

# **Emergency Preparedness System for the Lower Mekong River Basin: A Conceptual Approach Using Earth Observation and Geomatics**

Ferdinand Bonn, Guy Aubé, Claire Müller-Poitevien and Goze Béné

Centre d'applications et de recherches en télédétection (CARTEL), Université de Sherbrooke, Sherbrooke, Québec, Canada, J1K2R1.

Email: Ferdinand.Bonn@usherbrooke.ca

## **Abstract**

With the aid of the Canadian Space Agency and the Canadian geospatial industry (Ærde, HCL, Strata 360), CARTEL is working in close collaboration with the Mekong River Commission (MRC) and the Cambodian Red Cross to establish a Flood Emergency Response System in Cambodia. Earth Observation (EO) and Geomatics generally insists on spatial distribution and the accessibility of the health centres, food warehouses, flood safe areas as well as the spatial distribution of the disease according to the changing factors of the physical environment and planning and the management of public health in order to improve quality of the decision-making process. The strategy is centered on the analysis of the needs for the managers of the Mekong River Commission and of the Cambodian Red Cross. It also focuses on the questions and data relating to the follow-up in space and time of the flood events and its effects on the local communities. This study takes into account the three dimensions of security: vulnerability, preparedness, response. The methodology includes the following stages: (1) analysis of the needs of the Mekong River Basin managers such as health, transportation, safe areas, infrastructures at risk, food security; (2) design of the diagram of the emergency response system including the identification and the conception of georeference data and spatial analysis functionalities; (3) design and development of a database and metadata; (4) development of vulnerability maps by using multi-date EO imagery (RADARSAT-1, aerial photography, high resolution optical imagery) combined with the historical and topographic data.

## 1 Introduction

In recent years, it has become a pressing issue for governments to improve human security in emergency response situations. Some of the recent initiatives using space technologies to assist in disaster management are the Disaster Emergency Logistic Telemedicine Advanced Satellites System developed with support of ESA, the International Charter on Space and Major Disasters signed by CNES, CONAE, CSA, ESA, ISRO, NOAA, and the UN, the Mozambique Flood Information System developed with the support of the German Aerospace Center (DLR), the Environmental Monitoring Information Network in Bangladesh under development by RADARSAT International (RSI), the GIS-Based Flood Information System (AWRA, 2003), the National Urban Search and Rescue Response System (FEMA, 2003), the Real-Time Emergency Management via Satellite (REMSAT, MDA, 2001), the UN International Strategy for Disaster Reduction, etc.

When natural disasters occur, such as storms or floods, population's re-localisation and its management constitute a complex problem for health and security. These disasters mainly strike unprivileged populations, who reside in high-risk areas, such as along the banks of rivers or in non-protected coastal zones. As an example, water treatment facilities are often destroyed by floods, which bring drinking water contamination by bacteria, viruses, parasites and toxic substances. Rice fields, fisheries and aquaculture infrastructures are also damaged, causing food insecurity. In 2000 in Cambodia, 3,500,000 people were affected by floods (347 deaths, 7,068 houses destroyed, 347,107 ha of rice fields damaged). But droughts, which can also occur in this area, are an equally important threat to human security and they can disrupt the food security in the area.

## 2 The Lower Mekong Basin

Located in SE Asia, the Mekong River is 4 800 km long, flowing north-south. It drains a large, multinational watershed of 795 000 km<sup>2</sup> shared by China, Myanmar, Laos, Thailand, Cambodia and Vietnam (figure 1). The Mekong River Commission (MRC) has been established in order to harmonize management, environmental issues and water use between the different countries involved. Subjected to a monsoon climate, with the rainy season occurring from May to November, the Mekong usually enters a flooding stage from July to December. The overall hydrology of the Me-