

Introduction of Kumamoto City, Home of the Richest Groundwater in Japan: To our Asian Neighbors

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Abstract

Kumamoto City is located in the center of Kyushu, the southernmost major island of Japan. Kumamoto City is blessed with rich greenery and abundant groundwater. It is particularly worth noting that thanks to the abundant groundwater, all the drinking water for our 670,000 citizens is covered by groundwater. Kumamoto is the only city which supplies all drinking water with completely natural groundwater among the cities in Japan which have populations of more than 500,000. This has earned Kumamoto the title “The home of the richest groundwater in Japan”. We have been undertaking various efforts to maintain our abundant, pure and crystal-clean groundwater so as to pass down this treasure to our future generations. We strive to spread awareness of water-related problems in Asia and are considering sharing the information and message of our programs for groundwater conservation to other parts of the world.

Keywords: Kumamoto City, groundwater conservation, mechanism of groundwater, rainwater percolation, Japan water grand prix

Introduction

Kumamoto City is located in the center of Kyushu, the southernmost major island of Japan. We have a glorious view of Mount Aso to the east of the city, and to the west, the city faces the Ariake Sea. Kumamoto City is blessed with rich greenery and abundant groundwater.

It is particularly worth noting that thanks to the abundant groundwater, all the drinking water for our 670,000 citizens is covered by groundwater. Kumamoto is the only city which supplies all drinking water with completely natural groundwater among the cities in Japan which have populations of more than 500,000. This has earned Kumamoto the title “The home of the richest groundwater in Japan”.

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Actions for groundwater conservation

(1) Declaration of the Groundwater Preservation City

Our actions for ground water conservation have started with the adoption of the “Declaration of the Groundwater Preservation City” by the city council in March, 1976. Protest movements against apartment construction sites near the source of our drinking water stimulated the city council to adopt said declaration. The following year, we enacted the Groundwater Preservation Ordinance, organized an official office to oversee the groundwater system and extraction, and began to establish observation facilities.

(2) The mechanisms of groundwater

Our analysis from a team of researchers, representing Kumamoto City, Kumamoto Prefecture and outside research groups, have revealed much information regarding water circulation in the area.

*Groundwater is shared by 14 municipalities (hereinafter referred to as Kumamoto Region) including Kumamoto City, as well as a layer formed by Mount Aso's eruption provides the main aquifer for our groundwater.

*The Kumamoto Region receives 2 billion cubic meters of precipitation a year; approximately one third of it evaporates, another one third of it flows into river, and the remaining one third of it, around 600 million cubic meters, forms groundwater.

*Of the total of 600 million cubic meters of groundwater, 46% are cultivated in paddy fields, 41% are cultivated in dry fields or grass fields, and 13% are cultivated in mountainous areas. In other words, our agricultural land serves as the main source of the groundwater.

*Groundwater takes about 20 years to reach Kumamoto City from the outer rim of Mount Aso.

(3) Mount Aso and the feudal lord Kato Kiyomasa

The volcanic Mount Aso experienced violent eruptions with pyroclastic flows four times from 270,000 years ago to 90,000 years ago, when the pyroclastic flow deposited and accumulated to more than 100 meters in thickness, which would later serve to foster our groundwater.

In addition, about 400 years ago, Kato Kiyomasa, the feudal lord of Higo, present day Kumamoto, promoted cultivating paddy fields in the surrounding land, which is easy to permeate with groundwater. This concept worked considerably well and allowed Kumamoto access to a far greater amount of clean water.

In other words, the achieved system of creating groundwater in Kumamoto can be said to be a combined balance of the "natural system" of Mount Aso and the "human efforts" made many individuals such as Kato Kiyomasa.

(4) The current status of our groundwater

According to the municipal observation report, Kumamoto's groundwater flow has been steadily decreasing. There are two main reasons for this. One is the advancement of urbanization; the other factor is the adjustments in rice production.

After the Second World War, the central urban area broadened with economic development. Vast areas were laid with concrete or asphalt for urban expansion and it became difficult for rainwater to naturally absorb into the earth. Groundwater has become harder to accumulate in recent times.

In addition, as rice consumption in Japan has decreased, the amount agricultural land used as paddy fields has also been reduced by 50 percent. This is a serious problem for Kumamoto because our paddy fields are a major source of groundwater.

We have officially recognized the actual state of groundwater via observations, which have revealed the nature of these problems, and have begun to promote effective groundwater conservation measures which are in accord with the natural groundwater system.

(5)Groundwater cultivation which fully utilizes paddy fields

First of all, I would like to mention our programs of groundwater cultivation which utilize paddy fields.

Science proves that the ancient paddy fields, which were cultivated by Kato Kiyomasa, that are located in the towns of Ozu and Kikuyo, neighboring towns of Kumamoto City which lie towards the center of the Shirakawa River, are precious groundwater recharge areas for Kumamoto City. The city therefore concluded an agreement of groundwater conservation with these two neighboring towns in January 2004. Furthermore, we have established a subsidy system which encourages farmers to irrigate their rice fields even after these fields were no longer to be used to produce rice under the production adjustments. Currently, with the aid of more than 400 farmers, we create more than 1,000 cubic meters of clean groundwater a year. We also work with a coalition of upstream sites regarding these ancient and influential paddy fields by arranging exchange programs and promoting “local production for local consumption”.

(6)Maintenance of watershed protection forests

Secondly, I would like to expand upon the maintenance of watershed protection forests. Irrigation water for paddy field in the central part of the Shirakawa River is all derived from Shirakawa River. To ensure a stable river flow and to create sufficient groundwater, we have concluded an agreement for forest maintenance with our neighboring towns and villages and strive to maintain 656 hectares of watershed protection forest. In addition, we aim for local forest development with the support of volunteer citizens.

(7)Fostering a rainwater percolation

Third of all, we have addressed the issue of groundwater cultivation in order to foster a rainwater percolation in the urban areas. We have also implemented an original subsidy system for installing this rainwater percolation equipment or PVC greenhouses in dry fields which help rainwater get adequately absorbed. Moreover, we revised the “Kumamoto City Groundwater Preservation Ordinance” last July in order to ordain the practice of implementing the equipment or facilities to foster rainwater percolation even when constructing new buildings, an approach that has never been used before in Japan.

(8)Development of the citizens’ movement for water conservation

Next, I will tell you about the citizens’ movement for water conservation.

The quantity of groundwater extraction in Kumamoto City is on a downward trend after peaking in 1984. The quantity of the extracted water for industrial or agricultural use has also declined; however, groundwater for use in everyday life, which accounts for 70 % of groundwater extraction in Kumamoto City, has not declined in quantity.

We have been promoting this water conservation movement and working towards efficient water-saving methods at home with citizens since 2004. We have also made July a campaign period for water conservation, having reported citizen water usage everyday, which we aim to reduce the total amount by 10 % in 5 years.

(9)The Kumamoto Water Heritage Registration Program

I would like to continue by introducing you to the Kumamoto Water Heritage Registration Program.

This program is designed to maintain the various local cultures and trades which are deeply

linked with our water, such as architecture, customs, or food, for future generations to come. So far 43 concepts have been registered, and the bus tour to those Water Heritage sites is quite popular among citizens.

(10) Establishment of the Kumamoto City Official Water Examination

Next, I would like to explain about the challenges faced in establishing the official water examination. To conserve our water culture and pass it down to the next generations after us, it is vital that we instill awareness into citizens about our current water situation of Kumamoto. We have established the official water examination of Kumamoto City, with which you can enjoy learning about water of Kumamoto, and have been implementing this program since last August.

With this examination, we can spread the knowledge about our water culture and enlighten people about the challenges involved in maintaining our precious water supply. We promote groundwater conservation while advertising Kumamoto City as a pure groundwater city.

(11) Environmental education and lifelong learning programs

We also work hard to provide environmental education and lifelong learning programs.

We created and regularly distribute supplementary readers for elementary students to learn about water. Regarding lifelong learning programs, we have arranged some courses of water that citizens can take at home as well as offering them in various locations. These courses contain topics such as Kumamoto's groundwater, Kumamoto's rivers, water conservancy, Kumamoto Water Heritage, and the official water examination of Kumamoto. City employees present these materials at schools or community centers.

(12) Kumamoto City won this year's highest national award for water resource management, the Japan Water Grand Prix.

This prize is to be given to a person or an organization who improve the distinguished programs regarding revitalizing water circulation and aim to achieve a Japan in the 21st century where all water is safe, clean, and enjoyable.

This is because we are highly praised with our cross-administrative-district work for groundwater conservation over the past 30 years combining citizens and businesses, such as the establishment of the Groundwater Preservation Ordinance, groundwater cultivation programs which fully utilize our watershed forests and paddy fields, and involve citizens' movement for water conservation.

(13) The 100 best waters of the Heisei Year in Japan

The Ministry of the Environment has selected Suizenji Lake Ezu springs and Mount Kinpo springs in Kumamoto City as two of the 100 best waters of the Heisei Year.

These two springs were valued because of not only their water quality and size but also because of the communities' or NPO's proactive and continuing conservation activities for them.

Message from Kumamoto City, home of the richest groundwater in Japan, to our Asian neighbors

As we have explained above, Kumamoto City is the most groundwater rich city in Japan. However, there are currently many people who cannot obtain safe drinking water in Asia. We strive to spread awareness of such water-related problems in Asia and are considering sharing the information and message of our programs for groundwater conservation to other parts of the world.

This year marks 400th anniversary of the completion of Kumamoto Castle, which was originally built by the feudal lord Kato Kiyomasa. Honmaru Goten Palace has been restored and it attracts many visitors from both Japan and abroad. You can see panoramic views of downtown Kumamoto City as well as Mt. Aso from main tower of the castle.

We hope everyone attending this forum today will visit Kumamoto someday, enjoy the Kumamoto Castle or Lake Ezu or Mount Kinpo springs, and even enjoy tasting our groundwater that we feel so passionate about.