

Integration of Spatial Information System for Community Based Management of Agricultural Resources: Implications for Deliberative Policy

Researcher Team

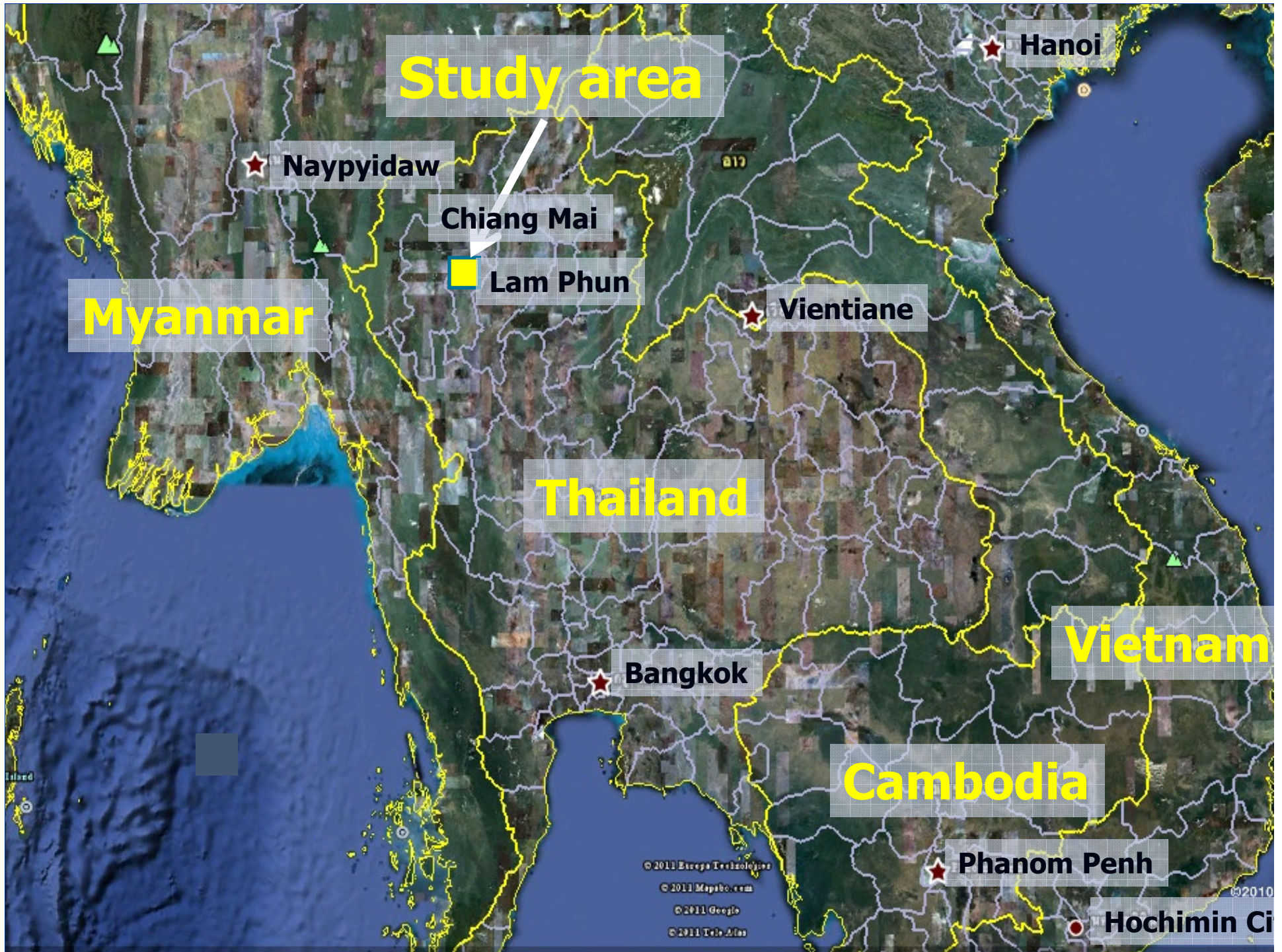
T. Onpraphai P. Yipmantasiri

B. Limnirankun and V. Verajit

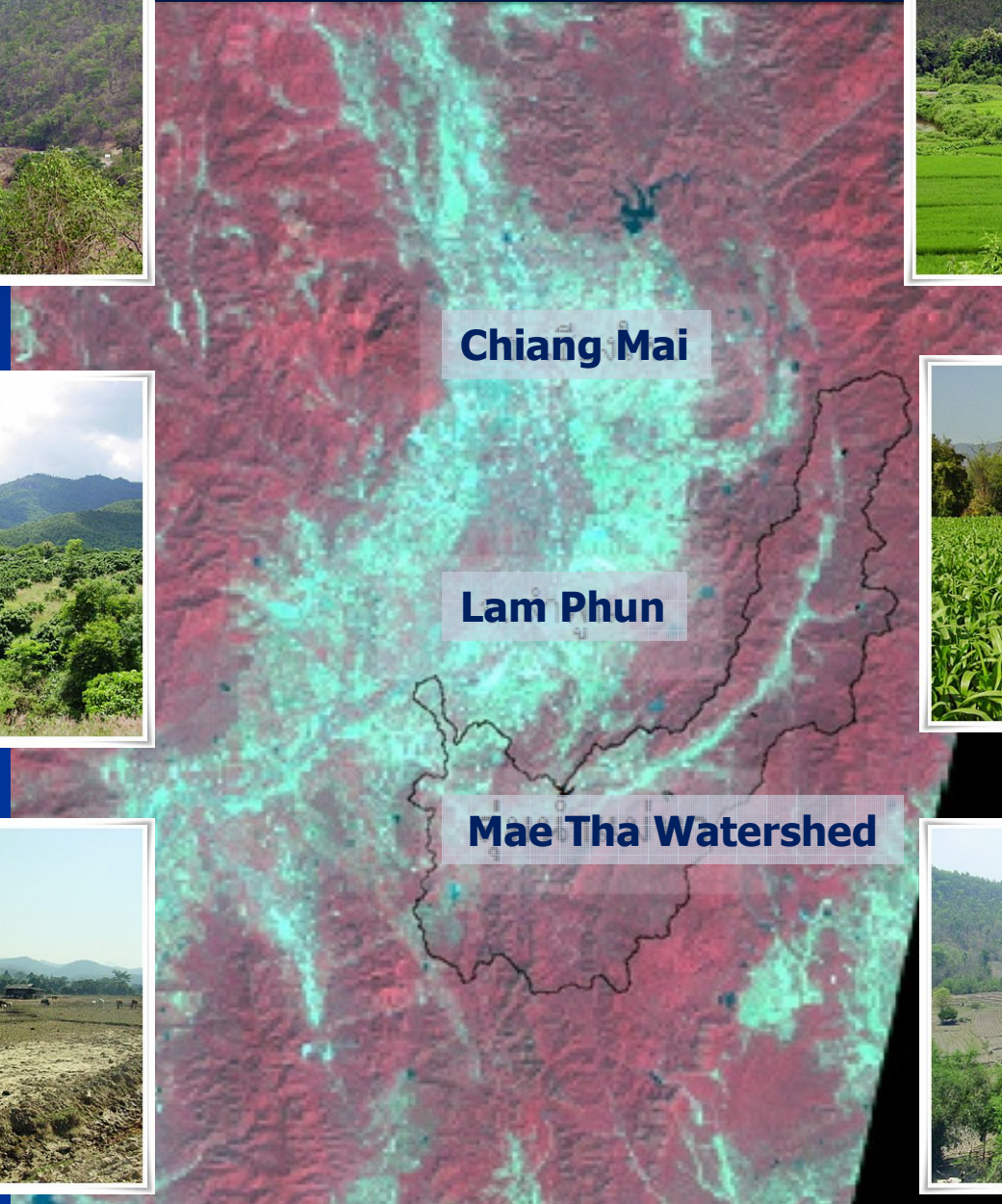
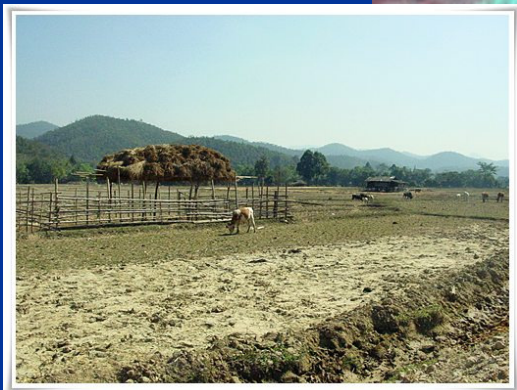
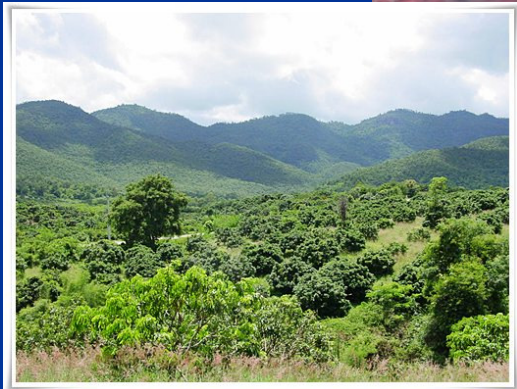


**Multiple Cropping Center (MCC)
Fac. Of Agriculture, Chiang Mai University**

**Public Policy Studies Institute
Chiang Mai University**



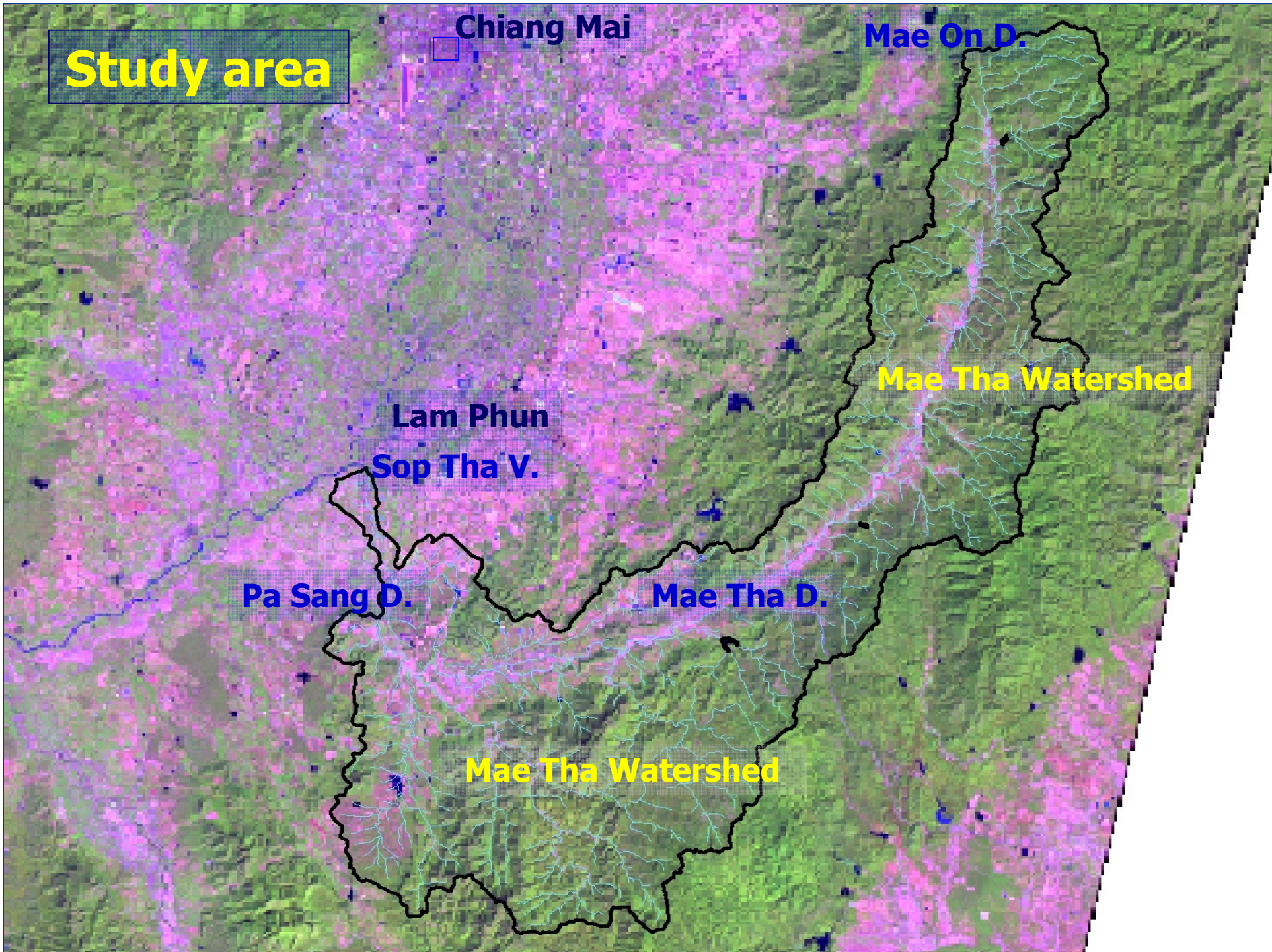
Study area



Chiang Mai

Lam Phun

Mae Tha Watershed



Study area

Chiang Mai

Mae On D.

Lam Phun
Sop Tha V.

Mae Tha Watershed

Pa Sang D.



Mae Tha D.

Mae Tha Watershed


18° 49'
98° 53'

Digital Elevation Model (DEM) of Mae Tha Watershed

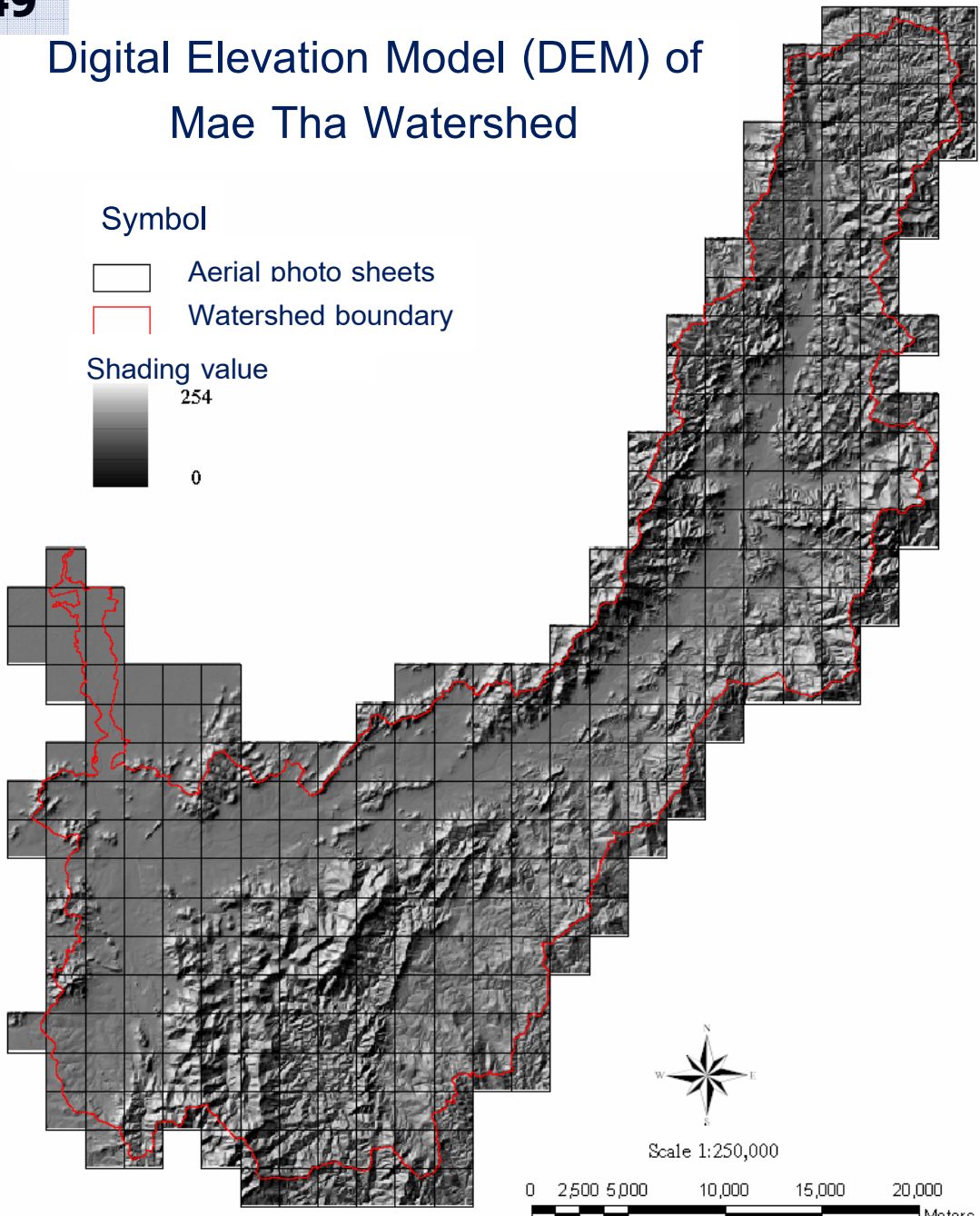
Symbol

-  Aerial photo sheets
-  Watershed boundary

Shading value



254
0



18° 15'
99° 23'

Research duration

Phase - I

1 June 2007 – 31 May 2009

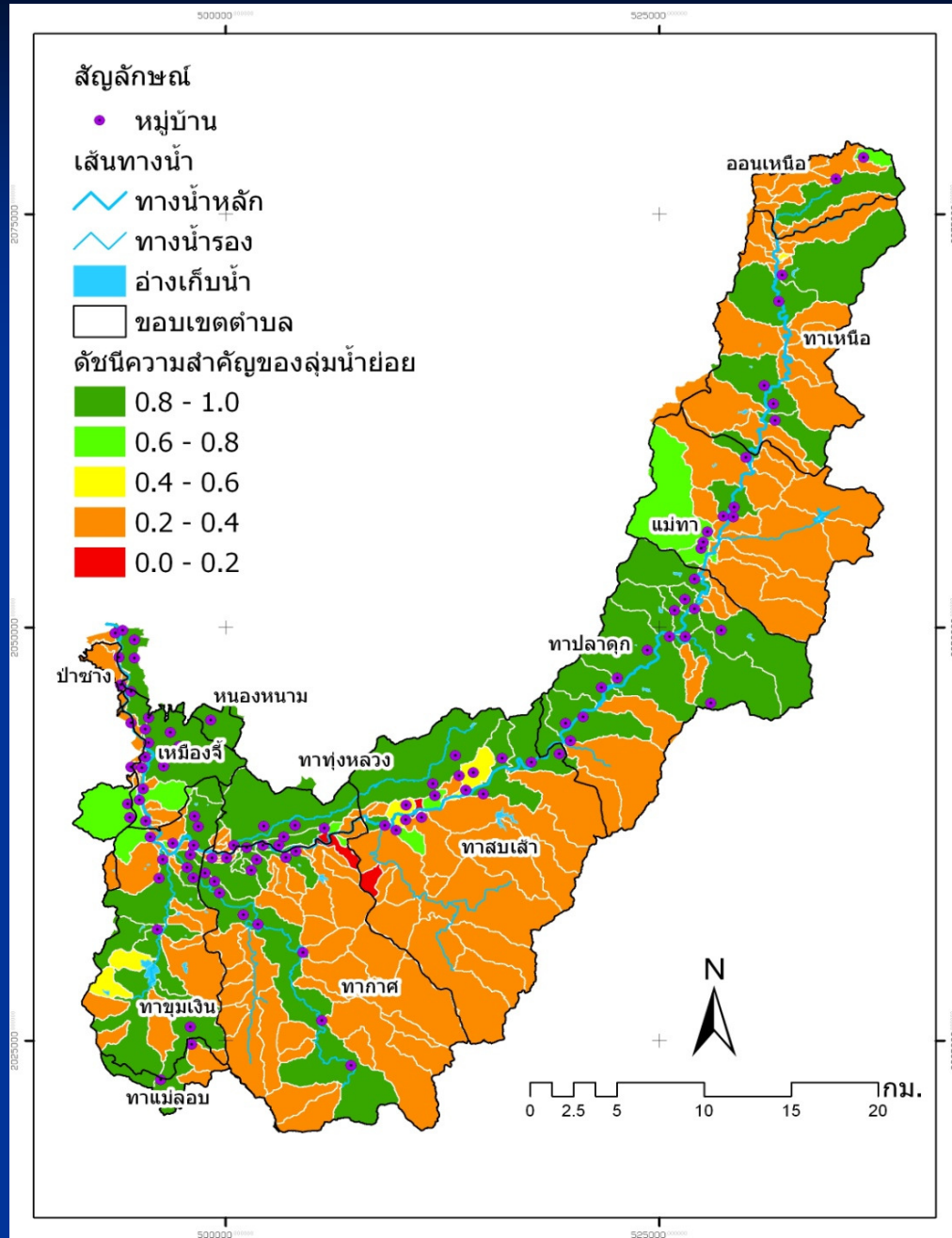
(2 year)

Phase - II

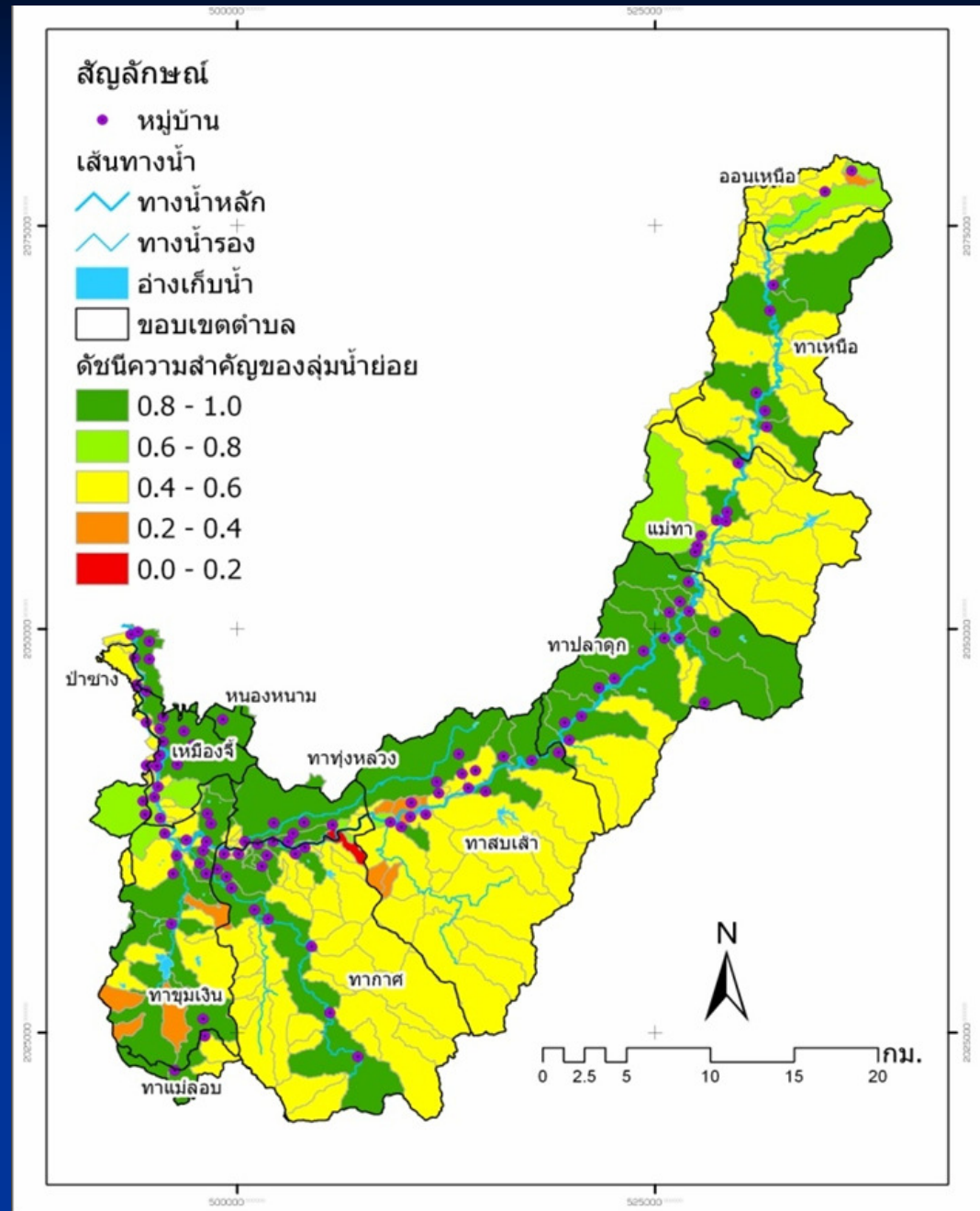
1 Sept. 2011 – 28 Feb. 2013

(1.5 year)

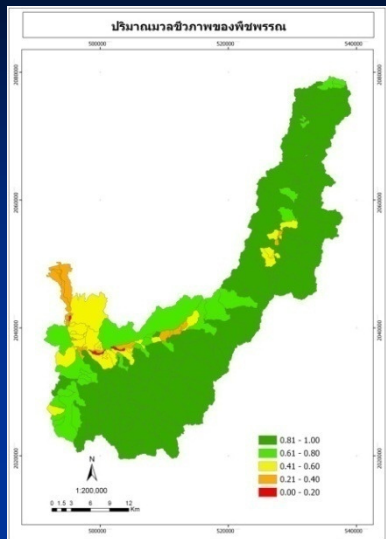
Watershed Assessment (opinion of stakeholders)



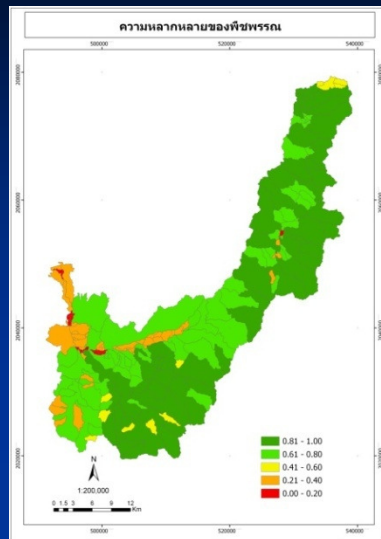
Watershed Assessment (opinion of conservative policy)



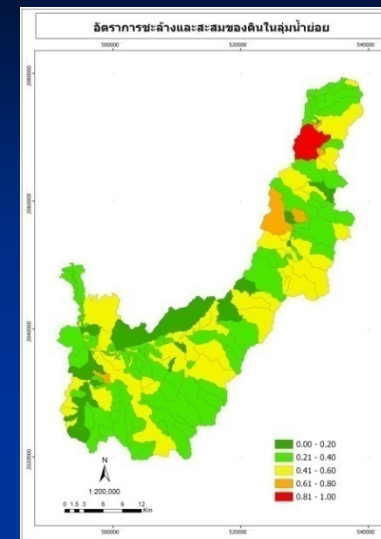
Criterion of Ecology



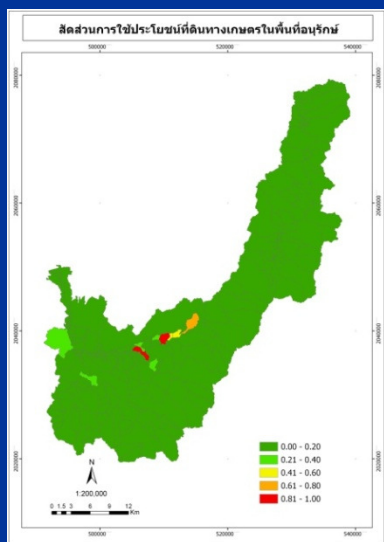
Biomass of Vegetation



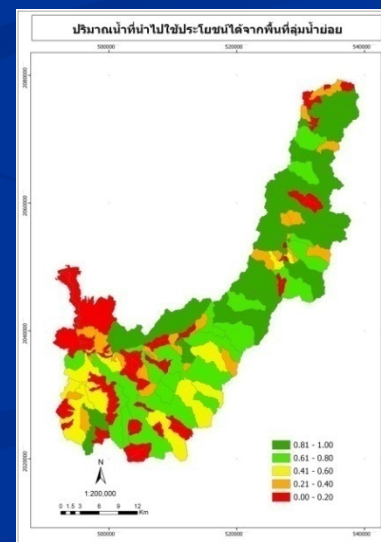
Diversity of Vegetation



Ratio of Soil Loss & sediment in sub-watershed

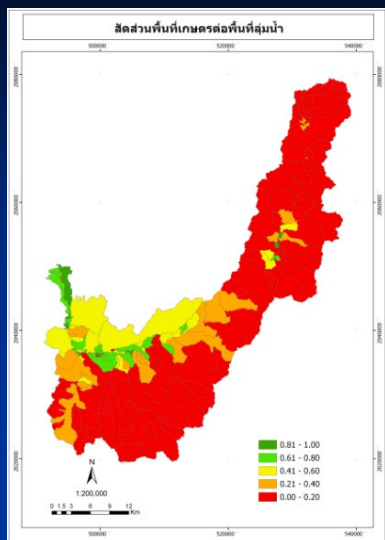


Ratio of Agri. Land Uses in Conservative Areas

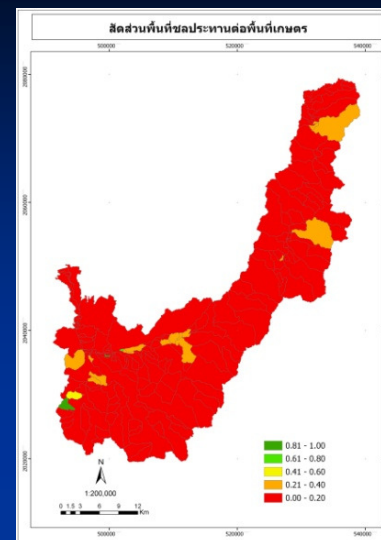


Available Water from Sub-watershed

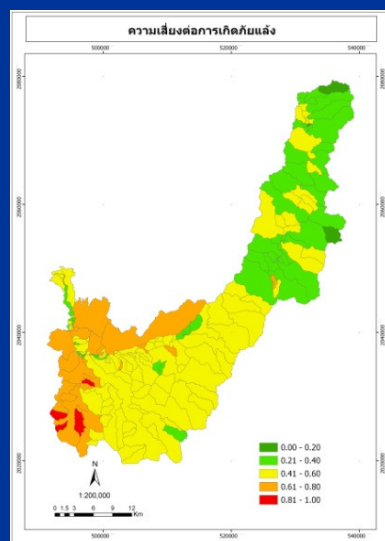
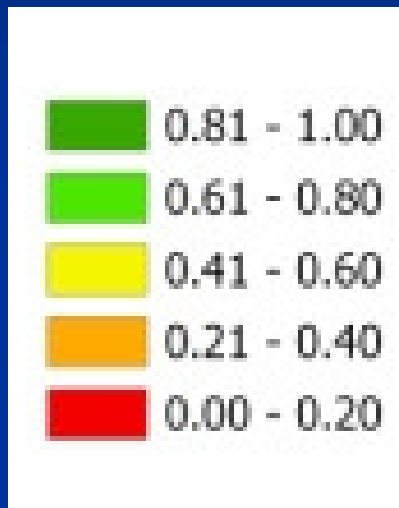
Criterion of Agricultural Productivity



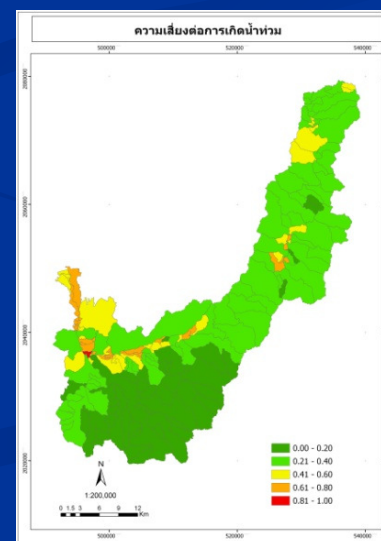
Ratio of Agricultural lands
in Watershed



Ratio of Irrigated areas
to Farming Lands

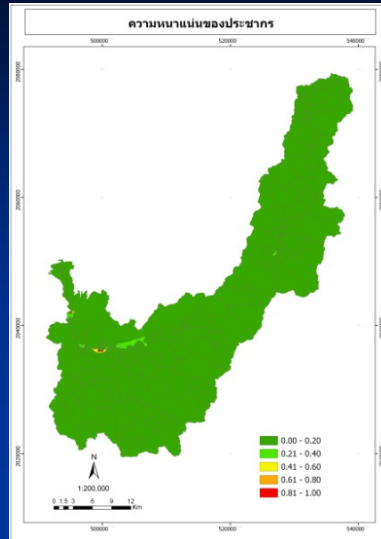


Risk of Drought
in Farming Lands

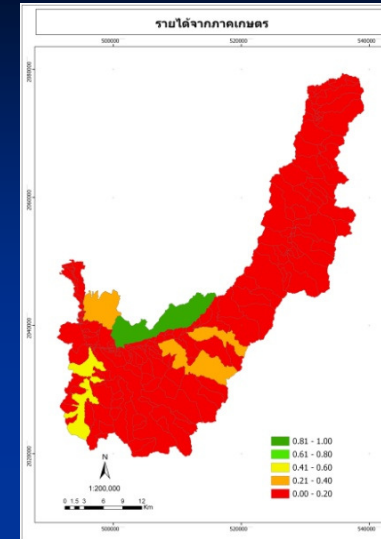
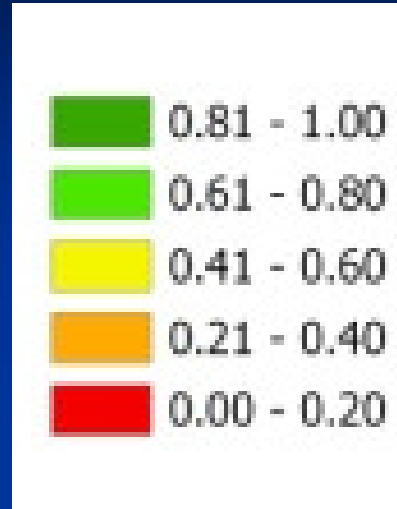


Risk of Flooding
in Farming Lands

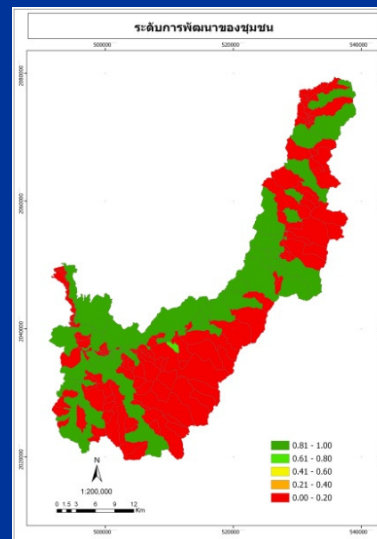
Criterion of Socio-Economic



Population Density



Agricultural Income



Development Level of Communities

Criterion Weighting by Academics, Farmers, and Local Administrators



Ecological Academics



Local Administrators & Officers

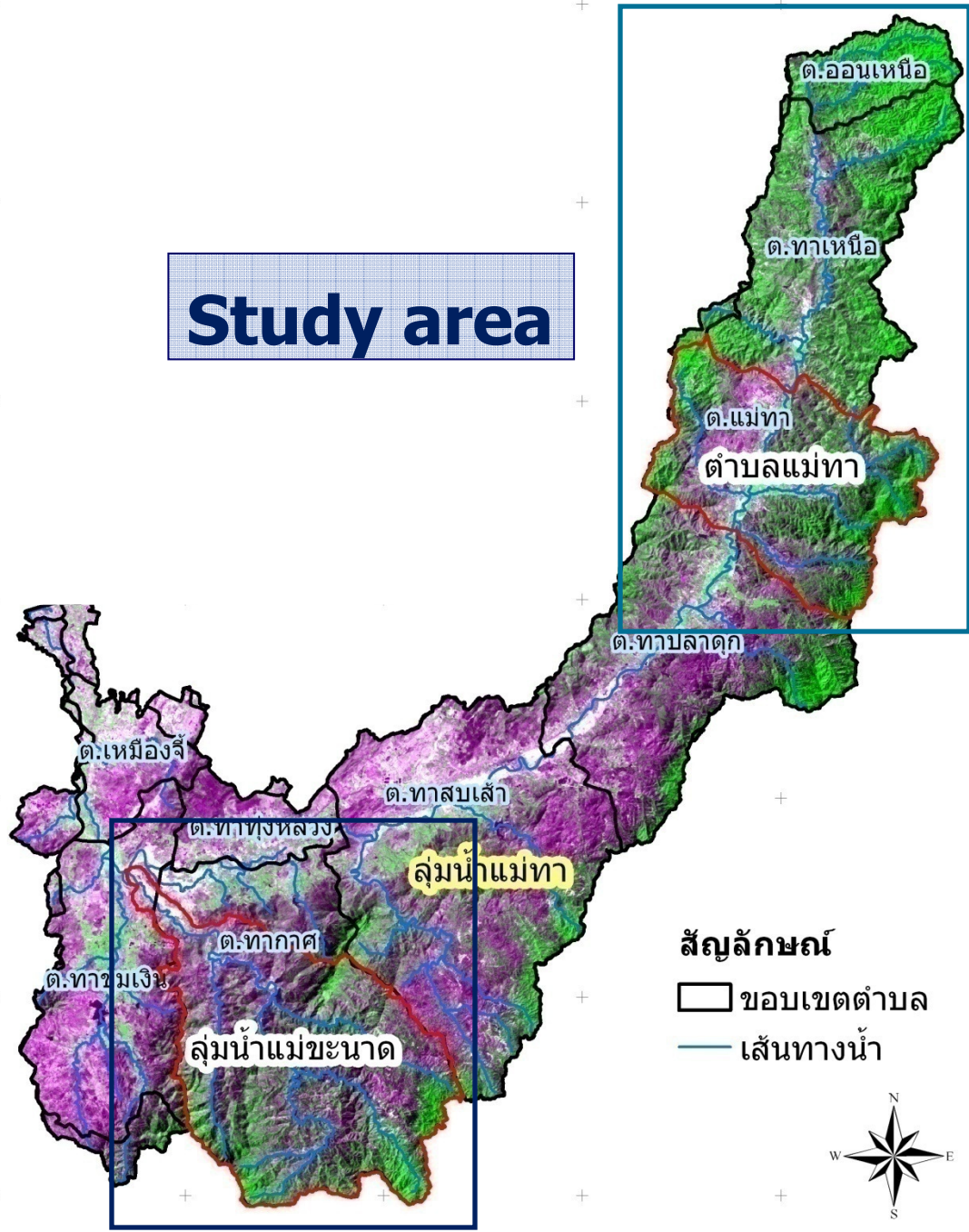


Community Leaders & Farmers

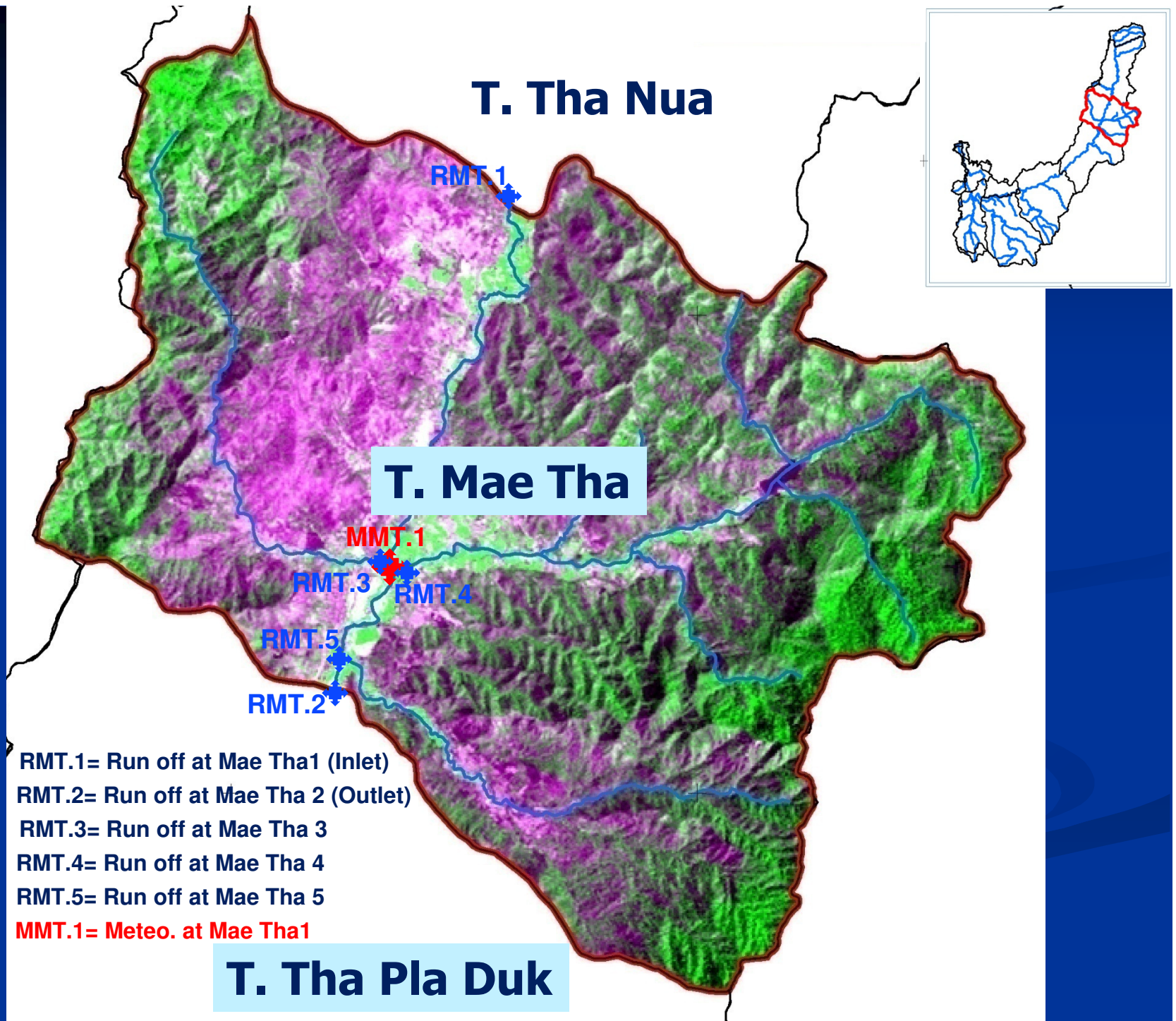


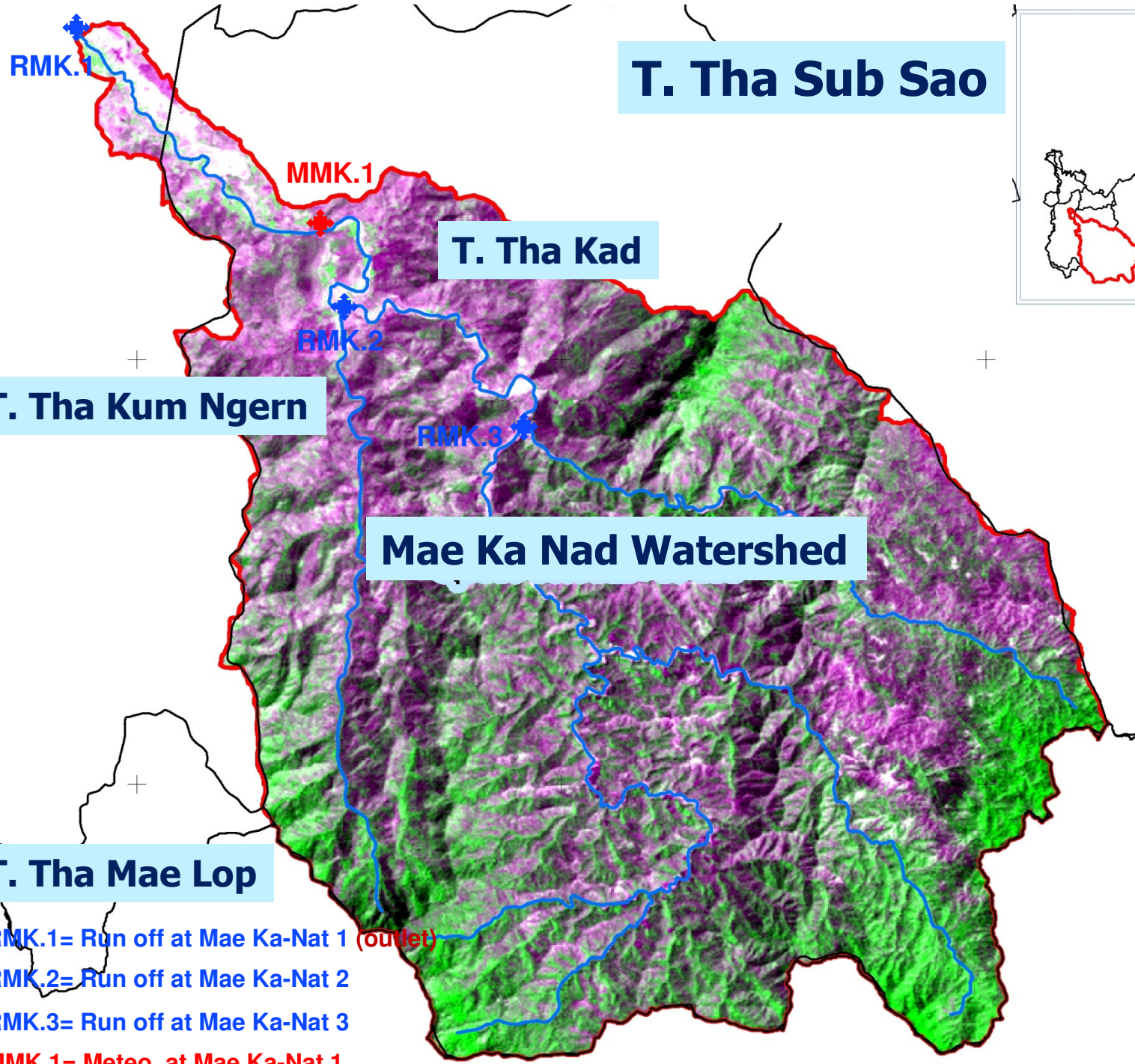
18° 49'
98° 53'

Study area



18° 15'
99° 23'





T. Tha Sub Sao

T. Tha Kad

T. Tha Kum Ngern

Mae Ka Nad Watershed

T. Tha Mae Lop

- RMK.1= Run off at Mae Ka-Nat 1 (outlet)
- RMK.2= Run off at Mae Ka-Nat 2
- RMK.3= Run off at Mae Ka-Nat 3
- MMK.1= Meteo. at Mae Ka-Nat 1

Background / Problems

- Problems of land and forest resources
- Limitation of agricultural occupation
- Problems of water resource
 - > Abrupt flooding in rainy season
 - > Water shortage & severe drought in dry season



Natural disasters in the watershed



Mae Tha, Chiang Mai/Lam Phun

**Severe Drought
in March 2006**

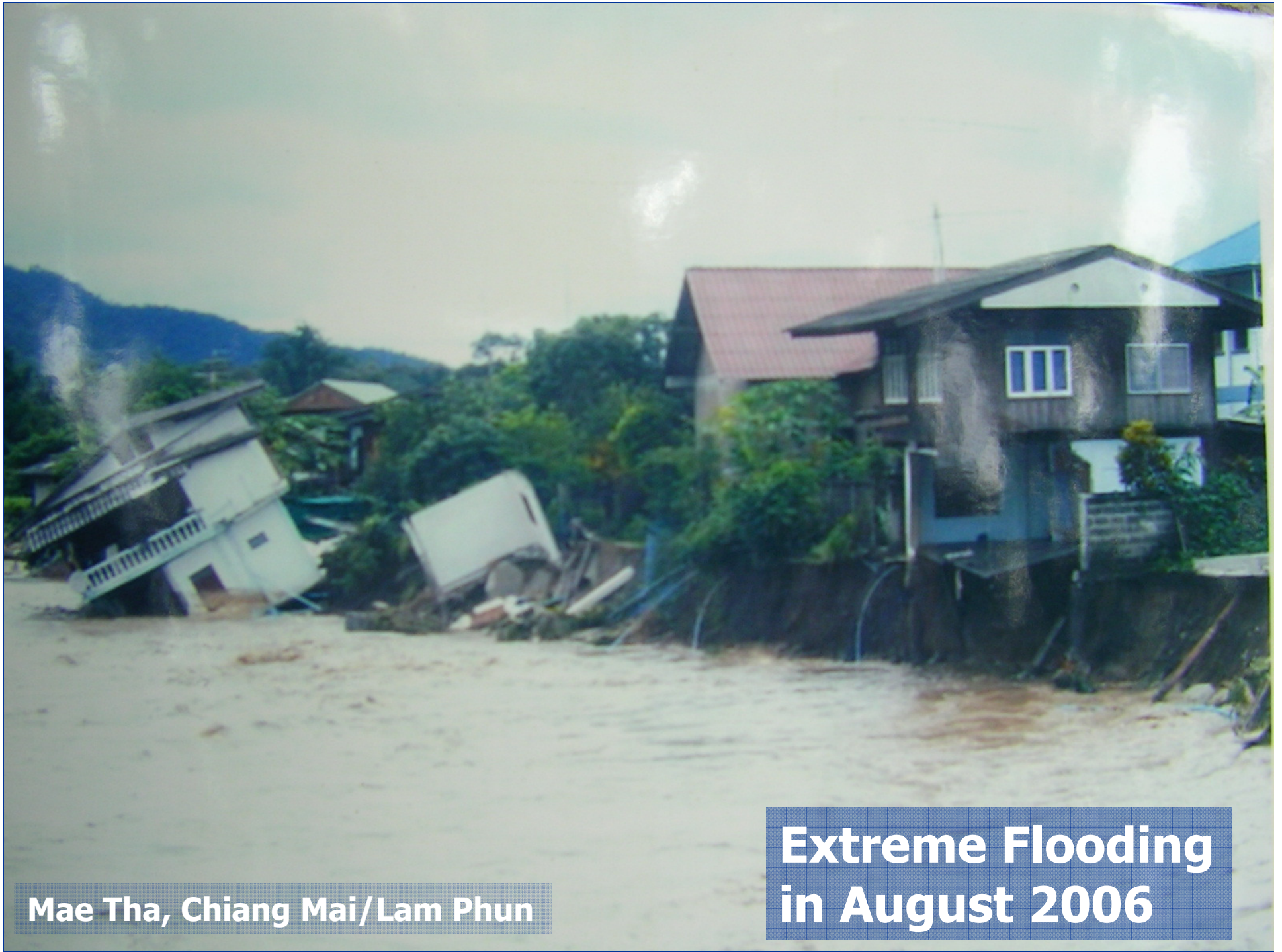


Severe Drought



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in August 2006**



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in August 2006**



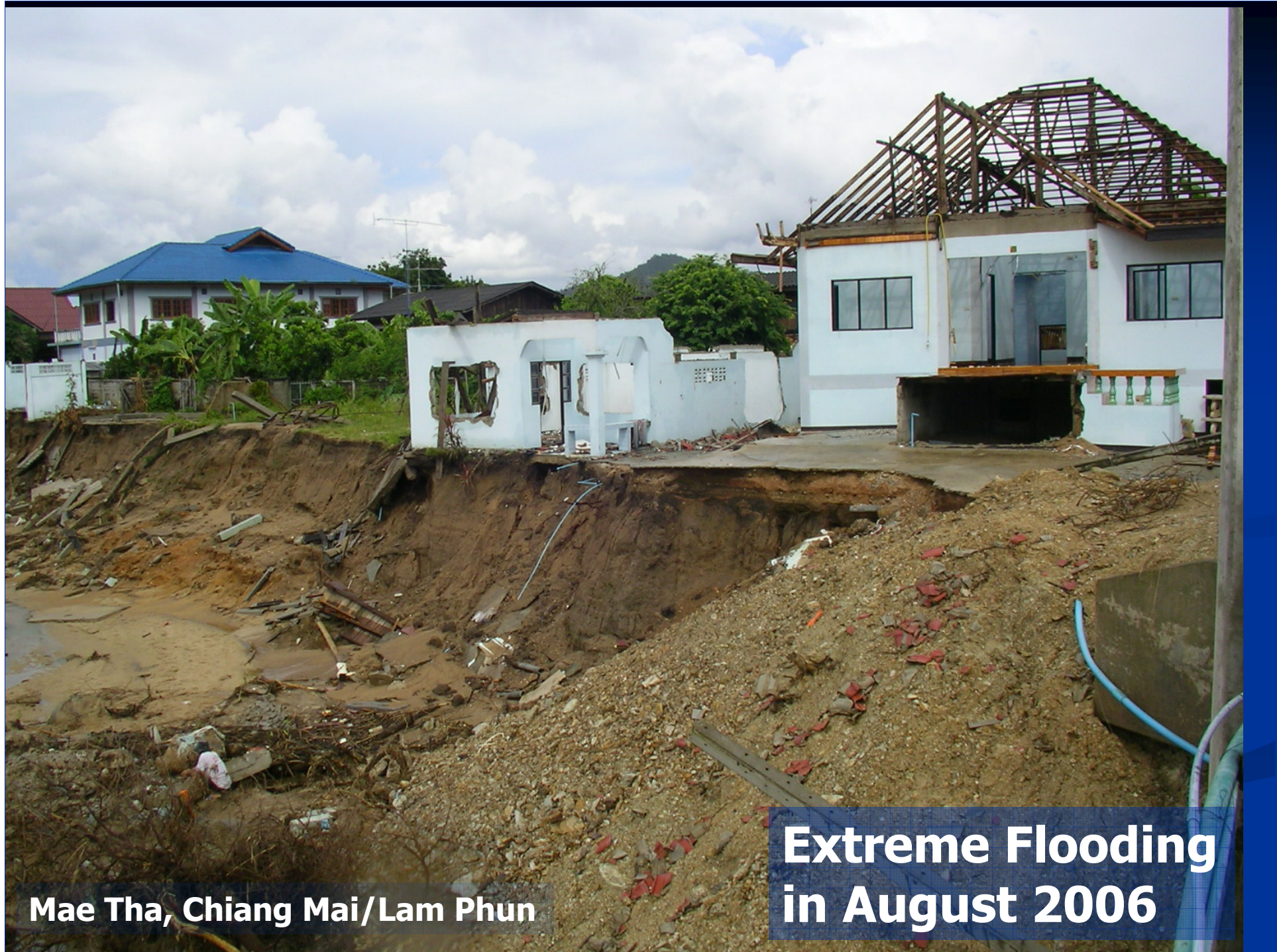
Mae Tha, Chiang Mai/Lam Phun

Extreme Flooding
in August 2006



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
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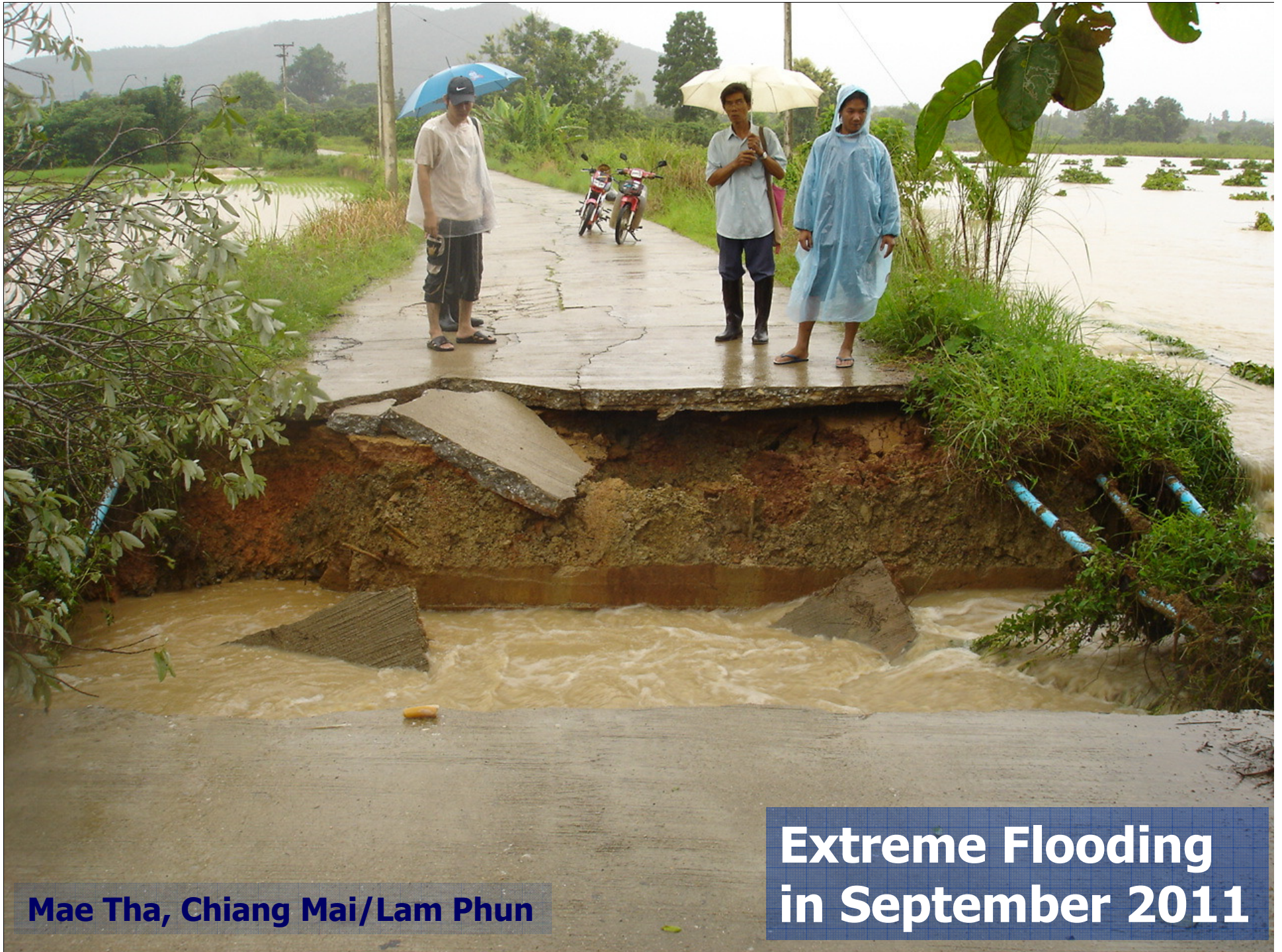
Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in August 2006**



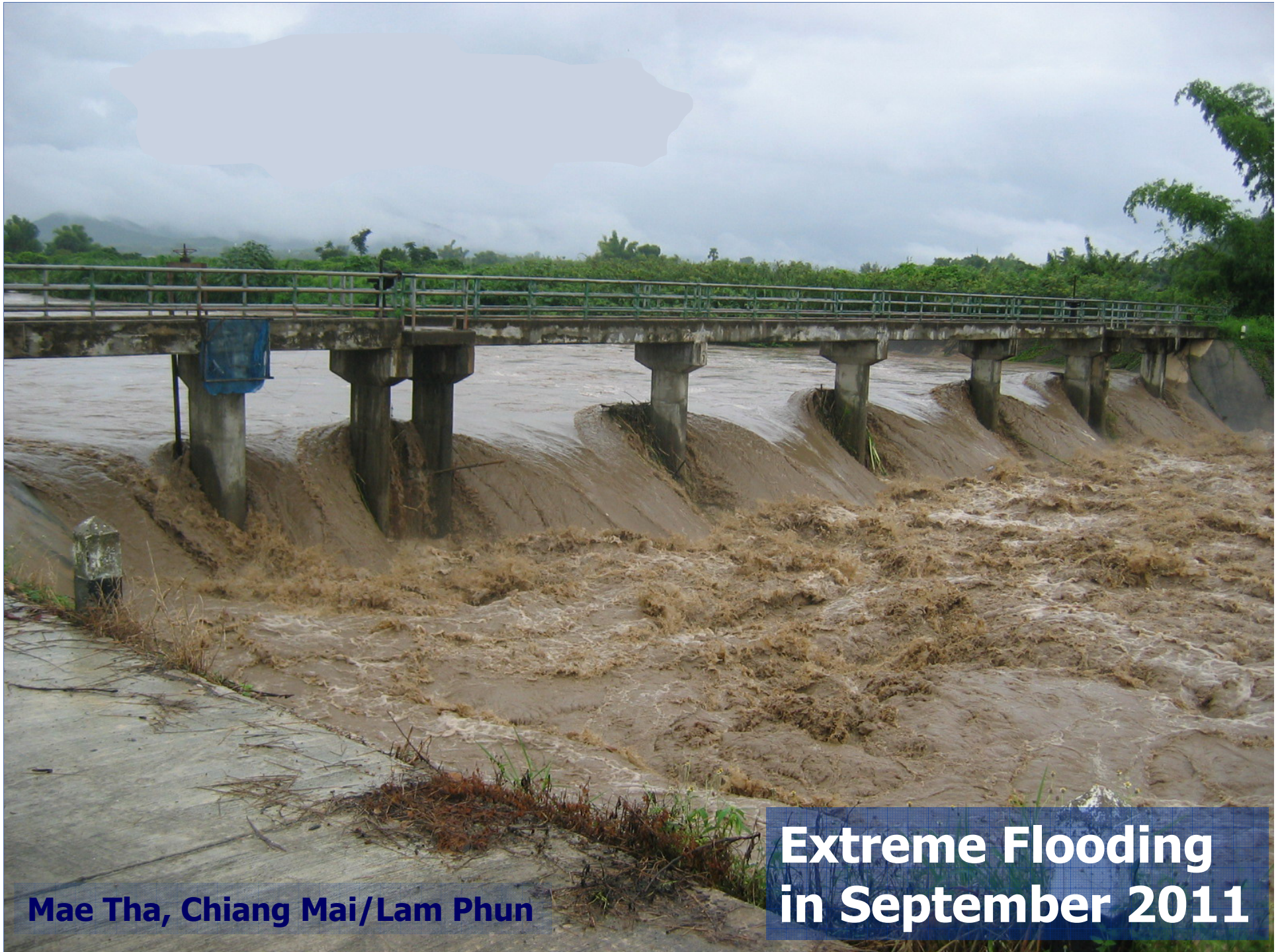
Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in September 2011**



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in September 2011**



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in September 2011**



Mae Tha, Chiang Mai/Lam Phun

**Extreme Flooding
in September 2011**

Objectives

- 1) To analyze landscape ecology system and socio-economic with the participatory process to make collaboratively understanding in the potentials, opportunities, and weakness of agricultural resources management
- 2) To assess spatial land resources: land uses and land cover changes, soils, water, forest, including risk of natural disasters to support making decision in uses of land and agricultural resources at the watershed level

Objectives

- 3) To synthesize the strategies of sustainable livelihood management for communities under the conditions of environmental changes
- 4) To study the organization patterns appropriately in natural resources management for sustainable agricultural and livelihood development
- 5) To develop the procedure of public policies building in natural resources management for the sustainable agriculture of communities

Research methodology

1. Spatial Information System; the development & applications

To transfer understanding in potentials and opportunities of uses of land resources, including information of risks of natural disasters in order to support the efficient decision making procedures of communities

Research methodology (cont.)

2. Participatory Action Research

To make the relationship, reliability, knowledge exchange, and collaborative network in order to strengthen the communities in land resources management

Conceptual Framework

(1) Information System of Land Resources

Spatial database

- Physical & Socio-economic data
- Water quantity & Climate data
- Present Land Use & Changes (Agri, soil, forest, water resources)
- Communities & Infrastructure
- Water use efficiency in agri.
- Risk areas of flooding and drought
- Changes of soil moisture & fertility (OM)

- Meeting of the leader groups to implement knowledge & info to communities
- Process to develop the concerned **"Public policies"**

Collaborative Planning

- Meeting of land use planning & water use at community level
- Data analysis to develop the strategy plan
- Meeting of the leader groups

Feedback

(2) Participatory Action Research

Action

- Study & recognize the problems of communities
- Useful information requirements (under the framework)
- How to implement the information to communities?
- Simplify & Transferring information to communities

Research Collaborative Agencies

- 1. Mae Tha Tambon Administrative Organization (TAO)**
- 2. Tha Kad Nua Tambon (Sub-district) Municipal**
- 3. The Hydrological Center of Upper Northern Thailand**

Expected Results

1. Digital spatial information of physical and geographical features, main watersheds, sub-watersheds, main streams, and sub-streams
2. Digital spatial information of present land uses and land resources (focused on agriculture, forest, water source, and urban)
3. Digital spatial information of socio-economic and fundamental infrastructure
4. Data profile and cross-section of streamlines, and sequential stream-flow data

Expected Results (cont.)

5. Analytical data of soil moisture, soil fertility, and soil OM
6. Scenario maps of flooding and drought risks
7. The practical and activity plans of natural resources management and agricultural system at watershed level; such as water conservation, crop practice and management water management by TAO
8. Establishing the public policies in natural resources mgt. particularly water resources for the local admin organization

Thank you