



REVIEW OF RESEARCH

ISSN: 2249-894X

IMPACT FACTOR : 5.7631 (UIF)

VOLUME - 13 | ISSUE - 2 | NOVEMBER - 2023



“POLAVARAM” MULTI PURPOSE IRRIGATION/ POWER PROJECTS - A BOON TO ANDHRA PRADESH STATE

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ABSTRACT :

The main objective of the paper is to analyse the Rehabilitation under major irrigation projects (Polavaram) in Andhra Pradesh and to analyse the Overview of Polavaram Multi-purpose Irrigation Project, Dam Details, Ayacut, Canals, Hydropower, Inter-state problems and Court cases. The paper is based on the secondary data, such data collected from the directorate of economics and statistics and secondary data was gathered from action plans, reports from various study teams, and material from government publications, research journals, media, SES reports, and press releases from irrigation departments. From Government Official Documents, the basic material on choice experiments, compensation, resettlement, and rehabilitation of impacted persons was gathered. The paper concluded that the Polavaram dam is part of India's Rs 400,000 crore National River Linking Project, which was presented as a solution to the country's water-related issues. It calls for water to be transferred from water surplus basins to water-scarce basins. Polavaram dam is a contentious project, with many lawsuits pending in the Supreme Court of India due to protests from neighbouring states such as Chhattisgarh and Odisha, as well as environmental and Adivasi groups, and challenges with the implementation of relocation schemes for displaced people. The Polavaram Project is located in Andhra Pradesh near Polavaram Village about 34Kms, upstream of Kovvur- Rajamundry Road and 42 KM, upstream of Sir. Arthur Cotton Barrage. The state of Andhra Pradesh is denoted for natural resources. It has naturally located Dolphin nose yards, Ports, ponds, lakes, cultivation which released from Bull (Nandi) nose at MAHANANDI temple and so many else. The Andhra Pradesh state also have biggest coastal belt 972 kms, where two big rivers Krishna and Godavari are flowing and finally reaching the Bay of Bengal sea on gravity. During rainy season lakhs of cusecs of flood water flows to sea through these two rivers. To utilise the free flow flood water for drinking and more over for cultivating the lakhs of acres preservation of water is only the solution. In these ways many more years back a project was designed by the prominent persons and it comes true after bifurcation of United Andhra Pradesh state named as polavaram, which have been declared as National project by the central government during the bifurcation. The Honorable Chief Minister of Andhra Pradesh Sri. Y.S.Jaganmohan Reddy reminded the union Home minister Shri Amit Shah that the central has agreed to release Rs. 12,911.15 Crore for implementing the relief and rehabilitation (R&R) package. But since then as per the Lidar survey, 48 additional habitations in 36 villages and colonies are to be shifted to safer places. The CM underlined that the government needed to Rs.17,144.06 crores to implement the R&R package and construct the Polavaram as per revised estimates. The CM further said Polavaram is the lifetime of AP and urged Amit



Shah to intervene in the matter and ensure that the revised estimates are accepted and R&R package released immediately.

KEYWORDS : Polavaram, Hydropower, rehabilitation, Adivasi and Irrigation Project.

INTRODUCTION:

Human displacement is linked to development in its various forms, whether freely or forcibly, through the transfer of property rights to competing purposes. The expulsion of humans from forests in colonial India, the enclosure movement in Europe, particularly in England, and the acquisition of native American land to build the First Transcontinental Railroad in the United States of America are the most notable examples. As a result, in the modern era, the growth-related people mobility is not a novel occurrence.

The two approaches can be seen as a response to the inherent ethical and moral concerns that result in people being displaced in the name of development. The first is the scale and consistency with which it has grown throughout the previous century, and especially in the last three decades. The second stems from the first and is concerned with the attempt to theorize the phenomenon on one hand and manage and regulate it on the other at the worldwide level. These difficulties appear in numerous conflicts in the current development paradigm, and they are increasingly cited by social movements opposing development that has resulted in global displacement.

OBJECTIVES AND METHODOLOGY

The main objective of the paper is to analyse the Rehabilitation under major irrigation projects (Polavaram) in Andhra Pradesh and to analyse the Overview of Polavaram Multi-purpose Irrigation Project, Dam Details, Ayacut, Canals, Hydropower, Inter-state problems and Court cases. The paper is based on the secondary data, such data collected from the directorate of economics and statistics and secondary data was gathered from action plans, reports from various study teams, and material from government publications, research journals, media, SES reports, and press releases from irrigation departments. From Government Official Documents, the basic material on choice experiments, compensation, resettlement, and rehabilitation of impacted persons was gathered.

Rehabilitation under major irrigation projects in Andhra Pradesh

Before independence, good resettlement and rehabilitation packages were provided to project displaced people in Andhra Pradesh and neighbouring districts. The ousters were given newly constructed residences, land for land restitution, and cash assistance to buy agricultural implements as part of the Nizam Sagar project (1925-31).

Tungabhadra was another significant project built-in 1947 in the former Madras Province in conjunction with the former Nizam State. Residents of 65 hamlets were displaced as a result of his endeavour. In this example, the resettlement program began even before the dam construction began. Each relocated family was given a dwelling that had been built. In the command areas, all farmers, including renters, were given land. The main goal of resettlement packages was to improve the living conditions of displaced people after they were resettled.

The Nagarjuna Sagar Project was the most important irrigation project implemented after the state's reformulation. Between 1957 and 1969, the Nagarjuna Sagar Project displaced around 5000 households. In comparison to earlier projects, the rehabilitation policy announced under this one was rather diluted. The ousters were allocated land that was not part of the command zone. However, there is no chance of irrigation in a recovered forest. Following the Nagarjuna Sagar Project in 1964, the next major project implemented a modified rehabilitation approach, which reduced the rewards to the displaced even further. In the first phase of the project, 19 rehabilitation facilities for residents of 26 hamlets in Adilabad and 12 centres for residents of 17 hamlets in the Nizamabad district were created. Those who were relocated to a resettlement center were given two acres of marsh and four acres of dry land. However, in the second phase, no rehabilitation institutions were given for the 27 hamlets that

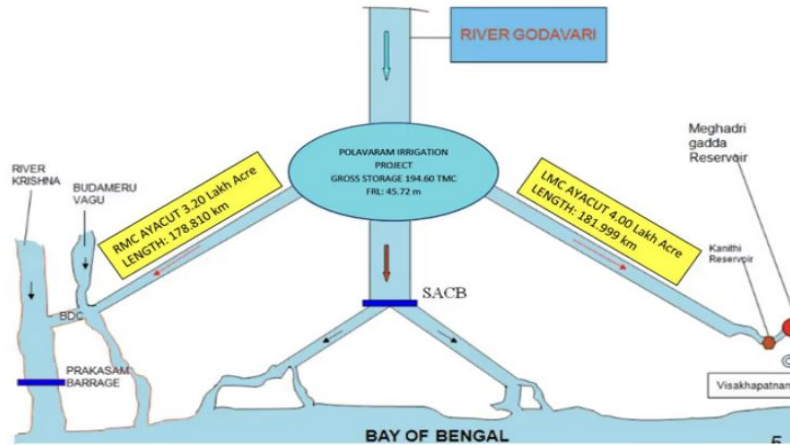
were drowned, and the rehabilitation program was drastically altered. In the case of the Srisailem project, a 1976-81 study found that large and medium farmers could receive 65% of the compensation, while the landless received only 5.6%.

Polavaram is also a big Hydel power project with a capacity of (12 X 80 mega wats). Hydel power will be generated on low cost and surely serve the future power requirements of residual Andhra Pradesh state. Acquiring of land, rehabilitation to the villages covering catchment area, arranging payments, lateral talks with neighbouring states of Orissa Chhattisgarh and Telangana, funding by central government to polavaram project are in a row to complete on faster rate to dedicate the nation. The Godavari has its own style that, during flood mood always be on dangerous way. Hence storage of water will be more when compared with other projects. It results uninterrupted power generation. The Installation of HYdel power Project on POLAVARAM should be appreciable and welcoming thought. The Polavaram project is the next important and nationalized multipurpose major project. Various authors and agencies have quoted different figures in this case in terms of the number of villages that will be affected and the number of people who will be affected by the project, as well as the extent of loss or damage that may occur in physical properties. According to some of them, the scheme will evict 1.31 million people from 276 villages. The impacted population is dispersed throughout three districts in Andhra Pradesh state: East Godavari, West Godavari, and Khammam district in Telangana state. However, the greatest displacement would occur in the Khammam district. Khammam district is responsible for 205 (74%) of the 276 communities that have been flooded. East Godavari and West Godavari accounted for 11% and 15% of the settlements, respectively. 147 (53%) of the 276 settlements were revenue villages, while the remaining 129 (47%) were hamlets. Tribals will make up 48.02% of the displaced people, while scheduled castes would make up 15.27%. As a result, the weaker sections account for 63.4% of those relocated (Sharma 2006 Trinadha Rao, 2006). Following the split of Andhra Pradesh state, the Andhra Pradesh Reorganization (Amendment) Act, 2014 took effect on May 29, 2014. Certain revenue Mandals and villages in Telangana's Khammam district have been relocated to Andhra Pradesh in order to aid the construction of the Polavaram project. With this transfer, the project's submergence zones are now under the jurisdiction of the new Andhra Pradesh state, which will be responsible for resettlement and rehabilitation.

Overview of Polavaram Multi-purpose Irrigation Project

The Polavaram project on the Godavari River in Andhra Pradesh was first proposed in the 1940s. The project was anticipated to cost Rs 129 crore when it was conceived in 1946-47. The reservoir's backwaters would touch the Lord Rama temple in Bhadrachalam, earning it the name "Ramapada Sagar Project." It was later renamed as the Polavaram project. Over 276 tribal villages scattered across 9 Mandals in the agency regions of Khammam, East, and West Godavari districts were predicted to be flooded by the reservoir created by the dam's construction. The number of individuals displaced is believed to be over 2.5 lakh. About 53.17% of those displaced will be tribals, while another 13% will be Dalits and 33.83% will be from other castes. All tribal peoples' natural resources, cultural systems, traditional knowledge, and so on are inextricably linked to the forests and land they occupy. The communities' very existence would become unsustainable if forest food, tubers, leaves, indigenous medical systems, common property resources, and land that supports human population and livestock were lost (Trinadha Rao, 2006).

Figure 1 : Water Utilization through Polavaram Project



The peak flood in the river Krishna in 2019 provided a clear indicator of what maximum peak discharges in Indian rivers might be in the future. Despite the fact that the impacts of global warming are not well understood in physical terms, experts have predicted that peak flood discharges in the Indian Peninsular Rivers Krishna and Godavari will increase in the future. On 3-10-2009, the peak flood flow in the Krishna River was estimated to be 25.5 lakh cusecs, about 2.5 times higher than the highest flood flow of 10.6 lakh cusecs ever recorded in the last 100 years. If the Godavari River at Polavaram Dam has the same phenomenon, some unexpected difficulties will surface. The highest flood discharge in the Godavari River in the last century was 33 lakh cusecs, while the Polavaram Dam was intended to handle 36 lakh cusecs. The dam spillway was redesigned after the Central Water Commission calculated the Possible Maximum Flood (PMF) to be 50 lakh cusecs. The recent floods in the Krishna River have engineers and policymakers worried about what will happen to the Polavaram earthen (rockfill) Dam if the Godavari River floods 2.5 times, resulting in 83 lakh cusecs of water.

Dam Details

Polavaram Dam Construction involves the building of a 1.5m -thick concrete diaphragm wall up to depths from 40 to 120m below the river bed under the earth dam which is the first of its kind **India.**The purpose of diaphragm wall is to secure the riverbed stability for withstanding the water pressure across the dam. The proposed barrage in place of Polavaram Dam would be identical to the one that exists across the Godavari River at Dowlaiswaram. Design of it would be such a way that the water level upstream of the barrage is the same as the water level downstream of the barrage, regardless of the flood discharge whether it is 20 lakh cusecs, 33 lakh cusecs, or 50 lakh cusecs. By extending its length into the flanks and offering studies, the vent way of the barrage gates will be increased to correspond to the river flow cross-section area during the greatest flood. In other words, for all river flows, the 'afflux' would be reduced to near zero, obviating the need for flood walls on the upstream side of the barrage. It is said that during 1986, when the greatest flood at Dowlaiswaram was 33 lakhs cusecs, a water level of 100 feet above MSL was recorded at Polavaram. This water level will not be raised to a greater level even if the barrage is built. Whatever natural submerision occurs for a river discharge of either 33 lakh cusecs flow or 50 lakh cusecs flow would continue to occur even after the barrage is built. In other words, the barrage will not cause any further flooding, and the entire flow will be contained to the high flood zone area, where it is currently residing. During major floods, they would evacuate their homes and relocate to higher ground, only to return a few hours or days later after the floods had subsided. However, when the barrage is built, the high flood zone will be flooded with water for a few months, necessitating their rehabilitation. This alleviation and recuperation will come at a very low cost. As there is no mention of submerging the 293 villages, forest areas, fields, and

other regions in this proposal, the need for protective dyke walls in Orissa and Chattisgarh is eliminated. The barrage's most important elements are briefly outlined. The main flood level at Polavaram is 28 meters (92 ft) MSL and lowest water level is 10.9 metres (36 ft) MSL.

Ayacut

The area of the ayacut is 2,50,000 acres. Originally, ayacut was planned to cover 7,20,000 acres. However, due to real site availability, this was decreased to 2,50,000 acres. According to studies conducted by scientists from an international organization (WWF), more than 4,70,000 acres within the project's ayacut area are already irrigated through several major lift irrigation projects that are about to be completed (e.g., Tatipudi Pushkaram, Chagalnadu), b) minor irrigation tanks that have been completed, c) private groundwater tube/dug wells, d) state-built public tube well projects Irrigation Department Corporation, etc. preserve on this basis.

Canals

On either side of the barrage, gravity-flow canals with a PSL of 95 feet will be planned. However, this would necessitate the excavation of new canals. Additional land purchases and capital costs, in addition to the Rs 2000 crores already invested on the two canals, would be required for new gravity canals. Though it is technically possible to divert 80 TMC from the Godavari River to the Krishna River just upstream of the Prakasam Barrage (as opposed to Budameru through the left canal under construction), it may be more cost-effective to use the canals currently under construction rather than excavating new gravity canals in the long run. In this situation, water will have to be raised from the river's 95-foot level to the canals' 133-foot level. For a discharge of 12,00 cusecs (needed for 2.5 lakh acres, diversion of 810 TMC water to the Krishna River, etc.) and a static head of 38 feet (11.6 metres), 54 MW would be required, which could be satisfied from the 350 MW hydropower generated in the barrage. On the left side of the river, 12 water turbines, each having 80 Mega watt capacity, were to be installed. The right canal connecting to Krishna river is upstream of Prakasam Barrage (173 Kms) Long.

Hydropower

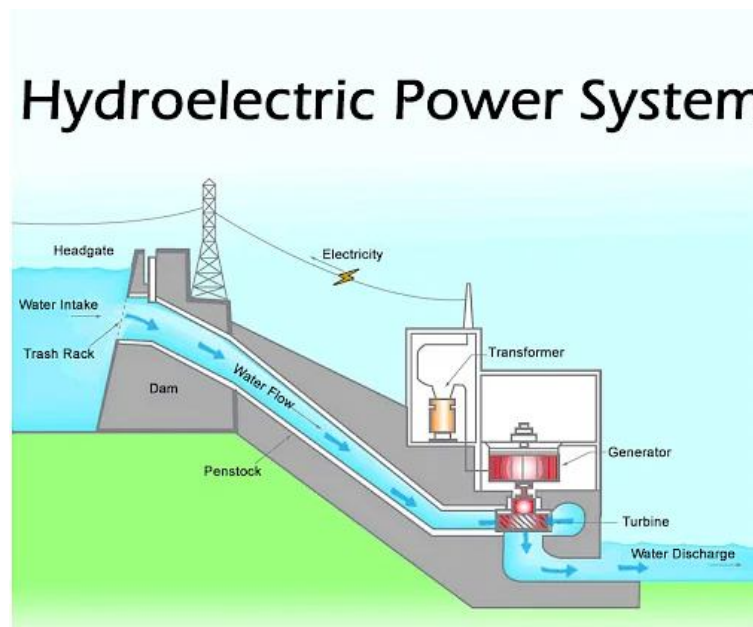
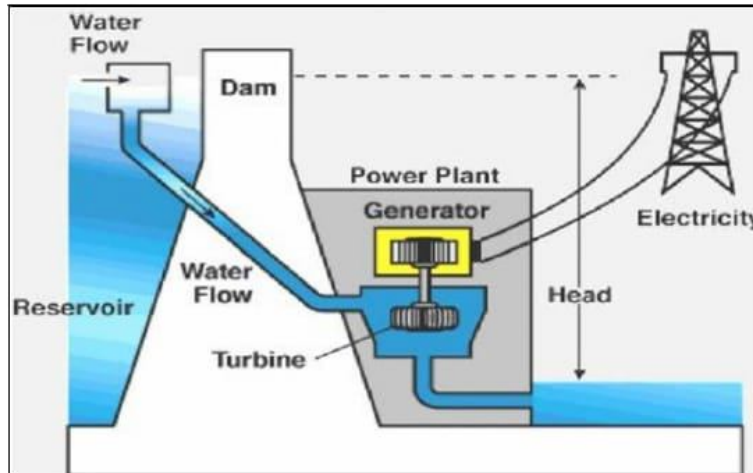
The Central Electricity Authority believed that 720 MW of hydropower could be generated in the Polavaram dam, rather than the 960 MW planned by the State Government. The hydropower component would be lowered to 360 MW due to the construction of a barrage (rather than a dam). However, by erecting three barrages on the upstream side one at Bhadrachalam, the second near Kunavaram on the Godavari River, and the third across the Sabari River this can be increased to 1260 MW. All of these barrages will be submerged within the river's high flood zone, but no villages, forests, or farmland would be flooded. As a result, these four proposed barrages, as an alternative to the Polavaram dam, can create an additional 540 MW of hydropower.

Hydroelectric energy is a useful renewable energy source; most hydropower comes from converting falling water to electricity. Hydroelectric energy provides an important portion of the electrical energy for the residual, commercial and industrial sectors. A hydro power resource can provide electric power by converting the energy of moving water into mechanical energy for spinning a turbine that produces electricity. Water is stored behind dams in large reservoirs. The energy in a reservoir is considered potential energy, the available energy is a function of the hydraulic head and the quantity of water. This potential energy is converted to kinetic energy as it falls. The energy from moving water can be captured and converted to useful work that turns a generator, to produce electricity power. Wave and tidal moments can also be captured to turn a generator.

The potential energy in stored water is converted to kinetic energy by releasing it from a height. At the bottom, the fast moving water is used to spin a turbine which is connected to a generator. The height the water drops is referred to as the head. Head is a height of water created by a vertical difference in elevation. The head is measured from top of the water level to the inlet at the turbine. The after distance is considered the gross head. The net head is the equivalent height after equivalent friction losses in piping are subtracted. To calculate the gross energy stored in a reservoir, the volume

and the average height are used. Water has a density of 1000 kg/m^3 . Thus the mass of 1 Acre foot of water is $1.23 \times 10^6 \text{ Kg}$. Although the total stored energy is relatively easy to calculate from the head and quantity of water, this does not take in to account the efficiency. So that it flows through turbine that turns generator to produce electrical power. A certain amount of energy in the water is lost in friction (or) escapes as a kinetic energy. The water loses most of its kinetic energy as it passes through the turbine. Hydroelectric is the most efficient method of large scale power generation just like a polavaram. It has an efficiency of 80 % to 95% for large installation with high flow rates but less in installation with a low flow rate.

Figure shows how the water is converted as Hydro Electricity.



Costs

The latest estimated cost of the Polavaram Dam (without canals) is stated to be 16,500 crores, out of which Rs. 10,000 crores would be for spillway, rockfill dam and Hydropower civil works plus Rs. 6,500 crores for Relief & Rehabilitation (R&R) of displaced persons. Based on the recent estimate for

the barrage at Kantalapalli on Godavari River (Rs.880 crores) the cost of the above mentioned four barrages can be estimated as Rs. 6000 including the capital cost of pumping at Polavaram barrage, Thus the alternative proposal would lead to a saving of about Rs. 10.500 crores apart from having the facility of quick execution and completion of the project much earlier than the Dam proposal. There will be no interstate or submersion issues as well. More crucially, there is no chance of the earthen (rockfill) dam "bursting" and endangering the lives of 46,15, 000 people, which cannot be ruled out as a figment of the imagination in light of recent floods in the Krishna River (when 2.5 times the maximum flood occurred). When all of the benefits of the Polavaram Dam project might be realized for less than a third of the cost and without submersions, it necessitates a rethinking of the project, particularly in light of the revised magnitude of peak floods.

Inter-state problems

There will be no interstate issues with the barrages proposal because there will be no submersion in Orissa and Chattisgarh when the alternative barrage concept is executed. If the Orissa state's experience with the Vamsadhara stage II and Janjhavati dam projects (stalling the projects for two decades) is any indication, it seems unlikely that they will approve the building of the Polavaram dam, which will submerge roughly 20 villages in their states.

Court cases

The Government of Orissa has filed an original Suit No. 4 of 2007 in the Hon'ble Supreme Court, along with various Interlocutory Applications (IAs), challenging clearances granted by various Central Agencies, including the Ministry of Water Resources (MoWR), and the Andhra Pradesh Government's decision to proceed with the construction of the Polavaram project, with the defendants being the Government of Andhra Pradesh, the Ministry of Water Resources (MoWR), the Ministry of Environment, and the Ministry of (MoTA). So yet, the Hon'ble Supreme Court has neither issued a decision nor issued a stay order prohibiting the building of the Polavaram project or declared it a national project⁴.

Direction of Hon'ble Supreme Court

Mr M. Gopalakrishna, Retired Member of Central Water Commission (CWC), has been nominated by the Hon'ble Supreme Court in an order dated 11.04.2011 to inspect the Polavaram dam and submit a report to the Hon'ble Supreme Court separately to determine whether the GWDT Award items have been implemented. Mr M. Gopalakrishnan and members of the CWC visited the Polavaram dam on the 23rd and 24th of May, 2011 and separately presented their findings to the Hon'ble Supreme Court on the 14th of June, 2011. Mr M Gopalakrishnan and Members of CW determined in their reports that the Polavaram project planning and limited construction activities seen so far by the team at the Polavaram dam site are in accordance with the authorised project and GWT provisions.

The government of Chhattisgarh has filed original Suit No. 3 of 2011 in the Hon'ble Supreme Court against clearance granted by various Central Agencies, including MoWR, and against the Andhra Pradesh Government proceeding with the construction of the Polavaram project, making defendants No. 1 to the Government of Andhra Pradesh, defendant No. 2(a) to Ministry of Water Resources (MoWR), Government of India, defendant No. 2(b) to Ministry of Environment and Forest (MoWR), defendant No. 2(c) to Ministry of Tribal Affairs (MoWR) and defendant No. 3 to Central Water Commission.

CONCLUSION

Overall, three problems surfaced as problematic features of the Polavaram impacted population's displacement and resettlement via direct consultation: the loss of the forest, the modalities of land compensation (in cash or land), and the appropriateness of monetary compensation. The second investigation strategy described the content of the Polavaram Resettlement and Rehabilitation Package (PRRP) as well as some aspects of its implementation in practice. According to the findings, the PRRP

only satisfies the preferences indicated by the affected people on a sporadic basis, and it fails to fully address the three difficulties mentioned above.

First, the PRRP relocates people away from the forest and the river; at the same time, access to the forest, which is a critical source of physical and social reproduction, is neither restored nor sufficiently compensated following resettlement. Second, only ST households are eligible for land-for-land compensation under the PRRP. Non-tribal families are compensated financially for the loss of their land, but the amount is insufficient to repurchase land in the resettlement regions. As a result of the relocation, many non-tribal families will lose their land. Third, the PRRP concentrates almost entirely on cash compensation, which is provided in insufficient amounts and paid in unpredictable and irregular instalments. Furthermore, monetary compensation is insufficient in terms of both quantity and quality to enable people to rebuild their lives. Finally, whereas the package purports to compensate for the loss of livelihood with a one-time monetary payment, no measures for the creation of employment alternatives outside of agriculture are planned. The only preference that the package actually addresses is the migration of the entire community into a single settlement, regardless of social category. On the completion of Polavaram Project, increased Agriculture production to a tune of 109 Lakhs MT, Per Anum, interconnecting of Godavari and Krishna basin, assured water supply to Visakhapatnam City, and enroute villages, steel plant and other industries in the vicinity, increased power generation of 960 MW and so. AP Honorable Chief Minister Sri .Y.S.Jaganmohan Reddy has been monitoring the Polavaram project. Polavaram hydroelectric project ($12 \times 80 = 960$ MW) was owned by AP state government PSU AP Generation Corporation limited (APGENCO) and is denoted as biggest hydro power plant in national wide and the pride of India as well as known fact that, it was already declared as a national project by the central government of India.

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