Post-Disaster Survey on Community Resilience

According to the National Resilience Basic Plan developed by the Japanese government, strengthening national land resilience requires both “the robustness to avoid catastrophic damage” and “the flexibility to recover quickly.” In the case of water-related disasters, it is also possible to take certain measures before damage occurs by using forecast information such as flood warnings. Therefore, in addition to the two elements above, “emergency response actions for disaster damage reduction” play an important role in mitigating impacts. As shown in Figure 1, building a resilient community requires strengthening all three elements through pre-disaster measures so that the social impacts of disasters can be minimized (Ohara et al., 2018).

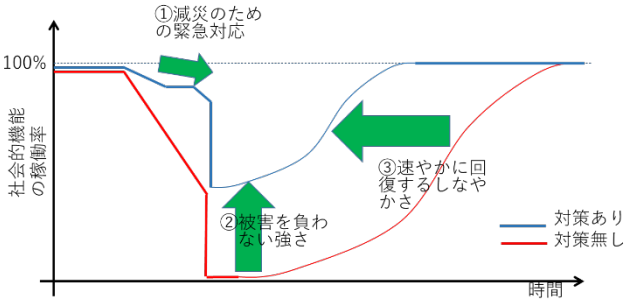


Figure 1 Social impacts of water-related disasters, created based on the Cabinet Office’s Business Continuity Guidelines (March 2023) (Ohara et al., 2018)

However, in terms of recovery capacity in particular, the actual conditions observed in past disasters have not been sufficiently documented. To address this, ICHARM conducted questionnaire surveys with businesses in Joso City, Ibaraki Prefecture, which was affected by the 2015 Kanto-Tohoku Heavy Rainfall, and with businesses in Hiroshima and Okayama Prefectures affected by the 2018 Western Japan Heavy Rainfall. These surveys were used to examine the relationship between the extent of damage and the number of days of business suspension.

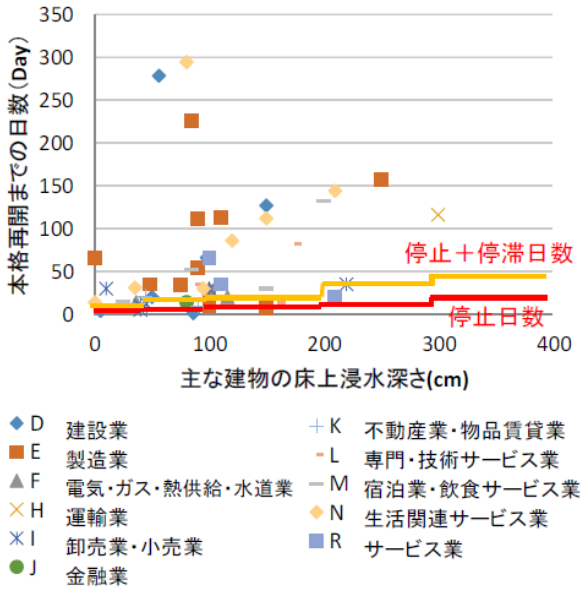


Figure 2 Comparison of business suspension and stagnation days between the ICHARM study and the Flood Control Economic Survey Manual (2005) (Ohara et al., 2018)

The project team also conducted a questionnaire survey with residents of Iwaizumi Town, Iwate Prefecture, which was affected by Typhoon No. 10 in 2016, to identify recovery curves for housing reconstruction, daily life, and community activities. Based on these results, they proposed indicators such as the time required to reach 50% recovery, and recommended using the shortening of this period as a target for various disaster risk reduction measures and investments.

a) Survey of businesses in Joso City

(Affected by the 2015 Kanto-Tohoku Heavy Rainfall)

Survey method:

In-person interviews conducted through site visits

(Questionnaires were mailed in advance and collected during the interview.)

Survey cooperation:

Joso City Chamber of Commerce and Industry

Survey period: September 1 to November 30, 2016

Number of businesses surveyed:

60 (56 on the east side of the Kinugawa River, 4 on the west side)

This corresponds to roughly 10% of the 582 businesses on the east side that experienced inundation.

Survey items:

Basic characteristics of each business; conditions at the time of inundation; damage incurred; status of business resumption and continuity; flood control measures before and after the rainfall event

Results: Based on the results of the questionnaire survey in Joso City, the project team studied a new evaluation approach to assess aspects of "resilience in daily life and business activities" that existing methods had not adequately evaluated. This new approach was used to estimate the resilience of affected businesses in the "Technical Study Report on Countermeasures against Giant Disasters that Cause National Crisis," compiled by the Japan Society of Civil Engineers. It was also used to estimate resilience in the "Simulation Tool for Flood Damage Estimation in Business Activities," published by the Economic Consortium for Disaster Management, hosted by the Cabinet Office.

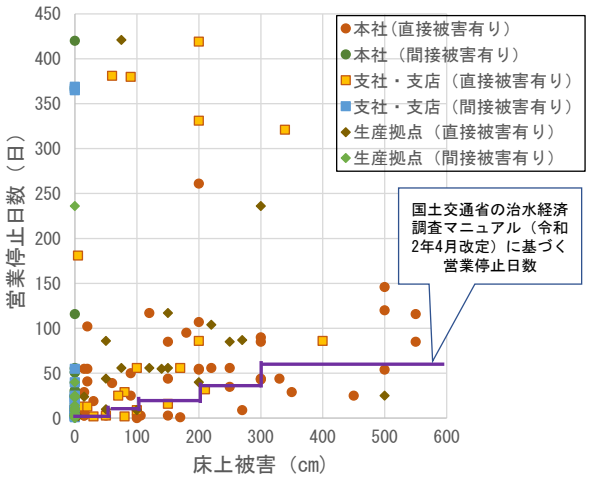


Figure 3 Relationship between above-floor inundation depth and business suspension days (Ohara et al., 2021)

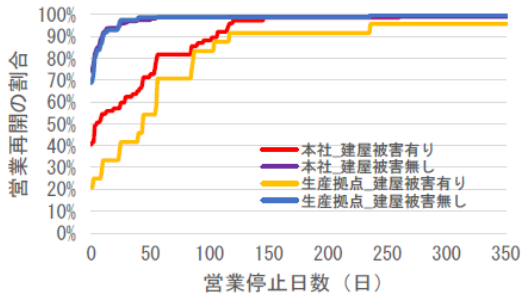


図-8 本社，生産拠点での建屋被害の有無別の営業再開曲線

Figure 4 Business reopening curves based on whether or not buildings at headquarters and production sites were damaged. (Ohara et al., 2022)

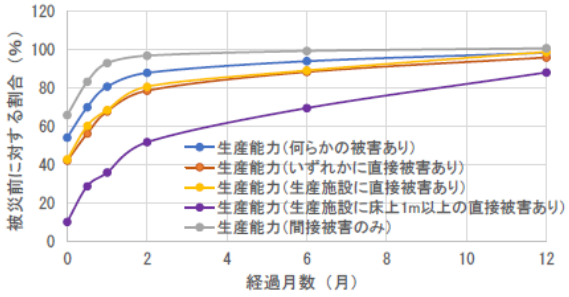


図-10 被害状況に応じた生産能力の回復状況

Figure 5 Recovery status of production capacity according to the extent of damage (Ohara et al., 2022)

b) Survey of businesses in Hiroshima and Okayama Prefectures

(Affected by the July 2018 Heavy Rain Disaster)

Survey method:

Mail-based questionnaire

(Follow-up phone calls were made to businesses that did not return the questionnaire.)

Survey period: November 26, 2019 to March 13, 2020

Number of businesses surveyed:

1,994 businesses with 20 or more employees

4,693 businesses with fewer than 20 employees

Total: 6,686 businesses

Number of responses: 1,146 businesses

Results: The project team conducted a questionnaire survey of businesses in Hiroshima and Okayama Prefectures that were affected by the heavy rain disaster in July 2018, and analyzed the impacts of the disaster on their production and sales. The analyses revealed the relationship between the presence or absence of direct and indirect damage and the number of days of business suspension. The results of this research prompted the revision of the Flood Damage Economical Survey Manual in 2020.

c) Survey of households in Iwaizumi Town, Iwate Prefecture

(Affected by Typhoon No. 10 in 2016)

Survey method:

A questionnaire was distributed to all households together with the town's public information bulletin, and responses were collected by mail.

Survey period: December 2019 to late February 2020

Number of households surveyed: 4,159

Number of responses received: 826

Response rate: 19.9%

Results: Although recovery progressed in the order of housing reconstruction, daily life, and community activities, the findings showed that the overall recovery process required a long period of time. A comparison between households whose homes were half-destroyed or more and all surveyed households revealed that the proportion reporting "recovered to pre-disaster conditions" was consistently lower among those with half-destroyed or more severe damage. However, the difference between the two groups was not large, indicating that even households without direct housing damage still experienced significant impacts. More than two years after the disaster, the differences in responses between the two groups had become smaller.

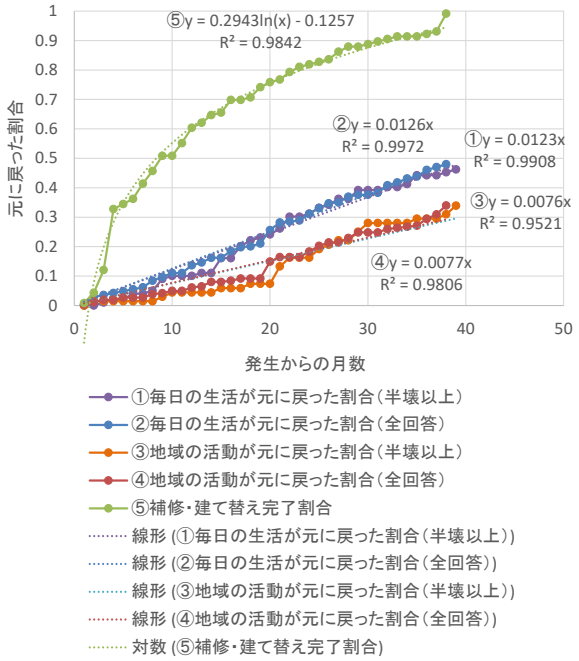


Figure 6 Recovery curves of housing reconstruction, daily life, and community activities (Ohara et al., 2021)

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