WATER RESOURCES IN TIBET AND CHINA'S POLICIES, 1979-2014

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DOCTOR OF PHILOSOPHY

SHIVDAYAL CHAUDHARI

CENTRE FOR INNER ASIAN STUDIES,
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI- 110067

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CENTRE FOR INNER ASIAN STUDIES
SCHOOL OF INTERNATIONAL STUDIES
JAWAHARLAL NEHRU UNIVERSITY
NEW DELHI-110067, INDIA

Tel.: 011-26704350

Date: 21.07.2017

DECLARATION

I declare that the thesis entitled **"WATER RESOURCES IN TIBET AND CHINA'S POLICIES, 1979-2014"** submitted by me for the award of the degree of **DOCTOR OF PHILOSOPHY** of Jawaharlal Nehru University is my own work. The dissertation has not been submitted for any other degree of this University or any other university.

SHIVDAYAL CHAUDHARI

CERTIFICATE

We recommend that this dissertation be placed before the examiners for evaluation.

PROF. SANGEETA THAPLIYAL

Chairperson

Chairperson
Centre for Inner Asian Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110067

PROF. SANGEETA THAPLIYAL

Supervisor

Centre for Inner Asian Studies
School of International Studies
Jawaharlal Nehru University
New Delhi - 110067

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NEW DELHI *SHIVDAYAL CHAUDHARI*

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List of Abbreviations

AD	Anno Domini
ADB	Asian Development Bank
ASEAN	Association of South-East Asian Nations
CPPCC	Chinese People's Political Consultative Conference
CTGPC	The ChinaYangtze River Three Gorges Project Development Corporation
CWR	China Water Report
DEM	Digital Elevation Method
EPBs	Environmental Protection Bureaus
ESCAP	Economic and Social Commission for Asia and Pacific
FAO	Food and Agriculture Organization
FYP	Five Year Plan
GDP	Gross Domestic Product
GONGOSs	Government-organized Non-governmental Organizations
IRN	International Rivers Network
MENA	Middle-East and North Africa
MRC	Mekong River Commission
NGOs	Non-governmental Organizations
NPC	National People's Congress
NTS	Non-traditional Security Threats
ODA	Official Development Assistance
PRC	People's Republic of China
QTP	Qinghai-Tibet Plateau
RMB	RenMinBi
SCO	Shanghai Cooperation Organization

SDB	State Development Bank
SEPA	State Environmental Protection Administration
SNWDP	South-North Water Diversion Project/Policy
TAR	Tibet Autonomous Region
TGD	Three Gorges Dam
TGPCC	Three Gorges Project Construction Committee
TVEs	Township and Village Enterprises
UN	United Nations
UNEP	United Nations Environment Programme
UNICEF	United Nations Children's Fund
USD	United States Dollar
VAT	Value-Added Tax
WHO	World Health Organization
WTO	World Trade Organizations
YVPO	Yangtze Valley Planning Office
3H	Huang-Huai-Hai

Chapter I

Introduction

Water is key to sustenance. If there was no water there would be no life on the Earth. Water is not only required for drinking but also for survival. Water is not only important for human beings but also plays an important role to balance eco system. All plants and animal must have water to survive. The importance of water for the growth of a nation can only be highlighted given its myriad uses for livelihood and agricultural and industrial sectors. Tibet is a water rich region while China is facing water scarcity issues for its livelihood, agriculture and industrial purposes. To resolve its water problems, China aims to harness the water resources of Tibet to serve its interest. It is against this backdrop that that the current study looks at Water Resources in Tibet and the implication of China's policies during the period 1979-2014.

Water plays a significant role in global politics because of its strategic value. Rivers and water sources are often shared by more than one country. There are 276 international river basins in the world today and 148 riparian countries. 80 percent of the world's freshwater originates in basins that traverse through more than one country and approximately 2.75 billion people live within transboundary river basins. The sheer number of people and countries that are directly impacted by transboundary water relationships makes the stakes all the more important. Yet for all of the debilitating fears of potential conflict, there is only anecdotal evidence to suggest that water has ever directly led to war. In fact, cooperation is far more common. The last 60 years (1948-2008) have seen only 44 acute disputes (those involving violence), 30 of which occurred between Israel and one of its neighbours (Chellaney 2012: 23).

Many countries are facing water crisis today because water resources are limited, and it is unevenly distributed. Water is one of the most critical resources, and around the world it is under threat. If one looked at overall world figures, 1.1 billion people live without clean drinking water, 2.6 billion people lack adequate sanitation,1.8 million people die every year from diarrhoea diseases, 3 900 children die every day from water borne diseases (World Water Council 2015). Water scarcity now affects more

than two-fifths of the people on earth, and by 2025 two-thirds of the global population is likely to be living in water-scarce or water-stressed conditions (Chellaney 2012: 24).

Water-scarce nations face very tough choices and serious socioeconomic consequences and the majorities of the world's people living in water-related paucity are and will be in Asia. Asia is the world's driest continent, with availability of freshwater less than half of the global annual average of 6380 cubic meter per inhabitant. Asia's rivers, lakes and aquifers provide per capita, less than one-tenth the water of South America or Australia and New Zealand, less than one-fourth of North America, almost one-third of Europe, and moderately less than Africa. The world's fastest-growing demand for water is in Asia, which now serves as the locomotive of the world economy. Today, the most dynamic Asian economies, including China, India, Indonesia, South Korea and Vietnam, are all in or close to being in conditions of water stress. The exceptions are few: Bhutan, Brunei, Burma, Cambodia, Laos, Malaysia and Papua New Guinea (Chellaney 2012). The strategic value of water for Asian countries can then be gauged given the distribution of fresh water resources in Asia.

Asia region is also facing the twin problem of too much and too little water. The source of freshwater are seasonal monsoon rainfall, glaciers placed in High Himalayas across the country and ground water. In addition, seasonal variations and climatic variability contributes to fresh water management and the associated challenges. The average annual rainfall varies from country and also within the country. While Pakistan which is one of the most arid country of the world receives 240 millimetre (mm) annual rainfall, Bangladesh receives 2320 mm rainfall. Out of 5.1 million sq. km. land area of South Asia, the agricultural land is 54.4 percent in 2005. Water is required to cultivate these areas and the need of nearly one billion people living dependent on agriculture. Access of water is central to sustain the recent high economic growth and in reducing poverty, about 20 percent of South Asian population lacks access to water services (World Bank 2007). Fresh water is the 'national assert' for India or 'important national resource' for Nepal or 'central to the way of life'in Bangladesh and the single most important resource for the well-being of its people for Pakistan (GOI 1987; HMG Nepal 2002; GOB 1999 and Anon 2005). The most important and major source of fresh water in South Asia comes from annual

precipitation and melting of glaciers through rivers from high Himalayan mountains. However, the major river systems originate from Tibeten Autonomus Region (TAR).

China is one of the countries facing extreme water scarcity and the crisis has been caused by its own activities. 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. Every year, water shortages cost the country an estimated 40-60 billion RMB, i.e. 6.3-9.5 Billion USD, in lost economic output. 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.

Tibet can be a panacea for China's troubles given its vast expanse of fresh water resources. It is also referred to as 'The Water Tower of Asia' as it is the originating source of major rivers that flow into India, Bangladesh, China, Nepal, Pakistan, Laos, Cambodia, Thailand, Myanmar and Vietnam. It directly impacts the lives of 1.3 living in its river basin that is estimated to be above 6 million sq. km.

Given the economic transformation that China is undergoing, the water needs of China are growing and so does its dependence of the water resources of Tibet to help address this situation. This study addresses this importance that Tibet's water resources hold for China and highlights the water resources in Tibet, water requirements of China and its water policy. It concentrates on the measures taken by China to meet its water requirements through available water resources in Tibet. It also deals with the responses of Tibetans and the lower riparian countries and also discusses China's water policy from 1979 to 2014, because of policy formulated in 1979.

China's water policy in Tibet is one of the most important debates among the scholars, academicians and policy makers. It is of great academic interest to look into the evolving China's water policy. This literature is thematically reviewed under the followingthemes.

Water Crisis in China

The present study examines why there is a scarcity of water resources in China. China accounts for approximately 19.5 percent of the world population but has only 7 percent of the globe's freshwater resources. Water efficiency in China is poor

compared to its G20 peers, requiring around four times as much water per US$ of GDP created. Two-thirds of China's 660 cities suffer from water shortages with the situation in 110 termed 'severe'. About 700 million people drink water that is contaminated with animal and human waste. Water pollution sickens 190 million Chinese and causes an estimated 60,000 premature deaths every year. By 2015 China is expected to have almost 110 cities with over 1 million people, growing to more than 220 cities by 2025. In 2005 the Chinese water supply system leaked an estimated 10 billion cubic meter, more than 20 percent of the total processed. In Northern China 90 percent of the aquifers situated under Chinese cities are polluted. Over 75 percent of river water flowing through urban areas is considered unsuitable for drinking or fishing. 30 percent of river water in China is regarded as unfit for agricultural or industrial use. (Dore and Reiyuan 2010:11).

According to the Water Resources Ministry of China, there were 50,000 rivers with catchment areas of 100 square km or more in the 1950s. Now the number is down to 23,000 and China has lost 27,000 rivers due to the over-exploitation by farms or factories. China has 20 percent of the world's population but only 7 percent of fresh water. As a result China has to take care of the water demands of growing population, industries, and agriculture for which it is making efforts to tap Tibet's water resources. According to 2009 China Statistical Yearbook, the levels of water stressed regions in China ranged from extreme scarce to surplus in different regions. For instance, Tibet scored the highest value of water availability with 139,659 m^3/person/year compared to Beijing and Tianjin, both averaging only 127 m^3/person/year. In short, China needs water more than ever and to complete its wishful economic model of 'Western Development Strategy' announced in 1999. This was indeed the last jigsaw piece through which all these major rivers and resources could be grabbed, thinly disguised as a mode of development.

China is one of the Asian countries where water crisis is a huge concern. China's growing industrialisation and increasing population are two prime reasons behind this phemonmena. According to Ross (2013), in 2007, and according to UN data, China's total industrial production was only 62 percent of the U.S. level. By 2011, the latest available comparable statistics indicated that China's industrial output had risen to 120 percent of the US level. China's industrial production in 2011 was $2.9 trillion compared to $2.4 trillion in the U.S.

If one look at the data of population growth of China, the total population in China was last recorded at 1367.8 million people in 2014 from 552.0 million in 1950, changing 148 percent during the last 50 years. Population in China averaged 996.85 Million from 1950 until 2014, reaching an all-time high of 1367.82 Million in 2014 and a record low of 551.96 Million in 1950. (National Bureau of Statistics of China, various issues).According to survey data analysed by the Joint Monitoring Program for Water and Sanitation of WHO[1] and UNICEF[2], about 100 million Chinese did not have access to clean water sources in 2008, and about 460 million did not have access to proper sanitation. In short, progress in rural areas lags behind what has been achieved in urban areas. Managing water in China is a major issue having implication on growth of the country. 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. Every year, water shortages cost the country an estimated 40-60 billion RenMinBi, i.e. 6.3-9.5 Billion USD, in lost economic output. 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.

According to World Bank, China has renewable internal freshwater resources of 2,071 cubic meters per capita, well above the UN definition of water scarcity as 1,000

[1] The World Health Organization is a specialized agency of the United Nations (UN) that is concerned with international public health. It was established on 7 April 1948, headquartered in Geneva, Switzerland. The WHO is a member of the United Nations Development Group. Its predecessor, the Health Organization, was an agency of the League of Nations. The constitution of the World Health Organization had been signed by 61 countries on 22 July 1946, with the first meeting of the World Health Assembly finishing on 24 July 1948. It incorporated the Office International d'Hygiène Publique and the League of Nations Health Organization. Since its creation, it has played a leading role in the eradication of smallpox. Its current priorities include communicable diseases, in particular HIV/AIDS, Ebola, malaria and tuberculosis; the mitigation of the effects of non-communicable diseases; sexual and reproductive health, development, and aging; nutrition, food security and healthy eating; occupational health; substance abuse; and driving the development of reporting, publications, and networking. The WHO is responsible for the World Health Report, a leading international publication on health, the worldwide World Health Survey, and World Health Day (7 April of every year).

[2] The United Nations Children's Fund (UNICEF is a United Nations Program headquartered in New York City that provides long-term humanitarian and developmental assistance to children and mothers in developing countries. It is one of the members of the United Nations Development Group and its Executive Committee. UNICEF was created by the United Nations General Assembly on December 11, 1946, to provide emergency food and healthcare to children in countries that had been devastated by World War II. Ludwik Rajchman, a Polish bacteriologist, is regarded as the founder of UNICEF and was its first chairman from 1946 to 1950.[3] In 1953, UNICEF became a permanent part of the United Nations System and its name was shortened from the original United Nations International Children's Emergency Fund.

cubic meters per person. But China's water resources are not distributed equally. In China, nearly 70 percent of water is used in the agriculture sector, while 20 percent is used in the coal industry. Both of these industries – agriculture and coal – are concentrated in China's north, which also happens to be an area of scarce rainfall, receiving only 20 percent of China's total moisture. As a result, demand for water is outstripping supply. In northern China, the average water per capita is only around 200 cubic meter. In Beijing, consumption levels were 70 percent greater than the total water supply in 2012. (Tiezzi 2014:17)

This means China needs water more than ever to complete its wishful economic model of 'Western Development Strategy' announced in 1999. This was indeed the last jigsaw piece through which all these major rivers and resources could be grabbed, thinly disguised as a mode of development. The aim of China's water polices under 12th Five Year Plan (2011-15) is to reduce water pollution through targets, quotas and caps, meetings industrial and urban water requirements in dry region through the South-North Water Diversion Project/Policy (SNWDP)[3] and saving water through increasing water tariffs and looking abroad for water intensive-resources. According to Zhang Boting, Deputy Secretary General of the China Society for Hydropower Engineering, the 12th Five Year Plan called for hydropower development and it is now a priority of China. For various reasons, two thirds of the hydropower projects detailed in the 11th Five Year Plan had not been completed and would be revived in the 12th Five Year Plan (National Staistics Bureau 2009: 17). China's water policy in Tibet is one of the most important debates among the scholars, academicians and policy makers. It is great academic interest to look into the evolving China's water policy.

[3] The South–North Water Transfer Project, also translated as the South-to-North Water Diversion Project is a multi decade mega infrastructure project in China. Ultimately it aims to channel 44.8 billion cubic meters of fresh water annually from the Yangtze river in southern China to the more arid and industrialized north through three canal systems: The Eastern Route through the course of the Grand Canal; The Central route flowing from the upper reaches of the Han River (a tributary of Yangtze River) to Beijing and Tianjin. The Western route which goes from three tributaries of Yangtze River near the Bayankala Mountain to provinces like Qinghai, Gansu, Shaanxi, Shanxi, Inner Mongolia and Ningxia.

China Water Policies

To deal with the water scarity situation, the government has established a set of laws and regulations including the Water Law (1988 and 2002 revised), the Enivornmental Protection Law (1979 and 1989 revised) and has sought to implement policies based on a multi-ministerial government system. There is much literature regarding China and its water resources, but few papers have looked specifically at China's water policies and the potential effect they could have internationally.

The Present study analyzes why China needed such water policies and how it will impact on Tibet water resources and lower riparian countries. In 1979, China passed its first environmental protection law—The Environment Protection Law of the People's Republic of China. Ten years later, a formal Environment Protection Law was promulgated, setting out provisions for protecting and improving the environment, preventing and controlling pollution, issuing state environment standards, and moving towards an environmental protection legal system with Chinese characteristics.China's water polices under 12th Five Year Plan (2011-15) is to reducing water pollution through targets, quotas and caps, meetings industrial and urban water requirements in dry region through the South-North Water Diversion Project/Policy (SNWDP) and saving water through increasing water tariffs and looking abroad for water intensive-resources. Zhang Boting, Deputy Secretary General of the China Society for Hydropower Engineering, told reporters that the 12th Five Year Plan called for hydropower development to be prioritized. For various reasons, two thirds of the hydropower projects detailed in the 11th Five Year Plan had not been completed and would be revived in the 12th Five Year Plan (National Statistics Bureau 2009: 25-26).

The revised water law of China which came into being in the year 2002 contains eight chapters and eighty two articles. It adopted at the 24th Meeting of the Standing Committee of the Sixth National People's Congress on January 21, 1988; revised at the 29th Meeting of the Standing Committee of the Ninth National People's Congress on August 29, 2002 and promulgated by Order No.74 of the President of the People's Republic of China on August 29, 2002. Here are the some important articles. Article 1 talks about the rational utilization of water as it says that this Law is enacted for the purposes of rationally developing, utilizing, conserving and protecting water resources, preventing and controlling water disasters, bringing about sustainable

utilisation of water resources, and meeting the need of national economic and social development. Article 2 talks about jurisdiction of law like it is applicable to development, utilisation, conservation, protection and management of water resources and to prevention and control of water disasters within the territory of the People's Republic of China (See Appendix). The water resources referred to in this Law include surface water and groundwater. People's governments at or above the county level shall pay special attention to construction of water conservancy infrastructures, and incorporate it into their plans of national economic and social development. Article 6 says that the State encourages units and individuals to develop and use water resources in accordance with law, and protects their legitimate rights and interests. Any unit or individual that develops and uses water resources has the obligation of protecting water resources in accordance with law. Article 14 says about the State formulates strategic plans for water resources across the land. Unified plans shall, on the basis of river basins and regions, be made for the development, utilisation, conservation and protection of water resources and for prevention and control of water disasters. The plans shall be divided into river basin plans and regional plans. The river basin plans shall include comprehensive river basin plans and special river basin plans; the regional plans shall include comprehensive regional plans and special regional plans. The comprehensive plans mentioned in the preceding paragraph are general outline drawn, in light of the need of economic and social development and the present conditions of water resources development and utilisation, for the development, utilisation, conservation and protection of water resources and for prevention and control of water disasters. The special plans mentioned in the preceding paragraph are plans for flood control, water logging prevention, irrigation, navigation, water supply, hydropower generation, bamboo and log rafting, fishery, water resources protection, water and soil conservation, prevention and control of sedimentation, conservation of water, etc.

For their requirements and deal with above problems China is working on three major water policies and these are: (1) Trans-boundary River Policy, (2) Chinese Dam Policy and (3) South-North Water Diversion Project/Policy (SNWDP). There are three major water projects being undertaken in Tibet. The Yangtze Diversion Project will become the world’s longest and largest water transfer project, which will meet the growing scarcity of water in China’s northern cities. The main idea was to divert

abundant water of Yangtze to Yellow and Hai River, a tributary of Yangtze. This Project also known as South-North Water Diversion Project (SNWDP) which consists of building three lines of diversion, namely the eastern, central and the big western line from southern to northern China. This project is essential to developing the fastest growing cities in the northern and western regions of China which are rapidly running out of water. The project was proposed in 1952 and the construction began in 2002. It is expected to be over by 2020.

China has planned another big project on Great Bend of Yarlung Tsangpo. The Yarlung River flowing eastwards is known in Tibet as Yarlung Tsangpo and Brahmaputra in India. The total course of this river actually extends to more than 1800 miles. Yarlung Zangbo's total drainage area is 622,000 sq. km, of which 330,000 sq. km is in China. China has proposed to build 13 cascade power stations with a total installed capacity of 46.336 million kW accounting for annual power output of 276.411 billion kWh, of which the potential installed capacity of the downstream section is more than 4100 million kW, accounting for 89.6 percent of the installed capacity of the main stream. As far as the development of cascade power stations is concerned, China has proposed two plans.

Plan A is to build Gangke (270,000 kW), Gu Lu (170,000kW), Qingding (150,000kW), Bosha (130,000 kW), Peng Cuolin (300,000 kW), Jiangdang (50,000 kW), Suolang Gatu (500,000 kW), Qushui (96,000 kW), Jiacha (1.65 million kW), Langxian (1.2 million kW), Rixue (420,000 kW), Motuo (38 million kW), Jie Riguo in the downstream (3.5 million kW) etc. power stations above Motuo.

Plan B is to, instead of Motuo, build a large dam at Daduka, straighten the river bends, excavate a number of large-diameter tunnels; single-hole single-tunnel would be around 41 km in length. The power station head reaches 2,400 m, and the installed capacity is around 43.8 million kW. However, the technical difficulty is too great. There are 134 tributaries on Yarlung Zangbo that has the hydro potential more than 10,000 kW, and there are 9 tributaries that have the capacity of more than 25,000 kW. China has proposed to build 21 medium size hydro stations on these tributaries that would have an installed capacity of 1.637 million kW with annual power output of 347 million kWh.

Since Yarlung Zangbo located in the Tibetan plateau, therefore, due to high altitude, thin air, poor project conditions, transportation difficulties, complex engineering and geological conditions, engineering marvals are required. As such, very little survey and design work has been done. At present, most of the river basin is almost undeveloped expect a few small size power plants and irrigation projects in some of its tributaries. China's water policies include major projects on them, which will impact lower-riparian nations. China has built several of its dams on shared rivers, which has influenced downstream hydrology, causing sediment erosion of riverbanks and changing nutrient profiles. This has caused increased tensions between China and its neighbours, especially as information to assess the impacts of these dams is generally not available.

China shares six river systems which originate from the Tibetan plateau in China with nine of its neighbours, which gives China an advantage utilising them. Through all these projects and dam constructions plans, China uses Tibet water resources for their purpose and benefits and diverts its water according to their needs and development strategy.Till date, all the major rivers and their tributaries that flow from Tibet are dammed and this dam building frenzy in the western Tibet is creating huge discussions and doubts whether these projects could act as a stepping stone in expanding its ambitious water transfer projects beyond its initial plan. The current expansion of railway network connecting Beijing and the rest of Tibet paves the way for logistical support and transportation of damming inventories, if required in due time.

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 (Zongshu and Nianzu, 2011). By just overlaying the UN seismic hazard zone map and the locations of these dams on the western rivers of Tibet clearly sends an inevitable signal that those living in the shadow of these dams are at the mercy of nature. According to the report published by Probe International (Jackson, 2012), more than 90 percent of dams that are built, under construction or proposed for the rivers that flow from Tibet, are located in zones of very high or moderate seismic hazards.

Water Resources in Tibet

The proposed study highlights water resources in Tibet, the Tibetan Plateau is one of the most distinctive land-features on this planet, with an average elevation of 4500 meters above the mean sea level. Also known as 'The Water Tower of Asia', it is the source of major rivers that flow into India, Bangladesh, China, Nepal, Pakistan, Laos, Cambodia, Thailand, Myanmar and Vietnam. The snow peaks and glaciers enable Tibet to be the source of major rivers that flow into Asia. As a result, approximately 1.3 billion people depend directly on the health of these major rivers that originates from Tibet. The total river basin area is estimated above 6 million sq. km.

The geographical location of Tibet consists of the high mountains, lakes, glaciers and rivers lying between Central, East and South Asia. Tibet is bounded on the north and east by the Central China Plain, on the west by the Kashmir region of India and on the south by Nepal, India and Bhutan. Tibet's area can be divided into three distinct natural zones due to the complex topography and these are: the North Tibet Plateau is enclosed by Kunlun, Tangula, Gangdise and Nyainqentanglha mountains, the South Tibet Valley is lying between the Gangdise Mountains and the Himalayas where the Yarlungzangbo River and its tributaries flow and the East is an area of high mountains and deep valleys. From the Tibetan Plateau, the Yellow River flows through China with a length of 5464 km. The Yangtze extends 6300kms across Tibet and China before ending in the Pacific Ocean near Shanghai, The Tsangpo River flows through the fertile Yarlung Valley and originates near the holy mountain of Kailash in west Tibet. There are also thousands of lakes on the QTP (Qinghai-Tibet Plateau), with a total water surface of 36,889 km2 and total water volume of 546 km3. Such a significant presence of lakes and wetlands substantially modulates the water resources.

There are three super large lakes, the Qinghai Lake, Nam Co and Siling Co, and eleven large lakes, the Zhari Nam Co, Tangra Yumco, Ayakkum Lake, Banggong Co, Har Lake, Ngoring Lake, Yamzho Yumco, Gyaring Lake, Chibuzhang Co, Ulan Ul Lake and the Ngangla Ringco (Xiangang 2008:30). The areas of the Har Lake and Ngoring Lake have remained relatively stable, the areas of the Qinghai Lake, Zhari Nam co, Tangra Yumco, Ayakkum Lake, Gyaring Lake, Ulan Ul Lake and Ngangla Ringco have been reduced to varying degrees, of which the areas of the Qinghai Lake and Ulan Ul Lake have decreased most sharply by 60.60 km2 and 59.80

km2 respectively (Zhu 2011:20). The areas of the Nam Co, Siling Co and Bangong Co have increased more or less, of which the area of the Siling Co has increased most sharply by 140.42 km2.

The main purpose of discussing the changes in areas of major lakes is to analyses the new materials for the further study of the lake evolution, climatic change and environmental variation on the Qinghai-Tibet Plateau (Zhu 2011:20). The importance of five large river discharge changes in the Qinghai-Tibet Plateau from 1956 to 2000 (Yuanyuan 2006: 56). The results reveal that though in general no increasing trends exist in the total river discharges, significant regional differences of river discharge exist, reflecting the decreasing trends of discharge in the Yellow River and the Tongtian River (upper Changjiang River), an increasing trend in Yalong River, and inverted change in the Lancang River and Yarlung Zangbo River. Based on analyses of the seasonal discharge, it is found that climatic change had a significant effect on the seasonal variation of river discharge in the Qinghai-Tibet Plateau. In spring (from March to May) the discharge increased significantly, especially in the source area of the Yellow River. Together with the analyses on data of the mean temperature in the Northern Hemisphere and climatic data within the river basins, the relationship between discharges and mean temperature of the Northern Hemisphere is explored, which indicates that there is no increase in the stream discharge in the Qinghai-Tibet Plateau with global warming. It is probably the increasing evaporation, caused by rising temperature that offsets the hydrological effect of increasing precipitation (Zhong 2010).

Tibet is full of natural resources and especially in water. The functional essentiality degrees of water resources conserving of regions. At first, based on the status of regional vegetation; whether the region has the function of water conserving was made certain. And then, according to the impacted objects of water resources conserving, taking into account the demands for water and regional supply capacities of water and the requirement of environmental protection, the functional grades of regional water resources conserving of Tibet were evaluated by them (Yuanyuan et al. 2006: 70).

North Tibet Plateau is one of the three major sandy desertification regions in China and also a representative sandy desertification zone of Qinghai-Tibet Plateau. Accordingly, it is an important region for the study of recent sandy desertification

processes and formation mechanism. From such aspects as desertified land types, areas and distributions etc. he analyses in detail the sandy desertification status on North Tibet Plateau, and qualitatively and quantitatively deals with the main factors that affect recent sandy desertification processes and the driving mechanism. He emphasized that North Tibet Plateau is an important sandy desertification region in China characterized with large desertified land areas, diversified types, high severity, extensive distributions and serious damages. Sandy desertification occurrence and development resulted from combined effects of natural factors, anthropogenic factors, natural processes and a man-made process, of which climatic change is the main driving force (Yangchen 2006: 85).

The Five representative peaks are first determined according to the topographic profile maps for the ridge and piedmont lines, and then the topographic gradient characteristics are analyzed according to the representative topographic profile acquisition method. Based on the geomorphologic database data, the regions between the ridge and the piedmont lines are divided into four geomorphologic zones; and the topographic characteristics are finally analyzed for the different geomorphologic zones regions using the DEM (Digital Elevation Model) data. From the piedmont to the ridge, there exist four geomorphologic zones: arid, fluvial, periglacial and glacial. The arid has the lowest elevation, topographic gradient, and relief and slope characteristics. The fluvial has lower elevation and the highest topographic gradient, but with lower relief and slope characteristics (Tsering 2006). With higher elevation, the periglacial has lower topographic gradient, but the highest relief and slope characteristics. The glacial has the highest elevation with higher topographic gradient, relief and slope characteristics.

The integrated use of isotopic and hydro-chemical tracers is an effective approach for investigating complex hydrological processes of groundwater. The stable isotope composition and hydrochemistry of the groundwater around Qinghai Lake were investigated to study the sources and recharge areas. Xiao-Yan, Bu-Li (2014) says that most of the groundwater points lie close to the local meteoric water line, indicating that the ground waters were recharged primarily from precipitation in the basin, though it had undergone varying degrees of evaporation. The recharge altitudes of groundwater were relatively low on the northern shore of Qinghai Lake relatively. High salinity of groundwater on the western shore was related with the evaporate

dissolution, (Zhuanti 2005:10) the groundwater is unsuitable for drinking, and the drinking water should be improved and enhanced in this area.

Impact of China's water projects in Tibet:

The study also looks at how China's water impact on China, China should work on Tibet water resources according to UN recommendation and should not exploit the hydro resources and ecological system of Tibet. Considering this it could be speculated that its impact is going to be on the whole Asian region. International water law is a good mechanism to operating this (CTA Report 2003).

The decreased flow of Brahmaputra river determine the China's water policy and India's response to this. Literature on this issue is explored to determine its effects on Sino-Indian relations, potential Indian responses to Chinese policies, and tensions between the nations situated near Tibet (Bajpaee 2010:11). The role of Tibet in shaping Sino-Indian relations, which includes the Sino-Indian border disputes and Tibet as factor between India and China relations (Sikri and Topyal 2011). Research on the threat perceptions of India and China gives an account of their security relationship and additional points of tension, including uneven economic trade (Saalman 2011: 20).

China's water need is gradually increasing day by day. To fulfill the water requirement of its population it is important to make interventions in the Tibetan rivers the southern part through dams and diversions (Sinha 2012: 14). While China is well within its riparian rights to do so, a set of externalities involving the principles of water-sharing and lower riparian needs. Politically controlling Tibet and thereby having control over the mighty rivers that originate there allows Beijing to overcome its uneven water distribution but also importantly gives its leaders strategic width and diplomatic clout for dealing with its neighbors. Based on the theoretical framework of power and hydro-hegemony this article examines how China's hydro-behavior on the Brahmaputra (Yarlung Ysangpo) could impact power relations with India and what India's counter-hydro-hegemony strategy should be.

The trans-boundary plan of China. China's trans-boundary plan of river cause water disputes due to the adverse economic and humanitarian consequences of interfering with Tibet Rivers and due to this plan China becoming a threat to India's water security. There are academic discussions on the likelihood of China diverting the

Brahmaputra River; the effects this could have on India, and China's actions as the hydro-hegemony in Asia, what this entails and how India can mitigate China's threat to their water security. Much of the discussions relating to China's plans regarding the Brahmaputra are from a mainly Indian perspective (Ranjan 2010:15).

The water war between China and India begins when China uses their upper riparian position for the exploiting the lower-riparian states and this will become the major tension between these two countries. The authors take these arguments beyond potential Sino-Indian water disputes and consider the wider international implications of a water dispute and conflicts between the two countries (Holsag 2011: 10).

The main rivers originating from China entering into India are Brahmaputra/Yaluzangbu in the North East and Indus & Sutlej in the Northern Part of the country. For India's point of view these two rivers have a great importance because these are not only fulfilling the water needs of their north-east states but also maintain their healthy relations with neighboring countries. If any discriminating policy and hydro-project starts on these rivers by China, (CEO water Mandate 2009:12) then it will affect India's north-east states. So to resolve this issue India always tried to talk to China by bilateral agreements and treaties. And one of the important Memorandum of Understanding signed between China and India was the provision of Hydrological information on Yaluzangbu/Brahmaputra River in flood season by China to India. In accordance with the provisions contained in the MoU, the Chinese side provided hydrological information (Water Level, Discharge and Rainfall) in respect of three stations, namely, Nugesha, Yangcun and Nuxia located on river Yaluzang/Brahmaputra from 1st June to 15th October every year, which was utilized in the formulation of flood forecasts by the Central Water Commission (The Ministry of Water Resources of India 2014).

The nature of this problem is multi-dimensional which is not affecting India's relationships at the inter-state level and equally contribute to tensions at the intra-provincial level. Indian policymakers need to be sensitized to the challenges of dealing with such complexities. The Task Force strongly recommends a policy revamp which moves away from a narrowly understood framework of water management to a broad-based and wide-reaching water resource management. This would require treating river systems, particularly the Ganga-Brahmaputra-Meghna and the Indus, in a holistic way and reorienting hydro-diplomacy on a multilateral

basis than just a bilateral format. There are widespread fears in India that China's diversion of waters of the Yarlung-Tsangpo, to meet high demand in its arid north, will cause hydrological imbalance in the northern part of India and shortage in Bangladesh, which in turn will impact riparian relations (IDSA 2010).

The China's policies regarding trans-boundary rivers are not clear which is impacting Sino-India relationship. In 2010, Chinese Premier Wen Jiabao assured Indian leaders that China will not undertake projects that will affect countries downstream; similarly, the Chinese Foreign Ministry spokeswoman told India that "at present, the hydropower station on the Yarlung Tsangpo will not lead to any big change in the downstream water levels or affect the harnessing efforts by the downstream countries". She stated that China "will fully consider impacts to downstream countries" and that "the dam being built on the Brahmaputra River has a small storage capacity. it will not have a large impact on water flow or the ecological environment downstream" (Gray 2011: 23). Chinese specialists, however, maintain that the shrinking of the Himalayan glaciers will cause the Ganges, Yangtze and Yellow Rivers to have seasonal flows, making water security an issue of food and political security. Therefore, these threats dictate that China should exercise territorial sovereignty, exerting unlimited rights over resources within its territory (Holslag 2011).

China's hydro projects are not creating any problem for India but there is always mistrust and fears from India's side, India will not take any chance to its water security. According to India China's will take the advantage of their upper riparian state and will harm India (Woels 2012: 23) so it's better to take serious actions before it would happened. India, in the short-term, will look to take preventative action against China to halt its dam projects, through aiming to increase cooperation and decrease mistrust between the two and through this, secure a water sharing agreement from China.

India is trying to use principles of international water law, such as "no significant harm" and "prior notification of works", to increase its legitimacy as the lower-riparian state and enhance its bargaining position. However, India recognizes that China is unlikely to cooperate voluntarily given its unpromising relations with other lower-riparian states and the Mekong River Commission, and so will need to incentivize China to engage in water issues, while safeguarding against the possibility

of hostile damming from China. India aims to achieve this through the de-securitization of water resource management and by taking a river basin approach (Chellaney 2010:13).

De-securitizing water resources is an important as it limits the potential for conflict, and for water to be used as a political weapon against India. River dialogue must be isolated from military and political concerns (Svensson 2012:17). To help defuse tensions, this separation can be achieved by presenting the issue as one of improving resource management with China. This is already underway, with the sharing of hydrological flood data between China and India, (Blalkle and Muldavin 2004: 22) which has helped build trust. India could seek to engage China in cooperating over issues that are not politically sensitive and that are mutually beneficial, such as collaborating on improving water use in the agricultural sector, which will hopefully lead to cooperation on more contentious water issues.

However, China has rejected offers to join the Mekong River Commission (MRC) for managing river disputes and continues to develop its dam projects on the Mekong without consulting downstream countries (Arpi 2010: 98). This reinforces the view that China wants to consolidate the greatest amount of control over its water resources and will continue to treat them with absolute sovereignty, making it difficult to find areas where cooperation is mutually beneficial. India encouraging cooperation may lead to a slight easing of tensions with China, but it is unlikely to halt China's plans on the Tsangpo, especially as China considers solving its water problems to be in its national interests (Bajpaee 2010: 24).

From an Indian perspective, including Bangladesh in the engagement of China in this area is critical to finding a long-term solution. It benefits India to protect Bangladesh's interests, as water shortages in Bangladesh will likely cause migration to India (Topgyal 2011). If Bangladesh is excluded, then it may feel that its sovereignty is being threatened and raises the potential for future conflict. China has signed a provision of flood season hydrological data with Bangladesh so will be unable to dismiss Bangladesh's interest as illegitimate (Al-Rodhan 2007: 43). Collaboration in these areas will create a more amicable political climate and increases the likelihood of an agreement being reached.

India's claims against China's water projects lose legitimacy when India's actions as an upper-riparian state with regard to Bangladesh are considered, as India is planning 168 large hydropower projects in Arunachal Pradesh. India has, therefore, effectively been acting in a similar manner as China by exploiting its water resources to Bangladesh's detriment. Given the volatile nature of the Indian-Bangladeshi water relationship, (Chellaney 2013) it is questionable if Bangladesh will want to side with India against China. Given that India has failed to solve water disputes with a friendly state, it seems overly optimistic that raising concerns with China will benefit India. China, therefore, will probably dismiss India, as it has the MRC states, and proceed with its water projects (Curry 2012: 67).

Since China has water scarcity and most of its rivers are polluted. Hence, it needs fresh water. The basic internal issue for China regarding water security is to transfer fresh water from the Tibetan Plateau in the country's west to its industrial and populated corners in its north and east. This has resulted in a spree of building dams, canals, irrigation systems, pipelines and water diversion projects. As Brahma Chellaney points out in his seminal work, "Water: Asia's Next Battleground," China has created more dams in the last five decades than the rest of the world combined, largely in order to divert the flow of rivers from the south to its north and east corners. The end result was the diversion of routes of various rivers originating in the Tibetan Plateau. China considers such diversions to be an internal security matter. But these inter-basin and inter-river water transfer projects in the Tibetan Plateau have tremendous consequences on other downstream countries that draw water from those rivers (Ninkovic and Lehman 2013)..

China utilizes the rivers originating upstream in the Tibetan Plateau to build as many as 60 new dams to augment its demand for energy. Electricity originating from these dams from the Tibetan Plateau finds its way to China's large metropolises of Shanghai, Chongqing and Guangzhou. The construction of dams on rivers originating in the Tibetan Plateau may seriously interrupt the water supply in downstream countries. In addition, these constructions pose a grave threat to the regions' biodiversity and environment. Located in a highly seismic zone, dam building also increases risks of catastrophic earthquakes affecting hundreds of millions. Even though China claims to have the interests of these countries in consideration, it remains one of the only nations without any institutionalized water sharing agreement

with downstream countries. For instance, China is building three large hydropower dams on the upstream Yarlung Tsangpo River (in Tibet, which China has renamed the River Yarluzangbu). Further downstream, it flows as the Brahmaputra into densely populated areas of India and Bangladesh. The great consequences of these dams are clear for all to see. These dams could well interrupt the fresh water supply to northeastern India and Bangladesh. This is also a region where most of the people depend on the fresh water supply for livelihoods, agriculture and food. India's and Bangladesh's combined population of over 1.3 billion is already edging past China's. India alone is expected to surpass China's population in just over a decade. Whatever the merits of the current South-North Water Diversion Project, China's multi-decade river rerouting plan at a cost of $62 billion, it will have severe environmental and water security consequences for its neighbours (Ninkovic and Lehman 2013).

Tibet's first major dam, the Zangmu hydropower station, started generating electricity at the end of November. This prompted complaint from India that Chinese dam building on the Yarlung Zangbo River could reduce water flow and cause environmental damage downstream in India. But Chinese experts say vested interests in India stand to benefit from playing up the threat of Chinese hydropower and that only dialogue and partnership will solve Asia's water disputes (Qin 2014).

The international arena, tensions have already surfaced through disputes over Asian Development Bank (ADB) loans to India that China attempted, or managed, to block, as they included funding for water projects in the disputed Arunachal Pradesh. Situations like this are predicted to become more common as water becomes increasingly scarce in the two nations (Bajpaee 2010). If India fails to engage China on their proposed dam projects, and the projects prove to be highly damaging to India, then India's response will probably be combined with its response towards the proposed Western line of the SNWDP. The Western line's effect on India will likely amplify the impact of China's dam projects, as diverting the river will reduce its flow even more and have greater potential environmental consequences.

Definition, Rationale and Scope of the study

In the 21st century, Water has become very important issue of Conflict and Cooperation between the countries. When most of the countries are suffering from the lack of water resources. Chellaney (2011) observes that water scarcity may lead to the

Third World War. There is scarcity of water in China and Tibet is one of the most water resource rich regions. In fact, it is also known as the Third Pole. The study will explain how China is trying to utilize water resources of Tibet for its own advantage by transferring water to resource scare region or by building dams for hydropower.

The study will make an attempt to explain the available water resources in Tibet in the form of rivers, lakes, groundwater etc. and critically analyze China's water policy. The proposed study will explore the consequences of China's water policy on Tibet. The study would also critically analyze the problems faced by Tibetans given the situation when China constructs various hydro projects or diverts water. This study would also try to understand problems and challenges faced by Tibet due to the water policies carried forward by China.

The rationality behind choosing 1979 year because of, China began it water policy in 1979. Hence the scope of the study is analyze China's water policy in Tibet and its impact within time frame 1979 to 2014.

Following the rational and scope of the study, the research seeks to answers some specific questions which are listed as under: Why does the water resource of Tibet important for China? What is Tibet's response towards China's water policy? How does China's water policy impact on Tibet? Will the present water policy of China mitigate its water crisis? Do Chinese water projects in Tibet pursue Tibetan's interest?

The objective of the study is to define how water is crucial for geo-political and strategic concerns in global politics. The study also finds out how the water resources of Tibet is important for Chin and why, then it also focuses on how china water policies impact on Tibet. China is constructing dams, big projects solve its water crisis problem. If China builds such dams how it will impact on lower riparian countries and what will be their responses. Particularly as a lower riparian countries like Tibet and India react China's activities of constructing dams.

The present study testes two hypotheses:

1. Growing agricultural and urban demands have prompted China to adopt policy towards Tibet's water resources.

   Rapid industrialization and the increasing levels of consumption of the ever-growing middle class in the mainland China are placing heavy demands on water resources in major Chinese cities and industrial sectors. 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 clean water sources in 2008, and about 460 million did not have access to proper sanitation. In short, progress in rural areas lags behind what has been achieved in urban areas. Managing Water in China is a major issue having implication on growth. 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.

2. Harnessing water resources is new factor in China's policy towards Tibet.

   Water is very crucial for life and it is a strategic concern for many countries since it has multidimensional use. Most of the countries are now facing water scarcity and China is one of them because of two prime reasons firstly, the growth of industrialization and increasing populations there is more need of water. Therefore, China has also made water laws like 1988 and revised versions of 2002. If one look at the attitude of China in the Tibet region, it behaves like a hegemon and using water resources of Tibet ignoring the livelihoods and biodiversity concerns of the lower riparian countries.

This study will incorporate both the qualitative and quantitative approaches to comprehend China's water polices in Tibet. The study will investigate rationale and impact of China's water policy. It will explore literature on policies from 1979 onwards dam policy, trans-boundary river policy and south-north water diversion policy. This study will be based on both the primary and secondary sources. The primary source will be official documents of the government of People's Republic of China. Moreover, the surveys done by governmental and non-governmental bodies would also be considered. Furthermore, data would be collected by interviewing the Ministers and Officials of Water Resources of China, Tibet and India. The secondary sources will be based on books, articles, newspapers and internet materials etc.

The present thesis is divided into six chapters, Chapter first introduces the study. This chapter introduces the research topic in the context of existing research work on the theme of China's water policy in Tibet. A brief detail to understand the water resources in Tibet will be discussed. It would also provide a nature, objective and

importance of China's water policy in regarding to Tibet. It focuses on methods to deal with the study.

This second chapter provides brief ideas about the water resources which are available in Tibet. It also discusses the water resources which are present in Tibet in the form of glaciers, rivers, groundwater, lakes etc. It also deals with the rivers which are originated from Tibet and then passes to Asian countries.

The third chapter provides a theoretical background of China's water policy in Tibet. It would also focus on China's development plans visible in its water policy and how it has an impact on Tibet and other countries.

The fourth chapter discusses the water construction projects like dams, water diversion projects and other mega-hydro projects in Tibet. This chapter would also deal with the actual interest of China behind these water projects and how these projects impacted on Tibet resources.

This fifth chapter concentrates on impact of China's water projects within Tibet. It will also highlight impact on eco-system of Tibet. The sixth chapter summarize the research and highlights the important findings. This chapter also attempts to come up with some suggestions and durable solutions.

The study analyzes how water is strategically important in relations among countries and how the paucity of fresh water has added a new chapter in the international relations. Today, the crisis of water resources has become an important issue under the non-traditional security of international relations. This study focuses on water resources of Tibet and how the water resource of Tibet has been utilised by China for its own interests ignoring the interests of the latter and what are the implications of such steps being taken by China on the biodiversity, and livelihood of Tibet. This study by taking water resources in consideration throws light on how China tries to cope up with its non -traditional security threats as a result, it will concentrate on the measures taken by China to meet its water requirements by utilizing available water resources in Tibet. It will also concentrate on responses of Tibetans and the lower riparian countries and will also discuss China's water policy from 1979 to 2014.

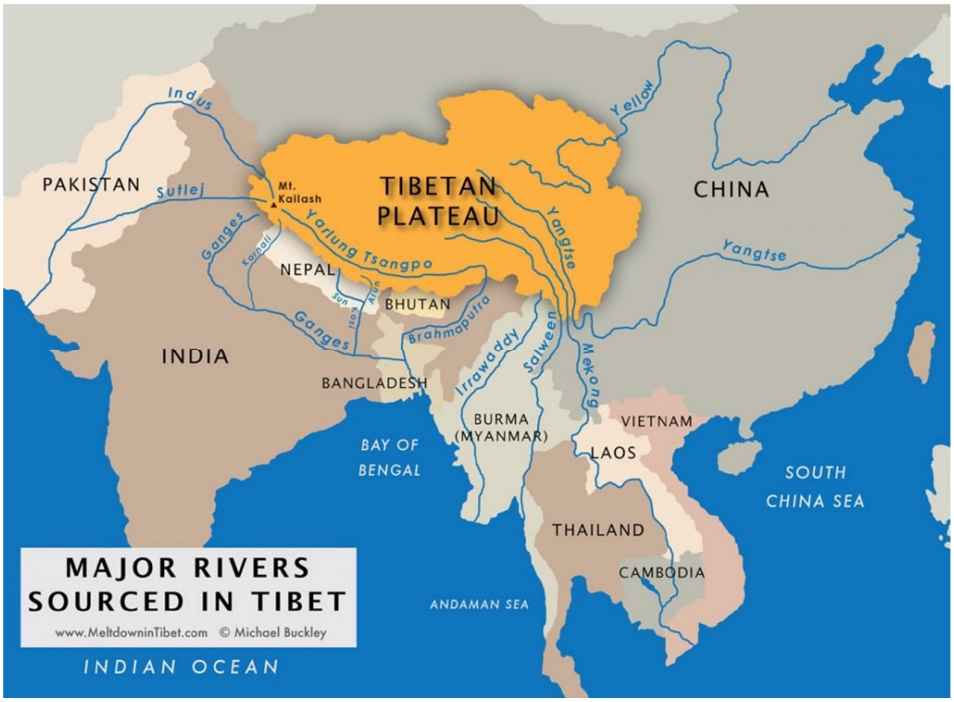
Chapter II

Water Resources in Tibet

The mountains of Tibet constitute the headwaters of many of Asia's major rivers and lakes. Tibet's high altitude, huge landmass and vast glaciers endows it with the greatest river system in the world. Tibet's rivers flow into the most populous regions of the world, supplying fresh water to a significant proportion of Asia's population. Tibetan rivers are distinguished by their high silt loads resulting from the largely desert landscape from which they originate.

Tibetan rivers are originating in Tibet flow into its various surrounding regions. These rivers consists of ten major river systems which includes the Indus, Sutlej, Brahmaputra, Irrawaddy, Salween, Arun, Yangtse, Mekong, Yellow River and the Karnali River. They all originate on the Tibetan plateau and support hundreds of millions of people downstream. The total area of river basins in Tibet is approximately 5 million sq km.

Map 1-Major Rivers Resources in Tibet



Source: Rivers in Tibet: images courtesy of Michael Buckley, author of Meltdown in Tibet

Based on its geography, Tibet can be divided into two regions, the lake region and the river region. Lake region of Tibet covers totally 23,800 square kilometers lakes, representing thirty percent of national lake resources which contribute the largest lakes on the earth. Overall, there are more than one thousand lakes, big or small, three of which exceed one thousand square kilometers, namely Namtso, Siling lake and Zhari Namco etc. Along with lakes, many of the largest rivers of Asia originate in Tibet and few of the important ones are The Indus, The Sutlej, The Tsangpo or (Brahmaputra of India), the Salween, the Takiang, the Mekong, Yangtse-Kiang, the Hwang Ho, Irrawady, the Yellow river, Kiria river, Cherchen Daria, Chumoreri, and many more.

Table: Major River Flowing from Tibet

No	Tibeatean Name	Common Name	Water Shed/ Regions
1	Machu	Yellow	Tibet, China, Inner Mangolia
2	Drichu	Yangtze	Tibet and China
3	Zachu	Mekong	Tibet, China, Laos, Cambodia, Thailand
4	Gyalmo Ngulchu	Salween	Tibet, China, Burma, Thailand
5	Yarlung Tsangpo	Brahmaputra	Tibet,India, Bangladesh
6	Macha Khabab	Ganga	Tibet, Nepal, India
7	Langchen Khabab	Sutlej	Tibet, India, Pakistan
8	Senge Khabab	Indus	Tibet, India, Pakistan
9	Bhumchu	Arun	Tibet, Nepal, India
10	Lhodrak Sharchu	Manas	Tibet, Bhutan, India, Bangladesh

(**Source:** Compiled by the author based on available information)

Indus along with Sutlej and Tsangpo rivers derive their sources in the Western Himalayas to be precise. All the three above mentioned rivers rise in the surrounding area, within a few radius of the sacred Mansarovar lake also known as 'Mount Kailas' by the Indians. According to Hedin Sven (who was the first white man to have discovered the actual sources of the two very important rivers Indus and Brahmaputra, and discovered the origin of these two ancient rivers, which happened to be the highest of all the mountain systems of the world-the Himalayas),

> We passed a memorable evening and a memorable night at this important geographical spot, situated 16,946 feet above sea-level. Here I stood and saw the Indus emerge from the lap of the earth. Here I stood and saw this unpretentious brook wind down the valley, and I thought of all the changes it must undergo before it passes between rocky cliffs, singing its roaring song in ever more powerful crescendo, down to the sea at Karachi, where steamers load and unload their cargoes. I thought of its restless course through western Tibet, through Ladakh and Baltistan, past Skardu, where the apricot trees nod on its banks, through Dardistan and Kohistan, past Peshawar, and across the plains of the western Punjab, until at last it is swallowed up by the salt waves of the ocean, the Nirvana and the refuge of all weary rivers (Hedin 2015: 213).

By this definition given by Hedin, it is clear that the Indus emanates from the area surrounding Lake Mansarovar and eventually flows to Pakistan through Ladakh (parts of which are situated along the Indus valley) Western Tibet, Baltistan, Skardu , Dardistan and Khotistan, Peshawar, the plains of Punjab and at last it reaches Pakistan where it merges with the ocean.

Kailash Mansarovar peak is also known as Kang Rinpoche by the locals as well as the Ladakhis. In Ladakh, the people are of the belief that the Indus emanates from the mouth of a Lion that's why they call it “Singe-kha-babas” and the Indus which flows from Ladakh is known as "Sindhu" or “Singe-kha-babas.”.Even Moorcraft who travelled upto the Mansarovar stated that, "The Indus riv:er (the Singe-kha-babs) rises from the Kangri on Kantisi, Tisior, Kailash range, a short way to the east of Ghertope" (Gartok). Here he highlights the place of the origin of the Indus again which is the Kailash. And by Ghertope he means the province of Gartok (ADB 2011: 15).

One of the most important and largest rivers in Tibet is the Tsangpo. It is the longest river in Tibet. Tsangpo is a trans-boundary river and being one of the major rivers of Asia, it flows eastwards for several hundreds of miles (800 miles approximately) and finally, touches on the plains of India via Assam first the Dhilong and then it becomes the Brahmaputra. This river runs undisturbed from West to East through the heart of the southern Tibet. Its sources lie somewhere near the east flowing and west flowing streams on the western border of Tsang (Blalkle and Muldavin 2004: 78).

The river has several tributaries. They are Chi-Chu and the Nyang Chu to name a few. The latter follows a north-westerly course through Gyanste, the economic and cultural centre of Tibet and meets the Tsangpo just northeast of Shigaste, the capital of Tsang. Lhasa and Shigatse are on the banks of Tsangpo. The river lies to the south and southeast of Tibet. Another similar story of a river which rises from the surroundings of the Lake Mansarovar is the river Sutlej, The Upper stream of the Sutlej has its principal source well east of the Mansarovar. Both Sutlej and Indus rise at the heart of Nari or Western Tibet. Sutlej is the easternmost tributary of the Indus River and it originates at Lake Rakshastal in Tibet near Mount Kailas. It flows to the southwest and enters India through the Shipki La pass in Himachal Pradesh. Both Indus and Sutlej cut North West from Mansarovar and then south through Punjab. It continues southwest into Pakistan to unite with Chenab River and eventually flows into the Indian Ocean (Blalkle and Muldavin 2004; Bogardi et al., 2011). Another river is the Salween which is the three largest rivers of Russia and lies in the south-eastern Tibet. River Salween runs south through Siam and Burma. The river is 2815 km long, it passes through deep gorges and is often called China's Grand Canyon.

The Mekong River is in the south western Tibet and is one of the three largest rivers in Asia. It is only twenty eight miles from the Yangtse on one side, and even less from the Salween on the other (Cascao and Zeitoun 2010). This river empties its waters into the South China Sea, flows its course through Tibet, China and French Indo-China the Mekong. The Hoang Ho (Yellow River) which is also known as the 'Sorrow of China' rises on the eastern fringe of the Dang-la range. It is also referred to as the Ma Chu locally. From the Tibetan Plateau, the Yellow River passes through China. It is also believed to be the "cradle" of Chinese civilization. The Hoang ho finds its source in the Oring Nor lake (or group of lakes) to the southeast of the great Koko Nor, and curves eastward and northward through the country of the Sifan (the western

barbarians of China), and approach within one hundred miles of the south eastern comer of the Koko Nor, where it takes its way as a full-grown river through northern China to the Pacific.

Huang He (The Yellow River)

The Yellow River is known as Ma Chu river in Tibet and Huang He in China. The Yangtze, 6,300 km long, is the largest river in China. It is also the third largest river in the world, rivalling Nile in Africa and the Amazon in South America. It has been given the nick named of the "golden waterway," as it forms a transportation artery linking west and east. The natural channels of the river provide impetus to navigation. The middle and lower area of the Yangtze River have a warm and humid climate, plentiful rainfall and fertile soil, rendering them very important agriculturally and also amenable condition for the industrial sector. It is very important river from the perspective of Tibet and China relations as well. The importance of the Yellow River is depicted by Han dynasty. There are numerous rivers in China, but there are only rivers which are most important. Out of these four, the Yellow river is the most prominent (Chellaney 2010; 2011). It is rendered more clear when one analyses the significance of the Yellow River in the birth of Chinese civilization. It is also the reason why Chinese have referred to the Yellow River as “Mother River” since times immemorial.

Ironically, over the centuries the Yellow River has not only been China’s savior but has also been the reason for devastation. The river also causes floods which lead to much destruction on the plains which lie in its lower course due to its elevated river bed. The elevated river bed has arisen due to the process of siltation in the Yellow River. The sediments annually received by the river is estimated to be around 1.6 billion tons. It is three times the amount of sediment received by the Nile, the Mississippi and the Amazon combined together. It is also the reason why the river is also referred as 'floating Yellow earth'. Ma Jun argues that “the river water is so silted up that one -half of a bowl of its water will be sediments” (Howard 2010: 14).It has led to the creation of dykes along the lower reaches of the river. Consequentially, the bed of river has been elevated and in certain places, the main channel is 20 meters above the surrounding countryside. Thus, poet Li Bai of Tang dynasty (618AD-907AD) describes “the Yellow River come flowing from sky”.

These embankments were unknown to earlier dynasty and it has been affirmed by River Notes of Western Han where it has been explicitly stated that "there used to be no embankments along the Yellow River but at that time there were numerous lakes and ponds in low lying places to hold the over flow of during the rainy seasons so we did not have floods". Thus, it is clear the process of siltation is not “long, natural and slow process but a result of man's tampering attempt to conquer and harness the nature” (Howard 2010: 150).

This process of harnessing the nature was slow till the establishments of People's Republic of China, after which it gathered momentum. The new government was committed to end the perennial problem of flooding. The attention of the government came to be focused on reservoirs as a way to control the floods and be a source of water for both agricultural and industrial uses. This harnessing of nature began with Mao who was inspired by the thought of Xunzi’s ideas which stated that by understanding the laws of nature man could master nature. And it is echoed in speech to Natural science Research society of the border region (Hughes 2013).

In the first five year plan (1953-57) of China, the Ministry of Water resources of China and The Yellow River Hydrology Committee *(Huangheshuili weiyuanhui)* got the a Three Gate Dam project approved with help of Soviets. Additionally, there were forty-six separate hydroelectric power projects from Longyang Gorge in Qinghai province to downstream areas that ran parallel to Three Gate. Unfortunately, when the Sino-Soviets relation witnessed turmoil, all the projects that were supported by Soviets were affected (Smil 2004: 27).

The three gate project was not part of the projects which were affected and continued and it started working in 1960. The Three Gate Dam was unable to achieve its aim of cleaning the Yellow River of sediment. The dam was filled up with 1.91 billion tons of sediment and only 1.12 billion tons was washed away (Norbu 1979: 30).

The Yellow River went dry in the summer of 1972 and again six times in the 1970s, seven times in the 1980s and again seven times during the first eight years of the 1990s. The process of flushing the sediments to the sea became a difficult task because 21 billion cubic meters of water was needed to complete the task. This resulted in the creation of a fine deposit of earth that could be easily blown by the winter winds and deposited elsewhere in large, shifting sand dunes. This posed a

serious threat to the creation of a prosperous North China plain (Norbu 1979; Ninkovic 2013).

In 1950s the volume of water in the Yellow River had decreased by 75 percent, so that the once-mighty river was reduced to a more or less seasonal body of water that usually dries up 800 kilometres before reaching the sea (Political and Social Report 2013: 10). In addition, the desertification of delta which causes soil erosion led the crisis. The forest cover, in the basin of The Yellow River, has dramatically dropped to as low as 7 percent. Resultantly, the soil erosion has affected some 75,000 square kilometres of land drained by The Yellow River (Schneider and Pope 2008).

The crisis was deepened, when the tributaries of the Yellow River were also affected by the same process of desertification and soil erosion. This led disappearing of thousands of lakes in Qinghai that nurture the Yellow River (Schneider 2011: 101). As a result, water flow into the river's mainstream as predicted by the Yellow River Water Resources Committee was 8.2 billion cubic meters in the first seven months of 2003. This was 5.5 billion cubic meters less than the previous dry season witnessed in 1997, and probably it was the lowest in five decades.

Another reason for low water levels as explained by Hong Shang Chi, was the huge increase in water consumption by the industrial and agricultural sectors in the drainage area of the Yellow River and also due to dry weather (Schneider 2011: 45). Along with a reduction in the volume of water, there has also been a decline in the water quality. Even when the river is flowing, the river water has is not fit for use in many places along the lower reaches. A study done in 1994 shows that potable water was available in only 31 percent of the entire drainage area of the Yellow River. Most of these areas lay in the west of Longyang Gorge in Qinghai province, which was a relatively untouched area. For about 4,507 kilometres of its entire length, the toxicity levels of the river water falls in category IV and V or above and there is no availability of potable water (Schroder 2012: 50).

In January 1999, near the Xiaolang di Reservoir, construction work led to the creation of half a meter thick layer of foam that spread across the river channel downstream till several kilometres, and it polluted the river water so badly that purification plants in many large cities like Henan and Shandong provinces had to be shut down, cutting off the water supplies to several million people (Shrestha 1999: 100).

This pollution of river water led to an investigation where it was found that nearly every single stream along the Yellow River- from Qinghai to Gansu, to Ningxia, to Inner Mongolia, to Shaanxi, Shanxi and Henan- was a source of pollutants but the bulk of pollutants were coming from the Fen River. A report on Yellow River Water Resources confirmed that only 33.3 percent of the water was in category 3 or was safe for drinking, aquatic breeding, fisheries or swimming and this quality had declined significantly when compared to 40 percent in the 1990s. Around 4.35 billion tons of waste water was dumped into the Yellow River in 2005 which was 88 million tons more than 2004 (Farrington et al., 2009). 'Pollution turns Yellow River red' was the title of BBC news headline when waste water from a heating station near the city of Lanzhou contaminated the river water. All these factors combined together has created the water crisis in basin of The Yellow River. In 1999, the river was dry for forty days disrupting shipping and commerce, and this become regular phenomena in the Yangtze River. It has significantly affected the livelihoods of basin people, has led to their deteriorating health conditions and has also hampered the development of the region (Falkenmark 1990: 80).

The sources of the Yellow River raise those next to the great river of China, the Yangtsi kiang. The Irrawady is also known as the great river of Burma, rises in eastern Tibet, and flows into the Bay of Bengal. The Yangtse Kiang and the Hwang Ho begin their journey hundreds of miles to the east Chinese coast (Finney 2013: 67). The Hwang Ho river and the Yangtse Kiang river flow eastward through China and lie in the eastern part of Tibet. It is believed that the river Yangtse and the Indus contain gold sands as it is noted that Tibet is rich in gold and minerals. The Changtang or the Northern Plains has several thousands of feet high in its mountain peaks and its ridges. The chief rivers rising from the northern limits are the river Kiria which breaks throughout the Kuenluen to the north-west, flows through Polu and empties itself into the Taklamakan desert (Gain 2011: 1000). Lastly, the Cherchen Daria river is three hundred miles further east the Taklamakan desert it rises from the Arka Tagh flows past the Cherchen and loses itself in the marshes of Lobnor. According to Sven Hedin who visited the lake while exploring Tibet the river was three hundred feet wide and its frozen surface was covered with snow (Hedin 2015: 278-279).

Economy

The economy of this area is a mix of agriculture and industrial occupations. Agriculture is the main stay of a large section of the population. The most important industrial centres of China are the inland cities of Wuhan and Chongqing and the coastal region of Shanghai. The areas lying in the lower basin and the delta fall among the most developed areas in the country. The mineral resources of the region include reserves of iron ore near Wuhan and Nanjing, and also coal, copper, phosphorus, gold, oil, and natural gas deposits in Sichuan province. The basin alone contributes to nearly half of China's crop production, which includes more than two-thirds of the total volume of rice production. In addition, crops like cotton, wheat, barley, com (maize), beans, and hemp are also produced in the basin. The fertile land of the basin and the climatic conditions are extremely positive to agriculture.

Fisheries

The Yangtze River and its associated tributaries and lakes are home to several types of fishes. The flourishing fishfug trade of the region supports livelihood of a large section of the population belonging to the region. There are about 30 species which have economic significance, especially carp, bream, Chinese perch, gapers and lamprey, however white and black amur, flatfish, and spotted flatfish possess even greater economic value. A joint research conducted by the Chinese Academy of Sciences, the Ministry of Water Resources and the World Wide Fund for Nature, found that the annual harvest of fish in the river fell from about 500,000 tonnes per year in 1950s to 100,000 tonnes in the 1990s (Gleick 2003: 69).

Navigation

Water routes in the Yangtze basin total about 56,300 km. The Yangtze River constitutes the principal navigable waterway of China. This leads to reduced transportation cost for many products as transportation through waterways is cheaper than transportation by road and air. The river also links many coastal cities with major cities of Nanjing, Wuhan, and Chongqing and cater to this traffic network. The Yangtze is also joined to the navigable stretches of the Huang He and the Huai, Wei, and Hai rivers by the Grand Canal, which is further connected with the seaports of Hangzhou and Tianjin (Finney 2013: 59). The river's 2,700 km stretch witnesses intensive cargo and passenger traffic. Nevertheless, large ships can travel only up to Wuhan, and cargo of around 2,000 tons can reach Yichang. Before Three Gorges

Dam was built, smaller vessels could travel as far as Pingchuan, but now construction of the Dam has increased the distance.

Most of the river's discharge, which provides for almost 90 percent of the total flow, comes from the tributaries of the middle and lower courses. While the average discharge in the delta is 31,150 cubic meter per second, it is 23,980 cubic meter per second in Wuhan, 14,980 cubic meter per second in the end of the Three Gorges area and "just" 1,980 cubic meter per second in the upstream areas. Due rainfall in summer months the discharge reaches its maximum level in August, and often lead to devastating floods , and its minimum water level in February (Granit 2009: 20). The dangeorus floods of June 1998 hit the entire Yangtze River basin and it took the lives of 4,000 people and cost the economy $36 billion (Glordano 2002: 200) .

This attracted the attention of leaders of China as well of many environmentalists. It was, though not the first flood to have hit the Yangtze. There were already several floods like of 1980, 1981, 1991 and 1996. Earlier the flood water or excess water of Yangtze was absorbed by the great wetlands of the Huguang plain. As the modernization process took devil forms and it started the reclaiming the lands of lakes and rivers of Yangtze valley. The Water Resource Ministry of China puts very appropriately the cause of 1998 flood “when numerous lakes were filled up for farming in the decades of struggle between the people and water for low laying land along the Yangtze River , the retention capacity was much reduced and the flood situation exacerbated”. Nonetheless, filling of lakes brought immense prosperity to Huguang -Hunan and Hubei province of China which are considered as major grain procedures of China and thus regarded “Huguang harvests could feed all under the heaven”. Ironically, it also brought more frequently and more severe floods (Gray 2011: 11).

It forced the people living on river banks to climb up the valley. The people began to burn and cut trees for settlement purposes. This worsened the situation disturbed the ecological cycle of the region. The rainy season led to washing of the soil due to loosening of the soil. Soil erosion became a common phenomenon and as a result it people were forced to move deeper and deeper in to the forest leading to more damage to the environment. This desertification worsened after the establishment of the PRC.

Further, one of the most significant factors to blame for loss of forests is establishment of the "third front" Altogether, it led to immense siltation in the Yangtze River as well, which turn increased the severity and frequency of floods. The siltation problem is not only associated with main river rather has also affected all the tributaries of the Yangtze River. The entire Min River valley gets more than 100 million tons of sediments annually even siltation in its tributaries has been doubled or some time tripled (Hasnain 2002: 80). The Yalong Jinsha river valley has also been badly hit by mudslides during the normal rainy seasons. In other words, it led to a substantial increase in the amount of the sediment in the Yalong River and silting up the Yangtze River. In 1993, soil erosion affected 4500 square kilometre of the river valley of the Longchuan, a tributary of the Jinsha. The Longchuan discharges 6.2 million sediments into the Jinsha River every year. It is to be noted that the annual flow of tributaries of the Yangtze has been declining substantially. The annual flow of the Yalong and Dadu river valley has witnessed a decrease from 14.8 billion cubic metres in the 1950s to 13 billion cubic metres. Also, the average annual flow of the Yangtze has also seen a drop. Now the droughts have become more frequent feature of the Yangtze basin as compared to floods. The salinity level in the valley has also been rising dramatically making the condition worse for agriculture.

As a result, fifty-nine cities of the Yangtze valley faced insufficient water supply in 2002 and it was feared by officials' that serious problems for water transport will soon arise (Hofman 2011: 17). In addition, about 20 billion tons of various toxic wastes in the Yangtze River turned the water once comparable to 'mother's milk' into venom. The reason include factories, special power plants which were often build along the river and without treatment facilities for waste water, water gas and industrial waste (Economy 2012a: 47) It absorbed more than 40 percent of the country's waste water, 80 percent of it untreated, said Lu Jianjian, from East China Normal University. Yuan Aiguo, a professor with the China University of Geosciences said to *Xinhua News Agency* that just 31 percent of the water is of first or second class quality, with 35 percent being below par. Yuan warned that without any measures taken to curb pollution it was possible that river would have 70 percent water below the third class in three to five years (Economy 2012b: 80).

In some cities polluted water is supplied for meeting daily needs of people as the complaint of one resident of Nanchang District states, "The tap water stinks and has a

yellowish colour, the whole family has not taken a shower for two days," said Shi Xiuying (Elhance 2000: 159). The 2007 annual report on Yangtze River protection and development states that more than 600 kilometres of the river water is in critical condition. The report states that almost 30 percent of its major tributaries, including the Minjiang, Tuojiang, Xiangjiang and Huangpu rivers are critically polluted. The report says the river's annual harvest of aquatic products dropped from 427,000 tons in the 1950s to about 100,000 tons in the 1990s (ENS 2012: 19).

A separate study of the Yangtze River Water Resources Commission depicts that the cities along the river discharge at least 14.2 billion tons of polluted water every year which constitutes 42 percent of China's total discharge of polluted water (ENS 2012: 35). The water level at Shanxi hydrometric station, downstream of Yichang, stood at 38.52 meters on August 10, 2000 and it was 1.65 meters lower than the average for August in past years. Further, the level monitored at the Hankou hydrometric station in Wuhan was 22.12 meters, 1.82 meters below the precious figure. Experts said this is because the river valley has had less rainfall this year than in normal years (Ellis 2005: 70). It is nothing but a repercussion of desertification. To solve the problem of sedimentation and flood of the Yangtze, various schools of thought have come up with different opinions. As Ma Jun described, one school of thought believes that this problem could be addressed by raising the embankment several meter higher. It would be more problematic to raise the embankments of the Yangtze River. Instead of providing a solution to sedimentation and floods, it will make the problem more serious. Another school of thought suggests that diverting the river's water into two ancient courses of Hubei would equally distribute the flood waters between Hunan and Hubei (Ma 2004:86).It can also create more problems such as resettlement of population from these areas to other higher reaches and above all this will not be practical and economically viable. The third approach is both feasible but could cause inter provincial and international conflict. Alternatively, three major rivers- the Jinsha, Lancang (Mekong) and Nu (Salween) could be exploited near their headwaters at their confluence in Yunnan province by building diversion channels and underground waterways that would connect them (Ma 2004:90).

There is a Chinese saying that "when misfortune reaches the limit, good fortune is close at hand'. And it seems Chinese government has heard the saying and have moved towards making Yangtze a good fortune. It has moved to build the Three

Gorges Dam. Though, the construction of the Three Gorges Dam has been much debated in China and outside due to their feasibility and environmental problem. When now it has already started working, the debate has been stopped. As the benefits of dams inscribed by the government, has many advantages. They are flood controls, power generation, navigations, and in addition the project will promote the development of fishery in the reservoir, as well as tourism and recreational activities. It will evidently improve the water quality of the middle and lower reaches of the river during the dry season and create favourable conditions for the South-to North Water Transfer (Three Gorges Dam).The issues of debate still haunted the mind of Chinese people. The questions remains whether the good fortune is close at hand or the limit of misfortune is yet to come (Elhance 2000: 50).

Mekong *(Lancang Jiang)* is the longest river in Southeast Asia and seventh longest river in Asia. Rising in south-eastern Qinghai province, China, it flows through the eastern part of the Tibet Autonomous Region and Yunnan province, and enters into lower basin as it forms the international border between Myanmar (Burma) and Laos, as well as between Laos and Thailand. The river then flows through Laos, Cambodia, and Vietnam before draining into the South China Sea, south of Ho Chi Minh City and has a drainage are of 620,000 square kilometres. It includes nearly all of Laos (207,400 square kilometres), the northern and north-eastern regions of Thailand (190,5000 square kilometres), nine-tenths of Cambodia (157,800 square kilometres), and one-fifth of Vietnam in the central and southern delta (64,300 square kilometers) (ENS 2012: 78).

In its upper reaches, the Mekong rises in the Tibetan Plateau between the Salween and Yangtze rivers; the streambed has cut deeply into the rugged landscape through which it flows. Along its course between Myanmar and Laos, the Mekong drains about 8,000 square miles (21,000 square km) of territory in Myanmar, comprising rough and relatively inaccessible terrain. In its more gentle lower stretches, where for a considerable distance it constitutes the boundary between Laos and Thailand, the Mekong inspires both conflict and cooperation among upper riparian and lower riparian states as well among Cambodia, Laos,· Thailand, and Vietnam (Fujita 2011: 89). Millions of people are dependent on the Mekong River (and the larger Mekong basin) for agricultural and fishing purposes. Thailand and Laos are keen to tap in the river's potential of producing hydro-electricity. Laos views the river as critical for its

agricultural interests. Similarly, Cambodia and Vietnam rely on the Mekong for agriculture and, Cambodia is particularly dependent on the river for its valuable fishing industry. The Mekong also provides critical transportation corridors (Jagerskog 2009: 65).

Approximately 50 million people depend on the Mekong and its tributaries for food, water, transport and other such daily needs. The MRC's research has shown that during the dry months which last from November through May, the 4,400-kilometer-long Mekong - which flows from the Tibetan plateau to Vietnam and outwards to the South China Sea – is reduced to 2,000 cubic meters of flowing water per second. During the monsoon months, from around June till September, the Mekong flows at a rate of 50,000 cubic meters per second. Unfortunately, the free flow of the Mekong River was halted in Chinese side to generate electricity as well irrigate the fields of least developed region of China. There are five more large dams planned in Yunnan for the Mekong and another nine for its tributaries. Together they would generate 20,000 megawatts of electricity, which is more than that produced by Three Gorges Dam on the Yangtze River (Jayaram 2013: 34).

There is geographical importance of the Mekong basin to riparian countries and China has taken, up the concerns of lower reaches and has started various initiatives. Interestingly, the darn constructions on Mekong River not only benefits China but at same time help lower riparian countries from perilous floods. In 1999, Jezpeh David, regional adviser on water resources for the UN Economic and Social Commission for Asia and the Pacific (ESCAP) officially proclaimed that

> .. the construction of darns on the Lancang will actually bring major benefits to the lower Mekong countries by reducing peak flood flow during flood season, and increasing the seasonal flow during the dry season, providing more water for domestic consumption, industry, irrigation, navigation and deferring salt intrusion (Jezpeh 1999: 250-252).

It is possible that Vietnam would “welcome an increase during the minimum-flow dry season to help prevent the damage caused by saline intrusion” (Jezpeh 1999: 300).

Thus, the deliberation that damming the Mekong River will benefit only China and have negative impact on lower riparians is no longer valid. Ironically, the damming of the river will have other consequences like environmental problem and migration

which will not only affect the lower riparian countries but upper reaches as well. There needs to be a strong political impetus among the basin to minimise the environmental cost and develop the region accordingly. This strategy will lead the countries of the basin towards conciliation. No riparian countries will favour confrontations on water when all of them are engaged in boundary disputes. Indeed, the cooperation on water among the riparian countries will also encourage other disputes to be resolved through mediation. In addition, all the lower riparian countries of Mekong River basin "are comprised of a combination of geophysical and socio-economic factors, with the first being either an upstream-downstream or a common-pool-situation and the second being either homogenous or heterogonous" (Jha 2011: 17).

The countries of Mekong river basin have varied capabilities and thus are likely to cooperate on the common resources than engage in conflict. Most of strategic analysts suggest that weak nations should cooperate with strong nations. Thus, it would be better to cooperate on water for Southeast nations of Asia with China. Moreover, it is not only lower riparian countries which have to cooperate but an upper riparian country like China also needs to avoid any confrontations on water with lower riparian. There are many determining factors which will lead the countries of the basin to cooperate on the Mekong issues than conflict. Firstly, China would try to avoid any confrontations in neighborhood which will obstruct the rise of China. China share a good relation with the countries of the basin, so any attempt of unitary action on Mekong, in long run, will impinge on the image of a responsible nation in world politics (John 2011: 05).

Secondly, China needs a huge market for her finished product and basin states are good near market. In addition, China also needs raw materials for industry; the states of Southeast Asia are rich in minerals and oils (Mazumdar 2006: 43).

Thirdly, the political supports of these nations are highly required by China in international politics and to play a vital role in UN and other international organisations. Fourth and more important, any disputes among China and Southeast Asian states will bring these states nearer to India. Thereby, China will avoid taking any arbitrary actions on the Mekong River. Fifth, from the Southeast Asian nation's perspective, China as an economic giant and politically tries to balance India in its relationship with other countries. The basin states will use China to balance India and

vice-versa. Sixth, these regions are getting huge investment from China and thus any effort to change status quo will hinder regions development. Seventh, the lower regions totally depend on China to provide hydrological data to forecast the floods and drought in the regions. Therefore, neither China nor the lower riparian countries of the basin afford clash on the Mekong River. In addition, there are several developments that have already taken place on the issue of cooperation on the Mekong River (John 2011; Klare 2001:17).

The exchange of hydrological data is the most advanced cooperation project between the downstream riparians states and China. In 2002, China installed two measurement stations that report the water level to the MRC Secretariat every 24 hours during the monsoon season. China under the agreement signed by China's Ministry of Water Resources and the Mekong River Commission, China will offer data on water levels of the Mekong as well as the rainfall in the river valley to the commission every day during the flood season from June 15 to October 15 until 2006 (KPMG 2012: 56). 'This will make a very big difference in our flood warnings', Thanongdeth, a hydrologist, said *(International Herald Tribune* 2002). In other words, Chinese government is eager to promote the development of the Mekong River Basin. Thereby it will help to "promote economic growth along the river, and narrow the development gap among East Asian countries" (Krishnan 2010: 70).

The Salween (Nu) River begins in central Tibet and flows south through Myanmar and Thailand before flowing to the Andaman Sea. The total length of the river is 2815kms/1760 miles. The Yellow River (pictured above) begins in the northern Kham. It is known as the Ma Chu in Tibetan. From the Tibetan Plateau, the Yellow River flows through China. The Yellow River is also the 6th longest river in the world with a length of 5464 kilometers/3398 miles. The Yellow River is very clean, but by the time it traverses it through the central and eastern regions of China, the river is quite polluted. The Yangtze River is known as the Dri Chu in Tibet. It is the longest river in Asia (Krishnan 2010: 89). The Yangtze River extends 6300kms/3938 miles across Tibet and China before ending in the Pacific Ocean near Shanghai. During the winter season, the Yangtze is frozen along the headwater regions in Tibet. The Tsangpo River is the most important river located in central Tibet. The Tsangpo flows through the fertile Yarlung Valley and it originates from the holy mountain of Kailash in west Tibet. As it flows east, it passes through many deep canyons. It is a very

popular river for whitewater rafting and kayaking. After passing through Tibet, the Tsangpo turns south and flows through India, where it is referred to as the Brahmaputra River (Lee 2006: 75).

The rivers in Tibet originate in the world's highest mountains and flow downstream through the numerous valleys of China, India and Southeast Asia. During its downstream course many of these rivers become polluted, but at their sources in Tibet they remain clean, pure and beautiful. This last picture is of the Tongtian River near Jyekundo, which is a segment of the Yangtze River (Lee 2006: 78).

Lakes in Tibet

Tibet has few of the highest Lakes in the world. Many are over 15,000 feet above sea level (Liu 2006: 90). (Mazumdar 2006: 43).

Like in others parts of China water is the key factor to promote moderinzation. The Tibetan land- scape numbers over 1500 lakes, covering an area of 2,42 million ha, which is one-third of the total lake area of China. Many lakes and mountains are worshipped in the Traditional Tibetan Bon religion and Tibetan Buddhism. Most lakes are saline, providing salt for trading in the nomad economy. The holy Nam Co or "Heavenly Lake" (1920 square km) situated on the Changtang north of the Nyainqentanghla Range is believed to be the highest saline lake in the world (Michel 2009: 98).

Many lakes are studded about the country in great numbers, mostly on Changthang and Southern Tibet. Most of the Chanthang area forms a great basin in which rivers flow and empty themselves into lakes, but never reach the sea as they have no outlet and most of them are salt water lakes. Chanthang comprises of two important lakes the Tengri Nor and the Nam Tso (Sky Lake). 'Tso' in Tibetan means Lake. The largest Tibetan lake is that of Koko Nor the northeast of the Tibetan plateau and outside the area of the basin. It has an area of 1 ,630 square miles and is situated approximately four days journey from Lhasa. According to, Swami Pranavananda there are several salt water lakes in Tibet like the Koko Nor and the Tengri Nor and fresh water Jakes like Tso Mavang and Langak Tso are also there. He further asserts that the Kokonor is the biggest of the Tibetan Jakes (Mochizuki 2011: 45).

The largest lake is Koko Nor on the north-eastern border the direction of the lake Koko nor is in the Northeast of Tibet. According to Purshottam Mehra, "Koko nor

along with the Tsadim basins is the second physical subdivision of Tibet." Therefore, Kokonor is the largest lake in Tibet seconded by the Tengri nor. It is also on the borderland of Tibet, Mongolia and China (Bell 2000: 56).

Another lake which is counted amongst the largest in Tibet is the Tengri Nor in the heart of Tibet it is about 1,000 square miles in area and many others are more than 100 sq miles. According to the local Tibetans the lake is called Tengri Nor by Mongols and Tengri Cho by Tibetans. It is the largest lake in the interior of Tibet and is only a hundred miles away from Lhasa. Other important lakes in Tibet are the Kailash Mansarovar Jake, Rawan Hrad (Heavenly Lake), Nag-Ch'u-Ka (Mouth of the Black Water) which wi11 be briefly discussed. Some fresh water lakes in Tibet which can be mentioned are Kurgyal-chhungo, Ding tso, Sham tso, Gouri kund tso, Nyak tso and Tamlung. However the present study has focused on the important lakes of Tengri and Kokonor which has already been discussed earlier. Other lakes are the Kailash Mansarovar Lake which is in the Western portion of Tibet which is bounded on the south by the great Himalayan range and on the east by the Kailash ridge and on the north and West by a very high land. Length from east to west is estimated at 15 miles, and in breath from north to south about 11 miles. (Mool 2001: 67).

The first Europeans to explore the holy lakes were William Moorcroft and Hyder Hearsey in 1825 (Ninkovic 2013). Captain C.G Rawling who has in his book given a detailed account of his two journeys undertaken in Tibet illustrates the beauty and location of the Kailas Mountain and the Lake Mansarovar. According to him, "Kailas Parbat, or Peak, situated a few miles to the north-west, and Manasarowar are two of the most interesting spots in Tibet, and will in time become to Hindus as important a place of pilgrimage as Mecca is to Mahomedans. Both deserve a fuller description than I can possibly give, for we were only able to reach the lake once, and to examine the mountain from the road, but even then much of interest was revealed, Manasarowar, for so it is known to the natives of India, is called simply Tso Rimpoche (Sacred Lake) by the Tibetans. Within a radius of a few miles rise four of the greatest rivers of India-the Indus, the Brahmaputra, the Sutlej, and the Ganges, the two former of which almost girdle India. Manasarowar has an area of about 100 square miles, is nearly square in shape, and presents a very regular outline. The water is fresh, and in it are many varieties of weeds, and as is to be expected, innumerable

fish. It is fed by numerous small streams running from the Memo and Kailas Peak ranges, but not by any river of importance (Pakistan Horizon 1959: 163).

The outlet of the Mansarovar for its surplus water is to the west of the lake, which separates it from the Rakas Tal, which was a narrow isthmus, and it was through the channel at its northern end that the water was said to run. Captain H. Strachey traversed this strip of land in 1846. He was then on his return journey, and declares that he came upon a "large stream 100 feet wide and 3 feet deep, running rapidly from east to west through a well-defined channel, this was the outlet of Manasarowar" (Poon 2012: 87). Rawan's Hrad Lake is within a short distance west of the Mansarovar it gets its water supply from the melting of the snow, from the west end of this lake flows the Sutlej river. The region between the Dang-la and the Trans-Himalaya has one of the biggest lakes of Tibet between them one such is Nam tso (Heavenly lake) Northeast of the Nam tso is the Nag-Ch'u-Ka (Mouth of the Black Water) (Ramchandran 2010: 17).

1-Basum Lake

Located in a deep valley at an altitude of 3,538 metes, Basum Lake is a crescent surrounded by mountain ranges and lush trees. It is famous for its beautiful landscape and it is the holy lake of Red Sect. Every year, thousands of adherents flood here for the purpose of worshipping. Basum Lake, sometimes called Basumco Lake, is named as Cuogao Lake which implies green water in Tibetan language. The visuals of the lake are stunning as it lies at an altitude 90km (56 miles) west of Kongpo Gymdo County. Besides offering awesome views, many glaciers on the upper reaches of the lake provide it with a constant supply of fresh water. The lake is surrounded by mountains and as a result enjoys a temperate climate. At the feet of the snow-capped mountains, the vegetation is widespread and the trees of various kinds such as black maples, birches, pines cypresses and azaleas connected to each other form a world of greenery. The pristine waters of the green lake reflect the picturesque snow-capped peaks around the lake. Basum is also a notable holy lake of Nyingmapa order of Tibetan Buddhism. Nyingmapa, is the 'school of the old persons', or so-called red caps, is one of the oldest Tibetan Buddhist School, and it traces its origins in 7th and 8th centuries on the shores of Basum Lake (Sikri 2011: 98).

2-Namtso Lake

It is situated at an altitude of 4718 m and Namtso, along with Yamdrok Tso and Manasarovar is considered as a holy lake revered by Tibetans. Namtso Lake is very near to Lhasa. The lake holds a revered place in Tibetans' heart and it literally means "celestial or sacred lake". It stretches as far as 70 kilometers from the east to the west. It is widely recognized as the second largest saltwater lake in China and also as the saltwater lake with highest altitude in the world. The dazzling turquoise water dazzles the vision making it difficult to fathom whether you are walking on the water or on the lofty snow-capped mountainous range looming far ahead within your easy reach. The lake is surrounded by many monasteries which can be visited by the tourists. The lake is also a halt of migratory birds and brown bears, wild yaks and Tibetan sand fox, and other plateau species (Sinha 2011; Sikri 2011).

3-Yamdrok Tso Lake

Yamdrok Tso, being the largest endorheic lake is lying in northern Himalaya, is known as one of the sacred lakes. Yamdrok Lake is the nearest to Lhasa and is accessible all year around situated at a distance of 2-3 hours drive from Lhasa. The lake partly freezes in winter. The source of lake water are the surrounding snow-capped mountains and there is no outlet for the lake water. The melting of snow and vaporization creates a perfect balance, and the entire lake is like a natural reservoir. The tranquil beauty of Yamdrok Tso is displayed by its tranquil and turquoise water Sinha 2011: 428).

Every year in winter, a number of migratory birds, such as swans, ospreys and spotted eagles fly to this biggest habitat of birds in Tibet. In addition, Yamdrok Tso is also the largest freshwater lake in Tibet, and is also home to the hydropower plant with the highest altitude in the world. Though the construction of this hydropower plant is fairly controversial, this plant does play a huge role as the major source of electricity to the south of Tibet (Sinha 2011: 429).

4-Manasarovar Lake

Lake Manasarovar is the sacred lake of Tibetan Buddhism and Hinduism. To the southeast of Mt. Kailash lies Manasarovar Lake. Among the three holy lakes mentioned above, Manasarovar Lake holds special relevance ast it is a lake that is closest to Mt. Kailash, the center of the universe revered by Tibetan Buddhists,

Hinduists. Pilgrims are deeply convinced that Manasarovar Lake is the sacred water bestowed by the Buddha and it can not only remove the nastiness of mankind, but more importantly is able to purify the soul and extend one's life (Sinha 2012).

The water of the lake is said to be the highly transparent. Tourists when visiting the lake can have a horse ride beside the lake and also enjoying the surrounding wildlife. One can witness the devoted pilgrims circuiting the lake, which is known as Kora. Travellers can even ascend to Chiu Monastery to have a bird eye view of the grandeur of Manasarovar (Sinha 2011: Sutter 2010).

5- Pangong Tso

It is located in very remote area of western Tibet. Pangong Tso is a long and winding lake that stretches from Tibet's Ngari prefecture to Kashmir in India. The peculiar thing about this lake is that the water of the lake on the Chinese side is fresh water while in India's territory the water is saline. As a result of its winding shape, Tibetans have named the lake Pangong Tso, which means a swan with long neck (Strategic Foresight Group 2010b: 15).

6. Basumtso Lake

Baumsto Lake is also known as "Cuogao Lake". It literally means greenish water in Tibetan Language. It lies in the upper reaches of Ba river valley, about 50 kilometers to Gongbogyamda County in Nyingchi prefecture. At an altitude of 3538m, and a coverage area of 15 square kilometers, the lake is considered a sacred lake and a holy place of Nyingma school of Tibetan Buddhism. Though it is small lake, the lake is famous for as the paradise of trekkers because of its picturesque environment (Strategic Foresight Group 2010b: 20).

7. Tangra Yum Tso

Tangra Yum Tso is situated at the bottom of a deep lake basin formed three million years ago. Tangra Yumco, next to Tangra Qonco, stretches over 80 kilometers from south the north. It is hels as the sacred lake by the disciples of Tibetan Bon Religion and it is also renowned as the third largest alpine lake in Tibet. The shape of the lake is like a sole of shoes and it is surrounded by snow-capped mountains. According to legends, the Tangra Yumco was once ruled by a demon and it was Lord Buddha Tonpa Shenrab who controlled the evil spirit and eventually transformed the lake into a sacred lake (Svenson 2012; Sinha 2011).

8. Lhamo La-tso

Lhamo La-tso is located in Shannan. It happens to be one of the most important pilgrimage destinations, and has been revered for centuries as an oracle lake. Lhamo La-tso sparkles like a brilliant azure jewel which is set in a ring of gray mountains. The weather conditions around the lake keep changing due to the elevation and the surrounding peaks, and the continuous passage of cloud and wind creates a constantly moving pattern on the surface of the water. The holiness of the lake lies is derived from the fact that traditionally Dalai Lamas have made pilgrimages to Lhamo Latso to seek visions that appear on its surface. The Tibetan regent journeyed to the lake in 1933 after the death of the 13th Dalai Lama and had a vision of a monastery of the present Dalai Lama (Topgyal 2011: 23).

9. Siling Tso

Siling Tso is the 2nd largest lake in Tibet. It's very remotely situated in northern Tibet, and it takes 3 days drive from Lhasa to reach there. Siling Tso lies to the south of the Changtang Plateau. Legends have it that Siling is an arch devil who used to live in Duilongdeqing County, to the west of Lhasa. He greedily took thousands of lives everyday that included both human beings and animals. One day, Padamasambhava found Siling and asked him to stay in the lake forever and confess. It is from that time that people have called the lake “Siling Tso”, which also means the “Siling Devil Lake”.Due to its natural environment, Siling Tso is the largest nature reserve and serves as an important habitat for Grus Nigricollis (Sinha 2011: 2012).

10. Rawok Lake

Rawok lake which is surrounded by magnificent snow-capped mountains and forests, is just nearby the Sichuan-Tibet road. The area of the lake is 22,000 square km, with an elevation of 3,850 meters. The famous Lhegu Glacier stands to the north of Rawok Lake. The lake is fed by the melting ice of the glacier and, water flows into Rawok Lake, keeping the lake abundant. In addition, thawed snow makes the water reflect different colors in different seasons. It is said that Ranwok Lake, together with Lhegu Glacier is a perfect combination of Alps of Swiss and Jiuzaigou (Tyler 2009: 78).

11. Peikutso Lake

Peikutso Lake, lies 40km to the east of Gyirong county at an elevation of 4600 meters. It is a beautiful alpine lake, and has a water area over 300 square kilometers.

The light salty lake is located near the world's fourteenth highest mountain, Shishapangma. Peikutso lake is situated on the way to Ngari (the far west end of Tibet), and between Zhangmu and Saga. It is often suggested to first trek here and then climb up to Lake Manasarovar and Kailash mountain. A lot of nesting birds can be found by the lake, and other wild animals such as Tibetan antelope, wild donkeys, wild horses, wolves, foxes, deer, gazelle, black-necked cranes as well as yaks and sheep can also be spotted (Vajpeyi 2011: 14).

Water Resources in Tibet and its Geo-Political Implications

Tibet is the world's largest and highest plateau, and is often referred to as the 'world's third pole' because it contains the biggest ice fields outside of the Arctic and Antarctic region. Tibet is a country which is full of rivers, lakes which are strategically important for the others Asian countries in general and China and India in particular. The two Asian titans, China and India, are gaining economic and international importance in an era of serious water shortages and also face the challenge that their modernization process may be stalled as a result of water shortage. Intra-state water disputes are already brewing in many Asian countries. China is now aiming at massive inter-basin and inter-river water transfer projects in Tibet which threaten to cause further damage to the already fragile ecosystem of the plateau. China is planning to build around one hundred dams across the Tibetan plateau and has also launched several water diversion projects to divert water into northern and eastern China. These projects will affect already-overstressed water supplies of hundreds of millions of people in South and South East Asia. China's neighbours downstream view these projects with increasing alarm as at these plans have the support of Chinese President Hu Jintao, who is a hydrologist by profession-with increasing disquiet (Wagner 2011: 67).

Managing Water in China is a major issue with implications on growth. Water scarcity poses threat to the ability of Chinese farmers to irrigate their crops. This will also impact food security as well as social stability, especially in northern China. Every year, water shortages cost exchequer an estimated 40-60 billion RMB, i.e. 6.3-9.5 Billion USD, in lost economic output. The uncertainty and the prospect of continued scarcity will affect the willingness of foreign and domestic investment in China, leading to a reduction in the production of existing facilities, and ultimately affecting the job market. According to the Water Resources Ministry of China, there

were 50,000 rivers with catchment areas of 100 square km or more in the 1950s. Now the number is down to 23,000 and China has lost 27,000 rivers due to the over-exploitation by farms or factories. China accounts for 20 percent of the world's population but possessed only 7 percent of fresh water resources. As a result China has to take care of the water demands of growing population, industries, and agriculture for which it is making efforts to tap Tibet's water resources (Xie 2009: 100).

China shares six river systems which originate from the Tibetan plateau with nine of its neighbours, and being an upper riparian country, China has an advantage in utilising them. Through all these projects and dam constructions plans, China uses Tibet water resources for their purpose and benefits and diverts its water according to their needs and development strategy. Today all the major rivers and their tributaries that flow from Tibet have been dammed and this massive dam building activity especially in the western Tibet is creating huge discussions and doubts whether these projects could act as a stepping stone in expanding its ambitious water transfer projects beyond its initial plan. There has also been an expansion of the Chinese railway network and Beijing is now connected to the rest of Tibet paving the way for logistical support and transportation of damming inventories, as and when the need arises. Dam safety has always been considered a sensitive subject. Now, accidents reported at a number of dams and reservoirs have cast aspersion on the quality of these projects, but they are rarely reported to the general public (Zeitoun 2006: 440-445).

> By just overlaying the UN seismic hazard zone map and the locations of these dams on the western rivers of Tibet, clearly sends an inevitable signal that those living in the shadow of these dams are at the mercy of nature. According to the report published by Probe International (2012), more than 90 percent of dams that are built, under construction or proposed for the rivers that flow from Tibet are located in zones of very high or moderate seismic hazards (Zhang 2011: 17).

The environmental crisis created as a result of climate change and ecological depletion on the Tibetan plateau is not just a regional issue. It is a global issue where cooperation is the key especially among scientists as well as governments and local people. The Dalai Lama has also emphasized on the need for raising awareness about

the crisis and the important role that the Chinese scientists and Tibetan people can play.

Availability of Water resources and its Importance in Geo-Political Perspective

Tibet is a water rich area and its significance for China lies not just in its geographical location but also its immense water riches. These water resources of Tibet has long been coveted by China, since the period of Mao (1949-1976). Tibet's being situated at a high altitude of 4,500 metres is richly endowed with fresh water resources in the form of glaciers and underground reservoirs. After, the Arctic and Antarctic region, it is in fact the largest repository of fresh water resources and is rightfully referred to as the "third pole". Some of the major rivers flowing out of the Tibetan Plateau are: the Yellow River, Yangtze Kiang, Mekong, Salween, Sutlej and the Brahmaputra. It is also the reason why Tibet is of vital significance for China, which otherwise is an arid country. One quarter of the country comprises of deserts and it faces severe water shortages. The major rivers of China are either too polluted or too silted to satisfy the thirst of 1.3 billion people. The most crucial issue for China with regard to water security is to divert fresh water from Tibet to the industrial and populated corners in its north and east. It has also given a spurt to building dams, canals, irrigation systems, pipelines and water diversion projectums (Zhuanti 2005: 17-25).

These water diversion projects are considered by China as an internal security matter. However, as a result of these inter-basin and inter-river water transfer projects in the Tibetan Plateau, other downstream countries that draw water from those rivers will also be affected. Water wars if they broke out, could destabilise not just the wider Tibetan region, but also all of Asia. Today, the neighbouring countries surrounding the Tibetan Plateau in Southeast Asia, the Indian subcontinent and China itself, is building "mountains of concrete". For now, these countries are engaged in dam building for the purposes of power generation, water security, food security, livelihoods and national identity. For instance, the biggest source of income to the economies of Nepal and Bhutan comes from hydropower development. It also reflects on their strategic upstream location. However, this policy of dam building has been most aggressively followed by China. China has utilized the upstream rivers in the Tibetan Plateau to build as many as 60 new dams to provide for its demand for energy. The electricity generated by these dams from the Tibetan Plateau finds its way to China's large metropolises of Shanghai, Chongqing and Guangzhou. For instance,

China is building three large hydropower dams on the upstream Yarlung Tsangpo River (in Tibet, which China has renamed the River Yarluzangbu). The same river flows downstream as the Brahmaputra into densely populated areas of India and Bangladesh. As a result of the construction of these dams, the fresh water supply to northeastern India and Bangladesh could be interrupted. The area covered by the river also happens to be a region where majority of the people depend on the fresh water supply for livelihoods, agriculture and food (Zhuanti 2005; Zhu 2011).

Irrespective of the merits of the current South-North Water Diversion Project built by China over the years at a cost of $62 billion, there will be severe environmental and water security repercussions for its neighbouring countries. China is motivated to go ahead with these projects in the Tibetan Plateau fueled by its "success" with the controversial Three Gorges Dam. It also forms a part of the legacy left its former President Hu Jintao, a hydrological engineer by training. The project connected two of China's most chronic problems — water and Tibet. The rerouting of the Brahmaputra River northwards to refill the fast drying Yellow River with the construction of three dams in the Great Bend is bound to have significant geopolitical ramifications over and above the typical issues in Sino-India relations (Ninkovic 2013: 86).

Even though India has more cultivable land as compared to China, the Tibetan Plateau constitutes the source of origin for most Indian rivers. There have been no great clashes between the two countries since the 1962 war between the two Asian countries. Today, the two countries have "re-emerged" as two great powers that can coexist. Their conflict potential has now shifted from territorial dispute to water security. This however cannot be the cause for too much optimism. Other countries in Southeast Asia are also affected by China's dam-building projects. China has also built dams upstream on the Mekong River, whose water is shared by downstream countries such as Cambodia, Laos, Thailand and Vietnam. 60 million population in these countries depend on the Mekong River for fresh water, food income, health and also for their national identity. An interruptions in this water supply could lead to devastating effects on food security and greatly affect their rich biodiversity. It will also lead to the creation of a number of environmental refugees. The foregoing points serve to highlight why the Tibetan Plateau is a global strategic epicenter. "It may well determine whether the "Asian century" emerges as a variation on an earlier European theme or it traces its own peaceful trajectory" (Ninkovic 2013: 56).

Concluding Remarks

Tibet's precious resources continue to decline, future water scarcity may become the biggest trans-boundary challenge the region will need to address. Chinese involvement in multilateral co-operation must occur in order to ensure that millions of people downstream have access to freshwater sources. Tibet's water resources needs to be used in a very eco-friendly manner otherwise it will impact on the Tibet and other riparian countries. There is a need for impartial, independent, and scientific assessments of the changes in the ecosystem of the Tibetan plateau, its water resources and land use policies. It requires the participation of all the relevant stakeholders from Tibet and also from other nations which are dependent on water resources originating from Tibet.

Chapter-III

China’s water policy in Tibet

China's water policy for Tibet Water resources is basically determined by strategic contemplations and periphery security. The attention on the periphery had been a perpetual security concern appropriate from the magnificent circumstances. Notwithstanding, in the post-1949 period, it increased transcendent concentration not as far as outer dangers alone but rather more because of its local concerns emerging out of country building activity and administration issues (Yao 2004: 23).

Water in China is a major issue having implication on growth. Water scarcity terrorizes the skill of China’s farmers who are irrigating their crops, impacting food security as well as social stability, especially in northern China. Every year, water shortages cost the country an estimated 40-60 billion RMB, i.e. 6.3-9.5 billion USD, in lost economic output. 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 (Yang 2001: 37).

According to the Water Resources Ministry of China, there were 50,000 rivers with catchment areas of 100 square km or more in the 1950s. Now the number is down to 23,000 and China has lost 27,000 rivers due to the over-exploitation by farms or factories. China has 20 percent of the world’s population but only 7 percent of fresh water. As a result China has to take care of the water demands of growing population, industries, and agriculture for which it is making efforts to tap Tibet’s water resources (OECD 2015: 66).

According to China Statistical Yearbook 2009, the levels of water stressed regions in China ranged from extreme scarce to surplus in different regions. For instance, Tibet scored the highest value of water availability with 139,659 m3/person/year compared to Beijing and Tianjin, both averaging only 127 m3/person/year (National Bureau of Statistics of China 2009: 97).

In short, China needs water more than ever and to complete its wishful economic model of ‘Western Development Strategy’ announced in 1999. This was indeed the last jigsaw piece through which all these major rivers and resources could be grabbed,

thinly disguised as a mode of development (National Bureau of Statistic of China 2009: 99).

China’s water polices under 12th Five Year Plan (2011-15) is to control water pollution by objectives, allocation and caps, meetings industrial and urban water needs in dry region by the South-North Water Diversion Project/Policy (SNWDP) and saving water through by growing water tariffs and looking abroad for water intensive-resources. Zhang Boting, Deputy Secretary General of the China Society for Hydropower Engineering, told reporters that the 12th Five Year Plan called for hydropower development to be prioritized. For various reasons, two thirds of the hydropower projects detailed in the 11th Five Year Plan had not been completed and would be revived in the 12th Five Year Plan (Roach 2011: 67-70).

After the foundation of the Communist government, the primary errand for China was to combine and coordinate its defenseless Tibetan periphery. It militarily possessed the district with its Red Army in 1950. It tried to lawfully fuse the area by constraining the Tibetans consent to the Seventeen-Point Arrangement in 1951. It officially incorporated the locale by making the Tibetan Autonomous Region in 1965. The minority policy in this way created does not deliver the worries identified with the Tibetan character as such however basically gives the formula to how to manage China's powerless periphery (Roach 2011: 78).

This chapter first looks quickly into how truly Tibet calculates China's magnificent periphery policy. Second, by investigating China's Tibet policy in the post-1949 Maoist period, the paper indicates how inside its minority policy, underscored in the ethnic order extend and provincial self-rule system, is adapted towards periphery solidification and how remotely China tried to settle its sway asserts on Tibet opposite India and accomplish a steady wilderness. Third, the paper investigates China's Tibet policy in the post - 1978 change period and exhibits how China has kept on tending to the Tibet issue from a security viewpoint and subsequently has actualized the Western Development Strategy inside and re-created its Nepal policy remotely. At last, the review assesses China's Tibet policy in the bigger periphery policy (Zhang 2010: 59).

China's topography was shaped about the appearance of the Qinghai Tibet plateau, formed millions of years ago in the crash of the Indian and Eurasian plates. The Qinghai-Tibet plateau rose constantly to turn into the roof of the world averaging

more than 4000 meters above the sea level. The territory in China then slowly moves down from west to east like a staircase. The next step of the staircase contains the lightly sloping Inner Mongolia Plateau, the Loess plateau, the Yunnan -Guizhou plateau, the Tarim Basin, the Junggar Basin and the Sichuan Basin, with a usual elevation of between 1,000 meters and 2,000 meters. The third step, dropping to 500-1,000 meters in elevation, begins at a line drawn around the Greater Hinggan, Taihang, Wushan and Xuefeng mountain ranges and expands eastward to the coast of the Pacific Oceans. The northern plain is situated from north to south, the North China plain and the Middle Lower Yangtze Plain. Interspersed among the plains are hills and foothills. To the east is the fourth step of the staircase, land that consists of the vast continental shelf formed by the shallows jointly with the islands on the edge of the mainland (Sharlo 1992: 34).

The overall water resources available in China make its ranks sixth in the world. The amount of water resources per capita and per unit cultivated land is far less than the world average for the country's dense population and vast territory. These additional water resources is circulated uneven both temporally and spatially and does not required to coordinate with the circulation of population, cultivated land, and mineral resources. Southern part of China has enough water and inadequate land but north has enough land and inadequate water in the North. The south of the Yangtze basin holds 80.4 percent of water resources of China; though help 53.5 percent of the population, 35.2 percent of the farmland and 54.8 percent of GDP of the entire country. (ABB 2011: 66-69). Therefore, it makes per capita accessibility of water 3480 cubic meters. This area of China has “more people, shortage of land, strong economy and comparatively rich water resources” (ABB 2011: 73).

The Northern area to the Yangtze River has comprise 44.4 percent of the population, along with 59.2 percent of the farmland and 43.4 percent of GDP, but only 14.7 percent of water resources less than southern part. It leads to less per capita availability of water i.e. 747 cubic meters. Now, given the condition if north and southern area of China, one could simply analyze that northern part of China faces the most serious problem of water requirement versus supply and most serious unparalleled situation of water resources with economic and social growth (OECD 2013b: 24). Furthermore, the north area of China is dealing lack of water and related environmental degradation. The main task is equally distributed among decreasing

"runoff from the mountainous areas of the region and water resources become overcommitted, serious water and environmental problems. Therefore, the region has facing a problem of drying-up of rivers, decreasing levels of groundwater, degradation of lakes and wetlands, and problem of water pollution (Xiangang, et al., 2007: 370).

But not only water utilization but discharge of wastewater has been growing with the economic growth. The scarcity of water deliver is aggravated by the decline of fresh water sources most of which have been contaminated. It still remains a difficult task to make sure the modernization procedure in China against the threats of floods and the lack of clean water sources. China however, helps one-fifth of the world's population with merely 7 percent of global water resources. Therefore, water availability of per capita is among the lowest in the world and the south area is concentrated with the majority of available water. It ultimately makes the situation even worse for the north and west area to face continuous droughts problems. Thereby, it causes severe sandstorms and increasing desertification. Due to overuse of water resources leads to drying situations to the rivers, lakes and underground aquifers in northern China. As a result, the present scenario not only is moving towards water crisis problem but at the same time creating health and food security issues. The problems of drying river and severe drought have “dropped the grain harvest in 2001 to 335 million tons, down from the all-time high of 392 million tons in 1998” (BBC 2012: 39).

Along with this, pollution also makes China's situation even worse. According to report of SEPA showed that 70 percent of lakes and five of China's seven largest rivers so polluted that they are no longer suitable for human contact. The issue of global warming is also intensifying China's water crisis. In the western China, the glaciers of the Qinghai-Tibet plateau are melting at an alarming rate. If analyzing the data of four decades from nearly 700 weather stations, experts estimate the glaciers are shrinking seven percent each year due to rising issue of global warming. The Qinghai-Tibet plateau has warmed over two degrees Fahrenheit (approx-16.67 degree Centigrade) a rate twice as fast as the rest of China, since the 1980s. Around the world this trend is being seen in ice covered regions due to the albedo affect (BBC 2012: 49). At present there are about 1360 million cubic kilometres of water available on the earth which contains 97 percent of this water is in the oceans. The rest -about 37

million of cubic kilometres is fresh water but most of that is of little use since it is locked in icecaps and glaciers. If all the water which is still available on the planet - from the oceans to, lakes and rivers, the atmosphere, underground aquifers, and what is locked up in glaciers and snow could be spread evenly over the surface, the earth could be flooded to an overall depth of some three kilometres. Current estimates showed that about 8 million cubic kilometres of water are reserved in relatively unreachable ground water, and about 0.126 million cubic kilometers of water are reserved in the form of lakes and streams. The rain that falls on the land differs from place to place but with averages some 725 mm a year. Like in some places it rains gently throughout the year and in others torrential places it rains occur for one or two months a year and the rest of the year being almost rain free. But there are some places like the Atacama Desert where the rainfall level is effectively zero; and there are places on tropical forests where there are more than 5 meters of rain a year. In the world's dry areas, where more than 600 million people live, rain fall is less than 300 mm a year (China Daily 2012: 11).

Every year rainfall is balanced by the world's run-of £3. Far more rain is evaporated than ever and reaches the sea via the rivers. A year total rainfall on land areas amounts to some 110,000 cubic kilometres, of which about 70,000 cubic kilometres of water are evaporated. Therefore, on usually near a third of all rainfall ever reaches a river or stream. In some places, the evaporation rates are high, the proportion of rainfall that is transformed in to run -off is much less. As a whole, in places like Africa, only about one-fifth of all rainfall is transformed into run off. Due to the availability of a small percentage of rainfall makes some of the world's river system even drier (Deepak 2013: 27). According to the PRC report (2004-05), the long term mean annual precipitation in China is 648 mm of which 44 percent forms the river runoff (at 2711.5 billion cubic meters) and 56 percent is lost in the evapo-transpiration from surface water bodies, plants and soils and the phreatic water evaporation. On the other side the long term mean annual river runoff depth for the whole country is 284 mm of which 25 percent is supplied by groundwater equivalent to 71 mm of water depth. The long term mean annual volume of evaporation and transpiration for the country is 364 mm of which only 3 percent is the phreatic water evaporation in the fresh water areas of the plains, is usable by means of groundwater withdrawal (Deepak 2013: 36-37).

Need for a Water Policy

The demand for water is growing at annual rate of 10.1 percent by cities and 5.4 percent by industry. According to the report of Ministry of Water Resources mentioned that in 2004 the total amount of water consumption all over the country was 311.1 billion cubic meter among which 77 percent accounted for the agricultural water consumption, 9.3 percent accounted for industrial water consumption, 12.1 percent accounted for domestic water consumption and rest of 1.6 percent accounted for the ecological water consumption (Ministry of Water Resources 2014: 12-15). This consumption of water is differs for place to place. In Shanghai, per capita consumption of water rose by 35 percent and consumption of water in Guangzhou increased by more than 25 percent in a short period of time from 1988 to 1994 (National Statistic Bureau 2009: 67). Therefore, due to the present situation of water, Ministry of water Resources of China has predicated a "serious water crisis"*(Xinhua* News Agency 16 November, 2001) in 2030 when the population reaches 1.6 billion leading to China's per capita water requirement declining to the World Bank's scarcity level. According to Malin Falkenmark, there are four different reasons of water scarcity (CEO Water Mandate 2009: 24-28):

1. Aridity, a permanent shortage of water causes by a dry climate,
2. Drought, an irregular phenomenon occurring in exceptionally dry years,
3. Desiccation, a drying-up of the landscape, particularly the soil resulting from activities such as deforestation and over grazing, and
4. Water stress, due to increasing numbers of people relying in fixed levels of Runoff (CEO Water Mandate 2009: 32-34).

   Though, Malin's categorization of water scarcity has included all the factors, but many still believe that he has disregarded. The most important factor in contemporary world of water scarcity is water pollution which has to add to in his categorization of water scarcity. And therefore, in addition to these four types, the following point will be value addition to the categorization of water scarcity.

5. A more common problem in contemporary world is contamination. This problem is growing rapidly due to industrial and agriculture wastes, pesticides and animal manure and the leaching of solid waste which is directly goes into the rivers and streams (CEO Water Mandate 2009: 38). Out of these five reasons, the first two

reasons connected to the climate and the rest three reasons connected to human activities. This third chapter highlights the last three factors whereby it would present the forthcoming water crisis in China vis-a-vis quest for water from rivers and lakes. Along with this, it also deals with legalistic approach to improve the water quality of various water bodies.

China's environmental programme was formally introduced in 1973 at a national conference on environment that was endorsed by Chairman Mao Zedong. However, the policy guidelines that emerged from the conference were non- binding in nature, "urged rational distribution and overall planning in industry and agriculture; comprehensive utilization of raw and processed materials, along with recycling; and reliance on the population to abide by laws and regulations and to take the primary responsibility for environmental protection (Carlson 2012: 07-10).

Premier Zhou Enlai was the driving force behind the conference and China's decision to formally pursue environmental protection as a national policy. China's environmental program has two main components: ecology and protection. Environmental ecology starts from the premise that national survival requires knowing how to sustain biological productivity, and that protection and conservation of forest, water, air, marine, and other ecosystems are essential to this (Carlson 2012: 12-14).

In the process of establishing and improving the environmental statutory framework China “attaches equal importance to environmental law enforcement and environmental legislation” (Arpi 2010: 09).

The Organizational Set-up

China has executed an environmental administration system, whereby governments at all levels are responsible for the environmental quality of the areas within their jurisdiction. The competent administrative departments have the power of overall supervision and management. For past 25 years, a range of institutions have been created to promote the environmental protection. Indeed, many of these bodies are incorporated by the provisions of Articles 9 and 16 of the 1989 Environmental Protection Law. Thereby it forces local people's governments to establish environmental standards to maintain the quality of the environment in areas under their jurisdiction, and to take measures to improve the quality of the local

environment. Interestingly, most environmental disputes are resolved by extra-judicial processes (Political and Social Report 2013: 17-20).

The most vital organ of institutional structure is the NPC's State Commission on Environmental and Natural Resources Protection *(Quanguorenda huanjing yu ziyuan baohu weiyuanhui)* established in 1993. The responsibility of this body includes "to deals with general policy matters in the area of protection of the environment and natural resources" (Pakistan Horizon 1959: 11). It also assists the NPC's Standing Committee in its supervision of other environmental agencies. The main purpose of the Commission on Environmental and Natural Resources Protection is to give inputs in the "drafting of regulations and guidelines on issues of environmental welfare" (Political and Social Report 2013; 22).

Second, State Council Committee for Environmental Protection *Growuyuan huanjing baohu weiyuanhuz* is the Secretariat for the Commission "drafting legislation, producing plans for and reports on environmental protection" (Pakistan Horizon 1959: 14). State Council also investigates into serious incidents of pollution, handling conflicts over environmental problems between provinces. Interestingly, Council decipher the problems of provinces through mediations. Council also works among masses to promote awareness of environmental security.

Established in 1988 as the National Environmental Protection Agency, the State Environmental Protection Administration (here after SEPA) comes third in this institutional hierarchy but many important jobs have been assigned. The agency functions under the direct leadership of the State Council. SEPA is responsible for "unified creation and management of the system, the prevention and control of pollution, enhancing environmental welfare and promoting sustainable development" (Choudhury 2012: 17).

Moreover, many other specific functions including "the development of State policies and laws on environmental protection, assisting subordinate departments in the formulation of administrative regulations, setting of environmental standards, assisting in dealing with such problems as international and trans-provincial boundary pollution, and co-ordination of the PRC's responses to the United Nations Environment Programme and other international environmental developments" makes SEPA more influential environmental organization in China (Economic

Times 2012: 42). At present time, there are nationwide more than 2,500 environmental protection administration departments above the county level. The total strength of the staff who are working in these administrations departments are 88,000 who are engaged in different sections of works like environmental administration, monitoring, inspection and control statistics collection, scientific research, publicity and education (Economic Times 2012: 45).

There are many drawbacks associated with SEPA, which has limited the broader influence of its and other organization related with environmental protection. One of them is, its bureaucratic challenge compounded by the low level of funding accorded with environmental protection. The budget for environment protection has been increased from 0.9 percent of gross domestic product (GDP) during ninth five year plan, 1996-2000 to 1.3 percent of GDP in the tenth five year plan, 2001-2005 (China Daily, 29 May 2001). Moreover, the rises of other environmental organizations have impinged the SEPA's mandate (Economy 2007: 107).

China has parallel organization, like local Environmental Protection Bureaus (EPBs), at the level of the provincial government. The main tasks of these EPBs are "the implementation of policies and laws specified by SEP A and supervision of the work of the local Environmental Monitoring Stations" (Economy 2004:108). On environmental assessment the EPBs also gather data on pollution and provide reports on those bases. The knowledge of local environmental circumstances make EPBs more specialised and become more important in their administrative mediation and dispute resolution functions.

Unfortunately, EPBs depend on SEPAs and local government literally for all “supports, including their budgets, career advancement, number of personal, and resources such as cars, office buildings and employee housing” (Jha 2011: 17). In addition, government policies of economic growth and local pressures to ignore environmental standards leave EPBs handicapped in their mission.

This presents a very public-sector orientated approach of environmental security in China. The reason is, China still “characterize the environmental as an internal matter” (Jha 2011: 36). Thus, there are few NGOs or pressure groups in the environmental field. The establishment of the first environmental NGO Friends of Nature in 1994, China opened the political space for popular participation in

environment protection, permitted the establishment of NGOs, encouraged the media investigations and supported grassroots efforts (Economy 2004:129). The legal provision, moreover, of the China does not “favour the promotion of environmental standards protection by the international non-governmental organization (NGOs) and other pressure groups such as Greenpeace, and Friends of the Earth” (Economy 2004: 129). Ironically, the Chinese government has also taken NGOs jobs in their hand by creating its own NGOs referred as government-organised non-governmental organisations (GONGOs). Interestingly, SEPA has three GONGOs: the China Environment Science Association, the China Environment protections Industry Association and the China Environment Fund serving merely as a 'retired home' for former government officials and staff (Economy 2004: 135).

Legislative Set-up

The principal sources of the body of environmental and water law are the Constitution, the basic laws, water laws, international environmental treaties. These laws have been approved by the NPC, State Council Regulations. These regulations promulgated and imposed by bodies subordinate to the State Council, local laws and interpretations of law. There are several provisions in the 1982 constitution that is apparently attached to environmental protection and natural resources. It defined the objectives of the State that “the State ensures the rational use of natural resources” (Article 9) and bind the citizen in duty to preserve it. In addition, it asks the State to "protects and improves the living environment and the ecological environment" (Article 26). Apart from these Constitutional provisions, there are other two laws of fundamental importance which have significance to environmental security (Curry 2013: 41).

The Environmental Protection Law 1989 was one of the major law codes promulgated by the NPC and its Standing Committee on environmental protection. The 1989 Law gave special attention to environmental protection and stipulates the very creation of law for "the purpose of protecting and improving people's environment and the ecological environment". There are other significant features which require the rights and obligations of the State and, in particular, enterprises and institutions with regard to environmental protection. The law asks the State to treat the environment as valuable entity, thus assigned the State to co-ordinate the work of environmental protection with economic construction and social development and

requires the incorporation of the State environmental protection plans into national economic and social plans. Moreover, the laws not only restrict its obligation to the State but also stipulates that it is a duty of all units and individuals to protect the environment and conferring a right on citizens to report on or file charges against those who pollute or· otherwise damage the environment (Article 6). It assigned State Council or SEPA to supervise and manage environmental protection work throughout the country (Curry 2013: 43).

China has so far two laws on water security: "Law of the People's Republic of China on the Prevention and Control of Water Pollution" formulated in 1984 and "Water Law of the People's Republic of China" adopted at the 29th Meeting of the Standing Committee of the Ninth National People's Congress of the China on August 29, 2002. The water law of 1984 is mainly dealing with prevention and control of water pollution. Like, the law on environmental protection, this law has also assigned task of protecting water pollution to various administrative agencies. The very first article cleared the objectives of this law which says, "to preventing and controlling water pollution, protecting and improving the environment, safeguarding human health, ensuring the effective use of water resources and facilitating the development of socialist modernization" (Article 1, See Appendix). Further, it very explicitly deals with the prevention and control of pollution of various water bodies within the territory of PRC (Curry 2013: 46). Even the law incorporates all the competent departments to include the provision of protection of water environment into their plans and adopt ways and measures to prevent and control water pollution. In other words, the law gives enough independence to all competent authorities to deal with water pollution according to their local demands. It does not necessarily mean that there is any absence of control and hierarchy over them. As I have explained in the preceding section, there is vertical hierarchy over the departments. It is thus clear now that Chinese government is determined to improve the water quality of various water bodies and for that they have given some autonomy to local authorities. There are many supervisory organs, nevertheless, established to watch and manage the prevention and control of water pollution (Clue 2012: 77).

According to the law which states that construction of any fresh projects, extensions, or reconstruction projects which directly or indirectly release wastes into water

bodies shall be subject to the State provisions. The main concern of these projects is to protection of environment (Article 13, See Appendix).

For the first time, China accepts the "sustainable utilization of water resources, and meeting the need of national economic and social development" in the water law of 2002. It termed water resources as owned by the State and approve the· collective use of water resources. According to the Article 6 which states that the State should encourage units and individuals to expand and utilize water resources but in accordance with mentioned law and protects their legitimate rights and interests. Throughout the country State Council, though is accountable for unified management of and supervision over water resources (See Appendix).

The law also stipulates that an institution for river basin management will be set up by the administrative department for water resources. Under the State Council for the key rivers and lakes defined by the State and it will perform the duties of water resources management and supervision, within the limits of their jurisdiction, specified by laws and administrative regulations and assigned to them by the said department. The separation between rivers and other water bodies indicates that China has given special attention towards rivers (See Appendix).

Article 16 deals with the planning for water resources and suggests a comprehensive strategy for water planning on the basis of river basins and regions. Interestingly, before a plan is formulated, the law recommends appropriate authority to have "comprehensive scientific survey, investigation and assessment of water resource" (Article 16, See Appendix).

The more important clause in this law is in chapter 4 which authorises the administrative departments for water-resources. Under the people's governments at or above the county level, it is the responsibility to the river basin authorities and the other departments to pay attention to maintaining a proper flow of rivers and keeping the lakes, reservoirs and groundwater at a proper water level in order to preserve the natural purification capability of the water body. Apart from these provisions, there are many articles which are dealing with various ways of controlling water pollution in any form. As fact of the matter, the law also provides legal framework for solving disputes among various provinces and between provinces and centre. It constitutes consultations mechanism through which different

institutions can resolve their water disputes. Indeed, the most striking feature of this law is that it overrides the international law over Chinese law whereby if any provisions of international laws or treaty "differing from those in the laws of the People's Republic of China, the provisions of the international treaty or agreement shall apply, unless the provisions are ones on which the People's Republic of China has declared reservation" (Article 78, See Appendix).

There are other laws as well which is related to environmental and water security of China. These are the "Water Pollution Prevention and Control Law" of 1984 (revised, 1996), the 1995 "Law on the Prevention and Control of Environmental Pollution by Solid Wastes"; the 1987 "Law on the Prevention and Control of Atmospheric Pollution" (amended in 1995 by the decision of the Standing Committee of the National People's Congress on revising the "Law of the People's Republic on the Prevention and Control of atmospheric Pollution)" the 1997 Law on Control and Treatment of Noise Pollution" (in force **1** March 1997, replacing the 1989 "Regulations on Noise Pollution" and the 1982 "Marine Environmental Protection Pollution Law" (See Appendix).

China's Water Policy and Response from International Community

The development of the law of international watercourses, in particular through the conclusion of numerous treaties over the past two to three centuries, has no doubt helped to forestall disputes over shared freshwater resources and strengthen cooperation between riparian States. In view of growing scarcity of freshwater per capita and as well the expanding threats to water quality and the integrity of fresh water ecosystem, it is not likely that disputes over freshwater resources will actually increase in the future. (Mathou 2005: 503-504).

The law of international watercourses has developed in tandem with the evolution of human social organization and the intensification of use by human societies of freshwater. Water, indeed is not only essential to human life but also fuels industry and facilities commerce. These factors have naturally led human to congregate near sources of fresh water since beginning of human life. Great ancient civilizations have always been flourished on the banks of rivers. Moreover, these old societies flourished not only in the old world river basins of the Nile, Indus, Huang Ho(Yellow), Yangtze and Tigris- Euphrates, but also in the New World regions of

Mexico and coastal Peru (Mathou 2005: 505-509). Nonetheless, evidences like early canals and dikes suggest that small communities had found it necessary to cooperate in order to control and utilize effectively the waters of major rivers (Mathou 2005: 510).

The critical issue in international law surrounding water concerns is what proportion of water of a trans-boundary river can be rightfully used by a state. One indeed, has to formulate his/her idea on the basis of four theories of international law of the water courses, to answer the above question which have been in practice for a long time. Ironically, the four theories under discussion have different understanding of international water courses.

Territoriality

The principle of territoriality basically gives enormous right to upper riparian State whereby most of the water of the river is that of 'absolute territorial sovereignty'. It moreover authorises State to 'do what it wishes with any water within its boundaries' (Roy 1997: 122). It ironically, also claims that ‘the State using the water does not have any legal responsibility for any harm caused to a downstream State as a result of the use of the waters’ (Roy 1997: 121). This doctrine is also famously known as Harmon Doctrine. He was the Attorney General of the United States of America. This ruling was given when he was dealing with the question of international legal responsibility for the damage caused to Mexican farmers as a result of irrigation diversions of water from the Rio Grande in the USA (Roy 1997: 122). He Stated that “the fundamental principle of international law is the absolute sovereignty of every nation, as against all others, within its own territory' and 'the rules, principles and precedents of international law impose no liability or obligation upon the United States” (Mathuo 2005: 520). He finally, concluded that 'right asserted by Mexico show that its recognition is entirely inconsistent with the sovereignty of the United States over its national domain.

However, Salman in his article stipulates that this opinion and the principle it involved were criticized and discredited, for obvious reasons, by subsequent decisions of international tribunals and writings of experts in this field. Unlike, the Harmon Doctrine, the basic principles of international law prohibit riparian States

from causing harm to other States, and Salman call for cooperation and peaceful resolution of disputes (Salman 2011: 169).

Territorial Integration

In opposition to the Harmon doctrine is the concept that the downstream State has a right to an uninterrupted river discharge from the upstream State. This theory, which is known as 'absolute territorial integrity', claims that an upstream State is not to develop the waters of a trans-boundary river if it will cause harm to the downstream State. Moreover, it assigned duties on the upstream States not to restrict such natural flow of waters to the lower riparians states and ironically, did not ask any reciprocal action from the downstream States. In other words, this principle imposes a limitation on upstream State vis-a-vis use of water (Schneider 2008: 12).

Limited Territorial Sovereignty

Unlike above said principle, it asserts that every riparian State has a right to use the waters of the international river. Here, 'equality of rights' defined by Lipper that in the context of international watercourses that all States riparian to an international waterway stand on a par with each other in so far as their right to utilization of water is concerned (Ranjan 2010: 08) Nevertheless, under a clause that it will not harm other riparians. In other words, this principle suggest that the equality of all riparians in the uses of the waters of the international river.

Communitarian Perspective

“Thus a river, viewed as a stream, is the property of the people through whose territory it flows or of the ruler under whose sway that people is the same river, viewed as running water, has remained common property, so that any one may drink or draw water from it” (Ranjan 2010: 10).

Under this principle, the basin of the entire river is taken as an economic unit or we say ‘the community of co-riparian States’ in the waters of an international river. This suggests a mechanism of collective body of riparian States which have rights over the waters of the entire river. Further, it also provides a solution to sharing of water among riparian States either by agreement or on the basis of proportionality. Watercourse, as well as the duty not to cause significant harm to other riparians (Political and Social Report 2013: 44).

International Legal Structure

The development of international environmental law is associated with the Stockholm Conference on the Environment in 1972. The key Statement of this conference was Principle 21, which is now become the basis for many international environmental law conventions. This principle was, further incorporated in the 1992 Rio Declaration as Principle 21 In addition, two words 'and developmental' and 'to their own environmental and developmental policies, were added in 1992 Declaration. (Central Tibetan Administration 2003: 15). The development of international environmental law fascinatingly is parallel to the rise of environmental awareness in the early 1970s throughout the developed world, especially in USA and Western Europe. In fact, international environmental law since then has been dominating politics in this globalized world where all States are involved in exploiting natural resources.

Today's, environmental concern sheltered by environmental law include ozone layer depletion and global warming, freshwater scarcity, groundwater depletion, protection of wetlands, desertification, deforestation, water, soil air pollution, and an array of specific issues related to environmental degradation and resource depletion. Environmental law is also cutting across other new areas of international law, such as commercial/ business law, trade, development and human rights (Finner 2013: 12).

For developing countries, water scarcity and management is one of the key issues, not only as part of the environmental protection related to resource depletion, but also because water is a major development issue. Ironically, freshwater scarcity and management is one of the most difficult challenges facing international law. Resultantly, the most difficult task these States are facing is with respect to solving freshwater scarcity in an equitable manner. It not only “contradicts with the vital principles of international law, such as *I* absolute State sovereignty' over natural resources” (Elhance 2000: 44) but also the geo presence of water resources makes the situation even worse. Most rivers of Asia are trans-boundary in nature. The four principles of international water law simply do not provide an easy answer about how to share fresh water resources among riparian States in an equitable manner (Elhance 2000: 51). Principle 21 and Principle 2, nonetheless recognize the joint concepts of the right to use resources within a country and at the same time a duty not to cause harm to other States. This view of international environmental law has now been

accepted as a fundamental principle in discussions on international water law. (Barrionuevo 2011: 11).

With increasing water scarcity on the one hand, and economic competitiveness on the other, the management of shared resources between two or more sovereign States became one of the most contested issues in international law. In order to achieve economic development, states are involved in the construction of big development projects. Ironically, they are doing this without any concern for environmental consequences or of damaging neighbouring countries' environment as well. Due to priorities of economic growth 'large water projects such as dams, irrigation canals, and hydroelectric power stations' were built without giving adequate concern to environment degradation. Thus, the benefits of these uses have affected the environment adversely. It leads to 'modifications of historic flow cycles, deplete resources over time, degrade estuarine systems and increased flood damage. Among shared resources, fresh water is particularly valuable as it constitutes a vital source of life, and its purity and availability have always figured prominently in national water policies. Blalke (2004) argues that to protect their sovereignty and independence and safeguard their liberation after the long ordeal of colonial exploitation' newly independent States were insistent upon controlling and developing their own natural resources, and doing this almost to avoid foreign intervention. This type of nationalistic attitudes blocked any possibility of joint management over shared resources. In addition, uneven distribution of wealth and water resources and political instability among neighbouring States, water has inevitably become a crucial focus of concern in international politics (Blalkle 2004: 22).

Existing International Water law

Article 4 of Helsinki Rule entitled that each Basin State within its territory to 'a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin'. In doing this, all relevant factors in each particular case will be taken in account like economic and social needs of each basin State, and population dependent on the waters of the basin in each basin State etc. Moreover, without causing substantial injury to a co-basin State, the needs of one State could be satisfied. In doing so, use or category of uses is not entitled to any inherent preference over any other use or category of uses (Article 6, See Appendix).

Article 7 restrict any possibility of future reserve of such water and denying the present reasonable use of the waters of an international drainage basin. In other words, no riparian State could reserve the water keeping in mind future uses and deny the rights of other riparian present demands (See Appendix).

The United Nations Convention on the Law of the Non-Navigational Use of International Watercourses declares that every Watercourse State is entitled to participate in the negotiation of, and to become a party to any watercourse agreement that applies to the entire international watercourse, as well as to participate in any relevant consultations (Article 4, See Appendix). Article 8 asserts that Water course States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse. In determining the manner of such cooperation, watercourse States may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate cooperation on relevant measures and procedures in the light of experience gained through cooperation in existing joint mechanisms and commissions in various regions (United Nation Environment Program 2006: 23).

It further asks the Watercourse State under Article 5 that in their respective territories utilize an international watercourse in an equitable and reasonable manner. The most important of these measures are article 9 where it demands the watercourse States to exchange readily available data and information on regular basis including hydrological, meteorological, hydro-geological and ecological nature and related to the water quality as well as related forecasts. Indeed, it also assigned the duty to a State that if a watercourse State is requested by another watercourse State 'to provide data or information that is not readily available, it shall employ its best efforts to comply with the request however it also put condition that ‘compliance upon payment by the requesting State of the reasonable costs of collecting and, where appropriate, processing such data or information’ (See Appendix).

However nothing in this clause obliges a State 'to provide data or information vital to its national defence or security' (Article 31). Interestingly, further it broadens the horizon and asks the State if the data that were demanded data were demanded in 'good faith' then State shall cooperate with the other watercourse States ‘with a view

to providing as much information as possible under the circumstances' (See Appendix).

As fact of matter, the convention directs parties to settle their dispute by 'peaceful means'. If they cannot 'reach agreement by negotiation requested by one of them, they may jointly seek the good offices of, or request mediation or conciliation by, a third party, or make use, as appropriate, of any joint watercourse institutions that may have been established by them' (Article 31, See Appendix).

International Water Law and China

An ADB fact finding mission to China found that there are many problems with the 1984 Water pollution Prevention and Control Law and its implementation. They asked the PRC to revise the existing law keeping in mind the stage of economic development, its transition to a market based economy and its evolving legal institutional structure (ADB 2011: 10).

The fact finding officials also indentified that wastewater point sources discharges to surface water bodies have amounted to about 100 million tons per day. Out of this, approximately 30 percent is discharged by municipalities, also includes industrial wastes as well as sewage, 10 percent by TVEs (Township and Village Enterprises) and rest by industrial enterprises. The report says that about of Chinese· rivers are seriously polluted, especially those in or near urban areas. The pollution includes heavy metals, mercury and etc dangerous to health. It also, takes a dip in lakes and finds that a substantial number of lakes are suffering from serious eutrophication (Anand 2009: 32).

Apart from these, ADB mission also encounters many difficulties with 1984 Water Pollution Prevention and Control Law. A number of these issues were particularly related with the implementation and enforcement of the law. The main problem with the 1984 Water Law is its 'fragmented authority as described by ADB fact finding mission. The division of competent water authority indeed is a general problem in the environmental protection efforts in PRC especially in the case of water pollution control (ADB 2011: 22). Ironically, the horizontal and vertical hierarchy exists among the authority but instead of coordinating the process it delays the processes. It also leads to the repetition of works.

The 1984 water law has limitation on of its own and does not deal with international river basins. But it also failed to manage or control the pollution of river that crosses local political boundaries. The conflict between upstream and downstream of river within the territory of PRC is serious in nature (ADB 2011:24).

There are many loopholes in adopting the water law. As for example, the discharge standards are not binding for some industries and pollutants. Therefore, it limited the effectiveness of discharge standards. ADB reports described that discharge standards are based on concentrations of pollution in discharges rather than the absolute quantity discharged. In other words, the discharge standards would not have effect on industries which are situated in far and remote areas. The same drawback is associated with the discharge fees. The fees is levied in relation to concentration and are the same whether or not there is a source in compliance with applicable discharge standards (ADB 2011: 28). ADB found that fees are too low and even in some cases enterprises do not pay fees or do not pay in full or on time.

Apart from these, the major drawback of this law is that it has failed to attract public attention and this is very explicitly defined in the Agenda 21 of PRC. Thereby it says that the effective support for and enforcement of environmental laws depend on enhanced public information and participation (ADB 2011:30).

It thus, becomes very clear that Water Law 1984 though, provides enough legislative mechanisms to counter the water pollution and enhance the quality of water. The lack of ground support and mismanagement at local level creates hindrance for the smooth functioning of the law. In· addition, the theoretical and loopholes in law itself also made the law practically not feasible.

In the past, China was not very supportive and was not a follower of international water law vis-a-vis river water. The reason behind this was that before 1978 Economic reform, China was an inward looking country, whereby, more focus was given to domestic development rather than international status. China was in need of river water (and is still in need) to run their industrial developments as well achieve agriculture self-sufficiency. In doing so, however, China has harnessed the river water to a dangerous extent which is now creating environmental as well water crisis. But this is not a valid reason in international law that one can use the common resources without concerning the interest of

other and exploiting the resources to a greater extent so that next generation would have nothing. Since Rio de Janeiro, 1992 the concept of sustainable development is prevailing in international environment politics. All the states of world are have taken the concept seriously and successfully incorporated in their domestic politics (Al- Rodhan 2007: 45).

China has joined hand with foreign countries to improve her environment "through not only technologies but also norms" (Economy 2012a: 17). China is receiving largest amount of environmental aid from World Bank and other funding institutions and foreign countries. In this respect, China is very beautifully playing her diplomacy in East Asia and co-operating with East Asian Countries. More interestingly, Japan is giving aid to China to develop environmental-friendly industry as well in several other projects vis-a-vis environment. China is receiving more financial aid under environment projects. As a matter of fact, both Japan and China are co-operating with each other to counter these problems. This has been proved when both countries established the Sino-Japan Friendship Center for Environmental Protection for effective and comprehensive exchanges and cooperation between Japan and China in the field of the environment. Japan's ODA(Official Development Assistance) is giving aid to China in the field of environment. The amount of environment-related Yen loans for China has been increased some 50-fold between Five Year 1995 and Five Year 1999 from ¥2,552 million in 1995 to ¥124,989 million in 1999 (Congressional Research Library of Congress 2008: 21).

China is also participating in various conferences on environment organized by United Nations. China is an active member of United Nation Environment Programme (UNEP) and incorporating rules and regulation adopted by UN in her domestic law. China announced her decision to ratify the Kyoto Protocol to address the challenges of global climate change (Economy 2007: 33) and ratified the protocol in 2005. In April 1992, China set up the China Council for International Cooperation on Environment and Development, in order to promote further international cooperation in the environment and development field.

In addition, China's entry into World Trade Organization (WTO) is also influencing patterns of its production, particularly agriculture. Ironically, already Chinese export to WTO member countries has shown sharp drop due to insufficiency in green

product. Therefore, China has to domestically have sound environmental policies to compete in trade with WTO countries (Economy 2007: 39).

To be regarded as a responsible actor in world politics, China is determined to develop coordination on environment in general and water in particular in her neighbourhood. On water related issues, whether it be water pollution or sharing river water, China is steeping forward to cooperate with lower riparian countries. The strategies of China's cooperation have been dealt in fourth chapter.

Though, China has a bad reputation in following international watercourses law and do not accept international principle of watercourses. The recent trend shows that China is not only sharing hydrological data with lower riparian countries but also paying attention on the genuine concerns of lower riparian countries. Chinese Ministry of Water Resources officials said that in order to provide more and better international cooperation hydrological information services to strengthen international river hydrological monitoring plan officially entered the implementation stage (Xinhua Report 2013: 55).

China is not behaving arbitrarily in the regions; particularly on trans-boundary River and accommodating the concerns of lower riparian in her water policy. Moreover, China is accepting rights of lower riparian countries on the shared rivers, though not as absolute territorial integrity of lower riparian. Chinese practices on trans-boundary Rivers illustrate that China was tracking absolute territorial sovereignty principle. But in this globalised world and in the domain of regional politics it has become necessary for China to .shift towards 'limited territorial sovereignty' to sustain in world politics and serve her economic and political interests better than behaving arbitrarily (Yinghong 2010: 862).

China’s Water Policies, Development Plans and its Impact on Tibet People

The problems that have manifested in China include extensive water and air pollution, deforestation and desertification. The ineffectiveness of the legal-regulatory regime for environmental protection reflects to a significant extent, the relatively late start in adopting legal measures for environmental security. It was only in 1950s, after the development of socialist legal system, and inspiration came from the Soviet Union. Mao Zedong was very much concerned about the degrading environment. He formulated his ideas on the Classical Marxism thought “relationship between

safeguarding the environment and economic development". His policy was for the promotion of afforestation and other aspects of "green agriculture" and he believed that collectivization could help to conquer environmental problems in the country side (UNDP 2006: 22). The subsequent natural disasters and famine conditions were "interpreted in terms of the vagaries of the climate and the errors of lower-level cadres, rather than as reflecting the central leadership's insufficient attention to environmental welfare concern" (UNDP 2006: 51). The inclusion of the concept of environmental protection in the 1978 Constitution accelerated the safeguarding mechanism for environmental welfare. This constitutional commitment was reaffirmed and expanded in the 1982 Constitution and proclaims that "the State protects and improves the environment in which people live and the ecological environment. It prevents and controls pollution and other public hazards. The State organizes and encourages afforestation and the protection of forests" (Article 26). Further, it also declares that State ensures the "rational use of natural resources and protects rare animals and plants. Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited" (Article 9, See Appendix). China, however, was reluctant to accept the important concept of "sustainable development" till 1992 Rio Earth Summit that had emerged in international environmental politics in the 1980s. Ironically, considering itself as part of the developing world, PRC gave explicit priority to "economic development" for many years. The inspiration drawn from the idea "first solves basic problems of over-population and poverty before adopting a more environmentally sensitive approach" (UNDP 2006: 28).

China's water polices under 12th Five Year Plan (2011-15) is to reduce water pollution through targets, quotas and caps, meetings industrial and urban water requirements in dry region through the South-North Water Diversion Project/Policy (SNWDP) and saving water through increasing water tariffs and looking abroad for water intensive-resources. Zhang Boting, Deputy Secretary General of the China Society for Hydropower Engineering, told reporters that the 12th Five Year Plan called for hydropower development to be prioritized. For various reasons, two thirds of the hydropower projects detailed in the 11th Five Year Plan had not been completed and would be revived in the 12th Five Year Plan (National Statistic Bureau 2009: 19). For their requirements and to deal with above problems China is working on three major

water policies and these are: (1) Trans-boundary River Policy, (2) Chinese Dam Policy and (3) South-North Water Diversion Project/Policy (SNWDP).

There are three major water projects being undertaken in Tibet. The Yangtze Diversion Project will become the world's longest and largest water transfer project, which will meet the growing scarcity of water in China's northern cities. The main idea was to divert abundant water of Yangtze to Yellow and Hai River, a tributary of Yangtze. This Project also known as South-North Water Diversion Project (SNWDP) which consists of building three lines of diversion, namely the eastern, central and the big western line from southern to northern China (BBC 2012: 19). This project is essential to developing the fastest growing cities in the northern and western regions of China which are rapidly running out of water. The project was proposed in 1952 and the construction began in 2002. It is expected to be over by 2020. It aims to pump almost 45 billion cubic metres of water a year to the north, equivalent to the water flow in the Yellow River in northern China. The water will be pumped from the Yangtze river and its basin (Asian Development Bank 2013: 69).

China has planned another big project on Great Bend of Yarlung Tsangpo. The Yarlung River flowing eastwards is known in Tibet as Yarlung Tsangpo and Brahmaputra in India. The total course of this river actually extends to more than 1800 miles. Yarlung Zangbo's total drainage area is 622,000 sq. km, of which 330,000 sq. km is in China. China has proposed to build 13 cascade power stations with a total installed capacity of 46.336 million KW accounting for annual power output of 276.411 billion kWh, of which the potential installed capacity of the downstream section is more than 4100 million kW, accounting for 89.6 percent of the installed capacity of the main stream. As far as the development of cascade power stations is concerned, China has proposed two plans (Asian Development Bank 2013: 70)-

1. Plan A is to build Gangke (270,000 kW), Gu Lu (17,000 kW), Qinding (150,000), Bosha (130,000 kW), Peng Coulin (300,000kW), Jiangdang (50,000 kW), Suolang Gatu (500,000kW), Qushui (96,000kW), Jiacha (1.65 million kW), Langxian (1.2 million kW), Rixue (420,000 kW), Motuo (38 million kW), Jie Riguo in the down stream (3.5 million kW) etc. power station above Motuo (Central Tibetan Administration 2003: 34).

2. Plan B is to, instead of Motuo, build a large dam at Daduka, straighten the river bends,excavate a number of large-diameter tunnels, single-hole single-tunnel would be around 41 km in length. The power station head reaches 2,400 m, and the installed capacity is around 43.8 million kW. However, the technical difficulty is too great. There are 134 tributaries on Yarlung Zangbo that has the hydro potential more than 10,000 kW, and there are 9 tributaries that have the capacity of more than 25,000 kW. China has proposed to build 21 medium size hydro stations on these tributaries that would have an installed capacity of 1.637 million kW with annual power output of 347 million kWh (OECD 2015: 49).

Since Yarlung Zangbo is located in the Tibetan plateau, therefore, due to high altitude, thin air, poor project conditions, transporatation difficulties,, complex engineering and geoplogical conditions, engineering marvels are required. As such, very little survey and design work has done. At present, most of the river basin is a almost undevloped expect a few small size power plants and irrigation projects in some of its tributaries. China shares six river systems which originate from the Tibetan plateau in China with nine of its neighbours, which gives China an advantage in utilising them. Through all these projects and dam constructions plans, China uses Tibet water resources for their purpose and benefits and diverts its water according to their needs and development strategy.

Till present, all the major rivers and their tributaries that flow from Tibet are dammed and this dam building frenzy in the western Tibet is creating huge discussions and doubts whether these projects could act as a stepping stone in expanding its ambitious water transfer projects beyond its initial plan. The current expansion of railway network connecting Beijing and the rest of Tibet paves the way for logistical support and transportation of damming inventories, if required in due time. 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 (Zhuanti 2005: 39). By just overlaying the UN seismic hazard zone map and the locations of these dams on the western rivers of Tibet clearly sends an inevitable signal that those living in the shadow of these dams are at the mercy of nature. According to the report published by Probe International (Zhang 2011: 16), more than 90 percent of dams that are built, under construction or proposed for the

rivers that flow from Tibet, are located in zones of very high or moderate seismic hazards.

Concluding Remarks

The deepening environment crisis has led China to transform her environmental policy. Water is essential for security now and has been incorporated in Chinese law through several means such as institutional and legislative arrangements have been adopted to improve environment and water. Unfortunately, the development issue still prevails in environmental security and thus by passing environment rules and regulation, China's drive for development is continuing. Being members of many environment organizations, China has no choice and indeed, for her own good to take environment security as first priority.

The changing nature of world politics, to a large extent, is influencing Chinese policy in the regions. Thus, any endeavour to secure water from trans-boundary rivers under 'absolute territorial sovereignty' impinge on the Chinese interest in the region. Having said this, the new guidelines of sharing water accepted by all other riparian countries will be outcome.

The drive for rapid economic growth since 1949 and then strained by economic reforms of 1978, skyrocketed the demand for water in agricultural, industrial and even consumption by the people of China. Years of drought, desertification, soil erosion and water pollution have further deepened the water crisis. Water pollution has become China's most pressing environmental issue. A World Health Organization survey found that 80 percent of human illnesses are related to water pollution. Every year over 25 million children die due to polluted drinking water-more than are made refugees by war. Environmental security, as a new aspect of national security, has been attracting increasing international attention. It means ensuring that the environment is free from threats to the basic necessities for human survival and growth (Yangchen 2006: 29). Overall, water scarcity and pollution will harm the Chinese economy by desiccating or polluting cropland, forcing investment into large river diversion projects and clean up efforts which impact the Tibetan People and lower riparian countries. In addition, the inland migration driven by water scarcity and pollution will contribute to growing tensions in both rural and urban areas of China. It will also engage China into an international conflict with her neighbouring countries on the issue of river water and migration attracted by water scarcity and pollution.

Chapter: IV

Chinese water projects in Tibet

China is one such country which is endowed with many rivers, although most of them flow from South to North this is one of the main reasons that it has decided to build many hydropower dams on the rivers originating from the Tibetan plateau. Now here lies the problem that is, most of them feed many of the SAARC countries like India, Nepal and Bangladesh in the Southeast Asia. This would ultimately deprive the people of those countries. After all they are located near or on the river paths downstream of a regular flow of water and people of those countries use water regularly in many ways for example, agricultural and economic uses. As a result, there would arise serious implications or consequences for the downstream areas and their populations by the fall in water table, life changing effects on lifestyle of people, effect on the whole ecosystem, the regional ecological balance and environment. These long lasting implications and effects will not be limited to just the local regional flora and fauna but its deep effect would resonate in the slow but gradual and everlasting changes for generations to come. The surprise here would be that the purpose of all these dams is not to provide electricity to rural Tibet, but to supply it to the smelters, heavy industries and distant cities of the plains below (Sinha 2011: 425-427).

China may soon start building dams over all of Tibet's major rivers in a single water capture scheme, on a scale that would dwarf the three Gorges project, in an audacious attempt to divert water to the North China Plain via the Machu (Yellow River). This would seriously decrease the water supplies of India, Bangladesh, Vietnam, Cambodia, Thailand, Laos and Burma, as well as the Yangtze river basin as far as Shanghai, especially in drought years. Meanwhile, as an irony in this whole plan is that the rural Tibetans continue to suffer high rates of hepatitis, water-borne infections and back pain because they are forced to fetch water from far down the valley due to inadequate village water supplies, even though fulfilling this requirement would cost only a tiny fraction of the amount spent on these massive dams. In this back drop, this chapter would discuss the water construction projects like dams, water diversion projects and other mega-hydro projects in Tibet. This chapter would also deal with the

interest of China behind these water projects and how these projects have impacted upon the Tibet resources (Sinha 2012: 15-25).

Asia's ten largest rivers by volume including the Yangtze, Mekong, Brahmaputra (which becomes part of the Ganges), and Indus originate from the Tibetan Plateau or from the Himalayas and serve 47 percent of the world's total population collectively. Inadequate or unreliable water supplies will not only serious and constantly worsening problems in all of the countries along these rivers, but also lead to energy shortages. These issues threaten the domestic stability throughout all the countries to varying degrees. Consequently the countries involved would start building dams to control the water flows as well as generate hydroelectric power. This would lead to even severe problems for the further areas downstream. Such projects would not only create significant environmental risks but also would increase international tension over water-sharing on trans-border rivers (Roy 1997: 122-123).

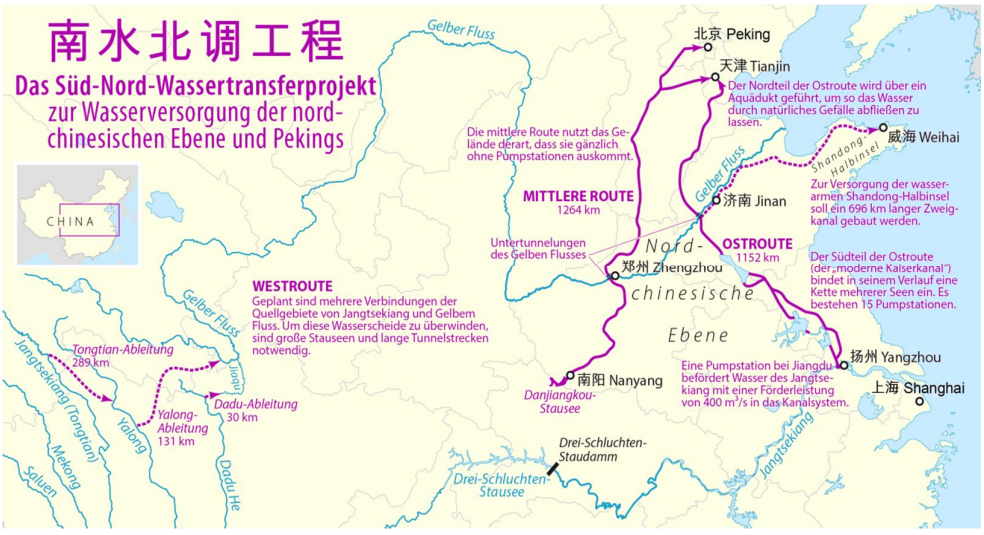
Moreover, nine of Asia's ten largest rivers begin in China, which has no water-sharing agreements with downstream countries; in some cases, the downstream countries also have no agreements with countries further downstream. The drying river, shrinking lakes and polluted water has already put China on the verge of a water crisis. The water crisis has not only threatened China's development drive but at same time it will become source of tension within China as quest for water between provinces have skyrocket. It has, thus, pushed China to secure the water for their development as well to free from any tension among provinces which will hinder the China's goal of development. China is an important player having serious effect in the international level both in terms of economy and special status, therefore, it is imperative that China's actions will have their potential political and non-political consequences (S.C.S. 1959: 237).

Water is an important commodity as there is no substitute for water and, as well as sustaining life, it is key to all aspects of the economy and agricultural production, making it a strategic resource (Ji 2011: 07). China is already running out of usable water, and has been working on trying to provide a solution for the same. So, now it will probably employ more proactive and far reaching policies to address these shortages. China has already taken several measures to provide undisturbed supply of water to industry, agriculture and drinking water. Unfortunately, these measures are not enough to support China's water demand. This has pushed China to take water

from South parts of the country and transfer it to the Northern parts of the country where it has greater demand. Even the sharing of hydrological data is quite spotty. The fact that China, as the upstream country, is increasingly capable of undertaking projects that would address its needs at the expense of its downstream neighbors makes the situation even more tense for rest of the world in general and the possibly to be affected region in particular. While China has promised to be mindful of other countries' interests, it continues to make decisions unilaterally and often secretly. More worrisome is the fact that Climate change, which is likely to reduce the water supply at the source all around the world would be affecting the water levels at source of many rivers specifically in the Himalayan mountain range. This reducing of the water levels at source of many Himalayan rivers in the Tibet region, will only magnify these disputes and probably make unfeasible any solution that guarantees specific amounts of water or parts of a joint river to specific countries. Nevertheless, the idea of transferring water from south China region to the north China region is new but it has originated from Mao's mind, *'borrow the surplus water from south to north'*, in 1950 (Qiu 2008: 394-397). This chapter would, briefly sketch the details and effects of the water construction projects like dams, water diversion projects and other mega-hydro projects in Tibet. This chapter would also deal with finding and putting forth the actual interest of China behind these water projects and how these projects impacted on Tibet resources.

China's Water Projects in Tibet

Map 2: The plan of South to North Water Transfer Project (SNWTP)



Source: China National Statistical Bureau (2002)

The plan of South to North Water Transfer Project (SNWTP), as it would be also vital to demonstrate the China's move toward to take water from Trans-boundary River. The chapter attempts to outline China's intention and effort made in the direction to take water from trans-boundary Rivers especially from Brahmaputra, Mekong and Salween. In so doing, China has taken the path of difference of opinion with all her neighbors for water, but it would turn out to be a suicidal attempt for China. It is more so relevant at present for China as it has just begun her career in international politics after a very long self imposed international isolation from the rest of world. China has been trying to avoid such situation since her establishment in 1949; this itself is also a one of the reasons of the self imposed isolation by China. Therefore, China would avoid getting into any such circumstances with her immediate neighbors (Raj 2010: 13). This would lead China into a not so preferred 'Do or Die' situation; thereby survival is primary goals for any country. China is very much expert in the mixing two prominent theories of international politics to serve her interests. Whereby, on one hand China took the realist notion of 'survival' and 'cooperation' of liberalism to secure water from trans-boundary Rivers while on other hand it did not consider the long lasting effect of its policies and actions on the downstream population, ecological balance of the region, its negative effect on climate and culture, the way it can affect the relations of China with its neighbors and most importantly how it can put a dent in the China's play in the international politics (Parry 2007: 19).

In this section, the strategies of China to secure water without confronting with her neighbors have been also discussed. In addition to other things, chapter will also illustrate the nature of cooperation and conflict and the strategies of China to use 'win-win situation' instead of 'zero-sum' to build her international status as well serve its own economic and political interests. Before going to deal with these trans-boundary rivers, a brief outline of SNWT will provide an additional platform with water crisis in China, for understanding China's quest for water from these rivers. So below is a detailed brief of the South-to-North Water Diversion (SNWD) Project for better understanding of the plan and the thought process behind the project (Poon 2012: 05-07).

The South-to-North Water Diversion (SNWD) Project (official translation), or the South-to-North Water Transfer Project, is an infrastructure project designed to divert water from flood-prone southern rivers to China’s water-poor northern region.

According to the project plan, the annual volume of diverted water is 44.8 billion cubic meters. The size is close to the total water volume of China's Yellow River, which is the third longest river in Asia. Although approximately 253 billion Yuan (Chinese currency, 1 Yuan = 0.16 U.S. dollar) has been invested in its construction, from a cost-benefit point of view, the SNWD Project is a feasible choice for North China and the rest of the country (Poon 2012: 10-11). A study on water vulnerability and demand-supply balance dynamics indicates that the incremental water supply from the project would help the receiving region keep pace with the development of the entire country.

Background of SNWTP

The Great South-to-North Water Diversion Project was visualized by Mao when he reportedly said in 1952: "The south has a lot of water, the north little; ……it is okay to lend a little water." Mao's grand ideas to take water from China's flood prone south to the arid north actually drew inspiration from the dam building era in the United States, with the mammoth Hoover Dam on the Colorado River serving as a prime example of how water on a massive scale can be diverted to parched areas. Constructed in the later 1920s and 1930s, the Great Depression era Hoover Dam was designed for multiple purposes in the arid west—from irrigation to hydropower. Mao also was influenced by the mega projects in the Soviet Union during Joseph Stalin's reign, which lasted from the mid—1920s to the early 1950s (Political and Social Report 2013: 14). By launching his own mega projects, Mao sought to hark back to the glory of imperial China, as symbolized by the Grand Canal and the Great Wall. Monumental projects were Mao's way of presenting himself as the Great Helmsman. Obsessed with taming of the Yellow Richer, whose, changing course and devastating floods had earned it the enduring sobriquet "China's Sorrow," Mao took the help of Soviet experts in the post Stalinist era to build his "biggest monument to man's power over nature" in central China –the 107 meter high Sanmenxia Dam, which uprooted 400,000 people from their homes but turned out to be an engineering and environmental disaster (Poon 2012: 17).

Within a few years of its completion, sediment piled up, forcing the authorities to reconstruct large parts of the dam. Yet such are the enduring problems that the mammoth Sanmenxia— which means the "Three Gates Gorge"—has spawned that it still linked to many of the environmental and social troubles that plague Henan

Province and the areas further downstream. Mao's fixation on big plans found expression in other grand water projects as well, including the 1m255 megawatt Liujiaxia Dam on the upper reaches of the Yellow River in the Tibetan Plateau and the 900 megawatt Danjiangbou Dam on the Hanshui River in Hubei Province. He conceived of several hydro plans that were left to his successors to carry forward, because it took many years of research and planning to finalize them. Finding adequate financial resources to initiate the projects also contributed to their long gestation period. Take the case of the Great South-North Water Transfer Project: Although that plan dates back to the 1950s, it was formally launched only 2002. Another project with a long, troubled history, the Three Gorges Dam, was also Mao's brain child (Zhang 2011: 2872-2875).

The Chinese government's preference for large projects prevents effective planning in managing water resources (Economy 2012b: 02) and there are problems with the SNWDP, which hinder its potential to address all the impending water issues. Looking at the plan, the SNWDP will take at least 10 years to complete, so, in the short–term, it will not alleviate water concerns, plus it will not transfer enough water to fulfill present, let alone future demand. The Ministry of Water Resources recognises this inability to meet demand, stating that the project will not solve China's water problem, but described it as a 'lifeline' (ABB 2011: 35). Additionally, there are also concerns over whether the water transferred will be clean enough to use when it reaches its destination. Extra treatment facilities are, for example, required for the Yangtze River's water, which currently is too polluted to be usable despite it already passing through over 400 water treatment plants and pollution control projects.

The majority of water transferred by the SNWDP is intended for industrial use, with a small percentage destined for agriculture, despite the concern that agriculture is in greater need of the water due to the risk of food shortages. Water from the project will be expensive for municipal and industry use, and probably prohibitively expensive for agriculture. High water prices make desalination a cheaper alternative. There is also the issue of possible water shortages in the south due to the project, as the south is already losing water. Several transfer regions are concerned they will not be left with enough water to meet their demand, which causes conflict between the supply and transfer regions. The Western line's chief, however, believes the political and cultural

resistance can be resolved and authorities maintain that the line will be built (Schneider et al., 2011: 16).

China is constantly and consciously moving away from the path of develop industries first and clean up the negative effects later, and this proactive stance on environmental issues is reflected in Country's 12th FYP. China's water policies under the 12th FYP mainly focus on reducing water pollution through targets, quotas and caps, meeting industrial and urban water requirements in dry regions through the SNWP and force water saving as a habit through sizably increasing water tariffs. It is also looking abroad for water intensive resources. Some intellectuals argue that even if China does successfully manage to implement SNWP and enforce policies relating to water conservation and preventing water pollution, these policies will have international repercussions (OECD 2013b: 33-34).

All this policies of China that are related to water (including SNWP) may have international effects on trade relations through increasing costs of manufacturing and operating in China: it may impact agricultural production; and may affect lower riparian states through trans-boundary river policies

Routes of SNWTP

The Middle Route There are three routes; west, middle and east, for south to north water transfer into consideration. The middle route would transfer water from the "Danjiangkou Reservoir on the Han River 3 to supply Hubei, Henan, and Hebei and eventually to Beijing and Tianjin" (Lee 2006: 23). Ministry of Water resources reports that "the middle and eastern route has been already commenced" (National Statistic Bureau 2009: 39). It would be necessary to divert additional water from "the Three Gorges Dam (Sanxia) on the Yangtze River to the Danjiangkou Reservoir to meet the large water demands from the Northern Provinces" (Lee 2006: 25).

The water source of the middle route, the Danjiangkou Reservoir, an "annual natural inflow of 41.1 billion cubic meters from a drainage area of 95.217 square kilometers" (South-to-North Water Transfer Project). In the first stage, 162-metre Danjangkou dam with a total storage capacity of 17.45 billion cubic meters, have been constructed. In the next stage, the height of Danjiangkou Dam will be increased in order to "increase the total storage capacity to 29.1 billion cubic meters" (Lee 2006: 26). In ad addition, supplemental water from the reservoir created at three Georges Dam or form

downstream Shashi may be purposed up to Danjiangkon. Moreover, some compensative projects will be built on the middle and lower Hanjiang to ensure the development of industry and agriculture, and the navigation and the environment of water exporting region (Lee 2006: 27-29).

The Eastern route

The eastern route will divert the water from lower reaches of Yangtze River at Sanjiangying in Jiangsu. The diverted water would be use in Jiangsu, Shandong, Hebei, Tianjin and areas in the Huai River Basin. This route would pass through four lakes, the Hongze, Luoma, Nansi and Dongping. The water would then be pumped through tunnels. Under the Yellow River at Weishan. It will flow mainly along the reaches of the Grand Canal (the Wellin, Wei and South cancals) and finally discharge water to the Beidagang Reservoir south of Tianjin. Nevertheless, the inter-state conflict (Jiangsu and Shandong provinces) has suspended the further progress. Jiangsu demands more water from the diverted water than it was allocated under a plan approved by the State Council (South-to-North Water Transfer Project). Jiangshu built the Jiangdu Pumping Station, in early 1962, to divert water from the lower the Yangtze River to the Northern provinces using the Grand Canal send as far as Xuzhou and the south Nansi Lake, even before the eastern route was planned. The Station could be a vital structure in the eastern route transfer project and has capacity to pump up to about 400 cubic meters per second (Zeitoun 2006: 444-445).

The Western route

He Zuoxiu 5 submitted a formal proposal for the major south-north water transfer which is now western route of the scheme, to the Chinese People's Political Consultative Conference (CPPCC). The proposal was aimed at to transferring 210 billion cubic meters of water annually from the Yarlung Zangbo River in Tibet and the Nu and Lancang Rivers in the southwest through a series of darns, reservoirs and mountain tunnels into three channels (Wolf 1999a: 160). The routes were: The Yellow River would carry water to the northwest, north China, the northeast and the Central Plain while the upper Yangtze delivered water to the lower Yangtze; Water stored in Lake Qinghai would be transferred to the Tsaidam (Qaidam),Talimu (Xinjiang) and Zhun'ge'er basins, as well as to the Gansu Corridor and Mongolia's

Alashan Plateau. Water stored in Mongolia's Dai Sea would be sent to the plains of Shanxi, Hebei, Liaoning and Mongolia (Wolf 1999b: 15).

The western route would transfer water from the upper reaches of the Yangtze to the upper reaches of the Yellow to provide water to north-western China (Chen 2003: 75). Eventually, this route would deliver water from a "high dam on the Salween River (Nu Jiang) through the Lancang, Jinsha, Yalong, Dadu, and Min Jiang to the Yellow river near Dingxi in Gansu Province". The proposed route is “3,800 kilometers long and would transport 120 x 109 cubic meter of water annually” (Chen 2003: 76). This route requires the construction of 50,000 kilometers of canals with a diversion of 500 billion cubic meters of water from the big south-western river basins. The Commission has determined on some shorter lines whereby a “lower magnitude of diverted water i.e. 22.1 billion cubic meters and smaller coverage of 168,000 square kilometers relying on gravity and some on pumps” (Lee 2006: 20)). There are several problems coupled with these projects like, huge cost, geographical conditions, inter-state tensions, environmental and most importantly international tensions. The economic, geographical and interstate problems have impinged within China. Environmental and the concerns involving neighboring countries of this project would have to decipher properly before going with the plan and have been dealt in latter part of this chapter. In addition, the eastern and middle route could not affect neighboring countries except environmental problem. The western route which is intended to transfer water from Mekong, Salween and Brahmaputra will affect the downstream countries in South and Southeast Asia. The chapter seeks to study the China's trans-boundary rivers and China's intention to divert water from these rivers. Thus, the coming 'water game' will play a crucial role in China's strategies to deal with her neighbors. There are two options available for China as an upstream in these trans-boundary rivers. Therefore, it is all in the hands of China to play her 'water politics' to serve her interest in world politics along with secure sufficient amount of water for her domestic needs (Chellaney 2014: 28-31).

China has an extraordinary number of dam projects on Tibetan rivers that are being planned, under construction or recently completed. Some are on the descent from the plateau, others just beyond the plateau. While the primary purpose of the Great Western Route project is to extract water for North China, the other dam projects listed below are almost entirely intended to generate hydroelectricity and seldom to

meet nearby demand. China has a grand plan to build a nationwide power grid to transmit electricity over great distances, from the wild mountain rivers of Tibet to the industrial cities of southern and eastern China. Building the power stations will come first, since their construction takes many years, but the entire grid is due for completion by 2015. This is known in China as the "west-to-east power transmission programme", matching the "south-to-north water transfer programme" discussed above. Gradually, the south-to-north water transfer became more ambitious in its proposed capture, in western China, of all of Tibet's major rivers. The locations of the hydro dams are well downstream of the water transfer dams, usually close to the edge of the Tibetan Plateau or on the dramatic descent of the rivers from the plateau. The Tibetan regions of Amdo (China Water Risk 2011b: 10-19), the "TAR" and Yunnan are all rich in hydropower potential and it is inevitable that Beijing plans to exploit the resources of these Tibetan regions.

The Chinese leaders of Yunnan province are especially eager to dam all of the province's rivers, one after the other, as a quick way to get rich and catch up with the wealth of the coastal provinces by becoming a hydropower exporter to Thailand and coastal Chinese industries. Yunnan provincial leaders have taken full advantage of the decentralization of central power in China in recent years, which has encouraged provinces to pursue their own agendas with little concern for the environment (Clu 2012: 28).The Yunnan provincial enthusiasm for dams seems to contradict the repeated calls, in the current Five-Year Plan, for development that is sustainable. At the highest level, China's top leaders cite social justice, sustainable development and ecological protection as guiding principles of the 11th Five-Year Plan for 2006–2010. The top leaders voice great concern over the widening gap between the rural poor and the urban rich, which leads to frustration and even instability. Yet there is no sign of slowing the rush to dam all the rivers in Yunnan.

Dam Project

Mao lived in an age when grand engineering ideas were fashionable in the world. The Cold War era's military culture, pivoted on the principle "the bigger the better," subtly influenced developmental projects, with more than 45,000 large dams being built in that period around the world. China was in the lead in dam construction. The worldwide erection of giant dams served as a linchpin of the Green Revolution. Yet such is the negative side to that dam building spree that the main rivers in China

proper now are in poor ecological shape and barely 2 percent of the rivers in the United States run unimpeded, whereas, globally, the flows of more than two thirds of the rivers have become subject to large-scale diversion and impoundment. Such "thoughtless tampering with nature has left a terrible legacy" in the world, serving as a reminder that it is "not only Communist central planners but capitalists as well who meddle with the flow of rivers, result with often devastating environmental consequences in downstream regions (Wirsing 2012: 36-38).

China, the world's most "dammed" nation today, still look forward to the "bigger the better" notion. Before the Communists came to power in 1949, there were only 22 large dams in china. But the Mao initiated program to develop massive hydro engineering projects—a program accelerated by the leaders who followed him—resulted in China completing between 22,000 and 24,000 large dams by the beginning of the twenty-first century. That number represents at least half of all large dams in the world. A widely accepted definition of a large dam, as drafted by the International Commission on Large Dams, is a structure with "a height of 15 meters from the foundation or, if the height is between 5 to 15 meters, having a reservoir capacity of more than 3 million m3." If all reservoirs and dams were counted, the number in China total more than 85,000, excluding the small and localized water diversions, check dams, and weirs too numerous to reliably count (Woels 2012: 22). According to the food and Agriculture Organization, these dams and reservoirs in 2005 could store 562.4 cubic kilometers of water, or 20 percent of the country's total renewable water resources (TRWR). Since then, China has completed more mega dams, including the world's biggest at the so-called Three Gorges. As the world's most dam-dotted country, with an unparallel human made water diversion infrastructure in place, it is hardly a surprise that China also is the world's largest producer of hydropower, with an installed generating capacity of more than 170 giga-watts. Yet another significant fact is that is the global leader in exporting dams. Today it is building more dams overseas than any other country. The Chinese Export-Import Bank and other Chinese financial institutions, state owned enterprises, and private firms are now involved in more than 100 major dam building projects in different countries, especially in developing world. Although the Chinese government has released no figures, one American analyst tallied at least 216 dam projects in forty-nine nations that were

ongoing in 2010 and had “some form of Chinese involvement,” with Chinese companies also in the process (Xi 2013: 1040-1043).

Chinese Dam Policies is such that China maintains that the purpose of building dams is to generate electricity and not to otherwise store water in large reservoirs. A senior engineer from the Zangmu dam’s construction company stated that the river will not be stopped during construction and when operational, the water’s flow will not be reduced (Xi 2013: 1044).

Potential Impact of Dams

Any damming of rivers affects their flow, and China plans to build numerous dams on different rivers in Tibet. Like the Dams on the Tsangpo, India believes that China’s current dams on the river have had an effect on the Brahmaputra. In Arunachal Pradesh, it was claimed that the Brahmaputra almost dried up due to China’s dams (Economic Times 2012, para.4). If this is so, then the reduced flow will have similar adverse effects on the economy and environment of the countries where the river currently flows. Like in India’s north east, the Zangmu dam project, which is under construction, is reported to have the potential for ‘flood control and irrigation,’ which requires water storage and diversion and suggest that this dam could reduce the Brahmaputra’s flow and have a greater impact on India than China claims (Xiao-rong 2005: 629-630). Even if the dams do not have a significant effect on the flow of the river, any hydropower dams still impact downstream ecology by removing silt, which can block turbines, from the river before it enters the dam. This silt is nutrient rich and vital for agriculture. Most people living in the river’s catchment area are farmers with farming and fishing as their main occupation (Xia0-rong 2005: 631). So the loss of this silt could adversely affect agriculture, especially if there is a reduction in water flow from the river, which raises concerns over region’s food security. Also, the pollution from the dams’ construction will also be carried downstream, impacting farmland and depleting fish stocks, adding more so to food security concerns (Jha 2011a: 10). The Air pollution is also believed to contribute to melting the Himalayan glaciers, further depleting the regions rivers. This great potential for food shortages could cause social instability in India (Jha 2011b: 14).These are general concerns and a special concern based on their geological location is far larger than any other concern is that these dams pose geological risks, especially

Those dams that are built on the Great Bend, which could cause seismic activity (Xie 2009: 13). And, in a worst case scenario, the dams could collapse, creating a giant wave and destroying anything in its path, which may cause a domino effect (ENS 2012, para.19), destroying downstream dams, which could be devastating to hugely populated areas including all cities and towns in the way of the water.

Map 3: Route of SNWTP

Source: China National Statistical Bureau (2009)

China's River Policies and International Implications of Trans-Boundary water projects

China's water policies include major projects on trans-boundary rivers, which will impact lower riparian nations. China has built several of its dams on shared rivers, which has influenced downstream hydrology, causing sediment erosion of riverbanks and changing nutrient profiles (Clue 2012: 19). This has caused increased tensions between China and its neighbors, especially as information to assess the impacts of these dams is generally not available. Downstream countries are susceptible as China has strong political influence and access to capital, and so can manage its water resources in a manner contrary to the interests of lower riparian countries (Clue 2012: 33). Furthermore, the SNWDP has the potential to divert water from the Brahmaputra River which is important to India, Pakistan and Bangladesh.

With respect to the Mekong River, Thai fishermen claim Chinese dams are responsible for the depletion of fish and the unpredictable flow of the Mekong since

dam building started (Clue 2012: 19). Downstream states have frequently requested China to participate in multilateral consultation and have formed the Mekong River Commission (MRC), which China has refused to join. This reluctance to participate in regional, multilateral engagement is down to China's increasing water scarcity and worries of similar demands by other downstream states. A severe drought in 2010, however, caused China to become more willing to cooperate, with Chinese delegations participating in MRC discussions and data sharing. Nonetheless, the Chinese delegation emphasized that the drought was due to forces of nature and not China's hydropower development and assured the MRC that China's projects will not severely impact downstream water flow (Mochizuki & Zhang 2011: 12).

China's river plans could potentially affect Nepal, as some of its major rivers originate in Tibet, where China is contemplating more dams and diversion projects. This could also impact India, as tributaries from these rivers account for 4671 percent of the Ganges River's water, creating problems for downstream India and Bangladesh (Jha 2011b: 67). There is, however, little evidence that these plans are high on the political agenda, especially compared to China's plans regarding the Tsangpo.

China has no water sharing agreement or treaty with any of its lower riparian states. Thailand, Laos, Cambodia, Vietnam and Myanmar have all been affected and expressed concerns over China's treatment of these shared rivers (Clue 2012: 23). These countries are, however, unlikely to have a significant effect on China's policies or stance towards trans-boundary rivers, as they probably will not form a united bloc against China as they are fighting amongst themselves over their water issues (Chellaney & Tellis 2013:14) and the power dynamic remains in China's favour (Economy 2012b: 34). However, India, as the other emerging regional power, is increasingly threatened by China's plans and may be able to challenge China, and so Sino Indian relations with respect to China's designs over the countries shared rivers will be an important focus of this paper.

In terms of policies impacting Sino Indian relations, China's policies regarding trans-boundary rivers are unclear. In 2010, Chinese Premier Wen Jiabao assured Indian leaders that China will not undertake projects that will affect countries downstream; similarly, the Chinese Foreign Ministry spokeswoman told India that "at present, the hydropower station on the Yarlung Tsangpo…will not lead to any big change in the downstream water levels or affect the harnessing efforts by the downstream

countries" (Yu cited in Mittra 2011: 10). She stated that China "will fully consider impacts to downstream countries" and that "the dam being built on the Brahmaputra River has a small storage capacity. It will not have a large impact on water flow or the ecological environment downstream" (Yu cited in Gray 2011:.20). Chinese specialists, however, maintain that the shrinking of the Himalayan glaciers will cause the Ganges, Yangtze and Yellow Rivers to have seasonal flows, making water security an issue of food and political security. Therefore, these threats dictate that China should exercise territorial sovereignty, exerting unlimited rights over resources within its territory (Yuan 2011: 37-39).

The Tsangpo, or Brahmaputra, is important to India, as it is one of India's largest non-seasonal rivers and accounts for over a 25 percent of India's total water resources and 29 percent of the total runoff of India's rivers. The Tsangpo currently flows into Assam in India, where it forms the Brahmaputra and then joins the Ganges to form the world's largest river delta, providing water to over 300 million people. This river has largely escaped Chinese notice until recently (Raj 2010; Ramchandran 2010), and, due to its importance to India and the region, China's designs have the potential to impact a huge number of people.

Machu River

The Machu (Ch: Huang He, Yellow River) has the highest recorded silt load of any other major river in the world, hence its English name. With every cubic foot of water, it carries about one kilogram of silt from the erosion of the Tibetan Plateau. This high silt load has greatly limited the use of water for power generation, urban consumption and industrial uses. The irrigation diversions mean that, in some years, the Machu no longer even reaches the sea. For example, in 1997, the Machu failed to reach the Yellow Sea for 226 days of the year. It is this acute scarcity of water that has led to the Great Western Route project outlined above (Yuan 2006: 595).

The Machu is able to flow year round because the large Tibetan wetlands act as a sponge and help maintain water levels in the river. While still in Tibet, the Machu reaches a great bend as it passes the flank of the Amnye Machen range and then disperses into the vast wetland near Dzoge (Ch: Ruergai), described earlier in this chapter. This wetland, famed for its wildlife, especially migrating water birds, is the sponge that regulates China's year-round water availability. It both absorbs and

steadily releases water, enabling the Machu to reach the sea, even in the dry winter months, despite its lengthy detour through the Ordos desert and the sand dunes of Inner Mongolia (Yuan 2006: 597).

The Chinese government has sought to harness the power of the Machu, by constructing multiple hydropower dams. The river, however, has repeatedly fallen short of water demand. Because of the river's unpredictability and the high need for water in the surrounding regions, a massive construction project that would divert water from the Drichu (Yangtze River) to the North China Plain was initiated in the late 20th century. The Tibetan province of Amdo (Ch: Qinghai), where the Machu and Drichu each has its first 1,000 kilometers or more, has a particularly large number of dams. This is not surprising as the area is the most industrialised part of Tibet, with oil and gas fields, petrochemical factories, energy intensive aluminum smelters and heavily polluting magnesium plants. These industries rely intensively on water as a low cost input in the manufacturing process, a source of cheap underpriced hydro electricity and a sewer for industrial wastes. Amdo is a hydro economy and its provincial Water Conservancy Bureau is the biggest and most impressive building in the capital city, Xining. The official *Qinghai Economic Atlas*, published in 2004, lists 45 small hydro dams in Qinghai, seven large dams, and four very large dams impounding the Machu in a stepped cascade (Zachos 2001: 689-690). Much of the electricity is exported downstream to the refineries and smelters of the industrial city of Lanzhou. Several more large hydropower dams are planned, with 12 listed for construction during 2001-05.

Zachu (Mekong)

Mekong (Lancang Jiang) is the longest river in Southeast Asia and seventh longest river in Asia. Rising in south-eastern Qinghai province, China it flow through the eastern part of the Tibet Autonomous Region and Yunnan province, and enters into lower basin as it forms the international border between Myanmar (Burma) and Laos, as well as between Laos and Thailand. The river then flows through Laos, Cambodia, and Vietnam before draining into the South China Sea south of Ho Chi Minh City and has a drainage are of 620,00 square kilometers. It includes nearly all of Laos (207,400 square kilometers), the northern and north-eastern region of Thailand (190,5000 square kilomerers0, nine-tenths of Cambodia (157,800 square kilometers). In other words, the three-fourth of the drainage area of the Mekong lies within the four

countries the river traversed on its lower course- Laos, Thailand, Cambodia, and Vietnam (Thakkar 2010: 28). The contrast between the physical conditions that prevail above and below the Mekong's descent from the Yunnan highlands divide it into two major parts. The upper Mekong flows 1,215 miles (1,955 km) through a long narrow valley comprising roughly one-fourth of the total area, through the mountains and plateaus of south-western China. The lower Mekong forms the border between Myanmar and Laos. Its relative flatness facilities its crossing from the Lao side in to the north-eastern side of Thailand. The river stream 1,485 miles (2,390 km) in length drains the Khorat Plateau of northeastern Thailand (Tan 2012d: 34). The Mekong traverses Cambodia for 480 km, entering a plain that transversally has the shape of a basin, at the bottom of which is the *Tonle Sap* or Great Lake with a surface area of 2,700 square kilometers (Nguyen 1999: 05).

In its upper reaches, the Mekong rises in the Tibetan Plateau between the Salween and Yangtez rivers; the streambed has cut deeply into the rugged landscape through which it flows. Along its course between Myanmar and Laos, the Mekong drains about 8,000 square miles (21,000 square km) of territory in Myanmar, comprising rough and relatively inaccessible terrain. In its more gentle lower stretches, where for a considerable distance it constitutes the boundary between Laos and Thailand, the Mekong inspires both conflict and cooperation among upper riparian and lower riparian and well among Cambodia, Laos, Thailand and Vietnam (Tol 2009:30-33).

Many millions of people are dependent on the Mekong River (and the larger Mekong Basin) for agricultural and fishing purposes. Thailand and Laos are interested in the river's potential in producing hydro-electricity. Laos, moreover, sees the river as critical for its agricultural interests. Similarly, Cambodia and Vietnam rely on the Mekong for agriculture and, moreover, Cambodia is particularly dependent on the river for its valuable fishing industry. The Mekong also provides critical transportation corridors. More than 50 million people depend on the Mekong and its tributaries for food, water, transport and other aspects of their daily lives (Topgyal 2011) 116-117).

The MRC's research has shown that during the dry months from around November through May, the 4,400 km long Mekong- which flows from the Tibetan Plateau down to Vietnam and out to the South China Sea- is reduced to 2,000 cubic meters of flowing water per second. During the monsoon months, from around June until

September, the Mekong flows at a rate of 50,000 cubic meters per second. Unfortunately, the flow of the Mekong River was halted in Chinese side to generate electricity as well irrigate the fields of least developed region of Chin. There are five more large dams planned in Yunnan for the Mekong and another nine for its tributaries. Together they would generate 20,000 megawatts of electricity, more than Three Gorges Dam on Yangtze River (Svenson 2012: 36-37).

The downstream countries are in panic about the damming of the Mekong River. They have concern that that the giant reservoirs will hold back water in the dry season which will disrupt their regular water requirement during the dry season to compound their problems. Though, China has already given assurance that "the dams are for power, not irrigation, and will help in regulating the Mekong's flow" (Sutter 2012: 78-80). "The river's annual flood-drought cycles are essential for the substantial production of food crops on the floodplains and along the banks of the rivers during the dry season," says a brief by the US-based International Rivers Network (IRN). The downstream countries have different interest associated with the mighty Mekong and so their anxieties are different. Vietnam is worried that intrusion of salt water from the sea already a serious problem in the low-lying Mekong Delta, where the bulk of the country's rice is grown will spread infertility further inland as China keeps more of the river's headwaters in its Yunnan reservoirs. Thus, the deliberation that damming the Mekong River will benefit only China and have negative impact on lower riparians is no longer valid (Sutter 2010: 27-30).

Ironically, the damming the river will have other consequences like environmental problem and migration which will not only affect the lower riparian countries but upper reaches as well. It needs a strong political impetus among the basin to minimize the environmental cost and develop the region accordingly. This strategy will lead the countries of the basin towards conciliation. No riparian countries will favor confrontations on water when all are engaged in boundary disputes. Indeed, the cooperation on water among the riparian countries will also encourage other disputes to be patch up through mediation (Strategic Foresight Group 2010b: 59-61).

In addition, all the lower riparian countries of Mekong River basin "are comprised of a combination of geophysical and socio-economic factors, with the first being either an upstream-downstream or a common-pool-situation and the second being either homogenous or heterogeneous" (Stodban 2009: 86-89).

The countries of Mekong river basin are heterogeneous in nature and thus it is likely to be cooperation on the common resources than conflict. Most of strategic analysts suggest that weak nations should cooperate with strong nations. Thus, it would be better to cooperate on water for Southeast nations of Asia and China.

Moreover, it is not only lower riparian which have to cooperate but upper riparian China to also avoid any confrontations on water with lower riparian. There are many determining factors which will lead the countries of the basin to cooperate on the Mekong issues than conflict. Firstly, China would try to avoid to any confrontations in neighborhood which will obstruct the rise of China. China share a good relation with the countries of the basin, so any attempt of unitary action on Mekong, in long run, will impinge on image of a responsible nation in world politics (Sorensen 2007: 358-359).

Secondly, China needs a huge market for her finished product and basin states are good near market. In addition, China also needs raw materials for industry; the states of Southeast Asia are rich in minerals and oils.

Thirdly, the political supports of these nations are highly required by China in international politics and to play a vital role in UN and other international organizations.

Fourth and more important, any disputes among China and Southeast states will bring these states nearer to India. Thereby, China will avoid taking any arbitrary actions on the Mekong River.

Fifth, from the Southeast Asian nation's perspective, China as an economic giant and political power balance India in the regions. The basin states will use China to balance India and vice-versa.

Sixth, these regions are getting huge investment from China and thus any effort to change status quo will hinder regions development.

Seventh, the lower regions totally depend on China to provide hydrological data to forecast the floods and drought in the regions. Therefore, neither China nor the lower riparian countries of the basin afford clash on the Mekong River (Sorensen 2007: 360-361).

In addition, there are several developments have already taken place on the issue of cooperation on the Mekong River. The exchange of hydrological data is the most advanced cooperation project between the downstream riparians and China. In 2002, China installed two measurement stations that now report the water level to the MRC Secretariat every 24 hours during the wet season. China under the agreement signed by China's Ministry of Water Resources and the Mekong River Commission, China will offer data on water levels of the Mekong as well as the rainfall in the river valley to the commission every day during the flood season from June 15th to October 15th until 2006 (Xinhua Report 2013). This will make a very big difference in our flood wanings'. Thanongedeth a hydrologist, said (IPCC 2001b: 46-47). In other words, Chinese government are eager to the development of the Mekong River Basin. Thereby it will help to "promote economic growth along the river, and narrow the development gap among East Asian countries" (Xinhua Report 2013).

Indeed, the lower riparian countries is also favoring cooperation on the Mekong river and echoed in Cambodian official words, 'cooperation between the upstream and downstream countries is vital', said Sin Niny, currently chairs the commission's joint committee. He took one step further and express we would like to avoid confrontation in the region' (Ullman 1983: 126). Moreover, the development of Mekong basin is also an important "test case of China's willingness to accommodate and reassure its weaker neighbors as to the non-threatening and mutually beneficial character of its ascendance" (Ullman 1983: 128). China has always used mutually beneficial development, and has invested substantially in promoting regional links that benefit her and others. All of the Southeast Asian riparian states seek to enmesh China 'in economic regionalisation as the most effective "tool they have to manage the consequences of its ascendance. As a result, the likelihood of outright military conflict between Southeast Asia and China arising from developments on the Mekong is low" (Ullman 1983: 130). Interestingly, the efforts. of cooperation is lower basin is already in progress and some tremendous work has been done to develop the lower basin of Mekong and sharing the river water by Mekong River Corporation. And thus, it provides a platform for other riparian countries to cooperate on Mekong River.

In 1995, the four governments of lower basin of the Mekong River established a new organization - the Mekong River Commission (MRC). The objectives of MRC's are to "equitably and reasonably sharing resources and sustaining both the

environment and human welfare". Unfortunately, two countries, China and Burma (Myanmar) have not joined the forum despite explicitly invited, due to their own reservations. The Preamble incorporates the broad objectives of the Agreement. They ask the riparian members to: Promote sustainable development, utilisation, conservation and management of the Mekong River Basin water and related resources for navigational and non-navigational purposes, for social and economic development, and the well-being of all riparian States, consistent with the need to protect, preserve, enhance the environment and maintain the ecological balance of the Basin. Promote inter-dependent sub-regional growth and co-operation among the community of Mekong nations, and Provide an adequate, efficient and functional joint organizational structure to implement the 1995 Agreement, programmes and activities, and to address and resolve issues and conflicts (Vorosmarty 2000: 285-288).

The objectives set in the preamble outlines the very nature of MRC. The Commission not only to give guidelines on water sharing but also emphasizes the sustainable use of Mekong basin. The MRC is working for "to optimize the multiple-use and mutual benefits of all riparian's and to minimize the harmful effects from natural occurrences and man-made activities". Thus, seeing in broader perspective, MRC as an ideal commission determined to give better opportunity to all riparian countries in order to get development without even harming the Mekong and Environment of concerned nations. Further, the commission is to "to develop the full potential of the basin with emphasis and preference on joint and/or basin wide development projects through the formulation of a basin development plan that would prioritise the projects and programmes to implement at basin level". Moreover, the commissions will not only harness the river rescores but it will equally work for "protecting the environment, natural resources, aquatic life and ecological balance of the basin from pollution or other harmful effects". Therefore, it requires high level of cooperation among riparian countries to ensure "that each Riparian should utilize the Mekong River system in a reasonable and equitable manner in their respective territories, subject to rules to be established under the Agreement" (Vajpeyi 2012: 178-180).

There are several provisions incorporated for cooperation among riparians. First of all, notification is required of all diversions in the tributaries and of intra-basin use in the wet season on the mainstream. In addition, in the wet season, prior consultation is

required for inter-basin diversions from the mainstream and for intra-basin use on the mainstream in the dry season. Secondly, riparian states, in the maintenance of flows in the mainstream, are required to cooperate among themselves. Thirdly, states must make every effort to avoid, minimise and mitigate harmful environmental effects, especially relating to water quantity and quality, eco-system and ecological balance of the river system. Riparian States must cease immediately an activity if it is notified with proper and valid evidence by another State that the activity is causing substantial damage, until such time as the matter is resolved between the concerned States. And finally, the Mekong River is to be kept free of obstructions that might impair navigability (Preamble and Objectives of MRC). The MRC helps to coordinate the management and conservation of the Mekong basin in South-east Asia. It does some useful information-sharing and practical work, even with its limited membership and mandate (Vajpeyi 2011: 121-127).

China is capturing the water for its own purposes and this will dramatically alter the flow of the river. In terms of hydropower, China's engineers have extraordinary plans for its rivers, especially the upper Mekong as it traverses Yunnan before reaching Laos, Burma, Thailand, Cambodia and Vietnam. A cascade of no less than 14 very large dams has been designed, with some already complete and others under construction. The uppermost six on this cascade of dams is in the Tibetan Autonomous Prefecture of Decent (Ch: Dicing or Shangri-La). The lower eight dams just beyond the Tibetan Plateau will be constructed first, since the terrain is less rugged and they are closer to the urban electricity markets (Solomon 2007: 18-23). The remoteness of the area and absence of major local consumers are no barrier to this ambitious programme. The dams are designed to be integrated into China's national grid, enabling users in distant coastal Guangdong to consume the power, or what remains of it after the inevitable leaks from the transmission wires along the way. Thailand, also hungry for energy, has been willing to finance the dam construction, and the ADB also provides expertise and loans – all of which has set the stage for Yunnan to replicate Qinghai (Tib: Amdo) as a hydro economy run by engineers (Solomon 2007: 30-35).

In addition to harnessing its energy potential, China has dynamited the Mekong rapids so that trade transported by boat can be increased from 100 to 500 tonnes. Thai farmers, NGOs and environmentalists regularly protest at China's selfishness, but

have had little success in bringing about change in China's policy, largely because China has chosen not to join the Mekong River Commission, a group which brings together the Mekong countries in an effort to find common governance of a single watershed (Smit 2006: 283-284). Chinese ambition has also impacted the upper portions of the river which flow through the Tibetan region. Three of Tibet's rivers – the Gyalmo Ngulchu (Salween), Zachu (Mekong) and Drichu (Yangtze) – run in parallel gorges as they leave the plateau. At China's request, UNESCO agreed to list the three parallel rivers as a World Heritage protected area. This supports China's tourism plans for the area and the Tibetan part of Yunnan – now officially renamed Shangri-La. The area is to become a major hill resort and eco-tourist zone. Tourism and hydropower are the two major industries planned for this stunningly (Smit 2003: 28-30).

Now China wants to reduce the 1.7 million hectares protected by UNESCO by as much as 20 per cent, to allow more commercial development, especially tourism. UNESCO is largely powerless in this situation. So too are the Tibetans, who are suspected of being "political" if they protest. Fortunately, others have increasingly spoken up with growing confidence in favour of conservation. At the grassroots level, many Chinese scientists and environmental NGOs are calling for long-term solutions to protect the environment in this area, not just short-term measures to address the present shortages of electricity and water downstream. The Yunnan Institute of Botany has established a Centre for Biodiversity and Indigenous Knowledge (CBIK, pronounced 'cubic') which establishes an international comparative framework for respecting both ecology and the traditional uses of these areas (Xu 2007: 3057-3058).

The Salween River

The Salween River is 2,800 kms long, flowing mainly through Central Tibet and Burma, then draining both eastern Burma and western Thailand. The Salween headwaters are a series of shallow lakes and marshes to the southwest, west and northwest of the Nagchu district of Tibet. This region of rolling hills within broad valleys is underlain by red sandstone and siltstone. From its start, the Salween River flows east until it nears the capital of eastern Tibet, Chamdo. From there it changes course and heads south toward the Khawakarpo Mountains near the town of Tseka, running nearly parallel to the Mekong River. Once in Kham Province, the two river valleys diverge and the Salween heads southwest into Burma, where it becomes that

country's primary river. Under the Chinese government, 13 dams are presently under construction on the Salween river in Yunnan Province alone, with the largest being a 34 meter-high dam at Chalong in the Nagchu Prefecture. China Huadian Corporation, a wholly state owned enterprise and controlling shareholder of the Hong Kong stock exchange (listed as Huadian Power International Corporation Limited), is the chief promoter of the proposed Nu river development in this area (Shrestha 2000: 319-321).

Drichu

Regarded as the world's third longest river, the Drichu (Yangtze) originates in the Dhangla (Ch: Tanggula) mountains in northeastern Tibet, a range approximately 4,900 meters above sea level. From these mountains, the river flows east, southeast and then south through Tibet into the Chinese province of Yunnan. From there it turns northwest across the Sichuan Province and then flows east through central China, past Shanghai and enters the East China Sea, ultimately draining an area of about 1.8 million square kilometers. Throughout the year, the high mountains at the Yangtze's source cause it to flow rapidly for most of its length. However, fed by melting snows in the spring and rains in the summer, the Yangtze flows strongest in late spring and summer, and abates through autumn and winter (Shrestha 1999: 2776-2779).

The Tibetan headwaters of the Drichu/Yangtze have been severely impacted by at least three decades of uncontrolled logging of the catchment forests. The Chamdo area of Tibet's Kham province, which includes significant portions of the Mekong and Salween watersheds, was until recently home to extensive cold-temperate forests, largely of juniper, pines and spruce. It is highly relevant that in the Chamdo area, logging practices under Chinese occupation have been unsustainable and this is seen to pose a threat to the hydrology of these vital Asian rivers. Additional threats to Tibet's rivers also stem from the level to which Beijing allows the mountains surrounding the Yarlung Tsangpo, Mekong and Salween watersheds to become deforested as well as the strategy the PRC chooses for developing hydropower and irrigation resources on these rivers. Aeroplane rather than by employing local Tibetan communities to plant and protect seedlings. The Three Gorges Dam on the Yangtze, China's biggest hydropower project until now, has been deeply controversial for many reasons, including the displacement of large numbers of people whose resettlement has been largely unsuccessful and the fact that promises of raised incomes remain unfulfilled (Shrestha 2004: 49-55).

The International Implications of China's Water Policies

Growing competition over resources and agricultural goods will increase international tensions as countries vie to secure resources. This will result in greater competition for acquisition of land and resources abroad, while targeted countries try and guard their resources or 'play countries off' each other to secure the best investments. While some countries like those in South America will pass increasingly restrictive laws making land acquisition by Chinese companies near impossible, resource exploitation in countries like Africa could hinder their development and increase conflict and instability within the region. There could also be a rise in armed conflict between local populations and foreign companies involved in land acquisitions. Trade disputes may increase due to countries looking to hold on to their own resources and increasing demand from other countries, particularly as China seems to be buying up strategic resources and tying up supplies, giving them a potential monopoly (Schuur 2011: 32-33).

There is, however, the argument that the outcomes outlined above could be mainly due to China's economic and population growth, and so it is these issues, rather than its water policies per se that are driving these potential international impacts. China's rising population contributes to increasing agricultural pressures; resulting in China increasing agricultural imports and 'going out' for resources; and economic growth is fuelling China's quest for resources and hydropower (Selby 2003: 122-124). Furthermore, if China did not address its water issues, the outcome internationally, especially in terms of food security, could be the same as the situation that could occur after implementation of their water policies, as both scenarios would result in decreased agricultural productivity and a greater demand for resources (Poon 2012: 34-39).

However, the Chinese government has introduced policies specifically addressing water issues to continue feeding its population and grow its economy in a sustainable manner to alleviate the worst potential outcomes. These issues ultimately boil down to water availability. China's economic growth cannot continue without a sufficient supply of water and China cannot grow crops to feed itself without water for irrigation. In the short term, some of China's water policies may have a similar outcome to those if the government was inactive. The fact that the government is taking action, however, will have a decisive impact and prevent the country from

grinding to a halt, which in the long term would be undesirable internationally. Projects such as the SNWDP are aimed solely at treating China's water shortages (Political and Social Report 2013: 18-20). International tensions caused by interfering with trans-boundary rivers can, therefore, be attributed to the fact that diverting rivers to meet water shortages is how China has historically dealt with its water deficits. While China's regional water imbalance has been exacerbated by rapid urbanisation and industrialisation, the SNWDP is seen as the logical permanent solution to solving the traditional water imbalance between the north and south.

Ultimately, it seems China's water policies will have a potential twofold impact internationally; being highly de-stabilizing to the region and increasing international tensions; but at the same time, potentially preventing China's economy from stalling, which could be de-stabilizing to the entire international system.

Concluding Remarks

Many of the rivers of Tibet are thousands of kilometers in length and they link the lives of billions of human beings. Tibetan population provides environmental services for all downstream users by preserving these rivers as clean flowing, uninterrupted, steady flowing all year round. These are substantial environmental services in an interdependent world in much need of environmental services that help provide scarce clean water, or limit climate change. Tibet, in the heart of Eurasia, provides not only the water but also generates the monsoon that produces the waters of Asia. Tibetans would prefer to maintain the purity and steady flow of the rivers and the plateau that is the number one water tower for China, Southeast and South Asia. But Tibetans are poor, not allowed to voice their aspirations, and now face many dangers, including climate change, massive river damming, the ongoing erosive consequences of intensive logging of Tibetan river catchments, mining close to major rivers and increasing pollution. Though, China is facing water crisis especially, north regions and much awaited China's South-North Water Project has already commenced. China will not arbitrarily divert the water from the Brahmaputra River and Mekong River. China has to negotiate with lower riparian countries in order to secure water from these rivers and the best possible option for China is cooperation with lower reaches of the basin countries and Tibetan voices and their perspective should be heard with great importance.

Chapter-V

Impact of China's Water Policy

This chapter would concentrate on impact of China's water projects in general and Tibet in particular. It will also highlight the impact on eco-system, economy, livelihoods, people of the lower riparian countries and Tibet in particular. This chapter has three sections, in the first section, it will discuss on China's water policies, second it will focus on a brief on china's water projects and the third will analyze its impact on people.

China's Water Policies and its impact on Tibet

In order to mitigate water insufficiency in the arid area of Northern provinces, the Chinese government ratified the South-to-North Water Transfer Project (SNWTP) in 2002. The SNWTP is one of the biggest and most expensive projects in Chinese history. The total project has a prepared finalisation date of 2050, and will divert a total of 44.8 cubic meters of water annually. The project is predicted to cost between $52 billion and $70 billion US dollars, which is more than three times the cost of the Three Gorges Dam. When completed, the project will cover 1,300 kilometres of pipeline from the western Qinghai province to Hebei on the eastern coast, dislocate an approximated 300,000 people in the mechanism. The SNWTP will mainly divert water from the Yangtze River to the Yellow (Huang) River and the Hai River, which are two parts of the 3-H (Anand 2009: 33).

The project is included of eastern, central and western routes. The western route of the project referred to as the Big Western Line will divert water from the Yangtze River into the headwater of the Yellow (Huang) River. The central route will mainly divert water from the Han River which is a tributary of the Yangtze to the northern cities of Beijing and Tianjin. The eastern route is constructed mainly to update the Grand Canal, which currently flows from Beijing to the southern city of Hangzhou. Each route will enclose a group of canals, tunnels, reservoirs, pumping stations, and water crossing structures. Construction has as of now begun on area of the eastern and central routes, since 80 percent of water deficiency in China appear in the Huang-Huai-Hai (3H) area (Lee 2006: 05).

The western route is currently in planning stages. The project is part of a national economic plan the three routes run through many provinces, which each have their respective administrative powers and economic interests. The construction of the backbone infrastructure of the project is financed by a central government fund designed to cover the costs of construction, interest, and maintenance. The main sources of controversy associated with the project have been high costs as well as the eventual displacement of at least 300,000 people to allow for the construction of the middle route. There has also been discussion among the international community about whether the project will actually succeed in mitigating northern China's water shortage. Many scholars believe that the project will do more harm than good in the long-term (Lee 2007: 08).

Although the project was approved more than a decade ago, the eastern and central lines have only been partially completed. Implementation has been difficult due to unforeseen water pollution, resettlement issues, and potential environmental impacts. In the case of the SNWTP, these problems have been compounded by China's recent economic growth, which make many of the assumptions on which the original project rested obsolete. However, Chinese officials have not recalculated the project to mitigate contemporary water issues and are continuing to push forward with Mao's solution to water issues in the north. Massive infrastructure projects like the South-to-North Water Transfer Project or the Three Gorges Dam have raised questions within China as well as the international community about the nation's long-term priorities (A-Rodhan 2007: 45-49).

Water management in China is, therefore, receiving increasing attention due to the worsening nature of the crisis. To attempt to address this, experts in China are pushing policies such as water pricing reforms, conservation, and recycling. Some of these are being enacted, but not enough as China's plans focus on major projects such as the SNWDP, which could result in additional economic and environmental costs (Economy 2012a: 11).

China has implemented several policies that directly look at tackling water pollution or promoting water conservation, but several of its other policies have an effect on its water resources. These include a number of pollution and environmental policies, as climate change exacerbates droughts in the northern region and the melting of the Himalayan glaciers limit river flows; energy policies due to the interlinked nature of

energy and water; as well as various economic policies, all of which effect China's water resources.

Recent reforms to address China's water problems, including the 11th Number One Document (which for the first time focused on water), have been heavily criticised for not going far enough to protect China's water resources. Fundamental changes are needed, rather than unattainable and difficult to enforce targets and consumption caps that do not address the reality that water resources are being polluted and overexploited without liability and accountability (Arpi 2010: 15).

12th Five Year Plan 2011-2015

China's 12th Five Year Plan (12FYP) aims to address flaws in previous water policies and has been described as the "turning point to a brave new world" (Tan 2012d: 09). The 12th FYP recognises China's water crisis and has been described as the "most stringent water resource policies to date" (Sevensson 2012: 19). The quotas and targets set in the 12th FYP are now part of the Central Plan and its pollution and efficiency targets ensure these are met in the long term and not only during official inspections (Tan 2012d:9). The government recognises that water will be a choking point for economic development (Tan 2012b:14) and so effectively has no choice but to address this issue. The 12th FYP focuses on conserving and cleaning water resources and introduces a range of policies aimed to do this; however, the present chapter is focused on Chinese policies affecting water under this plan that have potential international implications.

The measures under the 12th FYP that will possibly have international implications include those that raise the cost of operating in China, as these affect the cost of Chinese goods and exports. These include measures to curb water pollution and encourage water efficiency; mainly through setting targets. These targets include reducing the Chemical Oxygen Demand, by 8 percent by 2015 (Schneider 2011:734) and six new pollution targets that impact fertiliser use in agriculture. These targets include a 10 percent target for nitrogen oxides which is intended to encourage industries to move away from coal and implement pollution-reducing technology, reducing water use and pollution (Sutter 2012: 23). Penalties will be applied to enterprises or public institutions that contravene pollution standards of any surface water bodies and groundwater. A country wide system of imposing a levy on

discharges and fines for any violations of the permissible standards has also been introduced (ADB 2011:8). Water usage caps have been implemented to ensure that demand does not exceed supply (Tan 2012b:14), which means that enterprises will have to operate using less water, and if these quotas exceed the permissible limit, the enterprise could have its business permit revoked (Sutter 2012: 17).

Market-based policy mechanisms are increasingly employed to conserve water resources (Zhang 2011:36). Water prices will be reformed to reflect water scarcity and a progressive pricing scheme is planned for 2015. This means that the price of water will rise exponentially as water consumption increases. High water rates will be adopted for water-intensive industries (Tan 2012d:13) and in rural areas a system will be implemented whereby discounts are given when water use stays within quotas, but water prices will rise if the quota is exceeded. Water tariffs, to encourage water efficiency and improve water management, have been significantly raised for urban and industrial use, although prices vary between provinces (China Daily 2012: 05).

Export taxes have been placed on energy and resource-intensive goods, including a 5 percent export tax placed on coal, oil and coke, in order to discourage these goods being exported and to save scarce resources (including water in virtual form). Export tax rebates were eliminated or cut for 553 high-energy, pollution and resource-intensive products. Import tariffs on 26 energy and resource-intensive products were cut from 3-6 percent to 0-3 percent. There is also smaller export VAT refund on energy and resource-intensive goods. This policy is complementary to China's export tax policy and the two are designed to limit exports and increase the world market price of the affected goods. This policy seems to be effective as Chinese exports are less water-pollution intensive than Chinese imports and between 1995 and 2004, the water-pollution intensity of exports fell by about 84 percent (Zhang 2011: 26).

According to a World Bank report, the SNWTP will mitigate water scarcity in the short-term, given that water scarcity will be acute and that the first stages of the SNWTP at least are justified. Additionally, the social and environmental effects of the project are cause for concern. Exploiting natural resources without encouraging sustainable practices will not result in long-term economic prosperity. The SNWTP will also not assuage high groundwater withdrawal in the Northern provinces, as irrigation will remain the largest section of water use in the nation. This is primarily because cities tend to resort to more expensive methods of water acquisition, like

building deeper aquifers or withdrawal from more distant rivers, in place of giving farmers compensation. The South-to-North Water Transfer Project is a direct and non-controversial way of meeting priority demands and it can help contain environmental degradation to some degree. Water transfer in the Middle Route of the project is estimated to cause the average annual temperature to decrease by 0.10-0.24 C, and increase between 21-48 mm in average annual precipitation, which will lead to a more moderate climate. The Middle Route of the project is also expected to reduce the amount of water taken from groundwater supply, which will reduce the reliance in the region. Although both of these effects are beneficial, they only contain environmental degradation in the short-term (Lee 2006: 07).

Additionally, the implementation of the SNWTP has been troublesome because Chinese officials have not applied it to mitigating water scarcity in contemporary China. The calculations of the project during the 1950s are no longer applicable as the demographics, economy and socio and political structure of the nation have changed fundamentally. The SNWTP may have been a more adequate solution to China's water scarcity problem when Mao first proposed it half a century ago—when China's population was 583 million people. Since 1952, China has experienced a population increase of more than 670 million people, which is greater than the present day combined population of Europe. Additionally, China's nominal GDP has increased from $67.9 billion in 1952 to its present day $7.318 trillion and the economy has grown at an annual rate of 10 percent over the last two decades (Xiangang 2008: 364-365). The way in which Chinese citizens operate within the political sphere has also changed NGOs now have a significant presence in the country and Chinese citizens are much more outspoken regarding government policies they do not approve. Environmental conditions within China have also changed drastically since the project was first proposed. Southern China now experiences water quality issues, given increased pollution in the Yangtze River. This has been a major problem in project implementation, as increased pollution levels in the south have significantly increased both the total cost of the project and its negative ecological effects. These issues are exemplified by problems in construction of the middle route of the SNWTP (Xiangang 2008: 368-372).

Construction of the middle route has been the most formidable aspect of the South-to-North Water Transfer Project, in part due to significant changes in the demographics

of the middle route since the project was first proposed in the 1950s. When completed, the route will divert water from the Yangtze in the south to the northern cities of Beijing and Tianjin. This requires elevating the existing Danjiangkou Dam from 162 meters to 176.6 meters and raising the reservoir from 157 meters to 170 meters. The main source of controversy for this section of the project is the fact that it will eventually relocate between 300,000 and 400,000 citizens in three years. Although this number seems relatively small given both China's total population and the 1.2 million people relocated during the construction of the Three Gorges Dam, the nature of the planned relocation is intense (Lee 2006: 22).

According to an International Rivers report, the Chinese government plans to relocate 330,000 people in 3 years, or roughly 110,000 people per year. This is on par with the Three Gorges Dam, which resettled 1.2 million people over ten years, which averages out to 120,000 people per year. Resettlement is controversial for many reasons. First of all, it involves tearing citizens away from places of ethnic, cultural, and familial value. Second of all, displacement will lead to an increase of the migrant population in urban areas. This is already a problem in major Chinese cities, which are already overcrowded. For many citizens living in the affected area, this will be their second displacement as the construction of the Three Gorges Dam relocated many citizens to the region. Displacement and resettlement as a result of middle route construction have occurred as a result of China's rapidly growing population (Tol 2009: 30-32).

The SNWTP diversion project displacement area is five times larger than the displacement area of the Three Gorges Dam. Reactions to resettlement along the proposed middle route have been mixed, especially since the decision was made without the inclusion of public opinion. In a survey conducted by International Rivers, local affected people stated: "We have received a policy brochure, but we did not know how the policies were made or how the compensation standards were set." The affected parties also have no input in the regions that they will be relocated to they are required to relocate and build houses collectively. Chinese officials have failed to recalculate implementation of the middle route of the project on a socio-political level. Public participation in the Chinese political sphere has increased significantly since the time of Mao. If Chinese officials want to effectively construct the middle route of the project, they have to include some level of public input. There are also concerns about relocation given that the budget for resettlement of those affected by

the construction of the middle route is relatively small. This poses problems for the future livelihood of local affected citizens living in the area. There are also ecological risks associated with relocation, as there will be an influx of citizens in areas that cannot accommodate any significant population increase (Tsering 2006: 28-33).

The problems that Chinese authorities have run into while constructing the middle route of the project proves that the SNWTP does not factor in the economic, social and political changes that have occurred in China since the project's inception in the 1950s. Contemporary China is notably different from the China of Mao Zedong. The entire focus of the SNWTP is on the diversion of water from the water-rich southern provinces to the parched north. However, the state of water resources in the southern Chinese provinces—especially the Yangtze River—has changed drastically since Mao first proposed south-to-north water transfer. Scientists are worried that the SNWTP will only divert large amounts of polluted water to a new location. In the 1950s, the Yangtze was a plentiful and clean water resource. However, the river has become incredibly polluted as a result of China's rapid industrialisation and development in recent decades. For the first time, the southern provinces are experiencing water shortages as a function of industrialization and climate change(Tol 2009: 49-51).

In 2007, over a million citizens in Southern China were without drinking water due to a severe drought that decreased rainfall between 20 and 35 percent and dried up reservoirs, wells, and significantly lowered levels in the major rivers of the Yangtze, Yellow (Huang), and Zhujiang. Additionally, an estimated 20,000 factories half are located on the Yangtze are dumping uncontrolled or marginally controlled pollutants into the rivers. The pollution in southern water resources will have the greatest impact on the eastern route of the project, since water will flow through the Imperial Grand Canal, which is heavily polluted with untreated wastewater from the Jiangsu and Shandong provinces. In order to mitigate pollution on the eastern route, government officials have set aside a third of the total route construction budget to build water treatment plants and wastewater recycling centres. The cost of this endeavour is around 24 billion yuan(Tyler 2009: 97-100).

The general water trend in China is characterised by extended sections of poor quality. Twenty percent of the Yangtze and Pearl basins have poor water conditions. Although this number is low compared to 50 percent in Yellow basin and 78 percent in Hai basin, pollution of southern water resources continues to increase. Decreasing

water quality and quantity in southern China is further evidence of a project based on outdated demographics, as there has not been a recalculation of the base assumptions of the SNWTP to mitigate present water scarcity problems. Diversion of water from the south to the north may have mitigated northern water scarcity when the project was first proposed. However, increased pollution in the southern provinces means first that clean water is no longer plentiful in the south, and that the project may result in pollution conveyance, which will exacerbate rather than alleviate the northern provinces' water quality and quantity issues (Vajpeyi 2011: 87-89).

Is there a way out of the SNWTP? The project has been presented as the only policy solution to palliate domestic water stress. There are, in fact, alternative measures to mitigating water scarcity within China that factor in the contemporary economic, political and social changes that have occurred in the last few decades. Changes in the domestic water pricing system aim to mitigate water scarcity at the societal level. Improvements in water use through more efficient irrigation methods as well as changes in the price of water can work to assuage problems of water scarcity in the Chinese industrial sector. Lastly, changes in the Chinese water management system can alleviate water quantity and quality issues at a governmental level. Water expert Peter Gleick of the Pacific Institute writes that China's "absolute scarcity of water is seriously aggravated by grossly inefficient use in some sectors."(Vajpeyi 2012: 54-58)

Domestic water use in urban areas is particularly inefficient. This inefficiency could be reduced through a better water pricing system. Presently, water prices are set low, which means that they cannot fully cover the full cost of water supply. Current household expenditures for water hover at around 1.2 percent of disposable income, which is lower than the 2 percent level that stimulates water saving behaviour. In the city of Xian, located in the northwestern Shaanxi province, domestic water use is priced at 1.6 yuan per m3 when the full production cost is 5 yuan. Chinese officials have been reluctant to raise water prices in the past, as water is viewed as a natural human right. Raising water prices has the ability to provide citizens with incentives to use water more efficiently. If the price of water increases, citizens will be more likely to conserve the resource because they want to conserve their disposable incomes. As mentioned in the second chapter (water resources in Tibet) of this thesis, overuse of groundwater in the agricultural sector remains a large problem within China.

Although the South to North Water Transfer Project has the potential to reduce reliance on irrigation and groundwater, it does not provide any incentives for farmers to improve irrigation efficiency in the long-term (Tilt 2015: 52).

Water productivity is the lowest in agricultural sectors because of excessive waste in irrigation systems only 50 percent of water from primary canals reaches fields. Additionally, only 40 percent of water withdrawn for agricultural use is used. The irrigated area in Northern China is not likely to increase due to water scarcity—water saving agricultural practices could mitigate this problem. Xi-Ping Deng outline the following components of water saving agriculture, use of irrigated farming practice with the most economical exploitation of water resources, Limited irrigation: soil water deficit induced at non-critical growth stages and supplemental irrigation is supplied at critical growth stages, Dry land cultivation: water saving agriculture for areas run off collection (Vorosmarty 2000: 284-287).

Implementing the tactics as outlined by Deng et al could make significant contributions to mitigating water scarcity in northern China by significantly improving the water use efficiency in the agricultural sector. Groundwater scarcity and exploitation could also be mitigated by the employment of water pricing in the agricultural sector. According to a study conducted by the World Bank, a 100 percent price increase would result in a 17-21 percent reduction in water use given that the price elasticities of water demand for irrigation are between 0.17 and 0.21.108 The alternate solutions as outlined above demonstrate that other options for mitigating water scarcity exist that take the social and environmental affects of the problem into account. The South-to-North Water Transfer Project is not the only policy decision that the Chinese government can make in order to assuage water problems in the north (Curry 2013:48).

Located in the central Hubei province, the Three Gorges Dam and its related components comprise the largest amalgamated water infrastructure project in the world. The project is a unique case due to its scale and the controversies surrounding its environmental, social, and economic impacts. The project stretches 2 kilometers across the Yangtze River, across the Three Gorges of Xiling, Wu and Qutang. The dam is 185 meters high with a total installed power capacity of 22,000 MW making it the largest power station in the world (Deepak 2013: 29). Additionally, the project includes a reservoir that is 600 kilometres in length with a storage capacity of 40

billion cubic meters. Project designers claim that the dam will provide electricity and flood protection as well as improve navigation of the Yangtze. This region of China has a history of devastating floods resulting in massive losses of life and farmland. The project is also designed to improve shipping in the region. River navigation is the only cost-effective means of long-distance freight transport. The Three Gorges Dam increases water depth and improves navigation up to the city of Chongqing. The immense ship lock system of the dam allows large quantities of cargo to pass into the upper reaches of the Yangtze. Pre construction, this amount hovered around an average of 18 million tons annually. In 2006, the new system made it possible for 50 million tons to move to 113. The project was also designed to increase the total water supply in the long-term. The Yellow River (Huang He) is filled with silt and is running dry and policymakers believe that the Three Gorges reservoir could function as a potential water source if droughts and scarcity continue to be prevalent in the northern provinces(Deepak 2013: 66-75).

All those in favour of the project argue that it is ultimately beneficial to the environment, claiming that the electricity produced by the dam would otherwise be produced by dirty coal-burning power plants. Those who oppose the project argue that any potential benefits of construction do not make up for the large-scale environmental and social transformations downstream of the dam. Assigning an approximate value to the total cost of the Three Gorges Dam has been difficult, but estimates made in the mid-1990s range from $25 billion (US) to $60 billion (US) (Economy 2012b: 56). The State Three Gorges Construction Funds, power revenues from hydropower facilities and the TGD project, as well as loans and credits from the Chinese State Development Bank (SDB) have funded construction of the dam.115 Global commercial banks and investment firms have provided the project with additional funding. The China Yangtze River Three Gorges Project Development Corporation (CTGPC) set up directly under authority of the State Council has $672 million (US) in assets and has primary ownership of the dam (Economy 2012a: 43-45).

China Water Policies and Its Impacts on India

China maintains that the purpose of building dams along the Tsangpo is to generate electricity which will not require storage of water in large reservoirs. A senior engineer from the Zangmu dam's construction company stated that the river will not

be stopped during construction and when operational, the water's flow will not be reduced. However, as demonstrated by China's dams along the Mekong River, India could still be affected in several ways (Economic Times 2012: 66).

Any damming of rivers affects their flow, and China plans to build numerous dams on the Tsangpo. India believes that China's current dams on the river have had an effect on the Brahmaputra. In Arunachal Pradesh, it was claimed that the Brahmaputra almost dried up due to China's dams (Economic Times: 2012: 78). If this is so, then the reduced flow will have an adverse effect on the economy and environment of India's north east. The Zangmu dam project, which is under construction, is reported to have the potential for 'flood control and irrigation,' which requires water storage and diversion and suggest that this dam could reduce the Brahmaputra's flow and have a greater impact on India contrary to China claims (Elhance 2000: 22).

Even if the dams do not have a significant effect on the Brahmaputra's flow, hydropower dams still impact downstream ecology by removing silt, which can block turbines, from the river before it enters the dam. This silt is nutrient-rich and vital for agriculture in India and Bangladesh. Most people living in the Brahmaputra's catchment area are farmers (Elhance 2000: 38) so the loss of this silt could adversely affect agriculture, especially if there is a reduction in water flow from the Brahmaputra, which raises concern over India's food security. Pollution from the dams construction will also be carried downstream, impacting farmland and depleting fish stocks, adding to food security concerns (Jha 2011a: 10). Air pollution is also believed to contribute to the melting of Himalayan glaciers, further depleting the regions rivers water source. The great potential for food shortages could cause social instability in India (Jha2011b:14).

There are concerns that these dams pose geological risks, especially dams built on the Great Bend, which could cause seismic activity. In a worst-case scenario, the dams could collapse, creating a giant wave and destroying anything in its path, which may cause a domino effect (Eills 2005: 11), destroying downstream dams, which could be devastating to Arunachal Pradesh.

China's dam projects may not have a significant impact on India, but due to India's fears and mistrust of China, India will probably take action to ensure its water security. India feels threatened by China's advantageous position as the upper-

riparian state and will try to safeguard its water resources. India, in the short-term, will look to take preventive action against China to halt its dam projects, through aiming to increase cooperation and decrease mistrust between the two and through this, secure a water sharing agreement from China (ENS 2012: 24-25).

India is looking to use principles of international water law, such as "no significant harm" and "prior notification of works" (Svensson2012:29), to increase its legitimacy as the lower-riparian state and enhance its bargaining position. India aims to achieve this through the de-securitisation of water resource management and by taking a river basin approach (Svensson2012:29-30).

De-securitising water resources is important as it limits the potential for conflict, and for water to be used as a political weapon against India. River dialogue must be isolated from military and political concerns. To help defuse tensions, this separation can be achieved by presenting the issue as one of improving resource management with China. This is already underway, with the sharing of hydrological flood data between China and India, which has helped build trust. India could seek to engage China in cooperating over issues that are not politically sensitive and that are mutually beneficial, such as collaborating on improving water use in the agricultural sector, which will hopefully lead to cooperation on more contentious water issues (Svensson2012: 31-36).

However, China has rejected offers to join the MRC for managing river disputes and continues to develop its dam projects on the Mekong without consulting downstream countries. This reinforces the view that China wants to consolidate the greatest amount of control over its water resources and will continue to treat them with absolute sovereignty, making it difficult to find areas where cooperation is mutually beneficial (Svensson2012: 40). India encouraging cooperation may lead to a slight easing of tensions with China, but it is unlikely to halt China's plans on the Tsangpo, especially as China considers solving its water problems to be in its national interests.

From an Indian perspective, including Bangladesh in the engagement with China in this area is critical to finding a long-term solution. It benefits India to protect Bangladesh's interests, as water shortages in Bangladesh is likely to cause migration to India. If Bangladesh is excluded, then it may feel that its sovereignty is being threatened and raises the potential for future conflict. China has signed a provision of

flood season hydrological data with Bangladesh so will be unable to dismiss Bangladesh's interest as illegitimate. Collaboration in these areas will create a more amicable political climate and increases the likelihood of an agreement being reached (Finney 2013: 17-18).

However, India's claims against China's water projects lose legitimacy when India's actions as an upper-riparian state with regard to Bangladesh are considered. India is planning 168 large hydropower projects in Arunachal Pradesh. India has, therefore, effectively been acting in a similar manner as China by exploiting its water resources to Bangladesh's detriment. Given the volatile nature of the Indian-Bangladeshi water relationship, it is questionable if Bangladesh will want to side with India against China. Given that India has failed to solve water disputes with a friendly state, it seems overly optimistic that raising concerns with China will benefit India (Farrington 2009: 43-44). China, therefore, will probably dismiss India, as it has done with the MRC states, and proceed with its water projects.

In the international arena, tensions have already surfaced through disputes over Asian Development Bank (ADB) loans to India that China attempted, or managed, to block, as they included funding for water projects in the disputed Arunachal Pradesh. Situations like this are predicted to become more common as water becomes increasingly scarce in the two nations (Bajpaee 2010: 17 and Economist 2011a:19).

If India fails to engage China on their proposed dam projects, and the projects prove to be highly damaging to India, then India's response will probably be combined with its response towards the proposed Western line of the SNWDP. The Western line's effect on India will likely amplify the impact of China's dam projects, as diverting the river will reduce its flow even more and have greater potential environmental consequences. The options available to India in response to these negative impacts are, therefore, similar and discussed below.

The South-North Water Diversion Project and its Impact on India

The Western line of the SNWDP is the line that will have the most impact on India. This line is also the most controversial, as it is difficult to determine the likelihood of the line being built due to the lack of transparency and reluctance to share information from China. In response to Indian concerns, Beijing denies that it is considering diverting the Tsangpo, with China's Minister for Water Resources stating

that the diversion of the Tsangpo is "unnecessary, unfeasible and unscientific" (Jha 2011:11). Authorities close to the government, however, say the line will be built and it has been approved in China's 12th FYP (Schneider et al 2011:721). Many commentators also believe it is a matter of when, not if, the line will be built (Wirsing 2012: 167).

If the Western line proceeds, it will divert 200 billion m^3 of the Tsangpo's water north and could cause drastic water shortages in the north of India. This could result in India becoming dependant on China for the Brahmaputra's flow, giving China political leverage. By reducing India's water supply, China could effectively halt India's economic growth and India would be at China's mercy during the dry season, and for flood protection during the rainy season (Michel 2009: 25-26).

Reduction in the Brahmaputra's flow will affect India's utilisation of the river for its own projects. India's hydroelectric power potential will be reduced by roughly 40%, discouraging potential investors in this area and limiting India's clean-energy plans. India is suffering from a scarcity of potable water and has devised its own transfer project, the 'National River Linking Project' to divert water from the Himalayas to basins in south and peninsular India. The project is not currently underway, but if it proceeds, it will depend on water from the Brahmaputra. Reducing the river's flow would thwart this project and deny India a potential solution to their own water crisis (Ranchandran 2010: 18-20).

The diversion of the Tsangpo will adversely impact Bangladesh and could cause mass migration to India due to water related issues. Such a migration will create a human security issue and add to present ethnic conflicts, destabilise the region, and could strain Indian-Bangladeshi relations. There could be a greater reduction in agricultural production under the diversion of the Tsangpo than through China's dam projects due to the reduction in the rivers flow and silt, increasing the threat to food security and social stability. This threat to food security may be exacerbated by India's growing population and the influx of migrants from Bangladesh (Strategic Foresight Group: 2010b: 18).

There is, however, the belief, mainly among Chinese scholars and analysts, that the diversion of the Tsangpo would not have a significant effect on the Brahmaputra's flow. This is as the majority of the Brahmaputra's water is collected from tributaries

on the Indian side of the border and are a more significant source of the rivers waters than the shrinking glaciers (Krishnan 2010: 86).

The best outcome for India, and the region as a whole, with respect to China's SNWDP would be to prevent China from implementing the Western line, as once China has diverted the Tsangpo it will be difficult for India to change the flow back. As proposed above, India will probably adopt a strategy to de-securitise water and encourage a basin-wide approach. There are, however, several other strategies India may employ in the hope of securing their water resources and stabilising the region, and these are discussed below.

Chinese and Indian leaders recognise that water security is a matter of national security, which legitimises the use of an exceptional action. Water dispute is an issue that will probably be exacerbated with time (Krishnan 2010: 69) and is believed to be the "biggest potential point of contention between the two Asian giants". India's foreign policy is developing a harder line against China, and water disputes will potentially be escalated by existing tensions between the two. Furthermore, it is believed that internal disputes over water will result in governments taking a stronger stance on external water disputes, especially as water security is likely to become an issue of political security. China believes water security is vital to its national interests so may go ahead with all its water plans on the Tsangpo taking full advantage of its position as the upper-riparian state to ensure its own water supply. While this is seemingly beneficial to China, it could be highly destabilising for the region and detrimental to downstream states with the potential to cause a humanitarian and environmental crisis (KPMG 2012: 34-36)

India desires a water sharing agreement with China, similar to those it has with Pakistan and Bangladesh, which could prevent the Western line of the SNWDP being built and stop some of China's hydropower projects. These existing water agreements have survived numerous conflicts, provide clarity over water rights and use, and provide mechanisms for dispute settlement. Such an agreement with China could reduce China's leverage as the upper-riparian state and provide a dispute settlement mechanism so that disagreements can be worked out in a straightforward manner. India could attempt to obtain a treaty with China through continually engaging and opening channels of communication with China; building on previous

agreements on sharing hydrological data for flood control and any mutually beneficial collaborations (Kugelman 2011: 96).

India could also attempt to influence Chinese water plans and secure a water agreement by playing on China's insecurity over Tibet. India keeps Tibet issue as an international issue and its support of the Tibetan community in India has allowed the survival of their language, tradition, culture and nationalism. India's policies in this area, therefore, contradict China's claims that Tibet is an inalienable part of China and adds to Chinese insecurity over Tibet. In the past year India's policy towards Tibet has taken a harder line, with India implying to China that it will not concede to China on its core issue of Tibet, as long as China refuses to concede to India on their core issues. India, in 2010, publically and explicitly mentioned India's concerns over China's plan to dam Tibetan rivers that impact India, as an Indian core issue. Therefore, it would be political suicide for any Indian government to give ground to China on Tibet without an equal concession in return (Sikri 2011:65). Thus, this may be an area where India could politically manoeuvre to obtain a water sharing agreement.

India could look at the example set by Kazakhstan in their dealings with China over shared rivers. China has been diverting water from the Irtysh River since the 1990s and by 2020, plans to double the volume of water diverted from the river. Diverting the river has led to reduced flow and increased pollution in Kazakhstan, leading the Kazakh press to publish a series of unfavourable articles that induced China to negotiate and resulted in agreements being signed over sharing water quality information in 2006. In 2007, Russia and Kazakhstan managed to bring water usage and rights of international rivers as a discussion topic to the Shanghai Cooperation Organisation (SCO) Forum and eventually, in 2011, an Agreement on Water Quality in Transboundary Rivers was signed. Kazakhstan's success in getting China to negotiate may be attributed to the value of its copper and oil to China, and success in bringing the issue to the SCO Forum to exert pressure on China (Economy 2012b: 03). India, conversely, only has observer status in the SCO and is not rich in copper or oil (USDA 2012:33), but could raise the issue of water sharing in alternative international forums to pressurise China to sign an agreement.

India has mainly pursued a bilateral approach with respect to trans-boundary rivers, but believes that Pakistan, Bangladesh and Nepal should be involved in countering

China's water diversion plans as they also share rivers with China. Bangladesh has proposed joint basin-wide management of the Brahmaputra with China and India, which is hoped, will draw China into deeper engagement with lower-riparian states and set the basis for a water basin agreement. Furthermore, India aims to start a broader coalition, including Nepal, Bangladesh and Bhutan, on the Ganges-Brahmaputra-Meghna river system, which combined with increased international awareness, will induce China to formulate a river basin approach with the lower-riparian states (IDSA Task Force 2010:50).

However, China seems unwilling to enter into a water sharing agreement with India as Chinese local media believe that such an agreement would be "humiliating". As China is exercising the principle of absolute sovereignty over Tibetan rivers (Ranjan 2010:81) it is unlikely to let Indian concerns prevent it from fulfilling its perceived national interests. China is also unlikely to partake in a water sharing agreement, or become signatory to the 1997 UN Convention as China was 1 of only 3 countries that voted against the convention. This makes the resolution of potential problems complex and gives China leverage (IDSA Task Force 2010: 55). Additionally, there are worries in India that once water problems become more serious, it will be increasingly difficult to engage China in water treaties, as China will be unwilling to compromise its water security (Ranjan 2010:116). This makes it difficult to solve water disputes peacefully and increases the likelihood of conflict and tensions between the two countries.

China's track record regarding its involvement in river basin committees is not encouraging. The MRC, which is backed by Japan and the ADB, has been unable to prevent China's aggressive river projects. The Commission can only request China to "make amends" and this has not had any effect on China's projects (Thakkar 2010:42), therefore India's desire to involve China in a river basin management scheme regarding the Brahmaputra will likely yield similar results.

Impact On Climate

It is progressively perceived that Tibet's atmosphere and land utilise approaches ought not be dealt with exclusively as an 'inside undertaking' of the Chinese government. Albeit numerous particular points of interest stay tricky, in any event to some degree because of absence of information, researchers are progressively recognising the key

pretended by Tibet in the worldwide atmosphere framework. What occurs on the Tibetan level impacts atmosphere and air changes in Asia, as well as far away as East Africa and even Europe.

A current Chinese logical report expressed that intensifying *heat waves*[4] in Europe and north-east Asia are connected to more slender snow-cover on the Tibetan Plateau, highlighting the level's key part in worldwide climate frameworks.

European Parliamentarians in a meeting ahead of time of the Paris environmental change talks*: "The Tibetan level is the measure of Western Europe, and its mass, its occasional cooling and warming straightforwardly influence the climate, appropriate over the northern portion of the globe"* (Lafitte 2013: 38-40).

The fly stream that winds over the planet is deflected by the sheer mass and height of the Tibetan Plateau, which is near two percent of the planetary land surface. In winter, frosty polar air pushes southwards, and the fly stream is deflected to the Himalayas, which shield India from the serious chilly of mainland inward Asia. In spring and summer, the Tibetan level, particularly the uncovered shake of the upper inclines, warms quick, so quick that the fly stream changes far toward the north, deflected around the northern level edges, in this manner attracting from the far Indian Ocean the rain bearing billows of the rainstorm."[5]

Atmosphere researchers have looked along the scope circling the northern side of the equator, from the Tibetan Plateau, crosswise over East Asia, the north Pacific, North America, the Atlantic and on to Europe, and found that air pushed into the upper troposphere by Tibet just dives when it achieves Europe. This implies climatically, Tibet and Europe are straightforwardly associated (Hughes 2013: 48-50)

Half of the considerable number of dams on the planet is presently in China – it has fabricated more vast dams than the US, Brazil and Canada joined (Vajpeyi 2011: 121-122). After every one of the waterways in northern, focal and eastern China had been dammed, the Chinese specialists started to look west, mindful that the streams

[4]A Heat Wave is a time of unusually high temperatures, more than the typical greatest temperature that happens amid the mid-year season in the North-Western parts of India. Warm Waves commonly happen amongst March and June, and in some uncommon cases even stretch out till July. The extraordinary temperatures and resultant climatic conditions antagonistically influence individuals living in these areas as they cause physiological anxiety, once in a while bringing about death.

[5] 'Environmental Degradation on the Third Pole', A briefing for members of the European Parliament, Brussels, November 16, 2015, http://rukor.org/environmental-degradation-on-the-third-pole

hurrying through profound gullies at the edge of the Tibetan level hold the most noteworthy hydropower potential on the planet.

Practically unnoticed by whatever is left of world, a huge number of architects are building dams on Tibet's waterways keeping in mind the end goal to deliver vitality in hydro-electric power stations to be passed on along ultra-high voltage transmission lines for China's extending urban focuses a long way from Tibet.[6] The expectation is to integrate Tibet into the national network, with associations between hydro-dams and long-separate power supply from the foot of the Tibetan level to Guangdong[7]. Locally, the power created will moreover be utilized for mining and mineral handling. (Vajpeyi 2012: 77-78).

The hugeness and key ramifications of China's property utilize approaches in Tibet, terms it the "greatest water grab in history" (Chellany 2013: 19).

The quick and vast scale development of mineral and hydropower assets over the level, joined with the dramatic extension of a street, rail and air system, are key components of China's midway arranged development focuses for Tibet, which incorporate the development of tourism.[8] The dams, large portions of which are being built in the touchy and profoundly mobilized territory of Nyingtri (or Kongpo, Chinese: Linzhi), in the Tibet Autonomous Region, and the development of the new rail lines convey the Chinese government significantly nearer to the objective set by Mao Zedong more than 40 years back of coordinating Tibet with China. The implementation of these detailed arrangements elevates Tibetan feelings of dread for

[6] For Google Earth images of some of the large dams, see Michael Buckley's Meltdown in Tibet website, 'Big Dam Gallery', http://www.meltdownintibet.com/f_damgallery.htm

[7] Guangdong is an area on the South China Sea bank of the People's Republic of China. Generally Romanized as Canton or Kwangtung, Guangdong outperformed Henan and Sichuan to end up noticeably the most crowded region in China in January 2005, enrolling 79.1 million lasting occupants and 31 million vagrants who lived in the area for no less than six months of the year; the aggregate populace was 104,303,132 in the 2010 registration, representing 7.79 percent of Mainland China's populace. The common capital Guangzhou and monetary center point Shenzhen are among the most crowded and essential urban communities in China. The populace increment since the evaluation has been unobtrusive; the region at 2014 end had 107,240,000 individuals.

[8] This is an undeniably critical improvement that is past the extent of this answer to investigate. It will be inspected in up and coming ICT reports. Tourism in Tibet has hit a record high, and the dominant part of vacationers to Tibet is no longer Western hikers however white collar class Chinese. The push to propel tourism to Tibet is a vital component of China's vital and financial destinations in Tibet; taking after the substantial scale misuse of Tibet's mineral and other regular assets under the 'Western Development Strategy', now the 'post-modern' business of tourism has changed the element of venture, drawing more remote organizations and governments to enter the Tibetan economy, for example, worldwide inn networks, and coordinating it with China's.

the survival of their social and religious character.[9]

A noteworthy objective of China's Five-Year Plan, from 2016-2020, is to intensify the development of hydropower dams on all the real Tibetan streams, from which one billion individuals drink day by day.[10] Falls of dams are to be based on all the wild mountain waterways; on the upper scopes of the Yangtze and Salween, there are destinations for around 100 dams, which are either worked, under development or arranged. Different falls will stem China's sans last streaming global waterways, for example, the Mekong and Brahmaputra which could start pressures with India and Southeast Asian countries downstream (Stobdan 2009: 47-48).

On the most bewildering conduit on the planet,[11] the YarlungTsangpo (Brahmaputra), the last generator of the titanic Zangmu dam[12] twisted up detectably operational in October (2015), making real worry in India. The Zangmu Dam, on a curve of the waterway around 155 km from Lhasa in Shannan (Tibetan: Lhoka), is a piece of the Zangmu Hydropower Project and backings a gigantic 510 MW control station, which ended up noticeably operational in 2014 as the biggest hydropower station in Tibet (Svensson 2012: 32).

Regardless of Chinese affirmations that the dams would not influence the downstream range of the YarlungTsangpo[13], it has extended strains amongst China and India over catching the hydroelectric capability of the YarlungTsangpo stream bowl. Prem

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[9] ICT report, 'New strategic rail network to Tibet's borders endangers environment, raises regional security concerns', November 12, 2014, http://www.savetibet.org/new-strategic-rail-network-to-tibets-borders-endangers-environment-raises-regional-security-concerns/#sthash.RQ5td6a4.dpuf

[10] Detailed data on dams and three arrangements of hydropower ventures (HPP) in the watersheds of the Drichu (Yangtze), Zachu (Mekong) and GyalmoNgulchu (Salween) streams up until 2013, in the twelfth Five-Year Plan period, are given by master TashiTsering at his blogsite: http://tibetanplateau.blogspot.co.uk/Tashi Tsering expresses: "As tasks in Sichuan, Qinghai and Yunnan are finished, extends in Tibet Autonomous Region will be created, moving by and large from east to west. As these undertakings get created, vital framework will be set up to build up the Brahmaputra River's the Great Bend territory."

[11] China's first hydropower dam on Brahmaputra is fully operational", *HiLight News, October 13, 2015*, Accessed on 19th November 2015.

[12] The Zangmu Dam is a gravity dam on the YarlungZangbo/Brahmaputra River 9 km (5.6 mi) northwest of Gyaca in the Tibet Autonomous Region of China. This dam is built a few kilometers from the bhutan- India border. The reason for the dam is hydroelectric power creation utilizing keep running of-the-waterway innovation. It is a piece of the Zangmu Hydropower Project and backings a 510 MW control station. Development started in 2009 and the main generator was appointed in November 2014. The keep going ended up plainly operational on 13 October 2015. It is the primary dam on the Brahmaputra/YarlungZangbo River and has brought on contention in India.

[13] A Chinese Foreign Ministry spokesperson told a press conference on November 24, 2014, that the *"ecological power plant" "would not affect the downstream area of the YarlungZangpo River."* (http://finance.eastmoney.com/news/1365,20141126450114748.html in Chinese).

Shankar Jha, composing for China Dialog, trusts this is welcoming disaster: "These arrangements are specialists' fantasies run wild. On the off chance that they have their way, up to 360 dams will be based on slants with an angle of as much as 60 degrees, at the meeting purpose of three of the most youthful and most shaky mountain runs on the planet. In any case, neither the Chinese nor the Indian government has made even a simple appraisal of the effect that gouging out billions of cubic meters of shake and earth to manufacture dams, passages and streets, and store millions, sometimes billions, of cubic meters of water, will have on the security of the world's covering in this locale" (Jha 2011: 20-22).

Jiao Yong[14], representative leader of China's Ministry of Water Resources, told a public interview right on time in 2015 that China wanted to fabricate 27 noteworthy 'water preservation' ventures (which allude to damming and water redirection) in 2015, with about half packed in western areas, "trying to advance urbanization". Jiao Yong stated: "The measure of interest in significant water preservation undertakings will be additionally expanded for the current year, contrasted and the 488 billion yuan ($79.74 billion) a year ago" (Jha 2011: 32-35).

This monstrous venture sets records for number of individuals dislodged (more than 1.2 million), number of urban communities and towns over Sflowed (13 urban communities, 140 towns, 1,350 towns), and length of store (more than 600 kilometers). The venture has been tormented by defilement, spiraling costs, ecological effects, human rights infringement and resettlement troubles. The natural effects of the venture are probably going to deteriorate over the long haul. In 2011, China's most noteworthy government body surprisingly authoritatively recognized the "critical issues" of the Three Gorges Dam.[15]

Portraying the Three Gorges as "a model for catastrophe" the International Rivers Network expressed: "Yet Chinese organizations are duplicating this model both locally and universally. Inside China, enormous hydropower falls have been proposed and are being developed in some of China's most flawless and naturally and socially

[14]Jiao Yong, male, Han nationality, is a native of Shandong province. He was born in 1956, graduated from the North China Hydraulic Engineering Institute, attained a master's degree from the China Institute of Water Resources and Hydropower Research, and received a doctorate from the Imperial College of London, England.

[15] International Rivers Network blog by Peter Bosshard, May 19, 2011, https://www.internationalrivers. org/blogs/227/chinese-government-acknowledges-problems-of-three-gorges-dam

assorted waterway bowls the Lancang (Upper Mekong) River, Nu (Salween) River and upstream of Three Gorges Dam on the Yangtze River and tributaries."[16]

Damming upstream in Tibet conveys extraordinary dangers, especially as the level is a standout amongst the most seismically dynamic regions of the world. Dr Wang Weiluo, a specialist and geographer who is a specialist on dam-working at the University of Dortmund, calls attention to the high dangers of building dams in high mountain areas like Tibet: "Dam-building raises the water level of the waterway which expands the weight of the water on the ground. This raises the quantity of topographical calamities particularly since the valleys of the Himalayas are so youthful, avalanches or rockslides will as of now increment as has occurred in the Three Gorges dam locale.'[17]

The centralisation of dams will be especially thick on the Jinsha (upper Yangtze) River, where falls equivalent to five times the 22.5 GW capacity of the Three Gorges dam are proposed. These dams won't just keep down water stream additionally residue, increasing danger of significant subsidence in the Yangtze delta and surges around real urban communities, for example, Shanghai (The Economist 2011: 33).

"Hydroelectric power is presumably the most problematic option vitality source accessible. Vitality creating dams are basically in a tremendous wrestling match with capable streams," composed Joe McCarthy in Global Citizen. "The waterways need to stream unobstructed, while the dam needs to headlock the water. The resulting tussle prompts numerous unintended impacts."[18]

Supplanting coal with hydropower may prompt cleaner air for resident's east shoreline of China, yet there is a high environmental cost to pay. Chinese environmentalists have required a dire end to huge hydro ventures, calling attention to that the nation's scramble for dams has officially annihilated waterway

[16] International Rivers Network campaign summary https://www.internationalrivers.org/campaigns/three-gorges-dam

[17] Dr Wang Weiluo was speaking in the film 'Struggle for Tibet', a documentary originally shown on German TV, written and directed by: Shi Ming, Thomas Weidenbach for WDR and NDR, in collaboration with Arte. The film won the International Campaign for Tibet-Germany 'Snow lion' journalist award in 2014 (http://www.laengengrad.de/en/produktionen/dokumentationen/tibet.php)

[18] 'Why India and China should leave the YarlungTsangpo alone' by Prem Shankar Jha, March 5, 2014, https://www.chinadialogue.net/article/show/single/en/6753-Why-India-and-China-should-leave-the-Yarlung-Tsangpo-alone

biological communities, angle natural surroundings and brought fears about security up in tremor inclined areas, however without much of any result.[19] There are other options to upsetting the streams: "China has made incredible interests in sun based and wind control, however has not altogether conveyed them in Tibet" (Thakkar 2010: 32-33).

Impact on Tibet's Ecosystem

It is similarly disturbing that a detailed and goal-oriented arrangement to occupy water far from the upper Yangtze and into the Yellow River is planned to start development amid the thirteenth Five-Year Plan period.[20] In what is known as the western course of the enormous south to north water preoccupation extend, the Chinese authorities have finished two courses directing water from the Yangtze far toward the north, to dried northern China (Sinha 2012: 736).

The following stride is proceed with an anticipated third channel through Tibet from the Yangtze in the south to the Yellow River in the north. This would cross the unsettled Tibetan prefectures of Ngaba (Chinese: Aba), where the present influx of self-immolations started in 2009,[21] and Kardze (Chinese: Ganzi) in Sichuan region.

The arrangements were that first the two marsh channels would be burrowed and impacted, and then the whole building group would be changed to Tibet, beginning in the thirteenth Five-Year Plan period in 2016. It would involve a flood of Chinese laborers and designers with overwhelming gear into remote valleys, including tunneling through mountains and the trench itself twisting around the sides of mountains. It is probably going to take longer than five years and would have an irreversible and destroying (Tsering 2006: 33-34).

Prior in 2015, Jiao Yong, delegate leader of China's Ministry of Water Resources,

[19] In 2004, after a major campaign by Chinese environmental groups against damming of the Salween, the then Premier Wen Jiabao intervened and announced that the plans for the Salween would be delayed until more careful environmental and social impact could be assessed. Again in 2009, Wen Jiabao reiterated this stance.

[20] So far the authorities have not given full details of the content of the Five Year Plan beginning in 2016. More information is likely to be announced in March 2016 at the session of the National People's Congress.

[21] The first self-immolation in Tibet in the contemporary era was a young monk from Kirti monastery in Ngaba, Amdo. ICT factsheet on self-immolations in Tibet: http://www.savetibet.org/resources/fact-sheets/self-immolations-by-tibetans/ and report, 'Storm in the Grasslands: Self-immolations in Tibet and Chinese policy', http://www.savetibet.org/storm-in-the-grasslands-self-immolations-in-tibet-and-chinese-policy/

was referred to in the Chinese authority media as saying that he "*guaranteed to precisely concentrate the western course of the south-to-north water preoccupation extend that bolsters the parched Northwest and North China, including Gansu Province and Inner Mongolia Autonomous Region"*. Reliable with the line taken by the Chinese government that damming and water diversion represent 'conservation' he said that the authorities would be examining the project "with water conservation as a priority."[22] Jiao Yong said he was "confident that the project will play a dominant role in the economic development of northern China." There is no affirmation yet in authority arrangements of whether it will to be sure proceed; more subtle elements might be made open in March 2016, when the CCP(Comunist Party of China) has the National People's Congress in Beijing (Bandyopadhyav 1994: 10-15).

In an investigation of this mammoth water-preoccupation extend, Gabriel Lafitte alludes to changes in China's local legislative issues since the Three Canal South-to-North Water Transfer venture was initially reported, saying that "Clients of the Yangtze River, the distance down to Shanghai and the ocean, are progressively defensive of their river, and don't need any a greater amount of it occupied, and the downstream areas convey huge clout. Another reason against this third waterway continually being fabricated is that the water, in the wake of flooding the wealthiest wetland glade field in Tibet, at Dzoege, will course through the upper Yellow River, with water accessible to upper river regions, for example, Gansu and Ningxia, possibly as far downstream as Inner Mongolia. Be that as it may, they will snatch every one of the advantages, there won't be sufficient stream for the all the more politically effective regions assist downriver, including the heartland of China's coal and coal-let go power industry, in addition to Beijing itself." [23]

In any case, Lafitte additionally brings up that the new flood of industrialization as of now occurring in Xinjiang (East Turkestan[24]), straightforwardly toward the north of

[22] 27 water conservation projects planned, half in western regions', Global Times, April 1, 2015, http://english.sina.com/china/2015/0331/797168.html

[23] 'Water, water everywhere', blog by Gabriel Lafitte posted on January 16, 2015, http://rukor.org/water-water-everywhere/

[24]East Turkestan otherwise called Eastern Turkistan, Chinese Turkestan, Uyghurstan, Uyghuristan is a political term with numerous implications relying upon setting and utilization. Generally, the term was created by Russian Turkologists like Nikita Bichurin in the nineteenth century to supplant the term

the Tibetan level, is a component that could tip the adjust towards the third waterway which, if sufficiently enormous, could redirect water not just eastwards to Gansu and further down the Yellow River, additionally north and west in Xinjiang (Arpi 2010: 13).

"Numerous aluminum smelters are being fabricated, dependent on power produced by new coal and gas consuming force stations utilizing the rich fuel supplies of Xinjiang and which China imports, through Xinjiang, from Kazakhstan toward the west," Lafitte writes in a similar . "There is just a single thing missing in Xinjiang, and that is water. A lot of Xinjiang is abandon, its towns traditionally bunched around desert springs. Coal let go control stations require cooling towers that utilization a considerable measure of water, moreover aluminum purifying and other significant substantial ventures under development in Xinjiang will all need heaps of water" (Arpi 2010: 20-21).

Impact on Land

Researchers trust that in Tibet as somewhere else one driver of environmental change might be land cover and land utilize changes identifying with farming and urbanisationThese variables may even exceed ozone harming substance drivin"[25]. "The numerous structural building ventures right now under path, for example, the development of the Qinghai-Xizang railroad, consolidated with a cognizant exertion by China to urbanize the Tibetan level, will prompt further and likely enormously quickened populace increments and land surface changes later on," said researchers

Chinese Turkestan, which alluded to the Tarim Basin in the southwestern piece of Xinjiang region of the Qing administration.

[25] Anthropogenic' greenhouse gas substance driving is for the most part thought to be the fundamental driver of the watched warming in high-height regions. Anthropogenic impacts, procedures, articles, or materials are those that are gotten from human exercises, instead of those happening in common habitats without human impacts. Oliver W. Frauenfeld (NSIDC/CIRES CPP) and Tingjun Zhang (NSIDC/CIRES CPP) express: "Like somewhere else on the globe, a similarly vital anthropogenic part to environmental change might be land cover and land utilize changes on the TP [Tibetan Plateau]. These nearby—provincial surface impacts identified with agribusiness and urbanization possibly exceed ozone harming substance driving. Truth be told, our current research has demonstrated that level arrived at the midpoint of station records, one-sided toward low-lying populated districts, demonstrate a warming pattern of 0.16°C decade — 1 in the course of the most recent 50+ years. Nonetheless, level wide patterns from an autonomous information source free of surface pollution demonstrate no pattern. This has driven us to guess that, in fact, arrive utilize/cover change (LUCC) could to a great extent represent the revealed warming on the Tibetan level." For more detail see the paper 'Is Climate Change on the Tibetan Plateau Driven via Land Use/Cover Change?', a triumphant proposition for the Cooperative Institute for Research in Environmental Sciences Innovative Research Program, 2005, together supported by the University of Colorado at Boulder and the Office of Oceanic and Atmospheric Research at NOAA.

Oliver W. Frauenfeld and Tingjun Zhang. “As demonstrated by a couple audits, the passing on point of confinement of parts of the Tibetan Plateau has been far outperformed, to some degree as a result of ignoble land administration practices executed in the 1950s. In addition, urbanization, which can realize 8–11°C higher temperatures than in including rural reaches, has occurred on the Tibetan level in urban areas, for example, Lhasa, Golmud, and Xining (Arnell 2006: 39-42).

Researchers have now cautioned of an ‘ecosystem move’ on the level because of environmental change and human exercises, lessening future water supply to China and South Asia. Warming temperatures, joined with a sensational foundation blast, a developing populace and overgrazing are consolidating to push delicate ecosystems on the world’s biggest and most elevated level starting with one state then onto the next, as per researchers from the Kunming Institute of Botany (Xu and Grumbine:2014:2).

This irreversible move will mean the locale would never again have the capacity to give scratch ecological administrations for example, water and carbon stockpiling to whatever is left of Asia. It would imply that regions of fields, snowcapped knolls, wetlands and permafrost, fundamental to Tibet’s biodiversity, will vanish on the Tibetan level in the following 35 years.

Project History and Policy Making Process Of Three Gorges Dam

The idea of the Three Gorges Dam initially originated over eighty years ago with the father of modern China ‘Sun Yat Sen’ who first proposed construction of a large hydroelectric dam across the Yangtze in 1919. He proposed constructing a dam to “store water, so that ships can sail upstream against the flow of the river, and the river can be harnessed for electric power.” The Kuomantang government began a preliminary investigation of the project but was disrupted by the Japanese invasion in 1937. Following severe flooding in the region in 1954, Mao promised he would hasten construction of a massive dam, stating “A stone wall to be erected, to cut-off the cloud and rain from the Wushan Mountain, a lake with flat water surface is thus created in the high gorges.”TheJingjiang flood diversion project had been recently completed and was the key in limiting overall flood damages in the Three Gorges region. However, authorities believed that relying solely on the diversion project for flood control in the middle and lower reaches of the Yangtze was unwise and

constructing dams were imperative to ensure the safety of the region. During this time period, the government set up an administrative body called the Committee of the Changjiang Catchment Management to coordinate development activities in the Three Gorges area. Chairman Mao and Lin Yishan, the head of the Yangtze Valley Planning Office (YVPO) were two of the largest proponents of the dam. Lin Yishan had no formal training in water management but was instrumental in the development of the YVPO, which employed thousands of people hoping to make a career through participation and development of the Three Gorges project. Over the next three decades, a series of large-scale investigations were organised as part of engineering feasibility and environmental impact assessments (Lee 2006: 185-190).

Although the Three Gorges continued to be discussed during each Five-Year planning period, national conditions in China during the 1960s and 70s were not ideal for undertaking such a project. Although plans for the Three Gorges were not fully realised until the 1980s due to financial and technical constraints, the government began construction on the Gezhouba dam, situated 40 kilometers downstream from the planned Three Gorges site. The dam was used as a test to resolve any technical issues associated with the Three Gorges project (Arpi 2010: 48-50). In 1982, the central government mainly the YVPO revived earlier project investigations and conducted feasibility studies. In 1983, the State Planning Commission convened a conference of 350 experts to evaluate the results of the YVPO report and to thoroughly discuss all aspects of the dam. The committee concluded that the State Council adopt the YVPO report and move ahead with construction plans. Originally, the project was supposed to be 150 meters high. However, leaders in Chongqing were concerned that the dam would create sediment buildup in backwater regions, therefore complicating navigation and shipping. They proposed that the dam be 175 meters, which was preferable to Deng Xiaoping (Tsering 2005: 45).

In 1986, the Chinese Ministry of Water Resources and Electric Power propositioned the Canadian government to fund research on the feasibility of constructing a dam in the Three Gorges region of the Yangtze. The study was conducted by a consortium of Canadian firms CIPM(China International Pharmaceutical Machinery) Yangtze Joint Venture and was supervised by the World Bank. In 1989, the Changjiang Water Resources Commission was charged with planning, designing, and conducting further research of the project. However, project implementation was not smooth the Three

Gorges faced serious opposition. In 1986, representatives from the Chinese People's Political Consultative Committee (CPPCC) conducted a field trip to the Three Gorges region to meet with ministries and bureaus in cities that would be affected by the project. The report they submitted to the State Council recommended that they halt the project. The project also received a considerable amount of backlash from citizens, journalists, scientists, and even bureaucrats. Despite clear opposition, the People's Congress approved the project in 1992 and construction on the dam began in December 1994. The project was officially completed in 2009. Crackdowns on student demonstrations following Tiananmen Square in 1989 effectively silenced all opposition to the project (Arnott 2010: 21-25).

Additionally, extreme flooding in the region during 1991 highlighted the need for flood control infrastructure, which policymakers stressed was a key role that construction of the Three Gorges Dam would fill. Approval was also made easier due to high support from top leaders in the central government. Central Commissions (weiyuanhui) and leading groups (lingdaoxiaozu) directly under the authority of the State Council or the Communist Party apparatus were responsible for policy-making. The authority rested with the State Council Three Gorges Project Construction Committee (TGPCC), which was headed by then Premier Zhu Rongji. The committee was responsible for all work related to the dam project, which included overseeing construction, environmental, and resettlement work (Bamett 2007: 640-645).

Impact of the Three Gorges Dam Projects

The potential environmental effects the project will have on the Three Gorges region are controversial and numerous. Proponents of the project argue that will have beneficial environmental effects in the long-term, as it will reduce the amount of coal burned annually in China. The Chinese government estimates that if the electricity generated by the dam were generated using coal instead of hydropower, it would burn 50 million more tons of coal and release 100 million tons of carbon dioxide (CO2), 1.2 million tons of sulfur dioxide (SO2), ten thousand tons of carbon monoxide (CO), and large amounts of particulate matter (PM2.5) into the atmosphere. Forty billion yuan is estimated to go towards construction of 150 sewage treatment plants and 170 urban garbage disposal centers in order to reduce the annual amount of wastewater released into the Three Gorges reservoir. The negative environmental consequences of the dam are numerous. Construction of the project has caused further degradation

of the Yangtze River ecosystem, damage to fisheries, reduced sediment in the East China Sea, and has increased the risk of landslides and seismicity in the area. Many of the environmental problems in the region pre-date construction of the Three Gorges Dam, but the project has exacerbated, rather than improved, most of these issues. Scientific investigations were completed in order to prepare a baseline evaluation of plant and animal communities threatened by construction of the Three Gorges Dam. However, these assessments were completed during post-construction of the dam in 2007 (Bhattarai 2011: 29-32).

The Yangtze River basin is home to 36 percent of total freshwater fish species in China. Sharp declines in the region's fish population had already occurred following completion of the Gezhouba dam in 1981. Chemical and temperature composition of the water, and the character of the natural habitat and available food resources. Commercial harvest of four carp species was found to be between 50 and 70 percent below the 2002 pre-dam baseline. The dam has slowed the Yangtze's current, which has led to a reduction in the total amount of sediment in the Yangtze River basin. The Yangtze typically contains large amounts of sediment from its upper reaches to the East China Sea and is crucial in supporting ecological processes and fishery productivity in the Three Gorges region. Since the construction of the Three Gorges Dam, there has been a significant decrease in downstream sediment, which has increased coastal erosion and changed the productivity of the area (Blackmore 2012: 34-39).

Additionally, a slower current will increase the amount of pollution in the Yangtze. Prior to construction, the current movement was quicker and could therefore flush out waste. When reservoirs fill with water, increased pressure is placed on local faults, which increases seismic activity. The Three Gorges region was already seismically active previous to dam construction. Although reports of seismic behaviour have increased post-construction, Chinese officials have minimised the importance of seismic activity, stating "no unusual phenomena which could disrupt the stability of Three Gorge Dams have occurred" (Bhattarai 2011: 01-03). On July 13, 2003, a devastating landslide near Qianjiangping on the junction of the Yangtze and Qinggan rivers occurred. Twenty-four million cubic meters of rock and earth slid into the river, blocking flow and destroying 4 factories, 300 homes and 67 hectares of farmland. This event was attributed to the Three Gorges Dam. The risk of landslides has been

more than what officials expect, and is leading to the formulation of new resettlement efforts for at risk citizens in the region. It is predicted that an additional 4 million residents living in the Chongqing municipality will need to be resettled in the next decade (Bhattarai 2011: 04-07).

The Resettlement Policy

The mass resettlement associated with the Three Gorges Dam has been the most widely publicised and controversial aspect of the project. Before its construction began, the Chinese Academy of Sciences acknowledged that the most devastating aspects of the project were resettlement of citizens living in inundated areas and increased population in urban centres. In order to construct the dam, two cities, eleven county towns, 114 townships, and numerous small villages were completely flooded with water. By the time the dam was officially completed in 2009, 1.35 million people, 17200 hectares of land, and 1500 enterprises had been either relocated or submerged (Blalkle 2004: 521-522).

The Three Gorges Project Resettlement Development Bureau is responsible for the decision-making, planning, and supervision of population resettlement of the Three Gorges area. Authorities in charge of resettlement in the region argue that it will ultimately be beneficial and claim that those who are resettled will be able to maintain their livelihoods. The Development Resettlement Policy was designed to give rural resettlers economic benefits through government-financed reclamation of higher elevation land, growing cash crops, and creating industrial jobs. Authorities cite the abundant natural resources of the area as potential sources of employment for those who are forced to relocate. The central government designated 40 percent of the total costs of the project to be used to aid displaced residents in their relocation. The policy is categorised as development-oriented resettlement, which links displacement with development measures in order to prevent impoverishment of relocated citizens. The official statement of resettlement was “moving out, being stable, and becoming wealthy gradually” (Blalkle 2004: 532-534).

However, the resettlement has not occurred as smoothly as authorities hoped, mainly due to a shortage of available cultivated land, the delicate nature of the natural environment, and the underdeveloped economy of the Three Gorges area. Thayer Scudder outlines four stages of involuntary resettlement:- (1) forced relocation (2)

adjustment of new settlers to a new location and occupation (3)economic and community improvement and (4) consolidation (Chellaney 2010: 23-24).

Scudder posits that the most involuntary resettlement cases do not move into the third stage and the population is eventually worse off economically. This theory applies to government-mandated resettlement policies associated with the Three Gorges Dam. The Three Gorges region is one of the poorest areas in China literacy rates are low and the area has not received government funding since 1949 (Schroder 2012: 98). The region is also severely map developed forests have been destroyed and steep lands were converted to terraced fields in order to meet the needs of the 15 million people living in the area. Farmers make up forty percent of the total displaced population. Prior to construction of the dam, the state government estimated that sixty percent of farmers could continue working in their profession after relocation. Now, it appears that officials overestimated this figure, as the Three Gorges area is unable to sustain those who will be resettled. The environmental capacity of the region is already strained and will be exacerbated by increased population pressures, overflowing, deforestation, soil erosion, and effects on rural labor. Authorities stressed the large amount of land available for farm use in the area. However, one-third of available land is on mountain slopes with a grade of 25 or higher, where the cultivation is prohibited under the Water and Soil Protection Act. This means that there is less land available and more farmers will be forced to make career changes than previously estimated. The population in the resettled area is already dense, averaging 296 persons per km (Schroder 2012: 100-105).

Additionally, the dam flooded 34,000 hectares of farmland, and the area is predicted to experience a grain shortage of 120-150 thousand tons per annum as a result. The burden of resettlement has fallen under the responsibility of the Chongqing municipality. This has been problematic as Chongqing lacks the capacity to take in the large influx of resettled citizens and unemployment rates are already high in the municipality. The region also lacks the necessary funding required to accommodate those who are resettled, as it has not received the amount it was promised by the central government. This is a common theme in the resettlement policy surrounding the Three Gorges Dam funds designated to ease the burden of resettlement tend not to reach their intended recipients due to local government corruption. Instead, government officials appropriated significant portions of resettlement funds for

personal use. A project audit revealed that 473 million yuan nearly 9 percent of funds had been misappropriated and used for personal gain. Poor local planning meant that relocated people had meager land plots, lost their jobs and social status (Tilt 2015: 53).

Additionally, the resettled population often gets farmland that is taken from those already living in resettlement areas, which raises new tensions and conflicts between the host population and the migrant population. Inadequate resources, local corruption, and poor preparation mean that it is unlikely that the third and fourth stages of involuntary resettlement economic and community improvement and consolidation will come to fruition (Schroder 2012: 120).

Desertification

Open grassland accounting for 70 percent of the landmass of Tibet have sustained Tibetans, their pastoral herds, and the prolific wildlife mingling with them, over the millennia. The expert consensus on the Tibet's grasslands that they are degrading.the degradation is not only having serious consequences on the livelihood of tibetan nomads, but it is also affecting the climatic pattern of China and the World (Shrestha 2004: 12) However, there seems to be official Chinese denial over the causes for rangeland degradation and the factors contributing to this new phenomenon.

In reality, China's misguided agricultural policies from the early 1960s are chiefly responsible for the present state of the grassland. The following policies over the years have contributed to degradation of grassland on the Tibetan Plateau: conversion of grassland (the most fertile and lower altitude pastures) to cropland in the early 1950s privatisation of communal land, the traditional pastures of semi-nomads, under a new policy to allow commercial development cultivation of rapeseed on low-lying pastures particularly by Chinese settlers and military units around the pastoral plains of Tso Ngonpo (Lake Kokonor) uncontrolled gold mining and harvesting of wild medicinal herbs on grasslands with the connivance of local authorities infrastructure development such as highways, airports, railways and new townships for settlers elimination of indigenous predators leading to the loss of natural checks on the growth of pest population (Sikri 2011: 56-59).

Sedentarisation:

Sedentarisation policy is the policy of fencing and permanent settlement. The settlement policy restricts the flexibility and mobility of the nomads leading to the concentration of herds in limited areas of pasture that quickly becomes overgrazed. Mountain Closure: To facilitate the reforestation program restrications were imposed upon Tibetans and their live stocks by sealing off mountainous areas reducing the already marginal grazing land areas and further exacerbating the shortage of forage availability to the livestock (Sikri 2011: 72-74).

However, China has abrogated responsibility for grassland degradation by citing natural causes such as global warming and the general drying up of the Tibetan Plateau and blaming the nomads for 'irrational' and 'stupid practices'. Pikas, which are small mouse like mammals, are also being blamed, treated as 'pests,' and are poisoned over large areas (Sinha 2011:423).

Towards a Humanitarian Approach to Water Policies

The present chapter identified the dominance and self interestedbehaviour of China's water industrial complex in national water politics. From a political-economic point of view, this Complex is responsible for China's paradigmatic faith in the effectiveness of engineering approaches to water management, specifically through large-scale water development projects. And as the last three chapters elucidated, social and environmental costs of water development are the two most important costs from a human-interest perspective, and are externalized by contemporary Chinese water management practices. These practices in Chinese water politics raise many human interest questions (Tsering 2005: 40).

Policy priorities

Water is a finite resource, the same amount of which has been available throughout time. Its existence in a particular form in a particular region should be respected as a permanent feature of the landscape, along with the people and the natural environment,and it is therefore the needs of people and nature that must be given precedence. This is also the only way in which the interests and entitlements of both present and future generations can be preserved. From a human-interest approach to water policy, the guiding principle must uphold the fundamental sovereignty of people in harmony with nature. Within this principle, the two most sacred policy

priorities must be achieving adequate supply of safe water to ensure a decent standard of living for all people and to ensure preservation and natural regeneration of the environment. Allocation of water for commercial, industrial, energy, and other developmental purposes should be secondary in the hierarchy of policy priorities to these goals(Tsering 2005: 42).

The political objective of water development must be to foster equity, social justice, and integrity of nature. unman-interest approaches take a broad and integrated approach to understanding development. Individuals and organizations from around the world, concerned about human development, are developing various alternative indicators to measure "water well-being." Alternatives to traditional supply-demand water indicators include, for example, "water availability, access to clean and safe sanitation, the time and effort required to collect domestic water, cost and price, quality, vulnerability of water systems to climate change." Stockholm Environment Institute's "Water Resources Vulnerability Index," for example, uses indices such as "coping capacity," "use-to-resource ratio,"and "reliability." The "Falkenmark Water Stress Index," and the International Water Management Institute's "Indicator of Relative Water Scarcity" are two other examples of such efforts. Similarly, to encourage meeting basic human needs for water as a top policy priority, Gleick developed an indicator of "basic water requirement" of 50 liters per day per person for drinking, cooking, bathing, and sanitation and hygiene. Shifting the water debate from its current focus on measuring supply and demand to measuring the social aspects of water use and water needs are classic examples of the human interest approach (Tsering 2005: 45).

There are numerous technical and political problems in operationalizing this alternative approach to water development. Technical problems include lack of specificity and parsimony, lack of innovative technical studies, and lack of data. Political problems include sovereignty of natural boundaries (integrity of watersheds, etc.) rather than political units, de-emphasis on bureaucratic and technological approaches to water management, labels of "anti-capitalism" or "anti-globalization" for advocating local control and management of resources, and "excessive idealism" considering real-world politics. These problems mainly revolve around the larger failure of human interest advocates thus far to propose a coherent

world or national policy agenda to effect the transition 'from here to there' (Sinha 2011: 25).

As the Chinese cases prove, centrally-funded engineering and centrally-administered technological regulation are ill-equipped to address social and environmental issues of water development. Countries like Brazil and Mexico have adopted decentralized models from formerly centralized models of water management with the assumption that local participation will render decisions that are fair to all parties, leading to an overall effective management. The increasing numbers of empirical cases that support this assumption are promising indicators that resource governance *can* shift from "here to there." Other examples of the value of local-level control include proliferation of watershed initiatives in Northwestern parts of United States and local forest management initiatives in South and South-East Asia. In this regard, one of the positive developments in Chinese water policy (and there are many) is the adoption of the principle of "integrated water resources management." This concept has become a water policy buzzword most authoritative "guidelines for sustainable water development" prescribes this principle, and almost all of them identify participation of stakeholders as a key aspect of the principle. International water development organizations like Global Water Partnership, for example, has now committed to China in facilitating this principle, specifically in eliciting local participation in the construction of South-to-North Water Diversion Project's western route (Tsering 2005: 51-54).

Given the centralized, bureaucratic nature of governance in China, and the government's record for "strike hard" campaigns against its policy critics, the level of free and fair local participation is highly doubtful. Therefore, mere provisions for participation are not enough. In the human-interest tradition of prognosis, a structural approach is necessary to ensure effective community participation. In order for socio-political processes to operate smoothly, suitable institutional frameworks must exist or be created (Tilt 2015: 40).

These institutional frameworks must be de- centralized in nature and offer three minimum guarantees: open, inclusive and participatory processes of water policy making (agenda setting and decision making), implementation and management; public access to information; and access to judicial remedy. The first minimum standard ensures democratic public involvement in all aspects of water management.

The second minimum standard ensures complete availability of information to the public to ensure informed decisions. The last standard gives individuals and groups the ability to seek legal recourse when public authorities or businesses inhibit their well-being (Shrestha 2004: 12).

These principles or minimum standards are the subject of an important international environment agreement the Aarhus Convention, or the Convention on Access to Information, Public Participation in Decision-making, and Access to Justice in Environmental Matters signed by 35 countries and the European Union in 1998. There is tremendous attention that is being given to institutional and technical aspects of China's water problems. This thesis maintains that a fundamental aspect of China's water crisis has to do with the crisis of governance. Although incremental steps are being taken in reforming this aspect as well, from a critical human interest perspective, Chinese water politics will remain unacceptable to people as long as there are no decentralized institutional frameworks to ensure effective local participation in water governance (Tsering 2005: 51).

Conclusion

China's water policies need a humanitarian approach rather than a bureaucratic model for the sustainable development of ecology, culture not only of Tibet region but also for the whole world. China needs water more than ever and to complete its wishful economic model of 'Western Development Strategy' announced in 1999. This was indeed the last jigsaw piece through which all these major rivers and resources could be grabbed, thinly disguised as a mode of development.

Chapter-VI

Conclusion

Water is very crucial for life and it is a strategic concern for many countries since it has multidimensional use. Most of the countries are now facing water scarcity and China is one of them because of two prime reasons firstly, as a result of its burgeoning population and secondly due to the growth of industrialization. This study explored the implications of Chinese water policy in Tibet for the duration of 1979-2014.

The study reveals that managing water crisis in China is a major issue having implication on growth. Water scarcity has threatened the ability of Chinese farmers to irrigate their crops, impacting food security as well as social stability, especially in northern China. Every year, water shortages cost the country an estimated 40-60 billion RMB, i.e. 6.3-9.5 Billion USD, in lost economic output. Continued scarcity and uncertainty affects the willingness of foreign and domestic companies to invest in China, further lowering the production of existing facilities, and ultimately affecting the job market. According to the Water Resources Ministry of China, there were 50,000 rivers with catchment areas of 100 square km or more in the 1950s. Now the number is down to 23,000 and China has lost 27,000 rivers due to over exploitation by farms or factories. China has 20% of the world's population but only 7% of fresh water resources. As a result China has to take care of the water demands of growing population, industries, and agriculture for which it is making efforts to tap Tibet's water resources (Chopra et al 2003).

The study also finds out that since China has water scarcity and most of its rivers are polluted, it needs fresh water. The basic internal issue for China regarding water security is to transfer fresh water from the Tibetan Plateau in the country's west to its industrial and populated corners in its north and east. To achieve this aim, there has been a spree of building dams, canals, irrigation systems, pipelines and water diversion projects. As Brahma Chellaney points out in his seminal work, "Water: Asia's Next Battleground," China has created more dams in the last five decades than the rest of the world combined, largely in order to divert the flow of rivers from the south to its north and east corners. The end result is the diversion of routes of various

rivers originating in the Tibetan Plateau. China considers such diversions to be an internal security matter, but these inter-basin and inter-river water transfer projects in the Tibetan Plateau have tremendous consequences on other downstream countries that draw water from those rivers.

Thirdly, the study finds out that China utilizes the rivers originating upstream in the Tibetan Plateau to build as many as 60 new dams to augment its demand for energy. Electricity originating from these dams from the Tibetan Plateau finds its way to China's large metropolises of Shanghai, Chongqing and Guangzhou. The construction of dams on rivers originating in the Tibetan Plateau may seriously interrupt the water supply in downstream countries. In addition, these constructions pose a grave threat to the regions biodiversity and environment. Located in a highly seismic zone, dam building also increases risks of catastrophic earthquakes affecting millions of people. Even though China claims to have the interests of these countries in consideration, it remains one of the only nations without any institutionalized water sharing agreement with downstream countries. For instance, China is building three large hydropower dams on the upstream Yarlung Tsangpo River (in Tibet, which China has renamed the River Yarluzangbu). Further downstream, it flows as the Brahmaputra into densely populated areas of India and Bangladesh. The great consequences of these dams are clear for all to see. These dams could well interrupt the fresh water supply to northeastern India and Bangladesh. This is also a region where most of the people depend on the fresh water supply for livelihoods, agriculture and food. India's and Bangladesh's combined population of over 1.3 billion is already edging past China's population. India alone is expected to surpass China's population in just over a decade. Whatever the merits of the current South-North Water Diversion Project, China's multi-decade river rerouting plan at a cost of $62 billion, it will have severe environmental and water security consequences for its neighbours.

Tibet's first major dam, the Zangmu hydropower station, started generating electricity at the end of November2014. This prompted complaint from India that Chinese dam building on the Yarlung Zangbo River could reduce water flow and cause environmental damage downstream in India. But Chinese experts say vested interests in India stand to benefit from playing up the threat of Chinese hydropower and that only dialogue and partnership will solve Asia's water disputes.

Tibet, the world's largest and highest plateau, is referred to as the 'world's third pole' because it contains the biggest ice fields outside of the Arctic and Antarctic. Tibet is a country with many rivers and lakes which are strategically important for other Asian countries in general and China and India in particular. The two big Asian country, China and India, are gaining economic and international heft in an era of serious water shortages and face the prospect that their modernization may stall as a result. Intra-state water disputes are already rife in several Asian countries. China is now pursuing massive inter-basin and inter-river water transfer projects in Tibet which threaten to cause further damage to the plateau's fragile eco-system. China plans to build nearly one hundred dams across the Tibetan plateau and several water diversion projects to move water into northern and eastern China.These projects will disrupt already-overstressed water supplies of hundreds of millions of people in South and Southeast Asia.

Fourthly, the study also finds out how the construction of dams impact Tibet. China shares six river systems which originate from the Tibetan plateau with nine of its neighbours, which gives China an advantage in utilising them. Through all these projects and dam constructions plans, China uses Tibet water resources for its own purpose and benefits, and diverts its water according to their needs and development strategy. Till date, all the major rivers and their tributaries that flow from Tibet are dammed and this dam building frenzy in the western Tibet is creating huge discussions and doubts whether these projects could act as a stepping stone in expanding its ambitious water transfer projects beyond its initial plan. The current expansion of railway network connecting Beijing and the rest of Tibet paves the way for logistical support and transportation of damming inventories, if required in due time.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. By overlaying the UN seismic hazard zone map and the locations of these dams on the western rivers of Tibet clearly sends an inevitable signal that those living in the shadow of these dams are at the mercy of nature. According to the report published by Probe International, more than 90 percent of dams that are built, under construction or proposed for the rivers that flow from Tibet, are located in zones of very high or moderate seismic hazards.The impact of climate change and ecological depletion on the Tibetan plateau is not a regional but

a global issue. Cooperation is essential-among scientists as well as government and local people. The Dalai Lama has stressed the importance of raising awareness about the crisis and the important role played by both Chinese scientists and Tibetan people living on the land.

Many of the rivers of Tibet are thousands of kilometers in length and they link the lives of billions of human beings. Tibetans provide environmental services for all downstream users by preserving these rivers as clean flowing, uninterrupted, steady and perennial. These are substantial environmental services in an interdependent world in much need of environmental services that provide scarce water, or limit climate change. Tibet, in the heart of Eurasia, provides not only water but also generates monsoon that produce the waters of Asia. Tibetans would prefer to maintain the purity and steady flow of the rivers and the plateau is the number one water tower for China, Southeast and South Asia. But Tibetans are poor, not allowed to voice their aspirations, and now face many dangers, including climate change, massive river damming, the ongoing erosive consequences of intensive logging of Tibetan river catchments, mining close to major rivers and increasing pollution.

India is looking to use principles of international water law, such as “no significant harm” and “prior notification of works”, to increase its legitimacy as the lower-riparian state and enhance its bargaining position. However, India recognizes that China is unlikely to cooperate voluntarily given its unpromising relations with other lower-riparian states and the MRC, and so will need to incentivize China to engage in water issues, while safeguarding against the possibility of hostile damming from China. India aims to achieve this through the de-securitisation of water resource management and by taking a river basin approach.

De-securitising water resources is important as it limits the potential for conflict, and for water to be used as a political weapon against India. River dialogue must be isolated from military and political concerns. To help defuse tensions, this separation can be achieved by presenting the issue as one of improving resource management with China. This is already underway, with the sharing of hydrological flood data between China and India, which has helped build trust. India could seek to engage China in cooperating over issues that are not politically sensitive and that are mutually beneficial, such as collaborating on improving water use in the agricultural sector, which will hopefully lead to cooperation on more contentious water issues.

However, China has rejected offers to join the MRC for managing river disputes and continues to develop its dam projects on the Mekong without consulting downstream countries. This reinforces the view that China wants to consolidate the greatest amount of control over its water resources and will continue to treat them with absolute sovereignty, making it difficult to find areas where cooperation is mutually beneficial. India encouraging cooperation may lead to a slight easing of tensions with China, but it is unlikely to halt China's plans on the Tsangpo, especially as China considers solving its water problems to be in its national interests.

From an Indian perspective, including Bangladesh in the engagement of China in this area is critical to finding a long-term solution. It benefits India to protect Bangladesh's interests, as water shortages in Bangladesh is likely to cause migration to India. If Bangladesh is excluded, then it may feel that its sovereignty is being threatened and raises the potential for future conflict. China has signed a provision of flood season hydrological data with Bangladesh so will be unable to dismiss Bangladesh's interest as illegitimate. Collaboration in these areas will create a more amicable political climate and increases the likelihood of an agreement being reached.

However, India's claims against China's water projects lose legitimacy when India's actions as an upper-riparian state with regard to Bangladesh are considered, as India is planning 168 large hydropower projects in Arunachal Pradesh. India has, therefore, effectively been acting in a similar manner as China by exploiting its water resources to Bangladesh's detriment. Given the volatile nature of the Indian-Bangladeshi water relationship, it is questionable if Bangladesh will want to side with India against China. Given that India has failed to solve water disputes with a friendly state, it seems overly optimistic that raising concerns with China will benefit India. China, therefore, will probably dismiss India, as it has the MRC states, and proceed with its water projects.

In the international arena, tensions have already surfaced through disputes over Asian Development Bank (ADB) loans to India that China attempted, or managed, to block, as they included funding for water projects in the disputed Arunachal Pradesh. Situations like this are predicted to become more common as water becomes increasingly scarce in the two nations.If India fails to engage China on their proposed dam projects, and the projects prove to be highly damaging to India, then India's response will probably be combined with its response towards the proposed Western

line of the SNWDP. The Western line's effect on India will likely amplify the impact of China's dam projects, as diverting the river will reduce its flow even more and have greater potential environmental consequences. Chinese water politics will remain unacceptable to people as long as there are no decentralized institutional frameworks to ensure effective local participation in water governance. China's water policies need a humanitarian approach rather than a bureaucratic model for the sustainable development of ecology, culture not only of Tibet region but also for the whole world.

Hence the examination of Water Resources in Tibet and China's policies,1979-2014undertaken in the preceding chapters confirms the two hypothesises stated at the beginning of the research

These were:

1. Growing agricultural and urban demands have prompted China to adopt policy towards Tibet's water resources.

   Rapid industrialization and the increasing levels of consumption of the ever-growing middle class in the mainland China are placing heavy demands on water resources in major Chinese cities and industrial sectors. 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 clean water sources in 2008, and about 460 million did not have access to proper sanitation. In short, progress in rural areas lags behind what has been achieved in urban areas. Managing Water in China is a major issue having implication on growth. 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.

2. Harnessing water resources is new factor in China's policy towards Tibet.

   Water is very crucial for life and it is a strategic concern for many countries since it has multidimensional use. Most of the countries are now facing water scarcity and China is one of them because of two prime reasons firstly, the growth of industrialization and increasing populations there is more need of water. Therefore, China has also made water laws like 1988 and revised versions of 2002. If one look at the attitude of China in the Tibet region, it

behaves like a hegemon and using water resources of Tibet ignoring the livelihoods and biodiversity concerns of the lower riparian countries.

Appendix

Water Law of the People's Republic of China

Adopted at the 24th Meeting of the Standing Committee of the Sixth National People's Congress onJanuary 21, 1988; revised at the 29th Meeting of the Standing Committee of the Ninth NationalPeople's Congress on August 29, 2002 and promulgated by Order No.74 of the President of thePeople's Republic of China on August 29, 2002

Chapter I General Provisions

Article 1

This Law is enacted for the purposes of rationally developing, utilizing, conserving andprotecting water resources, preventing and controlling water disasters, bringing about sustainableutilization of water resources, and meeting the need of national economic and social development.

Article 2

This Law is applicable to development, utilization, conservation, protection and managementof water resources and to prevention and control of water disasters within the territory of the People'sRepublic of China.

The water resources referred to in this Law include surface water and groundwater.

Article 3

Water resources are owned by the State. The State Council, on behalf of the State,exercises the right of ownership of water resources. The water of ponds belonging to rural economiccollectives and the water of reservoirs built and managed by such collectives shall be used by thecollectives respectively.

Article 4

In developing, utilizing, conserving and protecting water resources and preventing andcontrolling water disasters, emphasis shall be placed on overall planning and all-round consideration,on both the root cause and symptoms, and on multipurpose use, efficiency, and the multiple functionof water resources, and attention shall be paid to

coordinated use of water in people's daily lives, inproduction and operation and in ecological environment.

Article 5

People's governments at or above the county level shall pay special attention to constructionof water conservancy infrastructures, and incorporate it into their plans of national economic andsocial development.

Article 6

The State encourages units and individuals to develop and use water resources inaccordance with law, and protects their legitimate rights and interests. Any unit or individual thatdevelops and uses water resources has the obligation of protecting water resources in accordancewith law.

Article 7

For water resources, the State applies, in accordance with law, the system of licensing forwater-taking and the system of compensation for use of water, except for water of the ponds andreservoirs belonging to rural economic collectives that is used by such collectives and their members.The administrative department for water resources under the State Council is responsible for makingarrangements for implementing the system of licensing for water-taking and the system ofcompensation for use of water throughout the country.

Article 8

The State encourages strict economy on the use of water, greatly promotes waterconservingmeasures, spreads the use of new technologies and techniques for water-conserving,develops water-conserving industries, agriculture and services, and builds a water-conservingcommunity.

People's governments at all levels shall adopt measures to improve management of waterconservation, establish a system for developing and promoting the use of water-conservingtechnologies, and foster and develop water-conserving industries.

All units and individuals shall have the obligation of economizing on water

Article 9

For the purpose of protecting water resources, the State adopts such effective measures asprotection of vegetation, planting of trees and grass, conservation of water sources, prevention andcontrol of soil erosion and water-body pollution, and improvement of ecological environment.

Article 10

The State encourages and supports research, extension and application of advancedscience and technology in development, utilization, conservation, protection and management ofwater resources, and in prevention and control of water disasters.

Article 11

Units and individuals that have made outstanding achievements in development, utilization,conservation, prevention or management of water resources, or in prevention and control of waterdisasters shall be rewarded by people's governments.

Article 12

For water resources the State applies the system under which management of river basinsis combined with management of administrative regions.

The administrative department for water resources under the State Council is responsible for unifiedmanagement of and supervision over water resources throughout the country.

The institutions for river basin management (hereinafter referred to as river basin authorities, inshort), set up by the administrative department for water resources under the State Council for thekey rivers and lakes defined as such by the State, shall perform the duties of water resourcesmanagement and supervision, within the limits of their jurisdiction, specified by laws andadministrative regulations and assigned to them by the said department.

The administrative departments for water resources under the local people's governments at or abovethe country level shall, within the limits of their specified powers, be responsible for unifiedmanagement of and supervision over the water resources.

Article 13

The relevant departments under the State Council shall, in conformity with the division oftheir duties, be responsible for work relating to the development, utilization, conservation andprotection of water resources.

The relevant departments under the local people's governments at or above the country level shall, inconformity with the division of their duties, be responsible for the development, utilization,conservation and protection of water resources within their administrative regions.

Chapter II Planning for Water Resources

Article 14

The State formulates strategic plans for water resources across the land.

Unified plans shall, on the basis of river basins and regions, be made for the development, utilization,conservation and protection of water resources and for prevention and control of water disasters. Theplans shall be divided into river basin plans and regional plans. The river basin plans shall includecomprehensive river basin plans and special river basin plans; the regional plans shall includecomprehensive regional plans and special regional plans.

The comprehensive plans mentioned in the preceding paragraph are general outline drawn, in light ofthe need of economic and social development and the present conditions of water resourcesdevelopment and utilization, for the development, utilization, conservation and protection of waterresources and for prevention and control of water disasters. The special plans mentioned in thepreceding paragraph are plans for flood control, waterlogging prevention, irrigation, navigation, watersupply, hydropower generation, bamboo and log rafting, fishery, water resources protection, waterand soil conservation, prevention and control of sedimentation, conservation of water, etc.

Article 15

The plan for a region within a river basin shall be subordinated to the plan for the riverbasin, and the special plan shall be subordinated to the comprehensive plan.

Comprehensive river basin plans and comprehensive regional plans as well as the special plansclosely related to land use shall be coordinated with the plans for national

economic and socialdevelopment, the general plans for land use and general urban plans and plans for environmentalprotection, and at the same time the needs of various regions and industries shall be taken intoconsideration.

Article 16

Comprehensive scientific survey, investigation and assessment of water resources shall beconducted before a plan is formulated. Such survey, investigation and assessment shall be arrangedby the administrative department for water resources under the people's government at or above thecounty level, in conjunction with the relevant departments at the same level.

People's governments at or above the county level shall pay special attention to establishment of aninformation system for hydrology and water resources. The administrative departments for waterresources under such governments and the river basin authorities shall pay special attention todynamic monitoring of water resources.

The basic hydrological data shall be made public in accordance with the relevant regulations of theState.

Article 17

The comprehensive river basin plans for key rivers and lakes defined as such by the StateShall be worked out by the administrative department for water resources under the State Council, inconjunction with the relevant departments under the State Council and the relevant people'sgovernments of provinces, autonomous regions or municipalities directly under the CentralGovernment, and they shall be submitted to the State Council for approval.

The comprehensive riverbasin plans and comprehensive regional plans for other rivers and lakes that run or straddle acrossprovinces, autonomous regions or municipalities directly under the Central Government shall beworked out by the relevant river basin authorities, in conjunction with the administrative departmentsfor water resources and the relevant departments under the people's governments of the provinces,autonomous regions or municipalities directly under the Central Government where the rivers runacross or the lakes are located, and these plans shall be examined and commented by the relevantpeople's governments of the provinces, autonomous regions or municipalities directly under theCentral Government, before they are submitted to the administrative department for water resourcesunder the State Council for examination

and verification; the administrative department for waterresources under the State Council shall consult the relevant departments under the State Councilbefore submitting the plans to the State Council, or the department authorized by it, for approval.

The comprehensive river basin plans and comprehensive regional plans for rivers and lakes otherthan the ones specified in the preceding paragraph shall be worked out by the administrativedepartments for water resources under the local people's governments at or above the county level,in conjunction with the relevant departments at the same level and local people's governmentsconcerned, and they shall be submitted to the people's governments at the same level, or thedepartments authorized by the governments, for approval, before they are submitted to theadministrative departments for water resources at the next higher level for the record.

Special plans shall be worked out by the relevant departments under the people's governments at orabove the county level, and they shall be submitted to the said people's governments for approvalafter the other relevant departments at the same level are consulted. With respect to plans for floodcontrol and water and soil conservation, they shall be made and approved in accordance with therelevant provisions in the Flood Control Law and the Law on Water and Soil Conservationrespectively.

Article 18

Once a plan is approved, it shall be implemented to the better.

Wherever the approved plan needs to be amended, the amended plan shall, according to theprocedure for the formulation of plans, be subject to approval by the original authority that givesapproval to the plan.

Article 19

Waterworks shall be built in conformity with the comprehensive river basin plans. Forconstruction of any waterwork on the key river and lake defined as such by the State or on the river orlake that runs or straddles across provinces, autonomous regions or municipalities under the CentralGovernment, the relevant river basin authority shall, before the feasibility study report on thewaterwork is submitted for approval, examine whether the waterwork conforms to the comprehensiveriver basin plan, write down their comments and sign. For construction of waterworks on other

riversand lakes, the administrative departments for water resources of the local people's governments at orabove the county level shall, before the feasibility study reports of the waterworks are submitted forapproval and within the limits of their administrative powers, examine whether the waterworksconform to the comprehensive river basin plans, write down their comments and sign. Where awaterwork is related to flood control, it shall be constructed in accordance with the relevant provisionsin the Flood Control Law; if it is related to other regions or industries, the unit that launches thewaterwork shall solicit comments from the relevant regions and departments in advance.

Chapter III Water Resources Development and Utilization

Article 20

In developing and utilizing water resources, the principles of combining promotion of what isbeneficial with elimination of what is harmful, taking into account the interests of the regions in boththe upper and lower reaches and on both the right and left banks of a river and the interests amongthe relevant regions, giving full play to the overall benefits of water resources, and subordinating tothe overall arrangements for flood control shall be adhered to.

Article 21

In developing and utilizing water resources, attention shall first be paid to satisfying theurban inhabitants' need of water in their daily lives, while taking into consideration the need of waterin agriculture, industry and ecological environment, and the need of navigation, etc.

In developing and utilizing water resources in arid and semi-arid areas, full consideration shall begiven to the need of water in ecological environment.

Article 22

For diversion of water across river basins, all-round planning and scientific demonstrationshall be needed, overall consideration shall be given to the need of water by both the river basinswhere water is diverted from and the river basins where water is diverted to, and damages toecological environment shall be prevented.

Article 23

Local people's governments at all levels shall make rational arrangements for developmentand multipurpose use of water resources in light of the actual conditions of the local water resourceson the principle of unified control over development of surface water and groundwater, combination ofthe tapping of new resources with water conservation, giving priority to water conservation, andrecycling sewage water.

Plans for national economic and social development and general urban plans shall be formulated andmajor construction projects shall geographically be distributed in such a way as to suit the localconditions of water resources and the need of flood control, and scientific demonstration shall beneeded. In areas with insufficient water resources, limitations shall be set on the scale of cities and onconstruction of industrial, agricultural and service projects that consume large amounts of water.

Article 24

In respect of areas that are short of water resources, the State encourages the collection,development and utilization of rainwater and slightly salty water, as well as the exploitation anddesalination of seawater.

Article 25

Local people's governments at various levels shall provide better guidance in respect ofirrigation, draining of waterlogged fields, and water and soil conservation, in order to promote thedevelopment of agricultural production. In areas that are prone to salinization and floodwater hazards,measures shall be taken to control or lower the groundwater level.

Where rural economic collectives or their members, in accordance with law, invest in construction ofwaterworks on land owned by the collectives or on land contracted, they shall, on the principle of"those who invest in construction shall manage and receive the benefits", manage and make rationaluse of the waterworks and the water stored.

Construction of reservoirs by rural economic collectives shall be subject to approval by theadministrative departments for water resources under the people's governments at or above thecounty level.

Article 26

The State encourages the development and utilization of hydroenergy resources. On riversrich in hydroenergy, multi-purpose and -cascade development shall be promoted in a plannedmanner.

In construction of hydropower stations, attention shall be paid to protection of the ecologicalenvironment, and consideration shall, at the same time, be given to the needs of flood control, water supply, irrigation, navigation, bamboo and log rafting, fishery, etc.

Article 27

The State encourages the development and utilization of water transport resources. Whenhaving permanent dams or sluice gates built across the migration routes of aquatic life or acrossrivers for navigation or bamboo and log rafting, the units that launch such projects shall have facilitiesfor the passage of fish and ships or for bamboo and log rafting built simultaneously, or take otherremedial measures upon approval by the departments authorized by the State Council and, inaddition, they shall make proper arrangements for protection of aquatic life, for navigation, and forbamboo and log rafting during the period of construction and water-storing and bear all the expensesincurred thereby.

Where a non-navigable river or man-made waterway becomes navigable after a dam or sluice-gate isbuilt across it, the unit that launches the project shall simultaneously have facilities built for thepassage of ships or sites reserved for such facilities.

Article 28

No unit or individual may divert, intercept (store) or drain off water at the expense of publicinterests or another person's legitimate rights and interests.

Article 29

The State applies a development-oriented policy with regard to construction of waterworksthat involves relocation of people and, on the principle of combining compensation or subsidies given in the early stage with assistance given in the later stage, makes proper arrangements for productionand daily lives of the relocated people and protects their legitimate rights and interests.

Arrangements for relocated people shall be made simultaneously with the construction of theprojects. The unit launching the construction project shall, on the basis of the ambient capacity of theplaces where people are to be located and the principle of sustainable development, work out a planfor arrangements to be made for such people in light of the local conditions, which, upon approval inaccordance with law, shall be implemented through arrangement by the local people's governmentconcerned. Funds needed for relocation of people shall be included in the investment plan forconstruction of the project.

Chapter IV Protection of Water Resources, Water Areas and Waterworks

Article 30

When working out plans for development and utilization of water resources and fordistribution of water resources, the administrative departments for water resources under the people'sgovernments at or above the county level, the river basin authorities and the other departmentsconcerned shall pay attention to maintaining a proper flow of rivers and keeping the lakes, reservoirsand groundwater at a proper water level in order to maintain the natural purification capability of thewater body.

Article 31

Any unit or individual engaged in activities concerning water, such as development,utilization, conservation and protection of water resources and prevention and control of waterdisasters, shall follow the approved plans. Where a unit or individual that acts against the plans andthus causes the lowering of the use functions of the rivers or lakes, overexploitation of groundwater,sinking of land surface or pollution of water bodies shall bear the responsibility of bringing suchphenomenon under control.

Where dredging or draining of water, necessitated by mining construction of underground project,results in the lowering of groundwater level, drying up of water sources or subsidence of ground, theunit that launches the mining or the construction project shall take remedial measures, and wherelosses are caused to other people's lives and production, it shall compensate for the losses inaccordance with law.

Article 32

The administrative department for water resources under the State Council shall, inconjunction with the administrative department for environmental protection and the relevantdepartment under the State Council and the relevant people's governments of provinces, autonomousregions or municipalities directly under the Central Government and in line with the comprehensiveriver basin plans, water resources protection plans and the need of economic and socialdevelopment, divide water function zones along key rivers and lakes defined as such by the State,which shall be submitted to the State Council for approval. Such zones along other rivers and lakesacross provinces, autonomous regions or municipalities directly under the Central Government shallbe divided by the relevant river basin authorities, in conjunction with the administrative departmentsfor water resources, for environmental protection and other departments concerned under thepeople's governments of the provinces, autonomous regions or municipalities directly under theCentral Government where rivers and lakes are located, which shall be examined by, and on whichcomments shall be solicited respectively from, the relevant people's governments of provinces,autonomous regions or municipalities directly under the Central Government, before they are furtherexamined by the administrative department for water resources under the State Council inconjunction with the administrative department for environmental protection under the State Council,and then they shall be submitted to the State Council or the department authorized by it for approval.

Water function zones along rivers and lakes other than the ones specified in the preceding paragraphshall be divided by the administrative departments for water resources under the local people'sgovernments at or above the county level, in conjunction with the administrative departments forenvironmental protection and the departments concerned under the people's governments at thesame level, and shall be submitted to the people's governments at the same level or the departmentsthey authorized for approval, and to the administrative departments for water resources and forenvironmental protection under the people's governments at the next higher level for the record.The administrative department for water resources under the people's government at or above thecounty level or the river basin authority shall, on the basis of the water quality required by a waterfunction zone and the natural purification

capacity of the water bodies of the zone, check and definethe pollution-receiving capacity of the water areas there and make proposals to the administrativedepartment for environmental protection on limitation of the total amount of pollutiondischarged to thesaid areas.The administrative departments for water resources under the local people's governments at or abovethe county level or river basin authorities shall monitor the quality of water in water function zonesand, when discovering that the total amount of major pollutants discharged exceeds the control normor water quality in water function zones falls short of the standard required by the use function of thewater areas,promptly report the matter to the people's government concerned for taking controlmeasures and report to the administrative departments for environmental protection in a circular.

Article 33

The State establishes a protection system for zones of drinking water sources. Thepeople's governments of provinces, autonomous regions or municipalities directly under the CentralGovernment shall define the drying-up of the water sources and pollution of the water bodies, for thepurpose of ensuring town and county residents' safety in respect of drinking water.

Article 34

Construction of any outlet for sewage discharge in the protection zones of drinking watersources is prohibited.Construction, reconstruction or expansion of a sewage discharge outlet along rivers or lakes shall besubject to permission by the administrative department for water resources or the river basin authoritythat has jurisdiction over the matter, and the administrative department for environmental protectionshall be responsible for examination of the written report on the impact of the construction project onthe environment before giving approval.

Article 35

Where a construction project occupies water sources for agricultural irrigation or irrigationand drainage facilities, or has an adverse effect on the original water for irrigation and sources forwater supply, the unit that launches the project shall take the necessary remedial measures. Wherelosses are caused, it shall compensate for the losses in accordance with law.

Article 36

In areas where groundwater is overexploited, the local people's governments at or abovethe county level shall take measures to keep exploitation of groundwater under strict control. In areaswhere groundwater wasoverexploited to a serious extent, certain areas may, upon approval by thepeople's governments of provinces, autonomous regions or municipalities directly under the CentralGovernment, be defined as areas where exploitation of groundwater is prohibited or restricted.Exploitation of groundwater in coastal areas shall undergo scientific demonstration, and measuresshall be taken to prevent sinking of land surface and encroachment by seawater.

Article 37

No one may throw away or pile up objects or plant forest trees or high stalk crops in rivers,lakes, reservoirs, canals or channels, which block the passage of flood water.No one may, in areas under river course control, put up buildings or structures that block the passageof flood water, or engage in activities that adversely affect the stability of the river condition orendanger the safety of the river embankment or other activities that block the passage of flood waterthrough the river course.

Article 38

In an area under river course control, construction of a bridge, wharf or other building orstructure that blocks, spans or borders on a river, or laying of pipes or cables across a river, shallmeet the flood control standard and other relevant technical requirements specified by the State, andthe plans made for construction of the project shall, in accordance with the relevant provisions in theFlood Control Law, be submitted to administrative department for water resources for examinationand approval.here for the construction of a project mentioned in the preceding paragraph it is necessary toexpand, rebuild, dismantle or damage the existing waterworks, the unit launching the constructionproject shall bear the expenses incurred by the expansion and rebuilding or compensate for thelosses incurred, except where the existing works are unauthorized.

Article 39

The State applies a licensing system for sand quarrying in river courses. Measures forimplementing the licensing system for sand quarrying in river courses shall be

formulated by the StateCouncil.Where sand quarrying in areas under river course control that may adversely affect the stability of theriver condition or endanger safety of the d ykes, the administrative departments for water resourcesunder the relevant people's governments at or above the county level shall delimit no-quarry areas orfix no-quarry periods, which they shall make known to the general public.

Article 40

Reclaiming parts of a lake for use as farmland is prohibited. The parts already reclaimedshall be restored as parts of the lake in a planned way according to the flood control standardformulated by the State.Reclaiming parts of a river course for use as farmland is prohibited. Where it is really necessary to dothat, the matter shall be subject to scientific demonstration and to permission by the administrativedepartment for water resources under the people's government of a province, autonomous region ormunicipality directly under the Central Government or by the administrative department for waterresources under the State Council, before it is submitted to the people's government at thecorresponding level for approval.

Article 41

All units and individuals have the obligation of protecting waterworks, none of them mayoccupy or damage dykes, bank revetments, flood control facilities or equipment for hydrologicalmonitoring or hydro-geological monitoring.

Article 42

Local people's governments at or above the county level shall take measures forsafeguarding the waterworks within their administrative areas, especially the safety of dams anddykes, and eliminate dangers within a given time limit. The administrative departments for waterresources shall strengthen supervision over the safety of waterworks.

Article 43

The State protects waterworks. The scope of management and protection of thewaterworks owned by the State shall be defined according to the regulations of the State Council.The scope of management and protection of the waterworks under the control of the administrativedepartment for water resources under the State Council or the river basin authority shall be definedby the said department or authority, through

consultation with the people's government of the relevantprovince, autonomous region or municipality directly under the Central Government.The scope and duty of protection for waterworks other than the ones mentioned in the precedingparagraph shall be defined in accordance with the regulations of the people's governments ofprovinces, autonomous regions or municipalities directly under the Central Government.Within the scope of protection for waterworks, activities such as blasting, well digging, quarrying andearth digging that may adversely affect the operation or endanger the safety of waterworks areprohibited.

Chapter V Allocation and Economical Use of Water Resources

Article 44

The administrative department for development and planning and the administrativedepartment for water resources under the State Council are responsible for macro-allocation of thewater resources nationwide. The medium and long-term plans of water supply and demand for thewhole country or such plans that cover more than one province, autonomous region or municipalitydirectly under the Central Government shall be drawn up by the administrative department for waterresources under the State Council, in conjunction with the departments concerned, and shall beimplemented after examination and approval by the administrative department for development andplanning under the State Council.

The local medium and long-term plans for water supply anddemand shall, on the basis of the medium and long-term plans for water supply and demand at thenext higher level and in light of the actual local conditions, be drawn up by the administrativedepartments for water resources under the local people's governments at or above the county level,in conjunction with the departments concerned at the same level, and the plans shall be implementedafter examination and approval by the administrative departments for development and planningunder the people's governments at the same level.The medium and long-term plans for supply and demand of water shall be drawn up on the basis ofthe current supply and demand of water, plans for national economic and social development, riverbasin plans and regional plans and on the principle of coordinated supply and demand of waterresources, comprehensive balancing of all interests, protection of ecology, strictly practicing ofeconomy and rational development of water resources.

Article 45

For regulating runoff and storing water, and for allocating the volume of water, a river basinshall be made a unit in formulating water allocation plans in accordance with the river basin plans andthe medium and long-term plans of water supply and demand.Water allocation plans and preliminary plans for water distribution under drought and emergencyconditions that cover more than one province, autonomous region or municipality directly under theCentral Government shall be worked out by the river basin authorities through consultation with therelevant people's governments of provinces, autonomous regions or municipalities directly under theCentral Government, which shall be implemented upon approval by the State Council or thedepartment authorized by the State Council. Other water allocation plans and preliminary plans forwater distribution under drought and emergency conditions that cover more than one administrativeregion shall be worked out by the same administrative department for water resources under thepeople's government at the next higher level through consultation with the relevant local people'sgovernments, which shall be implemented upon approval by the people's governments which theadministrative regions belong to respectively.Water allocation plans and the preliminary plans for water distribution under drought and emergencyconditions shall be executed by the local people's governments concerned.Projects for development and utilization of water resources to be constructed across rivers borderingon different administrative regions shall conform to the approved water allocation plans for the riverbasins in question and shall be submitted by the relevant local people's governments at or above thecounty level to the same administrative department for water resources under the people'sgovernment at the next higher level or the relevant river basin authority for approval.

Article 46

The administrative departments for water resources under the local people's governmentsat or above the country level or the river basin authorities shall, on the basis of the approved waterallocation plans and the predicted annual volume of in-coming water, work out annual water allocationplans and distribution plans for unified distribution of the volume of water, and the local people'sgovernments concerned shall follow them.Annual water allocation plans for the key rivers and

lakes defined as such by the State shall beincorporated into the annual plans for national economic and social development.

Article 47

The State applies a system for the use of water under which control over the total volume iscombined with control over the quotas.The administrative departments for the relevant trades under the people's governments of provinces,autonomous regions and municipalities directly under the Central Government shall set quotas forwater use by different trades in their administrative regions, which shall be submitted to theadministrative departments for water resources and the administrative departments for qualitysupervision and inspection at the same level for examination and permission, before the quotas aremade known to the public by the people's governments of the provinces, autonomous regions andmunicipalities directly under the Central Government, and are submitted to the administrativedepartment for water resources under the State Council and the administrative department for qualitysupervision and inspection under the State Council for the record.The administrative departments for development and planning under the local people's governmentsat or above the county level shall, in conjunction with the administrative departments for waterresources at the same level and on the basis of the quotas for water use, the economic and technicalconditions and the volume of water available for use in their administrative regions as is determined inthe water allocation plans, work out their annual plans for water use, in order to exercise control overthe total volume of water to be used in their administrative regions annually.

Article 48

Any unit or individual that takes water and uses water resources directly from a river or lakeor from the underground shall, in accordance with the regulations of the licensing system of the Statefor water-taking and the system for compensated use of water resources, apply to the administrativedepartment for water resources or the river basin authority for a water-taking license and pay waterresources fees, in order to acquire the right to take water, except where only a small amount of wateris taken for domestic use or for drinking by poultry and livestock reared outdoors or in pens.Specific measures for implementing the licensing system for water-taking and

for collecting fees formanagement of water resources shall be formulated by the State Council.

Article 49

The use of water shall be measured and water shall be used in accordance with theapproved plan for water use.For the use of water, the system shall be applied under which a fee shall be charged on the basis ofthe amount of water used and a progressive higher price shall be charged for the amount thatexceeds the quota.

Article 50

People's governments at all levels shall promote water-conserving irrigation methods andwater-conserving technologies, and shall take necessary measures to prevent seepage in agriculturalprojects for storing and transmitting water, in order to increase the efficiency of water use inagriculture.

Article 51

For use of water in industry, advanced technology, techniques and equipment shall beapplied to increase the frequency of the use of circulated water and the ratio of the use of recycledwater.The State gradually eliminates the techniques, equipment and products that are outdated and are ofhigh water-consumption. The specific list for them shall be complied and published by the department for comprehensive administration of the economy under the State Council, in conjunction with theadministrative department for water resources and the relevant departments under the State Council.Manufacturers, sellers and users in the process of production and operation shall, within a specifiedtime limit, desist form manufacturing, selling or using the techniques, equipment and productsincluded in the list.

Article 52

Urban people's governments shall take effective measures, as are suited to localconditions, to promote the use of water-conserving household utensils, lower the leakage rate of theurban water supply network and increase the efficiency of domestic water use; they shall payattention to centralized treatment of sewage water in cities and encourage the use of recycled water,in order to increase the utilization ratio of recycled sewage water.

Article 53

For construction, expansion or reconstruction of a project, plans for water-conservingmeasures shall be worked out to build water-conserving facilities in support of the project. The waterconservingfacilities shall be designed, constructed and put into operation simultaneously with theprincipal part of the project.Water-supply enterprises and units that build their own water-supply facilities shall pay specialattention to maintenance of the facilities to reduce water loss.

Article 54

People's governments at all levels shall take effective measures to improve the conditionsof drinking water for town and country residents.

Article 55

Where water is supplied by waterworks, the user shall, in accordance with the regulationsof the State, pay charges to the water-supply unit. The price of water supply shall be fixed inaccordance with the principle of compensating for the cost, gaining reasonable benefits, paying goodmoney for good quality and fair sharing of the cost. The specific measures shall be formulated by theadministrative departments for pricing under the people's governments at or above the provinciallevel, in conjunction with the administrative departments for water resources or administrativedepartments for water supply at the same level, within the limits of their powers.

Chapter VI Resolution of Water Disputes and Supervision over and Inspection of Lawenforcement

Article 56

Where a dispute over water arises between different administrative regions, it shall beresolved through consultation. If consultation is unsuccessful, it shall be subject to ruling by thepeople's government at the next higher level, which the parties concerned shall strictly abide by.Pending settlement of the dispute, none of the parties may, in the absence of an agreement reachedbetween the parties or approval granted by the same people's government at the next higher level,build any projects for draining, blocking, taking or intercepting (storing) water or unilaterally alter theexisting water

regime within a certain area on each side of the common boundary of theadministrative regions.

Article 57

Disputes over water that arise between units or individuals or between units and individualsshall be resolved through consultation. Where the parties are not willing to have them resolvedthrough consultation or where consultation is unsuccessful, they may apply to the local people'sgovernments at or above the county level or the departments authorized by them for conciliation, orinstitute a civil action directly in the people's court. Where conciliation by a local people's governmentat or above the county level or the department authorized by it is unsuccessful, the parties mayinstitute a civil action in the people's court.Pending settlement of the dispute over water, none of the parties may unilaterally alter the existingwater regime.

Article 58

When dealing with a dispute over water, the local people's government at or above thecounty level or the department authorized by it shall have the power to take temporary measures forsettlement, which all the sides concerned or the parties shall abide by.

Article 59

The administrative departments for water resources under the people's governments at orabove the county level and the river basin authorities shall exercise strict supervision over andinspection of violations of this Law and conduct investigation into and deal with them in accordancewith law.Supervisors and inspectors for the administration of water resources shall be devoted to their dutiesand impartial in enforcing laws.

Article 60

When performing their duties of supervision and inspection as stipulated in this Law, theadministrative departments for water resources under the people's governments at or above the county level, river basin authorities and supervisors and inspectors therefrom shall have the power totake the following measures:

(1) requesting the units under inspection to provide the relevant documents, certificates andmaterials;

(2) requesting the unit under inspection to make explanations to the questions related toimplementation of this Law;

(3) entering into the production sites of the unit under inspection for investigation; and

(4) instructing the unit under inspection to desist from violating this Law and to fulfil their statutoryobligations.

Article 61

The units or individuals concerned shall cooperate with the supervision and inspectioncarried out by the supervisors and inspectors for administration of water resources, and none of themmay refuse to do so or impede the said supervisors and inspectors in performing their duties inaccordance with law.

Article 62

When performing their duties, the supervisors and inspectors for administration of waterresources shall show their law-enforcement papers to the units or individuals under inspection.

Article 63

Where people's governments at or above the county level or the administrative departments for water resources at a higher level discover violations of law or negligence of dutycommitted by the administrative department for water resources at the same level or a lower level insupervision and inspection, they shall order the latter to rectify within a time limit.

Chapter VII Legal Liabilities

Article 64

Where administrative departments for water resources or other departments concerned, orunits for control of waterworks, or their staff members, taking advantage of their positions, acceptanother person's money or things of value or other benefits, or neglect their duties, or issue licensesor sign permission after examination to units or individuals that do not meet the statutoryrequirements, or fail to allocate water in accordance with the water allocation plans, or fail to collectwater resources fees in accordance with the relevant regulations of the State, or fail to perform theirduty of

supervision, or fail to investigate into and deal with violations of law discovered, which thusleads to serious consequences and constitutes a crime, the persons directly in charge and the otherpersons directly responsible shall be investigated for criminal responsibility in accordance with therelevant provisions in the Criminal Law; if the violation is not serious enough to constitute a crime,they shall be given administrative sanctions in accordance with law.

Article 65

Where a unit or individual, in areas under river course control, puts up buildings orstructures that block the passage of flood water, or engages in activities that adversely affect thestability of the river condition or safety of the river embankment or other activities that block thepassage of flood water through the river course, the administrative department for water resourcesunder the people's government at or above the county level or the river basin authority shall, withinthe limits of their powers, instruct it/him to desist from the violation, dismantle the unlawful buildings orstructures within a time limit and restore the original state. If the unit or individual fails to dismantle thebuildings or structures and restore the original state at the expiration of the time limit, suchdismantling shall be enforced, and the unit or individual in question shall bear the expenses incurredand shall, in addition, be fined not less than RMB 10,000 yuan but not more than 100,000 yuan.Where a unit or individual, without permission by the administrative departments for water resourcesor the river basin authority, constructs other building or structure that blocks, spans or borders on ariver, or lays pipes or cables across a river, for which no provisions are stipulated in the Flood ControlLaw, the administrative department for water resources under the people's government at or abovethe county level or the river basin authority shall, within the limits of its powers, instruct it/him to desistfrom the violation and to go through the necessary formalities within a time limit. If the unit orindividual fails to go through the formalities at the expiration of the time limit or obtains no approval,it/he shall be instructed to dismantle the unlawful building or structure within a time limit; if the buildingor structure is not dismantled at the expiration of the time limit, dismantling shall be enforced, and theunit or individual that violates the law shall bear the expenses incurred and shall, in addition, be finednot less than 10,000 yuan but not more than 100,000 yuan.Where a unit or individual, in spite of the fact that it/he has obtained permission of the

administrativedepartment for water resources or the river basin authority, fails to build the project mentioned in thepreceding paragraph according to requirements, the administrative department for water resourcesunder the people's government at or above the county level or the river basin authority shall, within the limits of its powers, instruct it/him to rectify within a time limit and, depending on the seriousnessof the circumstances, impose a fine of not less than 10,000 yuan but not more than 100,000 yuan.

Article 66

Where a unit or individual commits one of the following acts, for which no provisions arestipulated in the Flood Control Law, the administrative department for water resources under thepeople's government at or above the county level or the river basin authority shall, within the limits ofits powers, instruct it/him to desist from the violation, clear away the obstructions or take otherremedial measures within a time limit, and impose a fine not less than 10,000 yuan but not more than50,000 yuan:

(1) throwing away or piling up objects, or planting forest trees or high stalk crops in rivers, lakes,reservoirs, canals or channels, which block the passage of flood water; or

(2) enclosing parts of a lake for reclamation or enclosing river courses for reclamation withoutpermission.

Article 67

Where a unit or individual constructs an outlet for sewage discharge in a protection zone ofdrinking water sources, the local people's government at or above the county level shall instruct it/himto remove the outlet and restore the original state within a time limit; if it/he fails to comply at theexpiration of the time limit, removal of the outlet and restoration to the original state shall be enforced,and the unit or individual shall be fined not less than 50,000 yuan but not more than 100,000 yuan.Where a unit or individual, without examination and permission by the administrative department forwater resources or the river basin authority, constructs, reconstructs or expands an outlet for sewagedischarge, the administrative department for water resources under the people's government at orabove the county level or the river basin authority shall, within the limits of its powers, instruct it/him todesist from the violation and to restore

the original state within a time limit, and shall impose a fine notless than 50,000 yuan but not more than 100,000 yuan.

Article 68

Where a unit or individual manufactures or sells outdated or high water-consumingtechniques, equipment and products or uses them in the process of production and operation, thedepartment for comprehensive administration of the economy under the local people's government ator above the county level shall instruct it/him to desist form manufacturing, selling or using them andshall impose a fine not less than 20,000 yuan but not more than 100,000 yuan.

Article 69

Where a unit or individual commits one of the following acts, the administrative departmentfor water resources under the people's government at or above the county level or the river basinauthority shall, within the limits of its powers, instruct it/him to desist from the violation and to takeremedial measures within a time limit, and shall impose a fine not less than 20,000 yuan but not morethan 50,000 yuan; if the circumstances are serious, its/his water-taking license shall be revoked:

(1) taking water without permission; or

(2) failing to take water in accordance with the approved requirements specified in the water-takinglicense.

Article 70

Where a unit or individual refuses to pay, delays payment of, or is in arrears with waterresources fees, the administrative department for water resources under the people's government ator above the county level or the river basin authority shall, within the limits of its powers, instruct it/himto make the payment within a time limit; if it/he fails to comply at the expiration of the time limit, it/heshall pay a surcharge for the overdue payment at a daily rate of 0.2 percent of the total amount,counting form the date of delay, and shall, in addition, be fined not less than the amount but not morethan five times the amount of the water resources fees payable or payable retroactively.

Article 71

Where a unit or individual, without permission, puts to use water-conserving facilities of aproject, the construction of which is not completed or which, although completed, do not measure upto the requirements specified by the State, the relevant department under the people's government ator above the county level or the river basin authority shall, within the limits of its powers, instruct it/himto desist from using them and to rectify within a time limit, and shall impose a fine not less than50,000 yuan but not more than 100,000 yuan.

Article 72

Where a unit or individual commits one of the following acts, which constitutes a crime, it/heshall be investigated for criminal responsibility in accordance with the relevant provisions of theCriminal Law; if it is not serious enough to constitute a crime and no provisions governing it arestipulated in the Flood Control Law, the administrative department for water resources under the localpeople's government at or above the county level or the river basin authority shall, within the limits ofits powers, instruct it/him to desist from the violation and take remedial measures, and shall impose afine not less than 10,000 yuan but not more than 50,000 yuan; if the unit or individual violates the Regulations on Punishment for Security Administration, the public security organ shall, in accordancewith law, mete out punishment to it/him for security administration; if losses are caused to anotherperson, it/he shall bear the liability to pay compensation:

(1) occupying or damaging waterworks or dykes, bank revetments or other relevant facilities, ordamaging facilities or equipment for flood control or hydrological or hydro-geological monitoring; or

(2) within the area of protection for waterworks, engaging in activities that adversely affect theoperation or endanger the safety of waterworks, such as blasting, well digging, quarrying and earthdigging.

Article 73

Anyone who takes illegal possession of, steals or forcibly seizes supplies for floodprevention, equipment or apparatus for flood control, drainage of waterlogged fields, farmlandirrigation and hydrological monitoring and measuring or for other waterworks, or anyone whoembezzles or misappropriates State funds earmarked for

relief of disasters, for use in emergencies,for flood control, for arrangements and compensation to be made for relocated people and forconstruction of other waterworks, which constitutes a crime, shall be investigated for criminalresponsibility in accordance with the relevant provisions of the Criminal Law.

Article 74

Anyone who, in the course of a dispute over water and of its handling, stirs up unrest,engages in gang fighting, forcibly seizes or damages public or private property, or illegally restrictsother people's freedom of the person, which constitutes a crime, shall be investigated for criminalresponsibility in accordance with the relevant provisions of the Criminal Law; if the violation is notserious enough for criminal punishment, the public security organ shall, in accordance with law, meteout punishment to him for security administration.

Article 75

Where, when a dispute over water arises between different administrative regions, a unitcommits one of the following acts, the persons directly in charge and the other persons directlyresponsible shall be given administrative sanctions in accordance with law:

(1) refusing to carry out water allocation plans or preliminary plans for water distribution;

(2) refusing to comply with the unified distribution of the volume of water;

(3) refusing to abide by the ruling made by the people's government at the next higher level; or

(4) pending settlement of the dispute over water, in the absence of an agreement reached betweenthe parties or approval granted by the people's government at the next higher level, unilaterallyaltering the water regime in violation of the provisions of this Law.

Article 76

Any unit or individual that diverts, intercepts or drains off water at the expense of publicinterests or another person's legitimate rights and interests shall bear civil liability in accordance withlaw.

Article 77

Administrative penalties to be imposed on violations of the licensing system for sandquarrying in river courses, as prescribed in Article 39 of this Law, shall be drawn up by the StateCouncil.

Chapter VIII Supplementary Provisions

Article 78

Where any international treaty or agreement relating to international or border rivers orlakes, concluded or acceded to by the People's Republic of China, contains provisions differing fromthose in the laws of the People's Republic of China, the provisions of the international treaty oragreement shall apply, unless the provisions are ones on which the People's Republic of China hasdeclared reservation.

Article 79

The waterworks referred to in this Law mean the various kinds of works on rivers, lakes andunderground water sources for development, utilization, control, allocation and distribution, andprotection of water resources.

Article 80

Seawater shall be developed, utilized, protected and managed in accordance with theprovisions in relevant laws.

Article 81

Activities for flood control shall be conducted in accordance with the provisions in the FloodControl Law.Water pollution shall be prevented and controlled in accordance with the provisions in the Law onPrevention and Control of Water Pollution.

Article 82

This Law shall go into effect as of October 1, 2002.

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