Annexure-3

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KOSI – A REVIEW OF FLOOD GENESIS AND ATTEMPTS TO SOLVE THIS PROBLEM

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Kosi, known as River of Sorrow in Bihar, is one of the largest river of India, entering into India from Nepal. It has a notorious tendency of shifting its course due to heavy charge of silt/sediment. Kosi River has historically shifted from east to west over 114 km from 1739 to 1950 (CWC, 1981) at an implied average rate of 0.54 km per year. The river thus forms numerous Dhars, with the result built-up property and valued vegetations etc are destroyed which finally causes immense suffering and instability of life. As per one report, about 8000 sq. km. of lands in Nepal & India had been laid waste as a result of this shifting. This paper has attempted to present the genesis of recurring problem of floods in river Kosi, its eroding and oscillatory characteristics by making a review of various publications, books, reports and suggest some tangible solution to this perennial problem.

In the past, various solutions towards managing Kosi floods have been attempted since 1935 Patna Flood Conference culminating in 1953 CWPC proposal of constructing a Barrage along with Flood Embankments. The Central focus of all these conferences and proposals has been towards adopting structural measures for containing Kosi floods. Resultant structures as Hanumannagar Barrage & embankments built a few decades ago on river Kosi on Indo-Nepal border have definitely helped to temporarily check the lateral shifting of the Kosi and putting the river into a definite channel. But, this isolated engineering approach has proved to be

far too insufficient in its objectives as at present the pond of the barrage at Hanumannagar is almost full of sediments. Soon the embankments would be ineffective to control the Kosi floods. It would thus be naïve to embark upon finding a solution of this menace through structural measures alone in the form of High Dam without understanding the characteristics of floods in general and Kosi River in particular.

The paper attempts to remind the practicing engineers to adopt a multi-pronged strategy for tackling Kosi flood. This would inter-alia include construction of Kosi High Dam in Nepal as immediate solution. At the same time and in order to find a long term solution to this problem, the planners should allow the river Kosi to flow in a manner, condition, size and pattern which would minimize, if not totally eliminate, the eroding characteristics and oscillating trend of the channel/river. This may require patience and perseverance by carrying out diligent studies for understanding the texture, structure and behavior of the river over a number of years. Such efforts will also require mutually inclusive bilateral understanding between both India and Nepal.

COMMUNITY PARTICIPATION IN FLOOD MANAGEMENT

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It is no denying that community participation and self--reliance is necessary to strengthen the efforts of disaster preparedness. Community participation in flood management is possible in following areas.

i) Construction of Ponds: Community participation can be promoted in construction of ponds in each flood-prone village which would not only provide surface detention of flood water but will also bring economic benefits through pisciculture and aqua-culture which are more profitable than farm produce. The Community will reap other benefits too like irrigation, recharge of G. W. etc. from ponds.

ii) Construction of Raised Platforms: Raised Platforms stand out as the cheapest mode of Flood Proofing measures and can widely attract community participation through Panchayat and N.G.O. Govt. support will make it more lucrative. Every flood-prone village should be encouraged to provide land and construct Raised Platforms for their own shelter and relief~ during floods and for Panchayat activities during non-monsoon. The earth required for making Raised Platforms can be had by digging ponds in the vicinity. This will provide twin advantage of flood mitigation through ponds on one hand and shelter during floods on the other hand.

iii) Sinking of Injection Tube well: Floods can also be mitigated by absorption of flood water into G. W. through process of infiltration either by a) Basin method or b) by Injection well method. Simply raising of farm ridge height by 15-20 cm can help in retention and absorption of flood

water to a sufficient extent. So will be through Injection Tube well. NGO's and community participation in this sphere will be most fruitful.

iv) Formation of Anti-Flood Brigade: Villagers can form such brigades to give any information on likely danger to embankments or villages for prompt action. Such Village Brigades can even be trained in flood fighting measures with locally available materials like tree or bamboo etc. to initiate first hand measures.

FLOOD MITIGATION BY RECHARGING GROUND WATER

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Mitigation of flood problem through layered storage is a concept suggested by our Hon'ble President during Chief Minister's Conclave held at Delhi on 6.8.04. He recommended construction of layered wells so as to store the flood water at different levels in order to mitigate the floods and utilize the water thus stored during shortage period. RBA had also suggested for mitigating floods by induced ground water recharge but nothing concrete has taken shape so far. Recently, a study was conducted on this concept by a committee constituted by GOB of which the authors were also the members. The study revealed that the artificial method of recharging groundwater is being practiced abroad for the purposes like:

i) Meeting increased water demand.
ii) Improving quality of ground water
iii) Replacing over exploited aquifers etc. In India, not much has been done at a large scale in this field especially in flood mitigation.

The study has also established that there is distinct possibility of absorption of flood water in the area of study viz., Bagmati- Kamala- Kosi Basin of Bihar by adopting Injection Well method for recharging ground water. This can be achieved by first evacuating the ground water aquifer by pumping ground water before onset of floods and utilizing them for Rabi and H. W. irrigation. This will create the space required in the aquifer to accommodate flood water required to be absorbed. For this purpose, the well will have to be designed to function as Injection cum Irrigation well. Basin/Pit method can also be used for transferring flood water to ground

water aquifer by either spreading flood water in the paddy field with there farm ridges by additional 15 – 20 cms or conserving them in Ponds / Tanks to act as surface detention reservoirs. To start with, pilot projects have been suggested before taking up the work at a large scale.