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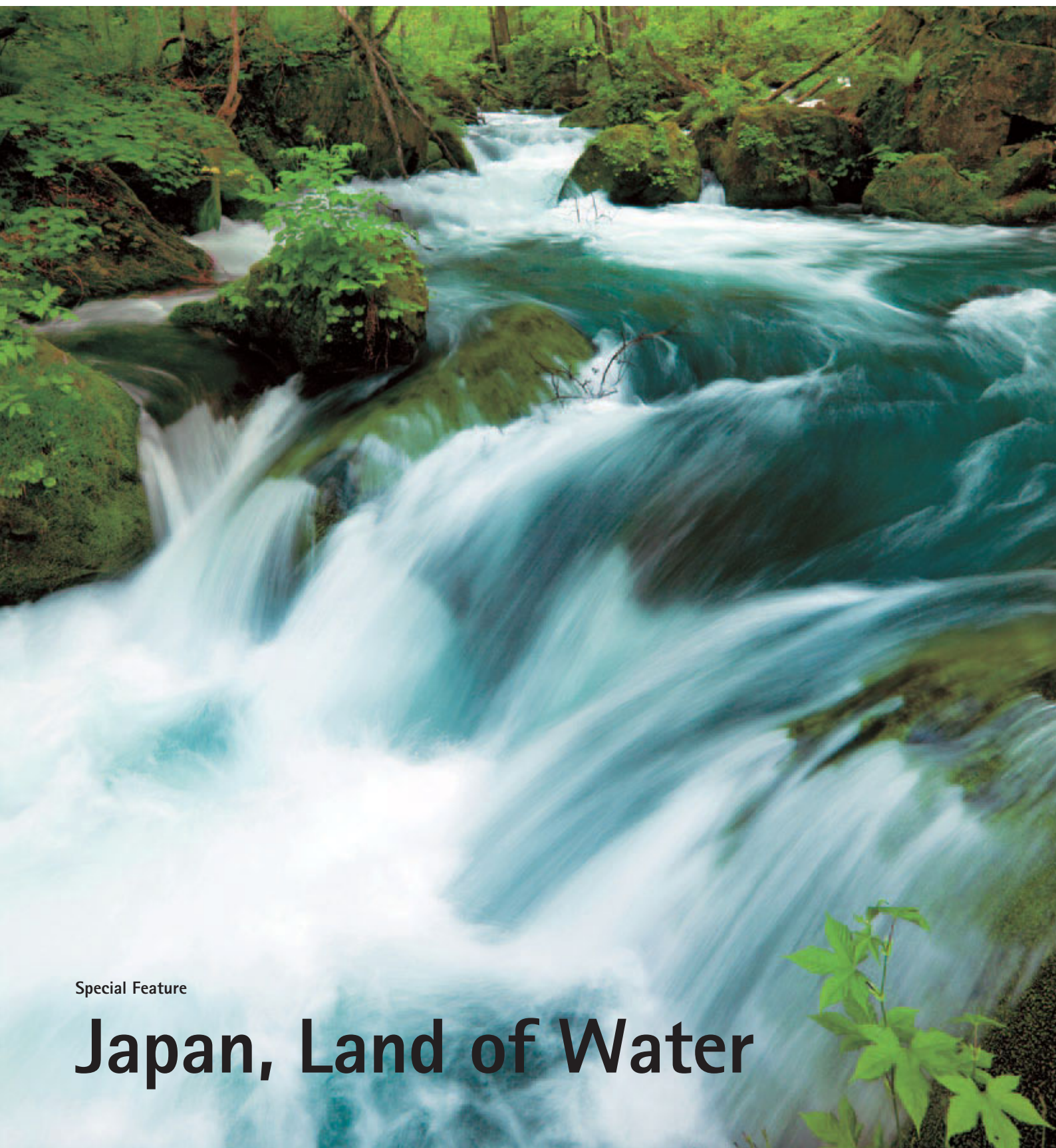
Discovering
Japan

2015
no.

15

Special Feature

Japan, Land of Water



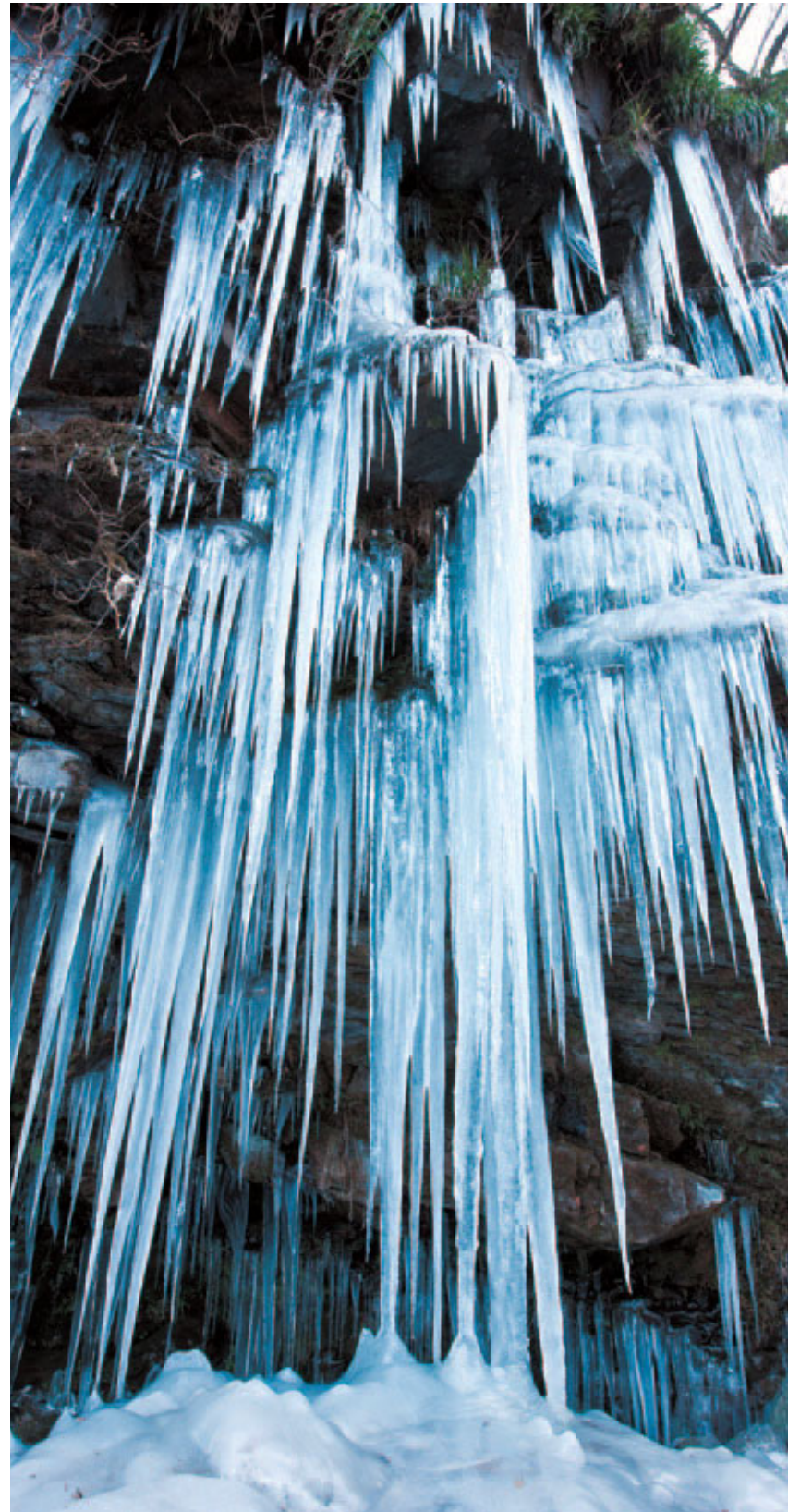


niponica is published in Japanese and six other languages (Arabic, Chinese, English, French, Russian and Spanish), to introduce the world to the people and culture of Japan today. The title *niponica* is derived from "Nippon," the Japanese word for Japan.

Special Feature

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Cover photo: Oirase Stream in Aomori Prefecture. The area is much admired for its waterscapes. (Photo: Nawate Hideki / Aflo)
Above: Icicles are a masterpiece of nature. In the Chichibu Mountains in Saitama Prefecture, they can grow almost 10 meters long. (Photo: Kataoka Iwao / Aflo)



Special Feature

Japan, Land of Water

In Japan, people have a deep connection with the country's plentiful water resources, creating a natural culture where water is not only used wisely, but also in some very unique ways.

Ukiyoe woodblock print by Katsushika Hokusai, entitled *Shokoku Takimeguri Shimotsuke Kurokami-yama Kirifuri no Taki* ("Kirifuri Falls on Mount Kurokami in Shimotsuke"), from the artist's *A Tour of Waterfalls in Various Provinces* series. His bold treatment of the rocks and water is remarkably expressive. (Property of the Shimane Art Museum)

Cities Blessed with Water

Water is a gift, meant to be handled well and protected since we need it every day. These pages present two places that have enjoyed the benefits of water for centuries and prospered as a result.

1. Ample supplies of water foster culture in an ancient capital: Kyoto

Sheltered on three sides by low mountains, Kyoto lies in a basin blessed by two major rivers: the Kamo-gawa in the east and the Katsura-gawa in the west. The rivers have formed an alluvial fan that lets water percolate down, creating a supply of groundwater so vast that Kyoto has been described as a city sitting on top of a big water jug. Summers can be stifling hot and winters bitterly cold, but even so Kyoto served as the nation's capital without a break for over a thousand years, beginning in the late 8th century. It continued to prosper over the centuries, thanks in part to its plentiful sources of excellent water.

The Kamo-gawa flows basically straight from north to south. It was once prone to overflowing its banks, creating major problems for the city folk, so Buddhist temples and Shinto shrines were established at some of the river's sources, to pray for protection from its wrath. During long dry spells, water festivals were held and residents prayed for rain. The ancient capital played a very important role as a center venerating the gods of water. Religious devotion focused on water, with purification ceremonies that included immersing oneself in a river, and there was faith in the miraculous powers of water from certain wells. Some of those beliefs survive to this day.

Weeping cherries in bloom and trees in all their greenery, reflected in the large pond in Heian Shrine's garden. (Photo: Nakata Akira)



Even in ancient times Kyoto residents had no problem obtaining enough drinking water—all they had to do was dig wells a few meters down, just about anywhere, and then quality water was theirs. When priests from China brought Zen Buddhism to Japan they also brought vegetarian recipes for making tofu, as well as *yuba* (the skin that forms on the surface of boiled soy milk), and *fu* (dried wheat gluten). Before long these were refined into ingredients that became an important part of Japanese cuisine. Kyoto's water played a part in this, too.

The key to the water's constantly good quality is the fact that the well water varies very little throughout the year in temperature and taste. The well water has created many opportunities for older businesses to enhance their reputations, and they still take good care of their wells for their signature products, such as saké and tea. Kyoto's fine water helped in the development of the *sado* tea ceremony and *ikebana* flower arrangement. It also kept temple gardens moist, and supported the growth of traditional industries like weaving and pottery.

Kyoto street scenes are still enlivened by old customs that use water effectively. To gain relief from the heat of summer, wooden decks called *yuka* are constructed sparsely near flowing rivers for revelers to relax and enjoy eating river-caught fish. Shopkeepers and others sprinkle water on the sidewalks and roads, to give passersby respite from the heat. This practice, called *uchi-mizu*, lowers the temperature in front of the narrow storefronts, thereby generating a breeze that pushes out warmer air in the long family home, called *machiya*, interiors. In a low-lying city practically surrounded by highlands, where cooling breezes are often

absent and water is plentiful, these scenes give Kyoto a unique and hospitable appeal.

The nation's capital was moved from Kyoto to Tokyo in the late 19th century, but Kyoto continued to develop, thanks again to water. To promote population growth, a major project was launched to bring water to the city through a canal from Lake Biwa in neighboring Shiga Prefecture. This led to better water-related infrastructure, and to the construction of Japan's first hydroelectric plant, bringing electric lights and modernization to the old capital.

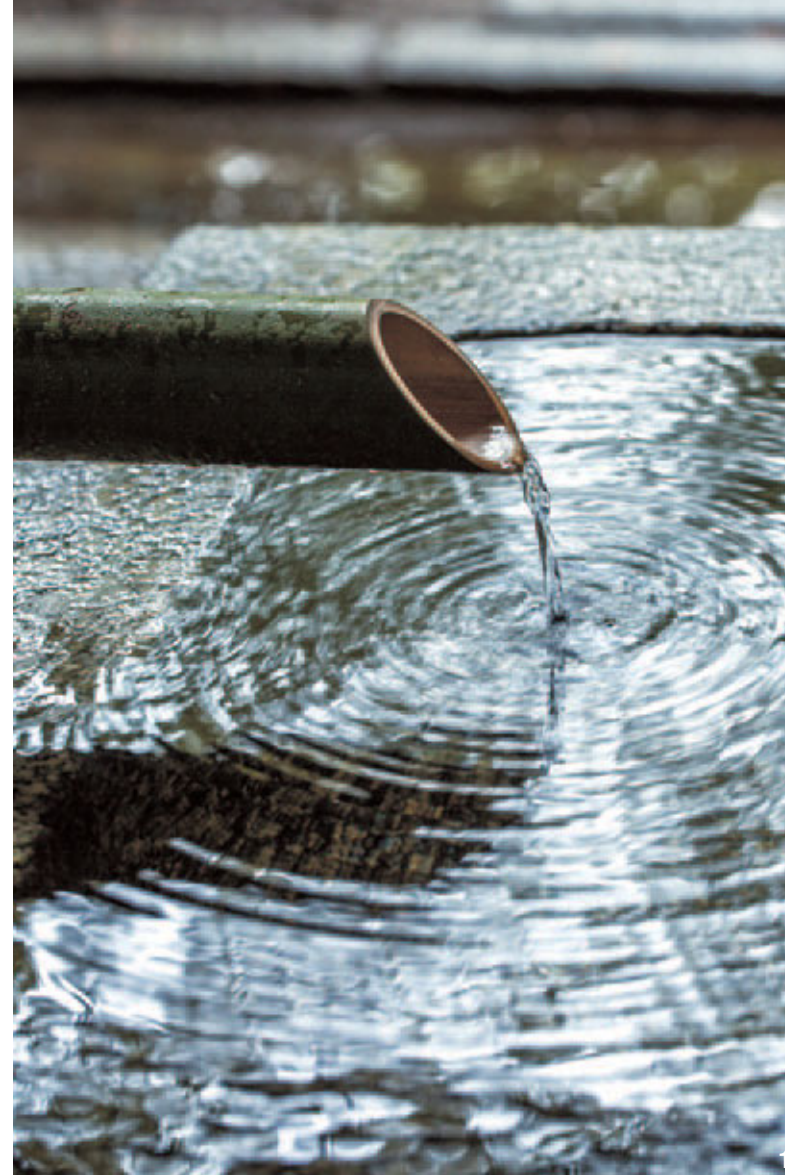
Kyoto has used water to nurture its thousand years of tradition and culture, and today it is one of the world's most vividly historic cities.

Cultural history: Water flows through it

Below: The Mitarashi-gawa Stream flows through the precinct of Kamigamo-jinja Shinto Shrine. Its water is used in purification rituals.

1. This well, located within the grounds of Nashinoki Shrine, has water so pure that it is honored on the list of fine waters in Kyoto. It is highly valued by tea ceremony practitioners.
2. Centuries ago, members of the aristocracy amused themselves by sitting beside a stream and trying to finish composing a *waka* poem before a cup of saké floated by. Then they would pick up the cup and drink the saké. The challenge, called *kyokusui no en*, is reenacted here in the garden of Jonan-gu Shrine.
3. Transferring one's sins or indiscretions to *hitogata* paper figurines, and then tossing them in a river, is a shrine ritual based on the mystical power of water. Photo taken at Kifune Shrine.
4. One of the highlights of the sacred Aoi Festival occurs when women dressed in the fashions of the Heian period seek purification by rinsing their hands in ponds inside the precincts of Kamigamo-jinja Shinto Shrine and Shimogamo Shrine. (Photo taken at Shimogamo Shrine.) The annual festival has alternated from one shrine to the other since around the 8th century.

(Photos: Nakata Akira)



Water for comfort in daily life

Right: Water is sprinkled in front of shops and residences for a cooling effect. The custom, called *uchi-mizu*, is a summer tradition. (Collaboration: Hatake residence; photo: Natori Kazuhisa)
Below: Enjoying food on partitioned decks and lolling about on the riverbank, as the summer day starts to wind down on the downstream stretch of the Kamo-gawa River. (Photo: Terada Shinsuke / Aflo)



Superb quality for a great taste

Far left: River-caught fish add zest to the cuisine served on decks located up-stream along the Kamo-gawa River. The grilled *ayu* fish rest on “waves” drawn with salt. (Collaboration: Hiroya)
Top left: Colorful *fu* made from water and wheat gluten.
Bottom left: Water from underground springs in Kyoto is plentiful and of excellent quality, two characteristics that fostered the development of the tea ceremony. (Photos: Natori Kazuhisa)





Cities Blessed with Water

2. Water, the source of a good life: Gujo Hachiman

Three rivers—the Nagara-gawa, the Yoshida-gawa and the Kodara-gawa—flow through the Hachiman district in the city of Gujo. Gujo Hachiman, as the district is generally called, is in Gifu Prefecture, and happens to lie practically in the center of the Japanese archipelago. Natural springs in about 107 locations release ample amounts of fine water, and thanks to their presence a town developed here about

400 years ago. Wells, some for individual homes, some for communal purposes, take advantage of the spring waters. They have long supplied water for daily living, and they stand ready to supply water for fighting fires when necessary. Using water without wasting it has helped residents develop a good life, and their know-how promotes harmony with water to this day.



Above, left: Water from a spring falls into the wooden tank. The tank's upper level stands ready to quench thirst, the lower to wash and cool vegetables. An ingenious way to conserve water.
Above, middle: Stroll along the walkway—just a glance at the water running between the carefully placed stones will lift away your stress and give a breath of comfort in the heat of summer.
Above, right: In Japan, each year sees fewer children playing in rivers, but here in Gujo Hachiman the kids keep up the summer tradition.
Left: Interacting with water is common in many parts of Gujo Hachiman.
(Photos: Natori Kazuhisa)

Water: A Natural Asset Readily Available in Japan

When it comes to water, life in Japan has been quite easy for a long time: just open the tap and out comes lots of good, clean water. The Japanese tend to take it for granted, but in fact a lot of hard work is involved.

Photos: Tokyo Metropolitan Government (Bureau of Waterworks, page 13, and Bureau of Construction, page 15), Tokyo Waterworks Historical Museum (page 14)



Sit down in a coffee shop or restaurant in Japan; without you even asking for it, water will soon arrive at your table. Water fountains are everywhere, in government offices and libraries, of course, and in department stores and hospitals, too. Drink as much as you want—after all, it is free! In parks, kids tuckered out from playing will shove their faces under taps and swallow it in big gulps. In cities and towns throughout the country, you will have no trouble finding water to drink, and you almost never have to pay for it. Everyone takes it as a fact that water is available everywhere, anytime, and always safe and good to drink. Conditions like these help promote the good life in Japan.



Top: In Japan, water is safe enough to drink from the tap. (Photo: Aflo)
Bottom: Water bottles filled straight from the municipal water supply are now ready for market.

Good taste, advanced technology

So what makes all this possible? The answer is a water supply system that is one of the best in the world, in terms of both quality and output. For example, in Tokyo, the nation's capital, there is a total of about 27,000 kilometers of underground water mains, enough to reach about two-thirds of the way around the planet.

“That’s not to say that the conditions facing Tokyo make it easy to treat and supply safe and great-to-drink water. We have to look after the source, managing and tending large areas of forest. And at the consumption end, we have to maintain and operate the water mains. That requires a lot of hard work and attention to detail,” says an official at the Tokyo Metropolitan Government’s Bureau of Waterworks.

Tokyo’s huge population needs a colossal amount of water, and the rivers supplying that water are hardly pristine. So, for example, all filtration plants drawing water from the Tone River employ not only the regular treatment procedures but also highly advanced systems that use ozone and

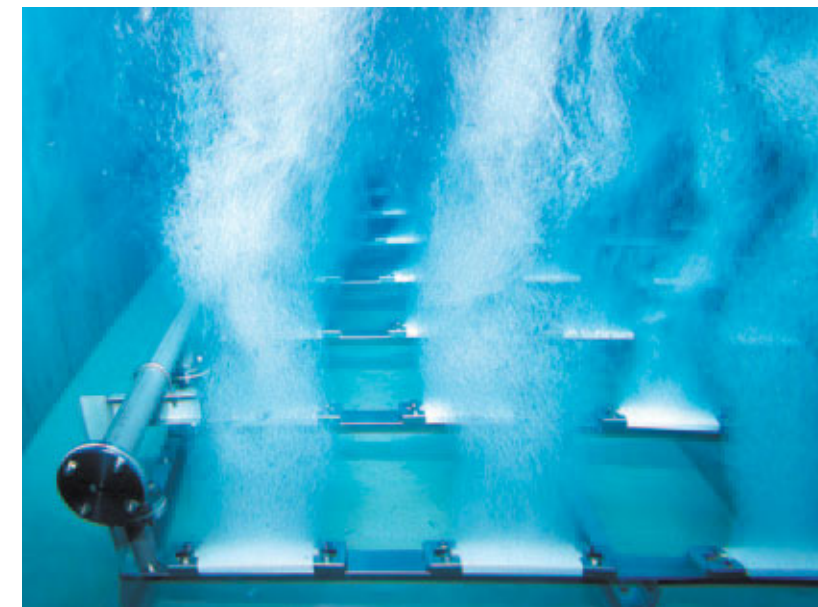
biological activated carbon, and break down and remove odorous and unclean matter.

The results are remarkable. A survey of residents about drinking water preferences discovered that nearly half think tap water tastes better than store-bought bottled mineral water.

Water quality depends a good deal on the condition of the distribution pipes. The Bureau of Waterworks is diligent about maintenance, replacing old pipes according to a regular schedule, and checking for leaks in the middle of the night all over the metropolis. Investigators place one end of a stethoscope-like instrument on the road surface, and listen for the sound of a leak. This helps ensure a low leak rate (around the 2% level over the last few years). The rate is one of the lowest in the world. (It is not unusual for major cities, even in advanced countries, to post rates between 10 and 20%.)



The Tokyo Metropolitan Government uses ozone to treat water.
Left: Ozone generator.
Bottom left: Ozone contact basin. Ozone is an oxidizing agent capable of breaking down organic matter.



In the middle of the night, workers listen (with the help of instruments) for water leaking from underground pipes.



19th-century ukiyoe woodblock print of a scene near a water supply channel in Edo (now Tokyo). Entitled *Meisho Edo Hyakkei: Sekiguchi Josuibata Bashi-an Tsubakiyama* ("Basho's Hermitage on Camellia Hill beside the Aqueduct at Sekiguchi," from the artist's One Hundred Famous Views of Edo series), by Utagawa Hiroshige. (Photo: Aflo)

Water access through a pipe network: It started in 1590

Tokyo's water supply system goes back a long way, to when a project called Koishikawa Josui (Koishikawa Water Supply) was established in 1590. The technology was advanced for its time: stone and wooden pipes or conduits carried water to cisterns, water sometimes even flowed uphill thanks to a siphoning effect, pipes were installed in riverbeds, and a network of water mains was constructed throughout the city (called Edo in those days).

Cisterns were installed in many places for residents to get their own water for drinking and sanitation. We can think of the cisterns as the taps of today—Edo citizens took as much as they needed when they needed it. This all began a good 400 years ago.

Today too, of course, a life with water always near at hand is standard. Just about the first action in the morning is to grab a cup, turn on the tap and drink, and one of the last in the evening is to soak in a full bathtub. Lots of good quality water—that is one way to describe life in Japan.

Underground stone channel that was once part of Kanda Josui, a water supply network developed and constructed by Koishikawa Josui (Koishikawa Water Supply). Moved to the present site and reconstructed.



Wooden conduit once used to supply water to Edo residents. Made from hardwood to make it watertight.



Remains of a cistern installed in old Edo. About two-thirds of it was placed below ground level. Water flowed through pipes and then sat in the cistern ready for use.



Protecting the City from Floods

The Underground Kandagawa River / Ring Road No. 7 Storm Water Reservoir



Inside a storm water reservoir. When full, the system can hold 540,000 tons of floodwater.

Ring Road No. 7 loops around Tokyo's 23 wards; directly under part of the road, about 40 meters below the subway tracks, lies a huge tunnel-like structure generally forgotten by the people above. The structure, extending north-south 4.5 kilometers, is called the Kandagawa River / Ring Road No. 7 Storm Water Reservoir.

The Kandagawa River used to be called Kanda Josui, indicating its role in supplying water to the city of Edo. Residents today are certainly fond of the river, although in low-lying areas many used to face flooding when it overflowed its banks from time to time.

The storm water reservoir was proposed to solve that problem. Today, when the river swells, water is drained off and stored temporarily in the reservoir. Engineers began drawing water from the river for part of the system in 1997, and they have done so 36 times thus far, dramatically reducing flooding downstream.

Similar systems have been constructed in several other places in Japan, although Tokyo's is the first and the most impressive. Recent trends show an increase in torrential rains in the country, so storm water reservoirs could soon play an even more critical role in saving communities from floods.

Before the reservoir was constructed, the Kanda River often overflowed its banks, as shown in this scene from September 1982. (Photo: The Mainichi Newspapers / Aflo)



Central control panel at the Zenpukuji Water Intake Facility in Tokyo. The facility monitors water drawn from three rivers and controls operations from this one location.

Water Wizardry

All the experts featured on these pages demonstrate a love and knowledge of water, whether in the form of shaved ice sweetened with a tasty syrup, or fresh tofu, or river rapids giving tourists a wild ride.

Photos: Natori Kazuhisa

Ice from water frozen in natural surroundings. The crystals are large and take some time to melt because they froze slowly.



The ultimate shaved ice treat made from spring water

Beside the Arakawa River in the Chichibu Mountains in western Saitama Prefecture, nestled in a steep valley made beautiful with scenes of water, is a shop specializing in sweetened shaved ice called *kakigori*. The ice is made from only pure spring water, and the shop is called Asami Reizo. In summer, people line up for a chance to enjoy this tasty treat. Some come from as far away as Tokyo, about 100 kilometers away.

The ice formed the previous winter in a natural pond. The surface is cleaned in November, and in December water is channeled from a mountain stream, which has been used since 1930. When the water has frozen to at least 15 centimeters thick the ice is cut into pieces and stored in an icehouse, then used to make *kakigori* until the following September.

"We circulate the water to prevent it from freezing for a while. That way, when it does freeze, the ice is clear, free from cloudy blotches. But the job's not

easy—if we add too much water the pond might not freeze, and if it rains the stream could bring in bacteria, so then we'd have to stop the flow. We keep checking the condition of the ice and the weather, fine-tuning the process to make sure our ice is great for human consumption," explains Asami Tetsuo, the 5th generation owner of the business. He is always on the lookout for changes in water quality.

"Housing projects, golf course construction and other land developments change the local environment, and this can harm water quality. When I was a kid, the streams had lots of freshwater crabs, but we don't see them much anymore."

The frozen spring water contains naturally occurring minerals, and when Asami shaves the ice to make *kakigori* the shavings are like soft snowflakes. The ice seems almost fluffy as it melts in the mouth. Asami's *kakigori* is the very best, crafted with care from beginning to end to make the most of the blessings of nature. Connoisseurs hope the future will always be good to their favorite taste of purity and clarity.

Above: Asami Tetsuo is the 5th generation owner of Asami Reizo.

Right: The pond ice is cut at a different time every year, after the weather creates the right conditions. This year, too, they hope and wait for the ice to freeze. Far right: Ice shavings make a fluffy treat. The syrup drizzled on top makes the most of the sweetness of its natural ingredients.



Oarsmanship works wonders in the rapids

Cedar trees were once part of an industry for the village of Kitayama in Wakayama Prefecture. In the old days, the trees were cut into lengths of 4 meters, tied together to make rafts, then guided downstream over two or three days to the river mouth almost 150 kilometers away. The skills of those raftsmen, called *ikadashi*, live on today. The Kitayama River flows swift and narrow, with rapids and other places where danger lurks. This requires considerable skill on the part of the raftsmen, who have their oars ready to work either side.

Transporting logs this way ended in the 1960s. But for the last 35 years, the rafts have been heading downstream again during the summer, this time for tourists.

Working in the woods occupies the men in the winter, but 13 of them still do rafting. They range in age from 23 to 60. One of them, Yamamoto Masayuki, has been a rafter for 16 years. "Every day brings a different challenge, because the flow depends on recent weather conditions. That's the most difficult thing for us. And then there's the wind—if it's strong it could force us up onto a rock, so we have to work our oars for all we're worth." With pride, Yamamoto says these Kitayama rafters are the only ones in Japan who can turn a raft a sharp 90 degrees in a swift current. Their skill and know-how are obvious as they use the force of the current to their advantage, giving their passengers a thrill while keeping them safe, deep in the mountains.



Yamamoto Masayuki leads the way, wielding his oar with true expertise in the swift current. (Photo: Kitayama Village)

Tofu made with water from a sacred mountain

Often washed by rains or covered in mist, Mount Oyama rises to a height of 1,252 meters in Kanagawa Prefecture. Local people have long believed that Oyama is home to gods who wield control over rice farming and the production of other blessings from the highlands and the sea. The pilgrim road still has almost 40 Japanese inns catering to travelers coming to Buddhist temples and Shinto shrines on the mountain. Koide Tofu-ten is a tofu shop that supplies the inns with tofu for the *shojin ryori* vegetarian meals they serve. (*Shojin ryori* is featured in Buddhist ceremonies.)

To make the tofu, the shop takes its water from a spring that feeds the river running nearby. About a kilometer upstream, the spring is unaffected by rainwater, so its temperature is a constant 12 or 13 degrees Celsius. Much of the weight of a tofu block comes from the water used to make it, so taste depends a lot on water quality. The tofu made

here on this sacred mountain has a silky texture and feels nice as it slips smoothly down the throat.

Kato Takayoshi, the 4th generation owner in a line stretching back to 1882, says, "The taste would suffer if we dammed the water up. We use only flowing water. We couldn't get this quality from some other method or source. If a pipe breaks somewhere, we'll go to fix it even in the middle of the night."



Kato Takayoshi is proud to show off his shop's tofu. When it is still fresh and plump with water, he cuts it with a brass knife the shop has been using for more than a century (above left).

A Marriage of Technology and Water

Japan is rich in water resources, as the people well appreciate. And now, developers have come up with new H₂O ideas to save resources while improving lifestyles at the same time.

Photos: Toto Ltd., Panasonic Corporation, Toshiba Lifestyle Products & Services Corporation, Fukuoka City Waterworks Bureau, Poly-Glu Social Business Co., Ltd., Hashimoto Laboratory of the University of Tokyo, and Dream Creativity Ltd.

Water conservation technology, developed in Japan

Japan is located in a part of the world where precipitation is generally high, but often the country also experiences dry spells and other forms of weather-related adversity. In response, household appliance manufacturers and cities are finding new ways to conserve water.

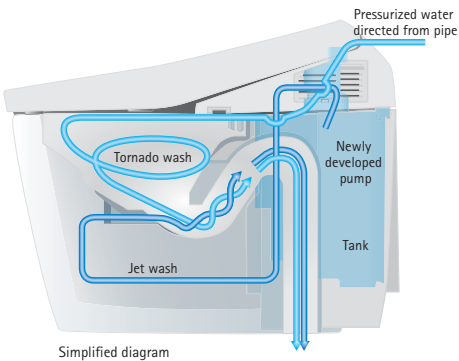
Showerheads: Mixing air with water

Conventional water-conserving showerheads emit less water, so the smaller flow generally comes out under greater pressure, hitting the skin hard enough to cause discomfort. The solution? A product developed by Toto Ltd., which mixes air with the water. It reduces water use by more than 35% while providing a wash that is both effective and pleasant.



Toilets: The world's most efficient flush

Toilet manufacturers keep searching for an even better way to get an effective flush with less water. The Tornado Wash-flush system uses a whirlpool to force everything to the center of the bowl, and then the Jet Wash system takes over, combining two types of flow to clean thoroughly. Some models have lowered water consumption to 3.8 liters per flush, better than any other toilet in the world.



Simplified diagram

Dishwashers: A complete wash with less water

People tend to assume that when it comes to washing, machines use more water than hands. But some machines have turned that on its head. A good example is the dishwasher: at the kitchen sink, many people keep the tap on while washing and rinsing, going through about 84 liters of H₂O for dishes used by a family of six. Some new dishwashers use less water to begin with, and their efficient recycle function slashes consumption even more, for both the wash and rinse cycles. Panasonic's latest models leave dishes sparkling clean after using just 11 liters for that same family of six.



Washing machines: They decide how much to use

Today it is standard for washing machines to use water sparingly. Toshiba's latest drum type models go further, with sensors that detect the temperature, the amount of laundry to be washed, and the type of fabric. Then the machine decides the optimum amount of water to use during the wash and rinse cycles. A vibration absorption damper prevents the load from becoming unbalanced during the spin cycle, ensuring a good wash while saving even more water.



Cities: Fukuoka residents band together to conserve

In 1978 a dry spell forced the city of Fukuoka to limit its water supply for a long 287 days. From that experience sprang the desire to transform Fukuoka into a model water conservation city, and citizens and the local government have worked as one to achieve this goal. The municipal Water Management Center monitors the amount of water being used 24 hours a day, to ensure efficiency in its supply everywhere in the city. Fukuoka also maintains a scheduled program of leakage prevention, including leak checks and pipe replacements. If each resident were to cut their daily water use by 10 liters, after one year the water saved would be equivalent to the amount in an average reservoir behind a dam. With facts like these in mind, city residents are waging a "Citizens' Reservoir" campaign to create yet another "source" of nature's water.



Fukuoka residents at a Water Bureau PR event



Left: Clean, safe-to-drink water in Bangladesh, courtesy of the cleansing technology of Poly-Glu Social Business Co., Ltd.
Below: The local community enjoys clean water just by adding an agent that causes suspended particles to clump together and sink.

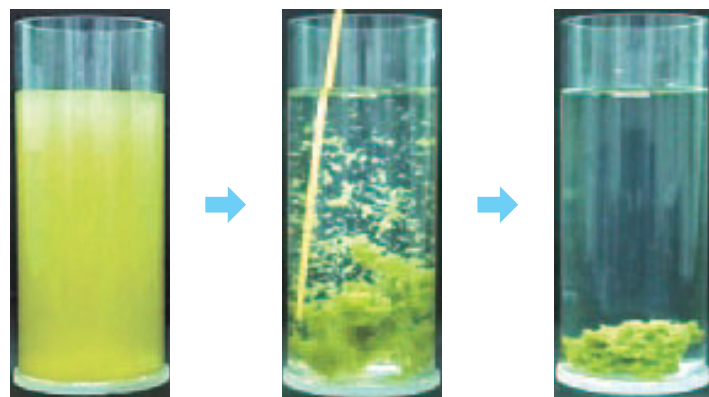


Traditional food product for modern water cleansing

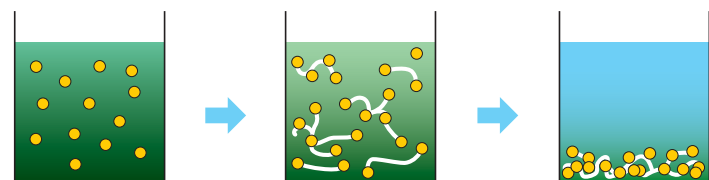
Around 1.8 million of the world's children die every year because they lack sanitary water. The technology of a Japanese enterprise is helping to reduce that number by delivering clean water for people in other countries at a low cost. Surprisingly, the technique involves a fermented soybean foodstuff called *natto*, which contains γ -polyglutamic acid. The acid is a flocculant, a gooey substance that makes particles clump together. This led developers to examine how *natto*'s flocculant power could cleanse water. When placed in a tank of water

containing suspended microorganisms and tiny particles, the flocculant turns them into big, heavy clumps. The result, which is actually easy to achieve, is water that would pass the sanitary standards of various countries.

The flocculant material is harmless and natural, and the method requires no special equipment. The technique has spread to countries including Bangladesh, Brazil, Colombia, India and Tanzania. It is also used in camps housing Somali refugees, improving their lives.



For clean water, simply add flocculant (a clumping agent), then stir. Suspended matter clumps together and sinks, leaving the water clean.



Particles of dirt are dispersed throughout.

The flocculant makes the particles clump together.

The clumps sink, and the water above is now clean.

Photocatalysis: A clean energy source changing hydroponics



The rows of tomato plants on the right are growing in water processed in a recycling system developed by the Hashimoto Laboratory at the University of Tokyo. The tomato plants on the left are grown the conventional hydroponic way, showing the remarkable difference between the two methods.

Hydroponic farms grow plants indoors, without the use of soil. Instead, the roots lay in water containing a mixture of mineral nutrients and fertilizer. Because the weather and pesky insects have little chance of harming the plants, farmers feel they can count on consistent yields.

During the growing process, however, organic matter seeps into the nutrient solution from the roots, hindering plant growth. The water has to be filtered to remove the organic matter, then recycled back to the plants. But now a new method has been developed. It breaks down the organic matter with titanium oxide, due to its photocatalytic effect in light. The process breaks down the organic material easily, with no need for an electricity-consuming filtration system. Developers report that, thanks to the system, tomato harvests have increased about 30%. And the solution can be reused, instead of being flushed away. This cuts down on the amount of solution required and prevents phosphorus and nitrogen, which are nutrients in the solution, from seeping into soil and rivers.

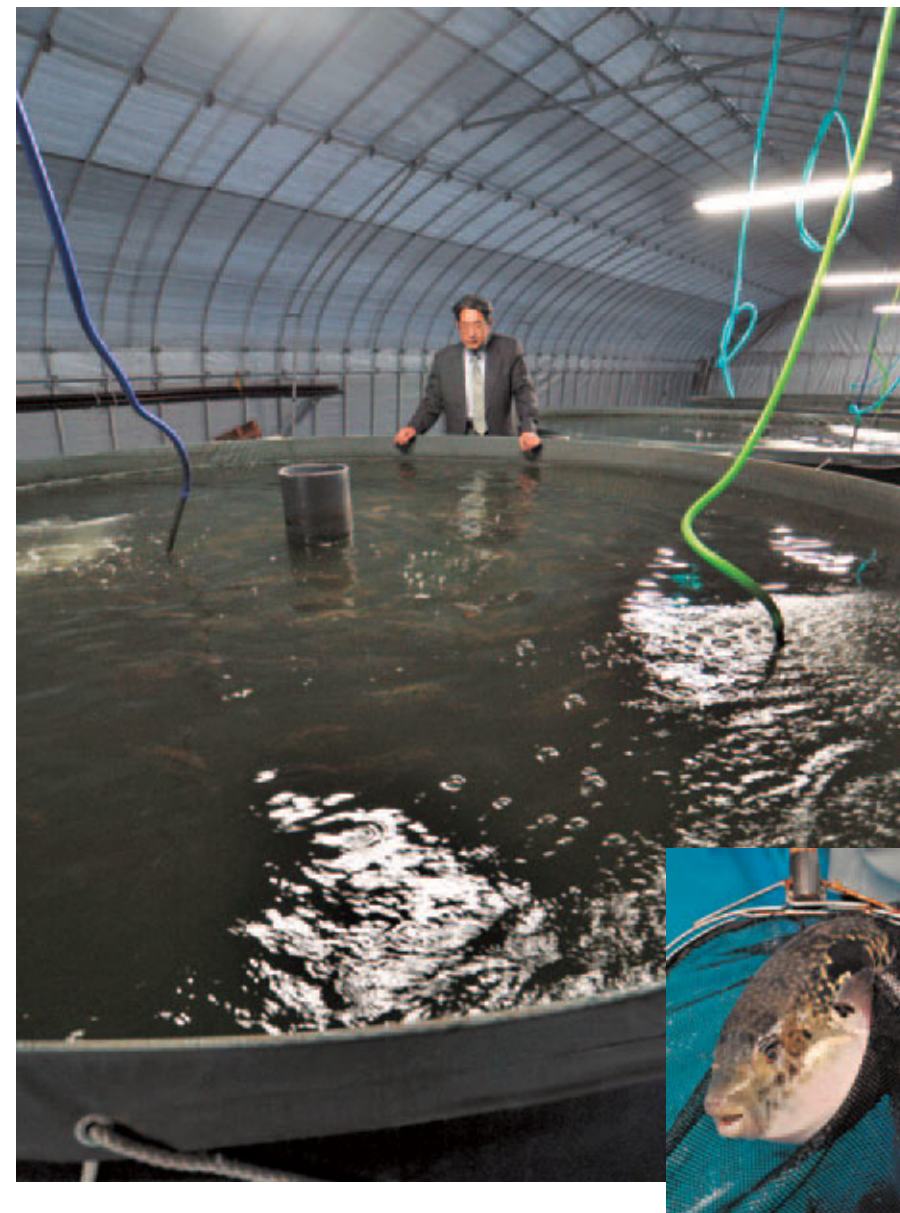
Less impact on the environment, and bigger harvests—this system will soon change hydroponic farms, which are part of a growing industry in Japan.

Saltwater fish in a highland spa?

Tochigi Prefecture north of Tokyo has no sea-coast, but it does have saltwater fish swimming in tanks. The fish are tiger puffers, and the place is Nakagawa-machi, a town nestled in the mountains. But why there? The answer lies in the fact that the town has springs of warm water bubbling up to the surface. At about 20 °C, the water is cooler than at most hot springs, and it contains no sulfur or other noxious minerals. In addition, its salt content ranges from around 0.9% to 1.2%, about the same as found in liquids in the bodies of living creatures. A local enterprise zeroed in on these advantages and succeeded in raising tiger puffers, a fish that is very expensive in Japan.

The natural habitat of tiger puffers is seawater, which has a salt content around 3.5%. Puffers have to reduce that salt density to around 0.9%, and they do this while absorbing water through their gills. Since the salt density of the spa water is about that same 0.9%, the fish do not need to adjust the salt content, saving their energy. And in addition, they have the advantage of plenty of nutrients. This explains why they can grow larger than their counterparts in the sea.

After tests, tiger puffer aquaculture began in Nakagawa in 2009, with 1,150 fish. By 2014 the facility's annual production was 40,000 ready-for-market fish. The mountain town had faced a decline in its population, but now it is ready to develop a new industry.



Noguchi Katsuaki, the president of the aquaculture company, Dream Creativity Ltd., checks the condition of the facility's tiger puffers.
Bottom right: One of the puffers that has done well in spa water. (Photos: Ito Chiharu)

Dashi Broth

It would be hard to imagine Japanese cuisine without it

Photos: Ito Chiharu Collaboration: Waketokuyama Restaurant



Katsuo-bushi (dried bonito fish) is shaved with a blade on top of a box specially designed for the purpose. Run the dried fish back and forth over the blade, and the flakes will fall into the drawer below, ready to use.

Washoku (traditional Japanese cuisine) is attracting more attention now that UNESCO has inscribed it on its Representative List of the Intangible Cultural Heritage of Humanity. At the heart of Washoku is *dashi*.

Dashi is a broth made by steeping any of a variety of dried foods in water to release their flavor. It is the base for *suimono* (clear soup) and *miso-shiru* (miso soup), one of which is sure to be part of a traditional Japanese meal. Once the *dashi* is made, ingredients for the soup are added and simmered in it, and then seasoned with soy sauce or salt for *suimono*, miso for miso soup. Simmered dishes also start off with *dashi*, with vegetables and perhaps seafood or meat put in later, and seasoning generally added when the simmering is done.

As for the *dashi* itself, the most common ingredients used to make it are a type of seaweed called *kombu* (kelp) and shavings of *katsuo-bushi* (bonito fish that has been heated to dry it). *Kombu* contains glutamic acid, while *katsuo-bushi* has inosinic acid, and combining the two gives the broth a denser, richer flavor. Other items often used to make *dashi* are *niboshi* (small dried sardines) and dried shiitake mushrooms. Because only dried foods are used and fat is excluded, *dashi* is different from the

soup stock made in Western kitchens or the *tang* stock of Chinese cuisine.

Nobody knows what ingredients were first used to make *dashi*, or when it was first made. But we do know that a cookbook written around the 15th century mentions both *kombu* seaweed and dried shaved bonito fish. By the second half of the 17th century, it appears to have become common to combine the two.

How to make *dashi* depends on the ingredients. *Katsuo-bushi* shavings are added to the water after it begins to boil, then removed after a few minutes. *Kombu* seaweed, *niboshi* fish and dried shiitake mushrooms are generally steeped in cold water first, although after that you have a choice, depending on the meal you are planning—either bring the temperature up and simmer, or take these ingredients out before heating the water. Some recipes call for them to be left in cold water a few minutes, others specify overnight. Methods vary because water in Japan tends to be soft, which means that the nutrients, taste and fragrance are released more easily than with hard water.

Another point: if you do simmer the food items, you should generally simmer them for only a very short time. Chefs frown on the thick, cloudy *dashi* that comes from simmering them too

long. In some cases you can use the same ingredients to make several batches of *dashi*. The first time (*ichi-ban dashi*) gives plenty of flavor and avoids distracting tastes, making it good for *suimono*. The second time (*ni-ban dashi*) makes a broth good for simmered dishes.

Nozaki Hiromitsu is the Executive Chef at Waketokuyama, a premier Tokyo restaurant specializing in traditional cuisine. He explains: “One specialty of traditional Japanese cuisine is the light flavors, letting us savor the actual taste of the ingredients. For example, when we make *suimono* clear soup, as soon as we shave a *katsuo-bushi* block we drop the shavings in the water, because otherwise we’d get an inferior taste. For our simmered dishes, we make a light *dashi* to highlight the taste of the ingredients. It’s important to strike a balance, to avoid getting a *dashi* that is too weak and one that it so strong it hides the taste of the ingredients.”

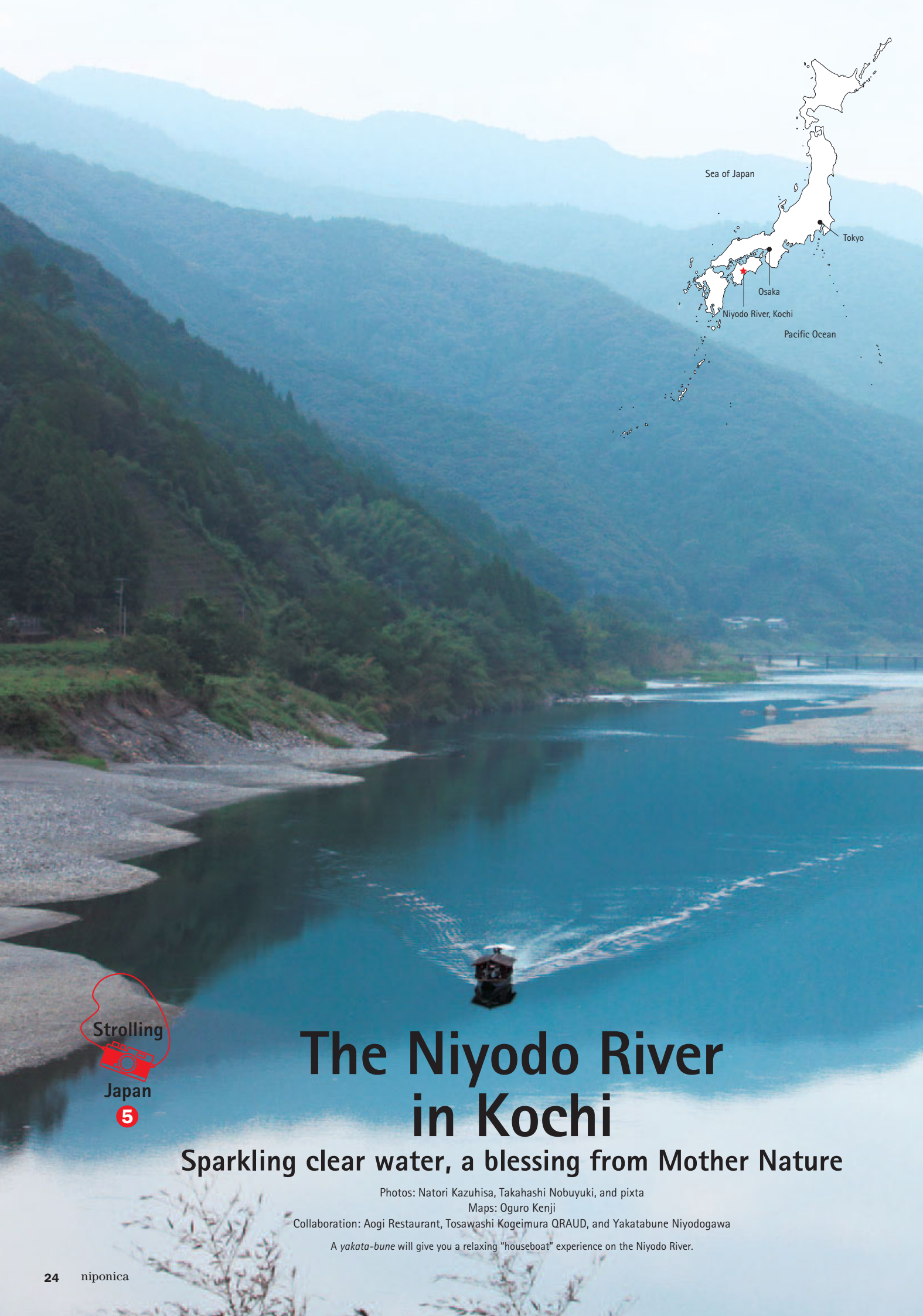
The fragrance wafting from *dashi* in the pot is one of the defining tastes of Washoku. The topography of Japan tends to make the water soft. *Dashi* made from that water has a taste that is complex yet delectably light at the same time. It would be difficult to imagine Washoku without it.

Far left: Standard ingredients for making *dashi* broth. Clockwise from upper left: dried bonito fish; small dried sardines; *kombu* seaweed.

Left: To check the broth, Nozaki Hiromitsu does a taste test. He is the Executive Chef at Waketokuyama Restaurant.

Following page: Water in Japan tends to be soft, and the water used to make this *dashi* broth was certainly no exception. The large pot holds plenty of *dashi*, which concentrates the delectable flavors of the ingredients.



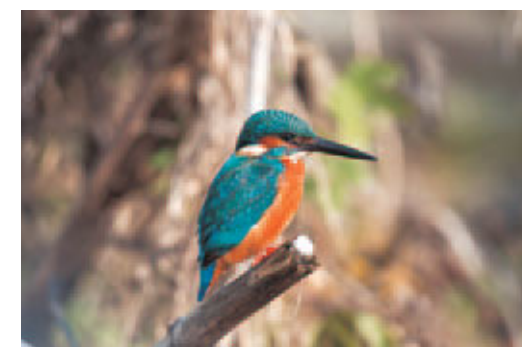


Above left: The steep-walled valleys of the upper reaches of the Niyodo River are a great place to enjoy the colors of autumn.
Top right: Azaleas in spring make a nice contrast with the blue of the river.
Bottom right: Tanaka Satoru, a *yakata-bune* boat guide. He shows tourists the sights and gives detailed information about the creatures of the river.

Born on Mount Ishizuchi in Ehime Prefecture, the Niyodo River takes its time meandering through mountains that form an east-west spine across the middle of the island of Shikoku. The river drains an area of 1,560 km² in Kochi Prefecture, flowing 124 kilometers until it empties into the Pacific Ocean.

During the entire distance, its waters remain crystal clear. So clear, in fact, that the quality is considered to be something of a miracle. Trickling down through forests and ancient rock layers, the water is filtered and becomes more and more transparent, taking on a mysterious blue. In some years it has garnered a number 1 rating in Japan's River Water Quality Index.

People living in the river basin have long shown their appreciation for the river's water and still enjoy its benefits. You too will fall for its charms along any part of its more than 100-kilometer stretch. One easy and exciting way to begin is by taking a cruise on a *yakata-bune* boat. One of the guides, Tanaka Satoru, says he is keen to have people learn more about the river he has loved since childhood. He started his own *yakata-bune* company, and takes tourists for 50 minutes on a gentle, luxurious ride through the



Top right: Another resident of the river valley is this kingfisher showing off its bright colors.
Bottom right: A school of Japanese trout. Note how clear the water is.
Left: The Niyodo River at dusk.



Strolling
Japan
5

The Niyodo River in Kochi

Sparkling clear water, a blessing from Mother Nature

Photos: Natori Kazuhisa, Takahashi Nobuyuki, and pixta
Maps: Oguro Kenji
Collaboration: Aogi Restaurant, Tosawashi Kogeimura QRAUD, and Yakatabune Niyodogawa
A *yakata-bune* will give you a relaxing "houseboat" experience on the Niyodo River.



Japanese paper (*washi*) has been made along the Niyodo for more than a thousand years. At Tosawashi Kogeimura QRAUD, you can try your hand at making some. The postcards (below, left) and flat *uchiwa* fans (right) produced here would make excellent souvenirs of your trip.



Blue, yet crystal clear: that well describes the Niyodo River. When the rain stays away, the water is clear enough to see right to the bottom.



mystical world of nature, with fantastic views of azaleas in spring and gloriously colored foliage on the mountain slopes in the fall. If you are lucky you will see kingfishers, known here as the jewel of the crystal clear waters.

Many creatures live in or along the river. Gray herons looking for a feed and fish jumping above the surface are a common sight. Some of the creatures sought by people are Japanese trout, lake prawn, Japanese mitten crab and eel, but surely the best prize of all are the trout. If you go when trout fishing is allowed, between June and October, you will almost surely see people casting for them. During the fishing season, restaurants along the river serve freshly caught trout, and you may very well want to enjoy its natural taste.

The river offers other bounties of nature too. *Tosa washi*, a traditional paper, has been an industry along the Niyodo for more than a thousand years, and during all that time the river has played an important role. When made by hand



Delectable bounty from the Niyodo River, served at the restaurant Aogi. Far left: *Udon* noodles with Japanese mitten crab. One part of the crab, called crab butter, seeps into the broth to give a truly exceptional flavor to this dish.

Middle: Freshly caught Japanese trout. They were simmered in a mixture of soy sauce, *mirin* (sweet rice wine) and sugar until tender.

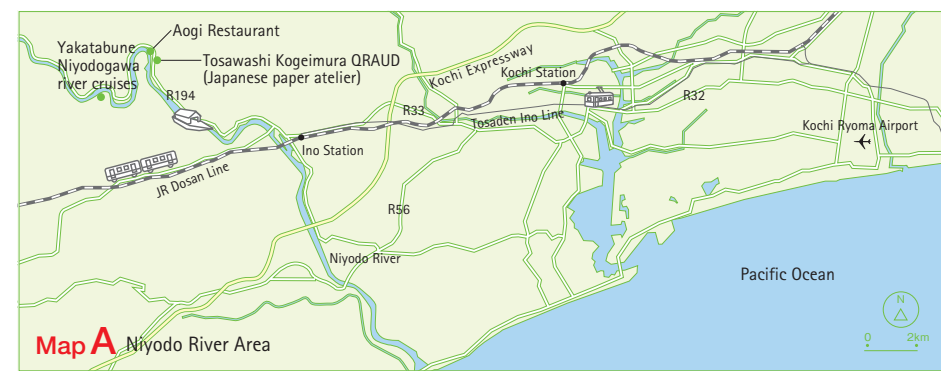
Right: The best way to eat lake prawn is the simple way: boil, then sprinkle on salt to bring out the flavor.

in the traditional way, Japanese paper requires plenty of water. First the raw material (bark from shrubs and trees), is soaked in water to remove impurities. Next the bark is heated and the fibers obtained, and during this step water is needed to wash away the impurities. Then a thick gummy agent is mixed with more water, the fibers are added, and finally the hand molding process begins, again using water. *Tosa washi* is thin but does not tear easily, and it is exported to other countries. Some types are even used in the restoration of works of art. At an atelier, you can try your hand at making Japanese paper yourself. Taking a lesson is easy, and will connect you to an ancient industry, made possible thanks to water.

Souvenirs to take home and recall the good things that pure water can bring include carbonated water made from Niyodo River water, and flat *uchiwa* fans and postcards made with *Tosa washi* paper. Or try some ice cream featuring *yuzu* citrus fruit, a local specialty.



Left: Carbonated water made from river water makes another good souvenir. Above: A variety of ice cream featuring specialties from the Niyodo and Kochi regions, including green tea (*sen-cha*), sun dried salt, and *yuzu* citrus fruit.



Niyodo River Area Map

●Getting there

Fly to Kochi Ryoma Airport from either Haneda Airport (Tokyo) or Osaka International Airport. From there, take a bus to JR's Kochi Station (about 30 min). Then from there, take a JR Dosan Line train to Ino Station (about 20 min).

●For more info

Aogi Restaurant:
Tel: +81-88-897-0435 (088-897-0435 if calling from Japan)
Tosawashi Kogeimura QRAUD (Japanese paper atelier)
Japanese-language website:
<http://www.qraud-kochi.jp/>
Yakatabune Niyodogawa river cruises
Japanese-language website:
<http://yakata-niyodo.com/>



Souvenirs of



Japan 6



A Wave Motif to Decorate Your Dining Table

Photos: Horiguchi Hiroaki



The motif of concentric semicircles aligned in a staggered fashion to symbolize waves has a long history in Japan and is familiar to people in many parts of the world. The pattern's name, *sei-gai-ha* ("blue ocean waves"), comes from an ancient *gagaku* musical piece of that name. In dance performances to the formal music at the Imperial Court, the dancers wear costumes decorated with this pattern. The gentle waves extend in all directions without

end, creating a feeling of happiness and good luck that will hopefully last forever. The motif is a favorite in Japan, an island nation surrounded by the sea. You will see it on kimono worn on festive occasions, and on hand towels used every day. But perhaps it is most common and best loved today as a pattern for tableware. In the small space available, the waves of the magnificent ocean will certainly liven up your dining table, too.

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