

# Consideration of Flood Evacuation Measures with a Case in the US

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## 1. Introduction

Since the flood damage caused by Hurricane Harvey, which hit the City of Houston in August 2017, which has the fourth largest population of 2.3 million (estimation as of July 2017) in the United States. is an important case for study of flood damage reduction measures in big cities, NILIM conducted a hearing survey in March and May 2018 from employees, etc. of the Federal and local governments (jointly with Water and Disaster Management Bureau, Ministry of Land, Infrastructure, Transport and Tourism, Cabinet Office personnel in charge of disaster prevention, etc.).

## 2. Scale of the flood damage

In the Harris County (population of 4.7 million), where Houston is located, about 125,000 houses, about 10% of the total number of houses, were inundated, about 300,000 cars were inundated, 36 persons were killed, more than 60,000 people were rescued, and a total of about 4.7 billion dollars (equivalent to about 520 billion yen (110 yen / dollar) were paid for a total of about 46,000 flood insurance claims. (May 2018 Harris County Flood Control District)

## 3. Case that should be referred in Japan

In the local hurricane evacuation map (Fig. 1), postal code areas are grouped and color-coded as purple, yellow, green, and orange according to storm surge disaster risks. Residents in the area of target group of evacuation order are supposed to evacuate, while residents of the area not color-coded are supposed to give way to evacuees from other areas without conducting horizontal evacuation. This is based on the concern that unnecessary horizontal evacuation of residents in low risk areas may cause road traffic congestion, etc. and prevent evacuation of residents in high-risk areas.

## 4. Issues to consider in studying flood evacuation measures in Japan

Of the calamity of the Hurricane, many were killed when moving in cars and many people were rescued from cars stuck on the road (the same County's crisis management center in March 2018), so that it was reconfirmed that horizontal evacuation also carries a risk. It is important for society to share the awareness that human damage / social cost may be increased when expanding the coverage area of evacuation order etc. for safety (Fig. 2).

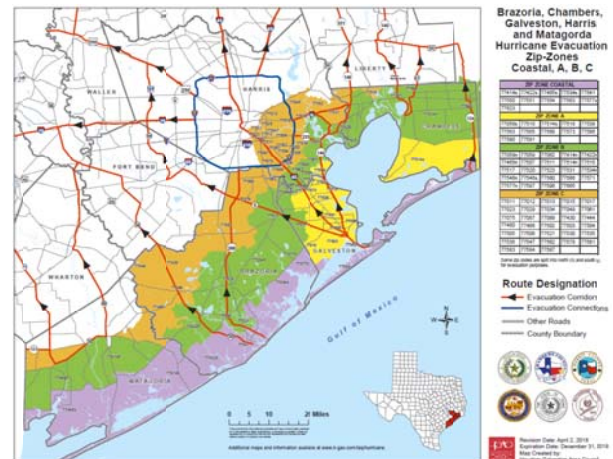


Fig. 1: Hurricane evacuation map (Houston-Galveston Area Council 2018)

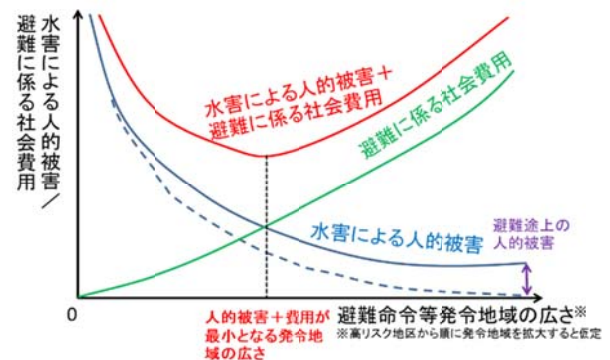


Fig. 2: Relationship between the coverage area of evacuation order and damage

## 5. Conclusion

It was found in the U.S. hurricane disaster above that limitation of target flood evacuees could lead to reduction of flood damage. We intend to study effective flood evacuation measures in Japan, where social characteristics, etc., are different.

See the following for details.

Research team report is to be published from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), etc.