

REMOTE SENSING AND GIS INTEGRATION IN THE MODEL FOR RIVER BASIN ENVIRONMENTAL MANAGEMENT IN THE NORTHERN VIETNAM



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An Integrated Approach in Watershed Management

- A watershed is an ecosystem with complex interacting natural components.
- Within a watershed, there are a variety of stakeholders relying on natural resources; their activities have a direct influence on water quality and quantity.
- In order that IWM be effective, plans must develop within a framework that outlines the vision for the watershed, principles, processes, goals and expected outcomes.
- IWM acknowledges that nothing happens in isolation and that everything is connected by the land and water within the watershed.

IWM Model and Process

Getting Started

- define the watershed area
- determine the stakeholders of the watershed
- obtain landowner and stakeholder support for a watershed plan
- discuss the fundamental principles involved in the planning process
- discuss the four steps – evaluate, plan, implement, monitor
- discuss the need for communication of groups activities
- discuss various stakeholder uses and needs
- conduct a visioning exercise with stakeholders
- set up Steering Committee for watershed group
- set up Technical Advisory Group to assist watershed group

Getting to Know the Watershed

- the assessment – describe the watershed and who's using it for what
- Technical Advisory Group to conduct watershed inventory

IWM Model and Process (Cont'd)

Determine Issues and Concerns

- determine and prioritize watershed's issues and concerns
- establish watershed goals & objectives
- conduct community/stakeholder Outreach Activities
- determine research needs

Action Plan Development

- identify and list possible approaches to obtaining your goals
- develop prioritized list of options, alternatives and initiatives to implement
- list/ identify available incentives
- obtain endorsement from all partners/stakeholders/public/governments
- determine agency involvement regarding implementation
- determine watershed plan success indicators/monitoring plan and costs
- develop communication/education plan



IWM Model and Process (Cont'd)

Implementation

- define individual responsibilities and partnerships needed for implementation
- determine funding sources available/needed
- identify roles and responsibilities of all involved

Monitor/Evaluate/Adapt

- monitor the implementation of the watershed plan
- evaluate its effectiveness for achieving stated goals
- re-assess the watershed – are there concerns?
- adapt plan as required



REMOTE SENSING AND GIS APPLICATION STATUS

- Remote sensing technology has been introduced into Vietnam since the **1980** with the Interkosmos Program: Cooperation with USSR, Germany, Bulgaria, Tcheckoslovakia...
- **1982-1989**: First FAO UNDP Project for improvement of Remote Sensing Application in some important fields such as: agriculture, forestry, geology
- **1990's**: Establishment of a series of research centers



REMOTE SENSING AND GIS APPLICATION STATUS

- **1990-2000** (cont): Establishment of a series of research and operational centers: 9 at the National Centre of Natural Sciences and Technology (3 in Physics, 3 in Geography, 2 in Oceanography, 1 in Geology), 1 in Min. of Natural Resources and Environment, 2 in Min. of Agriculture and Rural Development, 1 in University of Hanoi, 0 in private sector



REMOTE SENSING AND GIS APPLICATION STATUS

- **Data in popular use: Landsat (MSS, TM, ETM+), SPOT, RadarSat, NOAA**
- **Receivers: NOAA AVHRR (2), MODIS (1)**
- **Remote Sensing is actually taught in more than 10 universities**
- **Software in popular use: PCI, ER MAPPER, ERDAS, ILWIS, IDRISI, ENVI**
- **Application fields: Mostly in Land Use and Land Cover Mapping, Environmental monitoring, Management and Assessment, Topographic Map Revision, Disaster Prevention, Geology...**

PERSPECTIVE (1)

Context:

- High frequency of disaster
- More than 3000Km of coast lines
- $\frac{3}{4}$ of the population living in rural areas
- Economy based on natural resources and depending upon natural conditions
- New Open Economic Policy
- Willingness of Regionalization and Globalization

PERSPECTIVE (2)

Information and Data Needs:

- **Natural Resources Monitoring and Management**
 - **Economic Development and Environmental Protection**
 - **Disaster mitigation**
 - **Poverty Alleviation**
 - **Optimizing resources exploitation and management**
 - **Increasing information precision and reliability**
 - **Catching up the regional technology level**
- 

Application Examples

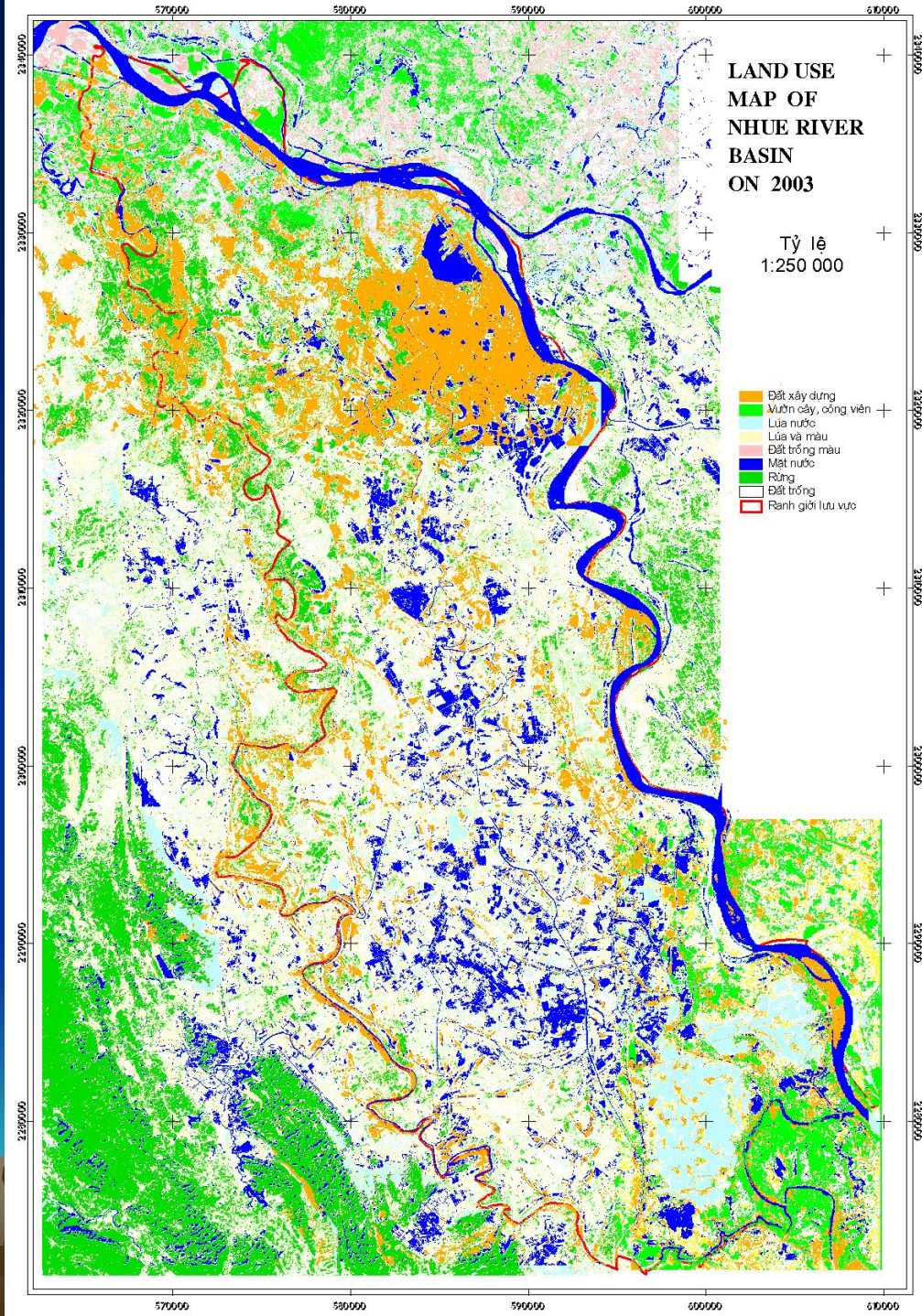


Remote Sensing and GIS Integration for watershed management (in Nhue River Basin)

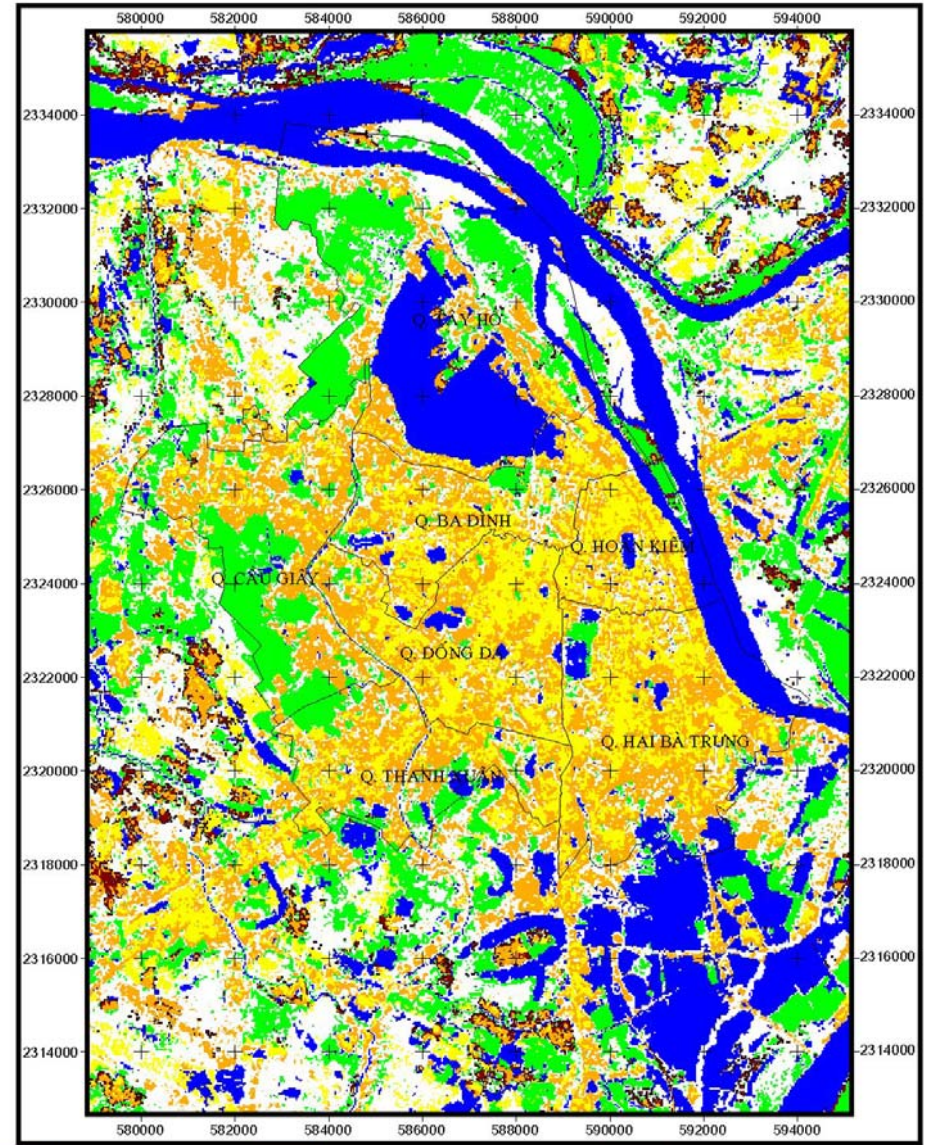
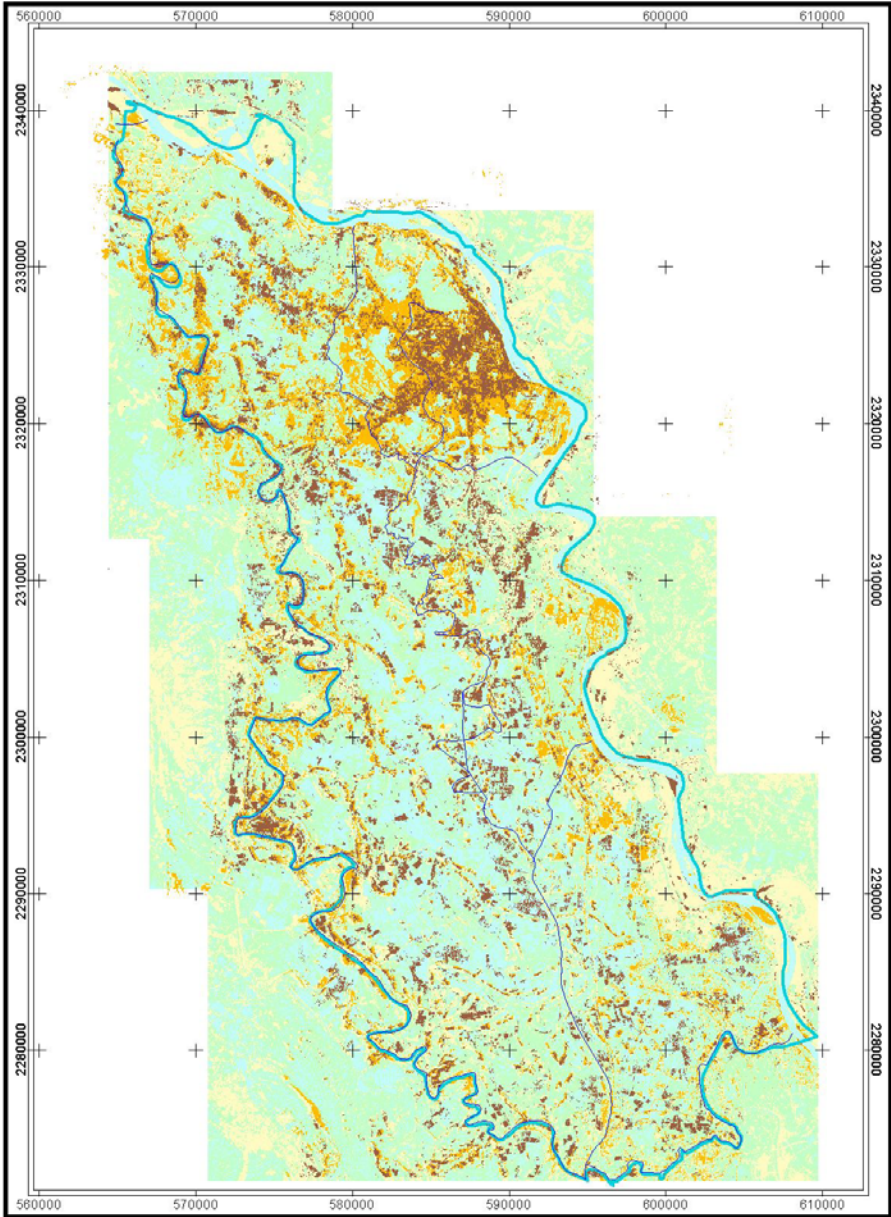
Estimation for changing of Urban area in connection with water quality in the Nhue River basin

3D model of Nhue River basin by SRTM in combination with topomaps

Input to SWAT model for general assessment

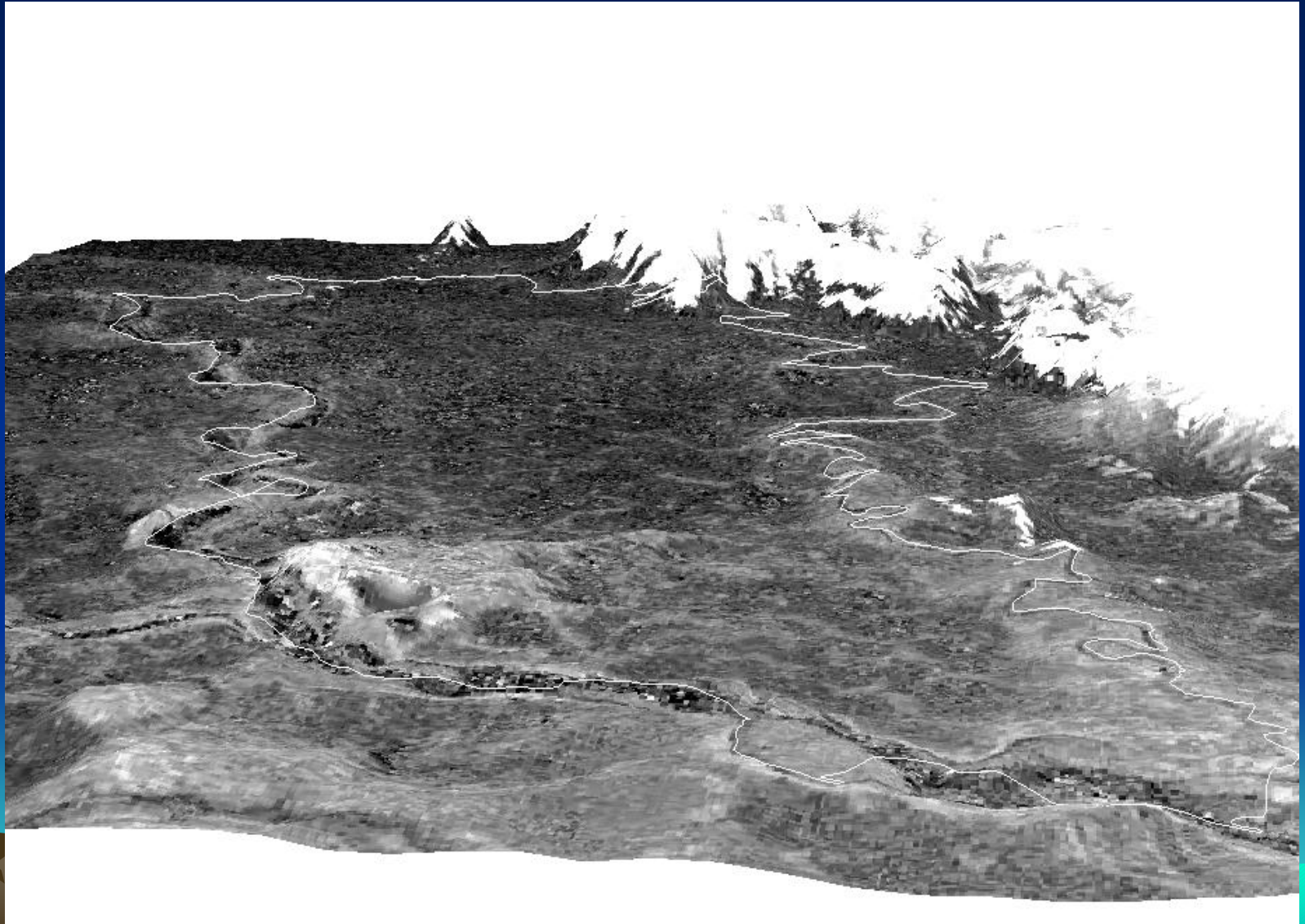


CHANGE OF URBAN AREAS IN A PART OF NHUE RIVER BASIN 1992-2003

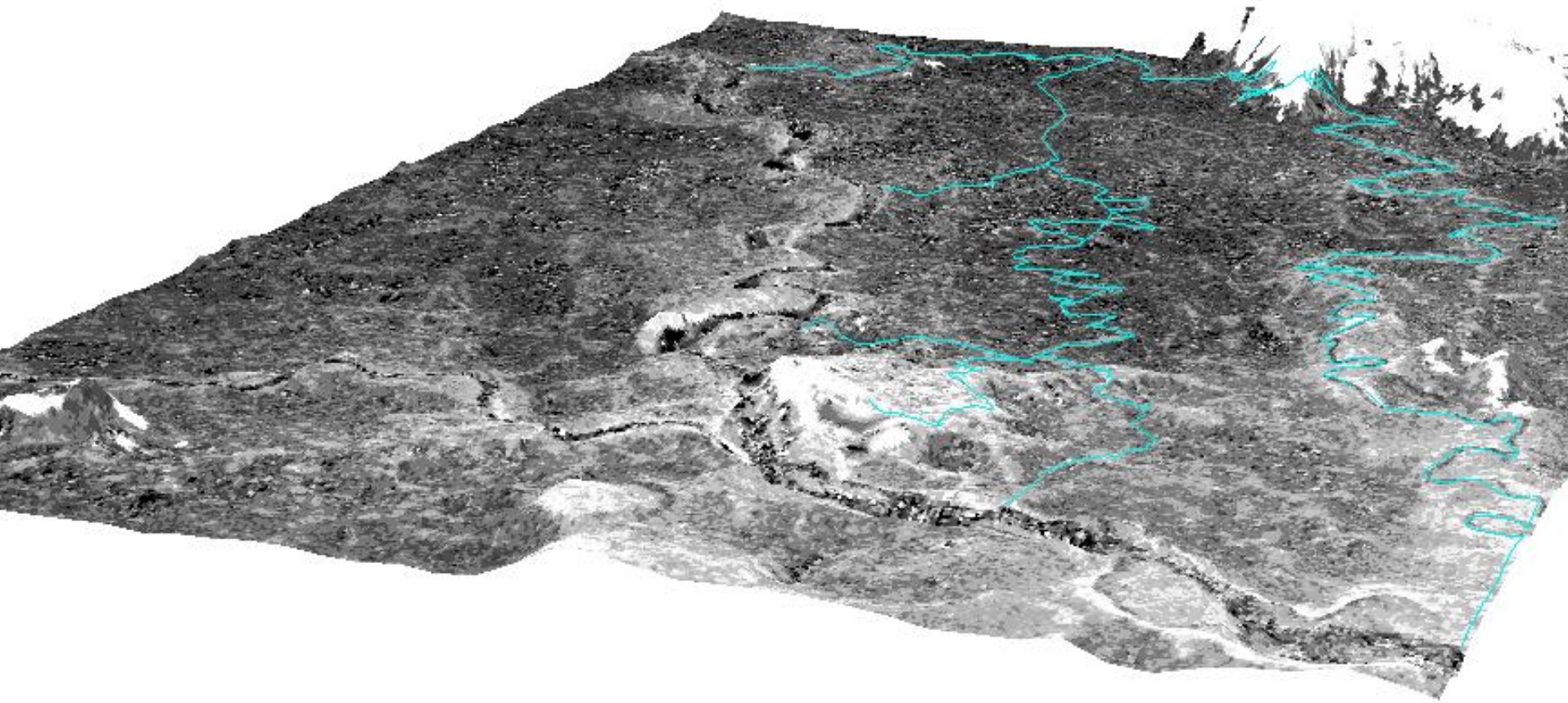


 Diện tích đô thị 1992
 Diện tích đô thị mới 1992-2001
 Diện tích đô thị mới 2001-2003

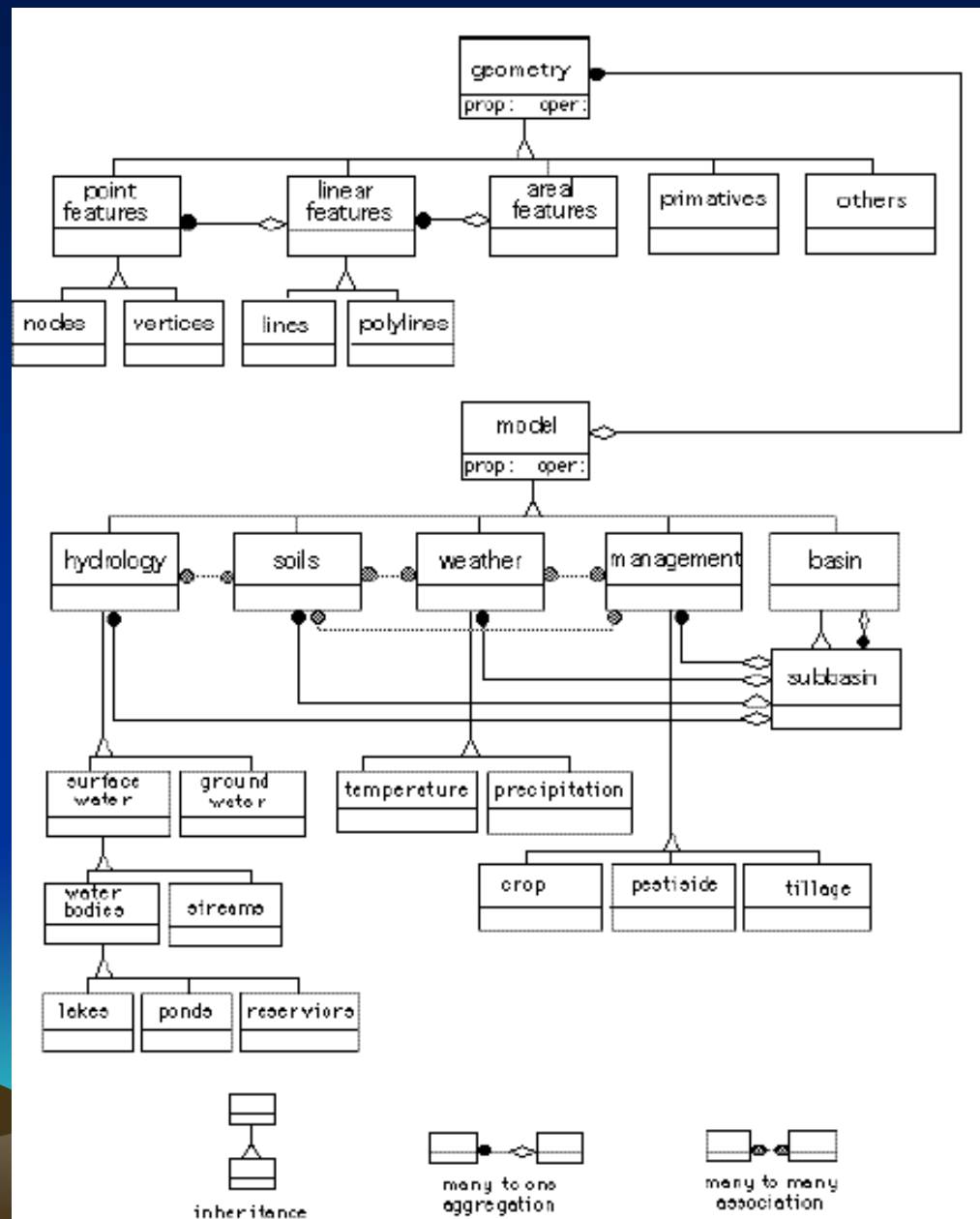
3D model of Nhue River basin by SRTM



3D model of Nhue River basin by SRTM in combination with topomaps



The internal process of SWAT model



**SOIL EROSION AND
LAND SLIDE AS COMPONENT FOR
INTEGRATED WATERSHED MANAGEMENT**

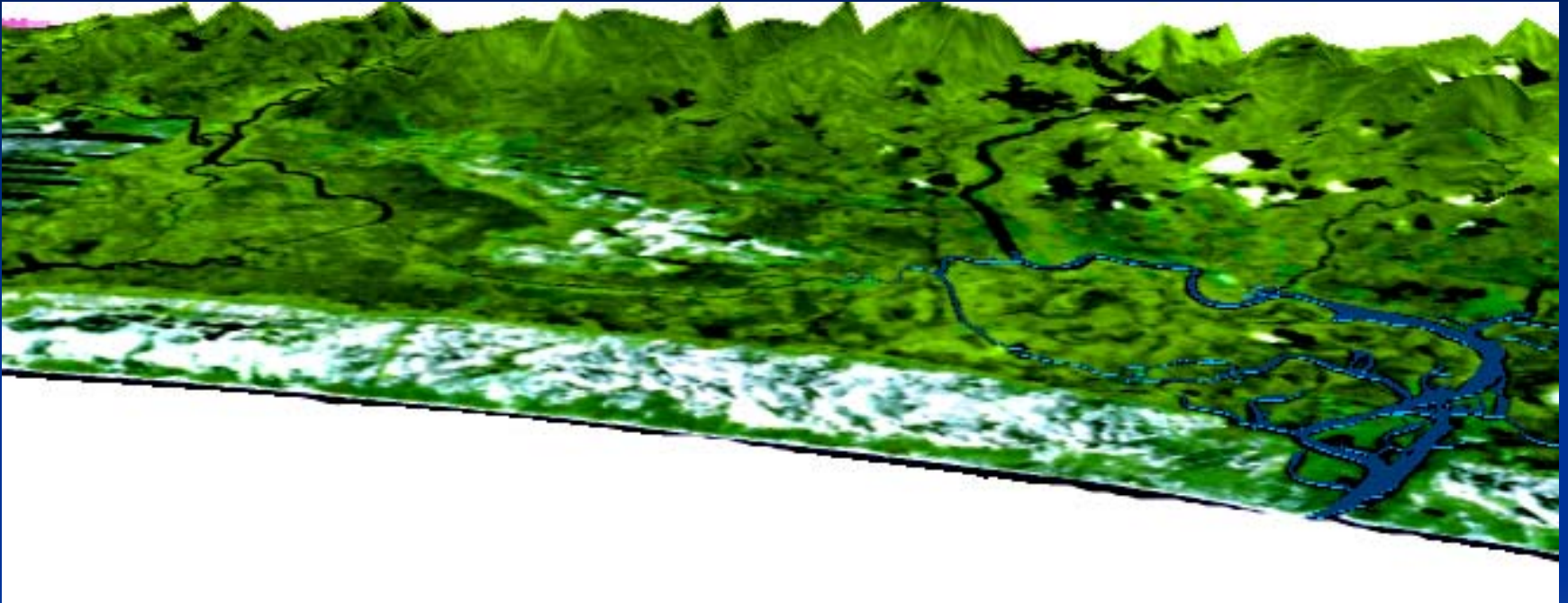


SOIL EROSION ASSESSMENT

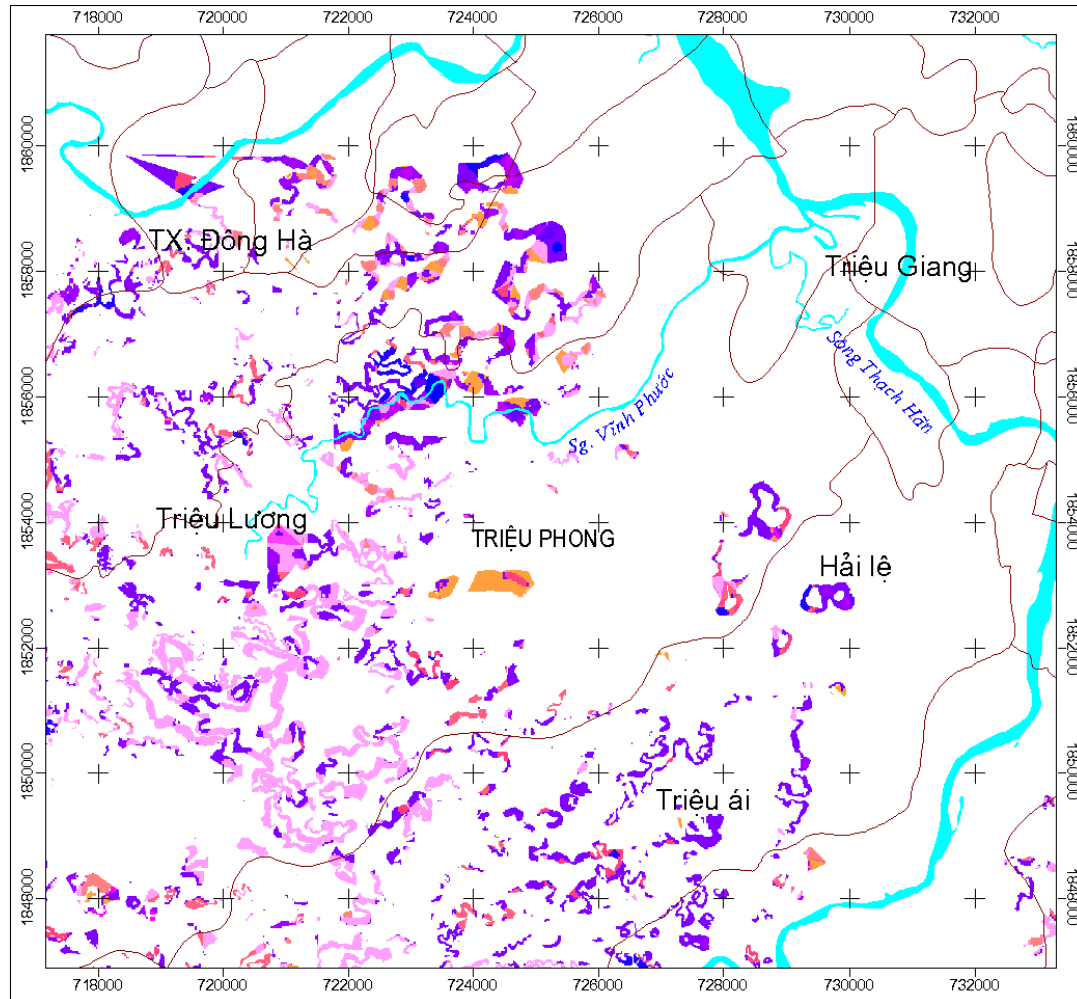
- Agriculture development
- Hydropower station construction
- Prevention of soil erosion at the coastal zone
- National Natural Park conservation.



3D MODEL FOR SOIL EROSSION ASSESSMENT



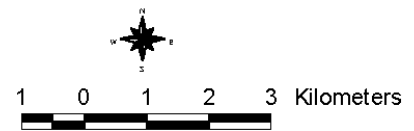
Map of soil erosion potential



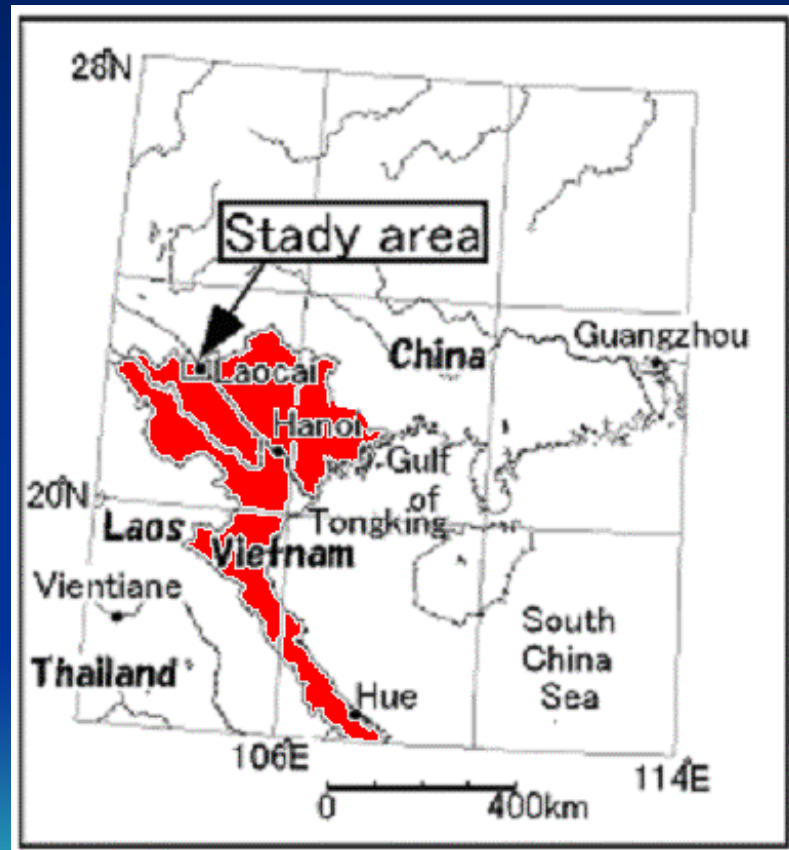
- Ranh giới xã
- Sông

Phân cấp xói mòn tiềm năng
Đơn vị Tấn/ ha/ năm

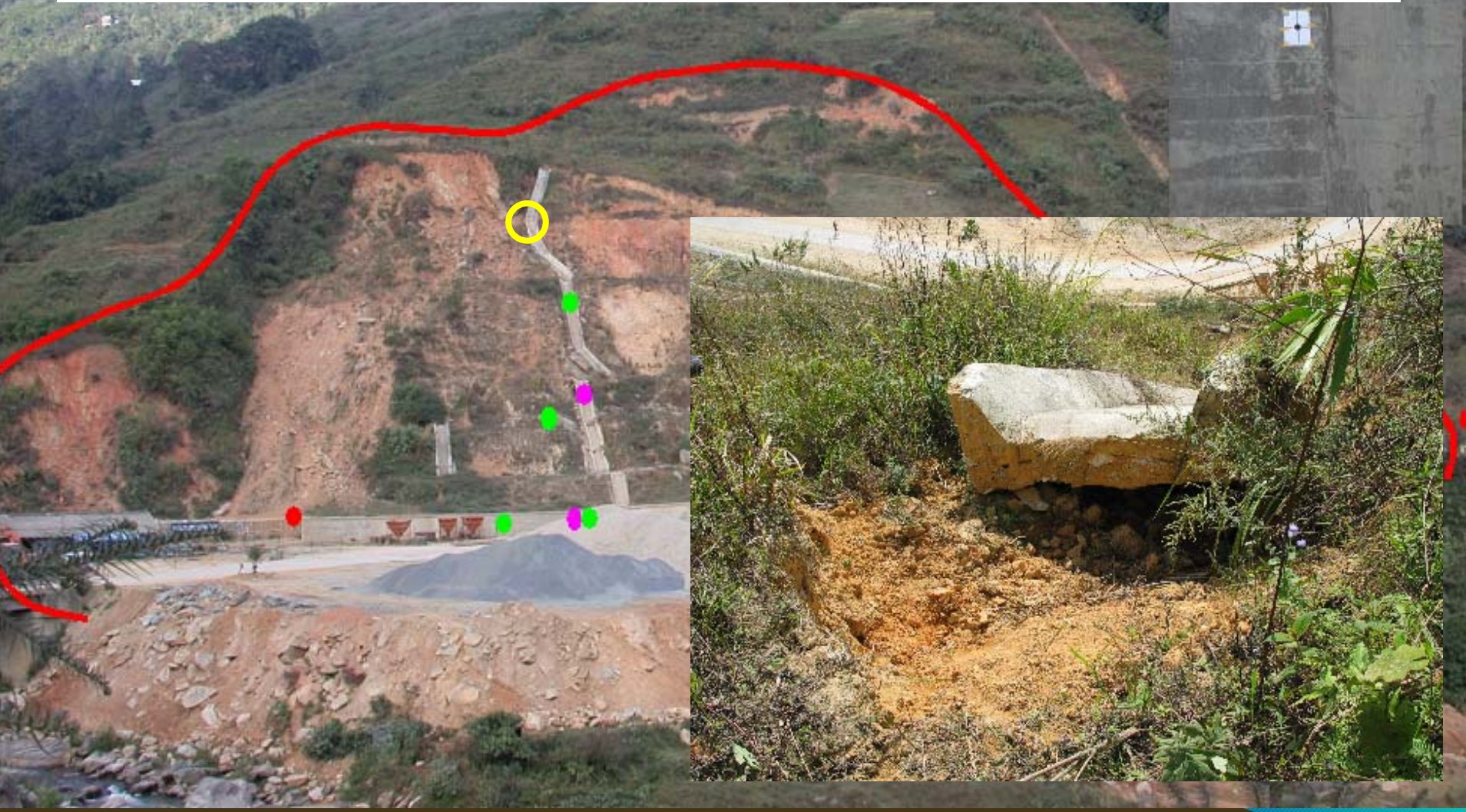
- 0 - 0.1
- 0.1 - 2.6
- 2.6 - 5
- 5 - 10
- 10 - 20
- 20 - 30
- 30 - 50
- 50 - 70
- 70 - 100
- 100 - 120
- 120 - 150
- 150 - 170
- 170 - 200
- 200 - 300
- 300 - 500
- 500 - 700
- 700 - 1000

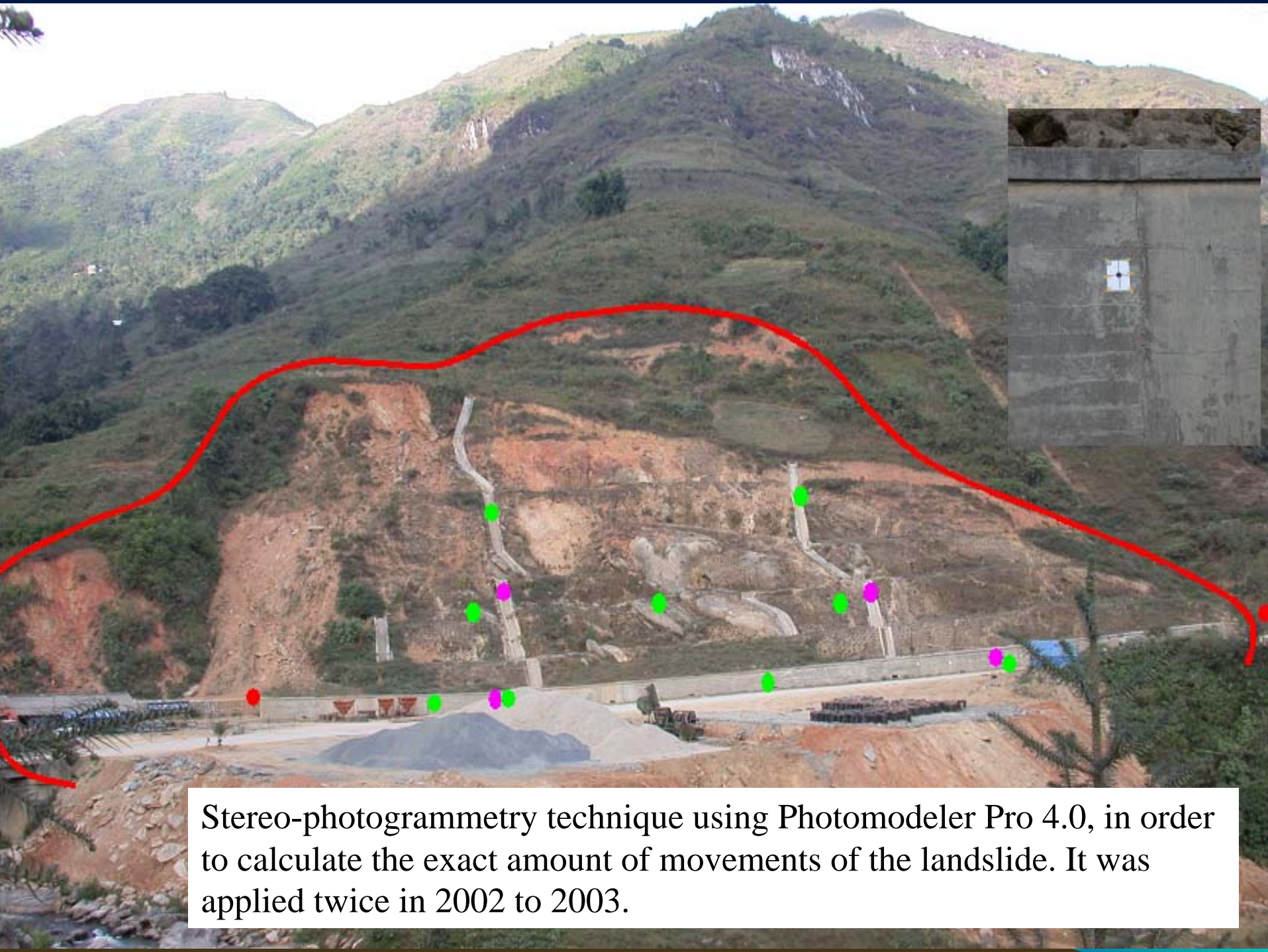


LANDSLIDE MONITORING in Monset Area, Northwestern Part of Vietnam



This landslide is 100 - 200 meter wide and is located at southern slope dipping 20 - 35 degree. The Road No.4 is located through the foot part of the landslide. The gravity retaining wall and surface water drainage are constructed for slope protection. But, the surface water drainage has broken by slope movement.





Stereo-photogrammetry technique using Photomodeler Pro 4.0, in order to calculate the exact amount of movements of the landslide. It was applied twice in 2002 to 2003.

We hope in the further:

- **RS and GIS Strategy Development would be soon established**
- **New Steering Structure would be soon created**
- **New Investments would be rationally deployed**
- **New International Cooperation would be more efficient**
- **And finally RS and GIS Technology for water management in Vietnam would become economic and efficient**



Thank you

