



GREEN TIBET

Annual Newsletter 2011
Environment and Development Desk

EDITORIAL

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“Just as we should cultivate more gentle and peaceful relations with our fellow human beings, we should also extend that same kind of attitude toward the natural environment. Morally speaking, we should be concerned for our whole environment.

This, however, is not just a question of morality or ethics, but also a question of our own survival. For this generation and for future generations, the environment is very important. If we exploit the environment in extreme ways, we may receive some benefit today, but in the long run, we will suffer, as will our future generations. When the environment changes, the climatic condition also changes. When the climate changes dramatically, the economy and many other things change. Our physical health will be greatly affected. Again, conservation is not merely a question of morality, but a question of our own survival.”

-His Holiness the Dalai Lama, from “The Dalai Lama, A Policy of Kindness”

Environment and Development Desk

Central Tibetan Administration established the Environment Desk in March 1990, which later evolved into the present Environment and Development Desk (EDD).

EDD operates under the Department of Information and International Relations (DIIR), Central Tibetan Administration in Dharamsala.

The primary goal of our desk is to monitor Chinese policies and practices related to environment & development issues in the Tibetan Plateau. EDD works closely with various governmental and non-governmental organizations, media, experts and advocates on environment from all over the world to exert international pressure on China to halt environmental destruction in Tibet. We conduct research and publish our work in order to encourage global awareness on environment and development in Tibet and campaign against environmental degradation in Tibet as a result of China’s developmental policies. Our desk also imparts environmental education trainings, workshops and seminars for Tibetans in exile.

EDD’s activities are mainly focused on Tibet. Our chief goals are:

- Monitor and research on environment and development issues in Tibet.
- Disseminate information and carry out selective advocacy on promoting sustainable development in Tibet.
- Create awareness and educate public on Tibet’s environmental issues in the world in general and the exiled Tibetan community in particular

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Dear Friends of Environment and Development Desk,

Tashi Delek and warm greetings!

We are happy to bring out the second edition of our annual newsletter 'Green Tibet' in electronic-version.

As part of the year-long celebration of the 75th birth anniversary of His Holiness the Dalai Lama from July 6, 2010 to July 6, 2011, Environment and Development Desk (EDD) in collaboration with the Department of Education carried out events and activities to create awareness on the environment and development issues in Tibetan schools in India. After visiting several schools in Southern India, Ladakh and Manali, last year EDD successfully concluded the environmental awareness campaign in Tibetan schools located in the north and northeast India this year. The researchers from EDD imparted information on Tibet's current environmental issues such as climate change and water issues, grassland degradations, nomad resettlement and resource extractions in Tibet.

EDD took active participation in *the 10th March Project 2011* held in Bangkok, Thailand. The head of EDD, Mr. Tenzin Norbu's presentation on Tibet's river and its implication on the downstream nations was highly acknowledged and appreciated. He also dwelled on the issues of nomad's removal from their ancestral pastoral land, and on resource exploitation. EDD also took part in the conference, *Tibet in the Aftermath of Devolution of Political Authority*, organized by Vivekananda International Foundation in September 6-7, 2011 in New Delhi. The paper titled 'Climate Change in Tibet and Asia' was also presented at the conference.

Environmental Ethics is a new discipline in the field of environmental studies. It is important because it concerns human beings ethical relationship with the natural environment. It focuses on actions of people to consider how their actions affect others and the environment. With this emerging discipline, we are fortunate to get an opportunity to participate in *the Mind and Life XXIII Ecology, Ethics and Interdependence* with His Holiness the Dalai Lama held at Dharamsala, October 17-21 2011. The conference provided understanding of interdependence through an examination of the most recent data on the scientific case for effective ecological action. The conference was unique because it gave us an opportunity to meet with environmental scientists and members of other faith traditions that have arrived at a religious basis for motivating environmental activism.

Similarly, members of EDD also attended an international conference, *River Waters: Perspectives and Challenges for Asia* organized by the Foundation for Non-violent Alternatives, that took place from the 18 -20 November 2011 in New Delhi. The paper titled *The Significance of the Tibetan Plateau* was presented at the conference. It was a great opportunity for us to meet and interact with Indian and International speakers including Chinese. We regret to inform our readers that our Desk could not participate in UNFCCC COP 17 held in Durban, South Africa in December because of some visa issues.

Since each one of us plays an important role and has a moral responsibility in making our earth sus-

tainable and livable for our future generations. With such realization, the EDD showcased ‘Trash for Education’ an exhibition initiated by Mrs. Tenzin Pelmo, (an English teacher of Upper TCV school) at the DIIR’s Lhakpa Tsering hall on November 25, 2011. The exhibition showcased ways to reuse trash in a creative and useful way such as teaching aids. Used bottles, milk cartons/tetra packs, newspapers, bottle caps, discarded CDs etc. have been creatively redesigned as flashcards, mathematical tools, comic books and book marks to encourage reading and inculcate interest in learning among the kids. Such impressive work on environment conservation and enhancing education by transforming trash for education to save the environment for future generations is a valuable task that helps to reduce excess loads of environmental waste, and promote ethical behavior and civic sense among the people.

In the age of fast track communication and Internet world, EDD felt the need to use and harness the virtue of Internet. Blogging is one of the useful tools that is easier, faster and inexpensive way to disseminate information by publishing contents online. Catching up with the speed of today’s digital media, EDDs blog went live on December 11, 2011, in the eve of International Mountain Day. Readers are encouraged to keep posted, as there will be weekly updates about different environment and development aspects of Tibet on this blog (<http://tibet-edd.blogspot.com/>).

In addition, the Tibetan version of our report, *The Impacts of Climate Change on the Tibetan Plateau: A Synthesis of Recent Science and Tibetan Research on Climate Change* has been completed. The english version was first presented in COP 15 in Copenhagen, Denmark. Kalon Tripa Dr. Lobsang Sangay launched the book on the 2011 Tibetan Democracy Day. This report extensively covers research by Chinese, Tibetan and Western scholars, on the Tibetan Plateau. We hope that this report will serve as a foundation for further research and communication. We also came out with Environmental Press kit Tibet in the Planetary Future: Is Tibetan Plateau part of the problem initially aimed to distribute during UNFCCC COP 17 held in Durban, South Africa.

EDD is happy to welcome two new staff in our team during this calendar year. Mr. Tempa Gyaltzen Zamla, under secretary joined EDD in May 2011. He has obtained Bachelor’s degree in Tibetan language and literature from the College of Higher Tibetan Studies and also Bachelor’s degree in Political Science from Delhi University. Mr. Tsering Dhundup, one of the candidates of Tibetan Scholarship Program (TSP) 2009 joined our desk as a deputy secretary in October this year, after successfully completing his study from the US. He pursued Master degree in Earth and Environmental Science from Lehigh University, Pennsylvania after getting M. Phil in Geography from Himachal Pradesh University, Shimla. Our new well-qualified and committed staff has added vigor and depth to our work. We also extend our heartfelt congratulations to Ms. Chokyi, who has left the office to study MA in Sustainable International Development at the Heller School of Social Policy and Management in Brandeis University as a Tibetan Scholarship Program recipient.

Finally, we extend our sincere gratitude to all our volunteers, interns, supporters and well-wishers worldwide. Your contributions and continued support give meaning and strength to our work.

We wish you all very happy and healthy new year 2012!

Tibet-Xinjiang railway to be built via Golmud in 2011-15

(TibetanReview.net, Mar 09, 2011) China said on Mar 6 that it will connect Tibet with East Turkestan (Xinjiang) via Golmud city in Qinghai Province by railway during 2011-15, its 12th Five-Year Plan period. The new railway will be between Golmud and Korla, the official Xinhua news agency Mar 6 cited Luo Yulin, vice governor of Qinghai, as saying during China's annual parliamentary session which began in Beijing on Mar 5.

Golmud is already connected to Tibet's capital Lhasa by rail and the new project will be the first direct rail link between Xinjiang and the Tibetan Plateau. "The new line will cut the train journey between the two capital cities by more than 1,000 km," Luo was quoted as saying.

At present, railway travelers from Xinjiang's capital Urumqi to Lhasa have to take trains to Lanzhou in Gansu Province first before they reach Xining and from there Lhasa, a journey totalling about 4,000 km.

The report said construction on the Golmud-Korla railway would start this year and it would be put into use within 2011-2015.

Luo was further cited as saying that in the coming five years, two other railway lines would be built between Golmud and Dunhuang in Gansu Province, and between Golmud and Chengdu in Sichuan Province. He was also cited as saying local authorities were also considering the construction of two more railways linking Xining with Chengdu, and Xining with Kunming in Yunnan Province. Such rail links would necessarily have to pass through Tibet.

Source: <http://www.tibetanreview.net/news.php?id=8479>

First five-star hotel in 'Tibet' opened, four more to follow

(TibetanReview.net, May 30, 2011) China said on May 28 that the first five-star hotel in the Tibet Autonomous Region (TAR) opened for business in capital Lhasa on May 28. Lhasa St Regis Hotel is a high-end property in the tourism market; the official Xinhua news agency cited Guo Yan, chairman of Yungao International Hotel, the hotel's investor, as saying.

The report cited Wang Songping, deputy

chief of the tourism bureau of TAR, as saying two more five-star hotels – Shangri-La Hotel and Inter-Continental Hotel – would begin constructions this year. He had added that the region's five-year plan envisaged five five-star hotels in the region by 2015.

TAR has abundant tourism resources but is short of elite tourism facilities and so the new international hotels would help promote tourism in the region, Wang was reported to have added.

Source: <http://www.tibetanreview.net/news.php?cp=6&id=8986>

Construction of the world's highest highway tunnel has kicked off in China to open up to Tibet

(CNC World June 2, 2011) China is investing 170 million U.S. dollars to build the world's highest highway tunnel at the Trola Mountain section of the Sichuan-Tibet Highway. The tunnel, located at an altitude of about 4,300 meters, links Sichuan's capital Chengdu to Tibet's capital Lhasa and the work began on Jun 1. The project is expected to take four years to complete.

The report cited construction manager Li Ming as saying the 7-kilometer tunnel will shorten travel time across the mountain from more than two hours to about 10 minutes. The tunnel's importance was also emphasized for the fact that it will dramatically reduce the danger for truck drivers zigzagging up and down the mountain.

The 2,415-kilometer Sichuan-Tibet Highway is one the world's most deadly road as it traverses a dozen rivers and 14 mountains with altitudes of 4,000 to 5,000 meters. And the report noted that the Trola Mountain section remained the most hazardous section of the highway, with drivers cited as saying crossing the snow-covered Trola Mountain in winter was like going through the hell. "Wrecked vehicles lie scattered along the road," the report said, adding, "on March 14, a bus veered off the road, killing 16 people and injuring 21 others."

China began upgrading the highway in 1990 with an initial investment of 1 billion yuan (154 million U.S. dollars). One result of it is that a vehicular journey from Chengdu to Chamdo County in eastern Tibet, which used to take about one week in the 1980s, has been reduced to just two and a half days.

It added that the governments of Sichuan and TAR were planning to build more tunnels on several key mountains to improve traffic.

Source: http://cncworld.tv/news/v_show/15455_World_s_highest_highway_tunnel.shtml

19 homes collapsed in Nangchen earthquake, Tibet

(TibetanReview.net, Jun30, 2011) Ninety percent of the buildings developed cracks and 19 collapsed in five remote villages in Nangchen County of Yushu Prefecture in Qinghai Province following a 5.2-magnitude earthquake on Jun 26, reported China's official Xinhua news agency Jun 28. The authorities were said to have received no reports of casualties so far.

Most of the collapsed buildings were reported to be mud-and-brick rural Tibetan residences. The quake was also reported to have damaged a Buddhist monastery in one of the villages, rendering most of the monks' dormitories uninhabitable.

Nangchen is situated near the town of Gyegu (Tibetan: Kyegudo or Jeykundo), which was leveled by a 7.1-magnitude earthquake in Apr 2010, killing nearly 2,700 people, most of them Tibetans.

Source: <http://www.tibetanreview.net/news.php?id=9151>

New hydropower station begins operation in Nyingtri, Tibet

(TibetanReview.net, Jun20, 2011) China said Jun 17 that it began operating that day a new hydropower station in Gongbo (Tibetan: Kongpo) Gyamda county of Nyingtri prefecture. It said the 1.288 billion yuan (US\$200 million) project had an installed capacity of 102 megawatts.

The Laohuzui (Chinese for "tiger's mouth") hydropower station, located about 343 km from Lhasa, is designed to generate 2.5 million to 2.6 million kilowatt-hours of electricity daily to supply Lhasa, reported the official Xinhua news agency Jun 17.

The report said several other hydropower stations had been built in Nyingtri prefecture, including a 722.6-million-yuan, 40,000-kilowatt Xoka hydropower station, and a 25-billion-yuan, 3.78 million-kilowatt Songta hydropower station.

The report noted that the prefecture had 77,000 hectares of rivers and lakes and at least 60 million kilowatts of hydropower reserves, indicating plans to build more hydropower stations.

Source: <http://www.tibetanreview.net/news.php?id=9097>

China launches new airline for restive Tibet

(Reuters July 27, 2011) A new airline for China's restive Tibet region began operations on Tuesday, state media said, part of government plans to boost development and raise incomes in the remote area that chafes under Beijing's rule.

Tibet Airlines will initially serve Tibet's growing number of airports as well as cities in neighbouring provinces, but will eventually fly all over China as well as to international destinations in South Asia, Xinhua news agency said.

Its first flight was from Tibet's capital Lhasa to Ngari, a distant and sparsely populated part of Tibet close to the Indian borders that only got an airport last year, Xinhua added.

It operates Airbus A319 aircraft, the report said, a suitable model to serve Tibet's high altitude airfields, including Bangda, which lies at 4,334 meters (14,219 ft) above sea level and is the highest commercial airport in the world.

Tibet Airlines is controlled by an investment company run by the government of what China calls the Tibet Autonomous Region, according to the civil aviation regulator's website (www.caac.gov.cn).

"In five years, it is expected to have a fleet of 20 aircraft," Xinhua said.

China wants to more than double the number of tourists visiting Tibet by 2015, when it hopes the Himalayan region will play host to about 15 million visitors a year, creating more than 300,000 jobs.

Tibet's economy has grown more quickly than the rest of China, sped by the completion of a railway to Lhasa and large mining projects.

But those projects have also brought more Chinese migrants to Tibet, leading to many Tibetans' perceptions that they have been left out of economic growth.

Since bloody demonstrations in 2008, the government has boosted training programmes, subsidies and investment there in an implicit recognition of the economic roots to the unrest.

Source: <http://www.reuters.com/article/2011/07/27/uk-china-airline-tibet-idUSLNE76Q01920110727>

Qinghai to develop vast mineral resources

(People's Daily Online, August 18, 2011) China's northwestern Qinghai province will spend 20 billion on prospecting under the 12th Five-Year Plan (2011-

2015), a senior official said. During the 11th Five-Year Plan period (2006-2010), about 3.4 billion yuan was channeled into the geological exploration programs in Qinghai, and 17 new ore fields were found.

Speaking at the eighth forum of National Reform and Development for Non-ferrous Metal Geology Exploration, Luo Yulin the vice governor of China's Qinghai Province has said the province, being located at the intersection of the PRC's four plates, was endowed with a unique geological environment and the most abundant metallogenic belts. He has added that so far, only one-fifth of the mine survey has been done across the province, leaving great potential for further prospecting.

Luo said the size of 58 categories of retained mineral resource reserves in Qinghai Province ranked in the top 10 across the People's Republic of China; of them, 27 ranked among the top three and 11 ranked as the first.

Source: <http://english.peopledaily.com.cn/90882/7573833.html>

The Dachang gold mine to be among Asia's largest

(Frik Els August 30, 2011) China Daily reports local land and mineral resource officials in the Qinghai province estimate that the Dachang gold mine in the Tibetan prefecture of Yushu is likely to become one of the largest gold mines in Asia with 300 tonnes in proven reserves.

The geological exploration was conducted jointly by Qinghai mining development bureau and TSX-listed Inter-Citic Minerals with a total investment of \$31.3 million. The project is at an elevation of approximately 4,500 meters and consists of five exploration licenses covering some 279 square kilometers. Tiny Inter-Citic says it allocated \$6.3 million in exploration expenses for this year.

The report said the mine already had a proven reserve of 195 tonnes, with another 35 tonnes expected to be confirmed by the end of 2011.

The Province of Qinghai is endowed with rich mineral resources. The proven gold reserves of the province's six mines, including Dachang, are 430 tonnes. The Dachang Gold Project is located approximately 160 kilometers from the City of Golmud.

Source: <http://www.mining.com/2011/08/30/small-canadian-miners-tibetan-plateau-gold-mine-likely-largest-in-asia/>

China to pump \$47 bln into Tibet to 2015

(Reuters, Sep 14, 2011) The Chinese government will pump 300 billion yuan (\$47 billion) into restive Tibet over the next five years, with 90.5 billion yuan to finance roads, railways, hydropower stations and other infrastructure, state media said on Wednesday.

The 226 projects the money will support are "aimed at achieving rapid development in Tibet", the official Xinhua news agency quoted deputy governor Hao Peng as saying at an internal meeting on Tuesday.

Key transport schemes will include an extension of the railway from regional capital Lhasa to Shigatse, the traditional home of Tibetan Buddhism's second highest figure the Panchen Lama, and highways to the rest of China, the report added.

Other spending will target housing, health care and environmental protection, Xinhua said. "About 8 percent of the investment will be used to foster the development of indigenous industries, including tourism, mining, agriculture and stockbreeding."

The billions of dollars China has spent in Tibet over the last few years are all aimed at winning hearts and minds in the unstable Himalayan region, and to better integrate it into the rest of the country.

Similar plans have been unveiled for neighboring Xinjiang, whose Turkic-speaking and Muslim Uighur people have likewise chafed at Chinese rule.

Tibet's economy has grown more quickly than the rest of China, sped by the completion of a railway to Lhasa and large mining projects, though much of Tibet is still remote and very poor.

But those projects have also brought more Chinese migrants to Tibet, leading to many Tibetans' perceptions that they have been left out of economic growth.

Since bloody demonstrations in 2008, the government has boosted training programmes, subsidies and investment there in an implicit recognition of the economic roots to the violence.

China has ruled Tibet with an iron fist since Communist troops marched in in 1950. It says its rule has brought much needed development to a poor and feudal region.

Exiles and rights groups accused China of failing to respect Tibet's unique religion and culture and of suppressing its people.

Source: <http://in.reuters.com/article/2011/09/14/idIN->

Glaciers on the Tibetan Plateau melting fast due to global warming

(Xinhua, Oct. 21 2011) The glaciers of the Tibetan Plateau, the world's largest source of freshwater, are melting faster than ever under the influence of global warming and human activities, including excessive exploitation.

Experts have been conducting research on the waters, geology, glaciers, and wetlands in the headwaters of three rivers in Qinghai Province since 2005. Results from the study showed that a large area of the glaciers has melted in the 2,400-square-kilometer region. In particular, the report cited an expert with Qinghai's Three-River Headwaters Office as saying the cluster of some 80 glaciers around what it called the Aemye Ma-chhen Range, the source of the Yellow River headwaters, was shrinking especially fast.

Glaciers are the largest source of fresh water on the planet. They are also a reliable indicator of climate change, and easy for scientists to observe.

"I can sometimes see the Aemye Ma-chhen Range on the plane. But I worry that we are not likely to see the glaciers there in ten years or more," Li Xiaonan, deputy head of the office, said.

Cheng Haining, senior engineer with the provincial surveying and mapping bureau, said about 5.3 percent, or 70 square kilometers, of the glaciers in Yangtze headwaters had melted away over the past three decades.

Cheng said that "the melting of glaciers is closely connected with climate change." He added that data collected by three meteorological stations over the past 50 years show a continued rise in the average temperature of the three-river headwaters area.

The winter of 2009, for example, was the warmest in 15 years, according to the provincial climate center. Last year the average temperature there hit a five-decade record high.

Local residents in Yushu Tibet Autonomous Prefecture said the Zachu/Lancang River froze in November in the 1970s, but it did not freeze at all in 1999. It is estimated that 70 percent of the glaciers in Zachu River headwaters have disappeared due to the warm weather, researchers said.

Besides climate change, experts said that human activities and excessive exploitation also account

for the melting of glaciers.

Xin Yuanhong, a senior engineer with the Qinghai Hydrography and Geology Study Center, said the melting of the glaciers could lead to a water shortage and even a dry-up of rivers in the long run, and consequent ecological disasters like wetland retreat and desertification.

"The Tibetan Plateau is among the regions worst hit by global warming. Consequently, this will have a deleterious effect on the global climate as well as the livelihood of Asian people," said Qin Dahe, a researcher with the Chinese Academy of Sciences.

Experts called for intensified efforts in conducting further studies on glaciers, and setting up a database to monitor glacier change in the three-river headwaters region.

Source: http://news.xinhuanet.com/english2010/china/2011-10/21/c_131205294.htm

Qinghai to invest heavily in mineral industries

(Xinhua, Nov. 28 2011) The Chinese rulers of the Tibetan province of Qinghai is to invest nearly 18 billion yuan (US \$2.82 billion) in the coming five years to exploit its rich mineral resources, the local government said on Nov 26.

It cited a provincial land and resources department as saying in a press release that the province had planned for geological prospecting during the 2011-2015 period with a budget of 17.9 billion yuan for excavating coal, iron, gold, potassium salt, copper, lead, zinc and cobalt. Of this, at least 10 billion yuan will come from mining companies and other funds, 5 billion yuan from the central government treasury, and the remaining 2.5 billion yuan from the provincial treasury.

The report noted that the budget was more than five times the 2006-2010 spending, which it said totalled 3.4 billion yuan.

The report said the province had reported new discoveries of coal, iron ore, gold and silver reserves in the past five years, with the geologists seeing huge potentials for further excavation.

The report added that the province also had rich hydropower, petroleum, natural gas and non-ferrous metal resources.

Source: <http://www.chinamining.org/News/2011-11-28/1322443808d51788.html>

The Significance of the Tibetan Plateau¹

Tenzin Norbu, Head, Environment & Development Desk

Abstract:

A glance at a map shows how the Tibetan Plateau dominates the geography of Asia. With an average elevation of 4,500 meters above sea level, the Tibetan Plateau stretches for almost 3,000 kilometers from west to east and 1,500 kilometers from south to north. Since time immemorial, the plateau holds the Hindu Kush Himalayan Ice Sheet, considered as the largest ice mass outside the poles. The current trend of glacial melting and permafrost degradation on the Tibetan Plateau would threaten the flow of mighty rivers that feed billions of people downstream.

Geographically, the Tibetan Plateau has a vast expanse of Permafrost (approximately 1.3 - 1.6 Million sq. km) and seasonally frozen grounds. The permafrost on the Tibetan Plateau is sensitive to climate change and is particularly vulnerable to warming temperature. For centuries, these permafrost soils have acted like a sponge, conserving and managing the flow of these mighty rivers. They have also been the store house for Millions of tons of carbon.

Lying few meters above the permafrost soil is the Tibet's rangeland that covers approximately 70 percent of the total area of the Tibet's area. These rangelands are the highest and coldest on Earth, made habitable through the co-existence of the Tibetan people and their yaks. Through their efforts the pastoral nomads and the herders have maintained the sustainable use of this area for many centuries. Over the past few decades, human intervention and natural causes have critically affected these rangelands and is now affecting the permafrost soil threatening not only the diverse species and nomadic way of life but also the underground aquifers that recharge these mighty rivers.

This paper will discuss the different arguments and research findings about the permafrost cover on the Tibetan Plateau, and also its significance towards the major rivers that flow down the Indian peninsula and South-East Asia.

¹ *The paper was originally presented at the conference, 'River Waters: Perspectives and Challenges for Asia' organized by the Foundation for Non-violent Alternatives from 18 -20 November 2011 in New Delhi*

Introduction:

Situated at the heart of Asia, with an average elevation of 4500 meters above the mean sea level, The Plateau is ringed and criss-crossed by fourteen high mountain ranges from all the directions. For many generations these high peak mountains have served as a source of water and also acted as a barrier against any unwanted guests and in the preservation of its unique biodiversity. The Tibetan plateau even though very in-hospitable to many species due to its high altitude and extreme climates holds one of the most diverse plant and animal species. There are many species (both plant and animals) that are only found on the Tibetan Plateau, for instance Wild Yak, Tibetan Antelope and medicinal plants such as *Rheum palmatum* (Chumtsa), *Frittilaria* (Abhika) and about 400 species of *Rhododendron*.

The infinite grasslands and meadows are breathtakingly awesome and serene. In the summer time it would be filled with different varieties of flowering plants and in the winter with a thick blanket of snow. These grasslands not only serve as feeds to the wild ungulates but recent scientific studies have revealed that these grasslands actually store more than 7400 million tons of carbon and graz-

ing herds in turn play an important role in maintaining these grasslands in many ways (Figure1). These grasslands represent one of the last remaining agropastoral regions in the world covering the major part of the Tibet's total area.



Figure 1. Summer pasture

The types of rangeland vary from alpine meadows and mountain scrub to mountain sparse wood and mountain desert, which helps sustain domestic herds and nurture a wide variety of wildlife species.

These pasture lands are the highest and cold-

TABLE 1 THE MAJOR RIVERS OF TIBET AT A GLANCE

Tibetan	Other	Chinese	Source (ft. in metres)	Length (km)	Watershed regions	Outflow
Machu	Yellow River	Huang he	Amdo Bayanhar Mountain (5266)	5,464	Tibet, China, Inner Mongolia	Yellow Sea
Dri Chu	Yangtze	Chang Jiang	Mt. Thangla (6328)	6,380	Tibet, China	East China Sea
Zachu	Mekong	Lancang Jiang	Mt. Thangla (Ch. Tanggula)	4,500	Tibet, China, Vietnam, Laos, Cambodia, Thailand,	South China Sea
Gyalmo Nguichu	Salween	Nu Jiang	Mt. Thangla	2,800	Tibet, China, Burma, Thailand	Andaman Sea
Yarlung Tsangpo	Brahmaputra	Yarlung Zangbo	Mt. Tesi range	2,900	Tibet, India, Bangladesh	Bay of Bengal
Macha Khabab	Karnali	Maqa Zangbo	Mt. Tesi range	1,609	Tibet, Nepal, India	Bay of Bengal
Langchen Khabab	Sutlej	Langquen Zangbo	Mt. Tesi (Kailash)	1,450	Tibet, India, Pakistan	Arabian Sea
Senge Khabab	Indus	Senge Zangbo	Mt. Tesi (6638)	3,100	Tibet, India, Pakistan	Arabian Sea
Bhumchu	Arun		Mt. Shishapangma (8012)	1,207	Tibet, Nepal, India	Bay of Bengal
Lhodrak Sharchu	Norbu Lakchu or Manas		Mt. Zholchen (6106)	380	Tibet, Bhutan, India, Bangladesh	Bay of Bengal

est on Earth and are made habitable through the co-existence of the Tibetan people and their yaks. Through their efforts the nomads and the herders have maintained the sustainable use of this area for many centuries. The fresh water wetlands on Tibetan Plateau are distributed in an area covering approximately 1,33,000 sq. km. Besides acting as a potential sink for atmospheric carbon, they also recharge the underground aquifers which in turn feed the mighty rivers. The contractions in the wetlands due to climate change have led to reduced flows of the Dri-chu (Yangtze) and Machu (Yellow) Rivers. With the major Asian rivers originating from its plateau (See table 1), the total river basin area (as of 2003 data) is estimated above 5,477,700 sq. km. Beyond the populations residing in the watersheds of these rivers are the additional hundreds of millions or billions who depend on monsoon rains drawn inland by the Tibetan Plateau. For centuries, these permafrost soils have acted like a sponge, conserving and managing the flow of these rivers.

Permafrost and frozen grounds:

Permafrost is defined as ground that remains at or below 0°C continuously for two or more years. It is widespread in high latitudes and in high-elevation regions. The permafrost cover on the Tibetan Plateau (1.3 to 1.6 million sq. km) is alpine permafrost best defined as warm permafrost and rich ground ice, usually not far from melting temperature. Tibetan permafrost comprises 74.5% of the Northern Hemisphere’s mountain permafrost, and is a direct consequence of land uplift on the order of 3000 meter over the last 2 million years (Figure 2). Because the Plateau is geologically young and active, the geothermal gradient is steep (0.0514 °C/m), resulting in a thin, relatively warm permafrost layer containing many taliks.

This permafrost cover varies in its thickness from 1 to 130 m, depending on local characteristics and soil water content. Unlike the permafrost of other cold regions, the permafrost prevailing on the Tibetan Plateau is generally ice-poor as a consequence of the arid climate, high evaporation, and glacial history.

Over the past several thousand years, these

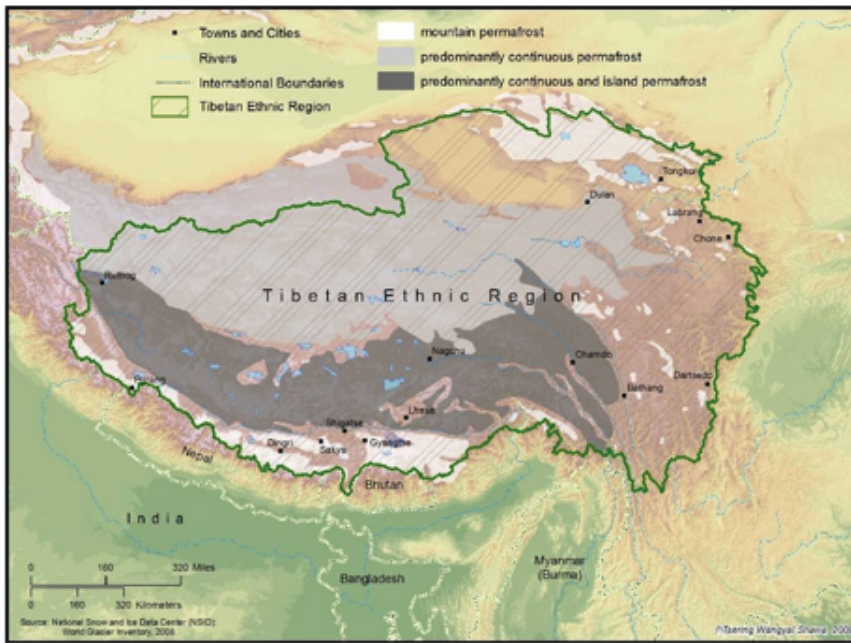


Figure 2: Permafrost cover on the Tibetan Plateau

frozen soils have enclosed vast amounts of carbons and methane. Many researchers fear that once the permafrost starts to degrade, the trapped gases will be released in the atmosphere leading to a positive feedback. Such feedbacks would lead to abrupt changes in the climate that would likely be irreversible. Researchers in 2008 estimated that these alpine permafrost stores about 12,300 Million tons of Carbon. A separate study conducted at the source region of the Machu (Yellow River) indicated that significant amount of methane gases are trapped in the permafrost layer. If the current trend continues, it would result in continuous declining of permafrost table. As a result those thawed layers of soils in warm season cannot refreeze completely in the freezing season. Such process is leading to a complete change in the local habitat and hydrology of the soil. The presence or absence of this permafrost layer necessitates major variations in the soil's physical structure mainly its moisture and nutrient content. On the Tibetan Plateau, the permafrost region goes through a high solar radiation load unlike other permafrost regions such as Siberia, making it highly sensitive to climate warming and surface disturbances.

Degrading Permafrost on the Third Pole

Over the past few decades, human intervention and climate warming have affected these permafrost regions and are now degrading and threatening not

only the diverse species and nomadic way of life but also the underground aquifers that recharge wetlands and the mighty rivers.

Field observations conducted by various scientists at different location on the Tibetan Plateau reveal that the ongoing permafrost degradation on the Tibetan Plateau has to be taken seriously and without any delay in implementing new effective policies or revising old policies that are in play.

In late 1950's and the following few decades, the people liberation army - PLA, in order to maximize the agricultural production (winter crop) from the alpine

grasslands have ploughed almost 20 million hectares of grassland in Tibet and Inner Mongolia. They were converted to croplands, by state owned farms, state-owned forestry operations, and other state owned enterprises. During that era, they were all labeled as "Newly Claimed Virgin croplands" but later failed to reap any harvest). These grasslands are now severely degraded.

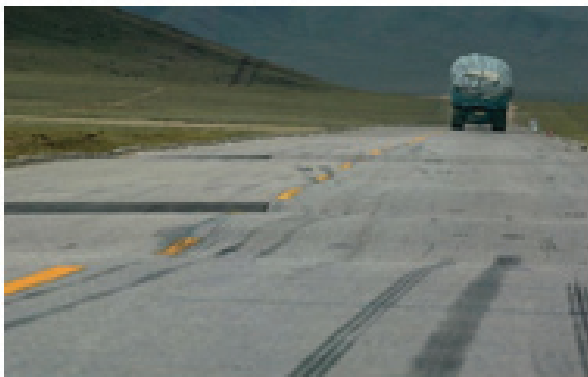
In 1954, the construction of Siling Lhasa Highway (Ch: Qinghai-Tibet Highway) from Lanzhou and Xining to Lhasa led to the severe degradation of the permafrost soil, its vegetative mat along the highway and its adjoining areas. Based on a scientific field survey in the year 1990, thaw settlement along the highway accounted for 83% of the road damage. The initial highway re-construction using asphalt pavement that took place during 1973- 1984 led to further degradation of these frozen soils. According to some researchers, approximately 30% of this highway has to be repaired every year due to damage cause by frost action. Those areas covered by asphalt road surface showed significantly higher Mean Annual Ground Temperature (MAGT) compared to the adjoining regions. In other words, the road construction/ renovation have resulted in a faster degradation of the permafrost layer, compared to the natural state. The stretch of highway near the Kunlun Mountain revealed that the thickness of active seasonal melt/refreeze layer under the asphalt road surface was 5.2 m compared to only 2.8m un-

der the normal state; and the surface temperature was warmer compared to the normal state (MAGT ranging from -1.0 to -0.2°C under the asphalt road and -2.5 to -3.5°C for the normal state). It was also found that the heat accumulation under the asphalt road bases resulted in increased thaw depths too great to be seasonally refrozen and, consequently, resulting in the transformation of vertically connected permafrost into disconnected phase.

In another excavations in the Kunlun Pass ($35^{\circ}40' \text{ N}$, $94^{\circ}02' \text{ E}$; 4715 m) the researchers found that the oil pipeline that was built in 1973 along the highway to pump Tibetan oil from Gormo to Lhasa, has induced a summer thaw depth of much higher magnitude compared to the nearby areas. They have also noticed that, due to the thaw settlement, the bridges and water conduits have also been damaged considerably.

At the highway near the Dhangla Ri-gyuth (Ch: Fenghuoshan Mountain), scientists found an arc shaped thaw slumping area measuring up to 73m wide and 103m long (in 2003) with the total volume of the failure about $10,000\text{m}^3$ caused by the repairing of the highway. Their survey results showed that the thaw slump has been active for more than 10 years compared to the general thaw slumping life year of 3-5 years and it will further remain active until the ice rich permafrost has disappeared altogether. The original sliding was caused by excavation of the slope toe in 1990 during the repairing of the Qinghai-Tibet Highway. After that, the excavation began to collapse in warm seasons and leave the ground ice exposed to the air.

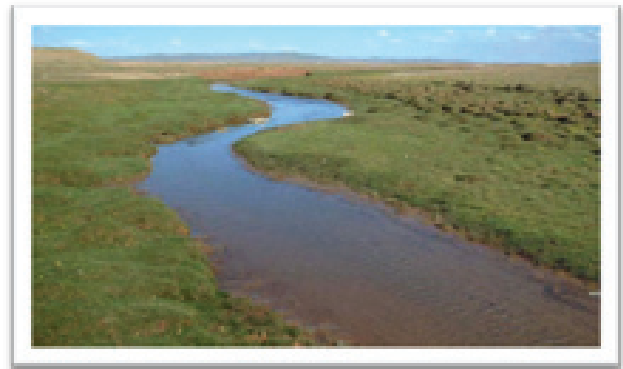
Researchers have found that, the permafrost



a) *Retrogressive thermal slumping*



b) *Slope failures*



c) *Head region of Machu (Yellow River)*

Figures 3. *Permafrost degradation and its impacts*

temperature at the source areas of Driчу (Yangtze River) and Machu (Yellow River) in the arid heart of the Tibetan Plateau has risen since 1980 resulting to the increase in the soil active layer. Under such conditions, the permafrost degradation is directly leading to the lowering of local water tables and lake water levels, and shrinking of wetlands and deterioration of marshy meadows. The diminishing marshy meadows allow for a greater depth of thaw thus further lowering of the water table. The same observations were also made by other researchers. Recently the researchers have noticed a shrinking of about 20% of the alpine meadows and the wetlands area in the vast Amdo area due to permafrost degradation.

These changes in permafrost regions has resulted (over the years) in loss of soil moisture and the subsequent release of trapped carbon to the atmosphere. Such degradation has/ will in future cause large scale environmental deterioration, including changes in surface hydrology, accelerated desertification, and destabilization of human infrastructure. Figures 3. depicts some of the impacts of thawing ice-rich permafrost inducing retrogressive thermal

slumping on the highway, slope failures on the alpine pastures and drying up of the head regions of the rivers.

In short, climate warming will degrade the upper permafrost as a result converting the alpine wetlands to alpine meadowlands, alpine meadows becoming grasslands, and grasslands becoming deep-rooted shrub lands. Such changes if subjected under climate warming over a long time can cause a further degradation of the permafrost and will finally lead to desertification. This is a succession of biomass productivity loss.

The above findings reveal that the current permafrost degradation was mainly due to the surface disturbances while the global warming has played a secondary role in speeding up this degradation. It is also clear that infrastructure development undoubtedly exerted additional stresses on these sensitive permafrost environments.

How to restore the degrading permafrost?

Up until today, the modern science and technology has no solution to stop or reverse the degrading permafrost. Once the ground temperature starts to increase above zero degree, then there is no turning back, it further increases the depth of the active layer and thereby magnifies the thaw size in warmer months. But we can always delay and reduce its impacts by careful investigation and understanding the basic nature of the landscapes. Scientists have spent many harsh winters to actually read the basics of these grasslands that have preserved the frozen soil for the past several centuries. Modern science is now beginning to understand what was known to the pastoral nomads for many generations. These nomads have evolved along with the extreme climates and are the best stewards of the grasslands. Although they might not know the technical and scientific details about the frozen soils and its relationship to the alpine grasslands but they were very sure that their ancestral cultures and their mobile lifestyle are successful in maintaining the grasslands healthy.

Does depopulating the grasslands actually help to restore the permafrost or the opposite is correct?

Pastoralism on the Tibetan Plateau is an 'adaptation to a cold environment at elevations above the limit

of cultivation'. For centuries, the Tibetan nomads and herders have successfully maintained a sustainable and mobile lifestyle, traveling from winter to summer pasture lands and autumn to spring pasture lands, thereby not pushing the limits of the grassland so called 'carrying capacity'. The alpine grasslands on the Tibetan Plateau represent one of the last remaining agro-pastoral regions in the world. The Plateau itself is covered in almost 70 percent of these precious grasslands. The pasture lands are made habitable through the co-existence of the Tibetan people and their yaks. Through their efforts they have maintained the sustainable use of this area for many centuries. China's introduction of different grassland policies over the years threatened the sustainability of this delicate environmental balance. The new policies restrict the flexibility and mobility of the Tibetan nomads. They are compelled to settle in concrete housings. Their livestock and their culture are held responsible for the degrading the grasslands, which in turn will dry-up the precious water tower of China.

These days many researchers and rangeland specialists dispute the effectiveness of the grassland laws and related new policies which requires depopulating these alpine grasslands. According to the Chinese state media, under the "new countryside" program launched in 2006, the local Chinese government of Tibet Autonomous Region - 'TAR' had moved a total of about 300,000 families involving 1.43 million Tibetan nomads and farmers into new or fixed settlement homes. Another 185,500 families are expected to move into new homes by 2013.

Field observations conducted on these grasslands have revealed some positive connections between the grazing herds of the nomads and the grasslands. The researchers say that abandoning these grasslands will lead to the domination of the invasive species and do more harm for the grassland which in turn would affect the frozen soil.

Recent field studies also revealed that skillfully managed grazing pressure actually helps in regenerating the grasslands by improving the Carbon/Nitrogen ratio and prolonging/ extending the growing season. These researchers say the degradation of these grasslands are due to many factors such as permafrost degradation, irrational human disturbance (mining, road construction, conversion of grassland

to cropland, gold mining, overgrazing etc.) and climate warming. They say a managed grazing could actually reverse the grassland degradation. The researchers went further to prove that global warming and grazing cancel each other and there were no significant effect on ANPP (Above Ground Net Primary Production) and those depopulated grasslands could in future have less ANPP. Their study indicated the following points;

- Grazing can alter the age structure of leaves and regenerate older plants
- It also helps to keep the expansion of invasive weeds under control
- Species richness in grazed areas remains stable, whereas in the absence of grazing, there is faster decrease in the species richness, especially the medicinal plants
- Grazing can increase the rangeland productivity and can reduce the negative effects of warming on both vegetation production and quality.

Some researchers even suggest that we cannot apply concepts such as “carrying capacity” and “stocking rates”. They are not applicable because most of the Plateau’s environments are extremely variable and unpredictable. Some even mentioned that the carrying capacities of some grassland were far exceeded partly due to inappropriate land-use and land management practices implemented in the 1950s. It was also mentioned that the major determinant for grassland productivity on the Tibetan Plateau is the rainfall rather than the past or the present livestock number.

Further human induced factors responsible for the degradation of the permafrost soil;

- Infrastructure development such as highways, new townships for settlers and railroad tracks
- Growing rapeseed on low-lying pastures - particularly by Chinese settlers and military units - around the pastoral plains of Amdo’s Tso Ngonpo (Lake Kokonor)
- Uncontrolled gold mining and illegal harvesting of wild medicinal herbs on grasslands with the connivance of local authorities
- Chemical elimination of indigenous predators on the grasslands leading to the loss of natural checks on the population growth of pest species
- The construction of the 1120-km, 159-mm

diameter Gormo (Ch: Golmud) to Lhasa Oil Products Pipeline (GLOPP) that took five years (1972 till 1977)

- Increased grazing pressure on the grassland due to sudden increase of livestock number (especially the number of sheep) during the commune system and during the implementation of fencing policy.

Conclusion & Recommendations

The Tibetan Plateau is the land bridge connecting South Asia with East Asia. If the neighboring countries maintain their habitual stance of viewing events in Tibet as some far place, they will fail to engage with the rapid changes outlined above, all of which directly impact on Tibetan Plateau long term sustainability.

As Jane Qiu quoted an excerpt in her article from Veerabhadran Ramanathan (an atmospheric scientist), “Our understanding of global climate change would be incomplete without taking into consideration what’s happening to the Tibetan Plateau”.

The very survival of almost 2 billion people depends on the monsoon dynamic and water resources originating from the Tibetan Plateau. The impact on Tibet’s landscape, especially the frozen grounds either due to human intervention of climate warming will threaten not only the future food security of many nations but also its developments. If Tibet’s grasslands are maintained and improved, through a combination of nomadic work and state/donor finance, they will form a part of the solution to a global problem. This is a far better alternative than excluding nomads, and will enable grasslands to recapture carbon while also sustaining human livelihoods.

Much effort is needed on the ground in Tibet to restore wetlands, adapt farm and pastureland, and preserve forests before the impacts of climate change makes it more difficult to save ecosystems. Through state and people working together, desertification may also be reversed. The fate of future developments and social security of the lower riparian countries relies on how well the resources are managed in TIBET.



The Importance of the Tibetan Nomads Regarding the Tibetan Grasslands and the Underground Water Levels

Erica A. Fox, an Intern at EDD from Miami University

The Tibetan Plateau is one of the locations on Earth that is being the most affected by Climate change. The Chinese government has realized this, but it is creating policies that are not conserving the underground watersheds, instead their policies are actually being aimed towards the Tibetan nomads. The nomads are being forced into settlements or limited grazing pastures, which are ultimately causing grassland degradation to be progressing and soon it will not be able to be reversed. The Tibetan nomads' culture and lifestyle is the only preventive measure the Chinese government has against global warming. However, the government is choosing to rid the world of this culture, thus sacrificing the unique ecosystem that is the Tibetan Plateau and the water tower of the Asia.

Climate change has already begun to affect the lives of many people across the earth. One group in particular is the Tibetan nomads. Because of the harshness of global warming effects on the Plateau, the life of the Tibetan nomads is highly affected by these changes. In the midst of trying to protect their land and continue their culture, China is forcing new policy on the Tibetan nomads without any communication or advice from the nomadic people. This is causing more problems with grassland degradation and the decrease in the permafrost layer, which then ultimately affects the underground watersheds causing water security issues. Although climate change is affecting the entire globe in different ways and at different degrees of intensity, the Tibetan Plateau is one of three locations in particular that are experiencing severe changes quickly and uncontrollably; the other two locations are the North and South poles (The Impacts of Climate Change, 2009: p. 14).

To begin, grassland degradation can be defined as, "The continuous deterioration in pasture quality. This includes the death of grasses, exposing soil to the erosive forces of gales, blizzards, hail, and snow. Degradation includes the invasion of plant species toxic to animals, and plagues of burrowing animals once soil is exposed. Because of Tibet's extreme climate, the vast grassland is vulnerable to degradation. Both degradation and desertification are widespread in Tibet. Once degradation starts it is hard to stop without considerable investment

in resowing pasture with grasses indigenous to the area. The last stage of degradation is desertification" (Tibet: A Human Development and Environment Report, 2009: p. 251).

Grassland degradation can be caused by multiple different reasons, some of which will be explained in this paper. One of these reasons is from the permafrost melting. Before global warming began, permafrost acted as a controller of the flow of rivers by soaking in the excess ground water and supplying it into the river system (Environmental Issues and Concerns on the Tibetan Plateau, 2010: p. 1). However, the system does not work to similar principles any longer because there is less surface water to be absorbed. This causes less underground water, which is causing the permafrost to melt. This thawing is no longer replenishing the rivers, so instead the rivers are draining into the ground. This issue is a dire problem to the Tibetan nomads because when water drains from the surface, plants and grasses lose its source of hydration. Also, as rivers lose their replenishing source of the permafrost, the underground water level will also decrease as it will too lose the sources of the permafrost and the rivers. This will further cause the soil to become drier which then continues to melt the permafrost. It becomes a detrimental cycle that only ends in grassland degradation and possibly desertification that only creates "withered surface vegetation" for the Tibetan nomads (Tibet: A Human Development and Environment Report,

2009: p. 145).

The rise in Earth's temperature is a possible reason for this decline in permafrost levels, which leads to the decrease in the underground water level. The increase in temperature and the decrease in rainfall have caused more water to be evaporated into the clouds from underground. This is lowering the water table and taking away the life-sustaining water source from the wetlands and grasslands. By drying out these lands, the capability for the nomads to graze the lands becomes near to impossible because the animals need a "wide biodiversity of grasses" to conduct healthy living (The Impacts of Climate Change, 2009: p. 26; Tibet: A Human Development and Environment Report, 2009: p. 145). This forces Tibetan nomads to move to higher grasslands that are not as safe and experience a harsher winter. Those that stay in the lower highlands, have to contend with drier soils and a change in the temperatures of the seasons (The Impacts of Climate Change, 2009: p. 22, 27).

Tibetan nomads have been relying on their knowledge of the seasonal cycle patterns for centuries. Climate change is forcing unpredictability onto the weather conditions for future seasons. In an interview with Gabriel Laffite, a consultant to the Environment and Development Desk, CTA in Dharamsala, India, he shared his knowledge regarding the nomadic dependence on the weather. Predicting when the winter season will begin is pertinent because the area the animals have to migrate through can be very harsh and dangerous and can become trapped in the high mountain alpine meadows if there is an early snowfall. Nomads have to predict the weather and be attentive to signs of the change in weather before it is too late. As Gabriel stated, "This is a time of risk management...A time that is under considerable anxiety and traditional wisdom, and consulting the oracles. And trying to figure out if we should have already brought our animals down or we leaving it a bit late?" (Laffite, 2011: 00:12:54-00:13:13). This late fall anxiety is similar to that of early spring anxiety of when to migrate back to the summer grasslands.

Climate change has caused the nomads to undergo more grief than before. The nomads are struggling to survive and to continue their Tibetan

traditions because of the changing of the already unpredictable weather patterns and causing the patterns to be even more difficult to foresee. Also with the permafrost melting, this is causing the soil to be drier and decreasing the underground water tables. In addition to climate change being the initiator of grassland degradation in the Tibetan Plateau, the Chinese government has been and still is initiating policy that is falsely putting Tibetan nomads at the center of blame for the degradation. To emphasize this statement, it is stated in Tibet's Nomads Facing Climate Change and Dispossession report, "But the most immediate impact of climate change is the exclusion of nomads from their lands, labeling them officially as "ecological migrants", as if they are victims of an impersonal force, called climate change" (2009: p. 3).

China is not being patient and logical regarding the important and dire issues happening with Tibet's environment. China's policies are hurting the grasslands greatly and causing more problems instead of solving them. China also refuses to work with or obtain advice from the nomads even though the nomads have the greater knowledge regarding the Tibetan Plateau (Tibet: A Human Development and Environment Report, 2009: p. 22). Up until recently, they have not witnessed many abnormal environmental experiences, which should be a clue to the Chinese that in order to save its "water tower", they need to work with the Tibetan nomads instead of settling them and stripping away their culture.

The nomadic people of Tibet play a very important role to the climate and ecosystem of Tibet. They may not be able to prevent the process of global warming and climate change, however their traditions, knowledge, and practices can slow down the effects of the anthropological pressures on the plateau as best as possible. The existence and continuation of mobile nomads is imperative to slowing the degradation of grasslands and trying to preserve the underground aquifers as long as possible. However, China's nomadic settlement policies are not helping its cause in trying to protect the grasslands. China's logic is stated in Tibet: A Human Development and Environmental Report as, "The rationale what is officially called 'ecologi-

cal emigration' is that the rangelands are degrading, so the pressing need for watershed protection requires the removal of nomads" (2009: p. 35).

This statement by the Chinese is illogical when determining the best course of action to protect the grasslands, because in fact, the nomadic grazing of the grasslands actually helps the grasslands, it does not degrade it.

The nomadic people of Tibet have been living their lives in this style for thousands of years and degradation has just begun only a couple decades ago. Tibetan nomads know how to use their land without damaging it. After years of practice, nomads know how to graze lands properly and do not let their livestock overuse and damage it. This is the ultimate reason why they are considered nomads, because they move constantly. Mobility is the most important aspect to Tibetan nomadic culture, because if their livestock is not free to roam, the grasslands become overgrazed very quickly (Tibet: A Human Development and Environment Report, 2009: p. 20). Also their mobility, "Has the best long-term guarantee of biodiversity conservation, sustainability and productivity" (p. 243). Even just the act of free grazing has multiple benefits to prevent land degradation. On page 29 of *The Impacts of Climate Change on the Tibetan Plateau: A Synthesis of Recent Science and Tibetan Research*, there is a list of reasons why grazing helps grasslands:

"Grazing can alter the age structure of leaves and regenerate older plants. It also helps to keep the expansion of invasive plants under control. Species richness in the clipped plots remains stable whereas the species richness in the surrounding, unclipped plots decreases. In the absence of grazing, there is a faster decrease in the species richness compared to warming with grazing. Grazing can increase the rangeland productivity and can reduce the negative effects of warming on both vegetation production and quality" (2009).

R.B. Harris from Case Western Reserve University found that the two most persuasive and supported hypotheses for Tibetan grassland degradation are, "Reduction in depth and extent of permafrost has led to rangeland gradation. Privatization and sedentarization (including fencing)"

(2010: p. 4). The first reason is explained above and the second hypothesis means the settlement of nomads and the restriction of mobility of their livestock. This way of life for nomads was not chosen on luck; this was made their lifestyle because they understood the land and adapted well to nature. It is even now knowledge among Chinese scientists that Tibetan nomads created meadows for grazing thousands of years ago and this is why there can be life flourishing in Tibet. Mobility was considered crucial because the nomadic people had the knowledge of when to graze, where to graze, and to be as familiar as possible with the unpredictable weather cycles (Tibet's Nomads, 2009: p. 1). The Chinese government who are just creating policies regarding grassland degradation is being conducted in an office many kilometers away, and not taking time to learn this knowledge of the Tibetan Nomads. The Chinese government does not understand that by fencing the land and settling the nomads, they are killing Tibet's ecosystem and causing the land to degrade even faster. This is why their policies are failing and the land is only becoming worse with time, which ultimately affects Tibet's water sources, which as of now, is also China's easiest assessable water sources.

China has implemented numerous policies regarding the sedentarization of the Tibetan nomads. One policy is the Four Way Programme that issued region-wide fencing settlements for nomadic families and their livestock. It is also stated in the Environment and Development Desk's report, *Consequences of China's Policies on Tibetan Pastoral Nomads*:

"This program limited the mobility of the livestock and encouraged the herders to invest and spend more time in winter pastures leading to increased grazing pressure on a smaller land area. Thus the Four Way Programme at some point intensified or at least in part, responsible for the problems for which the herders are now being blamed" (p. 2).

China is not realizing the consequences of their settlement policies, or at least not quick enough. The government is causing harmful changes to the Tibetan land and to the culture of the Tibetan people. An article called "Nomadic

Lifestyle” from FreeTibet.org stated:

“Camille Richard, a rangeland management specialist for the Kathmandu-based International Centre for Integrated Mountain Development (ICIMOD), says: “The behaviour and rationale of pastoralists are dictated first and foremost by an awareness of the realities of the marginal landscape in which they live, a landscape that has sustained their way of life for centuries. A rapid conversion to a new mode of thinking and living cannot take place without resulting in substantial socio-economic and ecological consequences” (Saunders, 2003).

Also, “Recent ecological evidence from warming and grazing experiments on the eastern Tibetan Plateau suggests that the presence of moderate grazing actually helps control the expected effects of global warming on reduction of biodiversity and rangeland quality” (Yeh, 2010). From this scientific evidence, one would assume by now that the Chinese government would begin to change its policies. However it has not really begun to do so. Another policy of the Chinese government is the Restore Grassland Policy or Tuimu Huancao in Chinese. This policy was created in 2003 because China believes the only way to conserve the watersheds of China is to remove all livestock and nomads from the grasslands. However, this thought is contradictory to modern scientific evidence from China and abroad (Tibet Nomads Facing Climate Change, 2009: p. 3). In my own opinion, it can be perceived that the Chinese government does not actually care about its watersheds, but only the destruction of the Tibetan nomadic culture.

In response to the Chinese government policies, K. Saunders stated in her article from Freetibet.org: “According to grasslands specialists, livestock must be mobile to prevent degradation of the environment and to maintain rangeland health, the basis of extensive grazing systems throughout the world. The harsher the environment, the further the herders must move to acquire forage for livestock. Fencing of land can prevent this mobility among livestock, leading to degradation of the grasslands” (Saunders, 2003).

The Tibetan Plateau’s harsh climate furthers the necessity to allow the Tibetan nomads to

continue migrating across the plateau. However, by forcing the Tibetan nomads into settlements, the government is not only degrading the land further, thus lessening the underground water tables, but also weakening the Tibetan culture and identity in the plateau. It has already been confirmed by Chinese scientists that the nomad’s grazing practices prove “To be the best chance of maintaining the health of Tibet’s ecosystems and offsetting the worst effects of climate change” (Whitticase & Brigden, 2010).

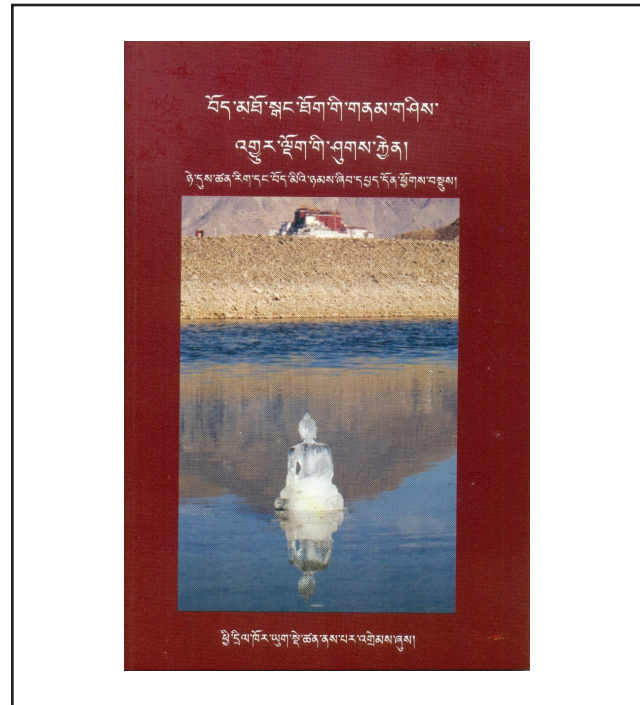
In sum, the start of the severe effects from climate change is affecting the Tibetan Plateau and the lives of the Tibetan nomads. The Tibetan nomads have inhabited this area and have practiced their culture for thousands of years without causing harmful effects to the environment. It was not until recently that the grasslands started to degrade, the permafrost began to melt, and the underground water level began to decrease. The nomads want to help preserve their land and have the plateau last for many more years into the future with its unique ecosystems and biodiversity. However, with the invasion of the Chinese, the preservation of this land has been hard to conduct because the Chinese government is enforcing policies that are not in the plateau’s environment’s best interest, as well as introducing anthropogenic pressures onto the grasslands, causing global warming to progress and further change and endanger the land, water, and permafrost. It is not the fault of the Tibetan nomads for the cause of grassland degradation or the lowering of the watershed levels, however if the Chinese government does not learn to listen to the nomads and obtain advice from them, China will be without a water tower and the rest of the Asia will be highly affect as well. Lastly, as stated by M. Whitticase and S. Brigden, “The Chinese authorities are gravely threatening the long-term water supply to hundreds of millions downstream” (Whitticase & Brigden, 2010).

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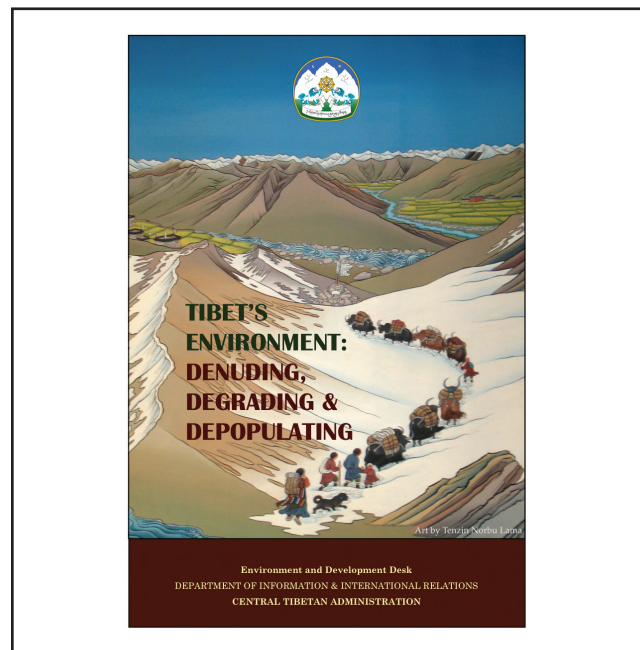
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EDD PUBLICATIONS



The impacts of Climate Change on the Tibetan Plateau: A Synthesis of Recent Science and Tibetan Research (in Tibetan)



EDD Press-kit: Tibet in the Planetary Future (2011)

Note: All the EDD publications can be downloaded online at <http://tibet.net/publications/>

Why Do Tibetans Protest China's Mining?

Dhondup Dolma Bhartso, Environment & Development Desk

China has conducted innumerable small scale exploitation of the mineral deposits found in the Tibetan Plateau causing destruction to the ecological balance. They had not succeeded in conducting this operation in a large scale due to many factors like high altitude, unreliable geographical data, lack of required infrastructure; things have changed after the inauguration of the Gormo-Lhasa railway.

After China's massive infrastructure investment on the Gormo-Lhasa railway and its planned extension from Lhasa to Shigatse and Hydro power stations have had a huge impact on the mining industry. Mines, especially those that process ores, need huge amounts of electricity, so hydro damming and mining in Tibet are closely connected.

These infrastructure developments attract an increased number of foreign and domestic players in the mining sector as their cost of transportation would be visibly reduced, thus leading to an intensification of mining in the area.

In 2005, Chinese geologists from The China Geological Survey Bureau announced the success of the seven-year-long geological survey that looked for mineral resources prospecting and environmental investigation on the Tibetan Plateau. The survey has found 5,000 mineral deposits on the Plateau. It estimated 30 million tons could be extracted from copper reserves, 40 million tons from lead and zinc reserves, and 1 billion tons from iron ore reserves. More specifically, geologists have discovered 600 new sites of copper, iron, lead and zinc ore deposits along the route of the railway line.

China announced in February 2011, that they would set up three major mineral bases in Tibet in the next five years, following discoveries of critically important/rich reserves in the Plateau. The bases would be set up in the Lhasa City, Lhokha and Chamdo Prefectures. With the necessary infrastructure in place and availability of the relevant geographical data, one can safely assume that China will carry out mining on a larger scale than before.

Frequent reports of mining protest inside Tibet led by the local Tibetans clearly shows that Tibetans are not happy with these mining developments. This paper looks at the recent mining protests and

some of the issues that arise from these protests.

Around the world, "resource curse" has become a concept that identifies the paradox of wealth in resources, translating into poverty of the local people. Tibet is an extreme example of this paradox. Not only does Tibet's mineral wealth fail to enrich Tibetan lives, it marginalizes and impoverishes them, also ruining their land and rivers. Tibetans are powerless and have no say in the decision-making processes that affect them, be it their culture, economy or environment. This leads to the impoverishment of local communities and the enrichment of the distant elite. Generally, all over the world impoverished and marginalized groups are underrepresented in any decision making process related to mining. Tibetans inside Tibet are experiencing the same which is clearly visible in the mining protest.

Following are the key issues that are of concern.

Employment Opportunities

The employment for local communities near mine sites is a major aspect of the mining activities worldwide. Local communities perceived employment as the greater immediate benefit that a project could bring to the area. However in the case of Tibet, even unskilled manual labor positions created by the mining projects invariably go to the increasing Chinese migrants in Tibet. Thus excluding Tibetans from employment and skills training despite the high number of unemployed local Tibetans. This biasedness to migrants has brought negative impacts, such as excessive immigration to the area of mine and economic marginalization of the local Tibetans. The sweeping in of non Tibetan workers would in the long run threaten the demographic composition of Tibetan areas. Such indirect consequences of mining

will make the Tibetan areas more like Chinese towns. There were cases where local Tibetans and immigrant workers had clashes. For example in June 2009, at least 3 Tibetans were seriously wounded after clashes broke over attempts by Chinese authorities to divert the Gyama river to a mining site, blocking irrigation water for the residents of Gyama township in Meldro Gungkar county near Lhasa.

Environmental Impacts

In addition to the irreplaceable loss of precious minerals, the environmental costs of mining are huge no matter how carefully and scientifically the mining operations are undertaken. Mineral resource extraction has a huge impact on the environment of the Tibetan Plateau and the local Tibetan people. Water pollution harms humans, livestock, aquatic animals and wildlife. Residents of Gyama township have filed a petition urging the Chinese authorities to put an immediate halt to the mining project as it endangers both human lives and animals because of the toxic waste from the mining work. There have been reports that more than 1000 animals have died after drinking toxic water close to the mine site. Scientific reports have shown that high levels of toxic metals are present in water bodies close to the mines. The mining in the Plateau is located very close to major rivers, upstream of Lhasa. There is also a case where **lead poisoning** of the water-supply due to pollution from the Ganhetan Industrial District in Rushar (Ch: Huangzhong) county in Qinghai province, led to more than 100 children falling ill in 2006.

Similarly water pollution has been a grave concern in Rebkong, **Kumbum, Kardze** and **Markham**. Mine operations also destroy grazing lands, negatively impacting the livelihood of local residents. The Tibetan plateau is the source of headwaters of great rivers of Asia, and contamination of these waters not only harms local environment it also affect millions of people locally and downstream.

Exclusion of the Tibetans: Unanswered Petitions and Grievances

As per the international mining standards worldwide (**ICMM good practice guide, Equator Principles**) the consultation, participation and involvement of all the stakeholders must be taken into consideration in all activities relating to a mining project. It is important that companies take the time to properly under-

stand the communities they work with including their concerns and aspirations. However, Tibetans have no say in how their mineral resources are used under the Chinese rule and have no way to speak out against the exploitation of their natural wealth. There were cases where Tibetans have petitioned to local authorities about their grave concern. In fact almost all the mining protest in Tibet (List of known mining protest are listed on page 24) did say that local people have filed petition to the local authorities concerning the damages done to the environment, human lives, livestock animals, inadequate compensation, broken promises, violation of human rights and disregard to culture. Petitions are brushed aside. Their petitions did not get any response from the authorities which clearly shows their apathy toward the Tibetans.

For example around **400 students** led a peaceful protest against the mining activities at Golog, in Qinghai province and have requested the authorities to stop mining activities at the three river head regions and sacred mountains. Similarly **Jiangpo village**, Foshan County, Dechen Tibetan Autonomous Prefecture in Yunnan Province filed petition to the local government about the opencast mining operations smothering Jiangpo and dozen other villages with swirling dust. Blasting had caused cracks in walls and foundations, putting the villagers in danger. However the local government ordered villagers not to interfere with mining and arresting seven people. If mining companies and the government do not seriously consult with local communities, they will not understand what contributes to local well-being. Instead, the mining project imposes serious costs on communities while ignoring the non-market environmental, social, and cultural costs. Therefore having communities approval ahead of time can be valuable, while proceeding without local approval can lead to ongoing conflict.

Disregarding local culture and world heritage site

From the mining protests, it clearly shows that the Chinese Government has no regards for Tibetan's sentiments. Holy mountain such as Khawa Karpo (Meili Snow Mountain) is one of the most sacred mountains that Tibetans revered. So much that they do not dare to climb the mountain. The mountain is a major pilgrimage site, with people coming from distant places to purify their minds while trekking round



In May, 2010 local Tibetans in the U Yuk Sogchen sub-district of Namling Shigatse protested environmentally destructive gold mining activities after repeated appeals to the local authorities for an end to the hazardous gold mining.

the mountain. But now, the holy site located halfway up the east coast of the Zachu (Lancang/Mekong) River is being mined. The area falls in “Three Parallel Rivers” which was designated as natural heritage site in July 2003. Meili Snow Mountain or Khawa Karpo is also a National park. However, since 2004, iron ore mining have been taking place on river slope of the world heritage site and the National park areas. Blasting has caused cracks in the walls and foundations, putting the villagers in danger. So such activities not only disregards the local Tibetan’s sentiments, it also degrades the world heritage sites, which is supposed to be protected from exploitation and degradation.

Conclusion

Tibet’s resource heritage is being threatened with more exploitation than ever before with coming of the railway/infrastructure and high prices of minerals worldwide. Mineral resource extractions have a huge impact on the environment of the Tibetan plateau and neglect the capacity building of the Tibetans. Almost all jobs in Tibetan mines go to non Tibetans bringing negative impact such as excessive immigration of non-Tibetan to the area of mine thus economic marginalization of the local Tibetans. Mine operations destroys grazing lands, negatively impacting the livelihood of local residents. Therefore it is important to have free, prior and informed consent of the local Tibetan in the decision-making processes of the project that impacts their culture, economy or environment.



List of Known Mining Protest inside Tibet

U-tsang

- June 2009, Meldro Gyama, Meldro Gungkar county (**water pollution & diversion**,
- May 2010, Wu Yug Sochen, Namling dzong (**protest- respite**)
- November, 2010 Lingka Monastery, Tamo, Shetongmon district (**15 People jailed**)
- April 2011 Phondo, Phenpo Lhundrup Dong (protest)
- May, 2011 Mining protest in Dzogang County, Chamdo (**Beaten and detained**) Tibetan Review
- June, 2011 Mining protest in Bethong township, Dzogang County, Chamdo (detained)

Do-Toe

- March 2009 Bathang county, Kham Karze (death of cattle)
- May 2009, SerNgul Lo, Lhara Village, Markham county, Eastern Tibet (**road blocked**) Phayul
- 8 April, 2010 in Nyarong, Kham , Exploitation of Mineral Resources (**Residents Protest**)
- August 2010, Fatal shooting of Tibetan in mining site, Palyul county, Kardze , Kham (**3 People killed**)

Do-Mey

- 2010, Dakthar Dineth, Amdo Golog (peaceful protest)
- May, 2010 Tibetan demonstrators against a highly pollutant local cement factory, Labrang, Sangchu County , Kanlho TAP , Gansu (**open fired**)
- April 2011, Rampant gold mining threatens human lives and ecology in Rebkong, Malho TAP (**imprisonment**)
- Monks and local residents of Kumbum filed a petition for environmental safety. Kumbum, Amdo, June 2011 (**lead poisoning**)
- June 2011, Golog, TsoNgon Shingchen, (**peaceful protest- 400 students**)
- September 2011, Chone (Ch: Zhuoni) Kanlho TAP, Gansu (**Concealed exploitation led to ecological damage**)

Talks/Seminars/Workshops attended by EDD staff in 2011

Date	Event	Venue
March 16, 2011	Human right 16 session of human right council	Geneva, Switzerland
March 28, 2011	GLAB	Dharamshala, HP, India
May 11, 2011	Special Workshop for Tibetans students enrolled in Indian Univ.	College for Higher Tibetan Studies Sarah, Dharamshala, HP, India
May 28, 2011	GLAB	Dharamshala, HP, India
June 2, 2011	10 March Project 2011	Rissho Kosei-kai Regional Center (Thailand)
June 12, 2011	TPPRC Workshop	Staff Mess CTA, Dharamshala, HP, India
June 23, 2011	TSP 2011 Batch	Peace Hall TCV, Dharamsala, HP, India
June 24, 2011	SFT - Asia	DIIR Hall, CTA, HP, India
Sept. 3, 2011	Tibet Talk	Tibet Meusum, McLeod Ganj, HP, India
Sept. 6, 2011	Tibet in the Aftermath of Devolution of Political Authority	Vivekananda International Foundation, New Delhi, India
Sept. 6, 2011	Australia Tibet Coucil	Norbulingka Institute, Dharamsala, India
Sept. 8, 2011	Miami University Students	CHTS Sarah, Dharamsala, India
Nov. 11, 2011	Workshop for the Students of Himalayan and Northeastern Regions	ITCO, Peacehouse Upper TCV Dharamshala, HP, India
Nov. 18, 2011	River Waters: Perspectives and Challenges for Asia	Foundation for Non-violenct Alternatives- New Delhi, India
Dec. 16,2011	Discussion on Tibet's current environment situation	Volunteer Environment Club CHTS, Sarah, Dharamshala, India
Dec. 29, 2011	TPPRC Workshop for Class XII students	LTCV School, Dharamshala, India



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