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**FIELD REPORT**

ON

# “RADHANAGARI DAM, KUNKESHWAR AND DEVGAD VISIT”

SUBMITTED TO

## SHIVAJI UNIVERSITY KOLHAPUR

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A total of 83 students and 3 staff members visited Devgad, Kunkeshwar Temple, and Radhanagri Dam. Students are able to understand various structures involved in civil engineering projects during this educational visit, and they also learn about ancient construction methods.

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# 2. RADHANAGARI DAM

## 2.1 Information

Radhanagari Dam is a gravity dam on Bhogawati river near Radhanagari in the state of Maharashtra (India). Construction was initiated by visionary Rajarshi Shahu on 18 February 1907. The dam is being used for irrigation as well as hydro-electricity. The dam is located amidst scenic surrounding in the backdrop of thick forest cover.

The scheme was suggested by Pandurangrrao Krishnajirao Shinde, Considering the suggested advantage towards increasing irrigated land up to 15000 hectares and satisfying Kolhapur municipal water requirement, the share capital raised was paid back to concerned shareholders who had planned for thermo-electric (by letting all water into Konkan for electricity generation) and mining project. Because of Mr Shinde's suggestion, the scheme was handed over to government in interest of people, after the capital invested was realised. Scheme was approved by Rajaram Maharaj or else would have been a thermal electric project, in favour of British industrial syndicate as suggested in the Second opinion of Sir Vishveswarayya. In 1941 PK Shinde was specially appointed as Chief Engineer due to his technical competency and experience.

Today Radhanagari Dam is the main reason for flourishing agriculture, and jiggery industry in Kolhapur District. The water need of Municipal Corporation of Kolhapur is satisfied through this dam. Radhanagari Dam supports large variety of Flora and Fauna. It is surrounded by dense forest and has wide variety of wildlife and naturally evolved ecosystem. It was because of Mr P K Shinde's efforts that thermo-electric project and mining for metals was side-lined. Radhanagari Dam not only has a technology worth studying but also a history that changed the fate of agriculture in Kolhapur.

## 2.2 History

In order to permanently solve the drought in the state of Kolhapur, Pati Shahu Maharaj set up small and large irrigation projects in his state, the largest of which is "Maharani Lakshmibai Lake", the construction of this project started on November 14, 1909, in the limits of Fejiwade village on the river Bhogawati. This was the largest irrigation project in India at the time and was completed by a low- income state like Kolhapur. After the completion of this project in the vision of Chhatrapati Shahu Maharaj, Kolhapur state and Kolhapur district have never been affected by drought till date.

Maharaja considered the construction of Radhanagari project as his life's work. Maharaja recognized the importance of irrigation 100 years ago and gave the highest priority to the work of this project. Maharaj himself used to economize for the enormous expenses incurred for this dam project. Maharaj used to say "My life work will have been done when I complete this project". This project has a unique importance in the overall development of Kolhapur district.

## 2.3 Specification

This dam is famous for its automatically operated 7 gates, which doesn't require any electrical or mechanical power to operate it. Till now this technology is not in any of the dam in India, except this dam. The height of the dam above lowest foundation is 42.68 m (140.0 ft) while the length is 1,143 m (3,750 ft). The gross storage capacity is 236,810,000 m3 (8.363×109 cu ft).

## 2.4 Components of Dam

The components of dams play an important role in maintaining the primary responsibility of water management. The parts of the dams are broadly classified as Water-retaining structure, Water-releasing structure, Water conveying structure

### 2.4.1 Water-retaining structure – Components of Dam

The water-retaining structure is the dam's walled structure that resists water while allowing a controlled amount to flow downstream. Accordingly, the side of the barrier where water is collected is known as the upstream side, and where the water flows is known as the downstream side. Generally, the following component of dams makes up the dam's water-retention section.

i) Heel

ii) Toe

iii) Abutment

iv) Crest

v) Cutoff

vi) Parapet wall

**i) Heel**

The part of the dams meeting with the groundwater or upstream side is called the heel.

**ii) Toe**

The portion of the dams meeting with the groundwater or downstream side is called the Toe.

**iii) Abutment**

Abutments support the lateral pressure. These are the sides of the valley. These are concrete or masonry structures.

**iv) Crest/Roadway of Dams**

The section of the dams used as a roadway or walkway is the crest. It is the upper area of the dam.

**v) Cut off**

The cut-off is an impervious barrier constructed beneath the earthen dams. The main function is to reduce the loss of stored water in the reservoir by preventing seepage. cut off – Earthen dams

**vi) Parapet wall**

The parapet wall is seen below the crest near the roadway. This assists in the dam investigation and safety barriers.

**2.4.2 Water-releasing structure: Components of dams**

Mainly, the components of dams that allow water to flow downstream are known as the water-releasing structure. Generally, these dam components are technically known as the dam's spillways. Generally, the spillway's mechanism allows for controlled water volume. A spillway contains the following components.

i) Galleries

ii) Spillways

iii) Diversion tunnel

iv) Sluiceway

v) Freeboard

**i) Galleries**

These are hollow openings passing through the dam as shown in fig. The main purpose of providing a drainage gallery is to collect seepage water from the foundation and body of the dam and drain it out. The seepage water received by foundation galleries is drained away under gravity. The galleries are broadly divided into:

a) Grouting gallery

b) Inspection Gallery

c) Drainage gallery

d) Valve gallery

e) Transformer Gallery

**ii) Spillway**

The role of the spillway is to convey excess water and prevent damage. The water passes from upstream to downstream. The spillway helps in the emergency discharge of water. They are two varieties:

a) Controlled spillway

b) Uncontrolled spillway

In a controlled spillway the flood flow is regulated by the gate.

**iii) Diversion tunnel**

The purpose of the diversion canal is to redirect the water. Diversion tunnels are constructed during the construction stage of dams. A diversion tunnel may also be constructed to divert floodwater to divert water from mountainous regions to low-lying areas experiencing a water shortage supply.

**iv) Sluice way**

The role of the sluiceway is to remove the silt accumulated.

**v) Freeboard**

The interval between the dam heads to the maximum water level on the upstream side.

### 2.4.3 Water conveying structure – Components of dams

Water-conveying structure mainly conduit and conveys the water from reservoirs through, around, or under an embankment dam Conduits are closed pipe structures. Conduits act as a passage for the water supply. Bottom discharge conduits are pipes that cross the body of the dam from the upstream to the downstream sides enabling water flow.

# 3. KUNKESHWAR TEMPLE

### 3.1 Information (construction)

The Shrikshetra Kunkeshwar at Devgad in Sindhudurg district is referred to as Kashi of Konkan. Kashi has 108 Shivalingas while Kunkeshwar has 107. This article gives concise information on this place of pilgrimage. The Shrikshetra Kunkeshwar temple is situated at the seaside in the village of Kunkeshwar. It is located at a height near the foothill of a mountain. The temple is 70 feet tall. This is included in the famous seats of worship of Deity Shiva in the Konkan region. 'Kunak' is derived from the word 'kanak (a flowering tree which grows along forested stream banks)'. It is said that there was a grove of kanak (Bayur) trees at this place.

### 3.2 The legend underlying this place of pilgrimage

Every day a cow belonging to a priest would come to graze in the vicinity of the present day Kunkeshwar temple. It would never give milk at home. To unravel the mystery underlying this, one day the priest followed it. He saw that the cow had released its milk onto a self-manifested stone. He struck the stone with a stick after which it broke, and a small piece flung from it and began to bleed. The stunned priest surrendered unto the stone. Thereafter every day he would offer obeisance to it by lighting a lamp there. The greatness of this place spread far and wide. This is the Shri Kshetra Kunkeshwar of today.

### 3.3 History

The Shri Dev Kunkeshwar temple came into light before the 11th century B.C. In the context of this temple there is a reference in the Nagdev copper inscription plate as 'A priest named Devsharma came to the spacious village of Indul (the present day Hindul). The local king honoured him. Thereafter the king acquired abundant wealth and with the grace of Deity Shiva in the form of Shri Kunkeshwar he was blessed with a son'.

### 3.4 The ancient temple

The construction of the Shri Dev Kunkeshwar is in Dravidian (Southern) architecture. There is a small temple of Shri Jogeshwari, temple of Deity Shiva in the form of Shri Dev Mandalik and temples of Shri Narayan, Shri Ganesh and Shri Bhairav in the vicinity of this temple.

### 3.5 The cave from Kunkeshwar

In 1920 A.D. some people were digging the land close to the temple at the eastern slope of the mountain at Kunkeshwar when the door to a hidden cave opened. Among the carved marble idols found there are idols in the attire of a warrior wearing jewellery on the

head. In the centre is a Shivalinga and Nandi. They are surrounded by statues of their devotees.

### 3.6 An ancient lake

There is a temple of Shri Hanuman towards the south of the temple adjoining a lake. When Shriman Labde Maharaj was performing austerities here he saw a vision of this lake. When excavation was carried out at this place a lake with sweet water was found.

### 3.7 The Shivalingas resembling those from Shri Kashi Kshetra

It is due to the Shivalingas behind this temple that this place is known as 'Kokan chi Kashi' (in Marathi). For several years the sea waves have been striking these lingas all year round. Despite this they are intact; have not undergone disintegration. Only 5 to 6 Shivalingas are visible here during low tide. Similar Shivalingas are found on rocks in Kashi too.

### 3.8 Nature of the celebration

Shri Dev Kunkeshwar is believed to be the presiding Deity among the Deities of 72 neighbouring villages. As per tradition, Deities from these 72 villages visit this seat of energy on Shivaratri, to increase their own Divinity. Devotees enjoy this beautiful union of Deities. These Deities reside here till amavasya (No moon day). Devotees of these Deities bathe in the sea and then perform ritualistic worship of Shri Dev Kunkeshwar.

# 4. DEVGAD

### 4.1 Laterite (Chira)

Mainly the Laterite is found in Kokan Region due to heavy rainfall, Humid Environment Devgad is one of them. Heavy rainfall and humidity lead to the leaching of basalt rock on a large scale. This process gives rise to laterite soils. Thus, to the west of Sahyadris, laterite soils are formed from basalt rock.

Laterite is both a soil and a rock type rich in iron and aluminium and is commonly considered to have formed in hot and wet tropical areas. It covers about 3.7% of the total land area of the country. Nearly all laterites are of rusty-red coloration, because of high iron oxide content. They develop by intensive and prolonged weathering of the underlying parent rock, usually when there are conditions of high temperatures and heavy rainfall with alternate wet and dry periods.[1] Tropical weathering (laterization prolonged process of chemical weathering which produces a wide variety in the thickness, grade, chemistry and ore mineralogy of the resulting soils. The majority of the land area containing laterites is between the tropics of Cancer and Capricorn.

Laterite has commonly been referred to as a soil type as well as being a rock type. This, and further variation in the modes of conceptualizing about laterite (e.g. also as a complete weathering profile or theory about weathering), has led to calls for the term to be abandoned altogether. At least a few researchers specializing in regolith development have considered that hopeless confusion has evolved around the name. Material that looks highly similar to the Indian laterite occurs abundantly worldwide.

Historically, laterite was cut into brick-like shapes and used in monument-building. After 1000 CE, construction at Angkor Wat and other southeast Asian sites changed to rectangular temple enclosures made of laterite, brick, and stone. Since the mid-1970s, some trial sections of bituminous-surfaced, low-volume roads have used laterite in place of stone as a base course. Thick laterite layers are porous and slightly permeable, so the layers can function as aquifers in rural areas. Locally available laterites have been used in an acid solution, followed by precipitation to remove phosphorus and heavy metals at sewage-treatment facilities. Laterites are a source of aluminum ore; the ore exists largely in clay minerals and the hydroxides, gibbsite, boehmite, and diaspore, which resembles the composition of bauxite. In Northern Ireland they once provided a major source of iron and aluminum ores. Laterite ores also were the early major source of nickel.

## 5. PHOTO GALLERY

RADHANAGARI DAM

## KUNKESHWAR TEMPLE

## DEVGAD

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