

Integrated Development of Bagmati Civilization, Nepal

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Key Words: Bagmati, Kathmandu, River, Integrated Development

SUMMARY:

The Bagmati River is the largest river in the capital city of Kathmandu Valley which comprises 57 rivers and rivulets as its tributaries. Bagmati a holi river of the Hindus and a major source of water for the Kathmandu Valley, has been polluted due to human activities such as settlement along the river side, unplanned urbanization in river, basin and disposal of untreated sewage and solid waste disposal into the river system. In addition, extractions of sand from river bed, construction of public infrastructure in river space, and illegal settlements of squatters along the bank have deteriorated the river environment and the water security in the citizen. It is important to make Bagmati a pollution free river.

In order to address the key issues and improve the natural environment along the river, The main objective included to set the foundation for improvement of the natural environment along the rivers in the Kathmandu Valley and wellbeing of urban residents in the capital city with giving high priority to restoration and preservation of rich cultural heritage. Furthermore, it included Construction of sewer lines along the river bank, River Training Works and Road and Green belt along river bank.

The outcomes of this study include reincarnate the Bagmati River and its tributaries with an increased access to better urban services. Various works related to roads, river protection, sewage, river bank beautification and river environment improvement in Bagmati, Dhobikhola, Bishnumati and other tributaries of the Bagmati river in the valley have also been identified.

From this study, it can be concluded that the existing practices are quite satisfactory. But for improvement in existing practices and for effective operation of works at different chainage, presence of slum and personal land should be solved prior to work start. And for the construction of river training works at different chainage, some obstacles like proper land acquisition problems, public issue should be resolved on time.

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1. INTRODUCTION

Nepal is rich in water resource with having more than 6000 rivers and rivulets distributed in different river basins. Among the basins, Bagmati River Basin lies in the middle-hill regions of the central Nepal encompassing the capital city Kathmandu (Ija et al 2022). The Bagmati River is the largest river in the capital city of Kathmandu Valley which comprises 57 rivers and rivulets as its tributaries (WEPA). Bagmati River bisects Kathmandu valley in to two parts and crosses the valley at Chovar. It originates from Bagdwar, about 15 Km northeast of Kathmandu in Shivapuri hills and tributaries originated from different parts of the valley. There are so many shrines and cemeteries located in its bank. Gokarneshwar, Guheshwari and Pashupatinath temples are famous shrines enlisted in the World Heritage sites which reflects its importance to all the races of human civilization. Thus, millions of national and international pilgrims and tourists from across the world visit the place.

The Bagmati River, which flows through the heart of Kathmandu valley, has been under strain for years, resulting from lack of coordination, poor planning, and rapid urban expansion. At present, Bagmati River and its tributaries has been used as a dumping site for all types of wastes. Thus, these rivers and rivulets are polluted due to human actions such as settlement along the river bank, unplanned urbanization in river basin and disposal of untreated sewage and solid waste into the river system.

Inputs of hazardous natural and anthropogenic contaminants result in high concentration of heavy metals such as Nickel (Ni), Chromium (Cr) and Copper (Cu) in the river, especially in pre-monsoon season, which severely impacts the species relying in this aquatic ecosystem (Karunanidhi et al., 2022; Adhikari et al., 2019). A comparison of estimated Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD) values for 2020 and 2030, with data from 2014, indicate that the river water quality is not likely to improve in the coming years (Mishra et al., 2017) unless dramatic changes occur.

In addition, extractions of sand from riverbed, construction of public/ private infrastructures in right of way of river system and illegal settlements of squatters along the banks have deteriorated the river environment and water security in the citizen. The rich cultural heritage along the river and the tributaries such as traditional monuments, ghats and temples are being slowly eroding. It has been reported that more than half of the fish species in the Bagmati river has disappeared indicating some parts of river is biologically dead.

As the Riversides are used for different cultural and ritual activities, Rivers in Kathmandu valley are integral part of our day-to-day life and therefore protection of river is very important for protection and conservation of natural resources as well as cultural heritage of the valley.

However, Rapid and unmanaged urbanization and population increase are challenges that result in a poor waste management system. Political instability, poor inter-ministerial coordination, lack of capacity as well as good intention on the part of development agencies, are some of the impeding factors that has resulted in sluggish work culture and failure of policy. Challenges such as inefficient private sector, and the lack of transparency in planning and implementation cannot be ignored (Campbell, 2008)

Inspite of these challenges, in order to curb further environmental degradation of the Bagmati River and adjoining area and restore the condition of once pristine Bagmati River, the Government of Nepal (GoN) formed a High-Powered Committee for Integrated Development of Bagmati Civilization (HPCIDBC). The Committee is fully devoted and committed to keep Bagmati River and its tributaries clean. The foundation of HPCIDBC lies in the joint initiation of citizen and government to make Bagmati a pollution free river.

1.1 Bagmati Area Physical Infrastructure Development Project

The High-Powered Committee for Integrated Development of Bagmati Civilization (HPCIDBC) has implemented Bagmati Area Physical Infrastructure Development Project (BAPIDP) to improve and reinstate the environment of Bagmati River and its tributaries within Kathmandu valley up to Katuwal Daha.

The objective of the project is to improve environment and well-being of urban residents in the capital city with giving high priority to restoration and preservation of rich cultural heritage. The expected outcomes of the project will be to reincarnate the Bagmati River and its tributaries with an increased access to better urban services. GON has approved the Bagmati Action Plan (2009-2014) in Shrawan 2066 which has introduced a concept of zonation of the river system within the Kathmandu valley. The whole river system in the valley has been divided in 5 zones in order to effectively address the key issues at a micro level to make clean, green and healthy Bagmati river system with full of life and valued by all.

- zone 1: natural Conservation Core Zone,
- zone 2: Rural Zone,
- zone 3: Peri-urban zone,
- zone 4: Urban Zone and
- zone 5: Downstream Zone

The Program aims to

- Improve the environment of Bagmati River and its tributaries.
- Restore and preserve cultural heritage along the Bagmati River and its tributaries

- Improve urban infrastructure and services
- Strengthen the institution for better service delivery build program management and implementation capacity

In order to address the key issues and improve the natural environment along the river, the HPCIDBC has set following objectives:

- Construction of sewerage line: about 30 km.
- Treatment plant: 5 nos.
- River training: about 30 km
- Roads and green belt along river banks: about 30 km.

1.2 Bagmati River Basin Improvement Project

The Bagmati River Basin has a cultural and economic significance to the people of Nepal. The water flowing in the Bagmati River is considered holy and is used for cultural and ritual ceremonies practiced at the many significant temples located along its banks. The river flows through Kathmandu which is the administrative and economic center of the country as well as Nepal's gateway for tourism. It provides most of the city's drinking water in its upper basin, hydropower generation in the middle basin and large-scale irrigation in the lower basin.

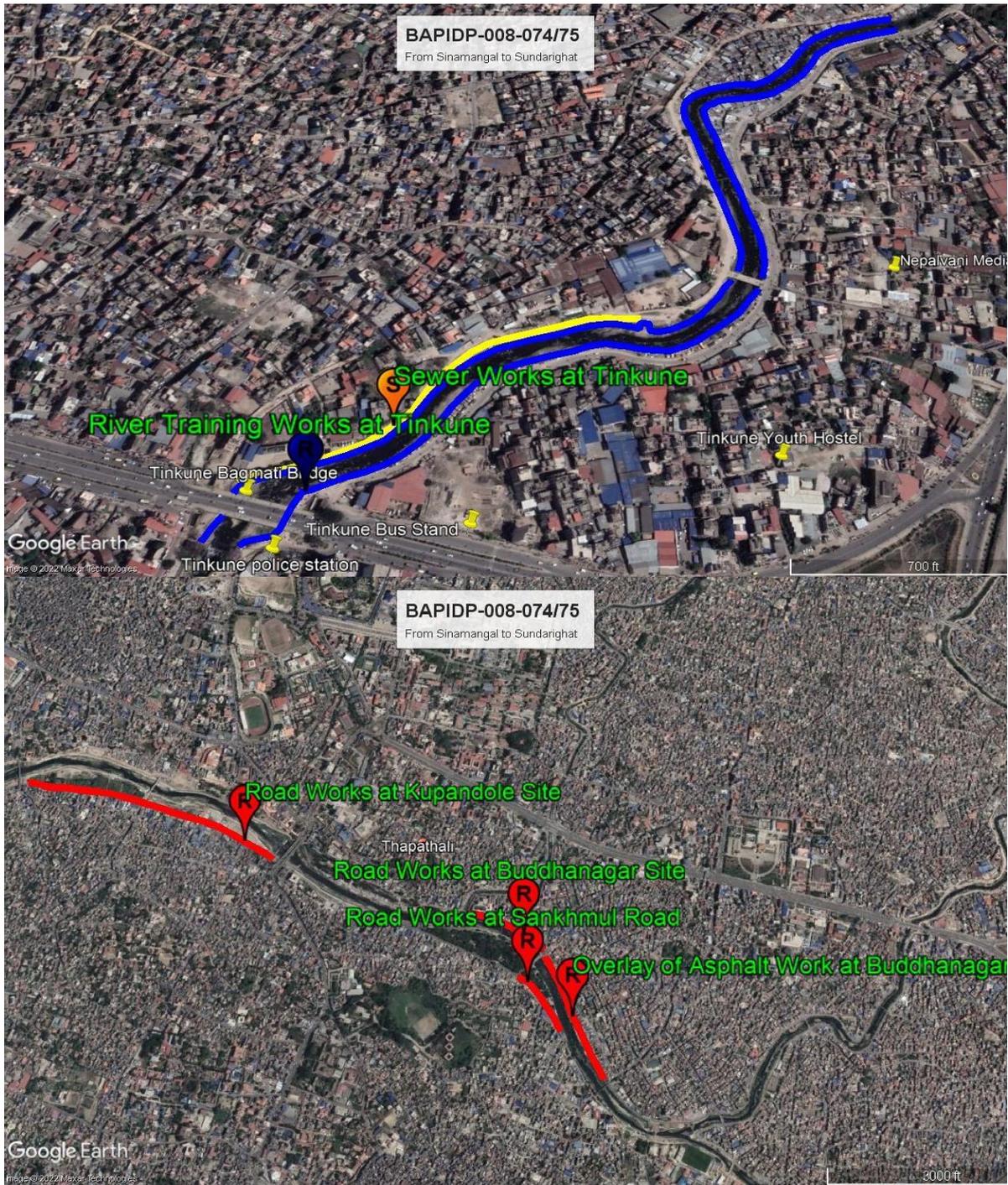
The HPCIDBC has implemented Bagmati River Basin Improvement Project (BRBIP). The proposed BRBIP will improve water security and resilience to potential climate change impact in the Bagmati River Basin. It builds on the general public's desire to restore the river environment in the Kathmandu Valley and the Government's efforts to mitigate the impact of water-induced disasters in the middle and lower reaches of the basin.

2. STUDY AREA

Bagmati River

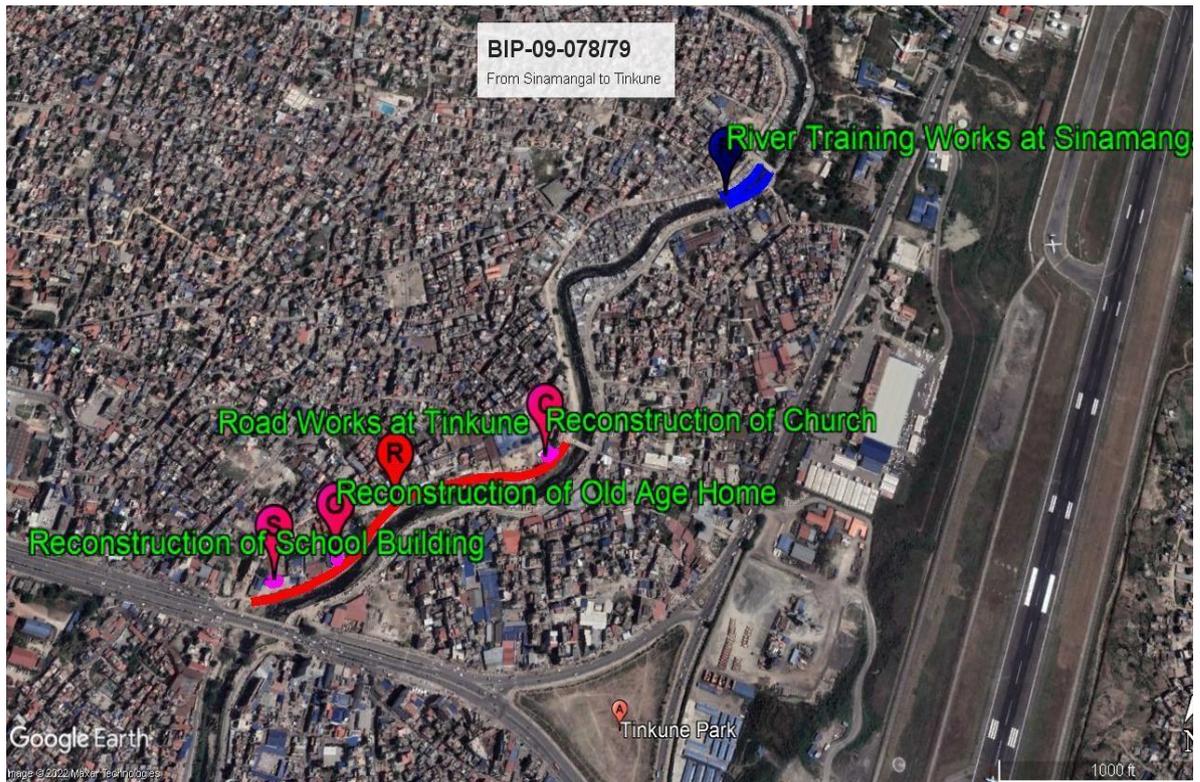
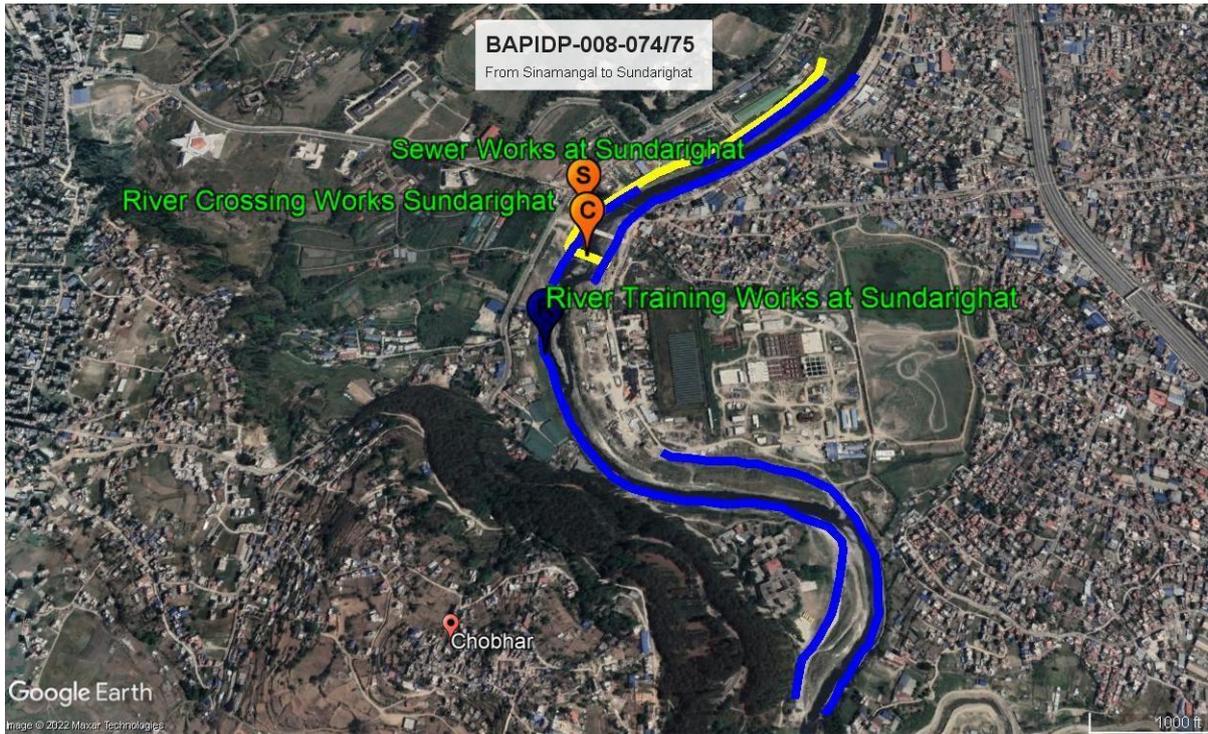
The detail status of the project study area to construct river training works, road works, Reconstruction of Building and miscellaneous works are presented below in provided Map.

In addition, **Location Map of Bagmati River** locating Work & Location - River Training Work, Road Work, Sewerage Work & other allied works from Sinamangal to Sundarighat is well presented in below mentioned Map.



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3. OBJECTIVES

Objective of High-Powered Committee:

The main objective of this High-Powered Committee is to keep Bagmati River and its tributaries clean by preventing the direct discharge of solid and liquid wastes to the river and to conserve the river system within the Kathmandu. In order to achieve the objectives, the following activities were being implemented.

- Construction of Trunk Sewer pipeline along both the banks of river.
- Construction of secondary Sewer pipelines.
- Construction of wastewater Treatment Plant.
- Construction of River Training Works.
- Construction of roads and green belts along the banks of the river and
- Public awareness programme

3.1 Impact and outcome

The impact will be the improved urban environment with the construction of sewer line along the main tributaries of Bagmati River, construction of river training work and road corridor along both the banks of main tributaries of Bagmati River. The outcome will be improved healthy environment and minimize traffic congestion in Kathmandu valley.

3.2 Project Outputs

There was no overall planning in Bagmati river tributaries, leading to haphazard construction on a piecemeal basis. The project has the following outputs.

Output 1: Infrastructure developed

Subprojects had been implemented along the corridor of Bagmati river and its tributaries to develop reliable infrastructure in accordance with the priorities set by the HPCIDBC in their annual plans.

River Training: The tributaries of Bagmati river were left free flowing except few reaches, as such the flow line shifting every year cutting the river bank at one side and depositing at other side. The river environment was also unhygienic. The construction of river training works (masonry retaining wall with gabion launching) improved the river environment and aesthetics along river corridor.

Sewerage Construction. The domestic effluent was directly discharged into the tributaries of Bagmati river which deteriorated the aesthetics and hygienic environment of the riverside settlements. The construction of sewerage line along both bank of tributaries enhanced the beauty and hygienic environment.

Road Construction. The main roads of Kathmandu valley were congested due to heavy traffic loads in low-capacity roads. The construction of roads along the banks of Bagmati and its tributaries had reduced the traffic jam to some extent in the city.

These systems will be improved under a comprehensive drainage development plan to alleviate water logging and reduce the resulting damage to assets, economic activities, and human health. Future increases in rainfall intensity will be addressed during the drainage system detailed design to strengthen urban resilience to climate change. Urban roads are dilapidated, especially in Janakpur, and they will be restored or upgraded in areas where drainage network improvements are undertaken.

Output 2: Capacity Building

This output will be achieved through the implementation of training program and excursion tours.

Output 3: Project Design and Supervision support

Support had been provided for smooth and effective project implementation and operation by the central government. The HPCIDBC had managed overall project implementation, assisted by the Design and Supervision Consultant (DSC). The DSC had been supporting the HPCIDBC in every technical issues.

Objective of consulting services:

The objective of the consulting service are as follows:

- Establish an effective management system to ensure timely, high-quality implementation and completion of the Project;
- Monitor the activities of the subprojects so that they comply with environmental, social, resettlement and other safeguards requirements provisioned in the project documents;
- Develop uniform working procedures, guidelines, manuals, quality assurance and quality control system for the smooth implementation of all subprojects in the Kathmandu valley;
- Plan and deliver training and orientation to employees of HPCIDBC about construction quality control, quality assurance, etc.
- Create awareness among stakeholders regarding their roles and responsibilities for achieving the intended outcome/ output of the project
- Develop a project management information system (MIS) and keep track of the project and subprojects schedule. Advise HPCIDBC of any deviations in the agreed subproject implementation processes, schedules, and agreed activities, and suggest actions that should be taken to remedy these deviations and thereby avoid delays;
- Provide guidelines and review the design criteria and standard specifications for civil

works so as to ensure the highest standards of quality in design and construction and uniformity in all projects.

- Prepare the Quality Assurance Plan and the Safety Manuals to be followed on each construction site so as to enforce safety of construction workers, engineers, and citizens;

Consulting Services:

The design and supervision consulting services were to support the Project for planning design and supervision of infrastructures. They cover broad areas of expertise including engineering design and construction supervision for river training works, sewerage works and road works.

4. CONCLUSION AND RECOMMENDATION

On the basis of above-mentioned practices, it can be concluded that the existing practices are quite satisfactory but for improvement in existing practices and for effective operation of Solid Waste Management system, following recommendations are made:

- For the construction of road works at different chainage due to presence of slum and personal land should be solved prior to work start.
- For the construction of river training works at different chainage due to obstacle like proper land acquisition problems, public issue etc., Therefore the construction works could not be continued and the project could not be completed within time frame.



Photo: River Training Work

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BIOGRAPHICAL NOTES

Mr. Mukunda Nanda Baidya holds a M.Sc. degree in Sanitary / Sewerage Engineering from Delft the Netherland in 1980. Also, He hold another M.Sc. degree in Civil Engineering (Water Supply) from Moscow, the USSR in 1972. He involved in Environment and Resource Management Consultant as a Team leader in various projects for 20 years.

Niki Budhathoki is currently involved on Environment and Resource Management Consultant as an Admin Officer since 2011. She is a life member in Ideal Woman Development Center, Bharatpur, Nepal for 25 years and member in Women Environment Group, Lalitpur, Nepal for 10 years.

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