

Water As An Element In The Politics Of The Subcontinent

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CERTIFICATE

Certified that the dissertation entitled "WATER AS AN ELEMENT IN THE POLITICS OF THE SUBCONTINENT" submitted by Mr. RAMESH NAMBIAR in fulfilment of nine credits out of total requirements of twenty four credits for the award of the degree of Master of Philosophy (M.Phil) of this University, is his original work and may be placed before the examiners for evaluation. This dissertation has not been submitted for the award of any other degree of this University or any other University to the best of our knowledge.

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INTRODUCTION

Water is an indispensable means of economic growth and social welfare besides being an essential element for supporting of life processes. The uses of water are innumerable and continues to increase every day. The total volume of water on the earth is about 1.4×10^9 cubic Kms out of which 95% is salty and cannot be used for drinking or for irrigation purposes. The remaining 5% is fresh water out of which 77% is stored in ice caps and glaciers and 22.4% is ground water soil moisture and atmosphere, and only .01% is in streams. Water resources are unevenly distributed over the surface of the earth. There are regions of scarcity as well as abundance. However most region where there is a concentration of human habitation water resources are becoming a scarce commodity. With the growth of population and industries water is no longer a readily available commodity. Even though it is a renewable resource it is also limited. Therefore the uses of water resources as well as its conservation has become a universal problem.

Inspite of its universal need water resources have become an issue for contest between one region and another. It has become an important element in global politics. Each country tries to maximize its share of fresh water whether it is from rivers lakes or even glaciers. This quest for optimising the use of water continues to grow. There has been several political overtones as well with nations going to war over the question of water. Conflicts over the issue of sharing or river waters for irrigation is a global phenomenon, especially when a river

traverses an international boundary.

There is friction in the co-basin states when the natural flow of water is disrupted by the withdrawal of water by one of the upstream states. This has brought about the question of upper and lower riparian rights. There are several uncertainties and unresolved issues. Since the nature of the problem varies from region to region no comprehensive law can solve some of the complicated issues. As some experts from the United Nations observed that "lack of accepted international law on the uses of these streams present a major obstacle in the settlement of differences with the result that progress in development is often held up for years to the detriment not only of the countries concerned but of the economy of the world in general"¹. The reasons for this is basically because it is one domain over which cooperation between nations is quite difficult owing to the peculiarity of each case. It is a problem best solved among the co-basin nations themselves.

In spite of the fact that certain laws have been made for the effective management of water more often than not other factors have influenced their implementation. This politicisation of a basic human need is what this dissertation attempts to bring out. Talking into account that global power structure the Indian sub-continent is not without its share of problems especially with such as vast potential for harnessing water resources.

1. U.N. Document, Integrated River Basin Development Report of Panel of Experts Requested in ECOSOC Resolution 599 (XXI), 3 May 1956 E/ 3066 pp. 38.

The countries which share rivers with India are Pakistan Nepal, Bhutan, Bangladesh and China and the rivers are the Indus Ganges and Brahmaputra. The Himalayas are the major source of water to these rivers. Hence the environmental changes in the Himalayas have a tremendous impact on the region. Another important factor which plays a major role in the flow of the river waters are the monsoons. Rain in the catchment areas of these rivers sometimes do cause floods. This is becoming a reccuring feature in parts of northeast India as well as Bangladesh.

When the rains are deficient droughts are also common. Widespread deforestation in the catchment areas are responsible for the erosion of soils. The amount of sediment that the Ganges, Brahmaputra systems of rivers carry is estimated to be about 4.2 billion tonnes. Half of this gets deposited in Nepal, Bhutan and India, the rest flows into the deltaic region of Bangladesh. This alters natural course of rivers and accentuates floods².

The mid August 1988 rains in the catchment areas caused devastating floods in Bangladesh leaving three quarters of the land under water by September. The situation is also similar in the Assam valley. Unfortunately Bangladesh cannot prevent this single handedly. It needs the cooperation of the other co-basin states.

The SAARC meetings did take some initratives to solve environmental issues but it still remains nothing more than a

2. D'MONTE DARRYL 'Asian View of the environment. Times of India
July, 5 1989.

pious sentiment.

Political considerations have invariably come in the way of solving regional environmental issues Bangladesh feels India is withholding water during the dry months though the Farakka and releasing it during monsoon to prevent floods in India.

The Indus Water dispute also began because of similar apprehension of Pakistan. It was not happy over what India was doing with the tributaries of the Indus.

Hence the question of upper and lower riparian rights is the cornerstone of river water management in the sub-continent.

The free export of millions of tonnes of top soil from Nepal into India is of serious concern to its economy.

The Brahmaputra is another rivers which has tremendous potential but only one percent of power potential has been tapped. Surveys in the late sixties showed that Brahmaputra during its long course through China and India goes through seven major falls along precipitious gradients. The total hydro-electric power potential was equal to the total world production of electricity in 1967-68. This should give us an idea of how important the harnessing of Brahmaputra is. Efforts have to be made collectively i.e. India, Nepal, Bhutan and Bangladesh to influence China to cooperate in this venture. Asian nations should understand that they share a common future in terms of sustaining their natural resources and should end their political differences.

Nepal has been keen on developing its irrigation and hydro power potential and join an international arrangement. However

it has certain reservation about joint projects with India even though 60% of its power has been provided with India assistance. It feels it might be put under political subjugation.

India on the other hand has reservations to Bangladesh's proposal of incorporating Nepal in the Indo-Bangladesh Joint River Commission. These suspicions must be overcome and India being the regional power should make concessions as it did with the Indus River. Smaller co-basin nations should realise that being antagonistic towards India only helps outside powers to meddle in the affairs of the subcontinent.

Nepal, for instance, should realise its inherent problems. It can never hope to balance its trade with India unless it is able to sell its hydro-power to India in a really big

³ way. Bangladesh will continue to have flood problems as long as Nepal, Bhutan, India and China ignore the Himalayan environmental issues.

The sub-continent is primarily rural and agricultural in nature. The pressure of population on the land forests and water resources is alarming. It has about 20% of the world population but only about 3.3% of the land area, which means on one square kilometre of land it has to support six times as many people as compared to the world average. It is also not endowed with enough natural resources to support its population.

However abundant water resources can be harnessed for agriculture and industry. 'It has been estimated that the rivers shared by India, Pakistan, Nepal, Bhutan and Bangladesh have an -

3. Chattopadhyay. B. "Harnessing Himalayan Water Resources".

(In South Asia. Regional Coop. ed. Agwani and others) 1983.

average flow of 3 billion acre feet most of which remains unutilized flowing down into the sea⁴. A river basin approach to development has been suggested by many experts and environmentalists. The following chapter of this dissertation deal firstly with the physiography and climate of these river basins to give us an idea of the magnitude of the problem.

A brief analysis of the floods, drought and the problem of assessment of Himalayan water resources is dealt in the second chapter.

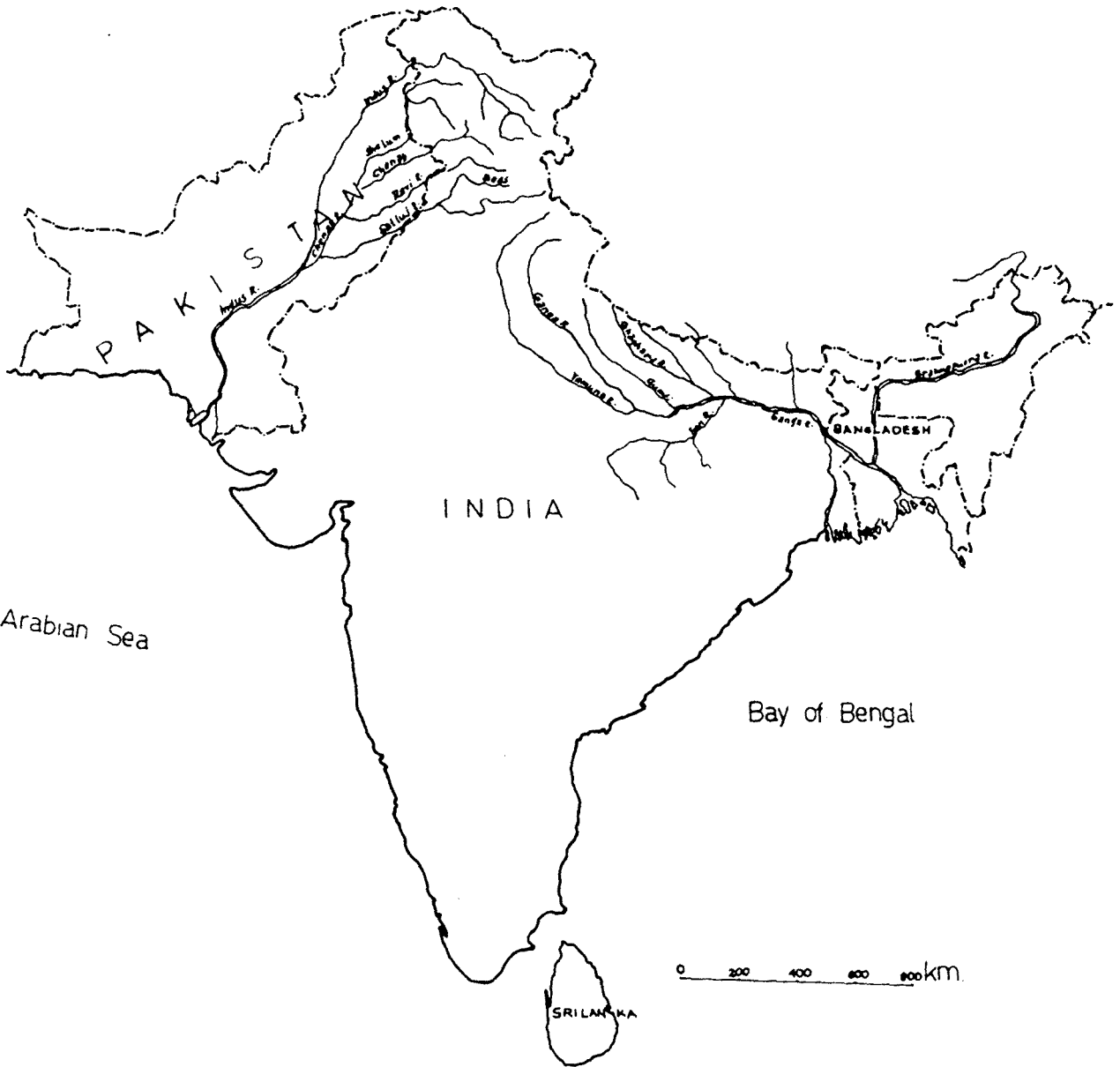
The third chapter deals with the historical perspective of various agreements reached on river water cooperation among the co-basin states of the subcontinent. This chapter goes into the details of the Indus Water Treaty since it stands out as a model for river water cooperation. The Farakka issue with Bangladesh is dealt with a chronology of events. Other cooperative endeavours with Nepal and Bhutan are also discussed briefly.

The fourth chapter tries to analyse the basic emerging issues such as environmental degradation, population explosion and migration which have an impact on the land forest and water resources of the sub-continent.

In the concluding chapter the political factors affecting the subcontinent are briefly analysed, which includes global, regional and bilateral issues and its impact on the cooperative ventures in the region. Finally a look at the problems and achievements in the realm of water resources.

4. AHMED BASHIR. 'SARC and Sharing of River Waters' (In SARC - asocioeconomic approach to peace & stability Ed. ABDUL HAFIZ Chapter 9. 1986.

INDIA BANGLADESH PAKISTAN SRILANKA
(POLITICAL)



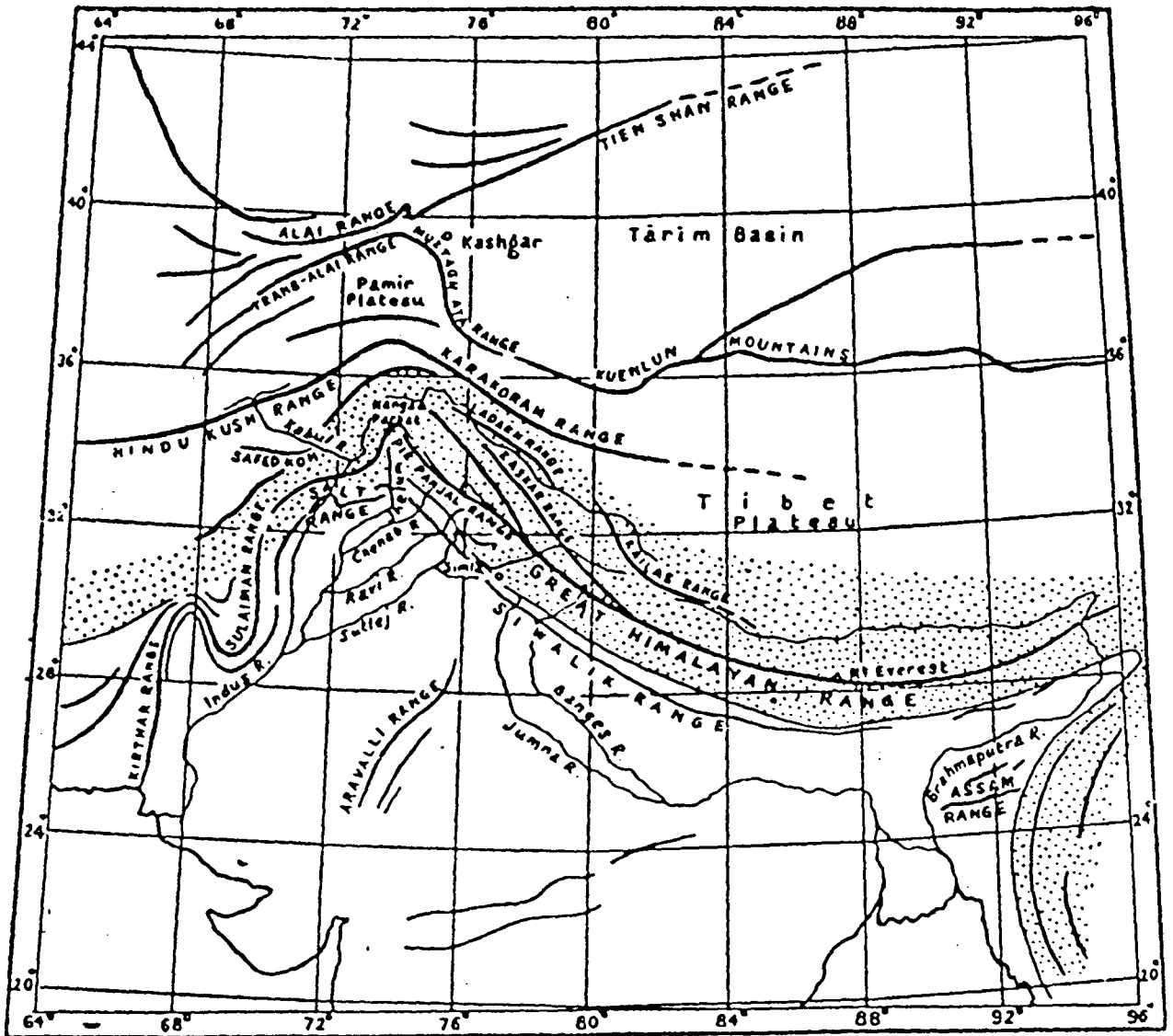
Arabian Sea

Bay of Bengal

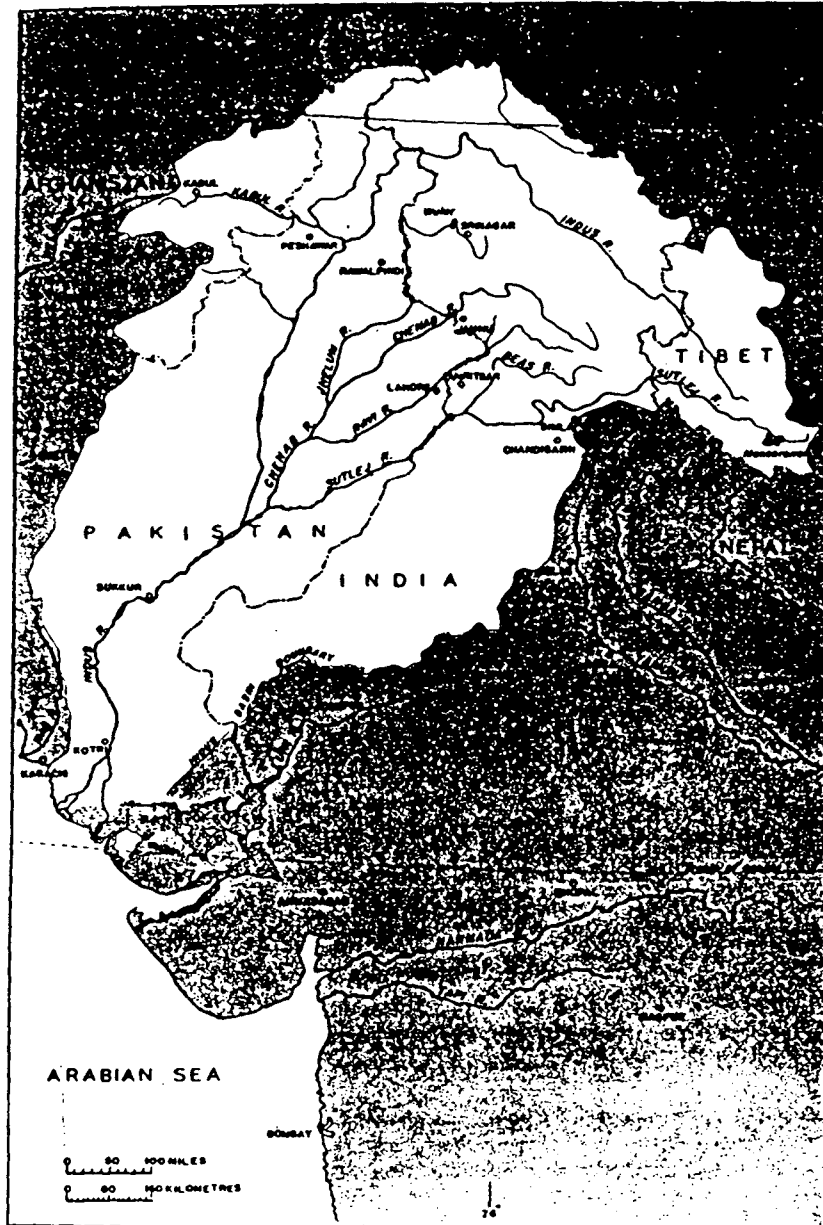
0 200 400 600 800 km.

Indian Ocean

HIMALAYAN RIVER SYSTEMS



The Indus Region



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Based upon Survey of India map with the permission of the Surveyor General of India

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line

CHAPTER I

PHYSIOGRAPHY AND CLIMATE OF THE INDUS GANGES AND BRAHMAPUTRA BASINS

PHYSIOGRAPHY:-

The physical diversities of the basins of the Indus, Ganges and Brahmaputra have often been overlooked as a result of the political boundries which cut through homogenous zones of the basins. Hence each of these basins have to be studied from its source to the mouth and also their respective tributaries.

The Indus system of rivers comprises the main Indus, which rises north of the sacred Kailash mountain at (7,500 m) (81° E + 31° N) near Lake Manosarowar. Its major tributaries are Jhelum, Chenab, Ravi, Beas and Sutlej joining from the east and Kabul, Swat and Kurram from the west. The Indus has a length of 1800 miles of which the first 200 miles it flows in Tibet and enters south east Kashmir at 4200m after which it passes near Leh 3200m, Gilgit and enters Pakistan. The Jhelum joins the Chenab at Trimmu in Pakistan and 45 Km downstream it is joined by Ravi. The Sutlej which receives the waters of Beas at Harike joins Chenab at Panjnad. These five tributaries join the main Indus at Mithankot which is 600 miles from its mouth. On the western back of Indus the Swat joins Kabul and falls into Indus opposite Attock and the Kurram falls into the Indus below Kalabagh.

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1. GULATI N.D. INDUS WATER TREATY. Indus basins and rivers allied publishers 1973 Chapter II page 24.
 2. Irrigation Atlas of India (National Atlas org) Calcutta 1972 Plates 3, 16.)
The flow characteristics of the Indus & its tributaries are

as follows. The flow is lowest for the main Indus River from mid December to mid February. The river then starts rising slowly till Mid March. Then it starts rising rapidly, peaking during the period between mid July and mid August. This is followed by a rapid decline till mid October and a gradual decline thereafter.

The Jhelum river has a winter minimum from mid November to mid January. It rises slowly until mid February then more rapidly till end of May. The Jhelum has a longer period of peak flow that extends from May to early July. This is followed by a steady decline till September and a gradual decline till winter.

The Chenab has a winter minimum from mid November to mid January. It then rises slowly till April end from May to July end it rises rapidly. The decline is quite rapid after the monsoons.

The Ravi has a smaller quantum of supplies but its characteristics are similar to that of Chenab.

The Beas has winter minimum from mid November to mid February. The flow is quite low till June as compared to Jhelum. It then peaks in mid July to mid August.

The Sutlej has winter minimum from mid November to mid February and slowly increases till April after which there is a steady increase till June and a rapid rise in July August only to decline thereafter³.

The Indus system receives most of its waters in the mountainous catchments unlike Ganges and Brahmaputra which

3. Ibid page 24.

recieve a considerable amount from monsoons. It has a drainage area of 450,000 square miles.

II. GANGES:

The Ganges and its tributaries cover what is called the heartland of India rising near the glacier Gangotri in the Himalayas ^o 31° N and ^o 79° E it flows though UP, Bihar, Bengal and Bangladesh before emptying into the Bay of Bengal. "The major trubutaries which join Ganges from the North are Gomti, Sarda, Ghaghara, Ganodak, Ramganga, Rapti and Sapt Kosi. From the South it is joined by Yamuna, Chambal, Sind, Betwa, Dhasan, Ken and the Son"⁴. The Ganges basins covers 1/4th of the land area of the country.

The main Ganges river has a length of 1650 miles rising at Gangotri near the Mount Kailash at 22,000 feet it flows in a south easterly direction and is joined by Ramganga near Kannauj. Flowing in a south easterly direction it meets the Yamuna near Allahabad and then the Gomati. The river then is fed by the waters of Sarda, Ghaghara Rapti and Son from the south near Patna. The Gandak joins the main Ganga river from the north as it flows east ward. Finally the Kosi joins it from the north before it enters Bangladesh. The main river joins the Jamuna (Brahmaputra) and then the river is called Padma which empties into the Bay of Bengal.

4(a) Report of the Irrigation Commission. Ministry of Irrig and power. Vol III Part I. 1972. GD. I.

(b) Irrigation Atlas of India, Calcutta 1972 Plates 3., 16.
The Yamuna which is about 600 Km long is one of the major

The Yamuna which is about 600 Km long is one of the major tributaries of the Ganges rising from the glacier Yamunotri ⁰ 30° N + ⁰ 78° E. It runs parallel to Ganga for a long distance through Uttar Pradesh. Although the waters of Yamuna have been diverted for the purpose of irrigation the normal flow pattern is as follows.

Minimum Flow is during the months November to mid February after which it slowly rises till June after that there is a substantial increase till August end followed by a steady decline till October. The Yamuna is fed by the Chambal Banas Parbati which rise in the Aravalli and Vindhayan Ranges. The other smaller tributaries being Sind Betwa Dhasan and Ken.

Most of these rivers have a highly intermittent flow mostly peaking in the monsoon period and virtually reducing to a trickle during the late winter months. GHAGHARA: With its upper half in Nepal this 1080 Km long tributary has a total catchment area of 125,950 sq Kms. of which only 57,64 % sq Km are in Indian Plains. It contains the combined waters of the Chauka and Sarda and Kauriala which unite near Bahnamghat in the Barabonki district of Uttar Pradesh.

Its source is in the Himalayan glacier 60 Km south west of Manasarowar at an elevation of 4800 m at ⁰ 30° ⁰ 38' N and ⁰ 80° ⁰ 57' E. After 72 Kms it enters Nepal and receives the Mugu Karnali & the Tila on its left bank after 25 Km after the junction with Tila it winds to Churighat from where it takes a westerly course till Dundras. This is followed by a U-turn and flows in a south easterly direction till it debouches into plains of Nepal though a gorge in the Siwaliks. Here it is joined by the Seti and Boeri

on its right and left banks respectively. It then divides into Kauriala and Girwa and the former receives Mohan on the right bank before entering India near Bharatpur in Bahraich district of Uttar Pradesh.

The Ghaghara receives most of its water from its upper reaches but it is accentuated by surface flow during monsoons in the Indian plains.

The other river basins which India and Nepal share are those of Sarda, Rapti and Kali Gandak.

The Sarda rises near the Indo Tibet border at 5250 m. ($30^{\circ} 28'N$ & $80^{\circ} 35'E$). Two streams Kuthiyankti and Kalapani join and flow in a south west direction and forms the boundary between India and Nepal. This river then receives the Dhaul Ganga, the Khoprang, Sarju and had Ladhiya on its right and Chumlia on its left. After series of rapids it enters Uttar Pradesh.

The Rapti ($28^{\circ} 22'N$; $82^{\circ} 56'E$) at its source rises from 3600m runs through Nepal for 150 Km before entering India in the Bahraich district of Uttar Pradesh. There is also the little Gandak which originates in the Baghban forest in Nepal at 300 m, flowing South east it joins Ghaghara near Simira in the Shahjahanpur district of Uttar Pradesh.

11. BRAHMAPUTRA: This river has a total length of 2900 Km. It rises in the northern most chain of the Himalayas in the Kailash range at an altitude of 5150 metres (Lat: $30^{\circ} 31'N$ & Long: $82^{\circ} 10'E$) south of the Kongyu Tsho. The Brahmaputra basin extends over an area of 580,000 sq Kms covering large areas in Tibet India Bhutan Sikkim and Bangladesh. Several tributaries big and

small join it during its course. "It flows eastward in Tibet for 1700 Km, where it is called Tsangpo. The first main tributary from the north is the Raga Tsngpo near Lhatse Dzong, further eastward it is joined by the Nyang chu near the trade centre Gyantse. Then the Kyichu from north on which stands Lhasa"⁵. Out of the 1700 Km in Tibet a 640 Km stretch from Lhatee Dzong is navigible where boats sail at an altitudes of 3650 m and more about sea level.

"After Lhasa the river is joined by the Griamda Chu from the north"⁶.

The river abruptly turns north east after Pe (altitude 3000 m) and northwards. Here there are series of rapids between the high mountains of Gyala Pari and Namcha Barwa (7756 m) and then turns south and south west to emerge from the foothills as Siang and Dihang into India in Arunachal Pradesh. In Arunachal it is joined by Dibang and Luhit before it enters Assam as Brahmaputra"⁷.

In Assam the main tributaries are the Subansiri and Manas from the north, Kopili from the south and several other smaller tributaries join it before it is joined by Sankosh and Ama from Bhutan in the north. It enters Bangladesh and is joined by Tista which cuts through Sikkim and North Bengal. In Bangladesh the river Brahmaputra is called Jammuna. It flows for 270 Km totally in Bangladesh before which its confluence with Ganga west of

5. Irrigation Atlas of India Calcutta 1972 Plates, 3, 19 & 23.

6. Report on Irrigation. Commission. Ministry of Irrug & Power New Delhi 1972 Vol III Part I Pages 197.

7. Ibid Pages 198. 201.

which cuts through Sikkim and North Bengal. In Bangladesh the river Brahmaputra is called Jammuna. It flows for 270 Km totally in Bangladesh before which its confluence with Ganga west of Dacca. The river is then called Padma and Joins the Bay of Bengal after 105 Kms.

In India the Brahmaputra has a drainage area of 187113 sq Km in the states of Arunachal Pradesh, Assam, Nagaland, Meghalaya and West Bengal.

The Brahmaputra Basin on the whole has an irregular shape. The basin in Tibet (Tsangpo) has narrow valleys because of the mountain ranges.

"The river goes through about seven major falls in units ⁸ gradient before it enters Arunachal Pradesh" and continues to be a swift flowing river till it enters the Sadiya town in the Assam valley.

The north and south bank tributaries have a distinct characteristic in the Assam valley.

The Lohit and Dibang in Arunachal as well as Subansiri have valleys with steep slopes, shallow braided channels with coarse sandy beds and carry heavy silt charge. These rivers like the Manas Sankosh and Tista have channels for a long distance even upto the outfall. One characteristic of these rivers which has made Brahmaputra such an unpredictable one is they frequently have flash floods.

8. Chattopadhyay Boudhyan. "Harnessing Himalayan Water Resources". South Asian Stability & Reg. Coop. ED. Agwani Muni & others. CRRID 1983 Page 68.

The south bank tributaries emerging from Patkai hills Nagaland, lower Assam and Meghalaya such as Kopili have flatter grades and deep meandering channels. The beds and banks are composed of fine alluvial soil. The silt discharge is comparatively lower than north bank tributaries.

"The drainage area of some Brahmaputra tributaries are as follows Manas 31000 sq Km; Luhit 21,000 sq Km Sankosh 26,000 sq Km; Dihang 13,000 Kms; Subansiri 10,000 sq Kms; Dhansiri 12250 Kms; Borelli 12000 sq Km; Kopili 16,000 sq Km; The quantum of water is quite high in some of them, Manas about 40,000 cusecs ; Luhit 33800 cusecs; Dihang 27,200 cusecs; and Subansiri 16,000 cusecs;" .

9. Irrigation Atlas of India Calcutta 1972 Plates 3, 16 & 23.

CLIMATE OF THE INDUS GANGES
AND BRAHMAPUTRA BASINS:

CLIMATE:-

The Indus, Ganges and Brahmaputra have distinct climatic characteristics in their respective basins. While the Indus basin as a whole falls in a comparatively arid part of the subcontinent, the Ganges basin is arid only in some parts such as the central highland region towards the west and south. The Brahmaputra on the other hand falls in the wettest part of the subcontinent. However the Himalayan zone of the three basins have a certain amount of homogeneity in terms of temperature and precipitation owing to altitude.

a. The Indus basin may be divided further according to certain climatic zones such as the "Himalayan zone, the sub-Himalayan zone and the plains"¹⁰. The Indus basin is represented quite uniformly in these three zones unlike in the case of Brahmaputra the transition is quite abrupt.

The Himalayan zone of the Indus experiences moderate temperatures in summer and is extremely cold in winter. The Ladakh region which is among the most devalued regions of the world is arid and devoid of vegetation, but several large glaciers provide the Indus and its tributaries with water.

The Sub-Himalayan zone comprising of the Pirpanjal Range is a region of moderate temperatures. Summers are quite warm and winters cool. The zone comprising mainly the Jammu and Himachal Pradesh.

10. GULATI. N.D., "INDUS WATER TREATY"., Indus Basin and Rivers allied publishers 1973 Chapter II page 23.

The plains are subjected to extremes of climate. Summer months especially May June and July are characterised by fierce dry heat while the winters in the region are cooler than most other parts of the country with the some topography.

Precepitation in the Indus basin is maximum on the southern slopes of the Sub-Himalayan zone with about 75 inches in Himachal Pradesh being the highest. Although precipatation occurs both in summer and winter there is a great deal of irregularity from year to year. The Himalayan zone has low precepitation not exceeding 35 inches annually. The plains have even lesser amount of rainfall avergaging 15-20 inches a year and reducing in a south west direction towards Sind in Pakistan where only 5 inches are recorded normally.

The Ganges basin comprises four broad meterological regions. They may be classified as the Himalayan zone, the Terai zone. The Central highland zone, and the Plains.

The Himalayan zone of the Ganges differs from the Indus in that it receives much more precipatation during the monsoons. The summers are cool in most parts but the southern slopes are comparatively warm. The winter months are not as cold as, the Indus upper zone and the snowline is much higher in these Himalayas as so winters are less severe. The areas which comprise this zone are eastern and northern Nepal and western Uttar Pradesh.

The Terai region mostly experiences very warm and humid summers and cool winters. The region comprises parts of north Bihar and Uttar Pradesh and southern Nepal and receive fairly

high amount of precipitation during the monsoons.

The central Highland region is fairly large region drained by the Son and Chambal. It is a region of moderate winters and hot summers. Precipitation is less towards the western part but this varies with altitude.

The Chotta Nagpur region receives more rainfall than the Vindhyan plateau and much more than the Aravalli region. The Vegetation also decreases westwards. Temperatures in the region as a whole vary with respect to rainfall, the eastern parts have higher rainfall and low range of temperature while the western parts have less rainfall and greater range of temperature.

The plains of the Ganges can be classified into three broad categories the Upper Middle and Lower Ganges basins. The Upper Ganges plain are in Uttar Pradesh the middle Ganges plain in Eastern Uttar Pradesh and Bihar and Lower Ganges plains in West Bengal and Bangladesh.

One characteristic of the Ganges plain is that they have wide flood plains and high banks. The climate variations are in an east west direction with the Middle and Lower Ganges zone receiving more rainfall annually.

The seasons can be broadly classified into hot summer, pre winter transition and winter.

The monthly and diurnal ranges of temperature are higher in the western Ganges basin but humidity is slightly lower than the middle. The humidity and rainfall is maximum in the lower plains in West Bengal and Bangladesh which are essentially a delta region. The average humidity in the Ganges basin is 70% but during monsoons it is over 90% in the eastern part.

The Brahmaputra basin can be classified into the Himalayan zone the foothill or Sub Himalayan zone and the plains.

The Himalayan zone comprises the entire west to east 1700 Km stretch in Tibet which experiences typical highland climate. The region is subject to heavy snowfall most of the year especially in the western and central Himalayas. In the eastern part which is now called the Tibet Autonomous Region experiences rainfall during the summer months. The humidity in this region is much higher than in the western parts and vegetation and cultivable and is more common. Temperatures range between sub zero minimum in winter to about 10° maximum. In summer the eastern part of Himalayas experience temperature from 20° maximum with a lower range of temperature than the Mid and West Himalayan zones.

The foothill zone of the Brahmaputra falls mainly in the Arunachal Pradesh Poorvanchal and Bhutan. Several tributaries rise here. The river is fast flowing. The region experiences heavy rainfall during monsoons. The winters are cold with temperature ranging from 1° C to 15° C daily while summers are not very warm with daily temperature in the pre-monsoon period ranging from 15° to 22° C. The Lushai and Khasi & Jaintia hills have slightly warmer climates but their precipitation is much higher.

The Plains of the Brahmaputra comprise the whole of the Assam valley and a major portion of the Bangladesh plains. The region can be classified into two sections, the Upper Brahmaputra plain and the Lower Brahmaputra plains.

The Upper Brahmaputra plains which comprise the Assam Valley

from the Manas eastward is a region of high rainfall and low range of temperature. The winter temperature are 13°C & 7°C the pre monsoon period roughly March to May records 23°C & 15°C June to September records 28°C & 20°C , and October, November period has 24°C and 12°C as maximum and minimum daily temperatures.

The rainfall in this region is characterised by thunderstorms with several stations recording over 80 days of thunder in a year. This phenomenon decreases to 60 days towards the Sub Himalayan zones and towards the Lower Brahmaputra plains.

The lower Brahmaputra plains comprise mostly western Assam parts of north Bengal and Bangladesh where rainfall is comparatively lower but the range of temperature is higher. Summer maximum temperature may go as high as 32° and Winter minimum in the range 3° to 5° .

CHAPTER II

FLOODS, DROUGHTS AND THE PROBLEM OF ASSESSMENT OF HIMALAYAN WATER RESOURCES

1. Nature of Occurrence:

The recurrence of floods and droughts in the sub continent has highlighted the immediate need for checking this colossal loss of life and property. A method of identifying the problem areas have to be sought. There is also a need for proper utilization of Himalayan water resources. Recent colonial history has aggravated the problem of proper distribution of water among the nations.

Regional cooperation for jointly harnessing the Himalayan water resources has been suggested so as to reduce hazards such as floods and droughts and other environmental problems. The changes in the pattern of monsoons every year has further complicated the problem. In fact the south west monsoon is one of the most important factors affecting the three river basins. The period June to September is crucial in deciding the livelihood of millions of people in the Indus Ganges and Brahmaputra basins.

Deforestation and increasing population are other factors which have to be taken into account when assessing floods and droughts.

The increasing frequency of floods and droughts in the eastern and north eastern part of the subcontinent calls for urgent measures for its prevention.

"One must note that the entire plains of north India

Pakistan, Nepal and Bangladesh have a thick aquifer of ground water about 150 meters or more below the surface¹ (National Atlas Org 1972). This factor continues to be of utmost interest for researchers in the field of water utilization. But it has also to be noted that ground water in the region is directly linked with the Himalayan water resource. Moreover problems regarding sharing of water resources among nations can be possible only with surface water management. Hence the focus of survey of problem areas will first emphasize on surface water resources which can be substantiated by the groundwater resources of the region.

Another very important factor which needs immediate attention is the environmental degradation in the 3 river basins which has accentuated the anomalies like floods & droughts.

2. POLITICAL FACTORS CONTRIBUTING TO THIS HAZARD:

The question of floods and droughts are a transnational problem and hence institutions working for the prevention of these hazards have to tackle a lot of problems while implementing their programmes. National interests invariably come in the way of implementation.

Instead of dabbling in pure academic research one has to identify the crux of the developing crisis and seek remedial action. The problem of floods and droughts ought to be treated

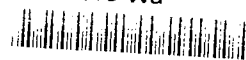
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(1) IRRIGATION ATLAS OF INDIA. (National Atlas Organisation)

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as an environmental problem with transnational dimensions. Organisation such as the SAARC need to intervene and create a congenial atmosphere for removing bilateralism which obstruct transnational solutions especially over such a basic resource like water.

The problem of floods and droughts is widespread in the Sub-continent and this can be attributed to the diverse Himalayan region with great differences, in attitude, climate population density, history and ethnicity. Most of the problems of the mountains have their roots in the plains and vice-versa which requires the cooperation of India, Pakistan, Nepal, Bhutan and Bangladesh. Regional cooperation for checking flood and droughts however cannot be dealt in isolation. It forms a part of the overall programme for Himalayan water management. Unfortunately the region is sensitive to the global power structure and this is a major obstacle in regional cooperation. The South Asian identity has not yet fully surfaced in the region and attempts to solve the sub-continent's problems from which have suffered due to bilateral issues.

However in this aspect one finds the situation encouraging with the growing confidence among SAARC nation especially on solving problems such as these.

In this light the Indo-Pak agreement or the Indus Water Treaty (1960) can be taken as a commendable achievement. In spite of several other differences the Indus water Treaty has been instrumental in solving the basic water related problems of that region to a large extent. Similar agreements in the Ganges and

Brahmaputra basins have not materialised though efforts are being made. In fact a scientific assessment of floods and drought damages does not exist whereby the subcontinent can be brought under some preventive measures to minimize losses in the entire river basins. Methods of assessment vary in India itself from district to district. It must however be understood that the subcontinent being rural and agricultural in nature about 75% of the losses are in the agricultural sector. If this parameter is taken as the major factor in the analysis one can certainly visualise some solutions and demarcate the problem area. If the drought of 1987 and the floods of 1988 are any indication of the things to come the task is no ordinary one. The problem becomes onerous if one neglects any of the factors involved and this requires the co-ordinated efforts of especially India Nepal, and Bangladesh where the losses due to floods and droughts have been maximum over the last few decades. In Pakistan the situation is slightly different considering its predominantly dry climate it does not always experience the severest of droughts and floods.

III FLOODS:

"The term 'flood' is somewhat ambiguous the more appropriate terms is inundation considering that we are more concerned" about the consequences of a river which floods its banks due to abnormal discharge". All the same inundation can be caused by

2.

2. Report of the High Level committee on floods. General assessment principle and policies Volume I. Ministry of Irrigation & Power. G.O.I. New Delhi-1957. Chapter I Page I.

several factors such as excessive precipitation and inadequate channel capacity³, which is quite characteristic of the Ganges and Brahmaputra basins. In fact such a large river system experiences all the possible types of floods since there are no measures taken to prevent them yet, especially in the case of the Brahmaputra.

Besides the overflow of banks these basins have flash floods in the upper reaches; floods caused on account of blocking of natural streams or congestion at the outfall; inadequate land drainage of low lying areas, this is typical of Assam and Bangladesh plains. There is also the phenomenon of flooding due to sea tides⁴. (Report of High level Committee on floods 1957)*.

Floods have also knowns to occur in several parts of U.P., Bihar, Assam, West Bengal and Bangladesh on account of breaches or erosion of river banks or embankments.

IV DROUGHTS:

A long spell of dry weather can be called a drought. In the subcontinent the single most important factor determining the possibility of droughts is the monsoons. This phenomenon is sometimes partial while as in 1987 it was widespread in the subcontinent water shortages occur basically when monsoons are either late or weak and cause serious disruptions in human activity. Since the monsoons are an unpredictable phenomenon past records are taken as a criteria for identifying drought prone areas.

3. Ibid pp 2.

4. Ibid pp.2

Most of the civil engineering endeavour are in response to droughts and floods. In the case of Ganges and Brahmaputra much remains to be done as far as designing of effective projects are concerned. Basically the fundamental problem in the sub-continent has been the lack of proper assessment of Himalayan water resources. This leaves the region at the mercy of the monsoons. As far as the 3 major river basins are concerned the problem of drought is more pronounced in the Indus and Ganges basins and much less in the Brahmaputra basin.

FLOODS DROUGHTS AND THE ROLE OF THE MONSOONS

A survey of rainfall data over a period of 75 years (1875-1949) during monsoon months gives us the pattern of occurrence of floods and droughts over the sub-continent. It was found that if the "deviation of the actual rainfall in a year in an area is more than twice the mean deviation that year may be defined as a year of flood or drought according to positive or negative departure respectively"⁵ (ICAR New Delhi 1960) pg. 21.

Over a large number of years the frequency of floods and droughts tend to equalize but one very predominant factor is that areas of very low rainfall such as Western part of Pakistan, Sind Rajasthan experience maximum number of anomalies as compared to areas such as Bengal and Assam, where heavy rainfall occurs. The two areas where this phenomenon is rare are the Indus, and Brahmaputra basins. The situation has changed considerably in the Brahmaputra valley in the last decade.

5. Crops and Weather in India. ICAR New Delhi, Dec. 1960.

The pattern of floods and droughts in the three river basins since 1900 were as follows. Brahmaputra basin experienced floods only in 1918 & 1935 and there were no serious droughts during this period. Bengal too had floods in 1918 and 1922 and no drought. The Ganges valley on the other hand had several floods and droughts (1) such as the Bihar droughts of (1901, 1903, 1908) & flood of (1922, 1924) and drought again (1932). (2) Eastern UP. alternate years of floods and droughts between 1900-1935 after which frequency of floods began increasing. (3) Western UP had mostly droughts; Since 1950 floods have increased in all these areas.

In the Indus basin, a series of floods and droughts in successive years from 1900-1920 ravaged, Punjab, Kashmir, NWFP, Baluchistan Sind & Rajputana. In 1925, Rajputana & Sind had floods & NWFP in 1929 & 1935. In 1939 the entire basin faced drought and 1944 floods again.

From the 1950s onwards this part of the sub continent continued to face a drought every 3 to 4 years till 1970s and two of them were very severe. The drought of 1987 was also quite severe in most parts of the sub-continent while 1988 witnessed devastating floods in the Assam and Bangladesh areas.

From this analysis the role of the monsoons has been found to be a major factor in drought and flood forecasting but it must be noted that it should not be the sole criteria as there may great variability in different valleys and the effect on human activity there.

VI PROBLEM OF ASSESSMENT OF HIMALAYAN WATER RESOURCES

Inspite of the recurrence of floods and droughts and the increasing demand of water due to population pressure there is insufficient data regarding the changing environment of the sub-continent's water resources.

Uniform data about distribution, quality variability and generation are still unavailable in the various nations of the sub-continent. This is the biggest hindrance to a joint project.

Past records have shown that in the Himalayan region and along these river basins floods have occurred when intense rain occurs in late summer and droughts when monsoons are weak. However this information is insufficient as far as the designing of projects is concerned. There is a lack of understanding of Himalayan hydrology.

The erosion and transport of soil from Nepal for example has reduced productivity there and caused excessive sedimentation in the lowlands in India and Bangladesh. Since all the three nations have their agriculture as the pivot of their respective economies, they should optimise the use of water for irrigation purposes. Besides using water to reduce pressure on forests for fuel by developing hydroelectric power and also domestic water supply.

Irrigation projects in the terai regions and mid Himalayas can help stabilize upland terrace and can improve productivity of lowland fields.

Hydroelectric projects can create new industrial areas by providing off farm employment thereby relieving pressure on land.

Power is also a commodity for export. This is one area where India Bhutan and Nepal are making efforts to set up several small and big projects for mutual benefit.

There projects will fail in their ultimate objective if the data is insufficient and design defective. Besides no project can be set up for short term gains or at the cost of another nations economy.

The Farakka dispute with Bangladesh can be taken as an instance of how a project can create disputes if a proper understanding between the two nations does not exist. Organisations such as the SAARC have an important role to play here.

VII EXISTING INFRASTRUCTURE FOR HIMALAYAN WATER ASSESSMENT

A. Meteorological Stations:-

Despite the dominance of the monsoons an the entire regin, the river basins have a complex topography and therefore a wide variety of climates". Much of the assessment so far have been based on climatic generalisations and overextended regionalisations of existing network data.

The Himalayan region in India have only about 50 rain gavage stations"⁶. compared to about 200 in the whole of Nepal and 24 in Bhutan.

Local variability of rain has greatly reduced the usefullness and accuracy of precipitation records.

B. Snow Melt:-

Another major source of water for the Himalayas comes from melting snow which provides the bulk of the dry pre monsoon river flow. The Indus and its Karakoram tributaries get 70% of the annual flow from snow melt. This is one aspect that needs to be given utmost importance for designing water project snow melt and glacier mass balance measurements are not sufficient but satellite imagery is now available for forecasting spring stream flow in the western Himalayas. Glaciological expeditions to Nepal and intensive study of the same over Karakoram has been done. However many regions have been found inaccessible due to strategic and military reasons which again creates hindrances to proper developmental projects. A high level committee from all the countries in the sub continent along with experts from all over the globe should be handed over the charge of studying this aspect of the Himalayas.

C. Stream Flow recording of run off generation:-

Flow recording from Himalayan rivers are carried out with more efficiency than earlier on. Though the Indus had river gauging as far back as 1921 it was neglected in other parts of Himalayas. Even now the flow recording in Ganga and Brahmaputra are insufficient. Nepal and Bhutan have also started doing so since the 1960's.

As far as run off generation is concerned it comes under the

6. KATTELMAN. R. in MOUNTAIN RESEARCH AND DEVELOPMENT VOL 7 No. 1987 PP. 279.

ground water reserves for which hydraulic routing studies evapotranspiration and water balance determination is carried out in several parts of Nepal and Central Himalayan foothills.

D. Erosion and Sedimentation Control

Proper understanding of hillslope processes and agricultural practices can control erosion. The lack of proper data seems to be the one common factor in all these studies which has hindered their control. Application of knowledge⁷ of other mountain ranges has not been of much consequence because Himalayas have extreme rainfall, relief and erodibility of soils" (KATTELMAN 1987).

Data regarding suspended load measurements have varied widely and comparison and compilation has therefore become difficult. Another vital information that is not available is of bed load transport.

Any soil conservation programme has to involve the farmers of the particular region so as to maximise the productivity of soil by promoting afforestation, improvement of terrnace construction, drainage and irrigation. This will reduce surface erosion and sedimentation.

VIII. THE ENVIRONMENTAL LAWS GOVERNING WATER RESOURCES

"There are essentially four sources of international law: (1) international agreements (2) international custom evidencing a general practice accepted by states as law. (3) general principles of law recognized by civilized nations". (4) judicial decisions and the teachings of the most qualified publicists"

⁸
(ARTICLE 38 (i) of the statute of the Int. Court of Justice) .

In the case of the subcontinent the most relevant factor that has to be considered from the above mentioned sources is the one concerning the protection of the water shed. This is of vital importance because the Indus Ganges and Brahmaputra have the basins spanning two or more nations. "Under these circumstances no country can undertake any activity within its jurisdiction or control so as to cause damage to the environment of other countries or areas beyond its borders⁹". This principle essentially states that one is to use one's property so as not to injure one's neighbours. (This law is called 'sic utere maxim').

"No state can claim an absolute right to ruin its environment in order to obtain some transient benefits....." (Prof hours B. Sohn in NA. Robnson 1987)¹⁰ .

The principle 21 of the Stockholm Declaration led to the Resolution 7 adopted by the U.N. General Assembly in the "World charter of Nature" in October 1982. This Resolution states that "Nature shall be respected and its essential processes shall not be impaired" (1 bid)¹¹ .

* based on Art 21 of the, Stockholm Declaration of Human Environment 1972)

8. ROBINSON. N.A. MARSHALLING ENVIRONMENTAL LAW TO RESOLVE THE HIMALAYA GANGES PROBLEM. MOUNTAIN RESEARCH AND DEVELOPMENT VOL 6 No. 3 pp. 306

9. IBID - 306

10. IBID - 306

11. IBID - 307

The application of the "sic utere maxim in the Himalayan context has not met with absolute success basically because the situation has not been regarded serious enough as yet to merit the application. But with the magnitude of the problem showing signs of worsening there is now a sense of urgency as was in the case of Indus. The application would involve international custom, decisions of tribunals & treaties. The Indus Water Treaty 1960 between India and Pakistan was one such treaty signed after several years of difficult negotiations. The Treaty ensures equitable allocation of the Indus river waters. A permanent Indus Commission was established to monitor its application for the benefit of India and Pakistan.

Similarly a Joint Committee was established in 1972 between India and Bangladesh for sharing of the Ganga Waters at Farakka and on augmenting its flows. The committee agreed upon in 1977 and allocates the volume of withdrawal of water allowed to India and releases what is required for Bangladesh. This is for the period January to May.

Yet another treaty coming under these laws is the Gandak Barrage Treaty between India and Nepal, basically its emphasis is on hydroelectric generation. Kosi and Karnali Project are also between India and Nepal.

The Chukha and Jaldhaka projects with Bhutan can be included under the same as a mutually beneficial project for both India and Bhutan.

The Indo-Bangladesh Memorandum of Understanding 7th Oct 1982 is yet another milestone in River Waters Co-operation.

However one has to study the different Laws that have been

followed in other parts of the globe especially in the realm of upper and lower riparian rights.

The 3 major types are as follows:

1. Principle of unrestricted territorial sovereignty or the HARMON DOCTRINE is of the extreme type.
2. Principle of absolute riparian rights ensures the lower riparian state to the continuance of the natural flow.
3. Concept of restriction on the rights of a state to the use of an international river without regard to injury to neighbouring states. It may be termed as that of equitable apportionment.

"The International Law Association, the non governmental agency who evolved certain rules for international rivers adopted the basin concept, where the entire basin was treated as a whole and not piecemeal". It was called the HELSINKI RULES:

The important points are as follows:

- a. Geography of the basin, extent of drainage area in each of the basin states.
- b. Hydrology of the basin, contribution of water by each of the basin states.
- c. Climate affecting the basin.
- d. Past utilization of the water of the basin and existing utilization.
- e. Economic and social needs of each basin state.
- f. The population dependant on the waters of the basin in each state.
- g. The comparative costs of alternative means of satisfying the

economics and social needs of each basin state.

- h. The availability of other resources.
- i. The avoidance of unnecessary waste in the utilization of waters of the basin.
- j. The practicability or compensation to one or more of the co-basin states as a means of adjusting conflict among users.
- k. The degree to which the needs of a basin state may be satisfied, without causing substantial injury to the co-basin state⁹.

All the relevant factors are to be considered together and conclusion reached on the basis of the whole.

Though the HELSINKI RULES are comprehensive it has certain drawbacks as far as concepts like historical flow natural flow etc are concerned and so its mechanical application to all river basins is not possible.

9. UN Document no 8 page 7

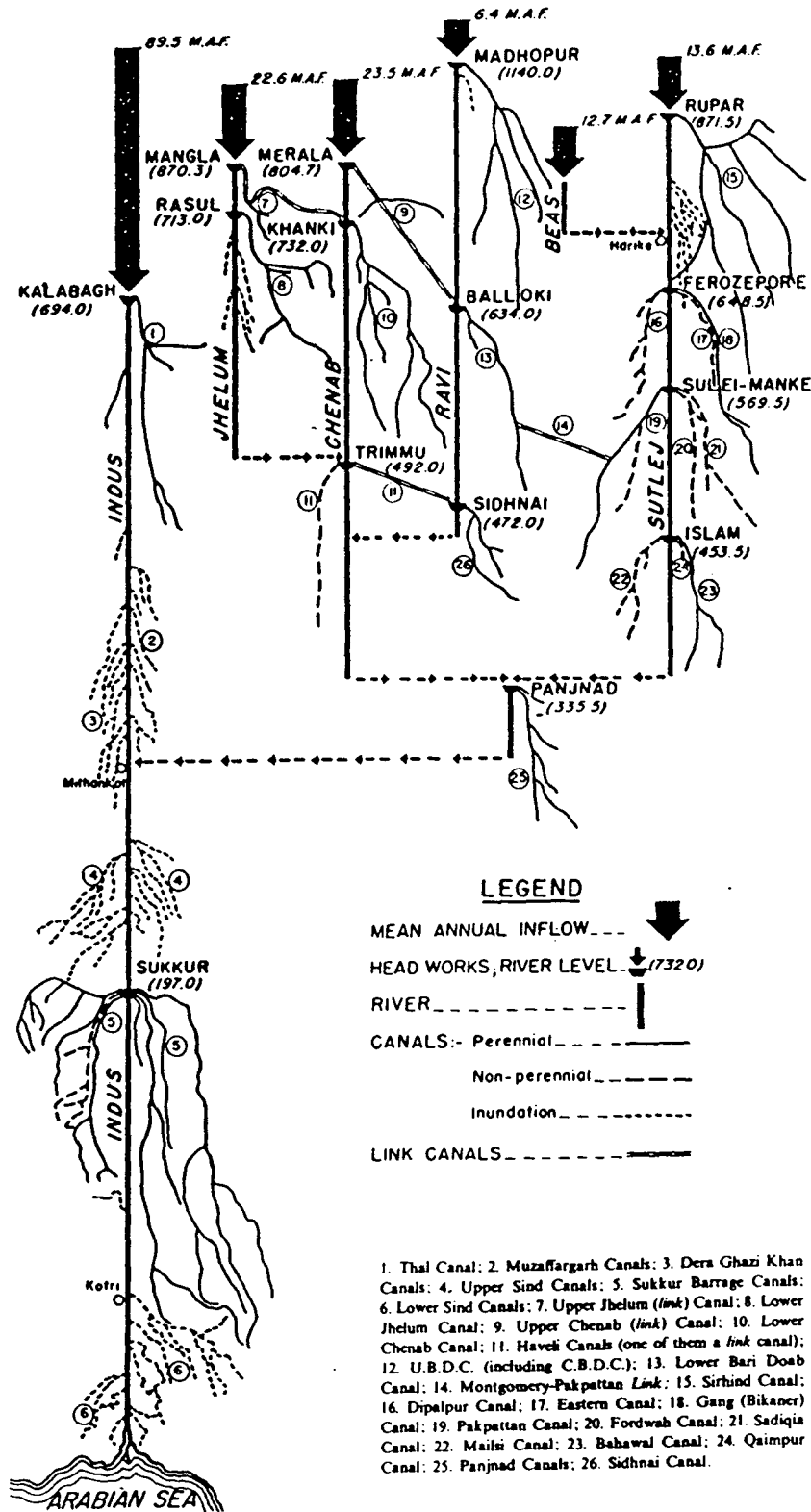
CHAPTER III

HISTORICAL PERSPECTIVE ON VARIOUS AGREEMENT FOR DISTRIBUTION OF WATER IN THE SUBCONTINENT

In spite of the vital importance of monitoring the water resources of the sub continent very few comprehensive agreements have been worked out in the way the Indus Water Treaty overcame the long standing dispute between India and Pakistan. Although the other rivers that are being shared in the sub-continent have so far not created serious disputes, it will be wise to bring the water resources under a joint management., within the purview of the SAARC. In order to arrive at any agreement one has to trace the history of the various agreements arrived at such as the Indus Water Treaty, Farakka and others.

INDUS WATER TREATY:

ORIGIN OF THE DISPUTE: The dispute on the use of the waters of the Indus system of rivers had its beginning long before Independence. There were differences between the states of Punjab, Sind, Bahawalpur and Bikaner. The basic problem was the distribution of irrigation water. Till 1947 the most dominant use of the waters of the Indus basin was for irrigation as no significant generation of hydro-elective power navigation or industrial use existed. In fact the Indus irrigation system depended on the run of the river untill about 1960 although as early as 1940 they had understood the need for storage reservoirs and in 1942 preliminary surveys were done in the Sutlej Beas & the Chenab.



Canals in the Indus plains, as in 1947 (schematic)

PARTITION OF THE INDUS BASIN:-

Following the creation of India and Pakistan the new political boundary was drawn right across the Indus basin. Leaving India the up stream and Pakistan the down stream riparian rights on five of the six rivers of the Indus system.

The dispute turned into an international issue and a complicated one at that because of the way the boundary was drawn. Sir Cyril Radcliffe chairman of the Punjab Boundary Commission was given the task. The existence of the canal system which was vital for Punjab complicated matters and Radcliffe suggested joint control of the intakes of the canal along with boundary demarcation since it was a system designed for single administration. However the conditions which followed partition were detrimental to this kind of an arrangement. Initially there was no problem about the continuity of the water supplies to the numerous canals but it was certain other developments which created tensions". Notable among them being the question of immovable property which Pakistan claimed could be solved only if the Indus water dispute was resolved. In fact this problem of immovable property took several years of negotiations to

overcome because of a very large number of displaced persons": .

It was the land around the canal headworks which created disputes and tensions especially around Ferozepore and Suleimanke canal headworks. There were occasional raids and even armies stood face to face at key places. It was under these circumstances that a solution had to be found. The imposition of

1. GULATI N.D. Indus Water Treaty 1973 Chapter In pp. 55.

the new international boundary across the Indus basin had created a series of unpleasant events.

"Starting from 20th Dec. 1947 agreement on the continuation of water supply on the Upper Bari Doab Canal, and at Ferozpur till March 31st 1948. In spite of India notifying West Punjab of the expiry of the agreement there was no response from West Punjab and on the 1st April 1948 the agreement lapsed.

East Punjab discontinued the delivery of waters from the Upper Bari Doab Canal to the C.B.D.C.^{*} where resulted in the drying of some irrigation channels near Lahore. Although this was only for a short time and water to these canals were restored after the 2 Dominion Government (East & West Punjab) mutually worked out an agreement² .

Pakistan became suspicious of Indian intentions from then on West Punjab as well as Bahawalpur and Sind were also concerned about Indian designs. The Prime Minister of India's assurances were not convincing enough and the experiences with Punjab made Pakistan apprehensive about its future in an agreement of this sort. There were fears about the consequences of the Bhakra Nangal project which was going ahead in East Punjab. They felt that canals taking off lower down on the Sutlej would reduce water flow in West Punjab and Bahawalpur. Pakistan was keen on finding some way to check any Indian activity on the upper reaches of Sutlej as it would, they assumed, cause damage to its economy and even its existence.

"The partition of Indian basin left 5 million acres of

2. Ibid.

3

irrigation land to India while Pakistan had 21 million acres" .
India's objective was to increase their areas while Pak was keen
to see that its 21 million acres were not disturbed by Indias
activities. "Subsequently on 15th April 1948 West Punjab made
requests for :

- (a) Extension of the STANDSTILL AGREEMENT and
- (b) Discussion between 4 chief engineers (2 From East From West Punjab).

On 18th April 1948 at Simla four Chief Engineers conclude two agreements which were to take effect after ratification by their respective countries.

As per the agreement arrived at Simla The Prime Minister of In Jawaharlal Nehru issued orders to East Punjab authorities on 30th April to restore water supply to the Central Bari Doab & Depalpur

4

Canals" .

This episode of April 1948 started the Indo Pak dispute on Indus water.

The agreements of 18th April 1948 beetween Chief Engineers of East & West Punjab according to the Prime Minister of Pakistan have "far reaching consequences". Hence the proposed Inter Dominion Conference scheduled for May 3rd sought to discuss these issues 2 agreements were reached. One was to....

- (1) restore 'status quo ante' in supplies to CBDC except for small channels which crossed from East Punjab to West Punjab (excluded for practical & administrative reasons) valid till

3. Ibid. pp. 59.

4. Ibid. pp. 66.

Sept-30th 1948.

(2) to restore supply of water from Ferozpure head works in India to the non-perennial Dipalpur Canal and to other West Punjab and Bahawalpur canals off Sutlej downstream near

5
Suleimanke and Islam .

There were many factors to be taken into account for these agreements to materialise and controversies were surfacing from time to time. Two items in the agenda were eluding an agreement concerning (i) Payment of the seignorage charges & (ii) to the capital cost of the UBDC taken for calculation of interest charges. The decision on them were postponed after several deliberations. On 4th May 1948 the Agreement was signed on behalf of India by Prime Minister Jawaharlal Nehru, N.V. Gadgil Minister of Works Mine & Power, Swaran Singh, Minister for Irrigation East Punjab. On the Pakistan side by Ghulam Mohd. Min. of Finance, Shaukat Hyat Khan and Mumtaz Daultana both ministers of West Punjab.

SIMLA AGREEMENT 4th MAY 1948

I. Dispute between East and West Punjab Govts over supply of water to CBD and Dipalpur Canals.

Punjab Partition Order 1947 and Arbitral Award gives East Punjab Govt proprietary rights in the water of the rivers in East Punjab and West Punjab cannot claim any share as a right.

West Punjab disputes this and claims rights to the E. Punjab rivers water in accordance with international law and equity.

5. Ibid. pp. 68.

II. East Punjab Government restores water into these canals under certain conditions, two of which are disputed by West Punjab. (i) right to levy of seignorage charges for water (ii) the capital cost of the Madhavpur Head Works and carrier channels to be taken into account.

III. East and West Punjab Government anxious to settle the problem without prejudice and in a spirit of good will and friendship.

East Punjab Government assures West Punjab Govt that it has no intention to suddenly without water from West Punjab without giving it time to tap alternative sources.

West Punjab reciprocates with recognition of East Punjab anxiety to develop areas where water is scarce and undeveloped in relation to West Punjab

IV. Apart from the law involved the Governments are anxious to approach the problem in a practical spirit i.e. by E. Punjab progressively diminishing its supply to these canals so as to give ample time to West Punjab to tap alternative sources.

V. West Punjab Government has agreed to deposit immediately in the Reserve Bank an adhoc sum as specified by Prime Minister of India. Out of this sum Government agrees to the immediate transfer to East Punjab Govt. sums over which there is no dispute.

VI. After an examination of the legal issues of estimating the cost of water to be supplied by East Punjab Government and the technical survey of water resources and means of supply to canals both Governments agree futher meetings of representatives should take place.

VII. Dominion Government of India and Pakistan accept the above terms and express the hope that a friendly solution will be reached" ⁶.

The Punjab Partition Committee at its meetings on 26th and 27th May took note of the new Agreement. West Punjab had stated that further negotiation will take place at the Dominion level and hence the Partition Committee relinquished all responsibility for the matter.

RENEWED CRISIS

"West Punjab began digging a new supply channel on the right bank of the Sutlej in Pakistan territory north of Ferozpur bypassing Ferozpur headworks thereby endangering its safety. The canal intended to connect Dipalpur Canal directly. This was done without the knowledge of East Punjab and hence India lodged a protest which Pakistan responded by a wireless message (16th May) to suggest a Dominion level discussion.

Several telegrams between Nehru and Pakistan foreign Minister Zafrullah Khan took place Pakistan stated that this was a precautionary measure against possible stoppage of water to Dipalpur Canal. India retaliated by saying it would tap Sutlej waters upstream to safeguard Ferozpur headworks.

Pakistan complained of non supply of water to Bahawalpur State Distributary of the Eastern Canal for the first time. India responded by saying that no mention was made of this earlier. India however suggested that if urgent steps to stop against the new canal was taken then India would request East Punjab to supply water to Bahawalpur State Distributary subject to interest, maintenance and seigniorage payments. On 6th July

Pakistan stops work on the new channel. Several negotiations followed without making much progress in finding a solution"⁷.

PAKISTAN'S INSISTENCE ON ADJUDICATION BY INTERNATIONAL COURT

"This deadlock was followed by Pakistans proposal of adjudication by the International court and they were making preparations by setting up a large organisation and also engaging lawyers from USA. India lost no time in setting up an organisation to prepare India's case.

The meeting and communications continued and the negotiating committee that was formed tried in vain to work out a solution for two more years.

Pakistan had three main proposals (1) Firstly it wanted a prior recognition of certain existing and proposed uses in Pakistan and change some of the provisions of May 1948. India on the other hand desired that technical investigation should be taken up without prior recognition of any use whether existing or proposed and that they should be considered as a follow up of the Agreement of May 1948.

(2) Secondly Pak insisted that in case of non-agreement, India should abide by the decision of the International court of Justics. India felt that it was a bilateral problem and stood by the May 1948 agreement.

(3) Pakistan also suggested setting up of a commission of non engineers with a neutral Chairman, with authority to employ technicians and advisers, senior engineers from either side and a

7. Ibid. pp. 69 - 75.

neutral chief engineer, as an interim arrangement. The commission would have authority only to make recommendations but not to arbitrate".⁸

Tensions mounted on either side and so India proposed that joint declaration by both countries not to resort to war for finding a solution to the dispute.

It was also agreed that only peaceful methods shall be used such as negotiations, or an agency which is mutually arranged for the purpose or an international body acceptable to both parties.

Pakistan however continued its insistence in the International court of Justice on the basis that India had agreed upon an international body as a third party. It also claimed that the May 1948 Agreement was signed by Pakistan under duress.

A virtual stalemate followed since no solution was in sight. Both East and West Punjab began constructions of canals and barrages to augment their water supplies and safeguard existing canal systems.

The situations seemed to move further away from any possible settlement.

LILIENTHAL PROPOSAL

David E. Lilienthal former Chairman of Tennessee Valley Authority and Atomic Energy Commission USA visited India and Pakistan. After having studied the situation regarding the Indus Waters and several other issues between India and Pakistan he suggested that the World Bank use its good offices in bringing

8. Ibid. pp. 76.

both parties to an agreement as well as help in financing an Indus Development Programme.

Engene Black President of World Bank endorsed this and sent word to both countries who finally agreed to use the good offices of the World Bank.

The World Bank had to face a lot of problems from then on trying to find a solution to the complicated issue.

WORLD BANK PROPOSAL:

With the help of the Working Party the World bank set out to find a mutually agreeable sharing system. The engineering consultants to the Bank Representative and the full support of the Bank management framed a proposal which sought to produce a fair and economic result.

It sought to give both countries the greatest possible freedom for operation maintenance and future development of its irrigation facilities.

This principle had negative as well as positive advantages. Negative advantage being minimising friction between the two countries and avoiding the necessity of a costly and possibly ineffective permanent joint administration. The positive advantage was that the provision for each country to develop its resource freely would efficiently develop the whole system rather than await approval from each other for every new venture.

The Proposal also embodies that historical withdrawals of water must continue but not necessarily from existing sources so as not to hinder the planning operation of effecient use of waters.

The summary of the Bank Proposals were as follows:

"Entire flow of Indus Jhelum and Chenab exclusively for use and benefit for Pakistan except insignificant use of Jhelum waters in Kashmir.

Entire flow of Eastern Rivers Ravi Beas Sutlej exclusively for Indian except a transition period during which historic withdrawals from these rivers to Pakistan would be supplied by India.

Transition period calculated according to the time taken to complete link canals needed in Pakistan.

Each country would construct the works located in its own territory at its own cost no joint constructions are planned but certain link canals in Pakistan to replace supplies from India were to be built. The costs were to be borne by India according to the benefit it receives in the process.

Since no storage was proposed for historic withdrawals certain provisions had to be made to fulfill the requirements in Sutlej Valley through the link canals. However some modification were needed for Rajasthan canal" .

INDIA AND PAKISTAN REACT TO THE PROPOSAL

India was keen on accepting the proposal provided certain modifications were made on the Chenabs existing uses in India as well as some existing irrigation developments in Kashmir. The World Banks proposal, that India should not withdraw waters from Chenab at Marhu, would make some parts of Rajasthan remain a

Ibid. pp. 137.

desert for ever India argued. India eventually was willing to forego Chenab waters at Marhu and Merala and Indus water from Kotri.

Pakistan was critical of the proposal since it felt no workable agreement could be arrived at without the allocation to Pakistan of some waters from Eastern Rivers. It pointed out some deficiencies in the link canals that were to replace supplies from Eastern Rivers.

The World Bank was firm on its proposal but it tried to placate Pakistan. It tried to work out a plan that could help Pakistan negotiate and make certain adjustments acceptable to both sides .

TRANSITIONAL AGREEMENTS AFTER INITIAL HURDLES

The Bhakra Canal was dedicated to nation on July 8th 1954 and this saw tensions mounting in Pakistan since they claimed a steep fall in Sutlej waters as a consequence of this. Pakistan considered it the "deadliest blow" to its economy. The media in Pakistan whipped up strong anti-Indian sentiments.

Pakistan was however brought back into the negotiating table. Some transitional arrangement for Kharif 1955 had to be made. Field trips were undertaken by both teams as well as World Bank officials which include William Iliff Vice President of World Bank. Mr. N.D.Gulati leader of the Indian delegation and Mr. Mueenuddin leader of the Pakistan delegation.

A transitional agreement was reached when India agreed upon the limitation on additional irrigation uses in Indian territory

so as not to reduce canals withdrawals in Pakistan existing since Mar.13 1952. A Comprehensive Plan continued to elude the Working Groups.

Several modification were made in the flow pattern of the Bhakra canal to suit the Kharif and rabi seasons.

Though negotiation on the Bank proposal resumed as early as Dec 1954, actual work started around June 1955. It was stopped during September for rabi seasons transitional arrangements and December and January 56 for talks relating to floods damage on the link canals in Pakistan. Little progress was being made since both parties were free to comment upon its merits.

Pakistan assumed the Bank Proposal to be Indias proposal and expected India to make concessions from it. The Bank proposal underwent some adjustments to remove certain shortages during rabi season.

India also asked for classification of some points in the Aide-Memoire or Bank Memorandum although the bank was not willing to change it.

INDIA CONCERNED ABOUT PAKISTAN'S ATTITUDE

In April 1957 Nehru showed concern at the progress. Since the Bank proposal had envisaged that after 5 years Pakistan would not need supplies from Eastern Rivers he wrote that 3 of the 5 years have elapsed without any indication of Pakistan acceptance. The Bhakra canal opened in 1954 and the Bhakra Dam and Sirhind Feeder Canal was to come into operation soon. Construction of a canal from Harike Headworks to feed arid areas of Rajasthan was going to be taken up. These projects Nehru said cannot be held

up because of Pakistans attitude towards bank proposal. India sets a deadline for 1962.

KASHMIR QUESTION

Since January 1957 Pakistan obtained a favourable verdict regarding the Kashmir question at the Security Council. It was trying to take political mileage out of this and make the implementation of Indus Water plan more difficult.

PAKISTAN'S PROPOSAL

"Pakistan made a proposal to the Bank for its own plan on 7th July 1958 in London. From May 1958 Pakistan early Kharif as well as rabi crop were to be fed by the new canals flowing off the Taunsa Barrage on the Indus completed in March 1958.

In 1958 during Kharif season Pakistan again complained that India was withholding Pakistans share of historic supplies of water. This period was also a phase when there was considerable political instability in Pakistan and so the Indus Waters became a convenient issue for political mud-slinging" ¹⁰ .

INDIA'S ALTERNATIVE PLAN

"India suggested a plan whereby all the waters in the Chenab at Marhu would be diverted into the Ravi besides using the link canals constructed in Pakistan for supply to Sutlej Valley canals and Central Bari Doab canal. The Indian plan was considered practical and economical but Pakistan could not accept the plan involving Indian "interference" with the uninterrupted flow of

the Chenab" . The Bank itself commended the Indian plan as a more economical and less time consuming one than the Pakistan plan. However fearing the possibility of the Bank inclining towards the Indian plan as well as a reappraisal by the new adjustment the Bank plan was accepted by Pakistan unconditionally on 22nd December 1958.

PROCESS OF TREATY MAKING

The process leading to the signing of the treaty took about 15 months starting from May 1959.

The process involved the formulation of the 1st draft on 9th Dec 1959. After this the Bank made a public announcement of the financial plan. The participation of the friendly Governments concerned would be as follows:

| COUNTRY | FINANCIAL PLAN FOREIGN EXCHANGE (MILLIONS) | EQUIVALENT in US \$ (MILLIONS) |
|----------------|--|--------------------------------------|
| AUSTRALIA | A 6.96 in quant | 15.54 |
| CANADA | Can \$ 22.10 ,, | 22.19 |
| GERMANY | DM 126. ,, | 30.21 |
| NEW ZEALAND | NZ 1.00 ,, | 2.78 |
| UNITED KINGDOM | 20.86 ,, | 58.48 |
| UNITED STATES | US \$ 177.00 ,, | 177.00 |
| | US \$ 103.00 in loans. | 103.00 |
| | in local currency | 409.20 US \$, |
| UNITED STATES | US \$ 235.00 in grants | 235.00 |

*Source: GULATI. N.D. 'Treaty Making' INDUS WATER TREATY pp. 277.

10. Ibid. pp. 235-243.

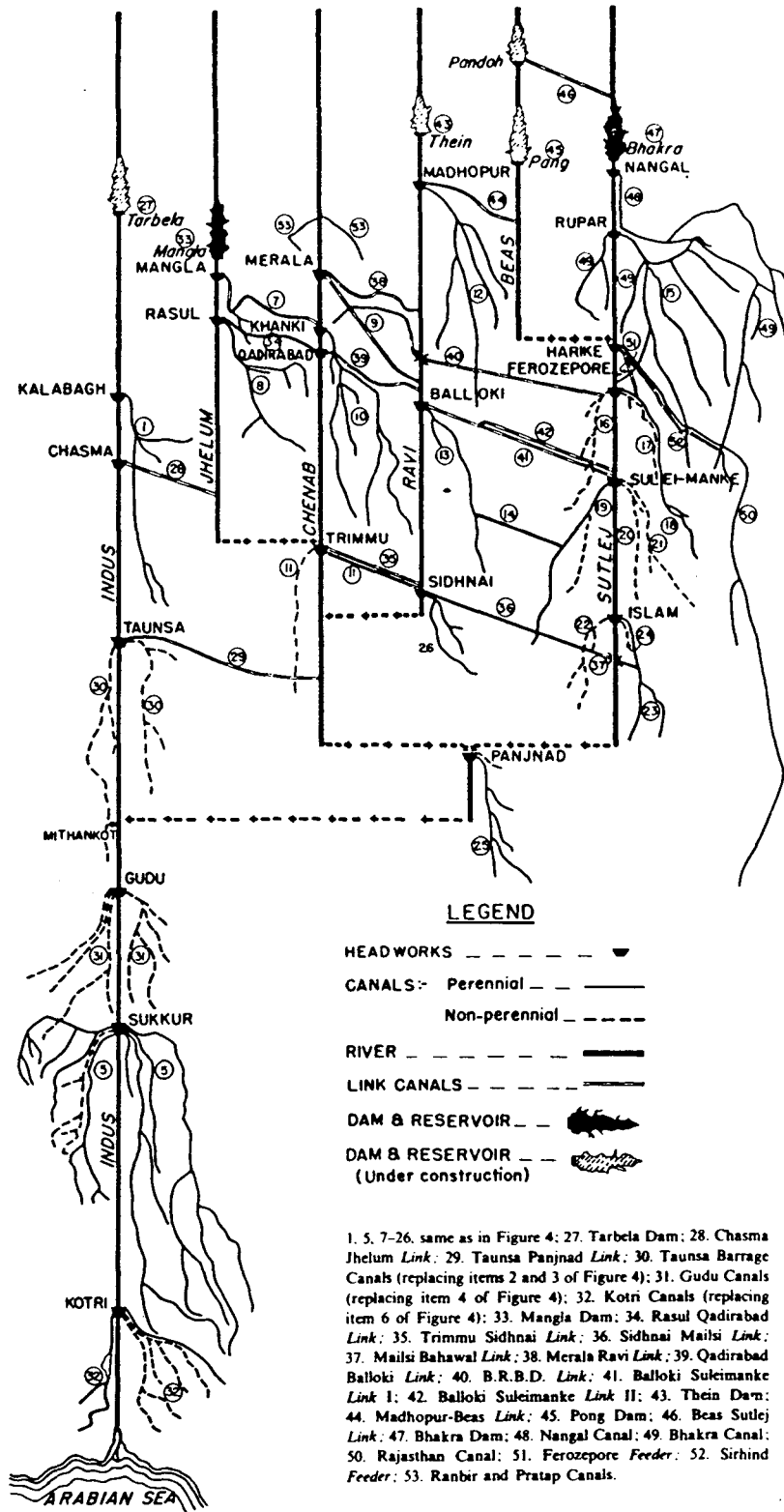
11. Ibid. pp. 248.

This was followed by a second Draft on 20th April 1960. An agreement on the Indian uses of Western rivers was made. Then the Third Draft was made after sorting out the objection made by Pakistan. Certain Transitional arrangements were made to facilitate the acceptance of the treaty. This was the final hurdle.

INDUS WATER TREATY (Karachi 19th Sept. 1960)

The historic Treaty was signed by Jawaharlal Nehru Prime Minister of India and Field Marshall Mohammad Ayub Khan President of Pakistan in the presence of the World Bank representative Mr. Iliff. along with dignitaries from different countries. It has been termed as a model for river water cooperation among nations. With the setting up of the Permanent Indus Commission the problem has been resolved and both India and Pakistan have contributed in making the Indus basin one of the most developed river basins of the world. It has also encouraged similar endeavours in the sub-continent.

The sequence of Events were followed from N.D. GULATI's book on Indus Water Treaty. He being the leader of the Indian delegation to the World Bank he has given a comprehensive account



Canals in the Indus plains, as in 1972 (schematic)

pp5.

repeatedly assured them that it would not jeopardize its irrigation schemes and that East Pakistan essentially did not have a problem of water scarcity rather it was one of abundance but of poor distribution.

LOWER GANGA BASIN

A brief description of the Ganga in the region can explain the magnitude of the problem. Ever since the Ganges changed its course two centuries ago the bulk of the water has been flowing into the Padma and progressively less in the Bhagirathi, which is essentially the Hoogly stream. This was a major problem for Calcutta port and hence a Barrage was considered necessary to divert more water into the Bhagirathi. Therefore a site was chosen by the British engineers 160 Kms north of Calcutta at Farakka.

The main Ganges bifurcates 38 Kms from here into Padma and Bhagirathi. It was then undivided Bengal and hence the problems of post partition was unforeseen. As in the case of the Indus basin the boundary of India and East Pakistan was drawn across the vast basin thereby complicating the problem of sharing of river water. Farakka which lies close to the international boundary has since become a crucial question in Indo-Bangladesh relations.

OBJECTIVE OF CONSTRUCTION OF THE BARRAGE

"The construction of the Farakka Barrage started in 1962 with a few important purposes in mind. Firstly for making the current in the Hoogly strong enough to flush out the silt and keep the Calcutta port clear. Secondly it would also provide fresh

water to Calcutta which was affected by excessive salinity of the river. Thirdly it would considerably reduce flood hazards downstream" .

India's plans were seen with much scepticism and the future of Calcutta port which was the life-line for Eastern India, Nepal and Bhutan depended upon a bilateral agreement which suited East Pakistans domestic interests as well as Indias.

The period 1960-1970 saw innumerable rounds of talks between India and East Pakistan to resolve the dispute. The basic problem was that East Pakistan seemed more keen on internationalising the issue. The initial discussions between Prime Minister Jawaharlal Nehru and President Ayub himself suggested that there was a difference in the two countries approach to arrive at a solution.

While Nehru insisted that the issue should be referred to technical experts, Ayub was more keen on holding the Ministerial level conference.

"In India's view this was not possible unless a proper analysis of the data for the project was done" .

While the barrage was under construction negotiations continued. Pakistan made several efforts to internationalise the issue and raised the question at the International Water for Peace Conference (Washington May 1967) and Afro-Asian Legal Consultative Committee (Bangkok 1968) but without much success since it was a bilateral issue.

13. Project to save Calcutta, Min. of external affairs Govt. of India N. Delhi 1961 pp2,3

14. Foreign affairs record vol VIII sept. 1962 pp203,04 Press

th
note 27 sept.

EXPERT LEVEL MEETING (NEW DELHI May 13th-26th 1968)

India put forth its views on the Farakka barrage and submitted the necessary data and charts to substantiate its stance. It also explained the benefits that East Pakistan may draw from the project such as flood control. East Pakistan also had a project Ganga-Kobadak adak project meant for irrigating 3500000 acres of land. Both sides decided to send engineers to inspect one another's projects. However the insistence on adjudication by a third party by Pakistan resulted in the conclusion of the Talks without the signing of an agreement.

SECRETARIAL LEVEL TALKS (DECEMBER 1968) (1969-70)

Some progress was made here considering the fact that Pakistan was willing to provide certain data which was so far withheld. Comparisons were made between the flow of water at Farakka and Hardinge Bridge to get the basis for East Pakistan's reasonable requirements.

Regeneration of water in the dry months showed an increase in the flow at Hardinge bridge which was downstream of Farakka. Technical details were found wanting from Pakistan's side and their actual requirements could not be ascertained.

Political turmoil in East Pakistan during the period 1969-70 delayed the efforts to find a solution. Four secretarial level meetings could not resolve the crisis. East Pakistan's quest for autonomy was becoming more pronounced and West Pakistan was

making all efforts to thwart Indian activities here. In this scenario very less could be achieved on the Farakka issue.

BANGLADESH AND THE FARAKKA ISSUE (1971-75)

The Emergence of Bangladesh coincided with the completion of the Farakka Barrage construction in 1971. Bangladesh under Sheikh Mujibur Rahman signed a Treaty of friendship & Cooperation and Peace on 9 March 1972 when Indira Gandhi Prime Minister of India visited Bangladesh.

The Treaty provided for the joint study and action in the fields of flood control river basin development and the development of electricity and irrigation.

"The Feeder Canal was nearing completion in 1974 when Sheikh Mujibur Rahman visited New Delhi in May 1974. Indira Gandhi assured him that till an agreement was reached on the sharing of Ganga Water India would not commission the Farakka Barrage".

On 21 April 1975 the Farakka Barrage and the Canal were commissioned on an experimental basis following an agreement on 18th April between the two countries.

"Under the agreement India was allowed to draw 11,000-16000 cusecs during the lean season (Apr 21-May 31) and the rest would go to Bangladesh.

The flows for both countries during this period were as follows"¹⁵.

| Month | 10 Day Period | INDIA [Cases flow in cube feet per secl | BANGLADESH |
|-------|---------------|--|------------|
| APRIL | 21 - 30 | 11,000 | 44,000 |
| MAY | 1 - 10 | 12,000 | 44,500 |
| MAY | 11 - 20 | 15,000 | 44,250 |
| MAY | 21 - 31 | 16,000 | 40,500 |

Source: BARIK. NIRANJAN. "River Water Disputes in S.A. Dissertation 1984.

"The Farakka project was dedecated to the nation on May 21st 1975 by Jagjivan Ram Indias minister for Agriculture and Irrigation.

He hailed the agreement as an outstanding example of mutual understanding and cooperation between neighbouring countries in the development of the water of an international river"¹⁶.

POST MUJIBUR REHMAN PERIOD 1975-

With the assasination of Sheikh Mujibur Rahman. Bangladesh's approach towards the issue changed considerably. The new leadership in Bangladesh found the Farakka issue a populist one to whip up anti-Indian feelings. Domestic

15. Joint Indo Bangla declaration on 16th may 1974 N.Delhi.

Press Info bureau Govt. of India 1975 (para 18)
16. Indian and foreign review 1 July 1975 pp8.

compulsion led to accusations against India. From a purely bilateral issue efforts were again made to internationalise it. It was raised in the Special Political Committee of the UN General Assembly in 1976- in which the Bangladesh representative claimed under International law it was entitled to the natural flow of the Ganga in order to satisfy its human and ecological needs.

India insisted that it was a bilateral problem and a solution of this nature would be more practical.

India however did not accept the demand by Bangladesh that it was entitled to the entire natural flow of the Ganga. India was keen on chalking out a long term solution for the augmenting the flow of the Ganga.

JANATA PARTY'S POLICIES (1977-79)

The Janata Party came into power in 1977 and negotiations with Bangladesh resumed. The talks were followed by an agreement to end the long crisis.

DACCA AGREEMENT. 3rd NOV 1977.

Under this agreement, which was signed by Indias minister for Agriculture and Irrigation Surjit Singh Barnala and Rear Admiral Musharaf Hussain Khan advisor to Bangladesh President on flood control and irrigation, it was felt certain long term and short term solutions have to be worked out for the complex problem.

SHORT TERM AGREEMENT

This was for providing both sides with a fixed amount of water during the lean season (1st January to 31st May)

The agreement was valid upto 5 years and could be reviewed by the two Governments at the end of 3 years and again before 6 months from expiry. It could also be extended further by mutual agreement. However there were certain important conditions by which the agreement was bound. They were regarding the changing flow of the river during the lean period. The normal flow as well as the amount of withdrawal of water by India and Bangladesh are as follows.

| MONTH/DATE | AVERAGE FLOW as per data (1948-73) | INDIA | BANGLADESH |
|------------|--|--------|------------|
| Jan 1-10 | 98,500 | 40,000 | 58,000 |
| 11-20 | 89,750 | 38,500 | 51,250 |
| 21-31 | 82,500 | 35,000 | 47,500 |
| Feb 1-10 | 79,250 | 33,000 | 46,250 |
| 11-20 | 74,000 | 31,500 | 42,500 |
| 21-31 | 70,000 | 30,750 | 39,250 |
| Apr 1-10 | 59,000 | 24,000 | 35,000 |
| 11-20 | 55,000 | 20,750 | 34,750 |
| 21-30 | 55,000 | 20,500 | 34,500 |
| May 1-10 | 56,000 | 21,500 | 35,000 |
| 11-20 | 59,250 | 24,700 | 35,250 |
| 21-31 | 65,500 | 26,750 | 38,750 |

(Source: BARIK NIRANJAN "River Water Disputes in South Asia SIS/JNU 1984)

However if in a ten day period water either increased or decreased then certain conditions were to be followed. In case of an increase then both countries are entitled to proportionate withdrawals. In case of a decrease then the proportion should be such that Bangladesh does not get less than 80% of the flow. The other important condition was that India cannot draw more than 200 cusecs of water between Farakka and Bangladesh for reasonable uses.

LONG TERM AGREEMENTS

The Joint River Commission established in 1972 by the two Governments to carry out study relating to augmentation of the dry season flows of the Ganga. The objective was to find a solution which was both economical and feasible. They were asked to submit their recommendations within three years.

It was also suggested that the agreement was bilateral hence differences would be resolved bilaterally.

The agreement drew mixed reactions in India and even sharp criticism from the media considering that over 150 crores was spent on the Barrage and it was found that Calcutta port needed a minimum of 40,000 cusecs throughout the year for its safety.

THE EIGHTIES:- After Indira Gandhi came back into power in January 1980 there were considerable changes in the Indian approach towards the Farakka issue.

India came up with several proposals such as the linking of Brahmaputra and Ganga within a specified time frame.

Bangladesh also came up with proposals such as the

construction of storage reservoirs in the upper reaches of the Ganges in Nepal and India.

Bangladesh backed out of the proposal of connecting Brahmaputra and Ganga on the grounds that it may lead to an ecological disaster.

There were several debates regarding the feasibility of the various proposals and not much headway was made.

The reluctance by either nation to grant certain concessions to one another eventually resulted in a deadlock. In New Delhi on the 26th June 1982 ministerial level meetings were held but not much could come out of it because both sides differed on the question of sharing of waters.

INDO BANGLADESH MEMORANDUM OF UNDERSTANDING 7th October 1982

After a meeting between General Ershad and Prime Minister Indira Gandhi in October 1982 an Indo Bangladesh Memorandum of Understanding was signed on 7th Oct. 1982 by the foreign ministers of India and Bangladesh.

The two countries agreed that the basic problem of inadequate flow of water imposed sacrifices to either side and hence an equitable sharing of waters at Farakka was necessary to end this problem. It was also admitted that the 1977 agreement had some inadequacies and was considered unsatisfactory.

It must be noted that the rejection of the earlier agreement in 1972 after Sheikh Miyubur and the criticism of the 1977 agreement after Janata Party's rule in India bring about glaring aspects about foreign policy in the region. How the entire

approach changes with domestic political upheavals on either side brings out the inherent weaknesses of the agreements arrived at so far. It must be also noted that though the role of the World bank in the Indus Water Treaty was played down to the minimum the involvement of a third party can sometimes make lasting changes on bilateral issues.

The Indo-Bangladesh crisis should not be allowed to linger on at the mercy of changing policies. If an agreement has to be arrived at either the World Bank or an organisation such as SAARC should intervene and work out a possible solution.

The 1982 agreement bestowed the responsibility on the Joint River Commission to study and analyse feasibility of schemes within 18 months (i.e. by 6 April 84)

The Joint Rivers Commission met at Dacca in March 1984 and could not arrive at an agreement because of the earlier differences.

"India showed grave concern over Bangladesh's intentions of constructing reservoirs in Nepal"¹⁷ .

INDO - NEPAL AGREEMENTS ON RIVER WATER

India and Nepal have had bilateral negotiations in the past over water but they neither strained relations nor became raging controversies as in the case of Pakistan and Bangladesh. This was so because Nepal's relations with India were of a different nature and so were the problems concerning water management.

Nevertheless if experiences with Pakistan and Bangladesh are

17. Times of India 17th feb. 1984 .

taken into account one would realise that controversies arise everywhere over political issues rather than technical or engineering ones even for a basic resource like water. This is also quite true with Nepal since several proposals from India have been received with much suspicion in Nepal. In spite of that several projects such as the Kosi, Gandak and Karnali have been undertaken by the two countries.

KOSI PROJECT AGREEMENT 25th April 1954.

India and Nepal signed an agreement for irrigation and flood control for the Kosi project. This was for protection of about 60,000 hectares of cultivable land in Nepal and 20,000 hectares in Bihar with the construction of flood embankments. The project also provides Nepal with half of the 21,000 KW of electricity estimates to be generated there.

The Western Kosi Canal Project takes off from the Western side of Kosi Barrage in the Nepal territory for 35.13 Km after which it enters Bihar and runs for 77.47 Kms including the breach canal of 20.57 Kms at the end.

GANDAKI PROJECT

A joint project comprising U.P. Bihar and Nepal with a barrage constructed at Valmikinagar. It will provide irrigation to 3.08 Lakh hectares in U.P. and 11.51 Lakh hectares in Bihar and .63 lakh hectares in Nepal. A power house with an installed capacity of 15 M.W. is to be located in Nepal. It was agreed upon by both Governments on 4th December 1959.

DEVIGHAT PROJECT

This 14 megawatt hydel project is in central Nepal built with Indian expertise intended to serve Nepals power needs of that region.

CHINA'S ASSISTANCE AND IMPLICATIONS OF INDIA

Nepal has taken help from other nations as well . Such as the Kulekhani Project This project is a World Bank aided project of 60,000 kilowatts with the assistance of Kuwait and Japan.

However India had some reservations regarding Chattra Irrigation Canal.

China has been an important factor in Indo-Nepal relations especially when there have been clear indications that Nepal has tried to woo China at the same time showing hesitation towards Indias proposals for several new projects.

The Chattra Irrigation canal originally built by India was given to China for renovation. India expressed resentment owing to its proximity to the Indian border near Naxalbari. Nepal claims that China bided low for its rights on the global market. India argued that despite India bidding low it still failed to get Nepals consent.

FLOOD CONTROL MEASURES

In December 1981 the two Governments agreed upon joint monitoring for flood control. In this agreement it was decided that 40 stations were to be set up for providing advance flood

warning and collect data of rainfall in catchment areas. The cost of the project 1.5 crores would be borne by India. The external affairs minister P.V. Narasimha Rao signed this agreement after a four day visit to Nepal in December 1981. The 2 nations also agreed upon prior consultation before any river project was designed. As of now 60% of Nepals hydroelectric power has been built with Indian help.

KARNALI PROJECT

Considered to be one of the most potential rivers of Asia only a minute quantity of its potential has been tapped for power and irrigation. For several years now discussions are underway for a joint project between India and Nepal.

There has been certain reservations from Nepal considering their criticisms over Indian interests. Firstly they complained of faulty dam construction in the Kosi which has caused the heavy siltation of the Kosi river and caused submergence in Nepal. Nepal also complained of very less power generations.

As regards Karnali, Rapti, and Pancheswar certain new dimensions have emerged which have been instrumental in delaying an agreement.

Nepal has been suspicious that Indian interests in these projects are aimed at keeping Nepal in economic and political subjugation. This is obvious from the fact that though the report on Karnali was prepared in 1965 it took Nepal 20 years of negotiations to arrive at an agreement. In fact the one major step in joint cooperation has been the February 83 agreement on Karnali, Rapti and Pancheswar multipurpose projects. However it

is not yet fully resolved because there still exists certain hurdles as regards storages on these rivers including Kosi. Nepal was not really in favour of multilateralism.

As in the case of Pakistan and Bangladesh many of the projects have been subjected to political means rather than technical or engineering, thus delaying the process.

The Nepal Government approached the World Bank for aid regarding the Karnali project.

Interestingly enough, the interdependence of India and Nepal being evident the World Bank sought assurance that India would buy the expected surplus of power generated which was around 3600 megawatts that can be stepped up by an additional 1000 megawatts.

INDO - NEPAL JOINT COMMISSION MEETING August 1988

The meeting saw the setting up of the Sub-commission on water resources. It is to deal with all aspects of Indo-Nepal cooperation in multiple uses of water resources for mutual benefit.

SUB COMMISSION MEETING December 88. KATHMANDU.

Rules of procedure for the functioning of the sub-commission was adopted. It was decided that the existing Inter Government bodies or Expert groups or Committees set up for specific work/problems will continue to function and shall report to the sub-commission. Discussions regarding Karnali and Pancheswar multipurpose projects, setting up of flood forecasting and warning system exchange of power etc were held.

Discussions were also held on Western Rapti Project soil

conservation and watershed management, inundation due to border rivers, inland navigation, transfer of technology etc.

Arrangements are being made for flood forecasting due to be operational before the 1989 monsoons with the help of 15 hydro-met site in Nepal.

A Standing Committee on Inundation problems on Borders was set up. The permanent standing committee held its 4th meeting in June 1988 at Kathmandu. The site inspection was done with the help of local contact officers/groups.

Meeting of the High Level Committee on Chandra Canal Project was held in October 1988 for which India had agreed to provide assistance to His Majesty's Government on 7th April 1978. This was for renovation and extension of the Canal. Besides this construction of Pump Canal from Western Kosi Canal at a cost of 28.44 Crores. The formal commissioning will be after completing micro canalisation work in 1989 it was decided in its meeting of December 1988.

The basic differences between agreements with Nepal and those of Pakistan and Bangladesh are the absence of complicated negotiations and inherent hostilities towards India. Also public opinion has not been as vocal as in the case of Pakistan and Bangladesh which is sometimes a conducive factor in joint ventures. However it must be admitted that these agreements have not been signed by Nepal without studying its merits and demerits especially since its monarchical structure lies in the midst of the contrary pulls of USA, China and India.

INDO-BHUTAN AGREEMENTS ON WATER

Of the 4 nations with whom India has entered into river water agreements in the subcontinent the negotiations with Bhutan has been the least controversial. Both India and Bhutan have taken a positive stance on the issue of river water cooperations.

CHUKHA AGREEMENT 1974

India and Bhutan signed an agreement for the joint hydro-electric project in 1974 under which agreement India was supposed to buy the internal surplus of electricity generated.

The Chukha Project Authority came into being on 27th September 1975 when its first meeting was held in Thimpu. The Authority then had their subsequent meetings on 26th March and 15th October 1976 to establish what is now Bhutan's most important power base as well as an important source of power for the north eastern region of India. The 336 megawatt project had an initial outlay of 85 crores in 1977-78 the assistance given by India was on a grant cum loan basis in the ratio of 60% to 40%. However the cost estimation in 1982-83 was around 180 crore and was expected to be commissioned in 1984.

MANAS AND SANKOSH: A pre-feasibility study was carried out in 1982 on these two rivers by Indian experts to harness their power potential.

INAUGURATION OF CHUKHA II May 85.

The second stage of the project downstream with a potential of 1000 megawatts was inaugurated while the first stage was nearing completion.

CHUKHA PROJECT was commissioned and power synchronised with eastern grid of Indian in 1986-87 though the first 2 turbines had started operations in mid 1986. The eventual cost came upto 244 crores.

The Prime Minister initiated new projects during his visit. The Chukha Project itself provides power to Thimpu, Phuntsholing, parts of West Bengal and Assam.

JALDHAKA POWER PROJECT: Indo Bhutanese joint venture began in September 1961. Harnesses the Jaldhaka river and provides 18 megawatts of power to West Bengal and South Western Bhutan.

NEW PROJECTS WITH BHUTAN

In 1986 the Gyesta Mini Hydroelectric project at an altitude of 2855 metres was taken up on a turn key basis. It was completed and commissioned on 7th July 1988. The project has an installed capacity of 1500 Kw (3 X 500 Kw). The operation and maintenance continues.

Khaling is yet another project undertaken with Indian expertise.

River training works of River Paro to protect Paro airfield was undertaken in south Bhutan. Other River training works and hydrological observations for Torda and Bhotikhola were also continued.

The Water and Power Consultancy services (India) LTD has been assigned the task of providing consultancy services and monitoring the Power Transmission Services for all the 4 Nos 66 K.V. Transmission lines awarded by the Royal Government of Bhutan.

CHAPTER IV

BASIC ISSUES IN THE LIGHT OF GROWING POPULATION NUMBER & INCREASING PRESSURE ON LAND, FOREST AND WATER RESOURCES:-

ENVIRONMENTAL DEGRADATION

In the sub-continent the Himalayas constitute the major water resources for millions in the three major river basins namely Indus Ganges and Brahmaputra. Hence the degradation of the Himalayan Environment has widespread implications and a strenuous quest to investigate the causes for it are urgently needed.

From the viewpoint of environment certain basic issues emerge. There is an urgency to differentiate the cause and effect. Several questions need to be asked such as (i) Is the population explosion a cause or an effect? (ii) Is widespread deforestation a post 1950 phenomenon (iii) Do current mountain land use practices produce the downstream destruction accredited to them? (iv) What can be done to solve the problem (v) Why has development of subsistence mountain people failing to show the desired results? (vi) How has the socio-economic characteristics of people in the region affected the Himalayan landscape? (vii) What are the political factors that have been responsible for accentuating the problem?

There are several other questions that need to be answered but the more obvious ones have to be tackled first.

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1. Himalaya Ganges Problem. (Mohonk Mountain Conference 6-11 April 86) Proceeding in MOUNTAIN RESEARCH AND DEVELOPMENT.

POPULATION EXPLOSION IN THE SUB-CONTINENT

Population explosion is assumed to be at the root of most of the problems such as increasing poverty, large scale deforestation accelerated land sliding and soil erosion and putting pressure on forests and agricultural land.

According to projections made by demographers the populations of approximately 865 millions in 1981 in the countries of the subcontinent, excluding Sri Lanka and Maldives, is expected to increase to about 1325 million by the year 2000.

In the sub-continent population increase has been much in excess of the estimates and the planners have recognized that these countries are in the midst of a 'Demographic explosion'.

According to GUNNAR MYRDAL "by now it is commonly recognised that all countries in the region have entered a critical phase of sharply accelerated population growth and that the prospects for successful economic development are crucially related to population trends".

The Socio-Economic characteristics of South Asian countries can be seen from the table :

| COUNTRY | BANGLADESH | BHUTAN | INDIA | NEPAL | PAKISTAN |
|---|------------|--------|-------|-------|----------|
| AREA 000sq Km | 144 | 47 | 3288 | 140.8 | 803.9 |
| POPULATION mid 1981 millions | 89.9 | 6.3 | 675.2 | 15.0 | 83.8 |
| DENSITY persons per sq.Km | 624 | 28 | 205 | 107 | 104 |
| POPULATION Growth rate % 1972-81 | 2.3 | 2.1 | 2.0 | 2.7 | 3.0 |
| LITERACY Rate % 1980 | 26 | - | 36 | 19 | 24 |
| PERCAPITA GNP US \$ | 140 | 80 | 260 | 150 | 350 |
| REAL GROWTH Rate of GDP % 1972-81 | 6.5 | -0.1 | 3.3 | 2.8 | 5.1 |

(Source: ASIAN DEVELOPMENT BANK)

The close linkage of the water resources of the above mentioned nations have to be taken into account while assessing the effect of population on agricultural land and forest. The environment and socio economic collapse in one area has led to a much greater problem in another. So far the Himalayan environment it has not been treated as a homogenous region and its protection ought to be a multilateral endeavour. There are several areas which have reached alarming levels of environmental degradation.

PRESSURE ON LAND, FOREST AND WATER RESOURCES:-

NEPAL AND THE CENTRAL HIMALAYAS

As far as Himalayan water resources and the environment as a whole are concerned Nepal is the most strategically located. It has one of the biggest potential for water resources in Asia and most of it is as yet untapped. The waters of Nepal flow into India and Bangladesh and hence its management is crucial to this very densely populated area.

It must be noted that though Nepal has a population of only 15 million and its density about 107 persons per kilometre the pressure on its land is tremendous since only about "12% of its usable land is under cultivation. About 40% of its land is unusable because of high altitude. The usable land account for 30% and its fast depleting forests around 30%"².

The large scale felling of trees in the terai region has caused heavy erosion and resulting in the silting of the rivers downstream in India and Bangladesh. The increasing frequency of floods in parts of Uttar Pradesh, Bihar and Bangladesh has been attributed to the environmental degradation of the Ganges basin particularly in the terai areas of India and Nepal.

CHANGING FACE OF THE FOOTHILLS AND TERAI

Recent research has shown that much of the earlier assumptions on Himalayan Degradation have been misleading and

2. Prithvi Narain Shah in Nepal Antiquary No & January 1979.

this could lead to improper planning and protection measures. In the Ganges Basin one of most important belts where changes in the environment has become progressively rapid is the terai. Some of the factors need close examination.

"With the introduction of modern health care, malaria was considerably suppressed after 1950. Since then there occurred an unprecedented wave of population growth which continues. The terai region has a higher growth rate of population as compared to the whole of Nepal (which is 3.0-3.05 as against 2.6 during the period 1971-81".

This population explosion which shows Nepal's population doubling in 27 years can be attributed also to the large scale illegal migration from India into these border areas. The region comprising North UP, North Bihar and South Nepal have about 90% of its population engaged in subsistence economic activity. This had led to the increase in demand for fuelwood, construction timber, besides fodder for the increasing domestic animal population as well as clearing for agricultural land to support more people.

This vicious circle is taking a toll on the land and loss of forests has reached alarming proportions. It has been predicted that since the region has lost half its forest cover in the last 30 years it is likely to lose most of it by the year 2000 AD.

The cutting of agricultural terraces on steep and more marginal mountain slopes has led to a catastrophic increase in soil erosion and loss of land through increasing landslides and disruption of the normal hydrological cycle.

This disruption is causing increased runoff during monsoon months and the increased frequency of floods and massive siltation with disastrous consequences on the plains. The water table has been lowered considerably in these areas and drying up of springs and wells during the dry season. Besides this there has been rapid siltation of reservoirs; abrupt changes in the courses of rivers; damage of agricultural land in the plains by the deposition of sand and gravel. There is also an increased incidence of disease in downstream areas.

One aspect that has been quite noticeable in the past few decades is the formation of river islands especially in the delta region of the Ganges and Brahmaputra rivers near the Bay of Bengal and huge plumes of sediments are even extending many kilometres into the sea.

When agricultural land becomes progressively reduced new areas are encroached upon in the mountains and terraces are constructed for subsistence crops reducing more forest cover.

When fuelwood becomes scarce and distances of forest from villages increase the people prefer to substitute animal dung for fuelwood. This in turn leads to the deprivation of natural fertilizers and lowers crop yields. This causes more pressure on land for subsistence farmers and increases the felling of trees from marginal steeper slopes and thereby making landslides more frequent. The multiplicity of these factors can be termed as the vicious circle of environmental degradation which is true not only of Nepal and northern UP and Bihar but of all the river basins in the subcontinent.

Yet another vicious circle is believed to accentuate the effects of the others. According to certain observation made by environmentalists deforestation has been affecting the climate in such a way as to reduce normal annual rainfall³ .

WESTERN HIMALAYS

The situation is not very different as we move westward into Western UP. Himachal Pradesh, Jammu and Kashmir Karakoram and Hindu Kush even though climatically it is much more arid. The forces of destruction are at work here as well with the increase in the construction of roads for both army and civilian traffic.

The roads construction being substandard has increased land slides. These regions have been exploited by the demands of lowland population centres for timber. The arid regions are losing what little vegetation it had and are turning into uninhabitable deserts. Many of these areas are being extensively used as military bases since they are near sensitive and strategic areas and this has not helped in the protection of the fragile ecosystem which determines the water resources.

EASTERN HIMALAYAS

These areas comprising east Nepal, Sikkim North Bengal Bhutan and Arunachal Pradesh receive heavy monsoon precipitation and deforestation is rampant in many areas. This has been not only due to the socio economic activity of the region but the

3. Ives. J.D. THEORY OF HIMALAYAN ENVIRONMENTAL DEGRADATION. MOUNTAIN RESEARCH & DEVELOPMENT VOL. 7. NO 3. 1987 pp. 190.

political strife that besets the region. The Sino-Indian conflict has not resolved the border issues nor the management of the waters of the Brahmaputra. The internal conflicts such as those between hill tribes and plains people for example are essentially generated by the competing demands for access to natural resources.

IMPACT OF TOURISM

The rapid growth of tourism especially in the Central and Western Himalayas has been found to be detrimental to the protection of the natural resources of these areas. It has been causing environmental pressure of an entirely different kind the result of demands for recreation and adventure from people outside the mountain areas. What was once regarded as a major revenue earning enterprise for the regions is now regarded with a different perception. Tourism in most of these areas have become a threat to the forest as well as being disruptive to the way of life of the local people.

REFUGEE PROBLEM

PAKISTAN:- "The environmental impact of 3,500,000 Afghan refugees who have fled from Afghanistan into Pakistan and settled mostly in North West Frontier Province are a major threat to the region. The impact vary according to the type of environment they come from and the type into which they have been settled. The maximum destruction has been caused by the refugees who have settled in the prime forest areas. In this political imbroglio the Pakistan

nationals themselves have taken advantage and started illegal logging. Though the extent of damage has not been assessed it is has found from Lanstat imagery and forestry maps that the forests and pastures in the catchment areas of Kabul and Swat tributaries of the Indus have been greatly depleted in the last decade.

Although deforestation has been a century old process in these areas it was accentuated in 1947 when large scale migration from India occurred and they were made to settle in these forested Western Himalayan region. However the spate of refugee influx after the Afghan war has done irreversible environmental damage and this is likely to affect the water resources of Pakistan in the form of floods, droughts etc. .

TIBETAN REFUGEES

Evers since the Chinese occupied Tibet there has been large scale migration into India and Nepal. In 1959/60 about 120,000 Tibetan refugees settled in the Khumbu Himal and Mustang valley in Nepal causing imbalances in the environment there. Several hundreds have migrated to India as well and some have settled in the Himalayan, foothills. Though their impact on the land has been ignored all these years, it has definitely caused disruption and added pressure on available water resources. The influx of Chinese into the Tibetan region and its military designs near the Indian and Nepal borders have shown drastic changes on the

4. ALLAN. J.R. NIGE. Impact of Afghan refugees on the vegetation Resources of Pakistan Hindukush. Mountain Research & Development Vol. 7, No. 3 1987.

vegetation and river valleys there and its effect on the Brahmaputra downstream.

BANGLADESHI REFUGEES

Since the partition of India and subsequent wars with Pakistan a large number of East Pakistan refugees have migrated into the plains of Assam and other neighbouring states of India. The main focus of the Assam agitators were on the "foreign nationals" from Bangladesh who have virtually captured many of the fertile flood plains in the Brahmaputra valley. Since most of them practice subsistence agriculture with less emphasis on irrigation and soil protection methods they have become a major threat to the indigenous population of the areas and have added to the pressure on land and forest.

The problem in Assam and Bangladesh in the last few decades has not been one of scarce water resources rather a problem of plenty. Floods are becoming an annual feature. It can easily be attributed to excessive deforestation and soil erosion. It has become of vital importance now that the forests resources of the subcontinent be examined critically so as not to hasten this destructive process. It will be wise to make a comprehensive analysis of the entire Himalayan system without ignoring political factors which has played a major role in this fragile ecosystem. There is also an urgency for certain adaptive measures to counter the growing population pressure in the various river valley especially those of the Ganges, Brahmaputra basin. The limits on the extensive use of land have been reached and even exceeded in some regions.

ADAPTIVE MEASURES

The areas where there is an excessive pressure on land and water resources what is urgently needed is intensifying irrigation and cropping patterns, retaining the fertility of the soils through traditional methods, reducing the number of animals to make up for fodder shortage and also for protecting forests and grassland.

These areas also lack in new technology that could introduce more disease and pest resistant plant varieties. The use of more labour is needed. The irrigation methods should be modern and widespread. These measures are most urgently required in the terai and sub-Himalayan zones of India and Nepal.

RIVER BASIN APPROACH TO DEVELOPMENT

The river basin approach provides three significant opportunities that do not exist otherwise:

(i) The opportunity to identify and develop potentials created elsewhere in a basin by the development of a single project of facility such as the obvious example of the multipurpose reservoir.

(ii) The opportunity to identify and mitigate the negative impacts of projects or facilities upon other water uses and the environment of a basin.

(iii) The opportunity to enhance economic development by increasing the efficiency of water resources development. Multipurpose or multiobjective river basin is intended to yield

greater net benefits to all communities within a basin than any single community could develop in isolation.

As far as river basin approach in the sub-continent is concerned the first step must be the establishment of joint committees of the co-basins states comprising Nepal, India and Bangladesh for the Ganges, and China India Bangladesh and Bhutan for Brahmaputra. The committee should establish institutes or centres with the full range of technical experts appropriate to river basin development. This should include scientists engineers, sociologists legal scholars economists, hydrologists who would undertake joint programmes of research training, investigation monitoring and basic planning. The staff shall be from the co-basin states:

The work in these centres should involve.

- a. Collection and exchanging of information on the physical aspects of the river basins. Establish and improve data collection networks and techniques including remote sensing by satellite carry out scientific studies of physical processes i.e. geology, ecology and hydrology of the basins and sub-basins.
- b. Carry out study and investigation programmes to identify major water management needs and problems and carry out technical evaluation of alternate solutions. This study should include field and laboratory investigation, surveys, research and testing.

* B.M. ABBAS. A.T. Regional Coop. for River Basin Development in SARC. A Socioeconomic approach to peace and stability E.D. ABDUL HAFIZ Chapter 8. pp. 113 B.I.I.S.S. 1985.

c. Develop multidisciplinary training and research programmes in modern scientific methods and approaches to all aspects of river basin, water management and development that is expressly tailored to the social, political and economic and physical framework of the region. (ABBAS. B.M. 1985)

The River Basin approach seems to be the only way to save the subcontinent from an environmental disaster. If steps are not taken now to deal with the problem it will prove to be a great failure on the part of the leaders of the co-basin states. Though it is not an easy task it will be easier now than ten years hence when the problems would have multiplied.

CHAPTER V

POLITICS OF THE SUBCONTINENT, BILATERAL ISSUES THE PROBLEMS AND THE ACHIEVEMENTS :

The question of management of the water resources of the sub-continent is a basic one. However the implementation of the same has been rather difficult because the region is a part of the global power system. The subject cannot be discussed in isolation of that. One has to take into account "regional projections of the global power structure and sub-regional specific sensitivities, which in turn are utilized by the global system"¹. It is also true however that water management in the sub-continent can be worked out bilaterally, as in the case of the Indus between Pakistan and India. This Treaty between two otherwise hostile nations has been hailed as a model for water resource management all over the world.

The sub-continent as a whole has a tremendous potential for water resources. Now that the Indus basin has been highly developed and the Treaty survived two Indo-Pak wars it is time to turn to the other co-basins of the subcontinent namely Ganges and Brahmaputra.

It goes without saying that harnessing this massive water resource would involve the cooperation between India, China, Bangladesh, Bhutan and Nepal. Besides mitigating the annual flood hazards it would also solve the energy crisis which is now a global phenomenon.

1. CHATTOPADYAY-B. "HARNESSING THE HIMALAYAN WATER RESOURCES" in S. Asia Regional Coop & Stability M.S. Agwani & other 1983

Studies carried out in this sphere have shown that technological as well as financial help would be necessary from United States, Japan the USSR and multilateral agencies which meant the involvement of the global power structure. Politics has stood in the way time and again over this issue.

"Solutions of problems of sharing water resources which optimise the benefits to each of the participant countries, are not difficult to arrive at even though perceptions of short and long term requirements and problems may not necessary match. It called for one or two conditions. Either the global power system should leave the regional countries done to sort out their differences or the regional countries should take shelter under a single power umbrella"².

It is however not so simplistic, since under the present circumstances the regional countries cannot ignore the global power system. As long as a strong South Asian identity is not cultivated it would be rather utopian to think of such a possibility. As far as taking shelter under a single power umbrella is considered the conditions are far more conducive especially since an organisation like the South Asian Association for Regional Cooperation as well as the Non-Aligned movement has gained acceptance in the sub-continent. This would facilitate a common stance towards a third party at least on the question of development and harnessing of water resources. There is a third possibility, over which India being a regional power should take the initiative to promote.

2. Ibid pp 74.

The countries of the region could agree to sort out their differences among themselves and bargain with the global power system jointly without allowing the latter to make use of the internal differences³. Even in this arrangement one cannot rule out the manipulation of the regional political system by one of the dominant elements of the global system - the influence of the United States being quite prominent in the sub-continent. The strengthening of the South Asian Association for Regional Cooperation SAARC will go a long way in eschewing short-run egoistical solutions which do not keep in view the maximisation of benefits for the other participating countries.

Taking the Indus Water Treaty as a forerunner in River Water Management of the Western sector a solution for the Ganges, Brahmaputra basin in the Eastern sector is long overdue. The one possible way could be a tripartite agreement between India, Nepal and Bangladesh to resolve the Lower Ganges, Brahmaputra basin. As far as the entire basin is concerned it would be quite unscientific to deal with the water resources without the cooperation of China.

The entire Himalayan area in the Eastern sector will have to be treated as a single ecological unit from Uttar Pradesh to Arunachal Pradesh, including Nepal, Sikkim and Bhutan. It would also call for a joint effort to influence China on this issue.

Before discussing regional cooperation vis-a-vis water resources one must understand the broader framework of the politics in the region. The policies of the individual nations

3. Ibid. pp. 74.

and their relations with one another. The subcontinent is a part of South Asia which has seven sovereign independent states: India, Pakistan, Nepal, Bhutan, Bangladesh, Sri Lanka and the Maldives. There is no doubt that South Asia constitutes a geopolitical sub-system. For centuries the conceptual unity of this sub system has been recognized. For almost a century their political system, economy foreign policy and defence were a composite unit. This changed after the withdrawal of the Imperial power following the Second World War. India is definitely the dominant regional power here. The other nations are not only small but are on the peripheral. In order to contain the core nation or the dominant power the peripheral nations have been seeking for options outside the region. There is clear evidence of encouragement to them from non regional powers. It is therefore important to analyse the stance of the nations of the region on major global and regional issues.

GLOBAL ISSUES

On issues such as global disarmament most of views have been equivocal but on more specific issues such as banning nuclear weapons tests in the ocean, underground or outerspace there has been certain differences.

The question of Regional Disarmament has had noticeable changes in the stance of certain nations. The early 1970's saw a special resolution declaring the Indian Ocean as a zone of peace which recieved overwhelming support by the UN General Assembly and the two sponsoring member states India and Sri Lanka.

Since Indias successful peaceful nuclear experiment at

Pokhran in 1974. Pakistan began taking a rather hostile stance. It sponsored a resolution of declaring South Asia as a Nuclear Weapons free zone. The resolution was passed by about 90 votes with Nepal and Sri Lankas support but Bangladesh abstained. India simultaneously got the counter productive provision of the Pakistani draft omitted by sponsoring another resolution and securing equal number of votes Pakistan has continued to introduce the same issues on Nuclear Weapons Free Zone in South Asia year after year. India has been trying to convince the world community that without proper consultations among the regional states and without mutual confidence regional disarmament cannot be attempted.

As far as the question of total disarmament is concerned nuclear as well as conventional arms the sub continent States expressed a common sentiment at the international level.

On Nuclear non Proliferation neither India nor Pakistan signed the Treaty while the other South Asia states have signed the treaty. One cannot deny the fact that there are several differences of opinion in the sub-continent over global issues. These have brought about intra-regional diversities and are a hindrance to regional cooperation.

Multiple views in the subcontinent are only natural considering the domestic policies and geo-political locations. For instance Pakistan has been following an antagonistic policy ever since the Afghan problem began. Nepal and Bhutan have the problem of being weak buffer states between two powerful states China and India. Srilanka and Maldives are island republics are

not only influenced by the other South Asian states but also developments in the Indian Ocean.

REGIONAL AND BILATERAL ISSUES:

More often than not bilateral or regional cooperation over basic resources such as water management and trade have been greatly influenced by political factors. Indus Water Treaty and the Farakka problem are few instances which bear testimony to this. If it were not for the inherent hostilities between the respective nations it could have been resolved much more easily.

The basic problem was more of an engineering or technical problem rather than any serious political crisis but emotions cannot be subdued.

The Indo-Nepal Trade crisis which has strained relations between the two nations could slow down the process of river water management which is of vital importance. Even the boycott of a member nation such as Sri Lanka over an ethnic crisis at a SAARC summit could seriously jeopardise efforts for cooperation in other fields.

Hence certain clear approaches have to be worked out to minimize these constraints. The first step in this direction would be to identify the two broad paths of cooperation namely bilateral and regional. The two approaches should promote regional integration rather than widen the differences.

There are issues which have bilateral implication only and can be solved bilaterally to avoid complications. Some issues which may be economic social political scientific or military can be dealt at the regional level. This will facilitate and

expedite their negotiations. There has to be a concensus and certain clear guidelines have to be laid down. These guidelines form the basis for the broad framework for regional cooperation.

In fact the South Asian Association for Regional Cooperation (SAARC) has been trying to adopt this type of a framework where both bilateral as well as regional issues function parallel to each other but without being a hindrance to the ultimate goal of regional integration. One of the major problems faced by the SAARC has been the lukewarm attitude of Sri Lanka on the one side and the question of Indo-Pak hostilities.

These have thwarted the efforts for a broader South Asia security framework and economic cooperation.

PROBLEMS IN HARNESSING WATE RESOURCES

There is a fear among most of the smaller nations in the sub-continent that cooperation with India would put them in economic and political subjugation.

This fear arises out of Indias predominant position due to its size, population, natural resources and geo political location.

Both Bangladesh and Nepal have viewed with much suspicion Indias efforts to work out joint ventures in river water management. Nepal had accused India for the faulty construction of the Kosi project where silting submergence and low power generation have affected Nepal. Bangladesh does not hide its displeasure over Farakka especially when flood and drought occur. In fact the proposed agreement between Nepal and Bangladesh for

better water management has been visualised so as to embarrass India. India has shown concern over Nepal's proposed plan to construct reservoirs to regulate the flow of the Ganges.

As far as Pakistan is concerned the problem of the Indus Water has been quite effectively tackled. However there are certain disturbing aspects such as the escalating arms race and objections to each others military designs.

The Indus Water Treaty has survived two wars in 1965, and 1971 and several other tensions and this is an encouraging factor. Nevertheless it is absolutely necessary that a peaceful atmosphere should prevail so that basic issues like water resource management are not under the mercy of each others military aspirations.

It must be noted that so far only Pakistan and India have had this attitude. The other nations namely Bhutan, Bangladesh and Nepal see India's military power as an umbrella for its own security.

Increasing cooperation among the nations in safeguarding the natural resources and environment is yet another high priority endeavour. Its close relationship with the immense water resource potential of the region calls for drastic steps. Here again the unnecessary bilateral tensions and misunderstandings have come in the way of regional cooperation. The turmoil in Punjab and Kashmir and its proximity to Pakistan on one side and the Sino-Indian border problem are the major impediments in evolving a comprehensive environmental plan for the entire Himalayan region.

The situation is further complicated because India is a

federal state, necessitating analysis of the division of authority for environmental protection and natural resources management between central government and the federal states. A uniform assessment methodology is lacking in the Indian states themselves.

This is true of the other nations as well some of whom have insufficient data regarding their environment

SOME ACHIEVEMENTS:

The nations of the sub continent have made some progress in solving certain basic issues inspite of the constraints. The foremost of them all has been the Indus Water Treaty considering the fact that bilateral relations between India and Pakistan have been hostile. What is more satisfying is that two wars between the two nations has not threatened the Treaty in any way. Although it must be admitted that the Indus plan could have had a broader perspective. It was under very unfavourable conditions that the Treaty was signed. The frayed tempers on either side was a result of the experiences of partition. The sharing of Indus water become an immediate problem and the respective Governments had to take drastic steps to control the mounting tensions in East and West Punjab. Another positive aspect of the Treaty was the playing down of the role of the Third party, the World Bank, whose proposals was eventually accepted. By doing so and subsequently sitting up a Permanent Indus Commission the problems and its future development is a matter which can be solved bilaterally. In fact the two nations can try and improve

upon the Indus Basin Treaty in the areas where it felt short of the ideal plan.

Even in the case of Bangladesh when the issue of Farakka was raised in the UN in 1976 India stuck firmly to the view that bilateral issues are best tackled bilaterally. This was reflected in the World Body's belief and also the concensus adopted by the General assembly brought out India's mature diplomacy. Although the problem is yet to be resolved the setting up of a Joint River Commission has gone a long way in helping negotiations. India should also consider the Bangladesh proposal of including Nepal and China if it would really help in solving the Ganges Brahmaputra basin problem. The Indo Bangladesh Memorandum of Understanding is yet another step in the right direction since it ensures the joint inspection and monitoring of the Ganges from time to time and a proper solution to the problem is being worked out if necessary with the help of Nepal.

As far as cooperation for harnessing the energy resources are concerned both Nepal and Bhutan have collaborated with India in sitting up various projects such as Gandak, Kosi, proposed Chisapani (Karnali), Rapti in Nepal, Chukha and Jaldhaka in Bhutan. More than the setting up of these projects the main achievement has been the willingness to undertake bilateral ventures showing a mutual concern for one another's needs and reducing the political overtones if any.

From the point of view of safeguarding the environment the effort so far have been dismal but not totally discouraging awareness is being created by the media and voluntary or

ganisations on the conservation of forest land soil and water resources.

The Chipko movement Project Tiger, the Himalayan Environment Institute, International Commissions on Ecology and the United Nations are some of the positive signs of activity involving the protection of the environment in and around the Himalayas.

CONCLUSION:

After having discussed the social economic and political aspects of water in the subcontinent one arrives at the inescapable conclusion that there are plural problem definitions and plural solution definitions. One cannot subscribe to any one perception of the sub-continent's problems.

The very title of the subject WATER AS AN ELEMENT IN THE POLITICS OF THE SUB-CONTINENT suggests that a basic resource like water is turning out to be a basic problem of the region. Why does it has to be treated as a problem? The chapter on the historical perspective on river water agreements answers this question. We have been following the "Single problem-single solution" approach. This has been the biggest drawback as far as co-operation among South Asian states are concerned. Till recently we have been oblivious or even negligent to the interest of the region as a whole. The correct approach for the region now is the multiple problem and multiple solution approach. A river basin needs to be developed in its entirety. If experiences of the past are taken into account one can conclude that politics has played a major role in the region for good or for worse.

If plans for the future are made then the spirit should be one of mutual understanding. There should be politics of co-operation rather than confrontation. However utopian this may sound it is not an impossible task and will eventually be a rewarding one. The ideal platform, at present, for cooperative endeavours is the SAARC. In spite of sharp political differences there is now a growing concern about environment and conservation of natural resources and also about controlling floods and

droughts.

In the first chapter the physiography and climate of the sub-continent was analysed broadly. For the purpose of effective planning in the river valleys a much more wider knowledge of the basins is necessary. For this provisions for collecting data have to be made which at present is insufficient

The assesment of floods and droughts in chapter two was basically to identify the problem areas. The colossal loss of life and property every year is a major impediment to progress. The existing infrastructure for forecasting floods and drought need to be improved. There should be stricter implementation of environmental laws in the sub-continent so that every member state is involved in the conservation of its water resources.

The third chapter dealt with the historical perspective of various water agreements. This was just to give us an insight into the past experiences in river water management and how it has changed the relations between the nations from time to time.

The fourth chapter attempted to highlight the important issues that are emerging in the environment of the sub-continent. The political factors contributing to the degradation of the environment has also been briefly analysed. How certain adaptive measures could help in reducing the pace of this deterioration and also a strategy for river basin management is suggested.

The concluding chapter which deals with political issues and its implementations on the sub-continent bring out the power game in the region. The foreign policies of the South Asian states and bilateral relations which are of immense importance in

the sphere of water management . This has been one of the most difficult aspects in this dissertation because during the course of this study the policies of the nations are continued to change. For instance, the SAARC meetings were almost jeopardized by Sri Lanka and the Indo Nepal trade impasse has altered the progress of many cooperative endeavours. There is a new fear psychosis ever since India successfully launched the Agni missile.

However it must be admitted that despite all these suspicions the co-basin states are slowly beginning to realise that cooperation is the only way to solve the water related problems in the sub-continent.

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