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GIS Technology Helps Rid Southeast Asia of Landmines and UXO

Southeast Asia remains one of the most heavily mined regions in the world. Cambodia, which has a 2009 deadline for the Ottawa Convention,³ has requested a deadline extension because it will be impossible to meet its clearance obligations by then. The Cambodian Mine Action and Victim Assistance Authority is in the process of clearing millions of anti-personnel mines from the ground. The United Nations Mine Action Service estimates that, in the past 30 years, approximately 250,000 people have been killed or maimed by such ordnance.

While Cambodia is focused on clearing landmines, there are many challenges to clear UXO—a legacy of several past conflicts. The Cambodian Mine Action and Victim Assistance Authority, which coordinates demining operations in the nation, reports more than 60,000 deaths and injuries from landmines and UXO between 1979 and 2004 and 1,675 casualities from 2005 to 2007. “The more demining (in those hazardous areas), the fewer accidents, which is good.”

I n Laos, they call them “bombies.” It’s an innocuous-sounding name for the small cluster bomb—leaves in the ground, silent and harmless, until someone accidentally triggers its deadly force. During the winter of 2007–08 in the province of Savannakhet, Laos, it happened to mine survivors. A group of young girls and boys unearthed an American-Vietnam War-era bomb in their field. The explosion and flying metal killed four of the children and injured five.

“The story is terribly sad,” says Arlene Engeset of Norwegian People’s Aid, a nongovernmental organization that supports demining operations in several countries. “The kids were playing and dug up the cluster bomb. It was just behind their houses.”

While not a demining area, Engeset works to rid Southeast Asia of those deadly types of cluster munitions and landmines using a special set of skills: last project management and geographic information systems expertise. As NPA’s advisor on information management systems in Southeast Asia, Engeset is helping create and update national databases that will contain a wealth of information about landmines and unexploded ordnance, namely where accidents have occurred, hazardous sites with confirmed or suspected contamination areas and land already cleared. Using GIS technology, this data is tested for quality assurance, mapped and analyzed, and the results form the basis for deciding where, when and if certain areas of land need to be demined.

“GIS is playing a big role because we get an overview of where the most accidents are, where the most people are living, and where the biggest problems (exist),” Engeset says. By considering these factors, prioritization can be set as to exactly where to clear mines and UXO in a given year. “The more demining (in those hazardous areas), the fewer accidents, which is good.”

Remnants of War

Approximately 15,000 to 20,000 people worldwide die or receive injuries from landmines or unexploded ordnance per year, according to the United Nations Mine Action Service. The United Nations estimates that millions of anti-personnel mines lay scattered across more than 70 countries in Africa, Asia, South America, the Middle East, the Caribbean, the U.S., Laos, Lebanon, Mozambique, Nepal, Somalia, Sudan and Vietnam. However, UNMA estimates Cambodia as one of the most heavily contaminated nations in the world, a country littered with landmines and UXO—a legacy of several past conflicts. The Cambodian Mine Action and Victim Assistance Authority, which coordinates demining operations in the nation, reports more than 60,000 deaths and injuries from landmines and UXO between 1979 and 2004 and 1,675 casualities from 2005 to 2007.

Currently, Engeset is working with In Channa, manager of the CMAA’s Database Unit, to conduct quality assurance and analyze thousands of pieces of mine data to get the best possible picture of where the worst problems with mines and UXO exist. They’re using GIS software from ESRI to build the database and produce the maps and charts that will help policymakers prioritize the areas that need to be demined. “We have to have the prioritizing data,” Engeset says. “How do you do the work? Where do you start? You will waste time, lives and money.” Engeset believes the work being done using GIS is now paying off. “By setting priorities and targeting the heavily mined locations, some of the most dangerous areas have been cleared,” she adds.

Casualties from mines and UXO accidents in Cambodia plunged 60 percent during a recent two-year period, falling from 875 deaths and injuries in 2005 to 350 deaths and injuries in 2007. “Time and the elements, such as rain, also are taking a toll on the mines and UXO, causing them to detonate less often and helping lower the casualty rate,” Engeset says.

Extension Needed for Mine Clearance

In 1997, Cambodia signed the Ottawa Convention,³ which bans the production and calls for the destruction of anti-personnel landmines. A provision stipulates that signatories must clear their countries of all known landmines within 10 years. Cambodia’s deadline is 2009.

Last January, Engeset took a leave from her job at Goodside AS, the ESRI distributor in Norway, to join Norwegian People’s Aid and go to Phnom Penh, Cambodia, to serve as a technical advisor to the CMAA’s national database project, which is funded by the U.S. Department of State and the Norwegian Ministry of Foreign Affairs. She is helping the CMAA consolidate and improve the quality and usability of the data. The recent focus on the database project was related to the extension request to that provision in the Ottawa Convention. Engeset and Channa, along with his team, collected and conducted quality assurance on the data, which they then analyzed to answer two major questions: What areas are left that definitely need to be demined? And how long might that work take? The results of the analysis, in the form of maps and statistics, were part of the request to ask for additional time to complete clearing the mines.

“We [prepared] an extension request asking for 10 more years to do this work,” Engeset explains. “There are a lot of areas where we know we still have landmines.” The deadline to prepare and conduct quality assurance on the data was August 2008; thus, the analysis work, using ArcView, began.

This is a complex project for many reasons. Engeset and the CMAA work closely with the Cambodian Mine Action Centre, which conducts about half the demining operations in the country (the two other major organizations are Mines Advisory Group and The HALO Trust). For the extension request, the CMAA must make sure that the data (e.g., stipulates that the location of hazardous mines (area) from Technical Surveys conducted by CMAC and entered into CMAA’s five provincial databases matches up with the information in the CMAA’s database. “MA and

by Carla Wheeler (ESRI)
HALO also provides data to CMAA using ESRI’s ArcGIS software,” Engeset says. Besides the results of technical surveys, the CMAA’s database also contains the results of the National Level One Survey conducted in 2001 and 2002 in 13,908 villages in Cambodia, a country 85,049 square kilometers (69,910 square miles) in size. During the survey, information was collected about accidents and suspected locations of landmines and UXO based on interviews with villagers. According to UNMAS

• 6,422 villages were identified as contaminated with landmines or UXO to some extent. “About 5.3 million people in or around those villages are considered at risk,” says Engeset.

• 7,486 villages were identified as uncontaminated.

• 20 percent of all villages in the country are contaminated to the extent of having an adverse socioeconomic impact on the community.

Equipped with the results of the National Level One Survey, CMAC is returning to the 6,422 contaminated villages to conduct Technical Surveys and map the exact locations of mines, they use GPS to map the border of the areas,” Engeset says. That information is stored as polygons with ArcGIS Desktop and later converted into shapefiles that, along with other data, can be shared and analyzed.

“Right now, we are working very hard with the operators to be sure we have the same information that they have stored in their data bases,” Engeset says. “As soon as we have all the data stored in one place, it will be easier to analyze.” The analysis began in the fall of 2008 and continues.

Resolve for Solving a Problem

“The Cambodian population increases, people are on the move looking for land to open up to farming and industry, making mine clearance all the more pressing,” Engeset says. Some people continue to live in the middle of minefields and go out into the fields daily, risking their lives. She feels the need to help make their futures safer.

“I am not an expert on mines, but I do know about information systems,” Engeset says. “This [landmine] problem is huge in Asia, and when you meet the victims, it affects you.” She is constantly amazed by the tenacity of the people who continue to work in dangerous conditions. Engeset remembers a Thai farmer who survived two landmine explosions.

Though his right foot was blown apart when he stepped on an anti-personnel mine, the farmer refused to let the accident prevent him from pursuing his livelihood and feeding his family. Fitted with an artificial limb, he returned to work in the rice fields where he had tripped the mine.

The man duly noted his accident during a Level One Landmine/UXO Survey that Engeset worked on during an NPA project in Thailand. The story would have ended there, except that Engeset and her colleagues noted a discrepancy in his report. The man had filed two forms listing two locations in the rice paddy for where the accident occurred. Thinking he had made an error, they sought out the farmer and were shocked to learn he had stepped on two mines at two different times.

He told them he was not lucky. The second time, he led his artificial leg on, so that was okay.

See Endnotes, page 112

The Reintegration of Landmine Survivors in Mine-affected Northeast Albania

The Albanian Mine Action Executive is the mine-action coordination center in Albania responsible for coordinating and monitoring all mine-action activities in the country. AMAE and the government of Albania has established a concrete victim-assistance strategy and plan outlining targets and goals to be achieved by the year 2009. Albania is one of the few States Parties that is included in the United Nations-led completion initiative and aims to achieve its Article 5 obligation of the Ottawa Convention by 2010.

by Melanie Reimer (Consultant)

In 2003, a project involving animal husbandry commenced to help mine survivors establish simple home-based livelihoods. It was not until 2005, that a well-coordinated and comprehensive victim-assistance strategy was developed and adopted with the goal of building a sustainable victim-assistance capacity by 2009. This strategy aims for all mine survivors to be physically, socially and economically rehabilitated into their communities. The VA strategy is based on a priority needs assessment undertaken by the United Nations Development Programme, AMAE and a local nongovernmental organization, ALMA (Albanian Landmine Action). Mine survivors, their family members, local authorities and medical institutions involved in the survivors’ care were included and interviewed during the assessment in order to identify the priority needs of mine survivors and face a concrete plan to address them.

Strengthening Medical Care

Medical assistance in northeast Albania was identified as being limited compared with the rest of the region because the mine-affected part

D ouring the Kosovo conflict of 1999, landmines and unexploded ordnance were emplaced and cast along the 120-kilometer (75-mile) Kosovo-Albania border and up to 20 km (12 miles) inside of the northeastern Albanian region of Kukes, affecting a total area of 15,250,000 square meters (3,768 acres). As a result, approximately 25,000 inhabitants have been unable to access their land, and records show that 238 civilians have been injured and 34 have died. In an area where inhabitants are dependent on subsistence farming for survival, landmines have greatly affected the residents’ ability to provide for their families, the mine-affected region is the poorest in the country with a 30 percent unemployment rate. There are 39 directly mine-affected villages, all of which have experienced severe difficulties as a result of the mine threat including loss of livestock from mine accidents, restricted freedom of movement and poor access to medical and educational facilities.

The national mine-action structures for coordinating and managing mine action were established in 1999 with the Albanian Mine Action Committee as the inter-ministerial, policy-making body and the Albanian Mine Action Executive as the coordinating and monitoring mine-action center. AMAE has coordinated the collection of incident and accident reports from 1999, which were entered into the Information Management System for Mine Action in order to help with mapping and planning mine-action activities (initially including clearance and mine-risk education, and later to involve planning and coordinating for victim assistance).

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A Cambodian woman and her father each lost a foot in a landmine explosion that occurred in a rice paddy.

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2008/09 the journal of ERW and mine action | notes from the field | 75