



Task Group on Geohazards

Flood disasters in SW Japan, July 2018

Yujiro Ogawa and Kiichiro Kawamura (IUGS-TG Geohazards, coordinators;
fyogawa45@yahoo.co.jp)

Heavy damage due to flood disasters has occurred and still continues in SW Japan. Geological reasons as well as meteorological will have affect the damage. Below, we summarize the major causes and results from various TV, newspaper and internet reports.

Causes, processes and outcomes

1. Slope failures, river floods, and debris flows from hilly areas of SW Japan, particularly around the Seto Inland Sea have been caused by incredibly heavy, concentrated rainfall of more than 1,000 mm for ten days up to 8th of July, 2018. Heavy rainfall is common in the monsoon season in SE Asia (also known in Thailand). After Typhoon No. 7 passed across Japan the front was stimulated to rain along linear zones for several days. Since the front moved to the same direction as these linear zones, the heavy rain was prolonged for more than 10 days.
2. Due to the rain and slope failures many rivers were flooded (some by “backing-up” of water from major streams into smaller rivers). Low land, including rice fields and residential areas have been submerged by water up to 5 m deep (Fig. 1).
3. Most of the life lines (infrastructure such as water, electricity, telephone, internet, small and large roads, railroads, highways, etc.) became out of use in various places.

It is not known when these facilities will be restored. Supplies of food, water and other essential supplies have been interrupted by road collapses.

4. Warning systems worked although some proved to be limited and slow. Hazards maps were mostly effective, but the too rapid rise in water levels in some locality prevented people from escaping.
5. Up to 10th of July, more than 200 people were dead or missing, and close to 20,000 people had to be evacuated. They need wide help but the muddy sands and deep water are preventing recover to normal life. The economical damage is huge, currently estimated at more than US\$ 2 x 10⁹. Some factories in various areas in Japan cannot operate due to feedstocks and products being undeliverable situation due to transport loss.
6. Houses and buildings along many small rivers, valleys, and on the deltas have been washed away or have been buried and moved by the debris flows, and many cars are out-of-use. Another cause of flooding is due to logs (trees) from the hilly areas (mostly plated cedar trees) blocking small rivers at bridges causing up-stream overflowing.

Geological causes of the floods

7. Geologically, the reasons for the strong debris flows are explained by several specialists as follows. The affected regions are mostly occupied by Cretaceous to Paleogene granitic rocks (Ryoke belt), which are densely weathered to become residual soils (“masa or masado”, meaning “real sandy soil” in Japanese). Due to heavy rain, the corestones of the weathered granitic rocks (boulder sized) are washed down with sandy and clayey soil, together with tree trunks, into the valleys impacting on and washing away houses along and at the bottom of the valleys. People who were too slow to evacuate might have been buried. Corestones cause damage down-stream in the valleys, rivers and fans and, where debris become stuck at bridges, they form dams causing the streams to overflow.

Social issues

8. A key question is “How to mitigate the potential future damages?” We cannot avoid meteorological phenomena as a hazard, but can reduce risk and prepare for evacuation. The present disaster mostly affects the lower slopes of hills and mountains and flood plains. Similar disasters occurred in Hiroshima City in 2014.

People are apt to build houses at foot of hills after filling the lower, convenient flood plains along rivers. Both types of area are potentially risky. If similar heavy rains (in this case the highest rate of rain fall in 100 years or so) occur in future similar disasters will affect the areas concerned. Risk reduction could be achieved by building in safer areas, and, once a warning is given, evacuation should be immediate.

9. However, social life lines are fragile and the ability to make perfectly robust preparation is limited. It requires both personal preparedness and governmental action.

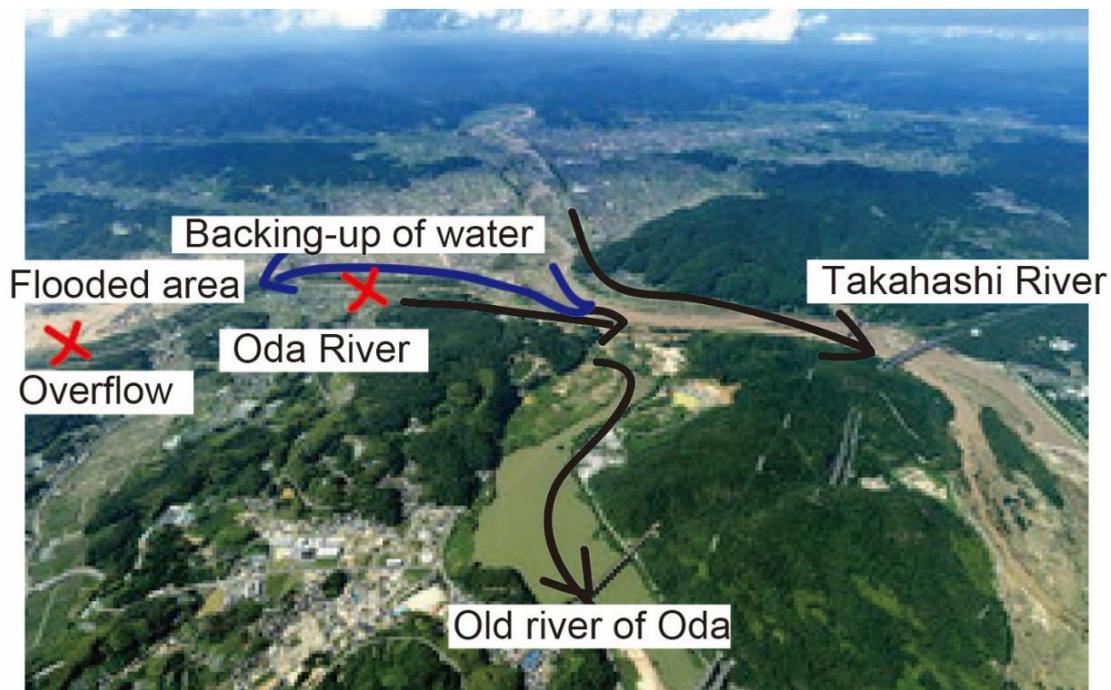


Fig. 1. Flooding by overflowing (red cross) of the smaller Oda River in which water “backed up” (blue arrow) from the larger Takahashi River into the upstream reaches of the Oda to raise the water level. The flooded area, Magi, Kurashiki City, Okayama Prefecture, is a rice field and residential area that is normally at the same water level as the Oda. The basic reason of “backing-up” may be related to the change of the river channel of the old Oda (Air photo after Asahi Shimbun Newspaper Company, Tokyo).