

How to design a river with children: community participation and stream restoration in Tokyo

By Takehiro Watanabe, Takizawa Kyohei, Nakamura Shinichiro, Satoquo Seino and Yukihiro Shimatani

This article gives an account of the planning of Osonigawa Brook, a stream restored in Tokyo, Japan in 2018. Local children, whose elementary school ran a river-centered curriculum using this stream restoration as a project-based learning program, participated in the design process. Years of cooperation between community volunteers, outside experts such as river engineers and hydrologists, and government agencies ensured the project's success. This case adds to the growing number of nature-based solutions being implemented in Tokyo, a mega-city seeking new ways to manage climate challenges.

A ribbon-cutting

On a summer day in 2018, an opening ceremony for a new brook took place in a small Tokyo park. On stage, six white-gloved figures stood side by side: the Sugunami Ward mayor, a council member, two local elementary school children, and two community group co-chairs. Behind them was Osonigawa Brook purling over riffles, its clear water shimmering in the sun.

This celebration showcased the children and many community members who worked to revitalize this urban waterway. Before the restoration, the brook had been fenced off and neglected, for good reason: it was dark and overgrown, its waters stagnant and knee-deep in semi-decomposed litter. But when a group of schoolchildren submitted a request to restore this waterway to the mayor, the community sprang to action to realize their dreams. After a series of participatory design workshops, the ward cleaned the stream and a new community group was formed to help maintain, monitor, and coordinate programs for this new blue space.

In cities such as Tokyo, rivers, ponds, and wetlands have captured the imagination of water experts due to their potential as spaces for biodiversity conservation and nature-based climate solutions. Yet many of Tokyo's rivers are cast in banks of ferro-concrete, fouled with combined sewage overflow. Many of Tokyo's inland waters are on life-support with pumps and bypasses, offering poor habitat for aquatic life. With rivers no longer directly linked to people's livelihoods, most Tokyoites are

uninterested in the water cycle and unaware of the vast infrastructure that supports and protects their lives.

Osonigawa Brook is an example of an urban water infrastructure project that was designed around the principles of ecological soundness and community participation. Behind the planning was a local elementary school that served as a hub of citizen science and river advocates who cooperated with the local government to reimagine a forgotten waterway.

A forgotten waterway

Osonigawa Brook flows into the Zenpukuji River, which connects to the Kanda River – an important river system in Tokyo's history. Temples and shrines that visitors may find in the area tell of its historical importance as a spring pond. At the time of the capital's seventeenth-century founding, this river supplied water for rice paddies, urban residents, and the castle moat. Until the twentieth century, the area surrounding the river's headwaters remained mostly agricultural.

But starting in the 1920s, urbanization transformed the area into a commuter town, adding new stresses to the river. Hydrologically, the population increase resulted in greater use of ground and surface water. When farming declined, so did night soil demand, creating fecal sludge disposal problems. Furthermore, the completion of a modern water supply system, spurred by the cholera outbreak, meant that the Zenpukuji River was no longer needed to be clean. Even so, citizens and officials



Figure 1 | Osonigawa Brook today. Photo by H. Watanabe.



Figure 2 | Opening ceremony for Osonigawa Brook. Photo by H. Watanabe.



Figure 3 | Osonoigawa Brook before restoration, April 2018. Photo by K. Takizawa.

campaign for public parks and green spaces. In 1930, the city designated Zenpukuji Pond and its surroundings as a “scenic area” and local landowners formed a conservancy, which worked to widen the pond for rowboats. In the 1950s, a second pond replaced rice paddies with an iris water garden. Efforts to re-fashion this spring-fed marsh into a recreational area for suburban families connected the former (upper) pond with the new (lower) pond, thus creating Osonoigawa’s modern shape.

During this transitional period, rivers in Tokyo became dirtier and flashier as they were channelized, culverted, and turned into sewage canals. Yet, as Japan entered an era of middle-class consumerism and gentrification, the public again called for improving urban environments. In the 1980s, a local group fenced off the waterway to protect fireflies, but this initiative faded as the springs dried up and the waterway fell into obscurity. In 1989, the River Revitalization Project, a government effort to revive desiccated waterways with treated wastewater, gave Zenpukuji River a second life. In 1997, the national government amended the River Laws, Japan’s premiere law on inland waters, making environmental concerns and community participation top policy priorities.

By the 2000s, due to a renewed community interest in the Zenpukuji River, local river advocates devised community-led programs that included citizen monitoring and environmental education with the river as an outdoor classroom. Local elders, recruited by the school as volunteers, used this opportunity to teach children about a bygone era when Zenpukuji River wove through farm lots and rice paddies through braids of irrigation dikes. These programs also helped expose issues such as non-point pollution, biodiversity loss, and watershed-wide drop in surface permeability, and allowed the participants to connect these issues to more immediate problems such as flooding and the heat-island effect.

Children’s hopes for a better river

Of the many schools along the Zenpukuji River, logi Elementary became an activity hub for the local advocacy of the river. logi has a rare feature: a river runs through it. With the help of these advocates, the teachers set up a river-centered environmental curriculum. Instruction now includes several trips in and around



Figure 4 | Map of Osonoigawa Brook. Created by T. Watanabe, based on OpenStreetMap.

the river, including river clean-ups, birdwatching, a river monitoring routine consisting of water quality testing and biological surveys, and lessons by local experts and university researchers.

logi’s program entered a new phase when the head of the school’s community liaison office and a key volunteer organizer of this curriculum developed an interest in the waterway as a potential site for environmental programming. The two noted that unlike the river proper, the waterway did not suffer from sewage effluents, was accessible from the park, and was managed directly by the ward government, thus lowering the jurisdictional bar. To explore this idea further, the duo began consulting experts in 2013 and invited river engineers, hydrologists, and ecologists to conduct classes for the schoolchildren.

These activities gave shape to the hopes of stream restoration and inspired the school to bring the children’s activities to the local government’s attention. In a series of classroom activities, 113 children in the fifth and sixth grades each drew, with crayon and color markers, their design ideas for the waterway. While the drawings varied in style and content, they revealed that the students were concerned about accessibility, habitat restoration, daylighting, and multifunctionality.

In July 2014, four students visited the local government office to submit these drawings to the Sugunami Ward mayor and asked him to “change the waterway so that we can enjoy it.” In attendance were the students’ teachers, the community liaison officer, and a television crew. Perhaps because this project was aligned with the ward’s push for more ecologically-healthy water spaces as well as greater civic participation, the ward earmarked the children’s proposal.

With the project approved, the river advocates prepared the community for active engagement in the planning. Community leaders met with officers and asked to hold a design workshop to guarantee the inclusion of community voices – especially those of children. The leaders also teamed up with outside experts to hold events, such as citizen science opportunities, a public panel with elders about local history, and a symposium about community-driven stream restoration projects. These events allowed local stakeholders to identify and resolve conflicting interests, while also building excitement for the project.

From design to construction

In October 2015, a year after the children submitted their drawings, the planning process began with a series of design workshops. Held meetings four times over two months at logi Elementary with 35 participants, the workshops were coordinated by a landscape architecture firm hired to draft the new waterway plan.

In the first workshop, the participants identified key desired outcomes. The schoolchildren launched the workshop with a presentation about their drawings and a survey that they had conducted to learn about the local residents' concerns.

The participants then created a wish list of four key features: A | better accessibility, B | chances to observe nature, C | sites for water play, and D | habitat conservation. The session also exposed contentious issues, such as differing approaches to habitat protection.

In the second workshop, which was held outdoors, participants conducted field observations and shared their findings on four themes: 1 | water, 2 | light and greenery, 3 | people, and 4 | the surrounding area. In the third workshop, participants were divided into four groups and plotted the four desired features onto the waterway's ground plans. All groups proposed zoning a habitat conservation area in the upstream section, followed by a midstream nature observation area and a recreational area downstream.

In the fourth and final workshop, the landscape architects unveiled their plan, to the general satisfaction of the participants. There were, however, several design concessions. First, while the city approved a wider channel and a riparian slope, which required an expansion into the city's jurisdictional area, the culverted section could not be daylight, thus limiting the restored stream's length. Second, water testing revealed that the upper pond's water was unfit for both recreational use and aquatic life. Suggestions from participants, such as improving the water quality of the upper pond through dredging and culling invasives, were all deemed impractical, costly, and too time-consuming. Instead, a two-part solution was devised: reroute the unwanted water to the lower pond through an underground pipe and draw clean groundwater via a nearby pump into the stream head. Despite these setbacks, the workshops ended with a consensus on the design principles for the waterway.



Figure 5 | A student explaining drawings for the new brook. Photo by T. Takizawa.

Toward a partnership

During the two years between the workshops and the opening ceremony, the ward held meetings to develop a co-management partnership with the river advocates. Since the 1980s, as a response to the decline of neighborhood associations, irrigation cooperatives, and 'scenic area' conservancies, the ward had experimented with new governance arrangements. This was on the mind of participants who during the process had called for greater community participation.

The earliest meetings began with unresolved issues from the workshop. For example, the river advocates, with the advice of engineers, proposed design changes that remedied the channel's straight and fixed lines in the ward's plan by including nature-oriented features such as stream meandering, weir-induced pools and mid-channel bars, and adding variety to the stream width for slower and faster flows. These new design details were not only intended to foster greater habitat diversity, but also to entice children to "play river engineer" – changing the movement of water with stones – in their new blue playground. Another issue, which was raised once the meetings became public, was the name. Instead of "Dream Waterway," which was criticized for sounding too bureaucratic and divorced from local history, participants suggested "Osonoigawa." This was an old toponym that, according to one interpretation, is linked to a legend about a samurai who drank from the spring, and according to another interpretation, is an allusion to river otters. Participants also proposed replacing the suffix "-suiro" (waterway), which connotes an artificial canal, with "-gawa" (river), to convey a more natural and folksier image. The suggestion was well received, and Sugunami officially adopted this new name. These meetings led to the founding of Osonoigawa Kappa Club, which was launched in 2017 by 13 members. Started with a ward partnership agreement, the group helps monitor the brook, conducts small-scale maintenance, and coordinates educational programs. Its charter explains the word kappa, a water trickster from Japanese folklore, as "someone who protects rivers and its waters." The group helped create rules of use for the new brook and ran programs during construction, such as enlisting schools in the effort to revive local flora from the soil seed banks of excavated layers.



Figure 6 | Osonoigawa Brook on opening day. Photo by T. Watanabe.

In closing

Four years after the children submitted hand-drawn blueprints to the ward mayor, a ceremony was held to open Osonoigawa Brook. Its banks stabilized by native flora that the children themselves planted, the new water space is a testament to the years of community-government cooperation, exchanges between local and outside experts, and the river advocates' insistence that children's experience remain at the heart of this project.

The new brook, now flowing clearly, is also lucid about the lessons it holds for community engagement and urban stream restoration. In this case, children's participation through the public school system was essential for its success. Like many schools, logi Elementary is connected to a range of stakeholders: children and their families, teachers and the board of education,

neighborhood associations, volunteers, local businesses, and government offices. As a network hub, the school was able to mobilize resources across different sectors and bureaucratic barriers. As an institution of learning, it served as a bridge between local knowledge, embodied by community volunteers, and expert knowledge, typified by professionals and researchers.

One way, then, to involve communities in stream restoration projects is to develop field-based, problem-driven educational curricula that embrace both local knowledge and global expertise. Although a tall order, this model encourages communities to develop innovative solutions to today's water challenges. If schools and communities continue to nurture the children's connection to water, then perhaps a sense of stewardship, one that reaches deep into local neighborhoods and wide across the entire planet, will grow with them.



Takehiro Watanabe

Takehiro Watanabe is an associate professor of anthropology in the Faculty of Liberal Arts and Graduate Program in Global Studies at Sophia University in Tokyo, Japan. He is an anthropologist specializing in social and cultural dimensions of environmental issues. His research focuses on industrial pollution, natural resource management, wildlife conservation, and urban ecology. He is also a member of Zenpukujigawa wo Satogawa ni Kaeru Kai, a community-based group in Tokyo seeking to restore the Zenpukuji River.



Kyohei Takizawa

Kyohei Takizawa is a landscape planner and serves as a board director of Mizube Soken, a waterfront design and management consulting firm based in Tokyo, Japan. As a planner, he specializes in nature-based solutions and is involved in numerous stream and waterfront restoration projects throughout Japan. A doctoral student at Kyushu University, he is a member of Zenpukujigawa wo Satogawa ni Kaeru Kai, a community-based group in Tokyo seeking to restore the Zenpukuji River.



Shinichiro Nakamura

Shinichiro Nakamura is an associate professor in the Department of Civil Engineering, Nagoya University, Japan. His specialties are hydrology, water resources management, and land-infrastructure design, with research focus on sustainable urban basin management, climate impacts and adaptations, and analysis of socio-hydrological processes in the Asian monsoon region. Serving on water-related research projects in Japan and Asia, he is a member of Zenpukujigawa wo Satogawa ni Kaeru Kai, a community-based group in Tokyo seeking to restore the Zenpukuji River.



Satoquo Seino

Satoquo Seino is an associate professor in the Department of Urban and Environmental Engineering at Kyushu University. She specializes in ecological engineering, coastal and watershed environmental conservation, and water-related multi-sectoral and multi-generational collaboration. Her research interests include habitat conservation and restoration, community-based coastal management, environmental planning and legal systems, and sustainable fisheries industries. She has also served on government committees and has extensive experience with local community participation.



Yukihiro Shimatani

Yukihiro Shimatani is a river engineer who specializes in nature-oriented river works, river ecology, participatory design and community engagement, basin-wide flood management. He has served on many government committees and has worked as a researcher at the Public Works Research Institute and as the head of the Takeo River Management Office. After his post as professor at Kyushu University, he currently holds positions at Kumamoto Prefectural University and Taisho University. He is a member of Zenpukujigawa wo Satogawa ni Kaeru Kai, a community-based group in Tokyo seeking to restore the Zenpukuji River.