The present study makes an evaluation of performance of an irrigation system in Tamil Nadu using multidisciplinary indicator approach. The study area is the Lower Bhavani Project where different intervention measures have been proposed in the past decades by the authorities with the overall objective to increase the agricultural productivity. Review of literature shows several approaches to improve the performance of irrigation systems. This work is taken up with the main objective to evaluate the system performance in the Lower Bhavani Project (LBP) through the study of Standardized Gross Value of Production (SGVP) approach to productivity, study of the economic viability of canal lining by computing the Benefit Cost Ratio, assess the ground water quality in the command area for irrigation suitability, assess the performance of the irrigation structures besides the role of Farmers’ participation in agricultural operations.

The area of LBP is vast and it is possible to consider only a representation of the whole system. Hence, six distributaries of the LBP system are selected, which could represent two in the head reach, two in the middle reach and two in the tail reach so that it provides an overall picture. In order to evaluate the performance of irrigation system, performance indicators are chosen such as output per unit cropped area, output per unit command, output per unit irrigation supply and output per unit water consumed using Standardized Gross Value of Production approach.
In order to determine the economic viability of canal lining, an analysis of benefits accrued from canal lining has been carried out in terms of investment made rather than conventional method of lining and its estimation. Indian standard IS: 5331 procedure for determining the maximum rate of expenditure and benefits on lining that is economically justifiable is used in this study. This method is reliable for any irrigation project where canals are lined and involves number of parameters like cost of lining and rate of interest which can be worked out whereas annual benefits, recovery factor and capital expenditure can be calculated by field measured data in order to finalize the Benefit Cost ratio.

The assessment of ground water quality in the irrigation point of view is done by creating a database for the parameters as observed in the field and linked with map info professional 6.0 of the GIS packages to create contour maps for all the parameters. The extent to which the areas affected due to contaminants present in the ground water is then analysed in the command area with its contour ranges.

Irrigation water quality varies greatly on the types and quantity of dissolved salts. A steady state model represents the maximum build-up of salinity and sodicity of root zone that would result from irrigation with poor quality water. A relatively simple steady state model called WATSUIT is used to judge water suitability for irrigation in this study. The results from the WATSUIT model were compared with the salt tolerance data and assessed for salinity, permeability and toxicity problems in the past. From these, water suitability is assessed for suggesting suitable crops to be grown.
An irrigation system is a set of structures aiming to capture, convey, control, and distribute water to irrigation units. The poor performance of the structure is due to technical and design related problems, poor operation and maintenance and insufficient discharge capacity of canals. An attempt has been made in this work to assess the flow behaviour of irrigation structures using sensitivity indicators and comparing the irrigation structure performance with the design performance in LBP. This particular aspect would be very useful to solve many issues in the domain of improvement of water delivery performance. Two distributaries in the LBP have been selected, one in the head reach and the other one in the tail reach for this analysis. The present physical condition of various structures in the selected distributaries is evaluated. In order to have better evaluation and comparison of off-takes, sensitivity indicator “Off-take Sensitivity to Discharge” was adopted in this study.

The structures are classified as high, medium and low sensitive based on response to water depth change and the performance can be analysed from these sensitivity values. The sensitivity indicators for the irrigation structures varied from 1.0 to 3.9 in Kavindampadi distributary (Head) and 0.5 to 4.6 in Chennasamudram distributary (Tail). The results explain that many of the structures at tail reach distributary are very sensitive having less actual discharge than the target and performing poorly. Therefore, highly sensitive structures should be operated with more precision than others to minimize deviations between the actual and targeted discharge.
The study assessed the functioning of Farmers’ Council in LBP, its role in water management and changes in them over a period since its formation. The farmer’s organisation has well defined structures, rules and functionaries and maintenance of irrigation structures and regulation of water supply is done by the Councils. The collective action with regard to functions of water management is quite significant and brought substantial benefits to farmers in terms of access to water and productivity gains from irrigation. Farmer participation along with its organization is required to resolve irrigation related conflicts for increased crop productivity thereby improving the performance of irrigation system. Apart from irrigation related conflicts, there are some other general problems which if properly documented could easily be solved with the effective functioning of Farmers’ Councils.

The overall performance with intervention measures was evaluated by summing up the scores on each of the indicators as percentage and analysed to assess the relationship between them. The effective functioning of the Farmers Council in many of the distributaries, especially in the head reaches, the cropping pattern change effected in tune with the changing socio-economic conditions, emerged as best measures that enhanced the performance of the irrigation system in LBP. Further, the canal lining and the maintenance of the structures, again mostly in the head reaches contributed to the saving and better delivery performance of irrigation supply emerged as the second important successful measure. The head tail disparity noticed in all the canal reaches may be a concern that needs to be addressed in further improving productivity in LBP command area.