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TELANGANA'S KALESHWARAM PROJECT

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The Kaleshwaram Project in Telangana is the world's largest multi-stage lift irrigation scheme designed to lift water from the Godavari River and provide irrigation, drinking water, and industrial water to 13 districts in Telangana. It involves huge infrastructure including three barrages, 24 reservoirs, tunnels, pressure pipelines, canals, and pump houses, lifting water from about 100 meters to over 600 meters above mean sea level across a network spanning about 500 km. The project aims to irrigate 45 lakh acres, benefit 2.5 crore people, and has a total water lifting capacity of about 240 TMC (thousand million cubic feet).

Key technical features include:

- Multi-stage lifts with 31 lifts and 21 pump houses.
- Longest underground irrigation tunnel system globally (over 14 km).
- The largest surge pool in the world with a capacity of 2 crore liters.
- Seven links and 28 packages stretch across 13 districts with a 1,800+ km canal and tunnel network.
- The project also aims to support drinking water supplies to Hyderabad and nearby villages, industrial uses, and improve inland fisheries, eco-tourism, and biodiversity.

However, the Kaleshwaram project has faced controversies and structural challenges, such as barrages developing cracks and foundation issues due to problematic site selection and construction lapses. Investigations found allegations of negligence and poor planning, with judicial commissions probing the structural failures and decision-making processes involving government officials.

In summary, Kaleshwaram is a massive, technologically advanced lift irrigation project crucial for Telangana's water security and agricultural development but has encountered execution and structural integrity challenges that drew public and official scrutiny.

What are the main controversies surrounding the structural integrity of Kaleshwaram barrages?

The main controversies surrounding the structural integrity of the Kaleshwaram barrages focus on serious foundational and design flaws, construction defects, and poor maintenance, leading to significant structural distress and safety concerns:

- **Foundation Problems:** The barrages were reportedly built on permeable and unsuitable foundations that could not withstand large water inflows, causing issues like soil erosion beneath the structures (piping) and cavity formation under the raft, especially in Block 7 of the Medigadda barrage which suffered irreversible damage with sinking, cracking, and tilting piers.
- **Structural Damage:** Sundilla and Annaram barrages also faced structural distress, including cracks and downstream erosion, making parts of these barrages unserviceable. The Medigadda barrage's Block 7 was deemed unsafe for gate operations due to severe structural failure.
- **Design and Construction Deficiencies:** Investigations revealed lack of proper geotechnical investigations prior to construction, design flaws, and deviations from approved project parameters. Notably, construction began before the project's detailed project report (DPR) was fully approved by the Central Water Commission and other agencies. The hydraulic designs, operation, and maintenance protocols were inadequate or ignored.
- **Operation and Maintenance Failures:** Absence of a proper operation and maintenance manual contributed significantly to the deterioration of hydro-mechanical components at the barrages.
- **Decision-Making and Political Issues:** The original barrage site at Tummidihatti was moved to Medigadda, leading to abandonment of earlier works worth thousands of crores. Moreover, accusations surfaced that then-Chief Minister K. Chandrasekhar Rao bypassed cabinet approval to push the project unilaterally. Rapid deterioration led to criticism of poor planning, negligent fund release, and rushed execution.
- **Regulatory and Safety Concerns:** The National Dam Safety Authority (NDSA) conducted comprehensive inspections and found "irreparable damage," recommending urgent rehabilitation design including advanced geotechnical and hydraulic studies,

instrumentation for continuous monitoring, and structural strengthening measures to ensure safety.

- **Financial Impact:** The project, while critical for irrigation and drinking water supply, is costly to maintain, with Telangana reportedly paying huge annual debt servicing costs due to these structural faults.

In summary, the controversies stem from foundational weaknesses, design and construction lapses, improper maintenance, and problematic decisions during project execution, raising questions about safety, quality control, and governance in the Kaleshwaram barrages.

How did political decisions impact the planning and execution of the project?



- Political decisions significantly impacted the planning and execution of the Kaleshwaram project, contributing to several challenges related to site selection, approvals, and governance:
- The original site for the barrage was shifted from Tummidihatti to Medigadda, abandoning earlier investments worth thousands of crores. This decision was politically driven and led to inefficiencies and rework.
- Allegations surfaced that then-Chief Minister K. Chandrasekhar Rao bypassed formal cabinet approvals to push the project forward unilaterally, affecting transparent governance and planning processes.
- Rapid decision-making with political urgency led to the project starting construction even before detailed project reports and approvals from central agencies like the Central Water Commission were finalized.

These political pressures and shortcuts contributed to inadequate geotechnical investigations, design flaws, and poor coordination between departments, exacerbating structural and operational problems.

More broadly, political shifts, leadership priorities, and the need to demonstrate swift progress in government projects often cause disruptions in continuity, fragmented ownership among departments, and rushed timelines, which can lead to execution failures and increased costs.

In government projects like this, balancing political imperatives with technical rigor and coordinated execution is critical; failure to do so can result in problems seen in Kaleshwaram's barrages and infrastructure.

In summary, political decisions influenced the Kaleshwaram project by accelerating timelines, bypassing formal approvals, changing project sites, and causing fragmented oversight, all of which impacted the quality, safety, and execution of the project.

What technical flaws have been identified in the construction of Kaleshwaram infrastructure?

The main technical flaws identified in the construction of the Kaleshwaram infrastructure, particularly the barrages (Medigadda, Annaram, and Sundilla), include the following:

Foundation Issues: Severe problems such as sand piping, cavity formation beneath the raft foundation, sinking, tilting, and cracking of piers were found, especially in Block 7 of the Medigadda barrage, which suffered irreversible damage. These foundation flaws compromised the structural integrity of the barrages.

Design Deficiencies: The designs deviated from approved standards, with inadequate or skipped geotechnical investigations. The hydraulic design, including velocity and scour considerations downstream of gates, was insufficient. For example, the secant piles used as cutoff piles did not consider horizontal water pressure adequately, and no proper rock erosion tests were conducted.

Construction Flaws: Construction started prematurely before the detailed project report was approved by central agencies. There were lapses in following safety and design protocols, leading to cracks, seepages, and structural distress in multiple blocks across all three barrages.

Lack of Operation and Maintenance (O&M) Protocols: The absence of an effective O&M manual contributed to hydro-mechanical failures, poor upkeep, and accelerated deterioration of the infrastructure.

Underestimation of Design Flood and Velocity: The design flood level was underestimated for some barrages, and excessively high water shooting velocities caused repeated failures of downstream protection structures.

Inadequate Sedimentation and Scour Studies: Sedimentation impacts were not properly studied, and the launching apron thickness was found insufficient, leading to erosion and structural damage downstream.

Premature Commissioning & Regulatory Oversight Issues: The barrages were commissioned before completing regulatory clearances and comprehensive assessments, raising questions of governance and oversight affecting technical quality.

Overall, the technical flaws involve a combination of poor site foundation assessment, flawed structural and hydraulic designs, rushed construction with inadequate safety checks, improper use of foundation components like secant piles, insufficient maintenance arrangements, and inadequate regulatory compliance, culminating in serious structural failures and unserviceability of key barrage components in the Kaleshwaram project.

