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Expedition Report Collection

Shan Plateau Expedition 2011



Final Report



Summary

The Shan Plateau Expedition 2011 was a six person three week caving expedition to the Southern and Northern Shan States in Myanmar (Burma). The expedition followed on from a four person reconnaissance to the Southern Shan State in 2010. Initially the expedition returned to the Hopong region visited in 2010, before carrying out further reconnaissance in two new areas in the Northern Shan State, Kutkai and Lashio.

These expeditions are characterised by the need to negotiate access to caves not only with the local authorities, but also with the local monasteries. Caves form a significant part of Buddhist religion and worship. A central government permit is only the first step in a line of a number of local permissions that cannot be gained in advance. This means that as well as time underground, the expedition also spent time forging local contacts and obtaining necessary local permissions.

In the Hopong area we found that despite the work of the 2010 expedition permissions were still not straightforward. However, despite this, we were still able to explore a number of new caves as well as significantly extending two caves explored the previous year. All new entrances were located with help from guides provided by the local monastery or by other local people. In total 3921m of cave passages were surveyed in the Hopong area this year.

In the Northern Shan State we spent a considerable time applying and negotiating for access. This left relatively little time for cave exploration. Nevertheless we surveyed a major cave near Kutkai to 859m as well as identifying other promising cave entrances which we did not have time to enter. The karst development in this area appeared to lead to a much greater passage density than the Hopong area which is characterised by major north-south trending trunk passages.

Also in the Northern Shan State we completed a very brief reconnaissance in the area of Lashio. We found the local immigration services to be very helpful in this area and they pointed us in the direction of the major river cave, Htam Nam Lay. Due to the condition of the local roads this is only accessible by cattle cart or motorbike and consequently we were not able to fully explore this significant resurgence.

In total the Shan Plateau Expedition 2011 mapped 4.78Km of cave at 11 separate entrances. Nine of these cave entrances were in the Hopong area, and a further two were in Kutkai. We also logged 37 new cave entrances. Given the useful contacts made in 2011 and the many leads remaining to be explored and surveyed, a return expedition is being planned for 2012.

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With Thanks

Myanmar is not always a straightforward place to travel and this was often true of our expedition. It is a country without the ongoing help and assistance from the Myanmar Tourist Authority, Ministry of Culture and Ancient Affairs and Ministry of Natural Resources and Environmental Conservation. Without the help and guidance from the local guides, we would not have been able to do this. The Myanmar Tourist Authority always made sure we had the necessary permits and visas.

This year we were also fortunate to receive the help of the Myanmar Tourist Authority, Ministry of Culture and Ancient Affairs and Ministry of Natural Resources and Environmental Conservation. Without their help and guidance, we would not have been able to do this. The Myanmar Tourist Authority always made sure we had the necessary permits and visas.

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Expedition Members

Imogen Furlong, Expedition Leader

Chris Densham

Joerg Dreybrodt

Fleur Loveridge

Phil Rowsell

Peter Talling

If you would like further information regarding this expedition then please contact the Expedition Leader, Imogen Furlong on [imogenfurlong<at>hotmail<dot>com](mailto:imogenfurlong@hotmail.com)

With Thanks

Myanmar is not always a straightforward place to travel and this expedition would not have been possible without the ongoing help and assistance from Mr Phyo Wai Yar Zar, Managing Director of All Asia Exclusive and vice chair of the Myanmar Tourism Promotion Board. We are also indebted to our guide and translator Yan Naing who worked tirelessly to help us achieve our objectives and also to our driver Dan Oo who always made sure we got there regardless of the state of the roads.

This year we were also fortunate to receive financial support from the Ghar Parau Foundation and Mount Everest Foundation. Visiting Myanmar is not a cheap activity and setting up expeditions always requires outlays on equipment. We are therefore extremely grateful for the support of these organisations.

We would also like to thank Starless River for support with equipment supply.

Introduction

Background

This was the second Myanmar Shan Plateau Expedition, following on from the successful reconnaissance in 2010. This in itself had been facilitated by early preparatory work by Joerg Dreybrodt, which had made key contacts and used these to carry out a short expedition to Southern Myanmar. While Joerg Dreybrodt was unable to return to Myanmar in 2010, Imogen Furlong made use of the essential connections to organise a small four person reconnaissance to the Hopong area of the Southern Shan State in 2010.

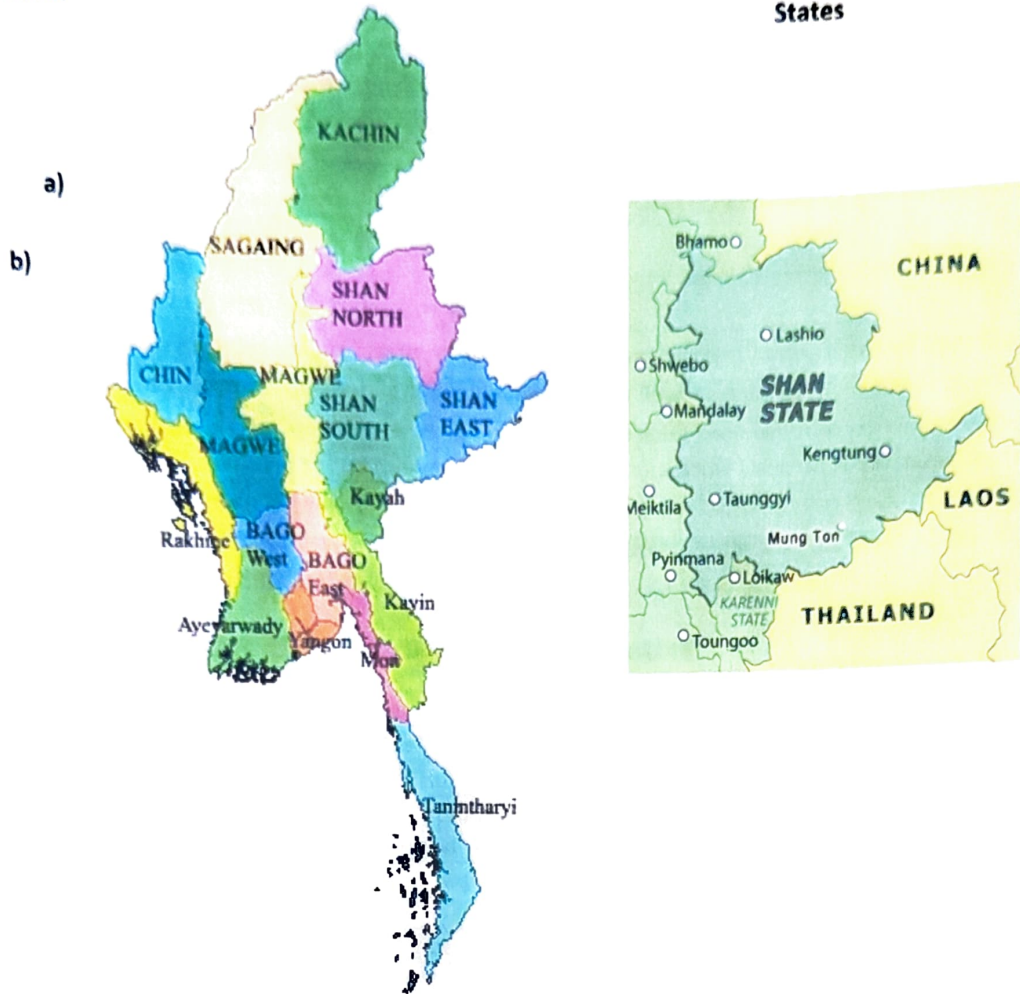
Hopong is situated to the east of Taunggyi (Figure 1), which is the capital of the Southern Shan State. As the Hopong area is restricted and not open to tourists special permission was required to cave there. However, this did not extend to local accommodation and hence the 2010 expedition used Taunggyi as its base camp and travelled every day to the region between Hopong and the well decorated Htam Sam Cave. Here the area is under the control of the local Pa-O tribe and much cave access was obtained through dialogue with the spiritual leader of the Pa-O, Ko Yin Lay, the prominent Siador or chief monk in the region. The 2010 expedition mapped 4.5km of cave passage. This included Htam Sam, in which significant works were ongoing to the convert the cave into a major underground temple. The survey in Htam Sam cave was carried out as far as a sacred lake, located at the end of the temple cave development. Here a paper screen hung across the cave passage, painted with images of large ornate doors. Ko Yin Lay suggested that if we returned in 2011 it would be possible to both stay in his monastery to avoid the lengthy commute from Taunggyi and also to continue to map Htam Sam beyond the sacred lake, where significant further passages were known to exist.

Consequently the 2011 expedition planned firstly to return to the Hopong area, but also to make initial investigation of a number of areas further north. The expedition team was also expanded to six people, the maximum that could be practically accommodated within our transport.

Permissions

Permissions for the 2011 expedition were obtained at the national level via Mr Phyo Wai Yar Zar, Managing Director of All Asia Exclusive and vice chair of the Myanmar Tourism Promotion Board. Mr Phyo was able to advise us of areas in the Northern Shan State which would be safe to travel to, as well as where permission would be forthcoming. In 2010, we had delayed making travel arrangements until permission arrived, which led to last minute and expensive international travel. In 2011, after the success in 2010, international travel was booked in advance of final permission, which did not arrive until a few weeks before departure.

Figure 1 Location of the Shan States; a) Location of the states in Myanmar; b) Area of the Shan States



National level permissions were obtained for:

- Hopong region. This included permission to stay within the restricted Pa-O controlled area.
- Pin Oo Lwin region. Pin Oo Lwin (May Myo) is situated on the road between Mandalay and Lashio at the border of the Mandalay state and the Northern Shan State. The town itself was the summer seat of the British Colonial government. Records from previous expedition reconnaissance suggested there may be caves nearby.

- Lashio-KutKai region. Lashio is the capital of the Northern Shan State. Study of topographical and geological maps and other papers had suggested that there were a number of karstic areas between Lashio and Kutkai on route to the Chinese border.

Once in the field it became apparent the national levels permits where only the first step in negotiating access with the State and local immigration departments and the local monasteries. These permissions could not be gained in advance and a certain amount of expedition time had to be set aside to complete these local negotiations. Information about local permissions is contained within the regional subheadings under Logistics below.

Travel & Accommodation Logistics

Five of the six expedition members entered Myanmar at Yangon airport having travelled from Britain or Germany via Bangkok. The sixth expedition member, Phil Rowsell entered Myanmar at Mandalay airport from Kunming in South West China. Internal flights were then taken to Heho, the regional airport which serves Taunggyi and the nearby tourist sites around Inle Lake. At Heho the expedition team was met by its guide, Yan Naing, its driver, Dan Oo, and the Mazda pickup truck which was to be our expedition vehicle. We had specifically requested the same support team as the 2010 expedition, following their professional and dedicated service to the expedition.

Table 1 Expedition Time Line

Date From	Date To	Comments
15 th Jan		All arrive in Heho and overnight in Taunggyi
16 th Jan	24 th Jan	Caving in Hopong region
25 th Jan	27 th Jan	Joerg Dreybrodt leaves the expedition, via a German Vineyard near Taunggyi and Yangon.
25 th Jan	26 th Jan	Remaining expedition members travel overland to Kutkai via Pin Oo Lwin
27 th Jan	30 th Jan	Obtaining permissions and reconnaissance around Kutkai
31 st Jan	1 st Feb	Obtaining permissions and reconnaissance to the north east of Lashio
2 nd Feb	4 th Feb	Travel to Yangon via Mandalay; leave Myanmar

Hopong Region

The first phase of the expedition was in the Hopong region (Table 1). As indicated above, Hopong is a restricted area, not normally open to foreigners. This year we discovered that the Hopong area is known as a "brown" area. This means that it is not under full control of the government, but a peace agreement is signed with the local tribe Pa-O tribe. Consequently we have been very fortunate to have permission to visit this area. In 2010 our permit had required us to stay in foreigner licensed accommodation in Taunggyi and to return before nightfall each evening.

Our original plan for 2011 had been to stay in the Siador's monastery, which is located south of the main road between Hopong and Htam Sam. This would have allowed us much greater time in the field as we would not have to commute daily (up to 2 hours each way) between the caves and Taunggyi. Upon arrival at the monastery on the 16th January we were welcomed and were very grateful when part of the Siador's mother' house was cleared for us to stay in. However, on the 17th

January it became clear that the local Immigration department were concerned about our stay within the restricted area and we had to return to Taunggyi for the night.

Further negotiations with the Immigration department followed, and on the 18th January we were given permission to stay at a small guest house in Hopong itself. However, this was short lived as permission was subsequently withdrawn accompanying by much apologising from Immigration officials. It seemed they had worked very hard to try and accommodate are requests to stay more locally, but in the end this had not been possible and we had to stay in Taunggyi for the rest of our time in this area.

The 2011 expedition differed from the 2010 reconnaissance in a number of ways. As well as much closer contact with the Immigration department during our negotiations about accommodation, we were also accompanied by immigration officials during most days in the field. This year we also saw more of the team from the monastery. The Siador had provided a number of guides who showed us new caves which was very welcome. It also meant that we could safely visit a number of sites further from the main road that we had been able to visit in 2010. However, this also served to control the areas we could visit, and there were a number of sites, which although identified, we were not allowed to descend. In the end we were also not able to continue exploration in Htam Sam cave which was a disappointment. These logistical difficulties eventually caused us to leave the Hopong area slightly earlier than we had originally planned. This was probably advantageous overall, as we had underestimated the amount of time required to travel overland to the Northern Shan State.

The Route to Kutkai

It took two long days to travel overland to Kutkai and we stopped on route at Pin Oo Lwin. There were two options for the first days travel to Pin Oo Lwin, to travel the long way round on major roads via Mandalay, or to travel through the mountains on more direct but poorer quality roads. We chose the latter option and this was beneficial as it allowed us to identify a very promising caving area neat to Ywangan Township. It is planned to return to this area in future.

Although our permit allowed us to explore caves in the area around Pin Oo Lwin, this area is not restricted and it was decided to press on to the restricted area around Kutkai as a first priority. We would then work our way back and spend time in Pin Oo Lwin if possible. In the end there was not time for this, due to the distances that had to be travelled and the additional time required for gaining local permission.

Kutkai Region

Kutkai is the last significant town on the major trade route that runs from Mandalay through Pin Oo Lwin and Lashio to the Chinese border at Muse. Special permission can be arranged to allow foreigners to enter Myanmar at Muse and travel on to Lashio, but permission is not given to leave Myanmar at Muse. Consequently, although foreigners can travel this route, it is rare for them to stop off. Kutkai therefore does not have any major hotels which are licensed to accommodate foreigners. Hence we were exceptionally fortunately to find an excellent and welcoming guest house on the main street in Kutkai. We must thank our hosts for extending a warm welcome and looking after us very well.

Local permits had to be obtained from the Immigration department in Kutkai. This required submission of a local itinerary for approval. Prior to doing so discussions with the Immigration

officials indicated that some large dolines which were marked on topographical maps and which we had hoped to visit would be off limits to us due to tribal insurgency. However, permission to access other areas was given within 24 hours after consultation with the State Immigration Department in Lashio.

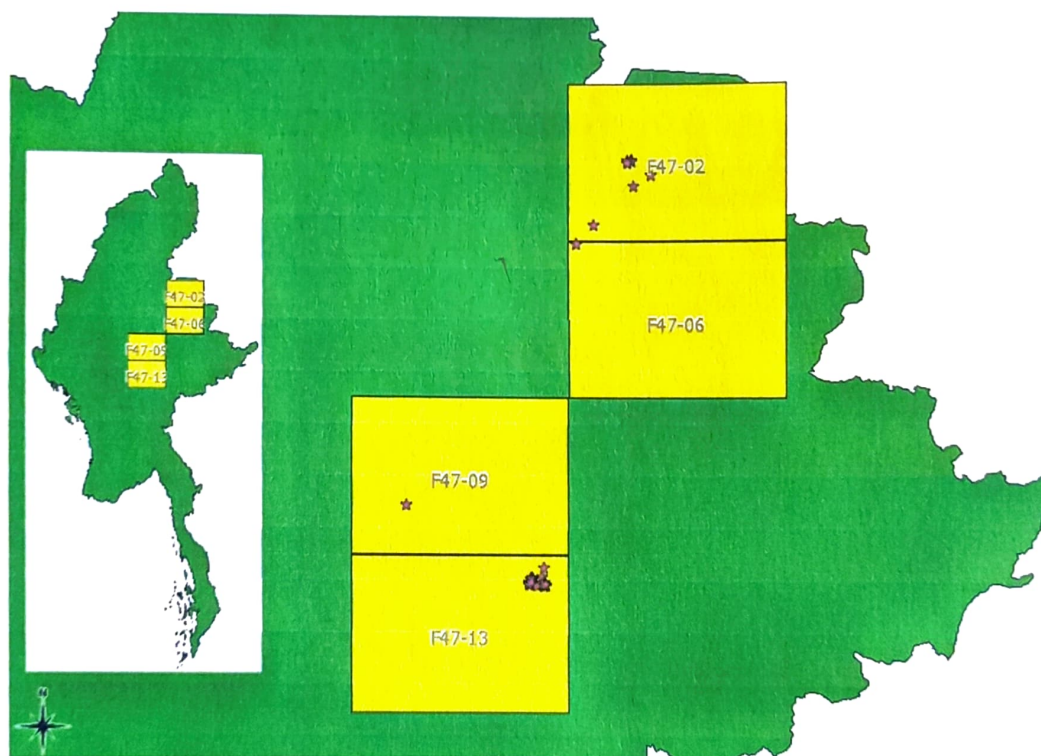
Lashio Region

We had only two days in Lashio, the first of which was spend applying for permission from the State Immigration department to visit some large dolines to the north of the city. As the State had received requests from the regional team in Kutkai they knew of our work and welcomed us to the area. We were advised to visit a large river cave which appeared to be in our area of interest. Permissions were again granted within 24 hours and we used directions given to us by the Immigration Department to locate the cave, known as **Htam Nam Lay**. Permission was also required from the local village head at E-nai, the nearest population centre. However, we soon determined that access to Htam Nam Lay was practical by motorbike or cattle cart only. Hence we were only able to convey Imogen Furlong to the entrance due to these travel difficulties. Nevertheless the impressive cave entrance was confirmed as an important lead for the future.

Despite being the capital of the Northern Shan State, Lashio sees relatively few foreign visitors and only three hotels have licences to take foreigners.

Figure 2 Locations of Caves Identified and/or Explored

(map sheet references from US Army 1955 series, see <http://www.lib.utexas.edu/maps/burma.html>)



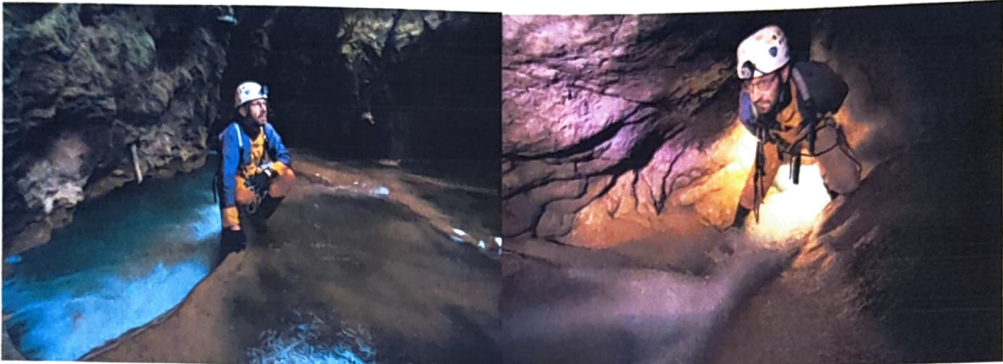
Equipment

Most of the caves explored were predominantly horizontal and minimal equipment was required to make progress. In two locations in the Hopong region 40m pitches were descended by single rope technique (SRT) in order to enter the horizontal passages at the base of the shafts. Other vertical entrances were identified but we were unable to descend them due to lack of permission.

To assist with future exploration in Myanmar a store of equipment has now been left in the country. This includes SRT rope, rigging tape, maillons, bolting equipment and tacklebags.

Surveying

All caves were surveyed to BCRA Grade 5 (with the exception of one small cave which was surveyed to a lesser standard) and the entrances logged using GPS. Where possible multiple GPS readings were taken to confirm locations. Surveying was by a mixture of traditional (hand held compass and clinometer in combination with a tape measure) methods and digital techniques. The latter used the DistoX which allows laser measurement of distance as well as bearing and inclination simultaneously.



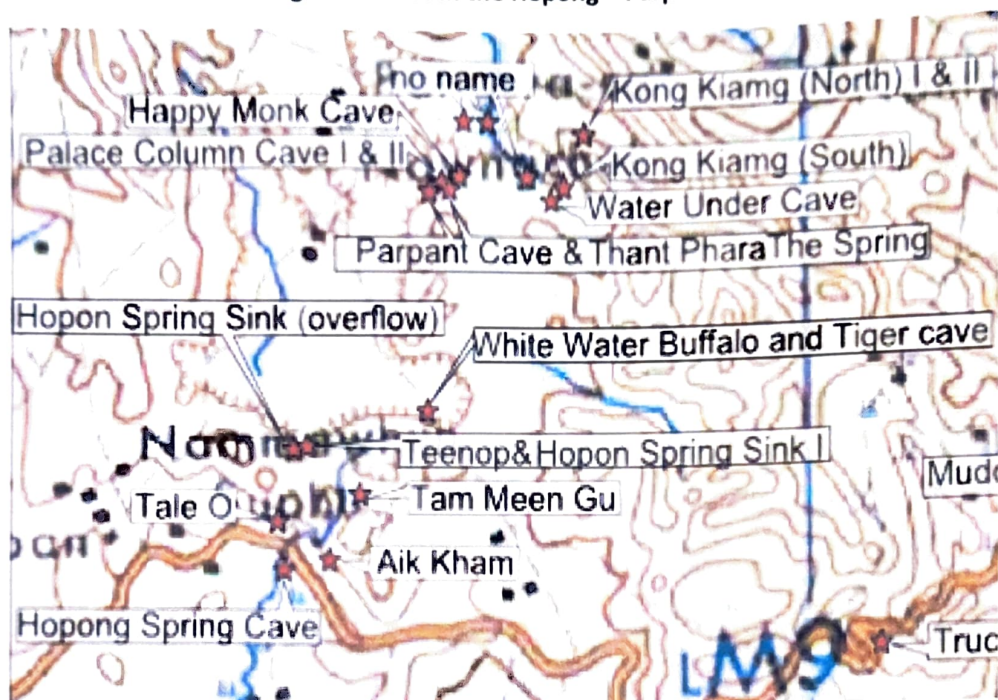
Chris Denham in Teenop, Hopong

Hopong Region

Parpant - Hopong Area

In 2011 we returned to and extended Hopong Spring Cave, including entering the underground river at a second location by a spectacular shaft called Tale-O. We also identified the main sinks for Hopong Spring Cave, including the beautiful pool at Teenop, but found that the underground river issued from a rising sump well before this location. We revisited the sumps in White Water Buffalo and Tiger Cave, but these could not be passed. A number of new caves were identified and explored, and these are described below. The entrance locations are shown in Figure 3.

Figure 3 Caves in the Hopong – Parpant Area

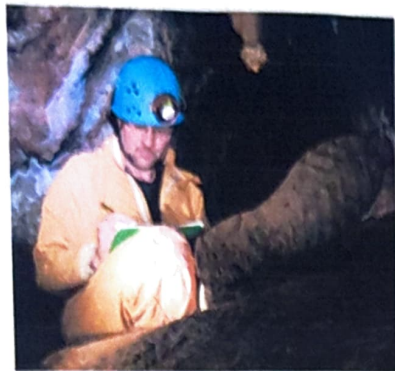


Kong Kaimg

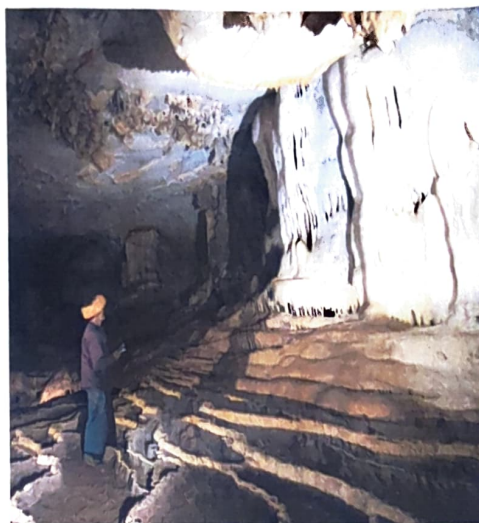
This cave was shown to us by the team from the monastery and comprised a 654m long through trip. The main passage is north south to northeast southwest trending and is an old fossil passage which cuts through the topography of the current landscape, exiting on either side of a small hill. In some places it is possible to climb down to a small active stream at a lower level. There are some smaller side passages which we did not have time to fully explore. The cave is well decorated throughout.

Palace Column Cave

Palace column cave is located immediately adjacent to Parpant, in very close proximity to Parpant Cave and Happy Monk Cave, although we were not shown the entrance in 2010. The cave is 404m long and consists of a very large fossil passage which intersects the hillside in three locations. In some places it is possible to climb down to lower levels, but these all close down. The cave is well decorated throughout.



Surveying in Kong Kaimg Cave



Palace Column Cave

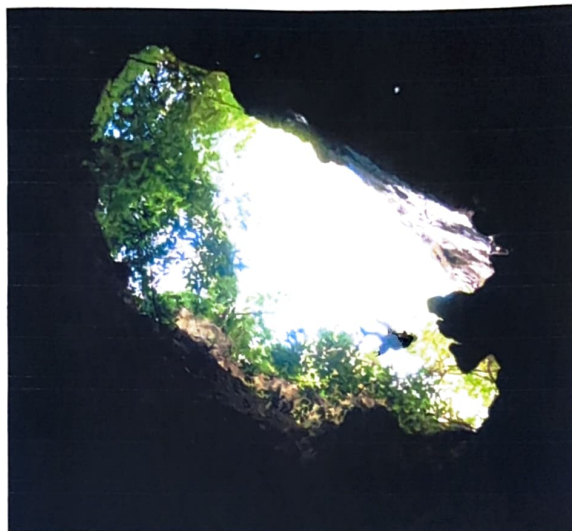
Hopong Spring Cave - Tale O

In 2010 we explored Hopong Spring Cave to where the river was blocked by a flowstone climb which could not be ascended unaided. In 2011 Imogen Furlong aid climbed this obstacle to regain the river which she, Chris Densham and Joerg Dreybrodt explored for several hundred metres. Meanwhile, Fleur Loveridge, Pete Talling and Phil Rowsell were being shown the large shakehole containing the shaft Tale O. This 40m pitch was descended by single rope technique (SRT) to reach a loose slope of boulders and soil. By climbing down this slope to its base a large river was met, which was followed in both directions for a few hundred metres. Given the location of the Tale O entrance it was immediately postulated that this river was the same as that at Hopong Spring Cave.

The following day, Imogen, Pete and Joerg entered by the resurgence cave and started to survey the river passage heading upstream. At the same time, Fleur, Phil and Chris descended Tale O also started surveying the river passage in an upstream direction. The hope was that they would meet at some point during the day. In the end, upstream from Tale O continue 700m to rising sump. The passage contained a lot of sharp and sculpted rock with ankle to waist deep water and occasional swimming sections. A few minor side passages were not able to be explored due to lack of time. Upstream from the resurgence continued for 852m in fast flowing water and 5m wide passage, mostly wading depth, until it did indeed connect Tale O, taking the total system length to 1.8km.



The river in Hopong Spring Cave



Descending Tale O

Aik Kham

Aik Kham and Htam Meen Gu are two high level fossil caves located in the hills above Hopong Spring Cave. Aik Kham consisted of a very high and well decorated trunk passage which was followed up flowstone climbs to a narrowing. A significant draft emitted from a small hole, which could be followed to further climbs up flowstone and calcite. However, a rope would have been required to continue up these climbs safely. Consequently, although we had been told that Aik Kham connects to the river in Hopong Spring Cave, it was not possible to verify this. Nonetheless, GPS and survey

data suggests the two caves to be very close together. The cave was surveyed to 305m length to the start of the second series of climbs up.

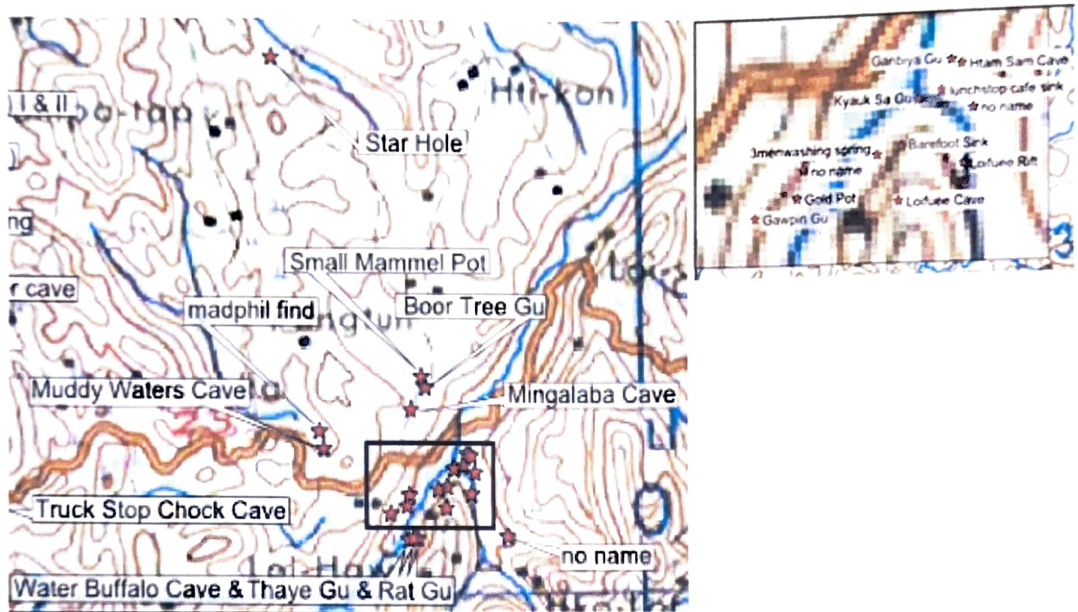
Htam Meen Gu

A dry walking entrance with old stalagmite and flowstone decoration and mud floor, zero draught indicated that it was probably sealed off to any larger cave and indeed the cave finished after 170m. It was however very well decorated with several tall columns and a host of stalactites. It was also home to a number of bats. There was evidence it had been used for meditation purposes in the past with some polished sections.

Htam Sam Area

While it was a disappointment not to continue exploration in Htam Sam cave itself, we made some extensions in Barefoot Cave, surveyed a number of new caves in the area and identified a promising new area to the north of Htam Sam Cave. Unfortunately we were unable to return to this latter location and exploration in this area must wait for future years.

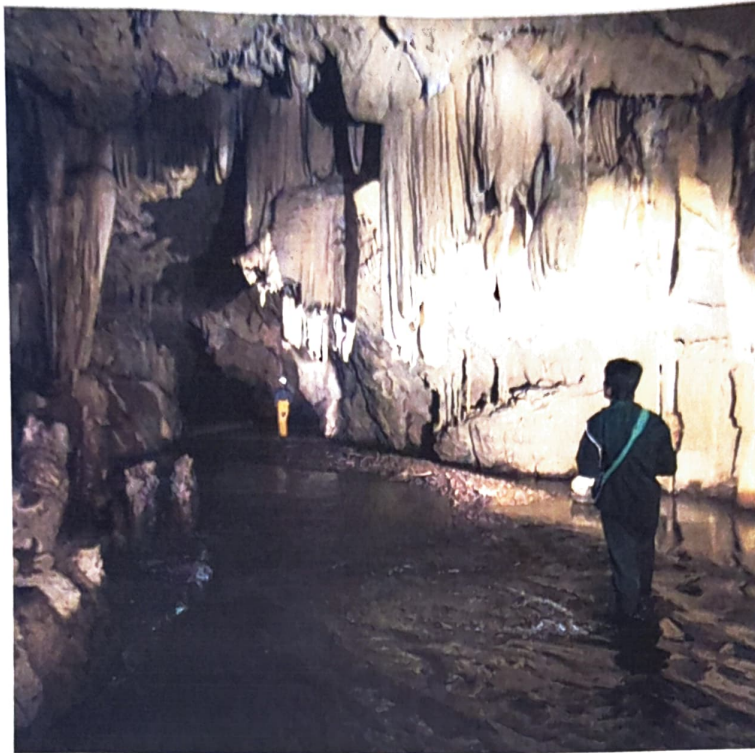
Figure 4 Main Caves in the Htam Sam Area



Barefoot Cave – Lunch Stop Cafe Sink - Scaffolding Cave

We always suspected that the water in Barefoot Cave flowed beneath Lunch Stop Cafe Sink and on to Scaffolding cave, but this was not tested in 2010. This year we were told that this was the case and attempted to survey the connection. Working downstream from Lunch Stop Cafe Sink we were able to re-enter the river and follow this for approximately 50m. However, as the depth of the water increased to within 20cm of the roof level and the nature of the river became severely polluted we ceased exploration of safety grounds. It was considered that given the build up of waste at this location it was likely that the passage must sump shortly afterwards. This was subsequently proved from the Scaffolding Cave end which Joerg Dreybrodt followed to a sump the following day.

Meanwhile, in the vicinity of large doline at Lunch Stop Cafe Sink, an inlet to the main river had been noticed. This was followed, via significant depths of mud, to where the smaller inlet stream rose from beneath one of the walls. A significant side passage was also explored, via some higher level fossil passage to an aven with a possible lead at roof level. There is a lot of mud in these areas, suggested significant backing up in the wet season. Subsequent surface reconnaissance works identified two sinks in the flat valley behind Loi Fuee Cave which are expected to be the source of the inlet water.



In Barefoot Cave

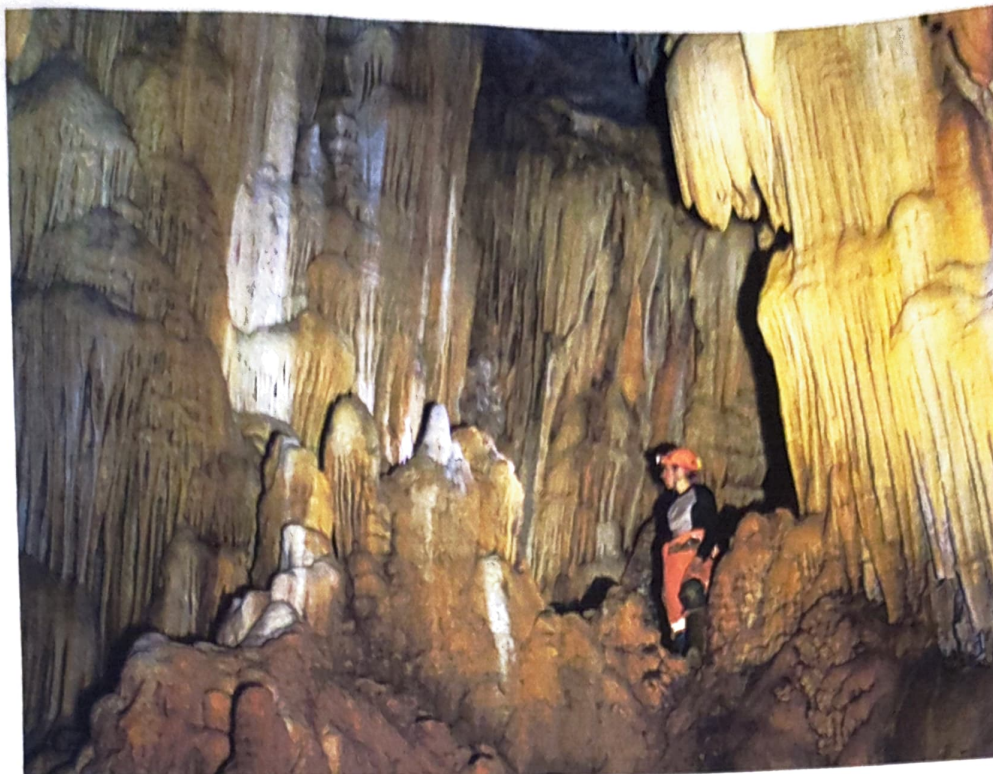
Loi Fuee Cave

Loi Fuee Cave is on the opposite side of the main valley to Gold Pot explored in 2010. The cave is much more complex than any others explored in the Htam Sam and Hopong areas, with much of the cave passage being formed by collapse. Although 234m in length, the plan area of the cave is limited with many passages being on top of one another. As with the other high level caves in this area, Loi Fuee Cave is extremely well decorated.

Loi Fuee Rift

Near to Loi Fuee cave is a steeply descending rift of approximately 50m depth. It is possible to climb down the hading rift, but it was found to have "bad air" (carbon dioxide build up) at the base and hence only a low grade survey was conducted.

Two short caves less than 50m each, Ghost Cave and Rat Cave were also shown to use near Loi Fuee village itself.



Loi Fuee Cave

Mingalaba Cave

In the area near the Pagoda site above Htam Sam were shown the entrance to a 40m shaft which we names Mingalaba Cave after the large quantities of thick and sticky mud at its base. From the bottom of the shaft the cave was explored for a further 30m down small muddy climbs until it closed down. One route appeared to take water in the wet season but no active stream was seen. A number of animal bones were recovered from the base of the shaft.

We were also shown three further entrances in the vicinity of Mingalaba Cave, but these were not entered.

Star Hole and Hill Hole

Around 4 miles to the north of the Htam Sam Pagoda we were shown the location of Star Hole. We were told that this cave was used for disposal of bodies of those people executed by the local tribes for various crimes. We were not given permission to descend this hole. We were also informed by some local people that a short distance away was a shaft known as Hill Hole, which was reported to be around 200 feet deep with water at the bottom. Again, we were not given permission to descend this hole.

Despite being unable to enter both these caves, this was the furthest from the main road which we had been able to travel so far.

Kutkai Region

We visited four caves to the north of Kutkai, all shown to us by local residents of the village Naung See. Naung See itself was inside a large, but shallow doline and the local people explained that when it rains the water sinks within the doline, but without any accompanying cave entrance. Instead the area to the west and slightly above the doline proved more interesting, containing the complex Naung See No. 2 Cave.

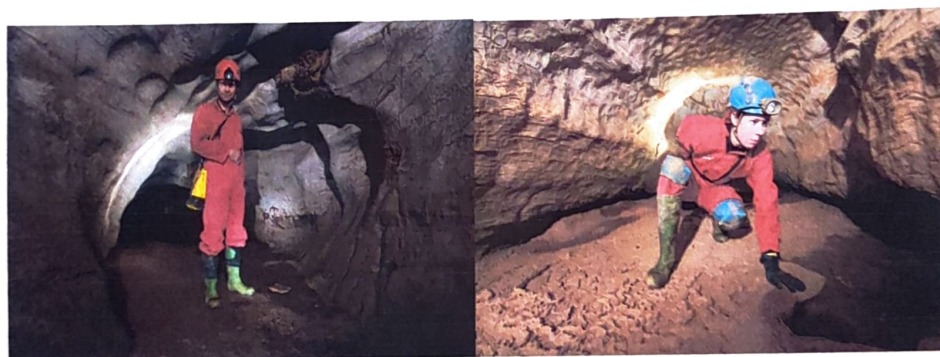
We also visited an area to the south and east of Kutkai, near Khom Lom village, where we had been told that there was a cave near the bottom of a deep gorge. The cave in fact turned out to be a natural bridge over the gorge, and although the geology of the area was limestone, this seemed to be developed into a spectacular gorge network rather than cave systems. We followed the river upstream to try and trace its origin, but this led only to a hydroelectric scheme and more rolling topography.

Naung See No. 1 Cave

The first cave we were shown near Naung See was only a few body lengths long and soon closed down. Its cracked mud floor, however, indicated that it is a sink in the wet season.

Naung See No. 2 Cave

This was the most substantial cave explored in the Kutkai area. Whereas most of the caves in the Hopong area were close to linear, with few side passages, Naung See No. 2 cave was very complex, with a passage network totally 859m. From the large entrance chamber a number of ways lead off. To the right and downslope there is a small and muddy active streamway, which is seen in three sections at different points in the cave. In this, the upstream section, the water flows from a rising sump through a narrow passage with small mudbanks on either side. Straight across from where the stream is first encountered it is possible to scramble up a mud slope to gain a section of high level fossil passage which eventually closes down.



Back in the entrance chamber, there are two further ways on. To the left a loop of high level fossil passage can be followed, while straight on and upslope leads to a sculpted section of old phreas. This gets smaller, and the way on is through a small hole emitting a strong draught. Crawling through here, one emerges, through a calcite shark's jaw formation, into a larger old, but mud filled passage. This continues to a cross roads. Turning right it is possible to regain the stream in a small muddy passage. Upstream leads to a sump, while downstream becomes low and miserable. Turning left at the cross roads a well decorated high level passage continues for a short distance, while straight on

it is possible (with care) to climb up a mud slope into the main continuation passage. This continues to intercept a large mudfilled chamber, which required more mud scrambling to exit. The continuation of the stream is then met again and can be followed to a downstream lake where it sumps. A small and muddy side passage to an aven also enters at this point.

Interestingly the mudbanks adjacent to the stream contain a very high density of animal claw / spine markings and these have been interpreted as porcupine scratches.

Tan La Moh 97m

A short cave ending after 97m

Ong Song Dwi

This cave was located 5km south of **Naung See** and the particular entrance Imogen Furlong and Pete Talling were shown had huge potential. With a strong draught, the entrance seems to come in at an intersection of 3 passages each ongoing in straight line with no signs of breakdown. There was no time to explore this, however, it is a very good lead for future trips to the area.

Lashio Region

Only two caves were entered in the area to the north and west of Lashio. However, one of these Man Htam Nam Leh, is an exciting prospect for further exploration.

Htam Pu Yam

While we were searching for the location of Man Htam Nam Leh, some local villagers took us to see Htam Pu Yam. The cave is located 15 minutes walk from the E-Nai Nah-Sai road and comprises one main passage with ends and a complex of small tube like passages which were not pushed to a conclusion. However, there is no draught in the cave. The cave was not surveyed as our time was prioritised to find Man Htam Nam Leh.

Man Htam Nam Leh

Man Htam Nam Leh is located over one hour from E-Nai at the end of a very poor quality dirt road. The chief of E-Nai arranged a guide with a motorbike to take us to the cave. However, after some time, which included several stops to dig out the ruts in the road, we reached a section of road which was impassable to our pickup truck. The road is only normally used for ox carts and motorbikes. As this was our only opportunity to visit Man Htam Nam Leh, we dispatched Imogen Furlong by motorbike with our guide to visit the cave. The cave proved to be a further hour by motorbike along the road. As well as the large 25m wide river resurgence passage, there is a second entrance high up. This is understood to be a significant cave and remains an excellent prospect for next year's expedition.



Fossil Entrance



Resurgence Entrance

Environment

Geology and Geomorphology

The Permian and Triassic carbonate sequences of Eastern Myanmar are extensive and large tracts of the Shan Plateau are comprised of these sediments (Figure 5). Although the main lithology throughout is limestone, this is often dolomitic rather than calcitic. The stratigraphy and ages of these deposits were uncertain for some time, with the major carbonate units variously referred to as the Plateau Limestone¹, or the Shan Dolomite Group², in older publications. More recently, a revised stratigraphic assessment has been made³ which divides the carbonates into two main units:

1. The Thitsipin Limestone Formation, named for a type section at Thitsipin village near the township of Ye-ngan in the Southern Shan State. The Formation comprises five main lithofacies:
 - a. Poorly bedded conglomerate
 - b. Laminated calcareous shale and other fined grained carbonate sediments
 - c. Massive fined grained calcareous sediments
 - d. Thick bedded calcareous sandstone with some calcareous mud
 - e. Massive or poorly bedded cherty wackestone (matrix supported calcareous grains within carbonate mud)

Some sections of the formation are partially dolomitised and comprise fine grained dolomite.

2. The Thitsipine Limestone Formation then passes transitionally upwards into the Nwabangyi Dolomite Formation
 - a. Calcareous conglomerate and sandstone with some carbonate mud.
 - b. Poorly bedded dolomitic wackestone
 - c. Thin bedded dolomitic and bioclastic wackestone
 - d. Thinly laminated turbiditic dolomitic mudstone

The formation often suffers from shattered and brecciation.

¹ Geological Map of the Socialist Republic of the Union of Burma, Prepared under the auspices of the earth science research division, research policy direction board, Government of the Socialist Republic of the Union of Myanmar, 1:1,000,000 March 1977.

² Bender, F. (1983) *Geology of Burma*, Gerbruder Borntraeger, Berlin.

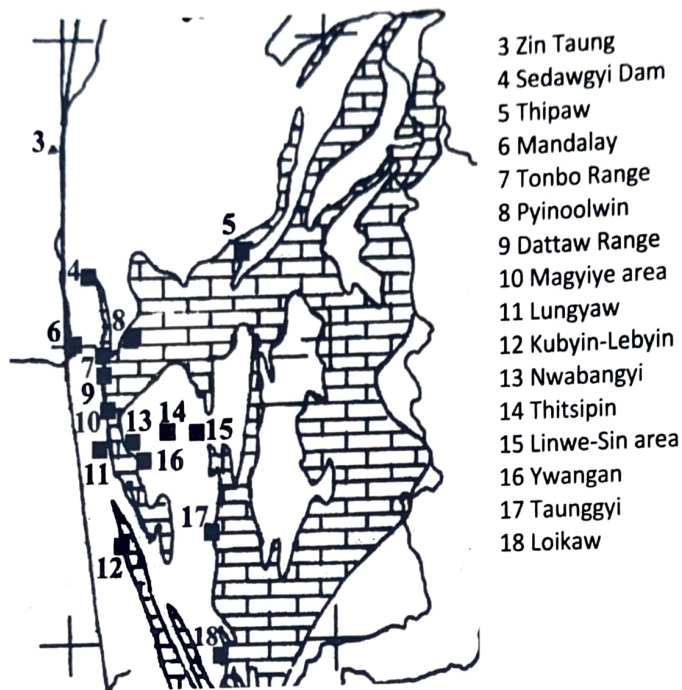
³ Oo, T., Hlaing, T. & Htay, N. (2002) The Permian of Myanmar, *Journal of Asian Earth Sciences*, 20, 683-689.

The overlying Permian limestones tends to be more crystalline and less sandy than the underlying Devonian strata. The younger limestones also contain a greater proportion of calcium carbonate, up to 98%⁴.

The sequence of carbonate rocks is thought to be of considerable thickness, with estimates in the range of 5000ft (approximately 1650m) in the Northern Shan State¹ and up to 1000m in the Southern Shan State⁵.

The presence of these abundant carbonate beds has a major impact on the scenery in the Shan States, leading to "dramatic scarp and ridge scenery and with spectacular karstic features"³. The carbonates that form the Shan Plateau also form a natural geographic break between the elevated and cooler plateau states and the hotter lowlands to the east.

Figure 5 Extent of the Permian and Triassic Carbonates in Eastern Myanmar



Hydrology and Hydrogeology

Hopong Area

Most of the caves explored in the Hopong region comprise large phreatic passages that would have been formed when the local groundwater table was at a higher elevation. These passages are now either dry (for example Palace Column Cave) or have been captured by the present hydrological system (eg Barefoot River Cave). In many cases the current water courses are "misfit" to these older passages or in some cases use them only in the rainy season as flood overflow routes. Many of the active stream caves end in sumps, where the current water table is coincident with the old phreatic

⁴ Chibber, H. L. (1934) *Geology of Burma*, MacMillan and Co Limited, London.

⁵ Robertson Research International Ltd (1997) *Burma, South East Asia Geological Map Series, 1:2,000,000*, with explanatory notes, June 1997.

level, or when the extensive calcite formations and flowstones within those caves come down to meet the water. In the dry phreas these extensive formations often block the passages themselves, where calcite deposits associated with old water flow has come to entirely fill the passages.

Other Areas

In Kutkai where only one significant cave was explored, the presence of older phreatic passages and smaller more recent misfit streams were also noticed. However, it was also clear that significantly larger volumes of water must flow in the rainy season, or at least back up from sumps, due to the extensive recent mud deposits.

Further exploration is required in the Lashio area in order to understand the hydrogeology.

Weather

We saw no rain in Myanmar this year. In the Southern Shan State day temperatures were again warm, with cooler evenings. However, the Northern Shan State was noticeably cooler, especially at night and warmer cloths are recommended for further visits to the north.

Cultural Differences

In 2010 the expedition was focused in the Southern Shan State and the area populated by the Pa-O tribe. In addition, we also saw some Chinese and Indian influences in the large city of Taunggyi, but this was entirely absent from rural areas.

As we moved further north, towards the border at Muse, the Chinese influence became much more significant. As well as being noticeable in the cuisine, we found greater numbers of mandarin speakers, and even some rural villages where mandarin was the first language rather than Myanmar.

The capital of the Northern Shan State, Lashio, was also more culturally diverse. There was a strong Indian community and a number of mosques were prominent within the city. Buddhism appeared to be substantially smaller influence in this part of Myanmar.

Appendix A: Cave Locations

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Htam Sam	3menwashing spring		2010	0326397	2302445	1227	10m		spring - too small	dead
Htam Sam	Barefoot Cave	HatHu Creek Parla	2010					386+2010	active stream passage, sumps both ends, but can exit to lunchstop cafe sink	dead
Htam Sam	Barefoot Sink		2010	0326520	2302482	1228	10m		Where Barefoot Cave water sinks. 1m2 entrance, with flood debris.	not explored
Htam Sam	Gawpin Gu		2010	0325776	2302152	1289	-		Small depression, start of small stream, sinks after 8m, 2 3m climbs, possible way on, good draught.	not explored
Htam Sam	Gold Pot		2010	0325990	2302243	1309	8m	122	pitch to well decorated cave	dead
Htam Sam	Htam Sam		2010	0326826	2302879	1234	-	587	Major temple cave to sacred lake	ongoing
Htam Sam	lunchstop cafe sink		2010	0326724	2302750	1248	-	-	Connects to Barefoot Cave, expected to connect to Scaffolding cave	ongoing
Htam Sam	Muddy Waters cave		2010	0324919	2302988	1278			Connects to stream sink	dead
Htam Sam	no name		2010	0326024	2302382	1304			sink to stal filled recess; no draught	ongoing
Htam Sam	Overlooked cave	Undersold Cave	2010	no-cordinates				phil knows	Flood overflow to muddy waters	dead
Htam Sam	Scaffolding Cave		2010						not explored, expected to connect to lunchstop cafe	ongoing
Htam Sam	Stone Scripture Cave North Entrance	Windy Cave (Kyauk Sa GuE2)	2010	0326604	2302710	1241		225	well decorated through trip	dead
Htam Sam	Stone Scripture Cave South Entrance	Quarry cave (Kyauk Sa Gu E1)	2010	0326604	2302710	1253		225	well decorated through trip	dead
Htam Sam	Supernatural Cave	Ganbiya Gu	2010	0326776	2302901	1239		163	well decorated	dead
Htam Sam	Thaye Gu (Ghost cave)		2010	0326067	2301827				not surveyed -ends in choke	

	Waterbuffalo Cave	Kyu wa gu	2010	0326005	2301814			not surveyed, ends in choke	finished
	Happy Monk Cave		2010	0316861	2306630	1161	479	large passage, possible hamsterable squeeze	lead
	Hopon Spring Cave		2010	0315185	2303004	1115	1527+2010	river cave to calcite climb	ongoing
	Parpant Cave		2010	0316576	2306491			temple cave	dead
	Thant PharaThe Spring		2010	0316770	2306510	1059		Major Sink	
	White Water Buffalo and Tiger cave		2010	0316533	2304470	1128	1343	major river cave with two branches, sumps upstream in both cases	dead
Truck Stop	Truck Check Stop Cave		2010	0320749	2302235			not surveyed, ends in choke	dead
	no name(madphil find)		2010	0324863	2303209			not explored	
Htam Sam	Mingalaba Cave		17/01/2011	9719423	2049231	1306	88	pitch to small muddy passages	dead
Htam Sam	Boor Tree Gu		17/01/2011	9719490	2049323	1314		climb down to narrow slot and short drop, no draught	ongoing
Htam Sam	Waterbuffalo Bore Pot		17/01/2011	9719478	2049377	1330		5m deep, 3mx4m wide pot, slight draught	ongoing
Htam Sam	Small Mammel Pot		17/01/2011	9719471	2049370	1329		two adjacent pots, 7m deep, contains mammel bones	ongoing
Htam Sam	Loifuee Cave		17/01/2011	9719583	2048423	1240	263	large depression, well decorated but ultimately choked cave	dead
Parpant	Hopon Spring Sink (overflow)		19/01/2011	0315269	2304123	1134		too small, choked with water and flood debris	dead
Parpant	Hopon Spring Sink I		19/01/2011	0315392	2304152	1134	8m	active sink filled with debris, several overflow entrances all choked with mud	dead
Parpant	Teenop Hopon Spring Sink II		19/01/2011	0315269	2304128	1124	9m	active stream sink with cascades and gowers. Sumps.	dead
Parpant	no name		20/01/2011	0317497	2306614	1164	12m	small dry streambed sink	dead
Parpant	Water Under Cave		20/01/2011	0317721	2306401	1177	12m	stream passage which villages have been inside	ongoing
Parpant	Kong Kiamg (South)		20/01/2011	0317841	2306519	1184	14m	654 6m climb down into large passage	ongoing
Parpant	Kong Kiamg (North) I		20/01/2011	0318035	2307004	1240	654	northern entrance to Kong Kiamg	ongoing
Parpant	Kong Kiamg (north) II		20/01/2011	0318038	2307004	1234	654	northern entrance to Kong Kiamg	ongoing
Htam Sam	Rat Gu		21/01/2011	0326121	2301833	1258		large entrance at base of 20m cliff in jungle	dead
Htam Sam	Loifuee Rift		21/01/2011	0326829	2302387	1276	49	hading rift to choke and bad air	dead

	no name			21/01 /2011	0327297	2301846	1241		major sink for valley beyond Loifuaa	dead
	no name			21/01 /2011	0326881	2307658	1256		major sink for valley beyond Loifuaa	dead
	Palace Cave I	Column	Parpant Cave I	19/01 /2011	0316694	2306575	1184	181	large fossil cave about Parpant	dead
	Palace Cave II	Column	Parpant Cave II	19/01 /2011	0316695	2306573	1191	181	large fossil cave about Parpant	dead
Htam Sam	Star Hole			21/01 /2011	0324320	2307948	1472		large shaft adjacent to road, 4 miles north Htam Sam, local criminal bodies at base!	ongoing
Htam Sam	Hill Hole			21/01 /2011					500ft shaft near village near Star Hole	ongoing - not seen
Htam Sam	Hill In Cave			21/01 /2011					Cave which goes "in" near Hill How	ongoing - not seen
Parpant	Aik Kham			22/01 /2011	0315591	2303095	1170	10m	305 Large well decorated fossil passage, climbs up gowers, needs rope	ongoing
Parpant	Tam Meen Gu	Cat Cave		22/01 /2011	0315887	2303704	1148	2m	170 old fossil passage, well decorated, descending, local hammered squeeze to chamber to low crawl to terminal muddy chamber	dead
Parpant	no name			22/01 /2011	0316911	2307135	1157		choked cave entrance	dead
Parpant	no name			22/01 /2011	0317133	2307127	1156		choked cave entrance	dead
Parpant	no name			22/01 /2011					doline to east of Parpant	dead
Parpant	Tale O	Hopon Shaft	Spring	23/01 /2011	0315108	2303457	1165		40m shaft to large river connecting to Hopong Spring Cave	ongoing
Ywangan	no name			25/01 /2011	0227684	2359620	1180		3-5m phreatic tube, ongoing after 20m, draughts	ongoing
Kutcai	Natural Bridge			28/01 /2011	0404986	2591294	1382		short natural bridge within gorge	dead
Kutcai	Naug See No.1 Cave			29/01 /2011	0388330	2599521	1297		short mud choked chamber	dead
Kutcai	Naug See No.2 Cave			29/01 /2011	0388271	2599503	1304	859	complex multilevel cave, possible high level lead remains, plus small crawl with hairy mary	ongoing
Kutcai	Htan La Moh			29/01 /2011	0388762	2601605	1296	97	short muddy cave	dead
Kutcai	Ong Song Dwi			30/01 /2011	0391742	2601266	1290		large ongoing cave with excellent potential	ongoing
Kutcai	no name			30/01 /2011	0391576	2601135	1283		unentered dolines near Ong Song Dwi	??

Lashio

Lashio

Lashio

Lashio

Area

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

Htam Sam

no name			30/01 /2011	0391349	2600978	1298			unentered dolines near Ong Song Dwi	??
no name			30/01 /2011	0391339	2600955	1300			unentered dolines near Ong Song Dwi	??
16 stupa cave			31/01 /2011	0392710	2583647	1268			gps on road near cave behind large group of stupas. Water allegedly resurgences at Hsenwi	ongoing

Htam Fu Yam I			01/02 /2011	0352120	2543133	1281			large entrance at side of doline, one large passage, possible ongoing tubes, possible rift at back, low prospects	ongoing
Htam Fu Yam II			01/02 /2011	0352142	2543111	755			as above	ongoing
Htam Nam Lay			01/02 /2011	0364221	2556316	667			large resurgence cave, ongoing with excellent potential	ongoing

Area	Name	Alternative Name	Date	UTM Easting	UTM Northing	Elevation	Accuracy	length m	Comments	Exploration
Htam Sam	3menwashing spring		2010	0326397	2302445	1227	10m		spring - too small	dead
Htam Sam	Barefoot Cave	HatHu Creek	2010					386+2010	active stream passage, sumps both ends, but can exit to lunchstop cafe sink	dead
Htam Sam	Barefoot Sink		2010	0326520	2302482	1228	10m		Where Barefoot Cave water sinks. 1m2 entrance, with flood debris.	not explored
Htam Sam	Gawpin Gu		2010	0325776	2302152	1289			Small depression, start of small stream, sinks after 8m, 2.3m climbs, possible way on, good draught.	not explored
Htam Sam	Gold Pot		2010	0325990	2302243	1309	8m	122	pitch to well decorated cave	dead
Htam Sam	Htam Sam		2010	0326826	2302879	1234		587	Major temple cave to sacred lake	ongoing
Htam Sam	lunchstop cafe sink		2010	0326724	2302750	1248			Connects to Barefoot Cave, expected to connect to Scaffolding cave	ongoing
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Htam Sam	Scaffolding Cave		2010						not explored, expected to connect to lunchstop cafe	ongoing
Htam Sam	Stone Scripture Cave North Entrance	Windy Cave (Kyauk Sa Gu E2)	2010	0326604	2302710	1241		225	well decorated through trip	dead
Htam Sam	Stone Scripture Cave South Entrance	Quarry cave (Kyauk Sa Gu E1)	2010	0326604	2302710	1253		225	well decorated through trip	dead

	Supernatural Cave	Ganbiya Gu	2010	0326776	2302901	1239	161	well decorated	dead
	Thaye Gu (Ghost cave)		2010	0326067	2301827			not surveyed - ends in choke	
	Waterbuffalo Cave	Kyu-wa gu	2010	0326005	2301814			not surveyed - ends in choke	finished
	Happy Monk Cave		2010	0316861	2306630	1161	429	large passage, possible hammerable squeeze	lead
	Hobon Spring Cave		2010	0315165	2303004	1115	1527+2010	river cave to calcite climb	ongoing
	Parpant Cave		2010	0316576	2306491			temple cave	dead
	Thant PharaThe Spring		2010	0316770	2306510	1059		Major Sink	
	White Water Buffalo and Tiger cave		2010	0316533	2304470	1128	1343	major river cave with two branches, sumps upstream in both cases	dead
	Truck Check Stop Cave		2010	0320749	2302235			not surveyed - ends in choke	dead
	no name(madphil find)		2010	0324863	2303209			not explored	
	Mingalaba Cave		17/01/2011	9719423	2049231	1306	88	pitch to small muddy passages	dead
	Boor Tree Gu		17/01/2011	9719490	2049323	1314		climb down to narrow slot and short drop, no draught	ongoing
	Waterbuffalo Bore Pot		17/01/2011	9719478	2049377	1330		5m deep, 3mx4m wide pot, slight draught	ongoing
	Small Mammel Pot		17/01/2011	9719471	2049370	1329		two adjacent pots, 7m deep, contains mammel bones	ongoing
	Loifuee Cave		17/01/2011	9719583	2048423	1240	263	large depression, well decorated but ultimately choked cave	dead
	Hopon Spring Sink (overflow)		19/01/2011	0315269	2304123	1134		too small, choked with water and flood debris	dead
	Hopon Spring Sink I		19/01/2011	0315392	2304152	1134	8m	active sink filled with debris, several overflow entrances all choked with mud	dead
	Teenop Hopon Sink II	Spring	19/01/2011	0315269	2304128	1124	9m	active stream sink with cascades and gowers. Sumps.	dead
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				21/01 /2011	0126121	2301831	1258		large entrance at base of 20m cliff in jungle	dead
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				21/01 /2011	0127297	2301846	1241		major sink for valley beyond Loifuee	dead
				21/01 /2011	0126881	2302658	1256		major sink for valley beyond Loifuee	dead
	Palace Column Cave I		Parpant Cave I	19/01 /2011	0316694	2306575	1184	381	large fossil cave about Parpant	dead
	Palace Column Cave II		Parpant Cave II	19/01 /2011	0316695	2306573	1191	381	large fossil cave about Parpant	dead
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	no name		30/01/2011	0391576	2601135	1283			unentered dolines near Ong Song Dwi	??
	no name		30/01/2011	0391349	2600978	1298			unentered dolines near Ong Song Dwi	??
	no name		30/01/2011	0391339	2600955	1300			unentered dolines near Ong Song Dwi	??
	16 stupa cave		31/01/2011	0392710	2583647	1268			gps on road near cave behind large group of stupas. Water allegedly resurgences at Hsenwi	ongoing
Lashio	Htam Fu Yam I		01/02/2011	0352120	2543133	1281			large entrance at side of doline, one large passage, possible ongoing tubes, possible rift at back, low prospects	ongoing
Lashio	Htam Fu Yam II		01/02/2011	0352142	2543111	755			as above	ongoing
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Htam Sam	Gawpin Gu		2010	0325776	2302152	1289	-		Small depression, start of small stream, sinks after 8m, 2 3m climbs, possible way on, good draught.	not explored
Htam Sam	Gold Pot		2010	0325990	2302243	1309	8m	122	pitch to well decorated cave	dead
Htam Sam	Htam Sam		2010	0326826	2302879	1234	-	587	Major temple cave to sacred lake	ongoing
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Htam Sam	Scaffolding Cave		2010						not explored, expected to connect to lunchstop cafe	ongoing

	Stone Cave Entrance	Scripture North (Kyeuk Sa GuE2)	Windy Cave	2010	0326604	2302710	1241		225	well decorated through trip	dead
	Stone Cave Entrance	Scripture South (Kyeuk Sa Gu E1)	Quarry cave	2010	0326604	2302710	1251		225	well decorated through trip	dead
	Supernatural Cave		Ganhyo Gu	2010	0326776	2302901	1339		161	well decorated	dead
	Thaye Gu (Ghost cave)			2010	0326067	2301827				not surveyed - ends in choke	
	Waterbuffalo Cave		Ryu-wa-gu	2010	0326005	2301814				not surveyed - ends in choke	finished
	Happy Cave	Mink		2010	0316861	2306630	1161		429	large passage, possible hammerable squeeze	lead
	Hofon Cave	Spring		2010	0315165	2303004	1115	1527+201 0		river cave to calcite climb	ongoing
	Parpant Cave			2010	0316576	2306491				temple cave	dead
	Thant PharaThe Spring			2010	0316770	2306510	1059			Major Sink	
	White Buffalo and Tiger cave	Water and		2010	0316533	2304470	1128		1343	major river cave with two branches, sumps upstream in both cases	dead
	Truck Stop Cave	Chock		2010	0320749	2302235				not surveyed - ends in choke	dead
			no name(madphil find)	2010	0324863	2303209				not explored	
				17/01 /2011	0319423	2049231	1306		88	pitch to small muddy passages	dead
			Mingalebo Cave	17/01 /2011	0319490	2049323	1314			climb down to narrow slot and short drop, no draught	ongoing
			Boor Tree Gu	17/01 /2011	0319478	2049377	1330			5m deep, 3mx4m wide pot, slight draught	ongoing
			Waterbuffalo Bore Pot	17/01 /2011	0319471	2049370	1329			two adjacent pots, 7m deep, contains mammal bones	ongoing
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			Teenop	20/01 /2011	0317497	2306614	1164	12m		small dry streambed sink	dead
			no name	20/01 /2011	0317721	2306401	1177	12m		stream passage which villages have been inside	ongoing
			Water Cave	20/01 /2011	0317721	2306401	1177	12m		stream passage which villages have been inside	ongoing

	Kong (South)	Kiang		20/01/2011	0317841	2306510	1184	14m	654	6m climb down into large passage	ongoing
	Kong (North) I	Kiang		20/01/2011	0318035	2307004			654	northern entrance to Kiang Kiang	ongoing
	Kong (North) II	Kiang		20/01/2011	0318038	2307004			654	northern entrance to Kiang Kiang	ongoing
	Rat Gu			21/01/2011	0326121	2301833				large entrance at base of 20m cliff in jungle	dead
	Loifuee Rift			21/01/2011	0326829	2302387			49	hading rift to choke and bad air	dead
	no name			21/01/2011	0327297	2301846				major sink for valley beyond Loifuee	dead
	no name			21/01/2011	0326881	2302658				major sink for valley beyond Loifuee	dead
Parpant	Palace Cave I	Column	Parpant Cave I	19/01/2011	0316694	2306575			381	large fossil cave about Parpant	dead
Parpant	Palace Cave II	Column	Parpant Cave II	19/01/2011	0316695	2306573			381	large fossil cave about Parpant	dead
Htam Sam	Star Hole			21/01/2011	0324320	2307948				large shaft adjacent to road, 4 miles north Htam Sam, local criminal bodies at base!	ongoing
Htam Sam	Hill Hole			21/01/2011						500ft shaft near village near Star Hole	ongoing - not seen
Htam Sam	Hill in Cave			21/01/2011						Cave which goes "in" near Hill Holw	ongoing - not seen
Parpant	Aik Kham			22/01/2011	0315591	2303095		10m	305	Large well decorated fossil passage, climbs up gowers, needs rope	ongoing
Parpant	Tam Meen Gu	Cat Cave		22/01/2011	0315887	2303704		2m	170	old fossil passage, well decorated, descending, local hammered squeeze to chamber to low crawl to terminal muddy chamber	dead
Parpant	no name			22/01/2011	0316911	2307135				choked cave entrance	dead
Parpant	no name			22/01/2011	0317133	2307127				choked cave entrance	dead
Parpant	no name			22/01/2011						doline to east of Parpant	dead
Parpant	Tale O	Hopon Shaft	Spring	23/01/2011	0315108	2303457			1165	40m shaft to large river connecting to Hopong Spring Cave	ongoing
Ywangan	no name			25/01/2011	0227684	2359620			1180	3-5m phreatic tube, ongoing after 20m, draughts	ongoing
Kutcai	Natural Bridge			28/01/2011	0404986	2591294			1382	short natural bridge within gorge	dead
Kutcai	Nueng See No.1 Cave			29/01/2011	0388330	2599521			1297	short mud choked chamber	dead

	Naung See No. 2 Cave	29/01 /2011	0388271	2599503	1304	859	complex multilevel cave, possible high level lead remains, plus small crawl with hairy mary	ongoing
	Htan La Moh	29/01 /2011	0388762	2601605	1296	97	short muddy cave	dead
	Ong Song Dwi	30/01 /2011	0391742	2601266	1290		large ongoing cave with excellent potential	ongoing
Kutcai	no name	30/01 /2011	0391576	2601135	1283		unentered dolines near Ong Song Dwi	??
Kutcai	no name	30/01 /2011	0391349	2600978	1298		unentered dolines near Ong Song Dwi	??
Kutcai	no name	30/01 /2011	0391339	2600955	1300		unentered dolines near Ong Song Dwi	??
Kutcai	16 stupa cave	31/01 /2011	0392710	2583647	1268		gps on road near cave behind large group of stupas. Water allegedly resurgences at Hsenwi	ongoing
Lashio	Htam Fu Yam I	01/02 /2011	0352120	2543133	1281		large entrance at side of doline, one large passage, possible ongoing tubes, possible rift at back, low prospects	ongoing
Lashio	Htam Fu Yam II	01/02 /2011	0352142	2543111	755		as above	ongoing
Lashio	Htam Nam Lay	01/02 /2011	0364221	2556316	667		large resurgence cave, ongoing with excellent potential	ongoing

Appendix B: Expedition Log

Date	Who	What
15/01	All	Arrived Heho, met by guide and driver, stayed Eastern Hotel Taunggyi.
16/01	All	Arrived at the monastery, went to Htam Sam to meet Siador, but he was elsewhere. Investigated changes in Htam Sam. Met Siador at new cave (Dream Cave) near Parpant.
17/01	All PR, FL, CD IF, PT, JD All	Htam Sam : measured passage heights. Mingalaba Cave: descended and surveyed Shown 3 further entrances near Mingalaba Cave. Were met by Immigration representative and informed of problem with permissions to stay at monastery Shown new cave (Loi Fuee Cave) on opposite side of valley to Gold Pot. Returned to Eastern Hotel, Taunggyi.
18/01	PT, PR JD, CD IF, FL All	Measured roof heights in Stone Scripture Measured roof heights in Supernatural Cave Take photographs in Htam Sam Explore and survey Loi Fuee Cave Permission given to stay in Hopong
19/01	PR, CD, Insane IF, JD, FL IF, CD FL, JD, PT	Checked sumps in White Water Buffalo and Tiger Cave Visited two sinks for Hopong Spring Cave (largest called Teenop). Take photographs in Teenop Explore and commence survey of Palace Column Cave
20/01	All PT, PR FL, CD ; JD IF	Surveyed Kong Kaimg near Parpant Surface survey around Parpant Caves Continue surveying in Palace Column Cave. Take photographs (with entourage) in Palace Column Cave.
21/01	FL, JD PT, PR IF, CD PT, FL, JD All	Explore and survey Loi Fuee Rift to bad air Walked up broad flat valley bottom behind Loi Fuee; found two sinks Went to Loi Fuee village; shown Ghost Cave and Rat Cave Commenced survey of connection between Scaffolding Cave and Barefoot Cave Drive 4 miles north of Htam Sam Pagoda; shown Star Hole and told about Hill Hole.
22/01	All PR, PT, FL JD, IF, CD JD, CD PT FL, PR	Visited monastery, All Asia made donation (30,000kyat) on behalf of expedition. Permission for Star Hole not forthcoming. All return to Parpant area. Partial survey of Aik Kham, not far from main road. Halted by climbs up that need rope. Possibly connects to Hopong Spring Cave. Survey Htan Meen Gu, to the north of Aik Kham. Complete survey of Palace Column Cave. Short prospecting walk north from Parpant. Complete surface survey between Parpant Caves.
23/01	All PT, FL IF, CD JD FL (PR and PT on surface) IF, CD, JD	Visited monastery and Siador busy. All to Htam Sam. Surveyed new side passage from Lunch Stop Café Sink – found second river, and climb to unentered lead. Took photos in Barefoot Cave Swam into scaffolding cave – to a sump Then all to Hopong Spring Descended excellent shaft (name Tale O) Climbed upstream lead in Hopong Spring Cave. Large and fast flowing river passage beyond.
24/01	FL, CD, PT	Surveyed in Hopong Spring Cave upstream from Tale O entrance. Surveyed in Hopong Spring Cave upstream from resurgence.

Date	Who	What
	IF, JD, PT CD, IF, FL	Take photos in streamway
25/01	JD Others	Visits German vineyard to make contacts Travel to Pin Oo Lwin via promising karst area near Ywargon township.
26/01	JD Others	Travel to Yangon Travel to Kutkai
27/01	JD Others	Leaves Myanmar Apply for and wait for permits from local immigration department.
28/01	All	Visit area to south east of Kutkai near Kham Lom village. Shown a natural bridge cave, but limestone in predominantly forming canyons.
29/01	All FL, PR, CD PT, IF	Shown two caves near Naung See village to north of Kutkai. Surveyed in Naung See No. 2 cave for 500m, left ongoing. Shown a further cave, Tan La Moh, 2 miles to north. Grade surveyed.
30/01	All IF, PT	Complete survey and take photographs in Naung See No. 2 cave. Shown new cave 3km to the east of road near Naung See village. Cave is located approx half way to village of Hnar-y. Cave named Ong Song Dwi (cave in Kachin) after guide. Coordinates recorded for 3 further dolines in promising dry valley.
31/01	All IF, CD, FL	16 stupa cave Travel to Lashio and visit immigration department. Permission granted to visit large doline to north west of city. Myint Ko Ko, deputy director of the Northern Shan State Immigration had visited the area in 1983 and reported a large passage with river. Information also gained on significant temple cave near Tang Yan. Visit Lashio hot springs.
01/02	All IF	Take road to west of Lashio (Lashio E-nai Nah-sai) in order to access large doline. Shown cave (Htam Pu Yam) to north of road between E-nai and Nah-sai. Route to large doline is established from E-nai and permission gained from village head. However, road is unsuitable for vehicle. Continues to visit cave on motorbike with local man Soi Cho Lu. Take photographs of Man Htam Nam Leh and meet monk Cho Ehh.
02/02	All	Travel to Pin Oo Lwin
03/02	All	Travel to Yangon
04/02	All	Leave Myanmar

Appendix C: Equipment in Myanmar

Item	Supplied by	Cost
Rope		
70m	Chris	70
55m	Phil	55
22m	Phil	22
Grappling hook	Exped	-
Hammer	Exped	-
Chisel	Exped	-
Spit Driver	Fleur	45
Bolting Hammer	Fleur	45
10 Hangers	Phil	50
7 hangers	Chris	35
1 hanger	?	5
20 thربولts	Fleur	30
33 thربولts	Phil	49.5
10 Maillions	Phil	10
10 Maillions	Fleur	10
Pencil Tin	Fleur	-
1 Krabs	Chris	5
2 Krabs	Imo	10
Nylon Slings 12m,6m,3m,2.5m	Imo	25
	Chris	10
	Imo	25
Survey Tape 50m	Exped	-
3 Inner Tubes	Exped	-
Polyprop		
Phils Wellies		
Washing Powder		
Warmbac Tackle Bag - bottom seam ripped	Imo	25
Wire	Exped	-
Total		£527