APPENDIX G

BENEFICIAL FROM REMOTE-SENSING IN CASE OF FLOOD FORECAST

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CONTENTS

			Page
CHAPTER	**1**	**INTRODUCTION**	G-1
	1.1	Introduction	G-1
	1.2	Objectives	G-1
	1.3	Study Area	G-2
CHAPTER	**2**	**METHODOLOGY**	G-3
CHAPTER	**3**	**CONCLUSION**	G-4

FIGURES CONTENT

		Page
Figure 1.1	Flooding area from ERS2	G-5
Figure 1.2	Flooding area from Landsat-5TM	G-6
Figure 2.1	Monthly Distribution of Climatic Variables at Hat Yai Airport	G-7
Figure 2.2	3-D Surface view-1	G-8
Figure 2.3	3-D Surface view-2	G-9

APPENDIX G

BENEFICIAL FROM REMOTE SENSING IN CASE OF FLOOD FORECAST*

CHAPTER 1 INTRODUCTION

1.1 Introduction

Flood is one of the national hazards that cause annual losses of lives and properties of people who live along flood-prone areas especially Hat Yai Municipality in the southern parts of Thailand. Thus the planning of flood mitigation project and control schemes are important in this region. The first stage of flood planning and management should be the ability to define zones liable to flooding. Even through a survey of flood boundaries is quite a difficult task because of the inaccessibility to the area, remote sensing techniques have proved useful in the preparation of reconnaissance flood mapping. Due to the influence of unusual tropical storm, several southern provinces in Thailand were suddenly inundated by flash flood. This flood caused much damage to the environment, people's lives and properties.

1.2 Objectives

The project objectives is to assess the flooded area affected by unusual tropical storm for :-

1. Analyze the natural hazard risk that will occur in Hat Yai Municipality area. Example is to identify potentially on recognizing hazards. Risk analysis should delineate areas on the basis of their relative susceptibility to damage and direction of actual flood flow. This knowledge can be used for drainage systems design.

2. Provide advance warning for floods. The satellite images can provide timely warning of floods and severe weather.

3. Assess the damage caused by a hazardous event. An early evaluation of damage caused by floods is essential for carrying of rescue, relief and rehabilitation efforts.

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* In this appendix, the following items will not be described;
1. Early flood warning system in Hat Yai
2. Telemetering and mathematical model and analysis

1.3 Study Area

The study area is located in Hat Yai Municipality, Songkhla province, southern parts of Thailand, between Latitudes 6°- 45′ to 7°- 15′ N and Longitudes 100°-15′ to 100° – 45′ E. The study area is characterized by mountainous, terrace, flood plain and tidal flat topography. The flood plain lies along Khlong U-Taphao that flows from the south to the north to Songkhla Lake then toward the gulf of Thailand at Sa-me-lar Cape, Songkhla province.

Western part of Khlong U-Taphao Basin and area surround the Songkhla Lake is annually flooded during late rainy season-early winter, especially in November.The satellite images from 2 different satellites namely ERS2 and Landsat-5TM are shown in Fig. 1.1 Flooding area from ERS2 and Fig 1.2. Flooding area from Landsat-5TM.

CHAPTER 2 METHODOLOGY

Two dates of ERS-2 SAR and Landsat-5TM data acquired on November 18, 1999 and November 5, 1989 respectively, the time during annually flooding, were used to assess and monitor the flooded area. Actually, it should be used during unusual flooding date, However, the Satellite Image Data on that day at GISTDA (GEO - Information and Space Technology Development Agency, Public Organization) Thailand and also data from aboard are unavailable.

Landsat-5TM data came from Optical sensors or passive remote sensing systems detect the available energy (multispectrum) reflected or radiated from the terrain (Fig.1.2). ERS-2 SAR data came from active remote sensing systems because it provides its own source of energy. The system "illuminates" the terrain with electromagnetic energy, detects the energy returning from the terrain and records the return energy as an image. Images can be acquired at night and through cloud cover. The illumination direction can be oriented to enhance particular linear features of the terrain, such as street patterns, fractures, (Fig. 1.1).

To identify the flooding area, it can be done by interpretation of ERS-2SAR and Landsat-5TM data then convert the flooding area into digital format by a process known as digitization and transfer to Geographical Information System (GIS), as shown in Fig. 2.1 and Digital Elevation Model (DEM) can be produced from images as shown in Fig. 2.2 : 3-D Surface view-1 and Fig. 2.3. : 3-D Surface view-2.

CHAPTER 3 CONCLUSION

Several factors contribute to flash flooding. The two key elements are rainfall intensity and duration. Intensity is the rate of rainfall and duration is how long the rain lasts. Topography, soil condition, and ground cover also play an important role.

Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water. Most flash flooding is caused by slow-moving thunderstorms, thunderstorms repeatedly moving over the same area or heavy rains from tropical storms.

Occasionally, floating debris can accumulate at a natural or man-made obstruction and restrict the flow of water. Water held back by the debris dam that could cause flooding upstream. Subsequent flash flooding can occur downstream if the obstruction suddenly release.

Fig. 1.1, 1.2 and Fig.2.1 shown most of the flooding area during annual flooding surround the Songkhla Lake and along the western parts of tributaries of Khlong U-Taphao. It mean backwater from Songkhla Lake (Natural Reservoir) was flow to Khlong U-Taphao to obstruct the flood flow from upstream because of Songkhla Lake itself can not properly release water to the gulf of Thailand (not adequate outlet) through 300 meters width, 7 meters depth of channel at Sa-me-lar Cape. So, for flood mitigation, the another effective emergency spillway shall be built for spilling some amount of flood, at appropriate crest level of emergency spillway, to the gulf of Thailand in order to protect water flow back to upstream.

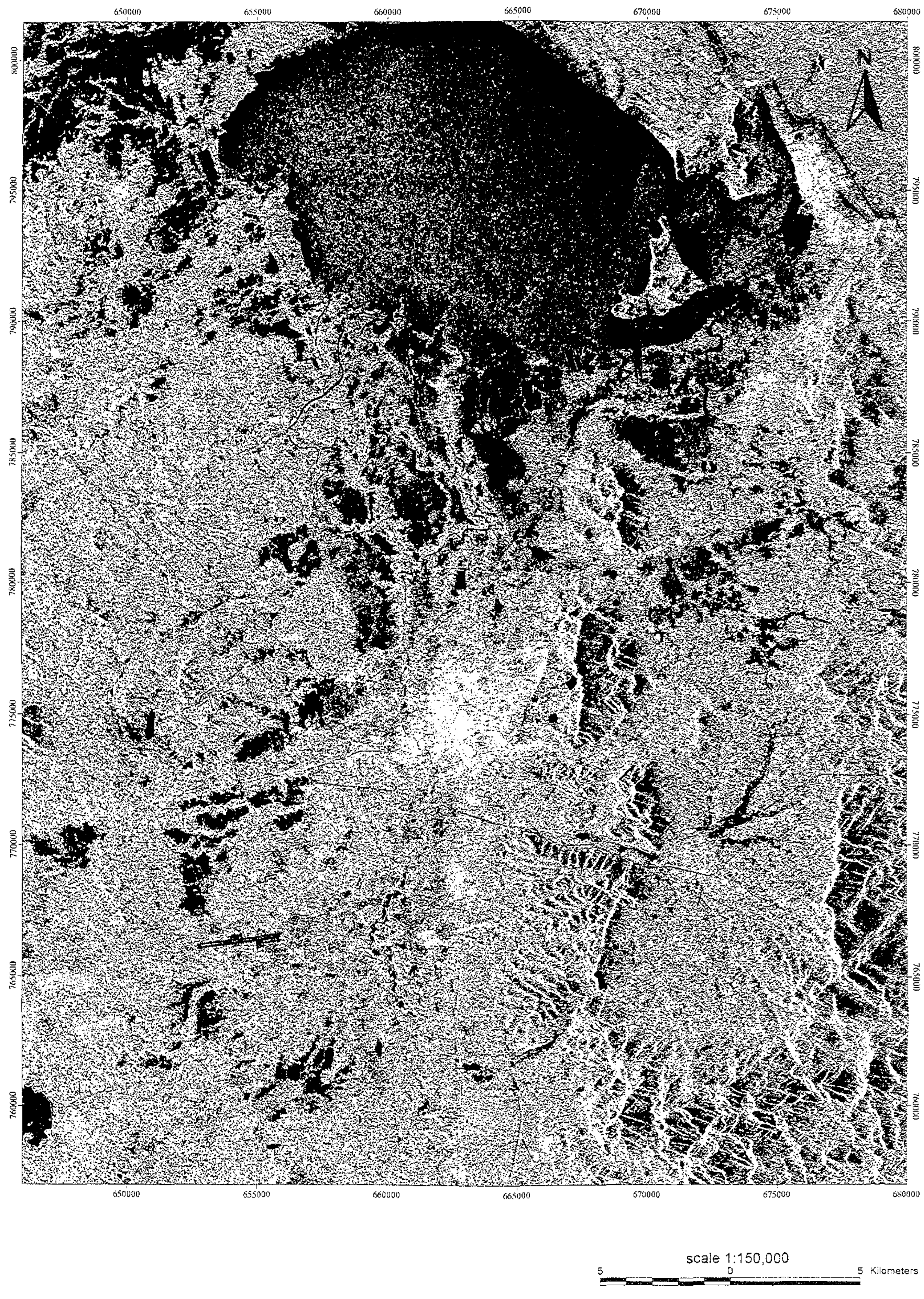


Fig. 1.1	Flooding Area from ERS2 (Nov 18,1999)

Fig. 1.2 — **Flooding Area from Landsat-5TM (Nov 5,1989)**

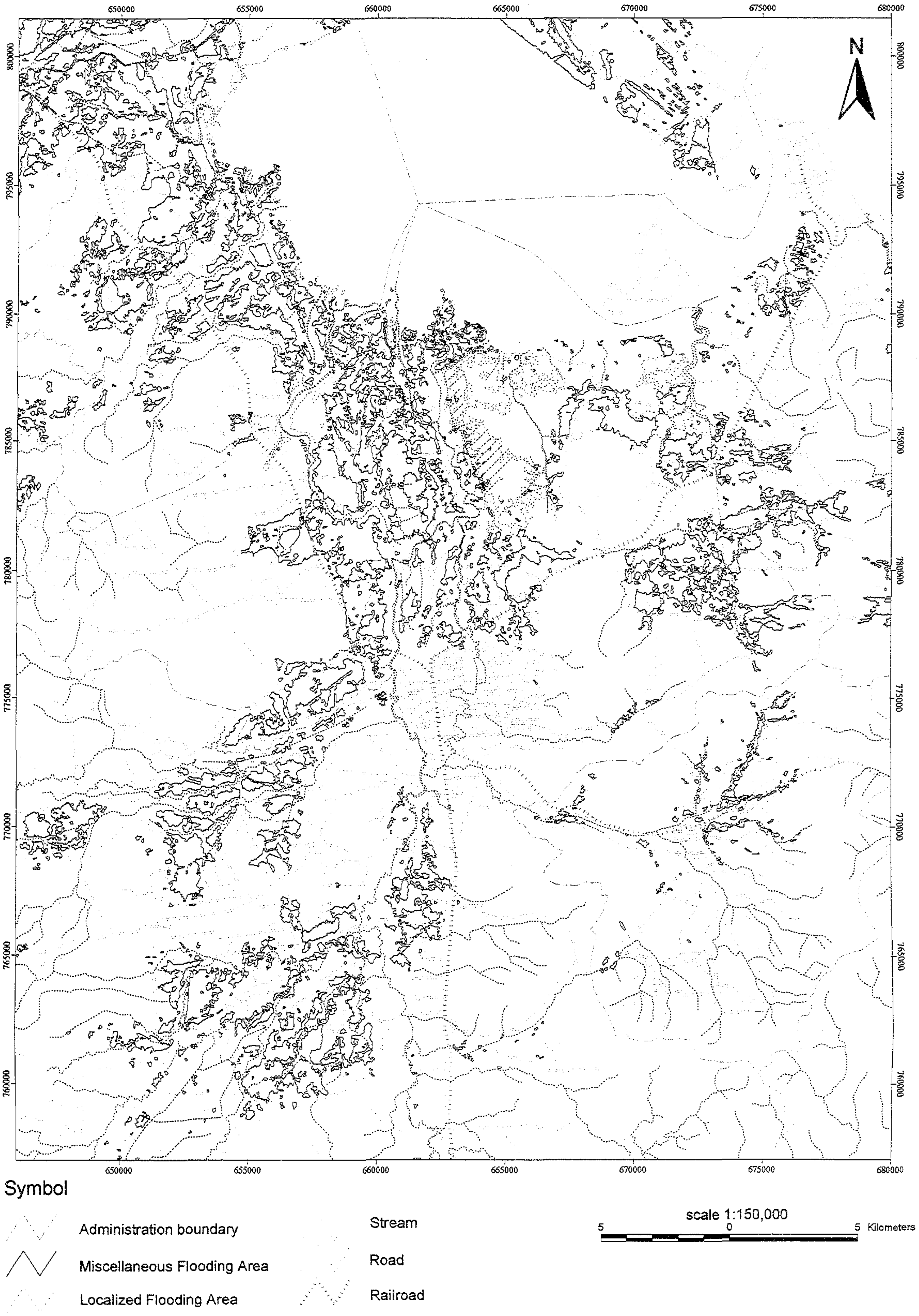
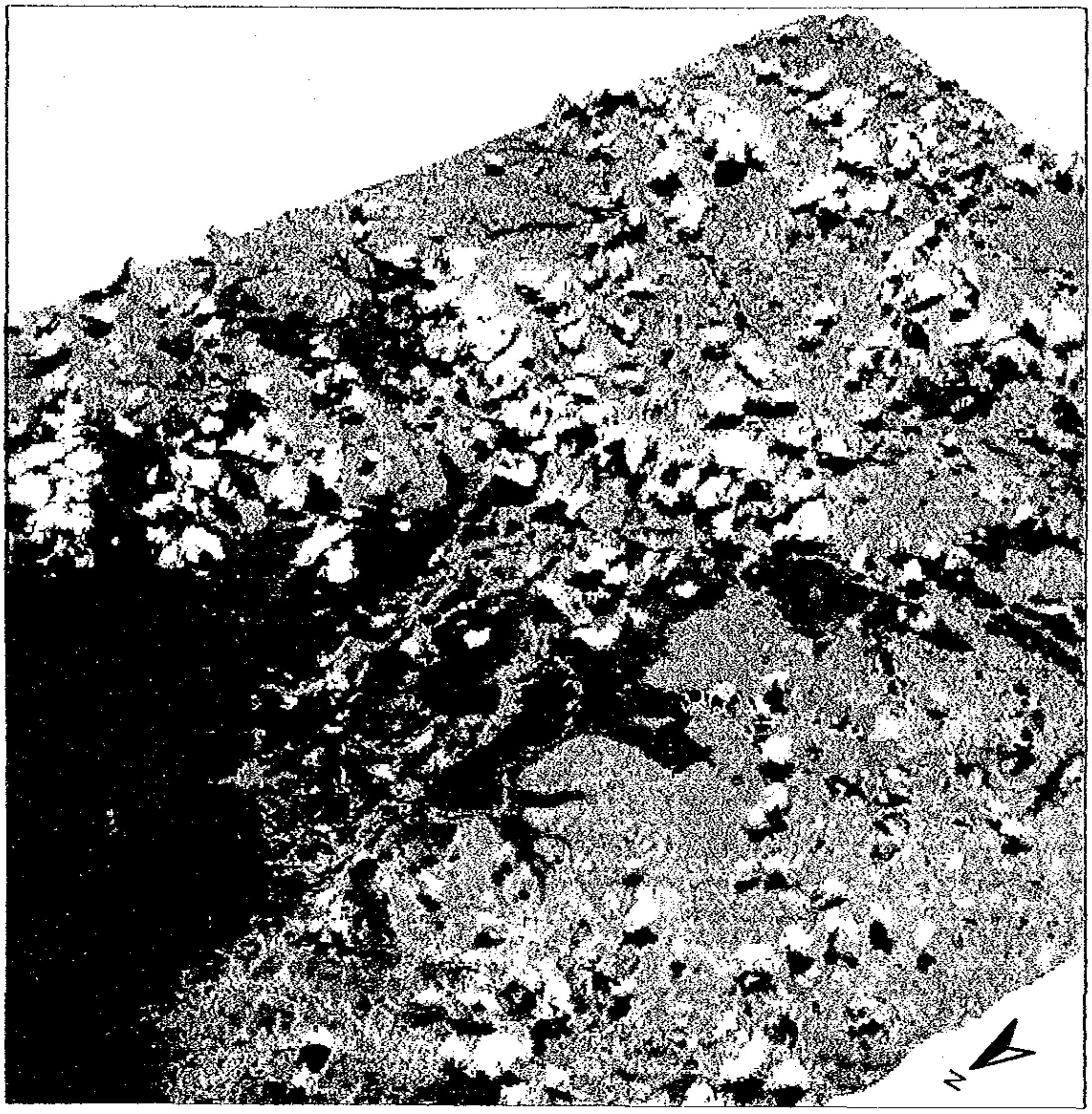


Fig. 2.1	Flooding Area (Nov 5,1989)



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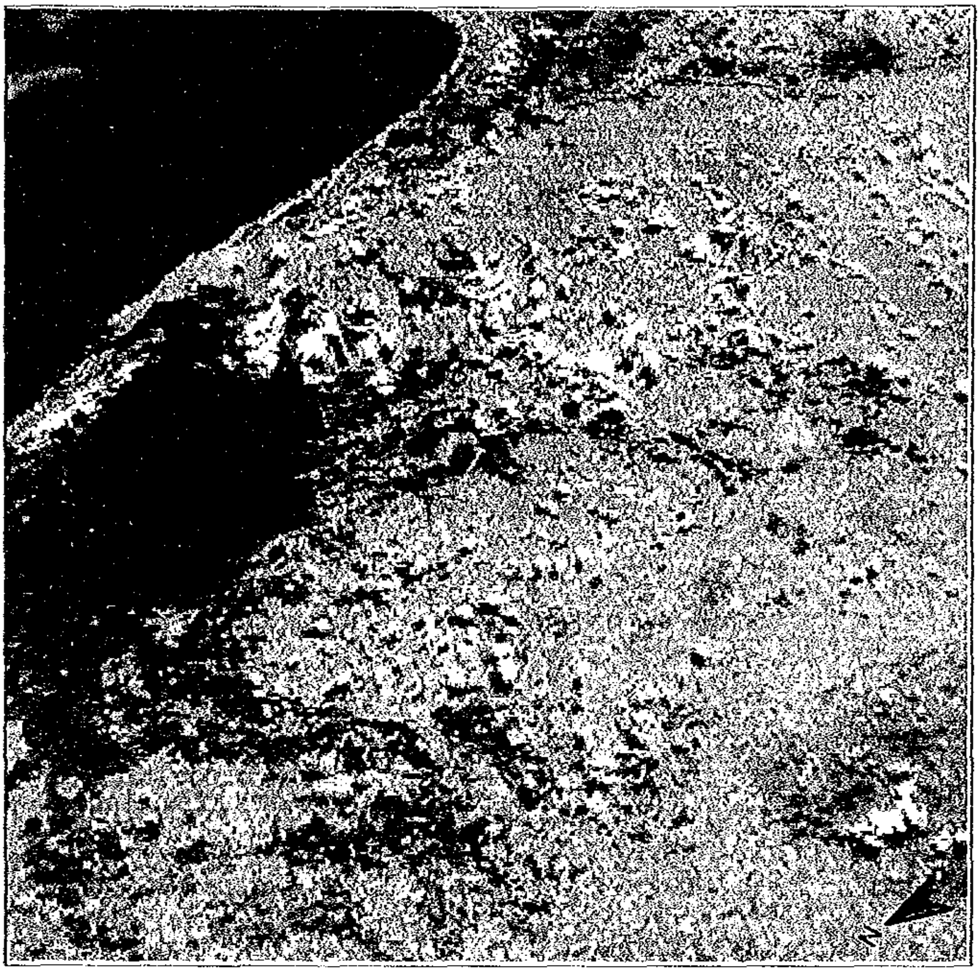
Miscellancous Flooding Area

Localized Flooding Area

Fig. 2.2	The 3-D Surface View-1



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Miscellaneous Flooding Area

Localized Flooding Area

Fig. 2.3	The 3-D Surface View-2