

TRIP REPORT

Khumbu and Kathmandu, Nepal

Prepared By:

Daene McKinney and Alton Byers

September 8 – October 12, 2012

1. Background

1.1. Objectives of the Trip

This trip had several objectives for the program workplans, including:

Subtask 3.2.2.2 - Develop new and expanded collaboration, commitment, and co-financing with other donors for priority project implementation. HMGWP is coordinating with the UNDP Imja Lake GLOF Risk Reduction project. HMGWP contributions include:

- Perform key community/engineering/donor coordination role within the UNDP Imja Lake GLOF Risk Reduction project
- Coordinate a 1-day workshop on Imja Lake GLOF Risk Reduction and current State of Knowledge (October 8, 2012)
- Provide a briefing to USAID and/or UNDP staff in Bangkok, Thailand (October 11, 2012)
- Identify potential co-financing mechanisms for implementing high priority projects

Subtask 3.2.4.1 - V&A training, capacity building and adaptation planning. Activities will include:

- Conduct community consultations and V&A training with Khumbu communities in Phakding (Sept. 11-12), Namche Bazar (Sept. 14-15), and Dingboche (Sept. 18-19)
- Conduct photographic, video, and webpage design workshop for Khumbu communities (taught and co-financed by the National Geographic Society's Enduring Voices Program)
- Update KACC on results of May GPR survey at Imja Lake and conclusions for the Imja Lake GLOF project in a community consultation workshop (September 18, 2012)
- Prepare and deliver an Imja Lake informational panel on GPR survey results illustrating the thickness of the ice in the terminal moraine to KACC in Dingboche (September 18, 2012)
- Begin development of the outline of the Khumbu Adaptation Management Plan
- Begin development of the Glacial Lake Risk and Adaptation Options in the Mt. Everest Region Case Study.
- Present "Glacier Lake Outburst Flood Risks and Analysis" at the Tribhuvan University/Hokkaido University Mountain Conference (October 9, 2012)

Subtask 3.2.4.2 - GLOF Rapid Reconnaissance and Modeling. Activities including:

- Collaboration with Italian researchers at the EVK2 Pyramid research facility in Lebouche to obtain detailed topographic information of the Khumbu region for updated GLOF models and vulnerability analysis (September 30 - October 1, 2012)
- Continue updating Imja GLOF model based on new data
- Perform bathymetric survey at Imja Lake (September 24-26, 2012).

- Perform additional GPR survey at Imja Lake (September 21-23, 2012).
- Present technical report of Imja Lake GPR survey to UNDP Imja Lake GLOF Risk Reduction project partners (October 8, 2012)

Itinerary for trip

Day	Date	Month	From	To	Lodging	Remarks
Sat	8	Sept	AUS	NRT		
Sun	9	Sept	NRT	BKK	Novotel	
Mon	10	Sept	BKK	KTM	Tibet Hotel	
Tue	11	Sept	KTM	KTM	Tibet Hotel	Meetings in KTM
Wed	12	Sept	KTM	Lukla	Lodge	Trek to Phakding
Thu	13	Sept	Phakding	Namche	Lodge	
Fri	14	Sept	Namche	Namche	Lodge	Community Mtg
Sat	15	Sept	Namche	Namche	Lodge	Community Mtg
Sun	16	Sept	Namche	Debouche	Lodge	
Mon	17	Sept	Debouche	Dingboche	Lodge	
Tue	18	Sept	Dingboche	Dingboche	Lodge	Community Mtg
Wed	19	Sept	Dingboche	Dingboche	Lodge	Community Mtg
Thu	20	Sept	Dingboche	Chukhung	Lodge	
Fri	21	Sept	Chukhung	Imja	Camp	GPR
Sat	22	Sept	Imja	Imja	Camp	Bathymetry
Sun	23	Sept	Imja	Imja	Camp	Bathymetry
Mon	24	Sept	Imja	Imja	Camp	GPR
Tue	25	Sept	Imja	Imja	Camp	GPR
Wed	26	Sept	Imja	Dingboche	Lodge	Brief KACC
Thu	27	Sept	Dingboche	Lobouche	Lodge	
Fri	28	Sept	Lobouche	Pheriche	Lodge	Pyramid
Sat	29	Sept	Pheriche	Debouche	Lodge	
Sun	30	Sept	Debouche	Namche	Lodge	
Mon	1	October	Namche	Namche	Lodge	
Tue	2	October	Namche	Namche	Lodge	
Wed	3	October	Namche	Phakding	Lodge	
Thu	4	October	Phakding	Lukla	Lodge	
Fri	5	October	Lukla	KTM	Tibet Hotel	
Sat	6	October	KTM	KTM	Tibet Hotel	
Sun	7	October	KTM	KTM	Tibet Hotel	
Mon	8	October	KTM	KTM	Tibet Hotel	Workshop
Tue	9	October	KTM	KTM	Tibet Hotel	Conference
Wed	10	October	KTM	BKK	Novotel	To BKK
Thu	11	October	BKK	BKK	Novotel	Meetings in BKK
Fri	12	October	BKK	USA		To US

2. Daily Activities During Trip [University of Texas at Austin and TMI]

Saturday, Sept 8, 2012: Travel Austin, Texas to Tokyo, Japan

Sunday, Sept 9, 2012: Travel Tokyo, Japan to Bangkok, Thailand

Monday, Sept 10, 2012: Travel Bangkok, Thailand to Kathmandu

Organized plan of work for Imja Lake field expedition which includes three days of bathymetric survey and three days of GPR transects. The lake is about 600 m across and 2000 m long. If we have one day for the survey of the outlet lakes, then we need to make 10 crossings of 600 m in the remaining two days.

Meeting with Dhananjay Regmi to go over final expedition plans and the October 8, 2012 workshop preparations.

Went to Thamel to purchase sleeping bags (-40°C) and duffle bags for carrying the equipment.

Tuesday, Sept 11, 2012: Kathmandu, Nepal

Tried to meet with ICIMOD staff today to discuss our May expedition GPR results and our upcoming expedition and the October 8, 2012 workshop. Unfortunately, we could not meet them due to their tight schedule.

Discussed Imja Lake GLOF model development with Marcelo Somos. We are considering several scenarios that we will analyze:

1. GLOF without UNDP Risk Reduction Project
2. Lowering Imja Lake 3 m using the outlet channel proposed by Kathmandu University
3. Lowering Imja Lake 20 m using an outlet channel
4. Adding a dam downstream of the lake in Scenarios 1-3 above

The rafting company brought the inflatable boat that we will use at Imja Lake for the bathymetric survey to the Tibet Hotel and inflated it to demonstrate its capability.



Inflatable boat for Imja Lake bathymetric



Life vests and other equipment for Imja

Wednesday, Sept 12, 2012: Kathmandu to Lukla and Phakding, Nepal

Today Marcelo and I flew from Kathmandu to Lukla to begin the trek up to Imja Lake. We walked from Lukla to Phakding (2 hours) and spent the night at Phakding. We met the rest of the expedition members at Phakding where they were conducting an adaptation workshop. We had a lot of baggage on this trip: boat, boat equipment (2 pieces), GPR and Sonar equipment (3 pieces), and personal duffles (2 pieces). The baggage was split and came on the first two flights to Lukla that day.



Filming session during Community Consultation on Adaptation Workshop at Phakding

Thursday, Sept 13, 2012: Phakding to Namche Bazar, Nepal

Micro-hydropower system at Phakding lodge – Power comes from a microhydro installation (perhaps from Monjo, but we didn't see it). The power is very stable with no load shedding. The lodge has a single light bulb in each room, 6 lights in the common room (4 have 5 bulbs each). The kitchen has electric light (3 – 4). The conference room has lighting similar to the dining room. The kitchen has a freezer, a refrigerator and an electric cooktop. Solar hot water is in use but the solar panels were not in sight.

We observed some of the lower region electrical systems. They appear to use 440v AC for the distribution system from the hydropower generation powerhouse. It must be stepped down to 220 once inside the building, since all of our electrical adapters work fine on that voltage. In areas where only solar generation is used, 12v DC is the normal system.



Hydropower penstock near Monjo



Lodge building with electrical supply box (440v) near Monjo

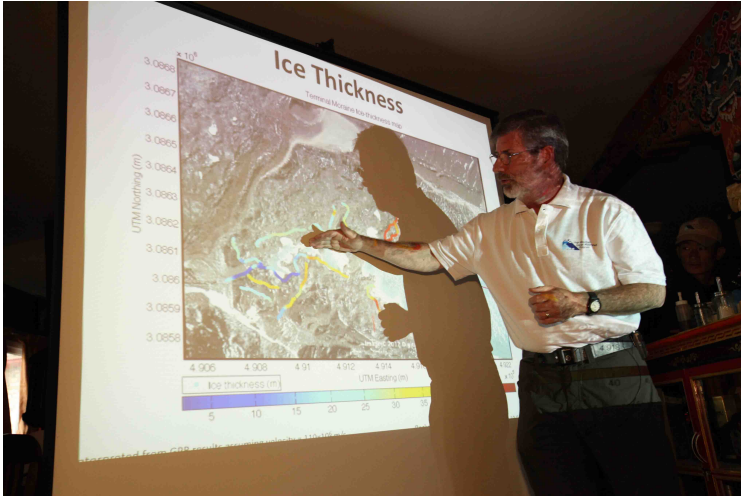
Today we walked from Phakding to Namche Bazar (3.5 hours). I started to feel the altitude during the last 30 minutes before arriving at Namche Bazar. This is a very steep hill that takes about 2 hours from the bridge at the bottom up to Namche. I had to lie down and rest for about 2 hours after arrival at the Khumbu Lodge in Namche due to altitude affects.

Friday, Sept 14, 2012: Namche Bazar, Nepal

Spent the day working on HMGWP contract documents for the Year 2 UT Subcontract. The first day of the 2-day Community Consultation on Adaptation workshop was conducted.

Saturday, Sept 15, 2012: Namche Bazar, Nepal

The second day of the 2-day Community Consultation on Adaptation workshop was conducted. I presented the results of the May 2012 Imja Lake Ground Penetrating Radar survey to the workshop participants. This resulted in a spirited discussion about the community's impression and fear of Imja Lake. There was a major consensus that something needs to be done to reduce the risk to communities that would be affected by a GLOF from Imja Lake.



Presenting May 2012 Imja Lake GPR survey results to the Community Consultation on Adaptation workshop in Namche Bazar.

Sunday, Sept 16, 2012: Namche Bazar to Debouche, Nepal

Trekking from Namche Bazar to Debouche today (about 3 hours). Stayed in the Rivendell Lodge. The hill from the river up to Tengboche was pretty difficult, but not as bad as the hill before Namche Bazar. I had another bout with altitude sickness when we go to Debouche and I had to sleep about 2 hours to recover. It was very cold in Debouche and rained all night until about 6:00 am.

Monday, Sept 17, 2012: Debouche to Dingboche, Nepal

Today we trekked from Debouche to Dingboche (about 4 hours) with a stop in Pangboche to visit the Lama of the Pangboche monastery (the oldest Tibetan Buddhist monastery in the Khumbu region). We informed the Lama about our project and our work at Imja Lake and received his blessing.



Hydropower powerhouse on hillside near Pangboche



Powerhouse near Pangboche



Pangboche Monestary



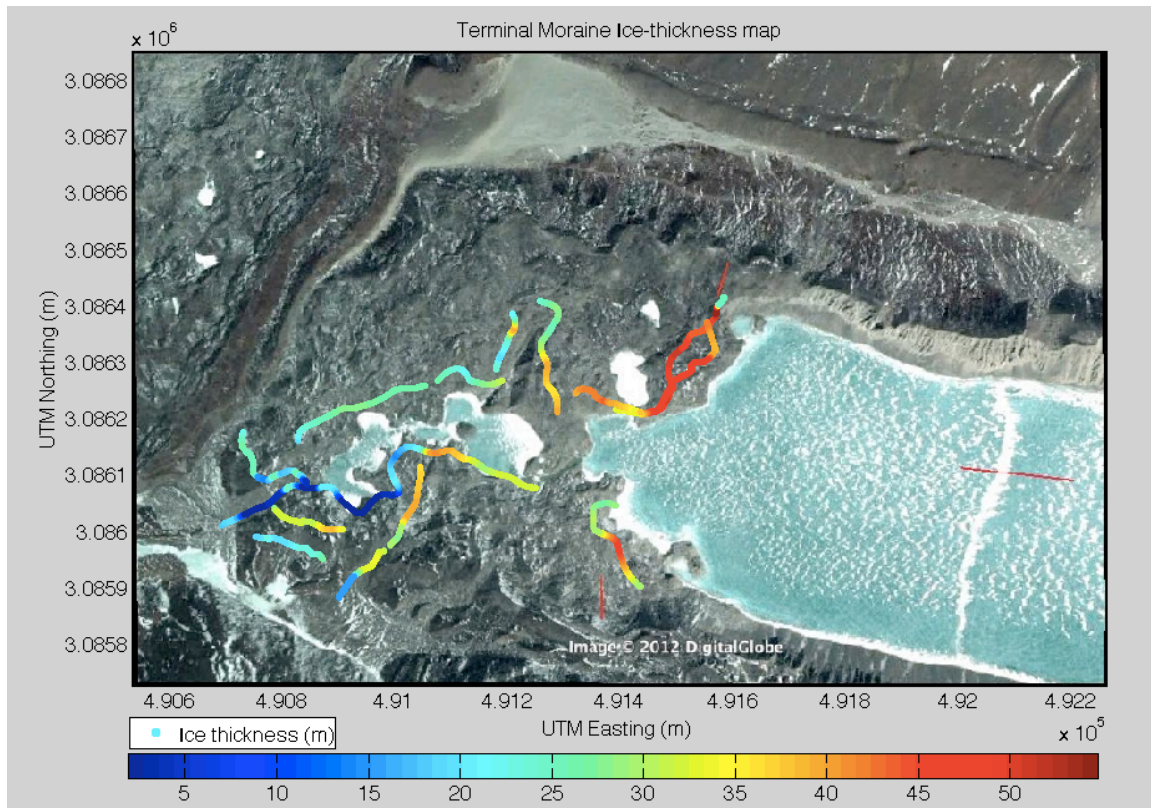
Receiving a blessing (Puja) form the Lama of the Pangboche Monestary

Tuesday, Sept 18, 2012: Dingboche, Nepal

Today was the first day of the 2-day Community Consultation on Adaptation workshop at Dingboche. I presented the results of the May 2012 Imja Lake Ground Penetrating Radar survey to the workshop participants. The presentation included a detailed description of the UNDP Imja Lake Risk Reduction Project and the role of the HMGWP in this project. The HMGWP was asked by the UNDP Nepal and Bangkok offices to undertake community consultations related to the Imja Lake project. There was a spirited discussion about the community's impression and fear of Imja Lake. The community members expressed the concerns about the potential GLOF from the lake and that someone needs to do something to reduce the risk posed by the lake. We explained how the May 2012 GPR survey was a significant input to the planning of the UNDP project and that our bathymetric survey on this trip would be another concrete input to the planning of a solution. The GPR results show the distribution of ice in the damming (terminal) moraine of the lake and indicate that it is relatively dangerous to excavate in the area of the terminal moraine without further and more detailed investigations to identify any possible sites to excavate a drainage channel from the lake.



Presenting May 2012 Imja Lake repeat photography to the Community Consultation on Adaptation workshop in Dingboche.



Results of the May 2012 GPR survey at Imja Lake showing the thickness of ice in the terminal moraine.



Participants working at the Community Consultation on Adaptation workshop in Dingboche

Discussion with Sonam Ishi, owner Sonam Friendship Lodge, Dingboche. Sonam discussed several things with us related to the issues of the community and Imja Lake:

Hydropower – The people in Dingboche want a micro-hydropower installation. It should be based on the model of an electrical cooperative and not Nepal government owned. They would be willing to pay for the operation and maintenance of the system through a system of tariffs.

Excavation of a drainage channel at Imja Lake – Any excavation that cuts through sand or small sediments is very dangerous because if any water flows over the exposed material will quickly erode and has the potential to cause a GLOF. The same is true for any excavation that cracks or disturbs the ice present in the moraine. Excavation should be done in areas where there is significant water saturation in the soils (according to Sonam). An Electrical Resistivity (ER) survey could be used to determine these areas. UT Austin may have (or could procure) the equipment to perform an ER survey at Imja Lake. Siphons may be the easiest and safest way to drain the lake.

Dam downstream of Imja Lake – A dam downstream of Imja Lake could be very effective in reducing the risk of a GLOF by reducing the height and peak flow of the flood wave. A dam in this location may need to be an arch dam or a buttress dam. The dam would have low level gates to pass normal flow down the river. A hydropower facility could be built into the gates to generate hydropower continuously. We have been simulating the performance of such a dam and have found that a 60 m dam could provide significant risk reduction for downstream communities.

We need to determine the strength of the moraine. Some simple calculations related to embankment dams could be used to get a first approximation of the strength. This would be followed by calculations of the forces on the moraine from the lake side to determine the “critical” conditions under which the moraine may fail. This could allow us to determine where the “weak” areas of the moraine are and where the “strong” areas are and excavation in those areas might be successful.

Siphons – Where would we place the siphon pipes (in the main lake or in the outlet lakes)? What capacity of water would we need to pass through the pipes in achieve the desired drainage (m^3/year , m^3/sec)? How many pipes of what diameter would be needed? The purpose of the siphon would be to lower the level of the lake. How far do we need to lower the lake (3 m, 10 m, 20 m, or more)? At what level is there a significant decrease in the downstream risk from a potential GLOF? We need to have a rough hydrologic model of Imja Lake in order to answer this question because the lake is constantly receiving runoff from the glacier melting, precipitation, groundwater inflow and losing water through outflow, evaporation, and groundwater outflow. This balance needs to be calculated on a monthly or annual basis in order to size the siphon(s).



Looking up the Imja Khola (river) near agricultural terraces at Dingbche indicating potentially flooded areas



Looking down the Imja Khola (river) near agricultural terraces at Dingbche

Wednesday, Sept 19, 2012: Dingboche, Nepal

The second day of the 2-day Community Consultation on Adaptation workshop was conducted. The discussion was very spirited with Ang Tsering being very active in the discussion. I made a presentation of the new panel showing the ice thickness at Imja Lake to the KACC members present at the workshop.



Presenting new interpretive panel to KACC.

Thursday, Sept 20, 2012: Dingboche to Chukhung, Nepal

We had a debriefing meeting with Meghan Hartmann and Jonathan Cooke this morning to discuss the outcomes of the three workshops and next steps.

Workshop outcomes:

1. Adaptation consultations

Dumbar indicated that participants need help formulating new adaptation projects: irrigation canal rehabilitation, adding a check dam in the river, developing a feasibility study for micro-hydro production, and livestock husbandry.

Ang Rita noted that invitations for the workshops were distributed too early and that participants were unaware that meals would be provided. Stakeholders should be chosen carefully. No more workshops should be held in Namche Bazar (go to Phortse or Thame). Women should be included in the workshops. People in the Khumbu do not seem to be aware of the Gov. of Nepal policies on climate change. We should work through the Sagarmatha National Park (this seemed to be a common theme).

Translations from Workshops: TMI will make a workshop summary report at the end of October. IRG and USAID (Meghan and Jonathan) will make a lessons learned report to CCRD. Translations of workshop outcomes should be available in 2 weeks.

2. Feedback on Imja Lake

The communities of Phakding and Dongboche have more concern about the lake and Namche Bazar residents. The Dingboche residents have much more knowledge about the lake than the other communities.

Imja Lake:

Reviewed previous Imja Lake work and plan for this expedition. The need for a flow gauge at the outlet of Imja Lake was discussed and the opportunity to include Damodar Lamsal (Kathmandu University and former PhD student of Teiji Watanabe) in this work since he submitted a climber-Scientist small grant proposal but did not get funded.

Future work in the Khumbu includes the Nat Geo Energy grant and possible USAID matching funds (we should put this in the spring 2013 workplan/budget for HMGWP). Energy demand survey is critical to this work as well as a socio-economic survey.

Web site, Social Media, and Film:

The blog from this expedition will be posted on the new website, not the AP website. The new website will be independent (like Climate Services website) but linked to AP and National Geographic Energy program. USAID is funding the HMGWP and needs to be part of the process.

The time line for the new website – Draft site to Livebooks soon and website live by December 2012.

Senior Advisor's meeting in October – include slide about new website.

The Summer Newsletter should be approved for distribution by next week.

8 October UNDP meeting:

- Partners' meeting to foster communication among project partners.

- Information exchange

- Process going forward

- Reporting good scientific data to achieve the result

Peru 2013 Conference

- Discussed the planning for the July 2013 CoP conference in Huaraz, Peru.

Structure for the conference and need for USAID support. We should send the Concept Paper to Meghan. The meeting will be a CoP meeting. What were the lessons learned from the Climate Services Brussels meeting?

Day 1-2: Presentations/posters/Cop membership meeting

Day 3-5: Field sessions/modules

Day 6: Central Asian planning day

Day 7-9: Field trek to glacier lake(s)

Potential keynote speakers: Lonnie Thompson, The Ohio State University; James Balog, Boulder CO.

We need to form a HMGW CoP Steering Committee to help maintain up-to-date CoP priorities and directions for small grants and encourage involvement in the CoP. The composition of the Steering Committee should be no more than twelve people and consider both geographic and disciplinary distribution of members. Activities of the Steering Committee would include: suggesting priorities for work and small grants; providing guidance for webinars, reports, studies, and other materials; suggest priorities for meetings; review small grant proposals; review documents; and assist in organizing/planning CoP meetings.

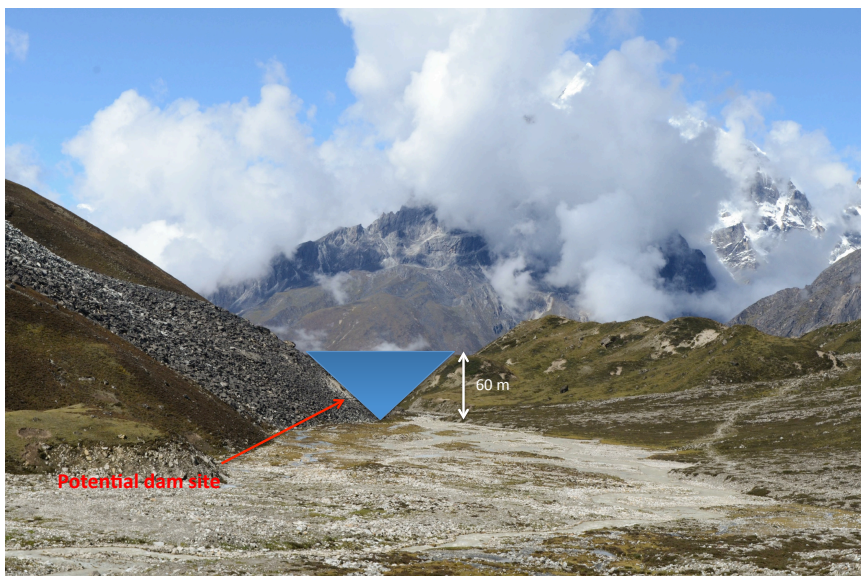
We trekked from Dingboche to Chukhung today (about 2 hours). Meghan and Jonathan left the trek to return to Kathmandu today, since the workshop portion of the expedition was complete. The boat made it to Chukhung today carried by 6 porters. It is unclear why a yak was not used to transport the boat, but it seems that securing the boat to a yak would be very difficult.



Group photo of workshop staff at Dingboche.

Friday, Sept 21, 2012: Chukhung to Imja Lake, Nepal

We arrived at Imja Lake today. We will spend the next six days working at Imja Lake on a bathymetric survey of the lake and completing GPR surveys of the terminal moraine and the Imja Glacier. We checked out the site of the proposed downstream dam on the way to the lake. The site seems very appropriate for the dam with a purpose of detaining a GLOF if it were to occur. It could also be used as a micro-hydro station during times of normal flows. The dam would need to be about 60 m tall and might need to include a small additional dam to prevent spill-over into a neighboring valley.



*Potential dam site
downstream of Imja
Lake*

We performed a long GPR transect from our camp to the outlet of Imja Lake and on to the southern lateral moraine of the lake. This was one transect that we did not get good GPS coordinates for when we performed a similar transect in the May 2012 expedition. It snowed from 5:00 pm for most of the night.

Saturday, Sept 22, 2012: Imja Lake, Nepal

Today we performed the first day of the bathymetric survey of Imja Lake. We launched the 6-person inflatable boat, attached the equipment and tested the equipment on the lake. We started at the lake outlet at about 8:00 am with 2 rafting guides, Marcelo, me, Alton, Daniel and J.B. in the boat. Marcelo and I were taking care of the equipment, Daniel was filming and everyone else was rowing. We entered the main lake body about half an hour later and began to make transects back and forth across the lake. Immediately, we were confronted with the problem of floating ice bergs from the glacier. We had to navigate around them to avoid hitting the ice and damaging the sonar equipment or sinking the boat. We also had to avoid going too close to the shore since the sonar sensor would hit the shallow bottom there and become damaged, and we did not want to be close to potential avalanches into the lake from the lateral moraines of the former glacier.

During the transects back and forth across the lake we measured water depths of 20-60 m on the western edge of the lake (outlet end) and 30-100+ m deep on the eastern (glacier) end of the lake. Previous bathymetric surveys have only measured a maximum depth of

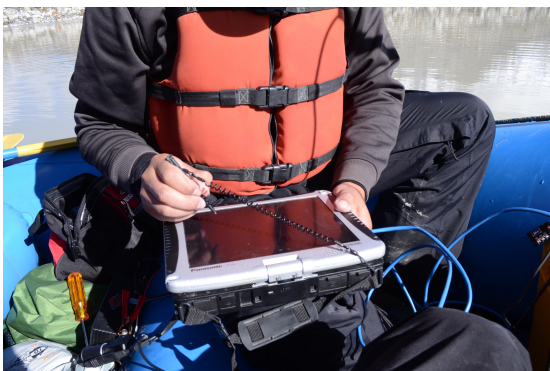
98 m (Saiti et al. 1993), so our data should significantly change the estimate of the volume of water in the lake. The volume of water in the lake has an impact on the potential GLOF and risk to downstream communities if the terminal moraine of the lake becomes unstable.



Paddling the boat in Imja Lake



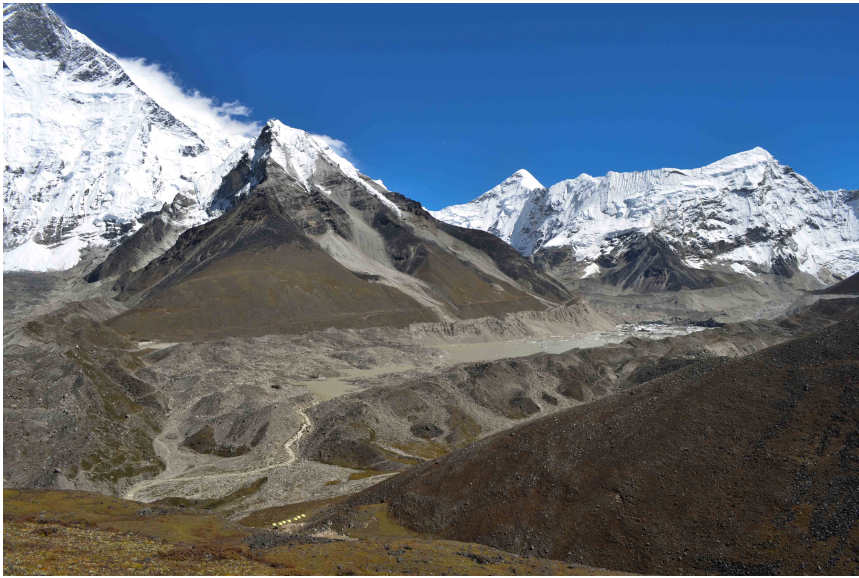
Avoiding icebergs in Imja Lake



The EchoSounder sonar equipment in the boat.

Sunday, Sept 23, 2012: Imja Lake, Nepal

Today we processed the bathymetric survey data from yesterday, researched all previous reports of bathymetric surveys of the lake, and took photos of the lake from a viewpoint high above the camp.



*View of Imja Lake
from overlook
above camp.*

Monday, Sept 24, 2012: Imja Lake, Nepal

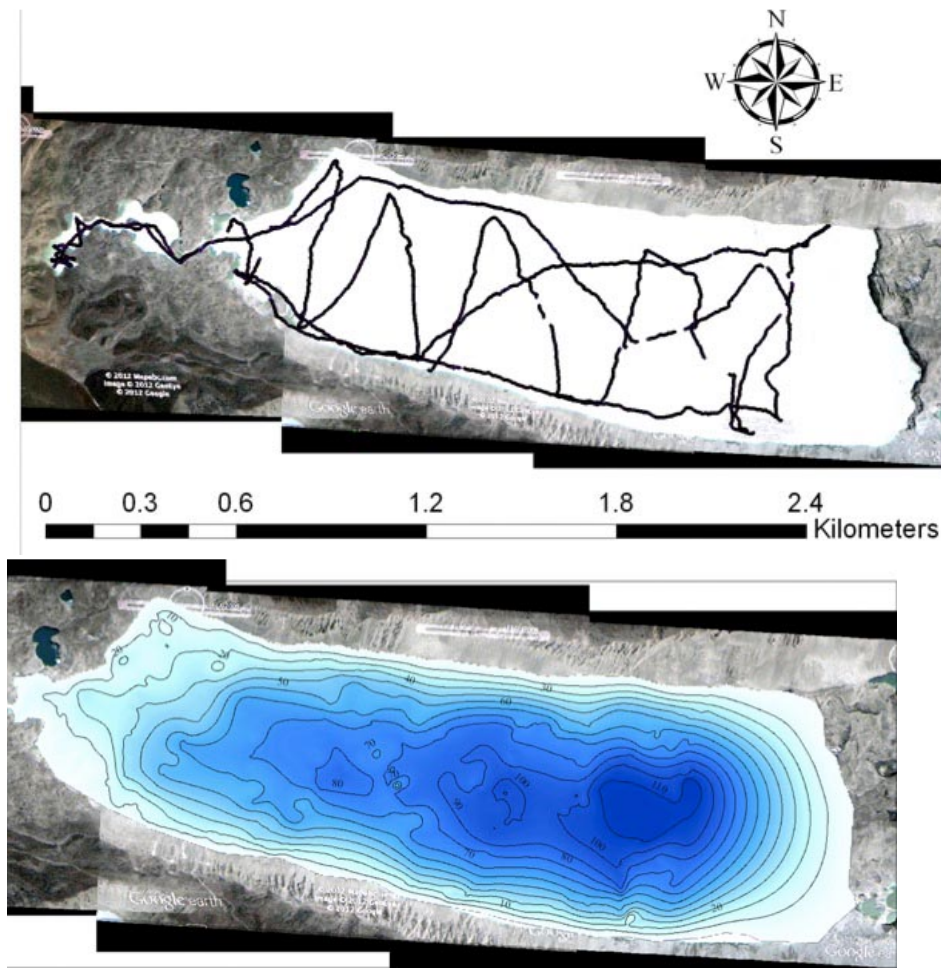
Today we performed the final day of the bathymetric survey of Imja Lake. We rowed the boat to the glacier end of the lake. There was about 2 cm of ice covering the lake surface, so the rowing was difficult. Then we did several transects across the lake before returning to the outlet end of the lake and passing through the outlet lakes.



*Icebergs present in Imja Lake during
Bathymetric survey. Photo: Mark Woods*



*Navigating raft in icebergs present in Imja
Lake during Bathymetric survey. Photo:
Mark Woods*



Transects performed during Imja Lake bathymetric survey.

Bathymetric survey results from Imja Lake

The results of the bathymetric survey are shown in the following table. It is important to note that our results show almost twice the volume water in the lake as previous surveys. This is due to the rapid glacier recession in the last few years. This has important ramifications for the estimation of a potential GLOF from the lake as there is an increased volume of water available for the flood. It also has an impact on the design of any glacier lake management system (e.g., drainage channel at the outlet) since the flow needed to reduce the lake level will be increased. If we take the lake elevation as 5010 m and the elevation of the valley at the base of the lake outlet as 4980 m, then there is a 30 m elevation difference. With the difference in lake area being $1.45 - 1.01 \text{ km}^2$ or 0.44 km^2 , the additional volume of water that can be drained from the lake in a GLOF, given these new bathymetric results, is 13.2 million m^3 . The maximum possible GLOF increases from 30.3 million m^3 to 43.5 million m^3 , a 30% increase in volume.

Table 1. Imja Lake Bathymetric Survey - Results

	Area (km ²)	Average Depth (m)	Volume (10 ⁶ m ³)	Maximum Depth (m)
1992 ¹	0.60	47.0	28.0	98.5
2002 ²	0.86	41.6	35.8	90.5
2009 ³	1.01	35.1	35.5	96.5
2012⁴	1.21	52.6	63.8	116

¹ Yamada, T. and C. K. Sharma (1993), Glacier Lakes and Outburst Floods in the Nepal Himalaya, IAHS 218

² Sakai, K. Fujita, T. Yamada (2003) Volume Change of Imja Glacial Lake in the Nepal Himalayas, ISDB 2003

³ ICIMOD (2011) Glacial Lakes and Glacial Lake Outburst Floods in Nepal. Kathmandu

⁴ Somos, M., D.C. McKinney, and A. C. Byers (2012) Bathymetric Survey of Imja Lake, Nepal in 2012, HMGWP

Tuesday, Sept 25, 2012: Imja Lake to Dingboche, Nepal

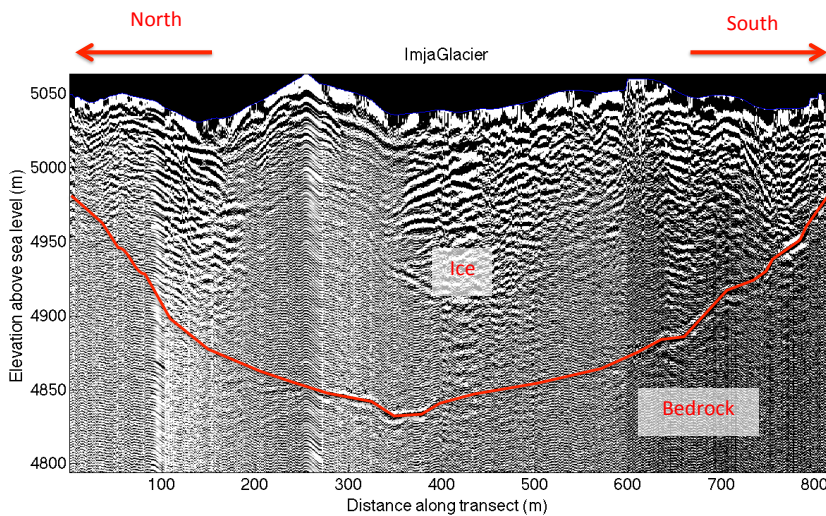
Today we performed a GPR transect across the entire width of the Imja glacier from the north lateral moraine to the south lateral moraine, a distance of about 800 m. The transect was a few meters east of the transect performed in May 2012, but it extended all the way across the glacier this time. The glacier at the end of the lake has been receding rapidly in the past year or so and many of the features that we saw in our May expedition had calved off into the lake as icebergs. The depth of the glacier was found to be about 200 m in the center, thinning to about 70 m at the lateral moraines on each side. These data will be critical to creating a hydrologic model of the lake and being able to forecast future evolution of the lake over the coming years.



GPR survey transect across the Imja glacier.



Route of the GPR survey transect across the Imja glacier.



GPR survey result across the Imja glacier.

Wednesday, Sept 26, 2012: Imja Lake to Dingboche

Today we trekked from Imja Lake to Dingboche. We discussed the recent GPR and Bathymetric survey results with Sonam Ishi and other community members.

Thursday, Sept 27, 2012: Dingboche to Lebouche, Nepal

Today Somos and McKinney trekked from Dingboche to Lebouche to visit Italian Pyramid (EVK2-CNR) researchers. None of the researchers was present at the facility, even though we were told they would be, and we were told that they would be arriving in about 4 days. Pyramid local staff told us we could meet them in 2-3 days at Namche Bazar. Byers trekked to Namche to perform photographic surveys.

Friday, Sept 28, 2012: Lebouche to Pheriche, Nepal

Today visited the Italian Pyramid (EVK2-CNR) to discuss data concerns with the researchers there. None of the researchers was present at the facility, even though

we were told they would be, and we were told that they would be arriving in about 4 days. Pyramid local staff told us we could meet them in 2-3 days at Namche Bazar. Byers trekked to Namche to perform photographic surveys. Later in the day, we trekked from Lebouche to Pheriche.

Saturday, Sept 29, 2012: Pheriche to Debouche, Nepal

Today we trekked from Pheriche to Debouche. Worked on presentations and reports.

Sunday, Sept 30, 2012: Debouche to Namche Bazar, Nepal

Today we trekked from Debouche to Namche Bazar. Worked on presentations and reports.

Monday, October 1, 2012: Namche Bazar, Nepal

Met Italian EV-K2 Pyramid team and discussed various geophysical survey equipment. Their equipment is all too heavy to be deployed in the type of environment we are working in. Worked on presentations and reports.

Tuesday, October 2, 2012: Namche Bazar, Nepal

Worked on presentations and reports.

Wednesday, October 3, 2012: Namche Bazar to Phakding, Nepal

Trekked from Namche Bazar to Phakding. Worked on presentations and reports.

Thursday, October 4, 2012: Phakding to Lukla, Nepal

Trekked from Phakding to Lukla. Worked on presentations and reports.

Friday, October 5, 2012: Lukla to Kathmandu, Nepal

Flew (by helicopter, since all flights had been cancelled for days due to bad weather) from Lukla to Kathmandu.

Saturday, October 6, 2012: Kathmandu, Nepal

Sunday, October 7, 2012: Kathmandu, Nepal

Monday, October 8, 2012: Kathmandu, Nepal

Organized the “UNDP Community-Based Flood and Glacial Lake Outburst Risk Reduction Project: First Partners Workshop for Enhanced Collaboration and Communication”. Notes on discussions below:

Session 1

Project Origins, Formulation Process, and Next Steps (Mr. Vijaya Singh and Ms. Anupa Lamichhane/UNDP) – **See presentation**
Discussion/Q&A

Has the Project Document (ProDoc) been submitted to the GEF? Yes, it has been submitted to the Regional Center of GEF and it is under review there. After review, UNDP/Nepal will revise and submit to GEF Secretariat. It probably doesn't go to the GEF Board since it is LDCF financing. Expected inception date of the project is 1st Quarter of 2013.

How does the Community Based Early Warning System (CB-EWS) work? A CB-EWS has been proposed for Imja Lake. This will be unlike the EWS at Thso Rolpa. There will be some data automation (sensors?) at Imja Lake. These sensors would trigger a cell phone network system (communicating with agencies and community). A GLOF Risk Reduction Committee (GRRC) from the 27 potentially affected communities will make up the GRRC. The GLOF trigger information will be sent to the GRRC members for them to warn the communities.

Is Imja the best glacial lake to consider for this work? The potentially dangerous lakes of Nepal were considered. Imja is in a very dynamic situation and changing very fast now. People want a solution there. UNDP is also working at Tsho Rolpa on a comprehensive disaster risk management plan.

There is a lot of talk about GLOF risk management knowledge. Where is that knowledge? Do we need to generate it? Most of the knowledge about this exists and we plan to draw knowledge from best practice examples in Nepal.

Session 2

Introduction to USAID ADAPT Asia-Pacific Program and Role in the Imja Project (Dr. Lee Baker/USAID ADAPT Asia-Pacific) – **See presentation**
Discussion/Q&A

How can we ensure the capacity of the Department of Hydrology and Meteorology? It is necessary to build the capacity of DHM or contract it outside the agency. A determination of the best mechanism has not been made yet. Perhaps a “needs assessment” would be appropriate.

Recent Imja Glacial Lake Management and Mini-Hydropower Evaluations (Dr. Ramesh Maskey, Kathmandu University - KU) – ***See presentation and the Final Report***

Discussion/Q&A

Has there been a study of the risk of the hydropower plant getting flooded? KU tried to calculate the risk of flood, but did not have the software to do this calculation. The powerhouse is located well above the river and is not expected to be flooded.

The 2 km canal to supply the power plant is very long and could be vulnerable. How will it be protected? Would a closed penstock be a better design? A penstock has a higher probability of freezing. The canal can be used for irrigation also. The canal was chosen as the best option.

How was the flow in the river at the hydropower intake calculated? Using a software named “MIP” (Medium Irrigation Project method developed by Mott MacDonald in 1982 and works only for average monthly flows). The small tributaries downstream of the Imja Lake outlet we also included and that is why the flow increases from 1 m³/s to 2 m³/s by the time you reach the power intake.

Is all of this information from Kathmandu-based desk studies or were field studies undertaken? Field studies were carried out for the topography and surveying. KACC in Dingboche was consulted in the process.

Session 3

Applying ICIMOD’s Knowledge on Climate Variability and Projections in Eastern Himalaya: with specific reference to Imja GLOF Risk Reduction Project of the GON/UNDP/GEF (Dr. Arun Shrestha) – ***See presentation.***

Discussion/Q&A

Have you considered the impact of the Pacific Decadal Oscillation in your analysis of the climate trends from the late 20th century in Nepal? In Peru, this has been shown to have a strong influence.

Recently UNEP has made the statement that there is a lack of reliable data about water and glaciers in the Himalaya. Who should monitor these resources and especially the glacier lakes?

ICIMOD has performed research at Imja for more than 10 years, but not a single paper or report has been provided to the community. Is there a reason for this? What is ICIMOD doing to solve the real problems of the communities? ICIMOD works in knowledge management, not field research. In 2009, ICIMOD field studies, but only for developing and testing methodology. After this ICIMOD worked with the community, in Namche

Bazar,. When we are not working in the field developing methodologies, we do not work with communities.

Why don't we translate the ICIMOD reports into Nepali and distribute them to the communities (schools, libraries, etc.)?

Collaboration and communication depends on the language used – Nepali or English.

Session 4

Origins and Activities of the HMGWP (Dr. Alton C. Byers/HMGWP)

The Community Consultation Component (Mr. Purba Sherpa/HMGWP)

Recent GPR, bathymetric survey, and participatory field research results from Imja lake (Dr. Daene McKinney/HMGWP)

Discussion/Q&A

Did you compare your recent bathymetric survey results to the ICIMOD results from 2009? Yes, we did compare them and there are some differences. First the lake has expanded greatly since 2009 and ice on the bottom of the lake appears to have melted, creating a deeper lake.

Did you compare your GLOF modelling results to the ICIMOD results from 2009? Our GLOF model results show a time from the initiation of the GLOF to the time it reaches Dingboche of 1/5 hours. ICIMOD shows 20 minutes, since they are measuring the time for the peak of the flood to reach Dingboche (0.5 hour). We believe it is better to consider the first moment when a GLOF warning could be issued to the time that the peak arrives.

Have you considered the economics of the various alternatives suggested in the presentation? No, we have not yet calculated any economic benefit or cost for these alternatives.

Have the communities expressed any support or disagreement with the UNDP-GoN Imja GLOF project? No, not yet.

What is the debris thickness on the south side of the Imja Lake outlet?
About 5 – 10 m.

Session 5

Imja Lake Risk Reduction Overview, Theory and Practice in Glacial Lake Risk management (Ing. Cesar Portocarrero)

Discussion/Q&A

Do you recommend lowering the lake 20 m? Lowering the lake by 20 m is about as much as can be achieved, since the valley below the lake is at this

elevation (approximately) and lowering beyond that depth would not add additional protection from GLOF.

Why are we planning to drain water from Imja Lake? What is the rationale for lowering the lake 3 m? In Thulagi Lake, all of the ice melted out of the terminal moraine. Won't that happen at Imja Lake also? If it will stabilize, then perhaps 3 m lowering makes sense. We could consider additional lowering later.

We have gotten new information and alternatives today and these should be looked at.

Recommendations

Other glacier lakes in Nepal are growing at an alarming rate (e.g., Lumding, Lower Barun lakes) and we should look into these lakes as well as Imja. We should not wait for water to accumulate in these lakes and we should do something now like dig drainage channels at the outlets. How can we handle all of these lakes systematically?

How do we link the social, community and media work to the technical work? Imja Lake has been presented as a problem (negative). We need to speak to the community in a positive voice, explain the benefits and do it in a language that they understand.

We need to understand the processes at Imja Lake better. This lake is changing very quickly now. What is the nature of this change? What is the nature of the terminal moraine? We need to do more studies at Imja Lake (ER survey, etc.). We need to build capacity. Tribuvana nd Kathmandu Universities have established a glaciology course or study and this needs to be strengthened. The depth of any excavation at Imja is very important. We need more research into the exact situation at the terminal moraine. What is the strength of the moraine? Is there Ice below the lake? How can we prove/disprove this? We need to establish more and better survey benchmarks at Imja.

We need to determine the vulnerability of the downstream communities to a GLOF from Imja.

The hydropower project in the Imja River makes everybody happy.

The group of experts on Imja Lake should be consulted during all phases of this work.

Tuesday, October 9, 2012: Kathmandu, Nepal

Presenation of "Importance of Field Work in Natural Disaster Risk Assessments in High Mountains," Daene McKinney, Marcelo Somos-Valenzuela, and Alton Byers, Hokkaido-Tribhuvan University International Symposium on "Changing Mountain Environments in Asia," Kathmandu 7-9 October 2012

Presenation of "Applications of Mountain Research," International Symposium on "Changing Mountain Environments in Asia," Byers, A.C., Hokkaido-Tribhuvan University International Symposium on "Changing Mountain Environments in Asia," Kathmandu 7-9 October 2012

Wednesday, October 10, 2012: Kathmandu, Nepal to Bangkok, Thailand

Thursday, October 11, 2012: Bangkok, Thailand

Meeting with Brad Phillips and Bryan Enslein at USAID/RDMA and Lee Baker of ADAPT-Asia in Bangkok. We presented an introduction to the HMGWP and recent progress to the RDMA staff and contractors. They suggested that we proceed with economic analysis of various alternatives of reducing risk form Imja Lake and vulnerability analysis of downstream communities.

Friday, October 12, 2012: Bangkok, Thailand to USA