

Western Kosi Canal Project (Extension, Renovation And Modernisation)

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Executive Summary

1. The Western Kosi Canal ERM Project focuses on modernising irrigation, improving water distribution, and mitigating flood risks in **Bihar's Mithilanchal region**. It aims to benefit over 50,000 hectares of farmland.
2. The project addresses long-standing challenges, including frequent flooding due to the Kosi River, outdated irrigation infrastructure, and waterlogging, negatively impacting agricultural productivity.
3. Key challenges include **bureaucratic inefficiencies, financial mismanagement, land acquisition disputes, weak project monitoring, and environmental risks** such as sedimentation and climate change-induced flooding.
4. Major issues affecting the project's success include **corruption in fund allocation, procurement irregularities, contractor non-compliance, and inadequate financial transparency**, all of which demand stronger accountability measures.
5. **Environmental concerns** such as embankment failures, waterlogging, and high sediment loads necessitate sustainable flood mitigation strategies like **wetland restoration and climate-resilient infrastructure**.
6. **Key policy recommendations** include **performance-based contractor payments, independent financial audits, streamlined land acquisition processes, and nature-based flood control solutions** to ensure the project's long-term viability.
7. If implemented effectively, the project has the potential to enhance agricultural output, control floods, and improve rural livelihoods, contributing to Bihar's sustainable development.

I. Introduction

- A. In a significant step toward enhancing agricultural productivity in Bihar, Union Finance Minister Smt Nirmala Sitharaman Ji, in her 2025-26 Budget speech, announced financial support will be provided for the Western Kosi Canal ERM (extension, renovation, and modification) Project benefitting a large number of farmers cultivating over 50,000 hectares of land in the Mithilanchal region of Bihar.¹
- B. The Western Kosi Canal ERM Project focuses on modernizing the existing canal system, ensuring efficient water distribution for agriculture. Given that the Mithilanchal region is predominantly agrarian, this initiative is critical in addressing long-standing issues such as:

¹ Pib.gov.in

1. Frequent flooding caused by the Kosi River leads to waterlogging and crop damage.
 2. Outdated irrigation infrastructure has hampered water supply and reduced crop yields.
- C. By upgrading irrigation systems, improving flood mitigation measures, and securing water availability, the project aims to increase agricultural productivity, support rural livelihoods, and drive economic growth in the region. This policy brief outlines the objectives, expected benefits, and key implementation challenges of the project, highlighting its role in sustainable rural development and climate resilience.

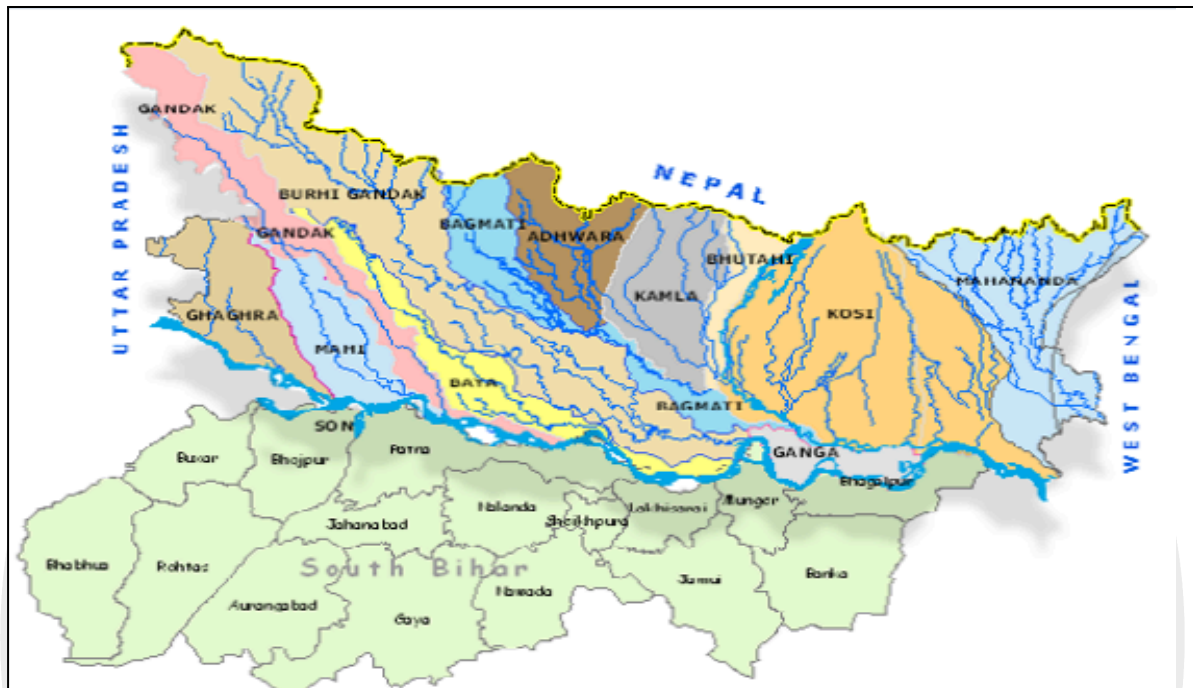


Image 1: Kosi river basin²

II. Historical Context

The Kosi River, often referred to as the "*River of Sorrow*," has historically caused widespread devastation due to its unpredictable course changes and heavy silt deposition, leading to the destruction of agricultural lands and displacement of communities in the North Bihar region of India and parts of Nepal.

Timeline	
A. Early Efforts and the Genesis of the Kosi Project	
1893-1937	Early attempts to control the Kosi River were made, but no concrete steps were taken due to the complexity of the river's behaviour and the lack of a comprehensive plan.
1941	A detailed report by Mr. C.C. Inglis highlighted the need for further investigation into the river's westerly movement, but no immediate action was taken.

² [World bank document](#)

Timeline	
1950	A multi-purpose scheme was proposed, including the construction of a high dam at Barahakshetra and a barrage at Chatra, with the aim of flood control, irrigation, and power generation. However, due to financial constraints, the project was divided into phases.
1953	The Kosi Project was officially sanctioned, focusing on the construction of a barrage at Hanuman Nagar, embankments, and the Eastern Kosi Canal System. The Western Kosi Canal was not included in the initial plan but was later added during the Third Five-Year Plan (1961-1966).
B. Western Kosi Canal: A Later Addition	
1960-61	The Western Kosi Canal was proposed to irrigate areas in the Darbhanga district of Bihar and parts of Nepal. The canal was designed to provide irrigation to 8.43 lakh acres, with 7.73 lakh acres in Darbhanga and 0.70 lakh acres in Nepal
1961	The alignment of the canal was approved by the Government of Nepal, but progress was delayed due to opposition from local villagers and the need for revised agreements between India and Nepal.
1966	The alignment of the canal was approved by the Government of Nepal, but progress was delayed due to opposition from local villagers and the need for revised agreements between India and Nepal.

C. Challenges and Delays

- Funding Issues:** The Western Kosi Canal, like other components of the Kosi Project, faced significant cost overruns. The original estimate escalated due to increased labour and material costs, as well as the need for additional infrastructure such as watercourses.
- Coordination with Nepal:** The canal's alignment and construction required cooperation from the Government of Nepal, which led to delays in finalizing the project details and iii. obtaining necessary approvals.
- Technical Challenges:** The Kosi River's tendency to shift its course and deposit large amounts of silt posed ongoing challenges for the project, necessitating continuous monitoring and maintenance of embankments and other structures.³

³ [Sixty-Eighth Report\(1968-69\) on Kosi Project. pertaining to Ministry of Irrigation and Power](#)

III. Analysis

The **Western Kosi Canal Extension, Renovation, and Modernization (ERM) Project** is a crucial initiative aimed at improving irrigation and flood control in Bihar's Mithilanchal region. While the project holds significant promise, it faces numerous obstacles related to bureaucracy, implementation, and environmental sustainability. These challenges must be critically examined to ensure the project's success.

A. Climatic & Environmental Challenges

1. Flooding & Waterlogging

The Kosi River has a long history of frequent and unpredictable flooding, earning the moniker "Sorrow of Bihar". Key issues include:

- a. **Embankment Failures:** Historical data indicate multiple embankment breaches, leading to widespread devastation. **Weak embankments can collapse under excessive water pressure, causing inundation of agricultural lands and residential areas.** Strengthening embankments with reinforced materials, incorporating real-time flood monitoring systems, and ensuring periodic maintenance can reduce breach risks.
- b. **Waterlogging & Soil Degradation:** Prolonged water stagnation due to inefficient drainage systems and embankment-induced flow obstructions leads to severe waterlogging. This not only reduces agricultural productivity but also **depletes soil fertility over time.** Implementing proper drainage mechanisms, adopting sustainable irrigation practices, and promoting afforestation in affected regions can mitigate these issues.
- c. **Inadequate Flood Storage Capacity:** Insufficient buffer zones exacerbate flood risks by failing to absorb excess rainfall. **The lack of adequate flood storage infrastructure means that excess water cannot be efficiently stored or redirected, increasing the likelihood of severe flooding.** Constructing additional reservoirs, expanding existing floodplain storage areas, and adopting controlled river diversions can help manage extreme weather events more effectively.

2. Sedimentation & Siltation

- a. The Kosi River carries a **high sediment load from the Himalayas, creating significant maintenance challenges.** Many experts have already addressed this issue. It has been observed that siltation is a major concern, as a large amount of sediment is accumulating in the Kosi, **causing the riverbed to rise and reducing the discharge level of the barrage by 1 to 1.5 meters.** Efforts are being made by the government to address the problem of siltation. It is further added that desiltation (silt removal) is a very complex process.
- b. According to a report by the International Center for Integrated Mountain Development (ICIMOD) on the problem of siltation in the Kosi, before flowing into the alluvial parts of Nepal and India, the Kosi crosses the world's highest peaks like Mount Everest and the Kangchenjunga and passes through the eastern-central Himalayas. It is a highly mobile and sedimentary river. Therefore, managing its sediment or silt is difficult. **The report links the high sediment concentrations to downstream river hazards such as flooding and channel shifting.**

3. Impact of Climate Change

Climate change is altering **precipitation patterns and glacial melt rates**, affecting water availability and flood dynamics.

- a. **Erratic River Flow:** Unpredictable monsoon patterns may cause prolonged dry spells followed by intense floods, disrupting water management strategies and agricultural cycles. Excessive rainfall in short durations can overwhelm the existing drainage infrastructure, leading to severe waterlogging and crop losses.
- b. **Increased Extreme Weather Events:** Rising global temperatures have intensified the frequency of cyclones, storms, and unseasonal heavy rainfall, worsening flood risks and making infrastructure planning more challenging. This necessitates adaptive policies such as climate-resilient infrastructure and improved flood early warning systems.
- c. **Long-Term Water Scarcity Risks:** Variability in rainfall distribution can lead to prolonged dry periods. Also, Over-reliance on monsoonal water cycles could become increasingly unsustainable, making it essential to develop alternative water storage and conservation strategies.

IV. Recommendations

A. Nature-Based Flood Protection

1. Wetland Restoration

Wetland restoration is a proven strategy for natural flood management, as **wetlands act as natural sponges, absorbing excess water and replenishing groundwater reserves**. Bihar can enhance its flood resilience by identifying degraded wetlands along the Kosi River and restoring them using eco-friendly techniques such as reforestation, controlled water flow management, and community-led conservation initiatives. Engaging local communities in these efforts ensures sustainability and maximizes both environmental and economic benefits. **A notable example of successful wetland restoration in India is the Vembanad-Kol wetland system in Kerala.** This extensive wetland complex supports rich biodiversity and provides livelihoods for over 0.2 million households through activities like backwater tourism, inland navigation, and fishing. **Restoration efforts have focused on improving water retention, preventing encroachment, and regulating water flow to mitigate floods.** Community participation has been crucial in conserving the ecosystem while enhancing local livelihoods. Bihar can draw lessons from Kerala's approach by reviving wetlands along the Kosi floodplains, creating natural flood buffers that reduce flood risks while supporting biodiversity and water security. This strategy aligns with global models like the Netherlands' "Room for the River" project, which successfully reduced flood hazards through wetland restoration.

2. Floodplain Vegetation

One effective way to manage floods along the Kosi River is by introducing native flood-resistant plants. These plants help stabilize riverbanks, prevent soil erosion, and improve water retention, reducing the impact of heavy rainfall and flooding. **Planting flood-resistant vegetation along embankments and in flood-prone areas can strengthen these regions against water currents, making them more resilient to extreme weather events.** Additionally, enforcing anti-deforestation policies is crucial, as deforestation increases soil erosion and weakens natural flood defences. Promoting agroforestry, where trees and crops are grown together, can help protect farmland while supporting local livelihoods.

A successful example of this approach is the Mahanadi River Basin Program in Odisha, which effectively used mangrove plantations and natural embankment protection to mitigate floods.

Bihar can learn from this model by implementing a similar strategy, integrating flood-tolerant vegetation, agroforestry, and community-led afforestation programs along the Kosi River floodplains. These measures will help reduce flood damage, maintain soil health, and create a long-term solution to flood-related challenges in the region.

B. Performance-Based Contracts for Contractors

India has successfully implemented energy efficiency projects through **Energy Service Companies (ESCOs)** in states like Rajasthan, Gujarat, Maharashtra, and Karnataka, where performance-based contracts have been used to upgrade public infrastructure, industrial operations, and urban utilities. **These contracts tie payments to milestone-based completion, ensuring efficiency and high-quality execution while imposing penalties for delays, cost overruns, or substandard work.** This model can be effectively applied to Bihar's Western Kosi Canal Project to enhance irrigation efficiency and sustainable water management. By defining clear energy-saving targets and enforcing strict accountability measures, the project can ensure timely completion, cost-effectiveness, and long-term operational sustainability. Integrating these principles will not only optimize energy use but also strengthen infrastructure resilience, benefiting local communities and the agricultural sector. Also, payments should be tied to progress on specific project sections, including flood mitigation structures and adherence to environmental standards. Independent third-party audits should verify compliance before fund disbursement, and contractors must submit periodic progress reports to improve oversight and accountability.

C. Regular Audits & Financial Transparency

Several Indian states have successfully implemented digital financial tracking, e-procurement, and auditing mechanisms to enhance transparency and accountability in public infrastructure projects. **Telangana's Integrated Financial Management System (IFMS) and e-procurement portal have streamlined fund allocation and ensured transparent tendering, leading to cost savings and faster project completion.** Maharashtra has been evaluating blockchain technology for applications in e-governance, aiming to prevent fund leakages and ensure real-time tracking. Bihar's Western Kosi Canal Project can replicate these strategies by implementing a digital financial tracking system, engaging external auditors, using blockchain or centralized dashboards for real-time expenditure monitoring, and establishing a grievance redressal mechanism for anonymous reporting of financial irregularities. Inspired by Georgia's e-procurement System, Bihar can also mandate online tendering and contract management to enhance transparency and accountability.

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