

# Application of Spatial Temporal GIS for Emergency Response against HPAI in Kiyotake Town, Miyazaki Prefecture: Spatial Temporal Information Handling for Risk Management

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## ABSTRACT :

Kiyotake Town (Miyazaki Pref.) was affected by HPAI in 2007. The local government had to take emergency response and the activities were successful in preventing more serious effects of HPAI. Spatial temporal GIS was used effectively in this process. This paper aims to reports a case study on application of GIS for countermeasure against HPAI.

**KEYWORDS:** DiMSIS (Disaster Management Spatial Information System), RARMIS (Risk Adaptive Regional Management Information System), HPAI (Highly Pathogenic Avian Influenza)

## 1. Introduction

In Japan, local government needs seamless transition between daily routine work and emergency management according to the lessons of the Great Hanshin-Awaji Earthquake. Therefore, the concept call as RARMIS [1] (Risk Adaptive Regional Management Information System) has been proposed. Foundation software that can realize RARMIS is DiMSIS [2] (Disaster Management Spatial Information System). DiMSIS is GIS component software and it can support feature with spatial attribute. DiMSIS was used for collapsed house removal action effectively in Nagata ward of Kobe city in the Great Hanshin-Awaji Earthquake. Our research team conducted joint research on spatial temporal information system which is GIS application software based on DiMSIS with local government of Kiyotake Town. Purpose of joint research was not only effective disaster management in earthquake disaster, but also effective daily routine work in local government. Therefore, Kiyotake Town staffs used DiMSIS to research and trial. During the research, Outbreak of HPAI (Highly Pathogenic Avian Influenza) of H5N1 subtype occurred in Kiyotake Town in January 2007. The local government of Kiyotake Town prevented infection through spreading with other government agency. DiMSIS was utilized for assessment of the situation and decision making as emergency countermeasure against HPAI. But, target of our developed information system was management in earthquake. Emergency management in HPAI outbreak was not target. This case of Kiyotake Town used information system for earthquake response in emergency situation of HPAI prevention. This paper considers information system for local government in emergency situation through case of Kiyotake Town.

## 2. Conducted research DiMSIS application

Our research team and local government of Kiyotake Town had been developing the comprehensive disaster preparedness information system to response of disaster effectively. It system was consider use of generator and the community wireless system, because usage situation is disaster. It situation is estimated damage of infrastructure. When outbreak of HPAI in Kiyotake Town, the comprehensive disaster preparedness information system was uncompleted. But, person who needed support function and earthquake early warning function was available. Purpose of the person who needed support function is effective disaster management for person who needed support. Local government of Kiyotake Town accept the request which is local residents who want to need support at disaster occurred. The requests were managed by the comprehensive disaster preparedness information system, and the request information are used for assessment of the situation and decision making such as place to open evacuation center, route of escape and dispatch of local government staff. This function was used at typhoon struck there and disaster drill. The earthquake early warning function is deliveries warning which is audio alert from the Japan Meteorological Agency for school and public facilities in the town. This function was used for disaster drill

for some elementary school.

### 3. Course of Kiyotake Town Case

#### 3.1. Highly Pathogenic Avian Influenza

In Japan, countermeasure of HPAI was stipulated under Act on Domestic Animal Infectious Diseases Control (Act No.166 of May 31st, 1951). And, Specific Domestic Animal Infectious Disease Quarantine Guidelines for HPAI (official announce: 2004) was announced publicly by the Minister of Agriculture, Forestry and Fisheries. It is comprehensive implementation of measures. Prefectural governors and mayors of municipalities shall take measures to prevent the outbreak or spread of domestic animal infectious diseases based on the Specific Domestic Animal Infectious Disease Quarantine Guidelines (official announce: 2004). It was stipulated under Article 3-2-2 of Act on Domestic Animal Infectious Disease Control (Act No.166 of May 31st, 1951).

#### 3.2. Result of Kiyotake Town case

If HPAI outbreak occurred, domestic animals, egg of domestic animals, feeding equipments, and feedstuffs are imposed on restriction of movement. Restriction of movement of domestic animals is kept till twenty one days at least. This restriction of movement was stipulated by Act on Domestic Animal Infectious Diseases Control (Act No.166 of May 31st, 1951). Case of Kiyotake Town, restriction of movement was lifted at twenty one days. It was in the shortest time.



Figure 1 Newspaper of Japan at HPAI outbreak in Kiyotake Town

Table 3.1 Type of inquiry and call volume to Kiyotake Town

Type of inquiry	12th	13th	14th	15th	16th	17th
Place	24	7		1		
Infection	11	4	8	6	2	1
Bird	19	11	8	5	1	
Food	2	3	2	1		
Regulatory action	14	2		2	1	1
Municipality countermeasure	14	10	2	3	1	
others		3		2		
total	84	40	20	20	5	2

Figure 1 is newspaper of Japan at HPAI outbreak in Kiyotake Town. Newspapers reported in praise of the initial prevention of HPAI, and falling price of chicken meat and chicken egg is small, and harmful rumor is small. Table 3.1 is call volume and type of inquiry to Kiyotake Town. Kiyotake Town explained to local residents at 12<sup>th</sup> and 13<sup>th</sup>. Table 3.1 is shown that call volume to Kiyotake Town office was declined after the explanation to local residents, and local residents were feel safe by Kiyotake Town countermeasures. Therefore, local government of Kiyotake Town prevented infection through spreading, and removed fears of local residents.

#### 4. Utilization of DiMSIS

Figure 2 is shows HPAI outbreak point, traffic restriction point, and disinfection point. Each material is same area. Different is with satellite image or without satellite image. Disinfection point is a place to disinfect vehicle related to livestock industry which go through. Disinfection point was stipulated by Specific Domestic Animal Infectious Disease Quarantine Guidelines for HPAI (official announce: 2004). Countermeasure office noticed there was university near HPAI outbreak point from this material. Information of university location influenced decision making of Kiyotake Town. Kiyotake Town restricted traffic before commute time. Additionally, they found nursing home near outbreak point from this material. So they could have opportunity to consider whether they were bad influence to nursing home.

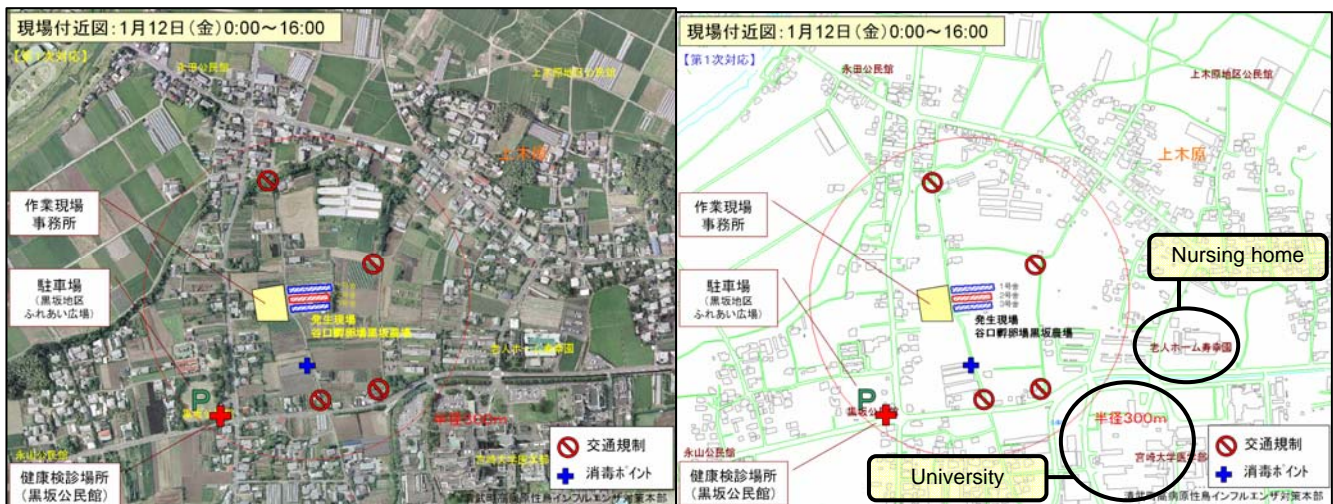


Figure 2 HPAI outbreak point



Figure 3 Neighborhood farms from HPAI outbreak point

Figure 3 shows distance to farms from HPAI outbreak point. Countermeasure office must grasp distance to farms from HPAI outbreak point. Because, restriction of movement area is ten kilometer in radius from HPAI outbreak farm. Distance of restriction of movement was stipulated by Specific Domestic Animal Infectious Disease Quarantine Guidelines for HPAI (official announce: 2004). This material shows Kiyotake Town is within ten kilometer from outbreak farm, and the farm in other city is within five kilometer from outbreak farm.

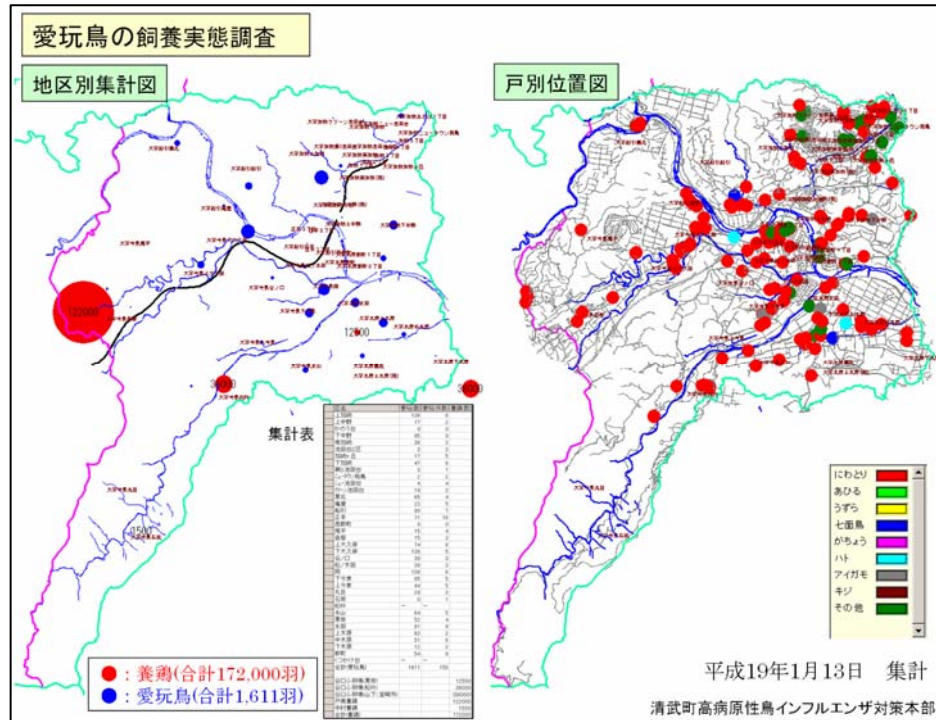


Figure 4 Distribution map of cherished birds



Figure 5 Carcass carrying out route

Figure 4 shows cherished birds in Kiyotake Town. Both domestic animal and cherished bird is also target of the Specific Domestic Animal Infectious Disease Quarantine Guidelines for HPAI (official announce: 2004). Figure 5 shows carrying out route of carcasses. The carcass carrying out route was very sensitive for local residents.



Figure 8 Countermeasure office

Kiyotake Town staffs made described materials, and utilized for countermeasures. Figure 8 is countermeasure office and scale-up materials on bulletin board. Such as Figure 8, the materials were used for assessment of the situation, risk communication, decision making in countermeasure office. And, the materials were used for explanation to local residents such as figure 9.



Figure 9 Explanation to local residents

#### 4. Conclusion

In the case of DiMSIS used for collapsed house removal action at the Great Hanshin-Awaji Earthquake in Nagata ward of Kobe city, information of district boundary was used effectively. Case of Kiyotake Town was not emergency management in earthquake disaster, but local government had to manage emergency situation by HPAI. In this case study local government also needs information of district boundary for emergency countermeasure.

Additionally, GIS shows point of interest information such as chicken coop that was HPAI outbreak and GIS can also show additional important information which is not expected about near target area. Actually, such information was very important for assessment of the situation and decision making. Therefore, it can be presumed that information system is needed show point of interest such as information of response to a query and unrequested important information in order to support assessment of situation and decision making effectively in emergency situation of local government about earthquake.

## **REFERENCES**

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