

# Image interpretation of irrigation weir on small stream in northeast Thailand using Quick-Bird

# Kenji Suzuki[1]

[1] JIRCAS

## 1. Introduction

High-resolution imagery produced typically by IKONOS or QuickBird satellites provide images that are as detailed as aerial photographs, with a resolution of up to 1 m. These satellite images are thought to be valuable for so-called site-based field studies. This paper describes an example of image interpretation regarding the small-scale irrigation facilities in northeast Thailand using high-resolution satellite imagery.

## 2. Overview of the study site and data used

For this study, we selected the BH District, Khon Kaen Province, in northeast Thailand. The study site is located about 30 km south of the city center of Khon Kaen. The area is characterized by a gently undulating terrain. Paddy fields dominate the lower site, the valley, while the upper site features sugar cane and cassava farms.

The soil is sandy with poor water retention capacity, and is susceptible to erosion due to heavy rainfall. The wet seasons and dry seasons are distinct in northeast Thailand. Even in the wet season, the rainfall is variable because the timing of seasonal onset and the amount of rainfall are unstable. As a result, agricultural productivity has remained low and unstable. Under such circumstances, there have been many small-scale water resources developments (Suzuki et al., 2005). Concrete irrigation weirs on small stream are typical examples for such measures.

For image interpretation, this study used pan-sharpen images (0.6 m/pixel) processed from panchromatic images (0.6 m/pixel) and multispectral images (2.4 m/pixel) taken by QuickBird of April 2002, January 2004 and October 2004. In addition, we conducted field surveys in the study site over the period from 2002 to 2006 to grasp the actual status of irrigation weirs for the basis of image interpretations.

## 3. Results of image interpretations

### 1) Erosion at the attached river banks

In a study in Japan, it was pointed out that the attached river banks of weir are often eroded when the difference between both riverbeds heights at the upstream and downstream area of the weir is great (Miwa et al., 2003). The study also pointed out that the damages of erosion at the river banks to which the side edge of a weir structure is attached are expanded to a detour channel. Although the differences of the riverbeds height were difficult to detect, such detour channels were observed on the images in our study site. Sandy soil in this area is also one of the reasons to accelerate the erosion at the attached river banks.

### 2) Sand deposition problems

Sand deposition problems are often observed in this study site due to heavy sandy soil. In the study site it was confirmed that heavy deposition caused to make detour channel in the satellite image. However, the detail of sand deposition on the river bed was difficult to detect through image interpretation.

### 3) Water use advantage of upper stream

Sakai et al., (1995) has confirmed that the water use advantage at the upper stream tends to be formed through the field survey in northeast Thailand on the stream having several weirs in series. In our study site, such the situation can be detected through a series of image interpretations of high resolution satellite imagery. We observed that ensuring storage capacity at upper stream area caused low water level at the downstream. Accordingly it is suggested that the storage status of the whole basin system may change a lot due to construction of the weirs.

## 4. Conclusion

This study examined information that can be extracted from image interpretation of high-resolution satellite imagery of irrigation weir on small stream in northeast Thailand. As results, it was found that valuable information on actual status of irrigation weirs can be extracted. These interpretation techniques are believed to provide valid information for selecting appropriate weir construction site.