

The circumstances were almost similar in other rural earthquakes, such as the 2005 Fukuoka-Oki earthquake with M7.0, the 2007 Noto-Peninsula earthquake with M6.9, the 2007 Niigata Chuetsu-Oki earthquake with M6.8, and the 2008 Iwate-Miyagi earthquake with M7.2.



Photo.3 In rural underpopulated regions of Noto peninsula, Ishikawa prefecture, local people were completely isolated from neighboring cities for a few weeks after the 2007 Noto-peninsula earthquake.



Photo.4 Very large scale land failures happened during the 2008 Iwate-Miyagi earthquake with M7.2 in the northeastern part of Japan. Most of the significant land failures appeared in the area where human developments had been made, such as dams, bridges, mountain roads those had been prepared for the convenience not only for the local people but also for the distant urban people to drive with a shorter ways.



## Land Failures Brought by Heavy Rain Disasters in Japan

Heavy rain disasters could be seen very often in southwestern part of Japan, such as the 1982 Nagasaki rain disaster and the 1993 Kagoshima rain disaster that was induced by three typhoons. But recently rain disaster can be seen everywhere in the country. Dr. Yutaka Takahashi, one of very excellent civil engineers, pointed out that recent developments in large scale not only in urban areas but also in rural areas have brought very vulnerable condition against rain disasters. We completely agree with him although we want to add earthquake disasters also.

Here we would like to introduce one of such cases. It is so-called “mountain tsunami”, that means a mixture of amount of water with avalanches. According to the residential people who experienced it, it suddenly came with 5 meters height and collapsed everything. They say that this is the first time they have met with such a terrible disaster. But in our impression, they are living almost in a river.



Photo.5 Heavy rain suddenly attacked some local societies along small rivers in July of 2009. This is not the special case because we can see lots of similar cases almost every year in Japan. They say that this is the first time they have met with such a terrible disaster. But in our impression, they are living almost in a river.

## Examples of Vulnerable Circumstances from the Viewpoint of Land Failures

We would like to introduce some of vulnerable examples from the viewpoint of land failures. As mentioned before, it looks very difficult to solve them, but the question is why do they live in such vulnerable condition? We are not sure, but the answers could be as follows.

- 1) They do not know that they are living in dangerous area.
- 2) They know that they are living in dangerous area, but they have never experienced any disaster.
- 3) They expect the local government to help them if they meet with a disaster.