CHAPTER 2

DESCRIPTION OF STUDY AREA

2.1 GENERAL

The Krishnagiri Reservoir Project (KRP) taken up for this study is located in Ponnaiyar river basin in TamilNadu state, South India. Figure 2.1 shows the map of Ponnaiyar river basin. The KRP is located between 78° 11’ 00” - 78° 17’ 00” longitude and 12° 22’ 30” - 12° 29’ 00” latitude. This basin has one more large reservoir downstream of KRP called Sathanur Reservoir Project. Both of them were simultaneously planned and constructed and the design is such that the operation of each reservoir is independent of each other. The KRP has a catchment area of 5397 sq. km.

Most of the technical details that are presented in this Chapter are taken from the following reports namely, The Krishnagiri Reservoir Project - A Technical Document (MohanaKrishnan, 1988) and Water Resources Assessment of Ponnaiyar River Basin(1990). The climatological and hydrological data were collected from the Office of Assistant Executive Engineer, Public Works Department at the project site.

2.2 PHYSIOGRAPHY AND DRAINAGE

Physiographically, the command area of the KRP is a peneplain terrain with minor undulations. The general slope of the terrain is towards south. The contours of the plain country vary from 630 m to 650 m above MSL and is confined to the central valley portion of the river. The western and eastern sides of the command area are occupied by rocky hills with very less vegetation having altitudes ranging from 1080 m to 1220 m.
2.3 CLIMATE AND RAINFALL

The KRP is influenced by both the south-west and north-east monsoons. At the Dam site there is only one rain gauge being maintained by Public Works Department. Daily rainfall data is available for this station from 1960. The data was collected until 1991. The average annual rainfall at the dam site is 888 mm. The annual rainfall for the period of 1960 to 1991 is shown in Figure 2.2. The figure presents the variability of rainfall in the catchment area. The annual inflow for the period 1960 to 1991 is shown in Figure 2.3. It can be observed that the variability of inflow into the reservoir is high. Water year starts from August and ends in July of ensuing year. The average monthly rainfall and inflow arrived at with 32 years of data are shown in Figures 2.4 and 2.5.

2.4 SYSTEM DESCRIPTION

The storage capacity of the Krishnagiri reservoir is 68.26 MCM and the water spread area at full reservoir level is 12.85 sq. km. Two canals take off from the reservoir one on either flank, with the same sill level. Both the canals are contour canals with Ponnaiyar river running in the middle. The length of the right main canal is 14 km and that of the left main canal is 18.2 km. The total command area under the project is 3600 ha.

About 26 tanks are fed by the main canals, of which 7 tanks are fed by the left main canal and 19 tanks are fed by the right main canal. The total capacity of all the tanks is 3.5 MCM. The command area irrigated by tanks is 885 ha and is approximately 25% of the total command area.

2.5 RESERVOIR OPERATION AND CROPPING PATTERN

Before construction of the dam at the dam site there were two spring channels which were buried below the bed of the river. It was irrigating 200 ha of paddy, coconut and betelvine. So during the construction of the dam, two pipe sluices
RAINFALL IN mm

FIGURE 2-2 ANNUAL RAINFALL AT KRP

INFLOW IN MCM

FIGURE 2-3 ANNUAL INFLOW AT KRP
Figure 2.4: Average Monthly Rainfall at KRP

Figure 2.5: Average Monthly Inflow at KRP
were buried in the masonry dam to connect the spring channels. These spring channels are operated when the main canal is not in operation. Thus, this 200 ha area gets water throughout the year.

When the reservoir was constructed it was intended to irrigate a paddy crop in the entire command area between August and December. After years of experience in reservoir operation, it has undergone a radical change. At the start of every crop season the reservoir opening is decided based on comparing reservoir storage with a critical reservoir storage. This critical reservoir storage is denoted here as CRL. Now, if the reservoir contents at August is more than a critical storage CRL(1), water is supplied from the reservoir for irrigating paddy crop. Otherwise the reservoir opening is postponed to November even if the reservoir gets filled up during September or October. This is due to the fact that if paddy is planted during September or October the yield is significantly reduced because of the cool climatic conditions during grain formation stage (Padmanabhan 1992). If the storage during November is more than a critical storage CRL(2), water is supplied for a paddy crop. The paddy crop planted during August is harvested during December. After December if the reservoir content is more than a critical storage CRL(3) water is supplied for second paddy crop. If the reservoir content is less than CRL(3) water is not supplied for second paddy crop. According to the experience gained from reservoir operation the value adopted for CRL(1) is 35 MCM. For both CRL(2) and CRL(3), 41 MCM is adopted. They are subjected to change in the future as more and more experience is gained in reservoir operation.

Approximately 50% of the command area has got very good groundwater potential. So farmers raise paddy and other cash crops such as coconut, mango, sugarcane and jasmine even when reservoir water is not supplied to them. When they receive reservoir water through canals they stop pumping groundwater. Between May and July the farmers in the tank command raise ragi using residual water in the tanks as ragi needs only very few irrigations. This work relates to application of Optimization and Simulation techniques to KRP to arrive at the optimal operation policy and critical storages CRL(1), CRL(2) and CRL(3) for chosen reliability levels of irrigation.