1.0 INTRODUCTION, OBJECTIVES AND METHODOLOGY

1.1 Introduction:

It is well known and widely demonstrated that agriculture, the back bone of economic development, especially rural economy, is fraught with multiple risks emanating essentially from erratic and scanty rainfall. Farmers over the aeons have, however, based on their experience and wisdom, evolved farming systems with technologies such as multiple cropping suited to the local conditions and to meet their requirements. But the burgeoning population has necessitated the rapid increase in agricultural production to ensure food security and nutritional requirements. One of the biggest challenges to-day in agricultural sector is, therefore, to increase productivity of crops to augment food production and alleviate poverty in the country side as for the arable land extensive cultivation is limited. The obvious choice then is the intensive use of available land. Intensive cultivation is inexorably interlinked with irrigation development, because monsoon is confined only to three or four months in a year. Man had therefore, evolved various strategies to harvest the surface run off during the monsoon period to be used for irrigation and other purposes after the monsoon is over, and also at times of long dry spells during the monsoon. One of the earliest modes of surface water harvesting was construction of small water bodies, called as tanks, to store rain water during the monsoon period. They were considered as the lifeline of villages and were treated as sacred places by the village communities, and were managed collectively, using local resources and technologies.

The importance of and the need for irrigation development for increasing crop production, reducing yield instability and providing insurance against failure of crops has been realized by the planners and was given priority in the successive plan periods after independence. Given the politico economy considerations in the post-independence period, the operation and management of tanks was

gradually taken over by the government. While concentrating more and more on large storage dams, adequate attention was not paid to the traditionally important tanks, which were efficiently and effectively managed by the local communities. With the result, the storage capacities of the tanks have gradually been reduced due to a variety of social, economic and environmental factors, affecting adversely the irrigation potential under tanks. Taking the contemporary requirements for rural development into account, efforts are being made to rejuvenate the tank systems in the country by the concerned state governments.

1.2 Tank systems in Karnataka – A perspective

Karnataka state like many other states in the country, is endowed with a number of tanks, to harvest surface run off in the water sheds at the micro level. There are 36,672 tanks in the state with an irrigation potential of 6.85 lakh hect. These tanks were and continue to be the lifeline of village communities, to meet diverse range of their requirements - agricultural and non-agricultural. Traditionally, the communities had evolved their own ways and means of managing the tanks, keeping environmental and ecological balance in view. Based on the politico economy considerations and requirements in the post-independence period, as mentioned earlier, the management of tank systems has gradually been taken over by the government. With the result, the traditionally practiced community based management systems, and strategies, sustained for generations, have slowly been discontinued due to a number of socio-economic and cultural factors. This has gradually developed dependency syndrome among hitherto self-propelling communities. Over a period of time, due to a variety of natural, economic and social constraints, the decaying of tank systems has started in the state, like else where in the country. For instance, tanks which used to overflow or discharge every year, or even twice a year in some cases, have not been getting filled once in 5 years or 10 years, or even more. The feeder channels have not been maintained properly and the neighbouring farmers gradually encroached upon them, which has led to reduced flow of water into the tanks. When the water availability in the tanks had become less and less dependable

over a period of time, the big and well-to-do farmers have started exploiting ground water through wells and bore wells, as supplementary sources of irrigation in the tank command areas. Among others this is one of the reasons for farmers' losing interest in the tank management, subjecting the tank systems to the 'tragedy of commons'. The cumulative impact of all these factors has led to the deterioration of tank infrastructure, leading to siltation and the consequent reduction in the irrigation potential under the tanks. The potential has comedown to 2.40 lakh hectares, which is one-third of the total potential created. This has obviously affected the agricultural production and income of the rural poor adversely. The need for rejuvenation of tanks has, therefore, gained importance to restore the originally designed storage capacities, which enables to increase the area irrigated and consequent improvement in agricultural production and the livelihoods of rural people.

1.3 The problem

The state is confronted with a development dilemma. Dilemma because, on one hand there is a critical need for rehabilitating the tank systems to the originally designed standards to restore the storage capacity, and on the other, the state has been facing increasing resource crunch to take up the required repairs and reconstruction of tank civil structures. Taking the contemporary problems and constraints for efficient management of tanks into account, it was felt that the responsibility of tank management should be handed over back to the communities in future. This process of reinventing the wheel, however, calls for systematic rehabilitation of the entire tank infrastructure before handing over to the community, which obviously calls for huge investment. The tank systems have deteriorated to a large extent due to lack of timely repairs and reconstruction. The government of Karnataka has, therefore, approached the World Bank for assistance to take up the tank rehabilitation programme in the state. It is in this background, the Karnataka Community Based Tank Management Project (KCBTMP) has been started on a pilot basis, during the year 2002-03 with the financial assistance from the World Bank.

Given the huge investment on this project, it is necessary to examine the intensity and spread of the outcomes of the project and benefits to different sections of the community. End of the project impact study, therefore, has been taken up, covering the six agro-climatic zones, where the project has been implemented.

1.4 Objectives:

The broad objective of the proposed study has been to assess the impact of various interventions / inputs under the KCBTMP on socio-economic and environmental conditions of rural communities. In doing so, it has been examined whether the intensity and spread of benefits is in conformity with the project objectives / goals, keeping in view the identified and approved performance indicators. The specific issues addressed in the study to examine various quantitative and qualitative impact indicators are:

1. The impact of tank infrastructure improvement on the live and dead storage of the tank and the consequent increase in irrigation potential, area irrigated, improved availability of water to tail enders and temporal increase of water storage in the tank;

2. The cost effectiveness of the repairs and reconstruction of tank civil works and its impact on prevention or reduction of silt flow from the catchment into the tank, improvement in the vegetative cover in the catchment and foreshore of the tank, water use efficiency in the tank command area and ground water recharge in and around command and catchment areas;

3. Effective implementation of schedule of activities proposed in the ITDP within the time frame fixed for each phase of implementation and their sustainability, including post-project O & M plan and lessons learnt;

4. Inclusiveness and participation of the community, including SC, ST and other vulnerable groups in the Tank Management Institution (TMI) at the village level;

5. Implementation of capacity building programmes and strategies and their effectiveness and suitability to build the capacity of tank user groups to manage the tank systems on a sustainable basis;

6. Income generation activities proposed and implemented under various social safeguards programmes and their impact on income and livelihoods of landless poor and other vulnerable groups;

7. Agricultural production system improvement: The impact of water management, arable and horticultural crop demonstrations on knowledge and adoption of modern farm technologies, crop diversification, irrigation intensity, crop intensity and productivity of crops: impact of FFS in finding solutions to crop production problems and improve crop yields; the effect of skill development programmes on adoption and spread of improved technical knowledge;

8. Promotion of silt and vermi-compost and other bio-fertilizer and bio-pesticides usage for sustainable agricultural production and their adoption by farmers.

9. The relevance and adequacy of institutional base created to manage the tank and the capacity of the community to generate resources through water tax, fisheries, foreshore plantation, turfing grass on the tank bund and other miscellaneous activities, for maintenance and management of tank system on a sustainable basis;

10. Positive externalities of the project in terms of time saved by women in fetching drinking water, temporal increase in dead storage in the tank for cattle, washing clothes and other purposes;

11. The effectiveness of functional literacy programme; and

12. Impact of the tank improvement programme on incomes and living conditions of direct as well as indirect beneficiaries pushing them above poverty lines.

1.5 Methodology:

The selection of sample village / tanks for the study was based **on multistage sampling**, the stages being agro-climatic zones, district, taluk and villages, as presented in Figure: I. The sample has been selected from the list of villages where pre-project baseline survey was carried out. The village / tanks already handed over to the community for future management and those which are in implementation / post-implementation phase were selected purposely. As of now, the programme has been implemented to improve the tank systems in 193 out of 304 village / tanks covered for baseline survey. Therefore, all the 193 tanks were selected for the study. However, during the course of survey, it was realized that some of the tanks selected for project implementation have been subsequently dropped for various reasons. Some others have been dropped after initiating the pre-planning phase. In all, 11 tanks which were identified for survey based on the list of JSYS have been dropped for the reasons mentioned above. The final list of effective sample villages had, therefore, been fixed at 182. (Figure 1.1). Since some of the sample villages have more than one tank, the number of sample tanks comes to 187 that is the reason for difference in the number of sample villages and tanks. The villages / tanks, where baseline survey was carried out, but not covered by the project, have been selected as control villages. In all, 35 such tanks, spread across the six agro-climate zones in the project area, have been selected as control, to measure the impact. Since pre-project base line data are available for all the sample villages / tanks the impact has been measured on certain indicators by adopting post- facto research

design, **Before and After the project approach (i.e. longitudinal)** and also **with and without approach (cross sectional)**.

The limitations of longitudinal approach for impact evaluation need to be kept in view. Normally the base year and the reference year for evaluation should be the normal years of rainfall. In the case of present project, the base year of 2003-04, which was decided in full interaction with JSYS and the World Bank as the programme started, rainfall in almost all the project taluks was below normal. The reference year for impact evaluation i.e 2007-08, is a good year, where majority of the sample taluks have received above normal rainfall. The impact measured, based on before and after approach, may not give the realistic picture about the project impact per se. However, the results based **on with and with out give fairly good estimate** of the project impact. A set of villages without project interventions (control) have also been surveyed and data collected.

The selection of households for the study was based **on stratified random sampling**, the strata being size of land holding, location of the plot in the tank command area and caste of the farmer, to assess the differential impact, if any, based on socio-economic background of the sample farmers. The list of command and catchment area farmers has been prepared and classified according to the caste, landholding size and location of the farm, and the sample unit i.e. household, was selected using random sampling technique. Ten percent of the farm households in the command and catchment area was selected for in depth study. Similarly, the households covered under various income generation activities were listed in each sample village and 10 percent of them have been selected at random to assess the impact of IG activities on their incomes and livelihood.

In all, 1298 farm households and 1006 IGA beneficiary households were selected for the study. With regard to agriculture, 1030 households selected randomly for collection of data to study the area under crops, technologies adoption, gross output, Crop productivity and net income.

The required secondary and primary data have been collected for all the sample villages / tanks. Structured formats were prepared to collect data on various components of the project namely, engineering, agriculture, social and institutional. The household schedule for collecting soci-ecomonic data has been the same which was used for baseline survey, with marginal additions to collect the required data.

The secondary data were collected from the records of DPU, CFT, and TMI; and from agricultural university consultancy services with regard to agriculture sector. The primary data from the sample households, demonstrator farmers, and the project beneficiaries have been collected by using survey method, where trained investigators personally visited the households and collected the data from the head of the household or his / her representative by using a structured interview schedule. The **qualitative data** have been collected through **Focus Group Discussions** of various stake holders, including women, and also from TMI office bearers, opinion leaders and other enlightened people.

The data have been thoroughly scrutinized and validated by the concerned specialists of M & L team by frequent visits to the field and by cross checking from the records and also individuals to ensure quality and reliability of field data.

Simple analytical tools have been used to analyze and interpret the data. The economic analysis has been done by using the required quantitative field data collected from various sources addressing the output / outcome and impact indicators.