Japan-Nepal Joint Student Himalayan Exercise Program 7 Years

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Abstract A geotraverse connecting the Kaligandaki and the Tinau rivers via Pokhara in Western Nepal covers all geologic zones of the Himalayan Orogen from the Tethys Himalayan Zone in the north to the Gangetic Plain in the south. The Student Himalayan Exercise Program has aimed to conduct tours of the above geotraverse, provided for Japanese and Nepalese students. The preparation of the program started in 2008, and the practical content of the tour was decided in December 2010 by collecting ideas from several Himalayan geologists in Japan and Nepal and receiving consent of 17 geoscience-related university departments, committing them to give education points for the participation in the exercise, or to examine the possibility of it. After collecting ideas from and sending call-for-participants to geoscience-related departments of over 60 Japanese universities, and after negotiations with several Nepalese trekking agencies, the first Student Himalayan Exercise Tour (SHET) was conducted in March 2012. Since then the exercise tour was conducted every year in March. We are convinced that the SHETs throughout all 7 years (2012-2018) were successful and meaningful, and we therefore suggest that the program should continue further in future.

Keywords Himalayan Field Exercise, Student Field Geo-exercise, Himalayan Geo-exercise, Himalayan Geotour, Kaligandaki Geotour

and researchers of geology. The experience of working with field geology is essential for the whole range of geoscientists.

We believe that every geoscientist should have the experience of geological field survey and of forming a geologic map by himself from his field survey. Without that, he can neither get the true understanding of geological reports by others, nor can make valuable research results that carry usable facts and could be utilized in long future times.

It is a pity, however, that field geology is fading from university curriculum, and further, teachers who teach field geology to students are becoming increasingly rare at the universities. We have been conducting student geo-exercise tours in the Himalaya for seven years since 2012, expecting that students who participated in the tour will become familiar to field geology and some of them will be encouraged to further utilize the field geology in their future work, and further would encourage the geology world to popularize field geology.

The Himalaya is one of the largest mountain ranges on the earth. Reflecting the collisional tectonics of Indian and Eurasian plates, the Himalaya exhibits a clear geologic constitution. Five geotectonic zones ranging in age from the Proterozoic to the Quaternary are arranged parallel to the mountain range as explained by Yoshida and Ulak (2017). A large uplifting rate of 5 mm/y still continuing today results in forming deep valleys and steep mountain slopes where slope collapse, debris flow, landslides and glacial lake outburst flood (GLOF) are often taking place. The Himalaya is the living museum for people studying geoscience and natural hazards.

All the situations and ideas above prompted us to start and continuously conduct the Student Himalayan Exercise Tour (SHET-HP, 2018).

1. Introduction

To see geology in the field, to observe the occurrences of rocks at outcrops and to touch and collect rocks in the field, are fundamentally required to students, educators,

2. Inauguration of the Program

For 2 years from 2003 to 2005, one of the authors (MY) worked at the Department of Geology, Tri-Chandra Campus, Tribhuvan University in Kathmandu, Nepal. During these years, MY joined several times to the student exercise camps of the Department in the Himalaya and trained students in collaboration with teachers of the Department especially often with one of the authors (BNU) who invited MY to the Department. During the field exercise, MY and BNU realized that it would be fantastic to bring Japanese students to the Nepal Himalaya for an exercise tour.

From 2004 to 2011, MY published 5 geoguidebooks including of Kaligandaki area, Everest region, Langtang valley and NW Himalaya, and he led Japanese groups to those areas, in collaboration with several TU staff including BNU. Through preparation and fulfillment of these geotours (Yoshida et al., 2008), know-how and improvements for the Himalayan geotours were gathered.

After making a variety of efforts over the years, a group named Student Himalayan Exercise Project was formed, who started preparation for the student Himalayan Exercise Program (SHET program) in 2011. We decided to utilize the geoguidebook (Upreti and Yoshida, 2005) for the section Tatopani-Mukutinath along the upper reaches of the Kaligandaki valley, and newly prepared a simple geoguide leaflet for the section Pokhara-Tatopani and Kathmandu-Pokhara-Butwal-Mugling. In 2014, the above guidebook was revised (Yoshida and Upreti, 2014). In 2017, we formed a new guidebook assembling all guidebooks into one book (Yoshida and Ulak, 2017) for convenient usage by the SHET.

A variety of ideas on the contents of the exercise tour was collected from about 30 Japanese and Nepalese geoscientists who have been studying Himalaya. We also collected ideas from earth science-related departments of 60 Japanese universities on the appropriate time for the exercise tour. We analysed these ideas above, received consent of 30 Japanese and Nepalese geoscientists who have been familiar to the Himalayan geosciences to register as the candidate to work as a leader of the

exercise tour, and collected nominal support from 6 academic societies of Japan and Nepal as well as from 34 senior scientists of Japan. After synthesizing various issues above the SHET program, including the plan of the exercise tour (SHET) in west-central Nepal Himalaya, the tour project was settled and started in 2012.

3. Preparation for the Tour

Through the above effort, the exercise tour (SHET) course Kathmandu- Pokhara- Mukutinath- Pokhara- Lumbini- Mugling- Kathmandu with a duration of 13 days in March was settled. We decided that the SHET should be safe, but within a reasonable economy. To lessen the cost of participation for the tour, the best Nepal trekking company was identified, collecting and assessing several quotations from Nepalese companies.

Advertisement of call-for-participants (Fig. 1) was sent to almost all geoscience-related department of Japanese universities as well as Antarctic and Gondwanan geologists in Japan and requested their collaboration to advertise the SHET program. The advertisement appeared not only in newsletters of some supporting societies including the Geological Society of Japan but also on the home page of the Gondwana Institute for Geology and Environment.

Through the advertisement, in March 2012, the SHET-1 received a group participation of 7 students and a teacher (one of the authors, T.S.) from the Shimane University, and in addition, individual 5 students from several universities in Japan, resulting in 12 participants in total by the end of November 2011.

After November until the end of February next year, several communications including the distribution of a geotour guidebook and leaflets to participants and an encourage of pre-study the book, and informations about tour conditions, including the danger of the Himalayan geotour and measures for them were dispatched to participants. Instructions for vaccination against dangerous diseases such as tetanus and rabies, and messages about altitude sickness, etc. were additionally addressed. With the above communications, participants came to face the departure of the tour with almost no trouble and worry.

The Seventh Student Himalayan Exercise Tour
-Call for Participants-
In March 2018, 15 days with less than 1200 USD
(Recommended by six academic societies including the International Association for Gondwana Research, Nepal Geological Society, Geological Society of Japan etc.)

Studying the true nature of an Orogen in the Himalaya!
 The tour covers the course Kathmandu-Pokhara-Muktinath-Pokhara-Lumbini-Kathmandu using a chartered bus or jeeps. More than 30 Japanese and Nepalese geoscientists who are familiar to the Himalaya are registered to voluntarily work as a geo-guide and tour leader to show students in the field the beautiful Himalayan geology and nature. All necessary expenses including lodgings, foods, chartering vehicles, employing sherpas etc are included in the above cost. Some Japanese and Nepalese universities decided or are under consideration to give a curriculum point to participated students.

Program* of this exercise tour started in 2012 and the 2018 tour is the 7th tour. A report e-book (mostly in Japanese with some English summaries) assembling reports by all participants has been published every year and is served for free downloading by the URL below.
<https://www.data-box.jp/p/dir/66ffe6c5e7a94f34826cf5a6f5bbad2>

Application for participation and/or inquiries:
 Please contact Prof. Masaru Yoshida with the following addresses.
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 147-2 Hashiramoto, Hashimoto 648-0091, Japan Tel & Fax: 0081-(0)736-36-7789
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Outline of the tour (Details can be downloaded from the above URL)
 <Period of application> 1st June 2017 – 31st December 2017
 <Period of the tour> 5th – 16th March 2018, 12 days (from Kathmandu to Kathmandu)
 <Participation fee> Less than 1200 USD per one student. Citizens are requested to add 300 USD, and those who are officially dispatched from organizations are requested to add 500 USD on the student's cost. The real cost is found on the last day of the tour and the balance will be refunded on that day.
 <Deadline and method of payment> The participation fee (provisional cost of 1200 USD) should be paid on the 5th March 2018 by cash.

* http://www.geocities.jp/gondwanainst/geotours/Studentfieldex_index.htm

Figure. 1. A leaflet, Call-for-participants to SHET-7.

4. Himalayan Geology and the SHET Geotour Course

The Himalaya formed by the collision of the Indian and

Eurasian Plates since ca 50 Ma. The geologic constitution of the Himalayan Orogenic Belt comprises five geotectonic zones running parallel to the mountain range (Fig.2). The geotectonic zones evidently reflects the collision tectonics as explained by Yoshida and Ulak (2017).

The 150km N-S traverse of the Himalaya along the route connecting Kaligandaki and Tinau Khola valleys in west-central Nepal is the best geo-excursion course that exposes a full view of the Himalayan Orogen (Fig. 3). From the north to the south the tour crosses the Tibetan Tethys Himalayan Zone occupied by the Paleozoic to Mesozoic Tethys Sedimentary Sequence (TSS), the South Tibetan Detachment System (STDS), the Higher Himalayan Zone composed of the Higher Himalayan Gneisses (HHG) of mostly late Proterozoic sedimentary sequence origin, the Main Central Thrust (MCT), the Lesser Himalayan Zone occupied mostly by the Middle to Upper Proterozoic Lesser Himalayan Metasediments (LHM) partly by the late Paleozoic to Mesozoic Tansen Group, the Main Boundary Thrust (MBT), the Siwalik Zone (the Sub-Himalayan Zone) composed of the Cenozoic Siwalik Group, the Main Frontal Thrust (MFT), and the Indo-Gangetic Plain (Terai) filled by the Aluvium sediments. Tables 1 and 2 represent simplified stratigraphy of the TSS and the LHM. Beautiful outcrops of all the above geologic zones and boundary thrusts are observable throughout the tour. A variety of Quaternary geological features as well as natural hazards are also observed throughout the tour. Detailed geologic explanations of the traverse and observation points are given by Yoshida and Ulak (2017).

Table 1. Stratigraphy of the Tibethan-Tethys Sedimentary Sequence (TSS) in the Kaligandaki Valley area (after Colchen et al., 1980)

Geologic age		Formation
Mesozoic	Middle Cretaceous	Muding Formation
	Lower Cretaceous	Chukh Formation
	Upper Jurassic	Spiti Formation
	Middle Jurassic	Lumachelle Formation
	Lower Jurassic	Jomsom Formation
	Upper Triassic	Quartzite Formation
	Lower Triassic	Thinigaon Formation
Paleozoic	Permo-Carboniferous	Thini Chu Formation
	Permo-Carboniferous	Tilicho Lake Formation
	Devonian	Tilicho Pass Formation
	Silurian	North Face Quartzite Formation
	Ordovician	Nilgiri Formation
	Ordovician	Pi Formation
	Cambrian	Annapura Yellow Formation
	Cambrian	Sanctuaire Formation

5. Program of the SHET

The SHET is conducted by the main responsibility of the Gondwana Institute for Geology and Environment (GIGE, Hashimoto, Japan) in collaboration with the Department of Geology, Tri-Chandra Campus, Tribhuvan University, Kathmandu, Nepal.

Table 2. Simplified stratigraphy of the Lesser Himalayan Metasediments (LHM) in western central and central Nepal

Geologic Age	Western Central Nepal			Central Nepal				
	(Sakai, 1985)			(Stocklin, 1980)				
Oligocene-early Miocene	Tansen Group		Dumri Formation					
Eocene			Bhainskati Fm					
late Cret. - Paleocene?			Amille Fm					
late Jura - early Cret.			Taltung Fm					
late Carb.-Permian			Sisne Fm					
Early Paleozoic	Kali Gandaki Super Group	Upper KG Group	Kerabari Formation		Upper NWK Group	Robang Fmation		
			Ramdighat Fm			Malekhu Limestone		
Middle KG Group		Saidi Khola Formation	Nawakot Complex	Lower Nawakot Group	Hushdi Beds			
		Khoraidi Fm			Dhading Dolomite			
		Chappani Fm						
		Virkot Fm			Nourpul Formation			
		Heklang Fm			Dandagaon Phyllites			
		Lower KG Group			Naudanda Quartzite	Fagfog Quartzite		
Andbi (Kuncha) Fm					Kuncha Formation			
					Unconformity			Fault boundary

The tour course includes the complete traverse of the Himalayan Orogen from the Tethys Himalayan Zone to the Indo-Gangetic Plain as mentioned above, covering the route Kathmandu- Pokhara- Muktinath- Pokhara- Tansen- Butwal- Mugling-Kathmandu in 10 days. Starting from Kathmandu, which lies in the center of the Kathmandu Basin filled by Quarternary sediments covering the Proterozoic Kathmandu Nappe of the Higher Himalayan Zone, the tour runs in the Middle to Late Proterozoic Lesser Himalayan Zone along the Trishuli River and reaches the Pokhara Valley which is again filled by the Quarternary sediments covering the basement LHM. From Pokhara, the tour directly goes to Muktinath, in the upper reaches of the Kaligandaki valley by driving jeeps. Muktinath has the altitude of 3800m and is the very holy

place of Hinduism. The traverse starts from Muktinath southward by trekking and driving along the Kaligandaki Valley, that flows between the Annapurna and Dhaulagiri ranges both having 8000m high peaks. The tour along the Kaligandaki Valley from Muktinath to Pokhara runs within the Tethys Himalayan, the Higher Himalayan, and the Lesser Himalayan zones and is blessed with amazing geology and fantastic scenery of the Himalaya.

The tour starts Pokhara by bus southward to Lumbini via Tansen mostly along the Tinau Khola river within the Lesser Himalayan, Sub Himalayan zones and the Gangetic Plain. Surrounding Tansen, the Gondwana Sequence of the Tansen Group occurs. The course ends at an additional holy place, explicitly Lumbini, the place of the birth of Buddha.

Table 3. Itinerary of the 7th Student Himalayan Exercise Tour in March 2018.

Days	March	Route	Details	Remarks
Day 1	4th	Japan - Kathmandu (Stay)	Via Guangzhou, arrive KTM 22:10	
Day 2	5th	Kathmandu (Stay)	Pre-tour seminar at TU, and town excursion escorted by TU students	No car necessary
Day 3	6th	KTM-PKR (Stay)	Viewing landslides, colluvium, talus, terrace, Lesser Himalayan geology, Krishnavir landslide	Bus, with a good quality speaker
Day 4	7th	PKR-Jomsom (Stay)	Some stops viewing Annapurna Range, Viewing Fagfog quartzite, Kuncha phyllite, GLOF sediments and terraces	Bus, with a good quality speaker
Day 5	8th	Jomsom-car-Muktinath-walk - Kagbeni (Stay)	Several stops to learn geomorphology and geology of Quaternary and of Tethys Sediments.	2 jeeps JOM-MUK. MUK-KAG, one jeep should be associated with the trekking.
Day 6	9th	KGB-car, walk-Kalopani (Stay)	Tethys Sediments, STDS, FHI of the Higher Himalayan Gneiss, Morain hills. Observation and sketches	KGB-JOM: one jeep should be associated with the trekking. JOM-MRP, bus should be with us, making several stops.
Day 7	10th	Kalopani-car, walk-Tatopani (Stay)	Higher Himalayan Gneisses, MCT, Lesser Himalayan Metasediments, Landslides	Lete-TTP, bus should be with trekking.
Day 8	11th	TTP - jeeps - PKR (Stay)	Lesser Himalayan Metasediments, GLOF sediments, Terraces	TTP-PKR, bus should be with us, making several stops.
Day 9	12th	PKR (Stay)	GLOF sediment, Landslides, Sand subsidence, Mountain Museum	One day city tour by a bus.
Day 10	13th	PKR-bus-TAN (Stay)	Mahabharat Range topography, Lesser Himalayan Metasediments, Tansen Group, Palpa Klippe.	By the bus, with several stops.
Day 11	14th	TAN -bus- Lumbini (Stay)	Lesser Himalayan Metasediments, Gondwana Sediments, MBT, Siwaliks, MFT, Gangetic Plain, Maya Devi Temple	By the bus, with several stops.
Day 12	15th	LMB- bus - KTM (Stay)	MFT, Lesser Himalayan Metasediments, MBT	By the bus, with several stops.
Day 13	16th	KTM (Stay)	Summary seminar at TU with TU students in the morning, free time in the afternoon..	No car used
Day 14	17th	Depart KTM 23:15	Visiting world heritage etc in Kathmandu escorted by TU students. Departure Kathmandu in late night.	Stay on the flight
Day 15	18th	Guangzhou-KIX	5:30 Guangzhou 8:40 - KIX 13:40	
TU: Tribhuvan University, KTM: Kathmandu, PKR: Pokhara, BEN: Beni, JOM: Jomsom, KAG: Kagbeni, MRP: Marpha, TTP: Tatopani, TAN: Tansen, LUM: Lumbini				

The itinerary of the SHET-7 in March 2018 is shown on Table 3. The Japanese tour team arrived Kathmandu on the 1st day. On the 2nd day, the pre-tour seminar was conducted at the Tri-Chandra campus in the morning and a city tour was escorted by students of the campus in the afternoon. From the 3rd to the 12th days the bus-jeep tour in the Himalaya as mentioned above took place. On the 13th day we had the summary meeting of the geotour in which all participants reported their fruits from the tour in English. On the 14th day, participants were escorted on the city tour again by the students of the Tri-Chandra campus in the day time and in the night the Japanese team departed Kathmandu for Japan.

All the budget of the tour is covered by the participation fee. The participation fee for a student is generally about 1000 USD which covers all necessary expenses of the tour of 13 days after reaching Kathmandu from Japan. The details of the account of the tour are given above.

6. Highlights of Field Observations in the Tours from the North to the South

Because the tour course covers a full traverse of all the geologic zones of the Himalayan Orogen, there are so many important points to observe during the tour. Among them the tour team selected one or two observation point(s) from each geotectonic zones of the Himalaya and from four major boundary faults. Detailed location and description of stops (observation points) are given in the guidebook (Yoshida and Ulak, 2017). Below given are highlights of observations in the tour from the north to the south, starting from the upper reaches of the Kaligandaki Valley.

(7th tour, March 2018).

Figure 4. SHET-7 tour team on the east terrace of Kagbeni with Dhaulagiri range on the back

The first stop is the beautiful scenery on the east terrace of Kagbeni. Here a full view of topographic and geologic characteristics of the Tethys Himalayan Zone is met with.

At this locality, a distant view to the snow-covered Himalayan ridges including the Dhaulagiri range is observed (Fig. 4). The first major outcrop is the Jurassic Spiti Formation which provides good possibilities for ammonite fossil hunting, and therefore, is very interesting and fruitful for participants (Fig. 5).

Observation of large-scale recumbent folds of the Tethys Sedimentary Sequence (TSS) is the highlight in the Tethys Himalayan Zone, among which those observed on the eastern slope of the Dapudon ridge (Fig. 6) are superb fantastic. At the location of the South Tibetan Detachment System (STDS), we can observe a general view of the system situated along the Chhaktan Khola (Fig. 7), and then after a good outcrop of a part of the STDS composed of calcareous sandstone of the TSS intruded by Tertiary leucogranite (Fig. 8). A beautiful fold structure of the TSS is also viewed on the southeastern slope of the Dhaulagiri Range. These structures are almost identical with the sketch of T. Hagen (1968) which shows folded lower TSS, STDS and the HHG (Fig. 9).

Figure 5. Ammonite fossils collected by students from the late Jurassic Spiti Formation, west of Muktinath (5th tour, March 2016).

Figure 6. Students enjoy walking on the gravel of the Kaligandaki Valley. Beautiful folding of most of Mesozoic Tethys formations are seen on the mountain slope (5th tour, March 2016). JM: Jomsom Formation, LUM: Lumachalei Formation, SPT: Spiti Formation, CHK: Chukh Formation, MD: Muding Formation.

In the Higher Himalayan Zone, beautiful augen gneiss, kyanite-garnet gneiss, sillimanite-garnet gneiss etc. of the HHG are observed (Fig10). At the Main Central Thrust (MCT), a variety of mylonitic, phyllonitic, and sheared rocks of both gneiss and phyllite origin (Fig. 11) is observed.

Just south of MCT, we came across a hot spring at the Tatopani village and can enjoy it (Fig. 12). The heat source of the hot spring is regarded to be the MCT movement. Just south of the Tatopani village, a good example of rock slide (slope failure) on the left bank and its debris still remaining

on the river floor of the Kaligandaki valley are observed (Fig. 13). Phyllite and slate of the Kuncha Formation (Fig. 14) of the HM form most of outcrops of the Lesser Himalayan Zone appearing all along the course to the south of Tatopani up to Pokhara. Before arriving Pokhara surrounding Baglung, a tremendous amount of fluvial sediments are present, most of which are possibly of the glacial flood overburst flood (GLOF) origin, forming a wide and high (reaching up to ca 200-300m above the river floor) terrace (Fig. 15).

Figure 11. The MCT Ghatte Khola (above) and phyllonite (right) Characteristics of MCT. Gravels are mostly mylonitic and phyllonitic rocks and gneissic and granitic rocks.

A photo of phyllonite derived possibly from a mixture of phyllite and granitic gneiss. Q: Deformed quartz pods. C: Deformed clasts rich in quartz-feldspathic minerals.

Figure 12. Students enjoy the open spa in Tatopani at the end of trekking (5th tour, 2016).

Tatopani Rockslide

In 1998, the left bank slope of Kaligandaki collapsed and the debris dammed the valley forming a lake. The Tatopani village was mostly submerged in the lake for 7 hours.

Figure 13. Rockslide of 1998 south of Tatopani, looking toward north. Here the dark rock is gabbro amphibolite and the light gray rock is quartzite of the Naudanda Quartzite of the LHM.

Figure 14. A large outcrop of phyllite of the Kuncha Formation south of Tatopani (3rd tour, March 2014).

Figure 15. Tremendous thick fluvial sediments surrounding Baglung. The sediments includes much amount of GLOF sediments. (3rd tour, March 2014).

Figure 16. River gravel observations on the Seti Khola river, Pokhara, with the Beautiful Annapurna Range on the background (6th tour, March 2017). Here, all varieties of Himalayan rocks are possible to observe and collect.

Figure 17. A large dolomite boulder of the LHM rich in Stromatolite fossils, south of Ramdhi (3rd tour, 2014).

In Pokhara, students can enjoy observing present river gravels of the Seti Khola river composed of a variety of rocks as well as the fantastic view of the Annapurna Range (Fig. 16). Along the route from Pokhara to Tansen, a variety of sedimentary formations composing the LHM are distributed. Students are interested in beautiful stromatolite fossils on river boulders (Fig. 17) surrounding Ramdhi town where the tour again meets the Kaligandaki valley.

Surrounding Tansen and to the south onwards, the Mesozoic to Cenozoic Tansen Group forms the most of outcrops (Fig. 18). Here all the stratigraphic units of the Tansen Group are met with. Moreover, the interesting geologic structures representing the nappe and thrust tectonics including the Palpa klippe along Tinau Khola is

observed.

In the lower reaches of the Tinau Khola river, the tour crosses the Main Boundary Thrust (MBT) which are clearly viewable on the mountain slope of the right bank of the river (Fig. 19). To the south of the MBT, we enter the Siwalik Zone composed of the Plio-Pleistocene Siwalik Group composed of clastic sedimentary rocks. We can observe very good outcrops all along the road (Fig. 20).

In Butwal which is situated at the southern foot of the Siwalik Range, a beautiful topographic expression of the Main Frontal Thrust (MFT) is observed (Fig. 21). The tour team generally takes a night halt in Lumbini and visit the Maja Devi Temple, the birth place of holly Buddha (Fig.22).

Figure 18. Rocks of the Tansen Group occurring on the river floor of Tinau Khola, south of Tansen (4th tour, March 2015).

Figure 19. The exposure of the MBT along the Tinau Khola north of Butwal.

Figure 20. Observing the lower strata of the Siwalik Group, along the Tinau Khola road (3rd tour, March 2014).

Figure 21. Main Frontal Thrust (MFT), the Siwaliks and the Gangetic Plain (Right, 3rd tour, March 2014).

Figure 22. Students are impressed to be at the birth place of Gautama Buddha (5th tour, March 2016)

7. Report of the SHET Programs and Tours

A simple report of the exercise tour of each year has been disclosed on the SHET home page every year, soon after finishing the exercise tour, and published in The Geological Society of Japan News as well. Participants of an exercise tour are requested to submit a summary report of their participation to the tour, either fully in English or in Japanese with an English abstract. All these reports were assembled to form a report book with the title, e.g., *Traversing the Himalayan Orogen 2018* (e.g., Yoshida, 2018) which carry not only the above reports but also formal report by the organizer and reports by leaders, as well as important data on the SHET program of the year. The book is disclosed on the SHET home page and has been made open to world book market.

A summary report of the SHET program so far conducted and a report of the exercise tour of a year were dispatched since 2012 every year at meetings of several

academic societies including The Geological Society of Japan, Association for the Geological Collaboration in Japan and International Association for Gondwana Research, and Symposium on Polar Sciences (e.g., Yoshida et al., 2018, Yoshida and Student Himalayan Exercise Project, 2018) as well. A full information on the SHET programs of 2012-2016 was summarized and published in five Japanese reports (Yoshida, 2014, 2015, 2016a, b, c).

8. Participants of the Past 7 Exercise Tours

Number of participants of the SHET of past 7 years were 14-5-25-21-15-19-16 (Table 4), varied from 2012-2018. The number of participants of the 2nd tour was the least (5 participants) among the 7 tours due to no group participation, and the 3rd tour included the largest number of participants (25 participants) due to the group participation of the Shimane University.

Table 4. Participants of the SHET each year

Affiliation etc	Number of members each year						Class etc								Gender	
	2012	13	14	15	16	17	1	2	3	4	MC	DC	Citi-zen	Tea-cher	M	F
Akita U				1							1					1
Niigata U					1		1									1
Ibaraki U					1					1					1	
Tsukuba U		1	1		1					1		2			2	1
Tokyo U			2			1		1			2				2	1
Meiji U						1						1			1	
Nihon U						1				1						1
Shizuoka U			1							1					1	
Shinshu U		1		10	6	1		15	3						13	5
Nagoya U	3			1	1				3	1	1				5	
Chiba U	1				2		1		1	1					3	
Osaka C U						1		1								1
Shimane U	7		14	5		7		21	5	1	5		1		21	12
Yamaguchi U			3		1		1		1		2				3	1
Kyushu U				1					1							1
Ryukyu U	1			1				1		1					2	
Highschool		1											1			1
Citizen			2			2							4		1	3
Tribhuvan U	2	1	2	2	2	2		5	2	4					5	6
Nepal Citizen		1											1			1
Kerala U						2				2					2	
Sum	14	5	25	21	15	18	3	44	16	14	11	3	7		62	36
JPN Teacher	2	1	2	1	1	2								9	9	
TU Teacher	1	1	2	2	1	1								8	8	
Grand Sum	17	7	29	24	17	21	3	44	16	14	11	3	7	17	79	36

The total number of participants for 7 years included 106 students including 91 undergraduate and 15 master and doctoral course students from 20 universities, 1 high school girl and 8 citizens, in addition to 19 teachers/leaders from Japan and Nepal. Throughout the 7 years, number of Japanese students who did not belong a group and joined individually was 5-3-7-4-7-5-11 for the 1st, 2nd, 3rd, 4th, 5th, 6th and 7th tours respectively. Group participations from two universities (Shimane and Shinshu universities) have thus been very much appreciated for the proper fulfilment and continuation of the SHET program by 2017, because a small number of participants results in higher participation fee and creating difficulty in maintaining the SHET program. Students participated individually should be encouraged further, for the continuation and development of the SHET program. For the SHET-8 of March 2019, we found that the advertisement and/or encouragement through SNS by students who joined the past SHETs affected over half participants to be interested to join the SHET-8.

9. Expense of the Past 7 Exercise Tours.

The expense of the SHET should be economical as far as possible. So, the simplicity, along with the safety and cleanness have been the motto throughout the tours of 7 years. The expense of the tour includes A) airfare Japan-Kathmandu, B) lodgings and meals, C) local transportation as the major parts and D) preparation for the tour, E) taxes such as VISA and trekking permit, F) stay and meals at transit airports, and G) other miscellaneous ones.

As for A), to obtain an economical ticket, order of purchase should be made as early as possible, as for B) and C), comparative assessment of quotations given by several trekking companies in Nepal was made. Details of expenses of 7 tours from 2012 to 2018 are summarized in Table 3.

The participation fee including the air fare Japan-Nepal for one student varied from 133,531 JPY (SHET3) to

190,000 JPY (SHET-2), with the average of 162,492 JPY for 7 years.

The participation fee, which is the practical payment of a student was a little less than the sum of the practical expense for each year. This is due to some contribution by the organizer and citizen participants, the participation fee of a citizen is settled 50000 JPY higher than that of student, to help students to lessen their participation fee.

10. Fruits of the Student Himalayan Exercise Tours: Conclusion

10.1. Fruits Related to Geoscience

Throughout the 7 SHETs, participants learned the ways of safe and effective geological field survey, of observation and identification of rocks, geological units, geologic structures, natural hazards and topography, as well as got the understanding on the principal geologic structure of the Himalayan Orogen. In addition, they should have become familiar to field geology, and felt the common signature of geology of the Himalaya and Japan, and understood the

importance of geology for the human beings and the necessity of further sincere study on geology.

10.2. Fruits Apart from Geosciences

Participants experienced meeting different cultures and attitude of students of other universities and countries, and became familiar to English reading and conversation. An English guidebook for the tour was given to participants some months before the tour and pre- study on it was requested. During the field tour, the guidebook was used at every stop, and all participants were obliged to open its pages. In addition to that, daily English communication with foreign students and teachers prompted participants to become familiar to English communication. Group city tours with students of the Tri-Chandra Campus conducted on the first and last days of the tours also facilitated participants to get the familiarity to approach English speaking people. All these experiences should have become the first step for the participants to develop their internationality. Some students even reported that their ideas on the way of living in future have now drastically changed due to the experience of the tour.

Table 5. Costs of the Student Himalayan Exercise Tour, 2012~2018 (JPY)

Years and (Number of Japanese student participants)	2012 (12)	2013 (3)	2014 (23)	2015 (19)	2016 (13)	2017 (11)	2018 (12)
Air ticket	81,980	56,293	56,196	72,324	69,601	59,780	60,461
Lodging and meal	30,241	75,727	31,833	43,089	42,944	42,738	55,131
Local transportation	21,715	36,951	23,125	25,636	34,308	35,733	40,500
Guide and sherpas	1,676	4,554	892	3,949	4,432	2,633	3,292
Tax (VISA and trekking permit etc)	5,848	7,539	6,536	7,206	6,965	6,707	7,876
Preparation	16,851	24,980	8,542	11,355	25,169	18,069	21,547
China stays	0	8,929	5,011	5,224	4,891	5,883	0
Miscellaneous	3,544	7,345	4,079	434		2,422	833
Margin of Nepale trekking agency	0	7,469	2,307	3,634	4,615	3,273	4,686
SUM	161,855	229,787	138,521	172,851	192,925	177,238	194,326
Average participation fee of a Japanese student	158,638	190,000	133,531	166,937	176,659	146,523	165,159

7 years average: 162,492 JPY

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