

# Water Security and Environmental Management on the Tibetan Plateau

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## ***Climate Change in Tibet and impacts in Asia***

***Overview:*** With an average elevation of 4500 meters, the Tibetan Plateau is one of the most distinctive land-features on this earth. For many generations, this Plateau has met the basic necessities to sustain life and flourish human civilizations beyond its vast border. The modern era now begins to acknowledge the significance of its strategic location for developing peace and harmony within the region or the opposite. The Tibetan Plateau, also referred as ‘The Water Tower of Asia,’ is the headwater of major rivers that flow into India, Bangladesh, China, Nepal, Pakistan, Thailand, Myanmar and Vietnam. The snowpeaks and glaciers enable Tibet to be the source of major rivers that flow into Asia. As a result, approximately 1.3 billion people are dependent on the health of ten major rivers that originate in Tibet. The total river basin area (as of 2003 data) is estimated above 5,477,700 sq. km. The Plateau provides Asia’s freshwater resource from the deserts of Pakistan and India to the rice paddies of southern Vietnam, from the great Tonle Sap lake of Cambodia to the North China plain.<sup>i</sup>

Critical components to Tibet’s ecosystem are undergoing major transformations due to climate change. For instance, it has led to the receding of Tibet’s glaciers, shrinking and disappearance of thousands of lakes, drying of wetlands, thawing of permafrost, and reduced flow regimes in many rivers. Abnormal weather conditions due to climate change has made subsistence farming and herding more unpredictable, thus impacting the livelihoods of a majority of Tibetans. These days, on the Plateau, the spring thawing is earlier and the permafrost is melting away before the growing plants can access the water. This affects not only the crops but also the native vegetation of Tibet, especially in wetlands and other low lying areas. The loss of wetland in turn threatens the migratory birds that are used to Tibetan stopovers during the mating season.<sup>ii</sup>

***Temperature rise:*** This rise in temperature has also increased the rate of evapo-transpiration from the rivers and watershed areas intensifying the desertification process. ‘***Eco-compensation***’ (payment or compensation for ecological services) for the Tibetan farmers could become a viable solution in order to protect the downstream areas from possible water crisis.<sup>iii</sup>

The immediate recipients of the climate change impacts are those herders and farmers who did nothing to face these conditions. Chinese National Climate Change Assessment Report<sup>iv</sup> revealed that China’s average annual temperature could increase between 1.3 to 2.1 degrees by

2020 and as much as 3.3 degrees by 2050. It is predicted that precipitation in three of the seven major rivers will drop by 30 percent in the second half of the century leading to a 37 percent decline in wheat, rice, and corn yields. Major cities in coastal areas will face serious challenges due to rising sea levels, and extreme weather patterns are likely to increase.

In recent years, Tibet has seen a continuous rise in temperatures at the rate of 0.3 degree Celsius per decade, which is twice the global average temperature rise. Increased temperature has accelerated glacial shrinkage and has accelerated the degradation of permafrost<sup>1</sup> regions.

**Glacier shrinkage, lake growth:** According to other scientists,<sup>v</sup> 82 percent of the Tibetan Glaciers have already retreated in the past half century. In the past 40 years, Tibet's glaciers have shrunk by 6,600 sq km (*as of year 2006*). It is estimated that they are currently melting at a rate of 7 percent per year. A separate study by a NASA scientist<sup>vi</sup> (2010) revealed that 20 percent of Tibetan glaciers have retreated in the past 40 years and if the current trend continues, more than 60 percent of the existing glaciers could be gone in the next 40 years. Even the Chinese national reports have mentioned that the area of glaciers and frozen earth is expected to decrease more rapidly and are estimated that glacier area in western China will decrease by 27.7 percent by the year 2050.<sup>vii</sup>

The formation of glacial lakes as a result of the rapid melting of glaciers on the higher reaches of the mountain ranges continues to pose a serious threat to downstream countries (lower riparian), especially Nepal and Bhutan. The International Centre for Integrated Mountain Development (ICIMOD) has identified some 8,790 glacial lakes in parts of the Hindu-Kush Himalayas, of which the organization has confirmed 204 glacial lakes as 'likely to burst,' causing floods that could be devastating to downstream communities.

**Permafrost:** The frozen soils and the seasonally frozen soils on the Tibetan Plateau are well preserved over a long time by low winter air temperatures. Its seasonal thawing and refreezing have also played a vital role in balancing the delicate alpine vegetations, until now. Slope failures are often seen on the Tibetan Plateau due to permafrost degradation<sup>2</sup>. Locally, this degradation would result in the gradual desertification of grasslands and increased ground temperature.

Human interference is also responsible for the degradation of permafrost layer on the Tibetan Plateau. Some Chinese scientists in their study along the Siling Lhasa Highway (SLH) corridor have found that the heat accumulation under the asphalt road bases resulted in increased thaw depths too great to be frozen and, consequently, resulting in the degradation of permafrost. They indicated that the ground temperature has been increasing noticeably leading to permafrost degradations.<sup>viii</sup>

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<sup>1</sup>In geology: permafrost soil is soil at or below the freezing point of water (0 °C or 32 °F) for two or more years.

<sup>2</sup>Permafrost degradation has changed the regime of water retention and regulation by producing more runoff in areas of permafrost, leading to more evaporation. It has also prolonged the thawing period significantly leading to many interconnected ecological changes and technological worries.

**Grasslands:** Just above these great stretches of frozen soils lie the alpine grasslands and cold meadows that represent one of the last remaining agro-pastoral regions in the world. The Tibetan 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 herders 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 nomads (*main factors in the nomadic pastoral production*) and blame their livestock for overgrazing the grasslands.<sup>ix</sup>

For centuries, the Tibetan pastoral nomads and herders have successfully maintained a sustainable and mobile lifestyle, traveling from winter to summer pasture lands and autumn to spring pasture lands.

For some social scientists, nomadism is a strategy to optimize use of available natural resources and capitalize on socio-political conditions. While often ridiculed as primitive or even 'incomplete' by outsiders, it is in fact a highly sophisticated adaptation for exploiting energy captured in the grasslands of the region.<sup>x</sup>

This new policy, 'tuimu huancao' (Annex 1) assumes the only way to conserve China's upper watersheds is to remove animals and nomads. Yet China's own scientists have now learned through patient observation that the grasslands of Tibet, when grazed moderately and intermittently, moving herds on well before the short summer growing season ends, actually maintains a higher biodiversity. It took Chinese scientists 50 years to discover what the nomads have always known. But the most immediate impact of climate change is the exclusion of nomads from their lands, labeling them officially as "ecological migrants".

UN Special Rapporteur on the Right to Food, Mr. Olivier De Schutter has mentioned in his Preliminary Observations and concluding statement during his mission to the PRC (15 -23 December 2010) that, the herders should not, as a result of the measures adopted under the 'tuimu huancao' policy, be put in a situation where they have no other options than to sell their herd and resettle.<sup>xi</sup>

These days, many researchers and rangeland specialist are arguing the applicability of these new policies, and how much these have actually benefited or affected the herders. Recent scientific findings<sup>xii,xiii</sup> give us more insight information about the regeneration of the grasslands and the vital role of grazers in replenishing them. In their studies, they revealed that grazing actually helps in regenerating the grasslands.

Field observations conducted on these grasslands have revealed 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 that recharges these mighty rivers. Some recent research revealed that underground aquifers are a major contributor to the flow of the mighty rivers originating from the Tibetan Plateau. These underground aquifers are in turn dependent on the health of the permafrost soils.

### ***Tibetan Plateau and the Asian monsoon pattern***

The Plateau's seasonal heating during summer and spring plays a principal role in determining the large-scale air circulation in summer. Heating over the Tibetan Plateau tends to generate a surface cyclonic circulation and upper-atmosphere anti-cyclonic circulation which results in the appearance of a large air motion in the eastern side of the Plateau. As long ago as 1884, an English meteorologist working in India had the inspired idea that the snows of Tibet and the Indian monsoon are causally connected. Henry Francis Blanford<sup>3</sup> also suggested that the less it snows in winter in Tibet, the earlier the snowmelt, and the earlier the monsoon.<sup>xiv</sup> During summer, the Tibetan Plateau acts as an elevated heat source driving the Asian monsoon, with sensible and latent heat fluxes domination over the eastern and western Plateau respectively. The differential heating between land and sea intensifies the pressure gradient between the south Asian landmass and the Indian Ocean leading to the flow of air and moisture from the sea.<sup>xv</sup> In other words, the Tibetan Plateau acts as a heat pump in the summer drawing in the moisture rich water vapors from the Bay of Bengal. The seasonal monsoon wind shift and weather associated with the heating and cooling of the Tibetan Plateau is believed to be the strongest such monsoon on earth. The major rivers that flow from the Tibetan Plateau are further recharged by the monsoon as they reach the lower riparian countries.

### ***Water availability and management in China***

According to survey data analyzed by the Joint Monitoring Program for Water and Sanitation of WHO and UNICEF, about 100 million Chinese still did not have access to an improved water source in 2008, and about 460 million did not have access to improved sanitation. Progress in rural areas appears to lag behind what has been achieved in urban areas.

Water scarcity threatens the ability of China's farmers to irrigate their crops, impacting food security as well as social stability, especially in northern China. Water shortages cost the country an estimated 40-60 billion RMB<sup>4</sup> in lost economic output per year. Continued scarcity and uncertainty will affect the willingness of foreign and domestic companies to invest in China, further lowering the production of existing facilities, and ultimately affecting the job market.<sup>xvi</sup>

The recent supply of water and the sewerage pricing in China with relation to its water scarcity is still very low and are not well balanced to meet the supply and demand level for long-term sustainability. For instance, in Chongqing,<sup>5</sup> more public funds are spent on bottled water than on metered water due to the low quality of the water and the poor people have no alternative than to consume the inferior quality water.<sup>xvii</sup>

The authorities have so far failed to combat the main reason behind the inefficient water usage - the substantial under-pricing of the water. And the main reason for this failure lies in the ever-

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<sup>3</sup>*in the pages of Proceedings of the Royal Society, in London, proposed that the greater the snow cover in the land of snows, the later the Indian monsoon wets the parched earth on India*

<sup>4</sup>*Equals to (6.3 - 9.5 Billion USD)*

<sup>5</sup>*Major city in Southwest China and one of the five national central cities of China.*

present sense of insecurity amongst the Communist party if the farmers and the factory owners protest against the proper pricing of water. <sup>xviii</sup>

According to China's Ministry of Environmental Protection, one quarter of China's surface water is contaminated, and more than a quarter cannot be used for drinking, swimming, or fishing. Such conditions have a significant effect on the Chinese economy. <sup>xix</sup> In the 12<sup>th</sup> Five Year Plan, China has made strict rules for pollution control, particularly so as to govern the wastewater discharge. It aims to cut the release of major industrial pollutants such as COD (chemical-oxygen demand), and others by 1.5 percent per year to 2015.

The current situation necessitates a change in the Chinese government approach toward the development of water infrastructure. China needs to step away from a protectionist stance and move toward a more global perspective which involves understanding that increasing foreign involvement will be a necessary part of strengthening China's national water security. <sup>xx</sup>

The sheer struggle to combat the water management and to achieve those wishful targets reflected in the 12<sup>th</sup> Five Year Plan requires a massive build-up of trust in common people and most of all, a huge upfront investment for new infrastructures and upgrading of the existing water treatment plants to function more efficiently. The same could be achieved by working hand-in-hand with the developed nations, in the case of water management, especially in the agricultural sector, the PRC could invest (as it has in state TV <sup>xxi</sup> and its military budget) in the emerging technologies in desalination and highly-efficient drip irrigation, and in water re-uses<sup>6</sup>. According to Yusha Hu, <sup>xxii</sup> China can achieve foreign investment in China's water infrastructure if it changes its current complex set of requirements<sup>7</sup> that are designed to limit foreign control while maximizing technology transfer to local firms. After all, even if it tries, the bureaucratic infighting and a lack of coordination among ministries, commissions, and state-owned companies have led to severe challenges in creating and implementing policies. <sup>xxiii</sup>

Often the implementation of water and pollution governance fails due to bureaucracy, lack of clear guidance and corruption causing major environmental accidents and negligence as demonstrated by the case of the chemical leakage at a copper mine in Fujian Province<sup>xxiv</sup> and the negligence of authorities at Kumbum monastery in Amdo (*Ch: Qinghai*), when the tap water detected high lead (Pb)<sup>8</sup> concentrations due to a mining activity. <sup>xxv, xxvi</sup>

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<sup>6</sup>*In doing so, PRC should also protect the intellectual property rights*

<sup>7</sup>*They include build-operate-transfer agreements (BOT), public-private-partnerships (PPP), and an array of joint venture structures (JV) that typically require majority ownership to be Chinese.*

<sup>8</sup>*Lead interferes with a variety of body processes and is toxic to many organs and tissues including the heart, bones, intestines, kidneys, and reproductive and nervous systems. It interferes with the development of the nervous system and is therefore particularly toxic to children, causing potentially permanent learning and behavior disorders. Routes of exposure to lead include contaminated air, water, soil, food, and consumer products*

According to Article 34 of China's 2002 Water Law<sup>9</sup>, it is illegal to construct waste outlets in protected drinking water sources. In Tibet, most of the water related problems are connected with mining activities. Since late 1960s, mining firms have exploited Tibet in various scales and mostly under very poor environmental norms and regulations. Besides destroying the ecology and polluting the water sources, most of these mining projects create social tension and distrust when standard corporate policies are not followed. According to an interview conducted by our office<sup>10</sup> with newcomers from Tibet (*in the year 2010*) we were told that loud announcements were made in the streets that the central government needs to develop these mineral ores. Anybody found revolting against mining would be considered as revolting against the State. But even under such circumstances, in the past two years (2010-2011) there have been several protests by local residents related to mining activities, mostly when the local water supply is diverted and polluted for mining activities. Unlike the environmental protests in many parts of China, such protests in Tibet are suppressed by armed forces and in many cases the locals are silenced by firearms.

If the concerned water authorities seriously want to curb the water pollution to manage this precious resource, it should start from the head regions of these rivers, rather than taking strict measures to clean the already polluted water.

On a larger scale, Ma Jun<sup>11</sup> writes that 'Environmental protection policies are subordinate to the broader economic picture. Environmental impact assessments can be breached if they are a barrier to investment. Once a crackdown has ended, polluting industries can pick up where they left off – as long as it will benefit GDP growth. Faced with the choice between economic growth and protecting water resources, local governments favor the economy.'<sup>xxvii</sup>

### ***Regional competition for water; Chinese dams***

Tibet is strategically important to China due to its centrality in Asia's hydrological cycle: Tibet's glaciers, underground springs, lakes and high altitude makes it the freshwater repository, water supplier and rainmaker of China, Southeast Asia and South Asia.<sup>xxviii</sup> Brahma Chellaney (*a professor of strategic studies at the independent Center for Policy Research in New Delhi*) writes, in his latest book<sup>12</sup>, "Control over the 'blue gold' wealth of the Tibetan Plateau makes China a potential water power in the way Saudi Arabia is an oil power."

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<sup>9</sup>China's 2002 Water Law, <http://www.china.org.cn/english/government/207454.htm>

<sup>10</sup>Environment and Development Desk (EDD), Department of Information and International Relations (DIIR), Central Tibetan Administration (CTA), Dharamsala, Kangra 176215, (HP) India

<sup>11</sup>Ma Jun is a Chinese environmentalist, journalist; he set up the influential NGO, IPE (Institute of Public and Environmental Affairs) in China. Time magazine named him as one of the world's 100 most influential people in the year 2006

<sup>12</sup>Water, Asia's New Battleground (Harper Collins, 2011)

According to a report published by Institute of Defense Studies and Analyses (IDSA) in 2010, "water demand in India will grow from its current water supply of approximately 740 billion m<sup>3</sup> (current level) to almost 1.5 trillion m<sup>3</sup> by 2030, principally driven by population growth and the domestic need for agriculture. With no proportional increase in water availability and an ever increasing demand, a water crisis is imminent. Water being international, indispensable, and emotional can serve as a cornerstone for confidence building and a potential entry point for peace." xxix

Loh Su Hsing<sup>13</sup> writes in JakartaGlobe, "The big issue in Asia, apart from climate change, is whether China will exploit its control of the Tibetan Plateau to increasingly siphon off for its own use the waters of the international rivers that are the lifeblood of the countries located in a contiguous arc from Vietnam to Afghanistan. China is not only building mega dams on the international rivers running out of the Tibetan Plateau but is also damming the trans-boundary streams in its north and west that flow to Russia and Kazakhstan. China has dammed almost every major river on the Tibetan Plateau, including the Mekong, the Salween, the Brahmaputra, the Yangtze, the Yellow, the Indus, the Sutlej, the Shweli<sup>14</sup> and the Karnali<sup>15</sup>. China has unveiled plans to dam the rivers that still remain free flowing, such as the Arun<sup>16</sup> and the Subansiri."<sup>17</sup> xxx

In the wake of climate change issues, the International Centre for Integrated Mountain Development (ICIMOD) has revealed alarming details on the sustainability of the Himalayan glaciers. According to their findings, the current trend of melting glaciers suggests that the Ganges, Indus, Brahmaputra and other rivers across the northern India plains could most likely become seasonal rivers in the near future.

The Chinese dam building frenzy is creating huge discussions on whether these dams could be an initial step in enhancing its ambitious water transfer projects. Some experts believe that the current railway network linking Beijing and Lhasa would further enhance the needful transportation of technical staff and inventories to initiate this water diversion project. After many years of denial, when the Indian satellite images confirm the plans for China dam on Yarlung Tsangpo <sup>xxxi</sup>, the Chinese finally accepted building a HPP (*Hydropower Plant; 510 megawatts*) on the upper reaches of Yarlung Tsangpo at rdZam (*Ch: Zangmu*), at Lhoka prefecture in Tibet. No doubt, the PRC was quick in responding that the current HPP is a run-of-the-river project. But that too requires some storing of water to fill the reservoir. But that is not the end, five more dams are on the drawing board along the Yarlung Tsangpo and no clear information is available as to how and when they will initiate the other projects.

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<sup>13</sup>*Loh Su Hsing is an associate fellow of the Asia Program at Chatham House.*

<sup>14</sup>*Shweli River is a river in Myanmar (Burma). It forms part of the boundary between Burma and China*

<sup>15</sup>*Karnali is the major tributary that flows from Tibet forms river Ganga*

<sup>16</sup>*Arun flows from Tibet as Bhumchu to Nepal and India*

<sup>17</sup>*The Subansiri River is a tributary of the Brahmaputra River flowing from Tibet to the Indian states of Assam and Arunachal Pradesh*

World Wide Fund (WWF) for nature, formerly known as World Wildlife Fund, named the Indus River as one of the world's ten rivers at risk. The Indus which was already facing an acute shortage of water in its flow due to climate change suffered more obstruction after Beijing built a dam on the dying river without informing the downstream countries - India and Pakistan.<sup>xxxii</sup>

The Zachu or Mekong River, originating from the central Tibet through Yunnan Province in China and then flowing through Laos, Thailand, Cambodia and finally ending its journey in Vietnam is the lifeline for the Mekong-region countries. This river directly supports approximately 70 million people along its basin from fisherman to farmers.

The damming activities along the upstream of Zachu/Mekong have significantly affected the flow volume of the river. So far, the PRC has in total 21 HPP either built, under construction, under active consideration in Tibet alone.<sup>xxxiii</sup> The users downstream are turning their frustration on the Chinese government whose damming projects on the upstream Mekong River has greatly affected their lifestyles. Fishing boats are seen stranded on the shores of dried Mekong River in Mukdahan Province and at Nakhon Panam in Thailand. The livelihoods of the local fishermen and many other communities from Cambodia are threatened by the reduced flow of the river but their concerned voices are blanketed by the aid their government receives from China.

According to Kate Lazarus<sup>18</sup>, the single largest activity affecting water use, management and productivity in the Mekong region today is development of rivers for hydropower. With the total count of over 140 hydropower plants that are either built, under construction or planned, it will put around \$3 billion US worth of fisheries at risk. The aggregate demand for electricity in Greater Mekong Sub-region is projected to rise from 108,850 GWh in 1995 to 600,000 GWh in 2020. Virtually every study of the impact of dams on the Mekong System predicts substantial environmental and social cost as a consequence of their development.<sup>xxxiv</sup>

China has built over 87,000 hydro dams, more than any other country in the world. Besides performing various functions, the issue of dam safety has always been treated as a sensitive subject. Now, incidents at a number of dams and reservoirs have cast doubt on the quality of these projects, but they are rarely reported to the general public.<sup>xxxv</sup>

Zhang Boting, Vice Secretary of China Society for Hydropower Engineering, told reporters that the 12<sup>th</sup> Five Year Plan called for hydropower development to be prioritized. For various reasons, two thirds of the hydropower projects detailed in the 11<sup>th</sup> Five Year Plan had not been completed and would be revived in the 12<sup>th</sup> Five Year Plan.<sup>xxxvi</sup>

On March 5, 2011, premier Wen Jiabao presented his “government work report” during China’s annual parliamentary session in Beijing, revealing the key goals of the country’s 12<sup>th</sup> Five Year Plan (2011 - 2015). Apart from other grand visions to cut energy and carbon intensity<sup>19</sup>, China also aims to boost the proportion of non-fossil fuels in primary energy consumption to 11.4

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<sup>18</sup>MSP Coordinator/ Specialist, CPFW-Mekong Water Governance, M-POWER

<sup>19</sup> Carbon intensity is defined as carbon dioxide emitted per unit of GDP (i.e., the ratio of one ton of carbon dioxide to \$1,000 of GDP)

percent. After the Japanese nuclear tragedy and the subsequent freezing of further approvals of nuclear projects in China (*at least for a few years*), this is in fact a green signal for the dam construction companies to invest more on the Tibetan rivers and to meet its energy target.

In a recent media interview, according to Chinadialogue, Zhi Xiaoqian<sup>20</sup> said that;

*"plans had been drawn up for all of Tibet's major rivers, including the middle reaches of the YarlungTsangpo. But a lack of clear policy direction has meant approval for those plans has been slow and the projects have not commenced. Now the time and conditions are ripe. China's energy supply is becoming ever more pressured, and there's an urgent need to develop the rich hydropower resources of Tibet," Zhi said. "Currently less than 0.6% of Tibet's hydropower resources have been developed. In comparison with the rest of China, this is virgin territory."*<sup>xxxvii</sup>

Meng Si<sup>21</sup> mentioned that, China's green NGOs believe hydropower projects could bring economic development, but not necessarily to the benefit of local people. They believe that today's insufficiently transparent policymaking mechanisms are maximizing the interests of hydropower industry, officials and a small number of experts, while driving ecological destruction, affecting local livelihoods and increasing the risk of geological disasters. According to an article in Huffington Post, Catriona Luke, a South Asia writer for newstatesman.com writes that for China, Tibet's rivers are proving as rich resources for hydroelectric and geo-political power as its mineral wealth. But frenzied dam construction projected until 2020 means that a prehistoric irrigation system that dates back 30 to 40 million years is coming to an end.<sup>xxxviii</sup>

Growing industrialization, population growth, and increasing levels of consumption are placing heavy demands on water resources, which provide vital support for the subsistence livelihood to millions of people.

Currently, there exists is no regional framework for South and East Asian nations to discuss or negotiate over water resources, other than the Mekong River Commission, whose members are Cambodia, Laos, Vietnam and Thailand. China is not party to any bilateral or multilateral agreement on water with downstream nations, other than as a 'dialogue partner' to the Mekong River Commission.

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<sup>20</sup>Head of the Chengdu Surveying Institute

<sup>21</sup>Meng Si is the managing editor of Chinadialogue's Beijing office

## ***Recommendations***

The Tibetan Plateau is the land bridge connecting South Asia with East Asia. The very survival of almost 1.3 billion people depends on the water resources originating from the Tibetan Plateau. The impact on Tibet's landscape and its natural resources due to climate warming and human intervention will threaten not only the future food security of many nations but also their development.

The United States can help address the problems of warming on the Tibetan Plateau and its consequences by providing political, financial and institutional support. To this end, we offer the following recommendations to U.S. policy-makers:

**RECOMMENDATION 1: MONITORING.** The U.S. government, in collaboration with private and academic institutions, should partner with Chinese and international scientific institutions to monitor glacial retreat, temperature rise and carbon levels on the Tibetan Plateau, with a goal of creating better models to understand warming trends and the resultant impacts on permafrost, river flows, grasslands and desertification, and the monsoon cycle.

**RECOMMENDATION 2: MITIGATION.** The U.S. should engage with the Chinese government and NGOs to encourage a systematic re-thinking of policies related to grassland management and nomad resettlement. Changes in the ecosystem of the Tibetan Plateau will require sound mitigation policies and on-the-ground stewardship, which must include the integral participation of Tibetan stakeholders, primarily the nomads and their indigenous experience in managing this land for centuries.

**RECOMMENDATION 3: REGIONAL FRAMEWORK.** The U.S. should promote creation of a regional framework on water security. Such a structure would facilitate cooperative agreements among all riparian neighbors that would promote transparency, sharing of information, pollution regulation, and arrangements on impounding and diversion of river water. The U.S., which is already involved in a similar role with the Lower Mekong Initiative, could cite this initiative as a model or a starting point for further regional cooperation.

(Annex 1)

*Restore Grassland Policy' or 'tuimu huanco' 2003*

*In 2003, a grassland rehabilitation policy is implemented throughout the country and in pastoral areas this policy is referred to as the 'Restore Grassland Policy' or 'tuimu huanco' in Chinese, meaning "closing pasture to restore grasslands". In recent years, moving herders from the grasslands to state build housings is being largely intensified and has now become the central measure in protecting these grasslands. The land lease certificates guaranteeing nomads long term land tenure have been nullified by the new command. Instantly, all their skills, risk management strategies, environmental services, traditional knowledge and biodiversity conservation are gone, redundant, as if they had never existed.*

*The compulsory "ecological migration" of the Tibetan nomads is grounded in ignorance, prejudice, a failure to listen and learn. China is far from alone in assuming its nomads are backward, and to blame for degrading land. But around the world, governments increasingly recognize that pastoral nomadic mobility holds the key to sustainability on the dry lands of the world.*

*In 1990s, even after implementing series of policies and measures, nothing much changed and it became obvious that everything on the grasslands was going wrong. The rangelands were degrading, including the arid area of eastern Tibet where both of China's great rivers, the Yangtze and Yellow, rise from glacier melt. Chinese scientists and administrators turned to just one explanation. The nomads were to blame. They were overstocking, beyond the carrying capacity of the pastures, and this was the cause of degradation. The compulsory overstocking during the commune system could not be discussed; it was and is off-limits. So only one cause was possible: to blame the nomads.*

*Irene Breivik who conducted field research in Tibet stated in his final research paper that Control is a central dividing component, as the nomadic pastoral practices are centered around mobility and flexibility, whereas the current semi-settled production system limits the herders' mobility, and grazing is sought to be better controlled. This diverging rationality seems to be largely causing a situation where the traditional practices are considered as insufficient to conserve and rehabilitate the grasslands.<sup>xxxix</sup>*

*But some recent research revealed that overgrazing and degradation of the grasslands is not entirely dependent on the grazing livestock. The herders even talked about weather changes, rodents and mining activities as important factors causing grassland changes.*

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<sup>i</sup> Environment and Development Desk, 'TIBET, A Human Development and Environment Report' (2008), EDD, DIIR, Central Tibetan Administration, Dharamsala, HP, India, ISBN 81-86627-68-5

<sup>ii</sup> EDD-COP15 Briefing papers, Environment and Development Desk, DIIR, Central Tibetan Administration, Dharamsala, HP, India. Available online, <http://tibet.net/publications/>

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