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**Conflict Resolution and Institutional Arrangements for Flood Disaster Management  
on Indo Nepal Fringe: Focus on Kosi Basin**

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## Abstract

*Trans boundary conflict is one of the chronic riparian problems not only in India but also in South Asia. This has constrained agricultural development in the basin. It has also enhanced economic insecurity in the region of upstream and down stream. The vulnerability of the people has also gone up. The purpose of the present paper is to highlight riparian conflicts in Kosi basin of Indo-Nepal region. Since many conflicts become chronic and reduces the growth and diversification of agriculture of the economy, therefore, the paper focuses on characteristics of the basin, intensity of conflict, conflict minimization process, areas of joint venture and concludes that in such circumstances of inter-country conflicts minimum common governance (MCG) may be a sustainable solution. The paper also proposes the modalities of MCG and its modus operandi. If such policy is executed then it may bring higher agricultural growth and other related changes. The livelihood losses of the people of concerned countries can be reduced forever which will ultimately lead to sustained eco-security, food security, employment and income guarantee.*

## INTRODUCTION

Trans boundary conflict is one of the chronic riparian problems in Indo-Nepal region of South Asia. The construction of a barrage and canal system for irrigation in Nepal and India was initiated in 1953. Also afflux bund was executed in upstream of barrage. Indian Government has also initiated eastern and western canal system along with embankments and powerhouse. The construction of embankment reduced loss of livelihood, enhanced employment and earnings. This also gave sense of eco - security in the region. Major irrigation has been provided in both India and Nepal. In addition, flood prone area has also been protected. Despite this, there has drainage congestion, water logging behind the embankment, severe flood problem in unprotected area, rising riverbed and recurring maintenance problem in the region. These are causes of concern for both the Government of India and Nepal. There is huge resource crisis for both the countries because of which promotional and protective measures are not taken to the desired extent. Even large reservoir could not be constructed although it was planned by the Indian Government a long back. There is lack of coordination between the two countries. This has constrained agricultural development in the basin. It has also enhanced economic insecurity in the region of upstream and down stream. The vulnerability of the people has also gone up. There are several contentious issues related to the above problems which needs to be resolved. It also includes land dispute, flood planning, water discharge and water management. The aim of the present paper is to examine the development in Kosi basin in South Asia. The purpose of the present paper is to highlight riparian conflicts in Kosi basin of Indo-Nepal region. Since many conflicts become chronic and reduces the growth and diversification of agriculture of the economy, therefore, the paper focuses on characteristics of the basin, intensity of conflict, conflict minimization process, areas of joint venture and concludes that in such circumstances of inter-country conflicts institutional reform for minimum common governance (MCG) may be a sustainable solution. The paper is based on secondary data and other related information of transboundary problem. The paper, on the basis of secondary information, also proposes the modalities of MCG and its modus operandi. In the end, the paper may conclude that common minimum governance in the Kosi basin of Indo-Nepal region may be a viable option for sustainable development of South Asia.

The need of joint minimum governance in the basin is being felt. In this framework both the countries will chalk out institutional reforms in several sectors and policies that will be of the nature of joint management. It may also include plan appraisal, ex post evaluation, monitoring and resource sharing. It has been felt that planning by a single country may not solved the disastrous chronic problem in this region of two countries of South Asia.

If such policy is executed then it may bring higher agricultural growth and other related changes. The livelihood losses of the people of concerned countries can be reduced forever which will ultimately lead to sustained eco-security, food security, employment and income guarantee The river Kosi

originates in the Himalayas. The total length of the river is about 74030 sq. km. The upper catchment of the river system falls in the region of Tibet and Nepal. This is 85% of total length. The remaining 15% lies in India where it mainly passes through north of Bihar state. Because of severe flooding through sudden overflow during monsoon, lateral shifting tendency up to 20 km a year and having uncertain flood plain, the river is termed as `the river of great sorrow` in South Asia. It brings large loss of livelihood in terms of loss of crops, life, property employment and earnings in the region. It carries enormous silt loaded discharge during flood and spills into the plains of Indo-Nepal border. About 1295 sq. km. of land in Nepal and 7770 sq.km. of land in India have become unused because of deposition of sand. It may highlight the nature and extent of common trans boundary problems for India and Nepal.

Trans boundary water conflicts settlement in river basin have several implications for agricultural development. Sometimes it leads to sudden underflow of water and some times it leads to overflow of water in the catchments of either of the two or more countries. As a consequence it leads to shortage of water for agriculture, industry and household sectors. Often it leads to overflow of water in the rivers during monsoon. Both ways various sectoral production and services are seriously affected which causes immense damage to crops, property and lives. If these situations become chronic and persist for a long time then the agricultural prospects of the region is badly affected in the concerned region. This may affect increase in gross cropped area, cropping pattern, increase in production and productivity and it may destabilize production There are many instances of conflicts of inter country nature in and around India.

The Indo-Bangladesh dispute over the Ganga water could emerge because of Farakka barrage project in West Bengal state of India. Similarly, projects on the Kosi and Gandak generated riparian conflicts between India and Nepal that was further accentuated by Tanakpur Barrage Project. Later on it would be resolved slightly through Mahanadi Treaty, 1996. Some issues are still awaiting to be resolved relating to Pancheswar Project. The causes of conflicts may be many like misunderstanding among the parties based on principles, sensitivity ignorance, indifference to share information relating to water disasters and politicization for electoral benefits of the governments.

Since many conflicts become chronic and reduces the growth of the economy, therefore, the paper focuses on characteristics of the basin, intensity of conflict, conflict minimization process, areas of joint venture and concludes that in such circumstances of inter-country conflicts minimum common governance (MCG) may be a sustainable solution. The paper also proposes the modalities of MCG and its *modus operandi*. If it is properly executed then livelihood losses of the people of concerned eastern Indian states can be reduced forever which will ultimately lead not only to agricultural diversification but also to sustained eco-security, food security, employment and income guarantee. Ultimately there can have a better eco quality and

reduction in socio economic miseries. This issue is very relevant. The South Asia Technical Authority Committee (SASTAC) of the Global water partnership in its document : Water for the 21<sup>st</sup> Century: Vision to action in South Asia emphasized that “poverty will be eradicated and living conditions of all the people will be uplifted to sustainable levels of health and well being, inter alia, through coordinated and integrated development and management of water resources in the region.” In the light of this the issue of discussing trans boundary conflicts is very important especially in the context of flood management. It may be noticed that South Asia contains about 20% of world population that may go up to 25% in 2025. It is emerging as the poorest, the most illiterate, the most malnourished or undernourished and lagging behind in agricultural diversification and development. According to World Bank estimates over 500 million population is surviving below the poverty line that is 40% of the world poor. Its share in global income is just 1.3 per cent.

### **Characteristics of Kosi Basin**

River Kosi is known as “river of immense sorrow” in India. It originates at an altitude of over 7000 Mts. above MSL in the Himalayas. The upper catchments is 62620 Sq. Km. (85% of total length) which lies in Tibet and Nepal. Remaining 11410 Sq. Km. falls in India and mainly passes through North of Bihar state. It originates in the Tibet, flows through India and Nepal. Flood is the chronic disaster in the Kosi zone of North Bihar, India and Nepal. As a result, there is loss of life, damage to agricultural crops and property, employment and earnings and enormous miseries to people of the region. It also carries enormous silt loaded discharge during monsoon and starts spilling into the plains of Indo-Nepal border. The meandering flow of the Kosi has rendered about 1295 Sq. Km of land useless in Nepal and 7770 Sq. Km. in India because of deposition of sand. The river is especially known for lateral migration and has shifted West. The river has shifted about 20 Km. in a single year. As a result the river has ravaged lands to the tune of around 3000 to 15000 Sq. Km in North Bihar and 800 to 1000 Sq. Km in Nepal. It has also generated huge scattered swamps. There are at least three factors responsible for the Kosi led flood in Indo-Nepal region. The river hardly passes a well - defined flood plain. Silt discharge is enormous. There is also excessive fluctuation in daily discharge during flood season. This range is 5 thousand cusec to 26 thousand cusecs. The riverbed has silted up considerably over the years. At several points ground level is lower than river bank. The problem becomes severe when the Ganga and other rivers also start overflowing. In 1950, it was decided to construct a barrage and canal system for 1.65 mn hac irrigation in Nepal and Bihar state in India. However, after 1953 a barrage across Kosi in Bhimnagar could be initiated. Also afflux bounds were executed in upstream of barrage in Nepal. India has also initiated eastern and western canal system along with enlargement and powerhouse. Then construction of 468 km embankment reduced losses of livelihood and enhanced rural income and worked as a surge of security at

India-Nepal border. The assured irrigation has been provided to 1.30 M ha in both India and Nepal and further 0.35 M ha is in process. Also 1.015 M ha flood prone area has been protected.

At the same time there has been drainage and water logging behind the embankment. Even the flood problem has enhanced in unprotected area. Embankment also needs recurring maintenance as riverbed has gone up.

In India, about 7% of disasters are because of flood. The trend of average area affected by flood hardly shows significant fluctuation during 1959-2001. However there is an increase in population affected and damages of agricultural crops. The mean of area affected has been around 7.56 million hectare during the last forty years. Flood prone area in India is 40 million hectares. This constitutes about 25% of cultivable land. This magnitude is much higher in frequently flood prone states like North Bihar, Assam, West Bengal and Coastal Orissa and Andhra Pradesh. Flood water conservation is quite essential for irrigation and other uses. Flood water can be very useful during irrigation of rabi crop. Normally flood comes during rainy season that is followed by rabi season. If flood water is conserved in medium and big dams, water sheds, channels etc it can be used in various ways including aquaculture. But in order to store and consume flood water public private partnership is quite essential. In several Asian countries flood control is looked after by the state only. The intended beneficiaries are the local community. They suffer a lot because of crop loss, property loss, losses to public utilities, animals and diseases of endemic nature. Some of the key statistics has been presented for Bihar in a table also. In India, China, Sri Lanka, Bangladesh, Nepal, Pakistan and several other Asian countries flood disasters are very common. The Rio-Earth Summit (1992) mooted the idea of social participation into the process of sustainable development. There is problem of sustainable livelihood of people in flood prone area. In India the material damages estimated was to the tune of Rs 5846 crore in 2000. It is the public department that takes care of various activities such as forecasting, rescue, rehabilitation and relief operations. Flood water conservation has hardly attracted the attention of the people. Dams conservation may be quite useful for flood water conservation. This will stop the overflowing of flood water in Bay of Bengal, Indian Ocean and other seas.

**DAMAGES DUE TO HEAVY RAINS AND FLOODS DURING SOUTH WEST  
MONSOON IN BIHAR IN 2002**

Total Districts	38.00
Affected Districts	25.00
Taluks/blocks Affected	205.00
Villages affected	8208.00
Areaaffected (Lakh Hactares)	18.45
Population Affected (Lakh)	158.18
Damagesto Croped Area (Lakh Hactares)	8.10
Estimated Value of Crops (Rs. In Crores)	467.44
Damages to Houses (No. in Lakh)	3.96
EstimatedValues of Damages to Houses(Rs. In Crores)	451.98
EstimatedValues of Losses to Public Properties (Rs. In Crores)	296.21
Human Lives Lost	434.00
Cattle Lives Lost	1380.00

**Intensity of conflict**

There are conceptual and divergent opinions for planning, design, construction and operations of joint projects on trans boundary river. Both the countries want to maximize their benefits and hence there is a clash of interest. In one such case, a water treaty has been signed by both India and Nepal. Both set up a joint project for detailed database. The conflict could be resolved through a free and frank dialogue where both the countries talk with a compromising attitude. There is always a lack of mutually agreeable regulatory machinery that generates disputes between these two nations. Rigidities, normally, lead to strengthen disputes, flexible dialogue reduces it. Therefore, as has happened in the case of the Indus river basin between India and Pakistan and the Ganga basin between India and Bangladesh, a proposal of similar footing is required for India and Nepal. According to the views expressed by the local people of the countries, flood is not only a natural process. Often people cut the embankment in fear of flooding of their own region. As a consequence, the protection of people is diluted. Therefore the bone of contention is safety of the local people if the flooding is naturally done or it is a manmade process. Nepal is on upstream and Bihar state of India is in downstream. It is essential to take pre-flood measures, post flood measures and structural and non-structural measures. These measures may have long term consequences for the people of both the countries. It may reduce damages of various types and it may provide production friendly environment in the region. It may also reduce the depth and duration of the flood. Even water logging can also be reduced in the major part of the area. The focus groups of local people intend to have joint authority in the area for their welfare.

**Conflict Minimization**

Since a big river like the Kosi passes through Nepal and India (mainly Bihar), therefore, from the viewpoint of hydrology the political and geographical boundaries of the two countries may be ignored. From the viewpoint of basin management the whole basin or sub basin may be treated as integrated unit. The administration over this basin and sub basin has to govern in isolation to the governance of other geographical nature. The basin may be treated as a regional unit for water management and other planning issues. A regional authority may be created for this purpose. In this authority the technical and other professional members of both the countries should jointly plan for the development of the area linked to the basin. The country having larger basin can have chairman and the country having smaller basin can have the position of deputy chairman. The other professional, technical, managerial and administrative personnel may be recruited on the basis of share of basin. The finance for these purposes may be generated through proportionate contribution of the concerned countries. It may have its own financial budget, time budget and may function as an autonomous body. Its annual report will be presented before both the government. The justification for common minimum governance is simply to strengthen regional, planning of basin. The development of basin area depends on local circumstances where both the countries may cooperate for success of a regional planning. The planning of basin needs comprehensive but flexible approach, it needs a practical friendly approach rather than a theory based planning. The planning at the regional basin level may plan formula for water sharing, agricultural production including horticulture and animal husbandry, industrial growth, growth of services including tourism and electricity. This may be slightly flexible depending on circumstances of each year. The regional authority of the basin will do proper justice in sharing of basic amenities also. The authority, although exercises the power over water, will also give due importance to the problems of the country of upper riparian (Nepal) and lower riparian (India). This way such environment will be created which may ultimately minimize the existing conflicts and discourage further conflicts to grow. Nepal and India both like other countries of South Asia depend on monsoon for fresh water. The monsoon is of about 90 days. Nearly 80% of available water appears in river basin. The total average rainfall in Nepal is about 200 BCM out of which 75% occurs during monsoon i.e. June to September. In India average precipitation including snowfall is around 4000 BCM. During monsoon all the major rivers like the Ganga, Brahmaputra, Kosi and Meghna overflow which leads to flood disaster. Agriculture provides above 40% to GDP in Nepal and provides employment to 80% of working population. In India agriculture provides around 30% to GDP and employs above 65% of population. There is wide spread poverty in the region. Food security is also quite less. The Kosi basin is basically a mono crop region. During monsoon because of flood Kharif crop is hardly grown. Therefore, it is felt that river basin may be treated as one of the area of planning and management of water resources. In this process both the

countries should come together and plan jointly. So far, it has not been possible to setup effective measures for managing water resources of Kosi basin. It is suggested to take institutional mechanism for flood water conflict resolutions in these countries. This may bring prosperity in the region in a sustainable manner. The trans boundary treaty may focus on such provisions which can help develop congenial relationships among the two countries. There may be enough scope for consultations, convergence, mediation and adjudication. It may function like an autonomous International agency. The memorandum of understating may be also very transparent so that nothing is pending for future resolution. This may also facilitate taking up growth friendly agenda for future. Normally, it has been seen that riparian conflicts arise because of conflicts between the country of upper catchments and downstream, between those having loss of land, crops, property, livelihood and those who enjoys the benefits like irrigable water, hydroelectricity and also between the head reach farmers and tail-enders in sub basin. Such conflicts can be alleviated on humanitarian ground also in addition to cost benefit analysis. The country down stream country like India must be at least not worse of because of launching a new project. The Indus water treaty between India and Pakistan for sharing the water of the Indus river has set up a permanent Indus commission. Both the countries may appoint an executive Head of the Commission. Despite political discords between these two nations it has been found that the commission has been working satisfactorily since last 30 years. Similarly India and Bangladesh have reached at long-term treaty on sharing of the Ganga water in 1996. General storage at down sites on tributaries of the Ganga are in the political territory of Nepal. It has enough infrastructure for hydropower generation, irrigation extension, flood management and navigation. The development of both India and Nepal may be accelerated in order to have sustainable livelihood. India and Nepal have already undertaken jointly the construction of the Pancheshwar project on the river Mahakali which is their common border. The common minimum cooperation needs to be strengthened further in order to make the Kosi basin developed as well.

### **Areas of Joint Venture**

There are several areas where both the countries may come forward for joint management of flood in general and improvement in the basin in particular. Construction of a major dam may be one option. This may be explored further for construction. The construction of the dam may be designated in such a manner that the benefits outweigh the costs. Other ecological impacts may also be considered for variable planning and management. Dam may also be constructed in the light of the chronic flood disaster. This may generate enough hydropower that may be used for economic activities like agriculture, industry and households. This may be a good substitute of thermal power. The third area where both the countries can participate relates to surface irrigation. A major canal network may be constructed in such a manner that

both the countries can develop agriculture, horticulture, fishiculture, tourism and encourage several other activities. This may also regulate the supply of drinking water. The fourth area may be social forestry. This may reduce soil erosion during flood, generate livelihood for tribes and animals, develop tourism, reduce the change in river course and provide as a good source of earnings as forest products. If necessary the theory of community approach may be applied because the local people are more familiar with regional planning. Their participation may strengthen the rate of success of social forestry and increase the rate of survival. The next area may be increasing bio-drainage system. Since in the area water logging is a big problem for vast area during post-flood situation, therefore, plantation of such trees may be promoted which can absorb maximum water. This system may be helpful along the railway track, canal and the catchments. All the activities need heavy investment in water sector. In addition to this there may financial requirement for research and development. It may also be thought to establish a water Research and Development Council Jointly. At present there are a few institutions to continue this research on local field issue especially of collaborative nature. South Asia is especially poor to carry out research in this sector. There is also need of inter disciplinary regional apex institution leaving research thrust on water sector. Thus the issue of effective governance is quite essential. The governance may develop common progressive issues, chalk out minimum program for execution and avoid differences. All these things need flexible institutional structure for both the countries. In addition to this, many economic reforms and law reforms are required in the existing governance set up. Development with equity and social justice may hardly be possible without transparent joint working of the two countries. Although there are a few inter-country set up in the region like joint river commissions for joint management of water including flood water amongst the neighboring nations but horizontal and vertical linkages are very narrow and weak.

## **Conclusion**

Flood disaster is a chronic problem for the Kosi basin of India and Nepal region. It is a problem of trans boundary water conflict as well. Both the countries are trying to resolve the contentious issues like pre-flood management, preparedness, post-flood management, structural measures and non-structural measures. But still it has not been possible to manage flood disaster in the region. As a consequence, economic vulnerability is further deepening, losses of various types are on increase every year and water saving devices are not available. As a result, flood passes through Nepal and Bihar state of India. It ultimately falls in the Bay of Bengal and thus of no use for agriculture. After highlighting this chronic problem in the region the present paper concludes that an institutional change is direly required for resolving the Trans boundary conflicts. The paper also concludes

that a joint authority may be setup. It may be the function of the authority to take care of most contentious issues, evolve a minimum common program effectively, take the assistance of local beneficiaries, professionals and non-professionals and resolve the most contentious issues first. In the second stage the authority may also chalk out other developmental water related plans that may be framed in the light of regional environment. It is hoped that both the countries of South Asia can resolve the issues in an eco friendly manner.

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