

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Archaeology is concerned with the full range of the human past behavior. Archaeological study is commonly related to other disciplines such as anthropology, history or science that are also concerned with the human story (Fagan 1991). Geoarchaeology is one of major importances in understand the archaeological record, and evidence, derived from the application of earth sciences (eg.geology, geomorphology, sedimentology, hydrology, pedology etc.) to archaeological problems. According to Karl Butzer (1982), geoarchaeology has been implied to archaeological research by using the methods and concepts of earth sciences. Archaeological research generally focuses on human ecosystem and the environmental context surrounding the archaeological sites. Many archaeologists have been trying to explain the questions on how the archaeological sites were deposited through time, how the sites were transformed and how people used landscape in the past. Therefore, geoarchaeology is an essential approach for archaeologists to identify microenvironments, mesoenvironment, and macroenvironment (Butzer 1982: 40-42).

Geoarchaeology shares its concept and methodology with earth sciences. Earth science's techniques and methods are widely applied in archaeological research. For instance, physical geography, sediments analysis and geomorphological study can provide the paleoenvironmental information of the archaeological sites. Soil science gives the information on stratigraphy; in particular, the depositional and post-depositional processes. It is also necessary for archaeologists to identify the site transformation whether it was caused by human or animals or natural agencies in order to explain the past activities. However, the understanding of geoarchaeology, especially site formation process, is not sufficient in comparison.

This research is to apply the methodology in geology or earth sciences in order to study archaeological data from the excavation of the The Tham Lod rockshelter (prehistoric site) located in Changwat Mae Hong Son, Northern Thailand. The The Tham Lod rockshelter is an important archaeological site because it is one of the earliest site in Thailand and a lot of archaeological evidences; stone tools; earthenware sherds; rock painting; log coffin; human and animal remains were found both on surface and subsurface in this area. The amount of evidences reveal that this area was a prehistoric habitation site. It has been a long term used by human in the past.

In 2001, the Highland Archaeology Projects at Pang Mapha, Mae Hong Son province was established by approaching multi-disciplinary research from archaeological perspective (archaeology, physical anthropology and dendrochronology). Archaeological sites around Pang Mapha district have been surveyed and two sites for excavation were chosen (see Shoocongdej 2002). The The Tham Lod rockshelter is one of the sites for excavation in 2002. This research is focused on geological aspects. It will help archaeologists to interpret the relationship among stratigraphy, sedimentology and archaeological data (artifacts and occupation layer from excavation) and to analyses the site formation processes, site functions and paleolandscape.

## 1.2 Objectives

The main objectives of this research are apply the geological data and earth science methodologies in archaeological analysis at the Than Lod rockshelter , a prehistoric sites in Amphoe Pang Mapha, Chang Wat Mae Hong as follows:

1.2.1 To study the relationship among stratigraphy, sedimentology and archaeological data (artifacts and occupation layer from excavation).

1.2.2 To evaluate land use and human resources in the past .

### 1.3 Scope of research

The major scopes of this research can be divided into three parts as follows:

1.3.1 The study area encloses in the The Tham Lod Nature and Wildlife Education Centre, Ban The Tham Lod, Amphoe Pang Mapha, Changwat Mae Hong Son, covering about 3 km<sup>2</sup>. The excavation was conducted at the Tham Lod rockshelter site.

1.3.2 This research focuses on microenvironment and mesoenvironment site analysis (The Tham Lod rockshelter) in order to describe site sedimentology, site stratigraphy, site function and paleolandscape.

1.3.3 The archaeological timescale will be focused on the prehistoric period and the Pleistocene to early Holocene in geological timescale.

### 1.4 The study area

The study area is a highland areas of northern Thailand. The Tham Lod rockshelter is situated on the base of the over hanging limestone cliff in the The Tham Lod Nature and Wildlife Education Centre , Ban Tham Lod, Amphoe Pang Mapha, Changwat Mae Hong Son. The area is located at a approximately of 19° 34' N and 98°16' E (4244 21636 in UTM system). The area appears in the reference topographic map at a scale of 1:50,000 series L1708 is the sheet 4648II (Doi Pak Kud) (Figure 1.1). The Tham Lod rockshelter is facing north. It elevator is about 640 m above the present mean sea level. The study area covers about 10 square kilometers. It can be accessed by highway no.1095 from Amphoe Mae Rim, Changwat Chiang Mai to Amphoe Pang Mapha, Changwat Mae Hong Son and approximately 10 kilometers on local road to the north to the The Tham Lod Nature and Wildlife Education Centre (Figure 1.2).

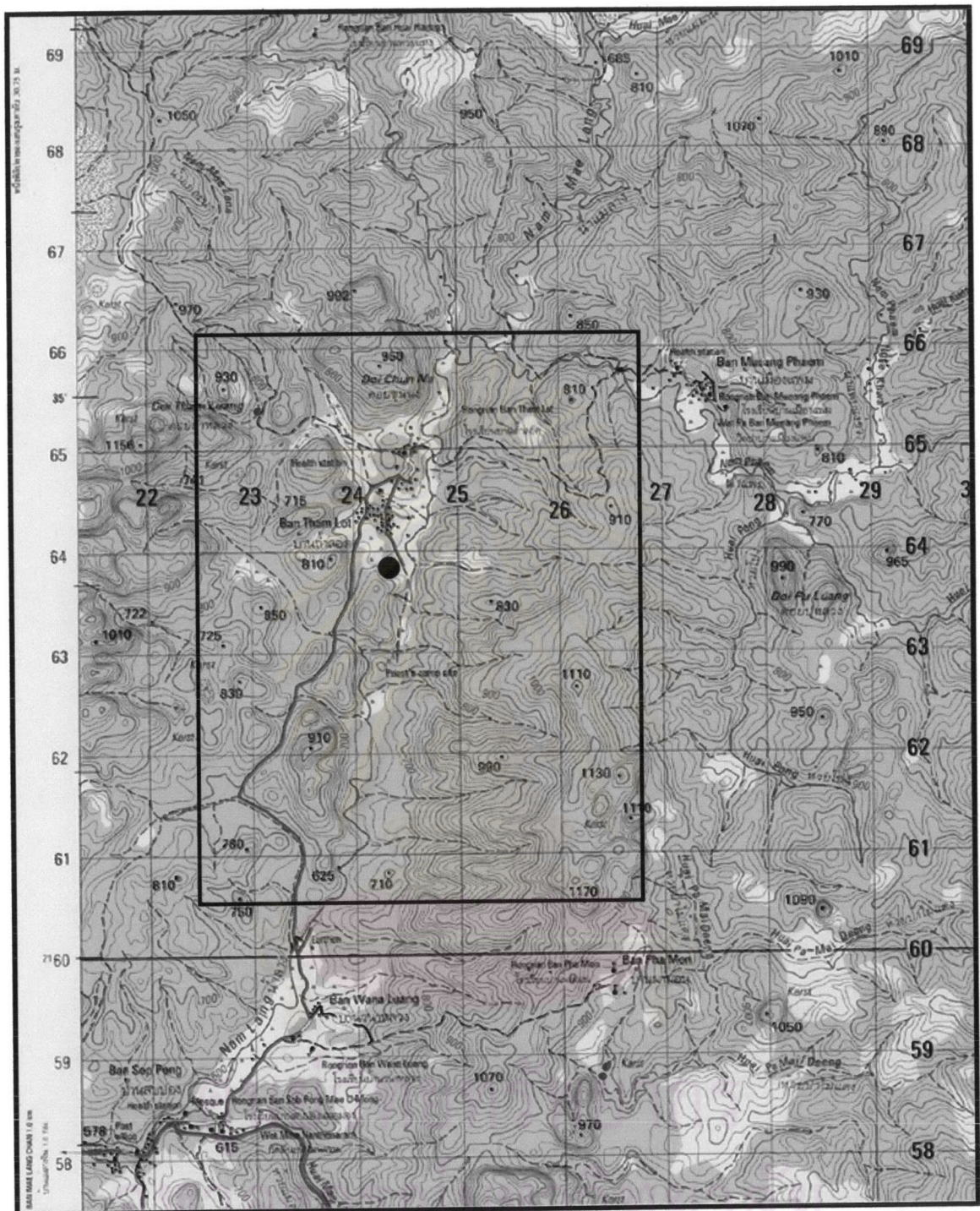


Figure 1.1 Topographic map of the study area (Series L7018, Sheet 4648II, Doi Pak Kud) (Royal Thai Survey Department, 1997).

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Study Area ● Excavation Area 0 1 2 3 Km.

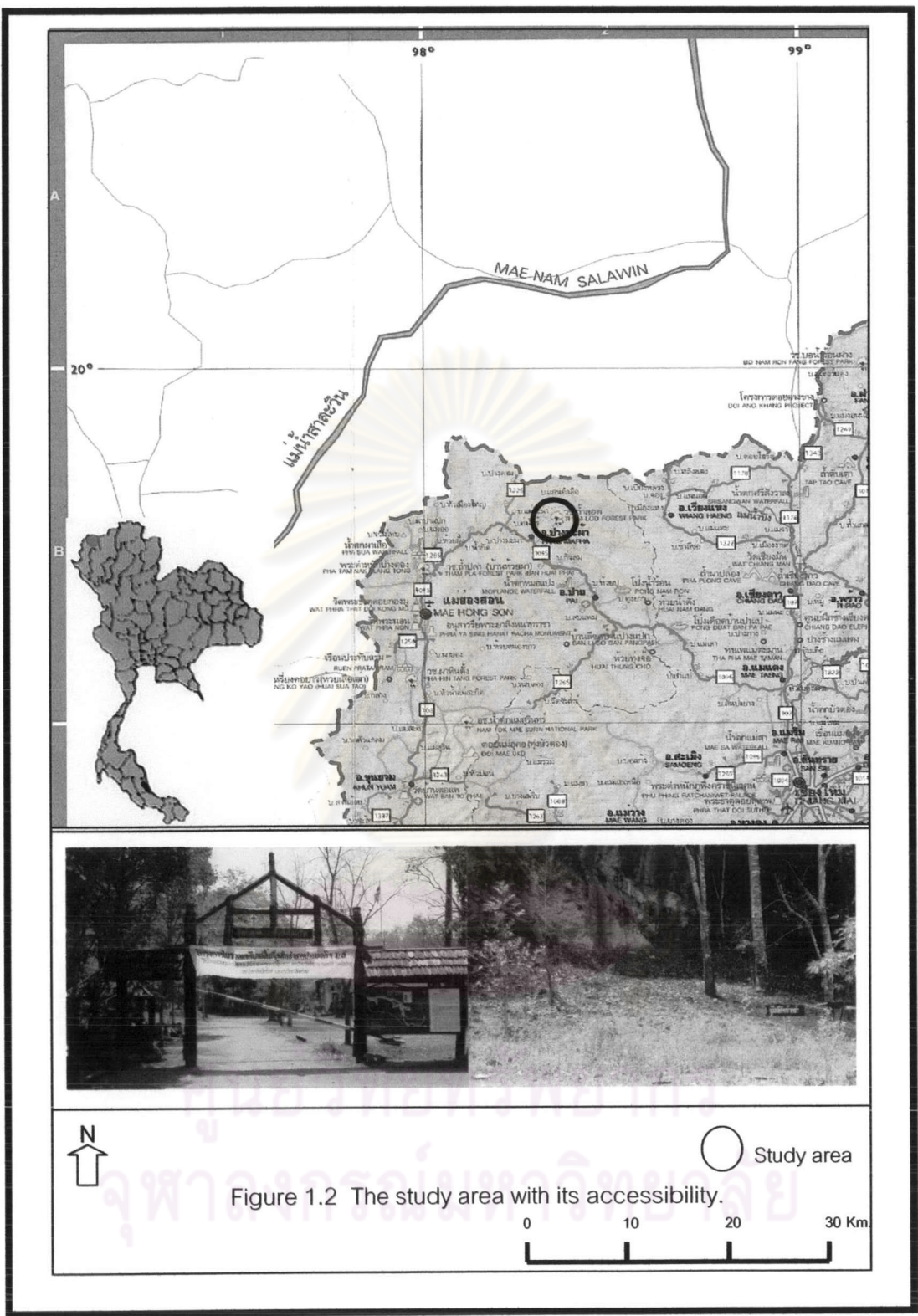


Figure 1.2 The study area with its accessibility.

## 1.5 Literature review

### 1.5.1 The principle of Geoarchaeology

The term "Geoarchaeology" (or geo-archaeology) has been used since 1970 to apply on variety of types of research. It is an applied science that apply geoscience techniques to examining the archaeology record (Rapp and Hill 1998).

Gladfelter (1977: 519) defines "Geoarchaeology" as "the contribution of earth sciences, particularly geomorphology and sedimentary petrography, to the interpretation of archaeological contexts". This means an integration of the earth sciences to study the human past. However, there are many different viewpoints concerning what can appropriately be called geoarchaeology. In Konigsson's view point (Konigsson 1980), archaeogeology is a complementary science that is useful in describing deposits related to archaeological material. It is seen as having an advisory role in archaeological interpretation. He describes geoarchaeology, in contrast, as a study in which the geologist try to determine the "cultural" development of an area. Geologists are not in direct collaboration with archaeologist and rely exclusively on geologic materials methods. According to Ferring (1980: 48), the definition of geoarchaeology emphasizes the changes in archaeological perspective since the advent of Lewis Binford's New Archaeology. From a practices point of view Ferring (1980: 86) sees geoarchaeology as a "grossly empirical approach to archaeological problems" or the "new empiricism". Geoarchaeology refers to the application of any earth science concept, technique, or knowledge bases to the study of artifacts and the processes involved in the creation of the archaeological record. Based on Butzer (1982: 40), geo-archaeology implies archaeological research using the methods and concepts of the earth sciences. Archaeological research generally focuses on human ecosystem and the environmental context surrounding the archaeological sites. Furthermore, archaeologists would like to clarify the questions of how the archaeological sites have been deposited through time or are transformed and how people used landscape in the

past. Geo-archaeology is an essential approach for archaeologists to identify microenvironments, mesoenvironment, and macroenvironment (Butzer 1982: 40-42).

A model relating the various scopes of geoarchaeology is shown in Figure 1.4. The standard impression of geoarchaeological study is one of sediments analysis from various archaeological site levels. It will be provided the paleoenvironmental information as well as relative age with respect to external paleoclimatic sequences. This is, unfortunately true of most "geological" site examination, in part because of limited geoarchaeological material.

Geoarchaeology is still in the process of developing a sophisticated approach to archaeological research, so that it is imperative to identify the full range of study component. This has been attempted to contribute to our understanding of the past human activities in five primary study components in geoarchaeology (table 1.1) (Butzer1982; Rapp and Hill, 1998).



คุรุณย์วิทยทรรพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

Table 1.1 Primary study components in Geoarchaeology (after Butzer, 1982: 38)

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### Landscape context

1. Site micro-environment defines in term of the local environment elements that influenced original site selection, the period of its use, and its immediate burial or subsequent preservation(Butzer1982; Rapp and Hill 1998). Sediment analyses of site strata represent an obvious study procedure in a sealed site.
2. Site meso-environment can be defined as a primary study in the topographic setting and landforms of the area utilized directly for subsistence. This geomorphic information, combined with bio-archaeological inputs, helps in defining the adjacent environmental mosaic.
3. Site macro-environment, represents a regional scale study of the environment provided by a particular biome or ecotone. The constellation of effective geomorphic process together with biotic information is indispensable in constructing a model of the regional ecosystem.

### Site formation

1. People and animals, as geomorphic agent, produce archaeological sediments with physical, biogenic and cultural components that require identification and interpretation.
2. Distinction of material includes: (a) material that were introduced to the site by people or animals, in their original form or as finished products; (b) material that represent alteration products from on-site processing or biochemical decomposition; (c) material that were transformed from primary on-site refuse and debris into new sediment through human and other physical agencies.
3. Evolution of archaeo-sedimentary processes helps elucidate settlement and subsistence activities in space and time.

### Stratigraphic context

1. Reconstruction of sequential natural events such as soil development, erosion, and sedimentation is recorded by detailed sediment units (micro-stratigraphy) in the site and environment.
2. Evaluation of the local physical sequence involves a regional landscape history and potential matches with dated sub-continental or even global stratigraphies. External correlation can serve as a chronometric aid, can assist in paleo-environment interpretation, can facilitate cross-checks between different categories of data, and can be used to test the temporal validity of archaeological horizons.
3. Geoarchaeology always deals with direct paleontological correlation and radiometric dating.

### Site modification

1. Pre-burial dispersal of archaeological residues through the actions of running water, gravity, frost, deflation, animal trampling, and deliberate human removal.
  2. Post-deposition site disturbance through various agencies includes burrowing animals and lower organisms, soil frost, expansion and contraction of clays, gravity and micro-faulting, and biochemical alteration.
  3. Site destruction and artifact dispersal are caused by various forces: weathering, running water, deflation, slumping, and human intervention.
  4. Interpretation of sealed or exposed cultural residues in terms of primary, semi-primary, or secondary context.
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Table 1.1 (continued) Primary study components in Geoarchaeology (after Butzer, 1982: 38)

**Landscape modification**

1. Identification of human intervention in the soil landscape is significant in the form of disturbed or truncated soil profiles and re-deposited soils.
2. Human intervention in the hydrological cycle, as reflected in erosional gullies, alluvial fills, and lake sediment records is also recognised.
3. Human constructs in the landscape include filled-in ditches, pits, and postholes; earthworks and spoil heaps; roadways, terraced fields, and irrigation networks; middens and burials adjacent to focal settlements.
4. Landscape modification also involves assessment of the cumulative direct and indirect impacts of human land use in spatial terms and in the temporal perspective of sustained landscape productivity or degradation.

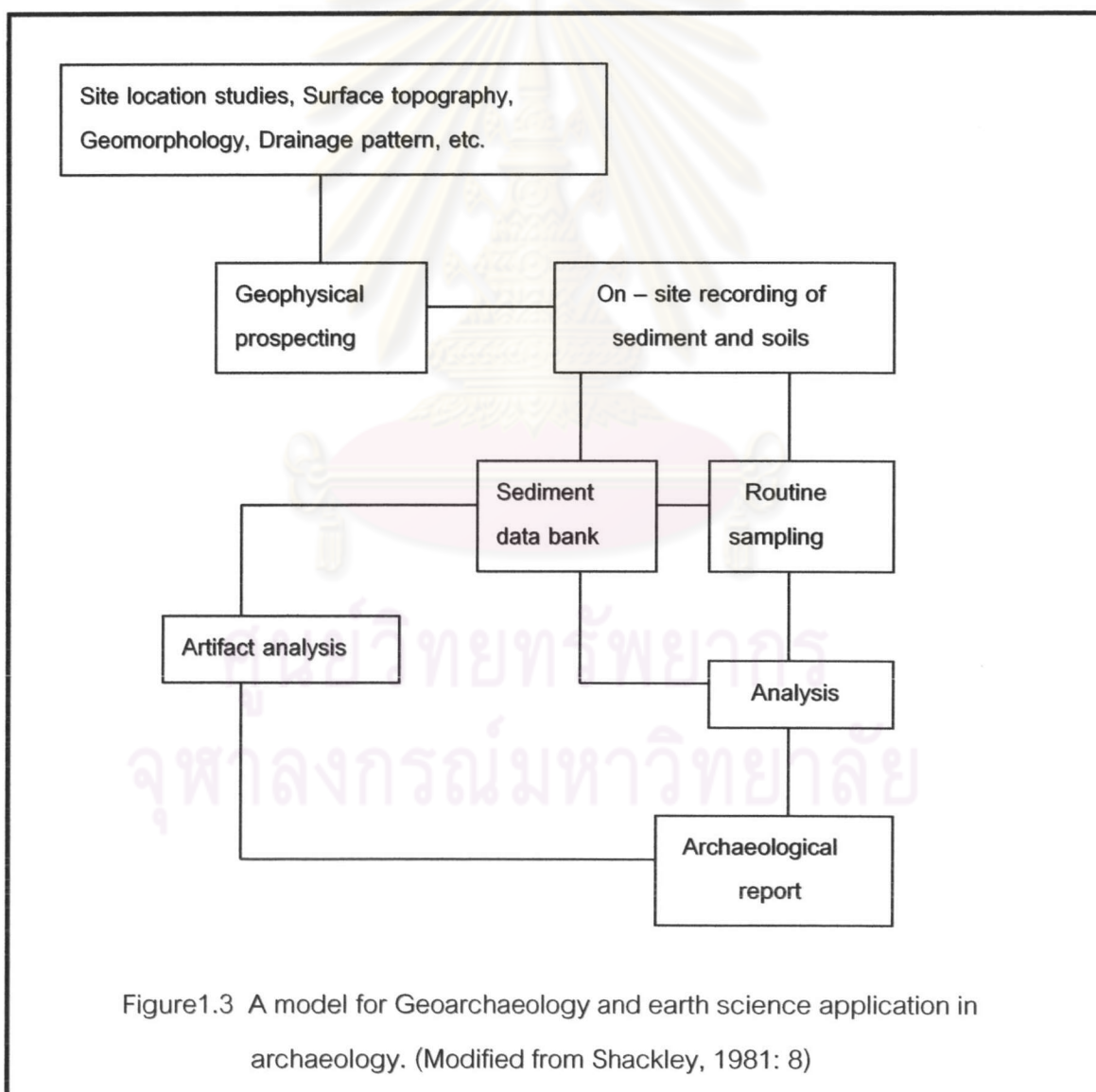


Figure1.3 A model for Geoarchaeology and earth science application in archaeology. (Modified from Shackley, 1981: 8)

### 1.5.2 The formation of rockshelter

The formation of a typical rockshelter and its sedimentary fill is depicted in Figures 1.4 and 1.5. With weathering, an incipient shelter begins to form in a less resistant zone of limestone, the detritus of rock debris resulting from its erosion accumulating initially as a talus slope building up at the base of the cliff and then subsequently on the deepening floor of the shelter itself (Figure 1.5 (1,2,3)). With continued erosion, the cavity deepens sufficiently to become protected by an overhanging roof and thus provide shelter for human occupation (Figure 1.5 (4 and 5)). Erosion continues, resulting in the accumulation of additional rock detritus which buries the occupation surface and, at the same time, undercuts the roof overhang to such an extent that it ultimately collapses under its own weight (Figure 1.5 (6)). However, the back wall continues to retreat and soon the shelter becomes deep enough to accommodate human occupation again (Figure 1.5 (7)). The artifactual remains are ultimately buried again by the subsequent accumulation of detritus (Figure 1.5 (8)). This process may continue indefinitely, even up to the present (Laville, Rigaud and Sackett 1980: 126).

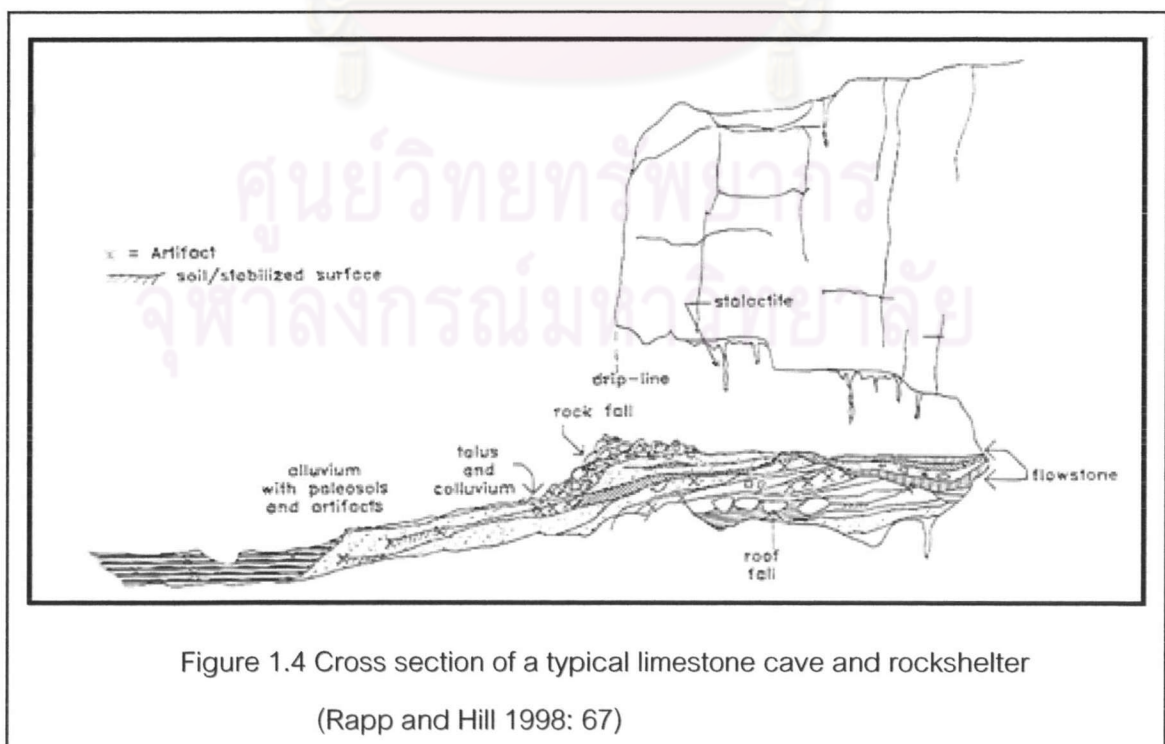


Figure 1.4 Cross section of a typical limestone cave and rockshelter  
(Rapp and Hill 1998: 67)

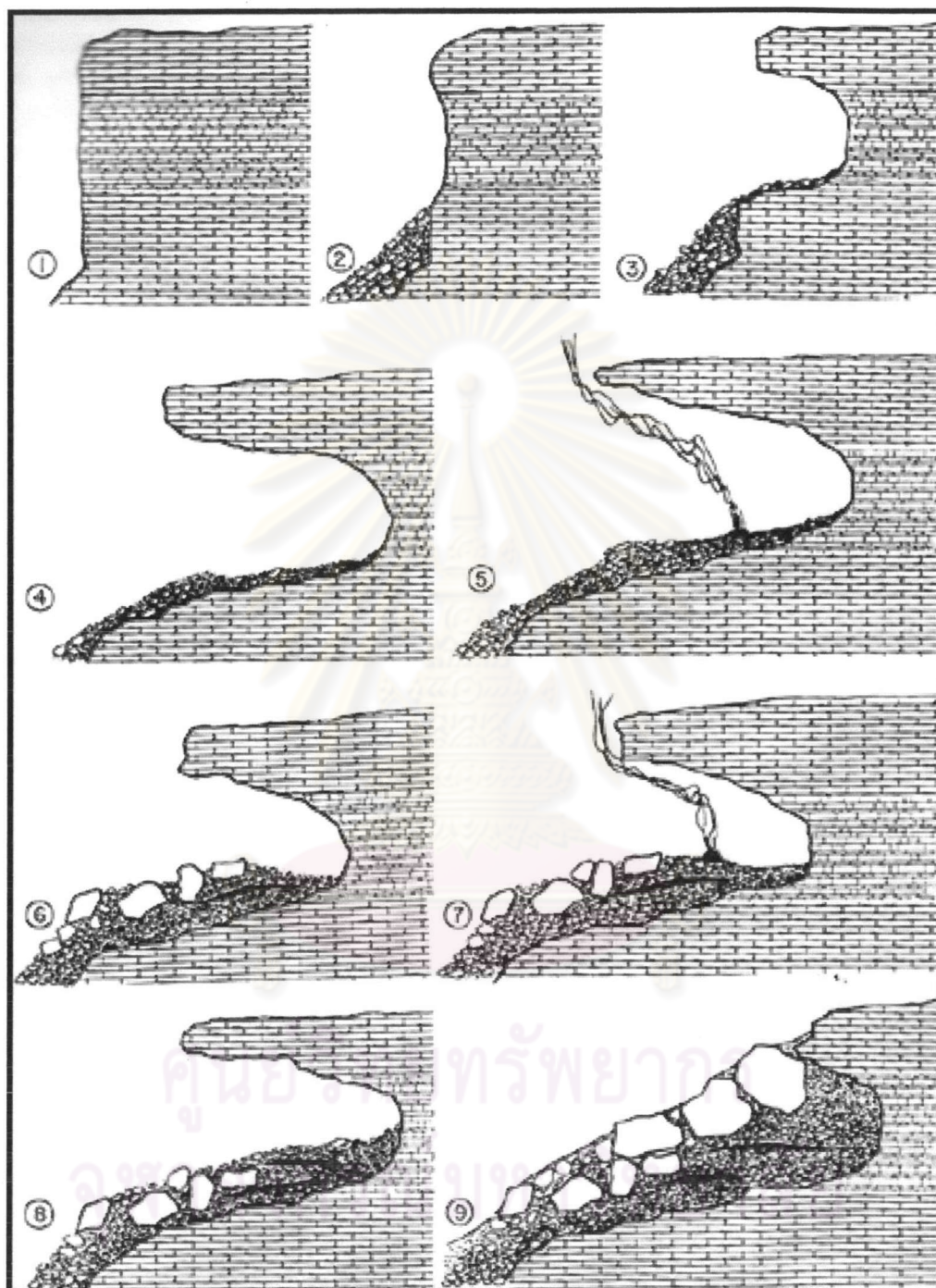


Figure 1.5 The evolution of a rockshelter and its deposits.

(Laville, Rigaud, and Sackett 1980: 126)

### 1.5.3 Previous investigations

The archaeological research in Mae Hong Son area was firstly conducted by Chester Gorman in 1960s for his doctoral research entitled “Prehistoric Research in Northern Thailand: A Cultural Chronographic Sequence from the Late Pleistocene through the Early Recent Period” (Gorman 1970). He discovered many site in this area and excavated at Spirit Cave, Banyan Valley cave and Steep Cliff Cave, which revealed occupations of Stone Age peoples dating back about 10,000 B.C. The stone tool tradition uncovered at Spirit Cave is identified as the Hoabinhian, a technology prevalent in Southeast Asian prehistoric times. The most significant discoveries were the remain of plants suggesting of incipient cultivation. However, the domestication debate is still going on up to present (Gorman 1970, Reynolds 1992).

In 1983 and 1985, The Northern Thailand Archaeological Project was carried by The Royal Thai and Archaeological Fine Art Department conducting a survey of sites along Tham Bon Soppon, Chang Wat Mae Hong Son, in which the lithic sites were found only on hills and mountains close to the river.

In 1987, Kavin Kierman and John Dunkley (Kierman 1988) reported the distribution and some characteristics of cave around Pang Mapha district. They found about 31 sites of archaeological site, and presented only short preliminary report on archaeological records.

In 1988, The Northern Thailand Archaeological Project, Fine Art Department (1988) reported of 52 open lithic sites in Chang Wat Mae Hong Son near the Mae Nam Pai and several tributaries at elevations ranging from 300 – 700 m. These sites were found only on hills and mountains close to the river. The lithic material scattered over the surface of these hilltop sites included large numbers of bifacial flakes and elongated axes. The conclusion was made later that the sites used to be the lithic workshop. (Prishanchit 1988).

During 1994 – 1995, Peter Grave (1996, 1997) had carried on his doctoral research on “The Shift to Commodity: A Study of Ceramic Production and Upland-Lowland Interaction in Northwestern Thailand 1,000-1,650 AD”. Grave conducted an archaeological survey along Tak, Mae Hong Son, and Chiang Mai province, He also collected the log coffin samples from Pang Mapha district for radiocarbon dating. The radiocarbon dating indicated that the Log Coffin in Pang Mapha date ranging from 720 to 2,080 years in year BP. This result has become the basis data for study the Log Coffin Culture of the highland archaeology project in Pang Mapha.

In 1995, Geographic Design Co.,Ltd. and Chiang Mai University (Geographic Design 1995) reported the potential and environmental assessment of The Lod Cave. A survey on the physical environment around The Tham Lod including forest data, geographical data, geological data, archaeological data etc. was conducted and only short preliminary report on geology and archaeology context was presented. However, some additional detail surveys have been made for planning inside the cave.

In 1997, Chiang Mai University (1997) reported on a survey of the cave sites around Pang Mapha district, especially in Ban Pang Kam. Archaeological archaeological records such as bronze axes, iron tools, human bone fragments, animal bones remain were found. However, this report presented only short preliminary archaeological records (Nakbunlang 1997).

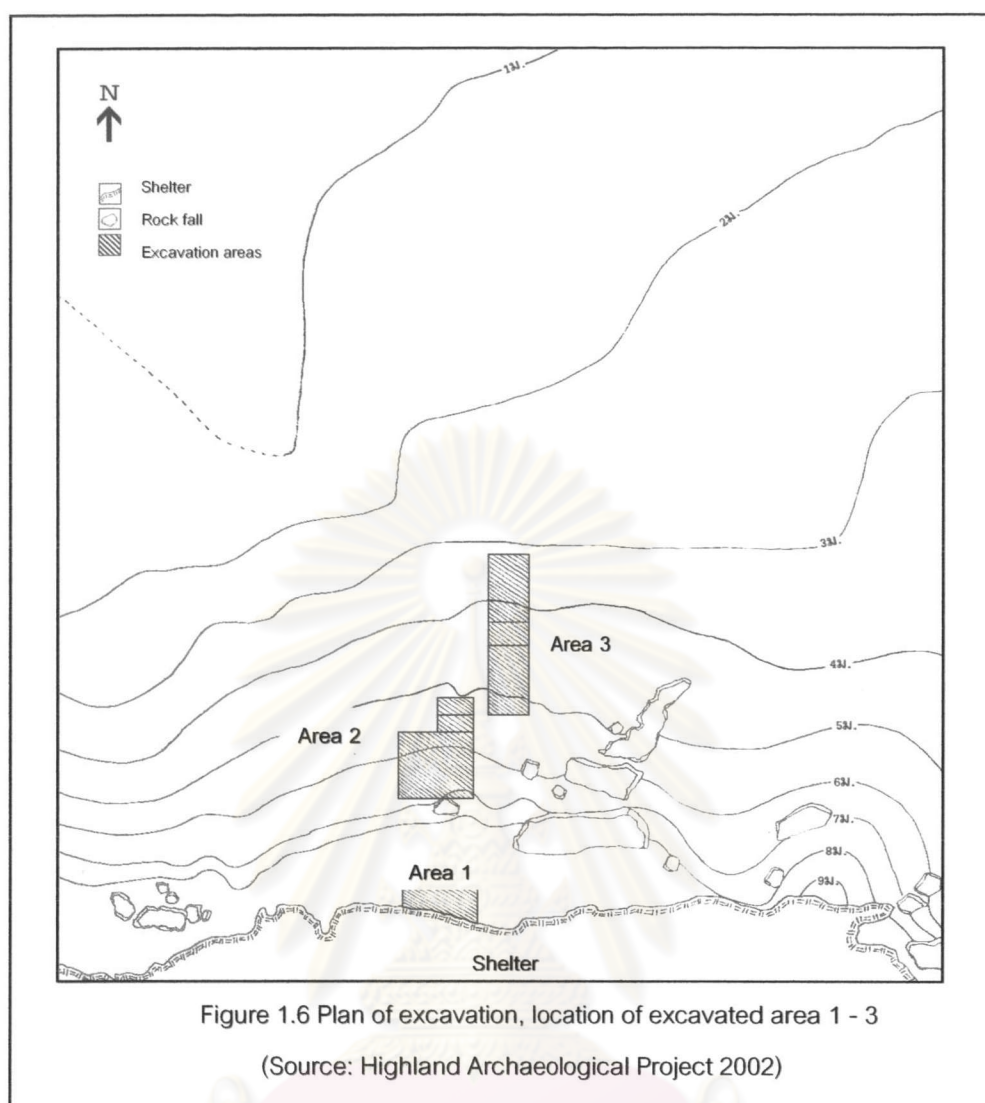
In 1998 – 1999, The Cave Survey and Database System in Mae Hong Son Project, supported by the Thailand Research Fund (TRF.), was launched by approaching multi-disciplinary research (Biology, Geology, Geography, Archaeology) aiming to survey the possible habitation related to the cave around Pang Mapha district. However, the main objectives of the project focused on geology inside cave and about archaeological relevance in cave only. The most significant research theme was that the project was the first attempt to integrate multi-disciplinary knowledges conducting by

Thai researchers (Rasmi Shoocongdej 1999, 2000; Sittipong Dilokawanich 2000). In the term of archaeological relevance, the project produced 5 senior projects on archaeology from Department of Archaeology, Silpakorn University. The senior projects included “The Location of Log coffin in Pang Mapha” conducted by Trirayapiwat (1998), “Rock painting in Pang Mapha” conducted by Sawatmalee (1998), “The cultural resource assessment Phi Man Cave in Pang Mapha” conducted by Suteerattanapirom (1999), “Ethnoarchaeology Study About Settlement Patterns of Highland Peple in Pang Mapha” conducted by Huntakul (1999) and “Petrography Study of Potsherd of Log Coffin in Pang Mapha” conducted by Khiewkampoood (2000).

In 2001 to 2004, The Highland Archaeology Project in Pang Mapha district, Mae Hong Son Province Phase I (supported by the Thailand Research Fund) was carried on by approaching multi-disciplinary research including archaeology, physical anthropology and dendrochronology. The project was aimed to focus an establishment local culture chronology on reconstruction of human culture and paleoenvironment. Archaeological sites around Amphoe Pang Mapha had been surveyed between 2001 to 2002 and two sites for excavation were chosen (Shoocongdej, 2002). The Tham Lod rockshelter is one of the chosen sites which excavated in 2002.

#### 1.5.4 History of The Tham Lod Excavation

The Tham Lod rockshelter was firstly recognized as a potentially important archaeological site during the archaeological survey by The Highland Archaeology Project Phase I (Shoocongdej, 2002). The Tham Lod rockshelter was one of the sites for excavation between April to July 2002 (Shoocongdej 2002, 2003). A horizontal grid system was employed by establishing base lines to the north –south of the site for detail trenching, then, 3 trench areas were chosen and for excavation (Figure 1.6).



Due to the difficulty in correlating strata across trench, the area was subdivided into three small trench areas as follows:

*The Shelter (on flat floor)* is the area where protected beneath the overhang limestone cliff and is expected to be the place where suitable for the habitation area.

*The talus (hill slope)* represents the portion of the slop deposit in front of the overhang cliff and is expected to cross check about relationship with the shelter area.

*The foot slope* is a portion mixed of high terraces and talus deposits. The objection of excavated in this area was to cross check about relationship with the shelter and the talus area.