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SHORT COMMUNICATION

Illogical dam policy in Japan

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Abstract
Super typhoon Hagibis on October 12, 2019, in Japan revealed that the current dam control policy has the fatal defect. The current dam policy should be updated for saving humans. Human-induced flood should be avoided by the weather prediction.

Keywords Typhoon · Human-induced flood · Weather information · Dam control policy

1 Introduction

The Shiroyama Dam is a multi-purpose dam on the main stream Sagami River in Sagamihara, Kanagawa Prefecture in Japan. It was designed to provide flood control and industrial and drinking water to the cities of Yokohama, Kawasaki, Yokosuka, and the Shōnan area where the total capacity is 62,300,000 m^3 and catchment area is 1201.3 km^2.

From October 12, 2019, super typhoon Hagibis has brought a record amount of rain in Japan which was, however, predicted by Japanese weather forecasts (Tonouchi et al. 2019; Natsuaki and Nagai 2020; Islam and Takagi 2020; Shimozono et al. 2020; Tay et al. 2020). The super typhoon had the highest winds (1-min sustained): 260 km/h, causing more than 36 billion USD damage which is the costliest Pacific typhoon in recorded history where 98 died and 7 were missing. The total size of flood areas is more than 185 km^2. Although many papers discussed the importance of weather forecast information, this paper addresses the defect of the current illogical water stream dam policy in Japan. The problem of water streams control dam policy in Japan was discovered by the dataset of inflow and outflow, and reservoir level of Shiroyama Dam where the dataset was provided by the Ministry of Land, Infrastructure and Transport in Japan. Note that the lowest reservoir level of Shiroyama Dam is 95 m, while the maximum reservoir level is 125.5 m.

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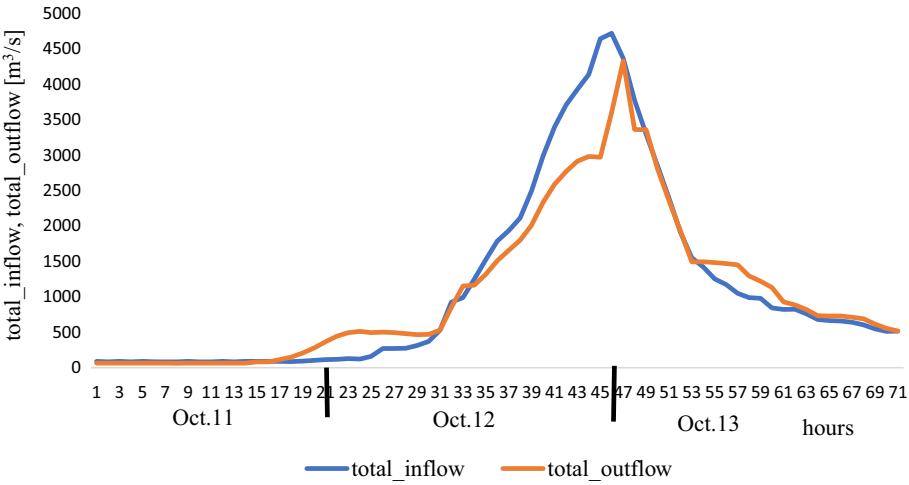

Fig. 1 Total inflow and Total outflow of Shiroyama Dam for 72 h from October 11 to October 13, 2019

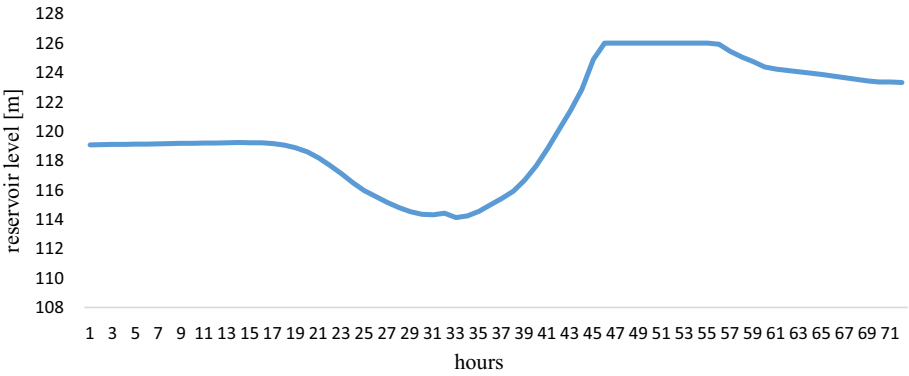

Fig. 2 Reservoir level of Shiroyama Dam for 72 h from October 11 to October 13, 2019

2 Methodology

The open-source dataset of the Ministry of Land, Infrastructure and Transport in Japan is only available in the past 1 week. Therefore, the open-source dataset from October 11 to October 13, 2019, was downloaded during the super typhoon Hagibis period. The dataset includes total inflow, total outflow, and reservoir level of Shiroyama Dam, respectively. Using the dataset, the current dam policy in Japan is discussed and analyzed. The open-source dataset of the total inflow, the total outflow, and the dam reservoir level can show how the current dam policy in Japan manages for the predicted heavy rain by the typhoon.

Figure 1 shows the total inflow and the total outflow of Shiroyama Dam for 72 h from October 11, one day before typhoon Hagibis arrival, to October 13, one day after the typhoon Hagibis .

Figure 2 depicts the reservoir level of Shiroyama Dam for 72 h from October 11 to October 13, 2019.

As shown in Fig. 1, the value of total inflow is similar to that of total outflow. The current water strategy in Japan is to keep the same reservoir level of the dam. As long as the amount of total outflow is greater than that of total inflow, the reservoir level decreases. Contrarily, the amount of outflow is smaller than that of inflow, and the reservoir level increases.

Figure 2 shows that the reservoir level of the beginning of October 11 is 119 m as usual which can deduce that water stream dam policy is to keep the ideal 119 m regardless of expected heavy rain. The same policy can be observed in other dams in Japan. Figure 2 shows that for more than 7 h the dam reservoir level was beyond the maximum reservoir level.

For flood control against the record amount of rain, all dams should be at the lowest reservoir level for minimizing the amount of outflow. For Shiroyama Dam, the reservoir level on October 11 should be 95 m instead of 119 m. As long as the lowest reservoir level kept in the dams, the minimum outflow from the dams can be achieved for flood control. In the past, many people have died due to the release (outflow) of dams in Japan. The dam control policy should use the latest weather forecasts data. Weather information issue was confirmed with weather forecast experts. Dam control managers told weather forecast experts that intuition, experience, and courage are only needed for dam control management.

3 Result

The open-source dataset as shown in Figs. 1 and 2 reveals that the Japanese dam control policy does not use the latest weather information. The author recommends that the current water stream dam policy in Japan should be changed as soon as possible for saving human lives from predictable floods.

4 Conclusions

Open-source dataset shows that the current dam control policy does not use the latest weather forecast information. The open-source dataset of the total inflow and outflow as shown in Fig. 1 and the dam reservoir level as shown in Fig. 2 revealed that the current dam control policy against the typhoon in Japan did not prepare for the heavy-rain typhoon. Human-induced flood should be avoided. The dam control policy in Japan should be updated with using the latest weather information.

References

Islam R, Takagi H (2020) Statistical significance of tropical cyclone forward speed on storm surge generation: retrospective analysis of best track and tidal data in Japan. Georisk Assess Manag Risk Eng Syst Geohazards. https://doi.org/10.1080/17499518.2020.1756345

Natsuaki R, Nagai H (2020) Synthetic aperture radar flood detection under multiple modes and multiple orbit conditions: a case study in Japan on Typhoon Hagibis, 2019. Remote Sens 12:903

Shimozono T, Tajima Y, Kumagai K, Arikawa T, Oda Y, Shigihara Y, Mori N, Suzuki T (2020) Coastal impacts of super typhoon Hagibis on Greater Tokyo and Shizuoka areas, Japan. Coastal Eng J 1:2. https://doi.org/10.1080/21664250.2020.1744212

Tay CWJ, Yun S, Chin ST et al (2020) Rapid flood and damage mapping using synthetic aperture radar in response to Typhoon Hagibis, Japan. Sci Data 7:100

Tonouchi M, Kurihara K, Yokoyama H (2019) Disaster management in Japan and effective usage of meteorological information with a prompt report of Typhoon Hagibis. Vietnam J Hydrometeorol 2–1:66–72