers playing a central role. In the twentieth century, Tokyo, like many Asian cities, followed a Western model of urbanization and industrialization, including prioritizing automobile traffic and creating infrastructure on top of nature. By drawing on its history and culture, Japan has a chance to become a global leader in new urbanism and a new environmentalism that joins city life with nature.

The Kanda River shows the potential for restoring a healthy ecosystem of rivers and riverbanks that have been neglected and damaged. Success metrics include the quantity and variety of species found in these green corridors. Humans and nature benefit from clean air and water, lower summer time temperatures, reduced carbon

emissions, and the creation of more natural pedestrian networks for walking and leisure.

What is missing is the opportunity to engage residents in fully transforming the Kanda River and supporting urban biodiversity. City gardeners, beekeepers, school children, urban farmers, bird watchers, and neighborhood volunteers can assist in tracking and identifying urban species and maintaining and expanding habitat.¹¹ The city government can do more to encourage active participation in green corridors, while citizens can create micro-gardens throughout the city that connect these corridors with every neighborhood.



Inokashira Lake during cherry blossom season and recreational boating



Ochanomizu Park inaccessible to pedestrians



channelization of river heading toward West Shinjuku



steep landscaped riverbanks



common view from narrow balconies along river, one of many bridges



shitamachi buildings up to river's edge

Figure 9 Various views from along the 25.5 km stretch of Kanda River (Photos by Jared Braiterman and Matthew Puntigam)

Bibliography

- Braiterman, J and Takahashi, Y. (2010). Urban Biodiversity Identification and Tracking System. URBIO Conference.
- Brown, A. (2009). *Just Enough: Lessons in Living Green from Traditional Japan*. Tokyo: Kodansha.
- Construction, Tokyo Bureau of. (2001). *Investigative Survey of Tokyo's Rivers*. Retrieved 2010 15-March from Tokyo Bureau of Construction:
http://www.kensetsu.metro.tokyo.jp/ikimono2/KekkanoKaisetu/kubun_rikusei.htm
- Jinnai, H. (1995). *Tokyo: A Spatial Anthropology*. Berkeley: University of California Press.
- Kajikawa, A. (2005). A Field Study on Revival Conditions of Covered Rivers in Tokyo's 23 Wards. *Journal of Asian Architecture and Building Engineering*, 4 (2), 489-494.
- Mishima, Y. et al. (2010). Revitalization of Kyobashi River. 15th Inter-University Symposium on Asian Mega-Cities (IUSAM).
- Miyazaki, H. (1991). *Totoro no sumu ie* [The Place Where Totoro Lives]. Tokyo: Asahi Shinbunsha .
- Winn, M. (2008). *Central Park in the Dark: More Mysteries of Urban Wildlife*. New York: Farrar, Straus and Giroux.
- WWAP. (2003). Pilot Case Studies: A Focus on Real World Examples, Chapter 22 Greater Tokyo, Japan. In UNESCO, *Water for Life: the United Nations World Water Development Report* (pp. 481-498). Barcelona: UNESCO and Berghahn Books.
- Yomota I (2007). *Tsukishima monogatari* [Stories about Tsukishima] Tokyo: Kosaku-sha.

¹ (Mishima et al.)

² Ministry of the Environment, more information at <http://www.env.go.jp/en/focus/071210.html>

³ Extracted from Google Earth, Rumsey Historical Maps. See www.davidrumsey.com for full maps

⁴ (Mishima et al.)

⁵ "Living Things in Tokyo's Rivers" <http://www.kensetsu.metro.tokyo.jp/ikimono2/index.htm>

⁶ Map slightly altered from Tokyo Bureau of Construction website, originals can be found at http://www.kensetsu.metro.tokyo.jp/ikimono2/KekkanoKaisetu/kubun_rikusei.htm

⁷ Extracted from Bureau of Construction Website, "Environmental Divisions among Terrestrial Creatures" http://www.kensetsu.metro.tokyo.jp/ikimono2/KekkanoKaisetu/kubun_rikusei.htm

⁸ Photos from Tokyo Bureau of Construction website, originals can be found at http://www.kensetsu.metro.tokyo.jp/ikimono2/KekkanoKaisetu/kubun_rikusei.htm

⁹ Extracted from "White Paper on MLIT in Japan" www.mlit.go.jp/english/white-paper/mlit03/p2c3.pdf

¹⁰ satellite image taken from Google Earth, March 2010

¹¹ (Braiterman and Takahashi)