Motorola Flood Warning System Saves Lives

By Yoichi Komatsu, Systems Engineer, Nippon-Motorola
and Yitzhak Bar-Magen, Sales Consultant, Motorola

Background

Japan is basically a long narrow chain of islands. Composed of high mountains and many rivers, it is particularly susceptible to the disasters of flooding from the heavy rains and seasonal typhoons. This flooding is especially costly in terms of human life because of its congestion. There isn't much the government can do to prevent natural disasters, such as flooding, but with sufficient warning many lives can be saved.

The city of Minokamo, located near Nagoya, on the island of Honshu, has suffered many times in the past from flooding. The city is located at the confluence of two large rivers originating in the neighboring high mountains. Minokamo also has the ill fortune to be situated in the path of the damaging typhoons that periodically hit Japan. Several times in the past, at least two-thirds of the city has been under water. The citizens have learned what damage the flooding can cause.

Motorola's Solution

The Minokamo Disaster Prevention Department asked Motorola to install a system that would allow it to accumulate historical data on rainfall and river water levels, in order to be able to predict flooding. The system, based on MOSCAD RTUs, uses the existing 60 MHz emergency broadcast system to remotely monitor and control the field sensors. Wireless radio allows the system to work, even in the event of natural disasters when telephone lines are down.

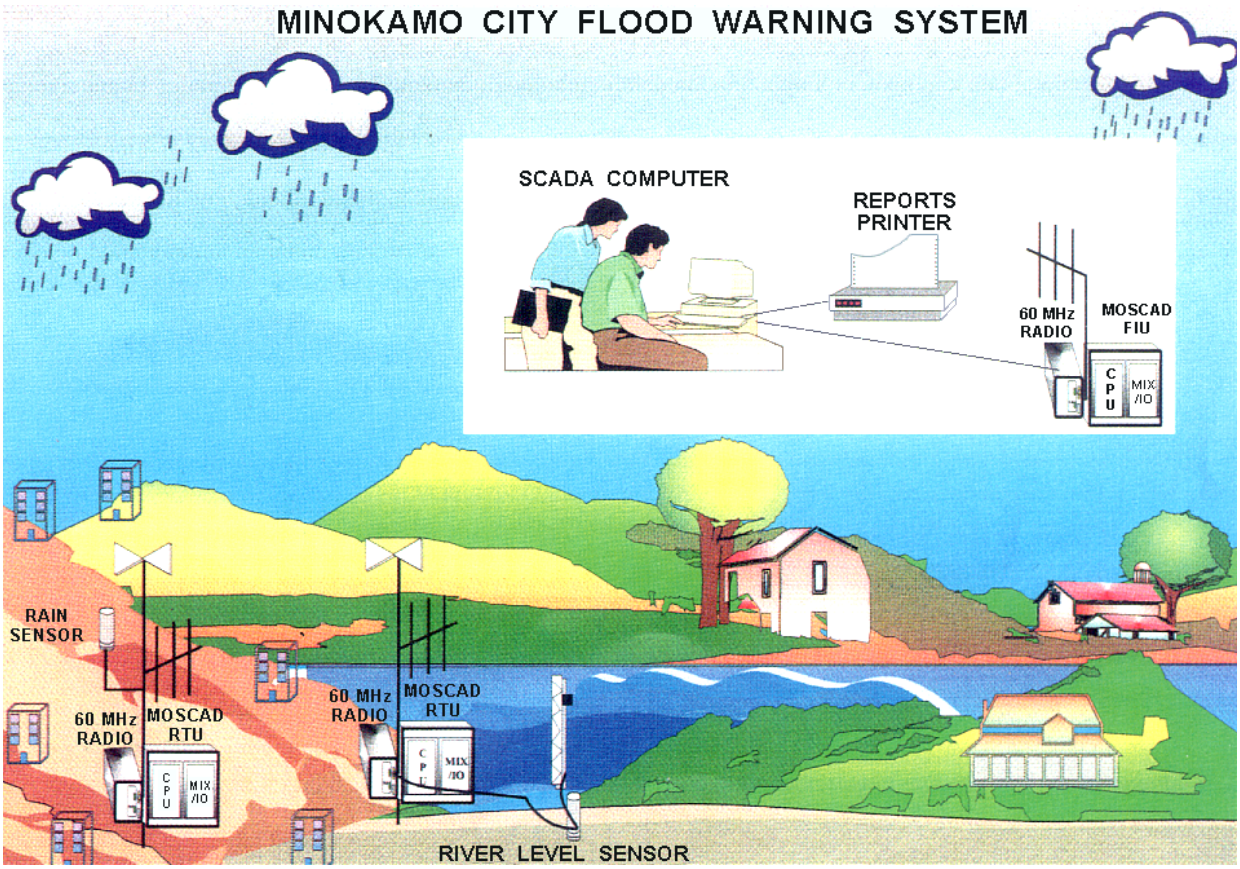
First Stage

The system was designed for installation in two stages. *(See figure on next page)*. The first added seven rainfall sensors to the city's existing 60 Mhz emergency broadcast system, located in 200 different parts of the city. Its purpose was to implement the MOSCAD RTUs to remotely monitor the accumulation rain sensors from the radio control room, located in the city's office building.

Second Stage

In the second stage of the project, begun in early 1995, river level sensors will be added to the system. The system, with these added river level sensors, will combine the following parameters, to declare a flood situation:

- Daily rain fall accumulation data (midnight to midnight)
- Hourly rain fall accumulation data
- Ten minute rain fall accumulation data
- Store the ten minute rain fall peak, every hour, in the MOSCAD RTU
- Hourly river level data
- Ten minutes river level data
- Calculate hourly rate of change in the river level
- Create flood warning message when predetermined parameters are exceeded
- Automatic daily reports of all parameters, are generated at midnight



By collecting and analyzing these data, the Disaster Prevention Department will be able to predict flooding and give the public adequate warning. This will allow sufficient time to evacuate those areas in danger of flooding. In addition, the department will be able to designate the safest evacuation routes.

The Motorola system has an additional advantage due to the remote programming and diagnostics capabilities of the MOSCAD RTUs. Many sensors are located in inaccessible spots throughout the mountainous region. All are monitored, controlled, programmed and even tested from the city office.

Sequel

No recent event caused such near total devastation as the recent earthquake in Kobe, Japan. This disaster proved the reliability of wireless communication. The main communication system that continued to operate after the earthquake were Kobe's various trunked radio systems. This was also true for the terrible earthquake in Simi Valley, California. All communication fell except for the radio system which works independently of any wired infrastructure.

More and more municipalities are looking to wireless warning systems for their electric, gas and water utility services. For example, during the earthquake, it was found that most fires were caused by broken gas lines. Installation of MOSCAD controlled emergency shutdown valves, could have prevented many of these fires.

Motorola's system can't prevent flooding but it saves lives!