CHAPTER - I

INTRODUCTION
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1.1 Background

Drought has long been recognized as one of the most insidious causes of human misery and being the natural disaster that annually claims the most victims. Its ability to cause widespread misery is actually increasing (Perez et al. 1995). Drought is a temporary, recurring natural disaster, which originates from the lack of precipitation and brings significant economic losses. It creates an atmosphere of doom and despair. Water scarcity can be said as the cause and effect of drought.

Drought occurs whenever and wherever the links in the hydrological cycle is broken or is destabilized. Drought is a slow poison, no one knows when it creeps in, it can last any number of days and its severity cannot be predicted. It has extensive spatial dimension and thus can have serious implications on the socio-economic stability of an entire region. It is not possible to avoid droughts. But drought preparedness can be developed and drought impacts can be managed. The success of both depends, amongst the others, on how well the droughts are defined and drought characteristics quantified (Smakhtin. et al. 2004).

Drought definitions vary from region to region and may depend upon the dominating perception and the task for which it is defined (academic study or a drought-relief plan). Drought always starts with the lack of precipitation, but may (or may not, depending on how long and severe it is) affect soil moisture, streams, groundwater, ecosystems and human beings. This leads to the identification of different types of drought (meteorological, agricultural, hydrological, socio-economic, ecological), which reflects the perspectives of different sectors on water shortages. Figure – 1.1 explains these perspectives in a concise manner.
A drought is a prolonged, abnormally dry period when there is no enough water for normal the needs of the users. Conceptually it can be defined as “a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield” (National Drought Mitigation Center, 2005).

1.2 Definition of Drought

There is no definition of drought that is universally accepted and applicable. There are as many definitions as the aspects considered serious and the relative importance attached to the different adverse effects. To the
agriculturist, drought is a lack of optimum soil moisture in the root zone of crops in the growing season adversely affecting crop production. To hydrologists and the water resource engineers, drought is abnormally low stream flow in rivers, low water levels in reservoirs, lakes and marked lowering of the ground water table. To the economist and administrator, drought is a general water shortage adversely affecting hydro-electric power generation, industrial and agricultural production and the general economy and public wellbeing, including food supplies and public health, necessitating special measures to relieve distress. A definition of drought which is fairly comprehensive is that it is a situation in which there is prolonged deficiency of rainfall over a wide area resulting in serious depletion of soil moisture and consequent by poor agricultural production and general water shortage, resulting in low production, employment, income and great public suffering and distress.

In general drought can be defined as a shortage of water for a certain use. In a simple meteorological parlance, drought is less rain than 90 per cent of the long period average and the absence of enough moisture in the soil to allow a crop to grow due to scanty and erratic rainfall. It could be most accurately described as a condition in which the amount of water that is needed for evaporation and transpiration exceeds the actual availability.

Drought is a major natural disaster that has been striking one or other regions of the world with a canny regularity. Whenever and wherever it strikes it devastates the agricultural, social, economic, industrial, commercial, food, health, demographic and ecological face of the region or the country. Many African, Sub-Saharan and Asian countries are the witnesses to such havoc and it has been jeopardizing their economic growth seriously. It is one of the most serious causes of making some 840 million people in the world today victims of hunger.
1.3 Types of Drought

A drought situation occurs when water supplies are lesser than demand. The greater the demand placed on an area's water supply, the more serious the drought. There are several types of drought.

a) **Meteorological drought;** is defined as a deviation from normal precipitation conditions over a period of time for a specific region.

b) **Agricultural drought;** occurs after a meteorological drought and is the lack of adequate soil moisture needed for a certain crop to grow and thrive during a particular time.

c) **Hydrological drought;** occurs when precipitation is reduced for an extended period of time, and water supplies in streams, lakes, rivers, and reservoirs are found deficient.

d) **Socio-economic drought;** is a condition when the physical water supplies are so scanty to the extent that they negatively affect the community where the drought occurs.

1.4 Drought in India

India is predominantly an agrarian country as more than 60% of its population is dependent on agriculture. Due to the vagaries of rainfall, more than 68% of the net sown area in the country is drought prone, out of which 50% is severe in nature. The country experiences drought in every 2 to 3 years in one part or the other (Parasuraman, et al. 2000). The drought frequency, intensity and impact vary greatly with the geographic area affected. Aberrations in the total volume and pattern of rains from Southwest monsoon are primarily responsible for droughts in India. It has experienced 22 large scale droughts in the years, they are 1891, 1896, 1899, 1905, 1911, 1915, 1918, 1920, 1941, 1951, 1965, 1966, 1972, 1974, 1979, 1982, 1986, 1987, 1988, 1999, 2000 and 2002
(Employment News, 2004). Everywhere in India monsoon does not exhibit any particular trend and also random in nature. However, there have been several epochs of frequent drought.

In India, as elsewhere, drought causes widespread crop failures leading to acute shortage of food and fodder that adversely affects human and livestock populations. In such situation hunger, malnutrition and scarcity of drinking water are common problems. Further drought accelerates degradation in natural resources, depletion of ground water and its quality and ecological imbalance. Hence, large scale of human and livestock population have been migrating in search of food, fodder, drinking water, health services and employment during the drought year. From the economic point of view, it impairs the purchasing power of rural people. This leads unable to make consumer durable and non-durable products in companies. At the same time the supply of raw materials for industries particularly agro-industries are critically affected retarding the industrial and commercial growth of the country.

India is one among the developing countries of agricultural predominance in nature. About 58 per cent of the population is directly depending on agriculture for their livelihood and about 10 per cent of the population is indirectly depending on agricultural sector for their incomes, even though the agricultural sector is remained backward due to the several problems. One of the important problems is rainfed cultivation. Nearly three-fourths of the total arable land (143.8 million hectares) in India is dependent on rain. The fortune of millions of farmers cultivating these lands is linked with the vagaries and vicissitudes of the monsoon. The monsoon based agriculture tilts the balance of the income, employment and socio-economic condition of the farmers and economic development of the country.

Drought is a periodic phenomenon in India. Almost 50 per cent cultivable land of the country is considered drought-prone due to weak or
irregular monsoon. As a result of it, there is a limit to increase irrigation potential in the country. Hence, the country will have to grapple with the problems of dryland agriculture in about 50 per cent of arable land (Hegde, 1989). It leads to more problems than progress of the agricultural sector. This has also created wide income disparities and socio-economic problems among the farmers. The small and marginal farmers of the rainfed areas have poor resource base and still practice subsistence farming. They are the ones most vulnerable to weather aberrations and suffer the most in the event of natural calamity like drought and its related problems.

In India, an area of about 175 million hectare constituting 53.3 per cent (out of total geographical area of 328.8 million hectare) is estimated to be a problematic area. Out of this, about 150 million hectares are subjected to soil erosion by water and wind. Other 25 million hectares are reported to have been degraded into ravines and gullies, shifting cultivation, water logging, alkalinity, salinity etc., (Anonymous, 1982). It is obvious that the problematic areas particularly the drought areas are impoverished, deficit in nutrients and often prone to soil erosion causing serious limitation to moisture storage which ultimately affects the sustainability of production.

The term drought refers to a situation of substantial crop failure on account of insufficient moisture in soil. In India majority of farmers are practicing dryland cultivation and they highly depend on rainfall for growing crops. Hence, droughts have been a common feature of the Indian agriculture scene for centuries; there are certain pockets in the Country. These certain pockets of the country are often frequented by drought. These areas are known as the drought prone areas (Prabhakar, 1995). Occurrence of drought is inevitable in dry-farming regions. The disastrous effects of drought cannot be eliminated but the miseries can be minimized to a reasonable extent by the application of appropriate techniques (Srinivasulu, et al. 2002).
In order to mitigate/overcome bad effects of drought the Government of India has devised many strategies and implemented relief and development programmes in cooperation with concerned states in the last three decades. The systematic Government intervention to tackle drought started as early as during the Second Five-Year Plan (1956-61) when the Dry Farming projects were initiated. During the Fourth Five-Year Plan various programmes were launched in India with a view to attaining growth with social justice. The Rural Works Programme (RWP) one of such programmes was started in 1970-71. It objected to create assets designed to reduce the severity of drought, wherever it occurred and to provide employment in the drought affected areas. Initially this programme was merely geared to the execution of rural works and employment generation. For implementing the programme schemes, the following priorities were followed:

a) Major, medium and minor irrigation projects including on farm development works and land leveling etc.

b) Soil conservation and afforestation schemes and

c) Open up village and district roads to raise agricultural production.

But the RWP could not bring about drought mitigating development of rural areas. Therefore the programme was re-oriented to follow the area development approach. Hence, at the time of the mid-term appraisal of the Fourth Plan, the RWP was renamed as the Drought Prone Area Programme (DPAP). The programme is one of the area development projects designed and implemented in chronic drought areas in India, where the rainfall is very low, where agricultural yields are far below the average, where forests have disappeared long ago, where soil erosion is a common phenomenon and water is a scarce commodity to plants, cattle and human beings too (Reddy, 1995). This programme is preventive as well as curative; preventive in the sense that re-occurrence is reduced to possible extent and curative in so far as advance
planning is to be introduced in taking up works under scarcity relief operations. For this purpose the programme has plan for creating infrastructural facilities, remunerative assets and labour intensive work in areas where drought and scarcities had occurred frequently in the past.

1.5 Statement of the Problem

Drought is as much as a socio-economic phenomenon as it is a meteorological, climatic and hydrological. In fact drought is a complex mixture of the above said interacting factors rather than an isolated phenomenon (DMC report, 1999). But occurrence of drought is a major problem confronted by the people living in the study area and it disturbed normal condition of the area. It causes instability in entire economy due to the fluctuations and level of productivity that in turn leads to low level of development and regional disparities. Drought first affected the agriculture, which produced a chain reaction on all other sectors of the economy and economic growth of the study region. Further, it played a very important role in the socio-economic life of the people in the area. The adverse effect of the drought has led to under utilization of natural resources, low production and low standard of living of the people. In such context some people cannot get basic necessities in the region. In this context people have been struggling to lead even a normal life and migrate to other places for the sake of procuring bread and butter.

The social life of the people in drought affected region shows all signs of backwardness. Socio-economic implications of drought include rise in price of essential commodities, distress sale of cattle, import of food-grains, rural unemployment, malnutrition, health hazards (Adinarayana, et al. 2002). The study area has not been an exception from the above said stated condition. The economic condition of the region displays a very dismal picture. The prevalence of widespread acute poverty and also high regional variation is a common situation. The small and marginal farmers, land-less labourers and
livestock are the worst victims of drought. During drought, shortage of fodder and drinking water for cattle lead to migration of cattle to the areas where water and fodder are available. Shortage of drinking water for human beings leads to migration other areas where water is available. In such context death of cattle and human beings due to shortage of food and water under severe drought conditions is common. Further, drought not only affected socio-economic aspects of the region but also disturbed the ecological balance. The biotic content of the region which either human, animals or plants are crippled due to adverse effect of drought. Shortage of fuel for cooking in rural area leads to deforestation; it deteriorates environmental condition of the area. Some of the environmental effects include: lowered reservoir and ground water levels, low streamflows; exposed shoreline, water quality problems. The reduction of water resource quantity and quality directly and indirectly affects on people and impaired fish and wildlife habitats. Along with extended dry weather also heightens the danger of fire.

In this context, long-term neglect of drought areas, the economically weak and fragile farmers have eroded the production potentiality in drought areas. The production from these areas has also been highly unstable as they are subjected to the vagaries and vicissitudes of the monsoon. In addition to the rainfed agricultural lands, forests and other common property resources in the area have been shrunken not only physically but also inherently in terms of losing their biotic potential for sustainable production. The common property resources have become over exploited during drought periods. Totally drought disturbs the normal situation of the area and normal life of the people and the livestock.

1.6 SCOPE AND NEED FOR THE STUDY

The present study is focused on the rural resources like land, water and irrigation, livestock, manpower and related aspects and their effective use in watershed under the DPAP and non-watershed implementing area. This study
delineates differences in the socio-economic characteristics of beneficiaries under DPAP-watershed and non-beneficiaries. Further, it emphasizes on differences in water availability for various purposes, expenditure on bore well, total production and productivity of land, cropping pattern, and cropping intensity within the program and outside the program area. It examines the relationship between the dependent and selected independent variables for understanding the changes in resource-use efficiency in DPAP and non-DPAP areas. Further, the outcome of the study will be useful to modify the existing strategies and overcome the barriers involved in planning and implementation of the programme. The suggestions of the study would become a prescription for the drought prone areas elsewhere in the country. It also helps to the policy makers, researchers, and administrators concerned with DPAP. Ultimately, the information gathered will add to the already existing knowledge and understanding of DPAP.

1.7 OBJECTIVES OF THE STUDY

The study is undertaken with the following specific objectives:

i) To study the structure and functions of DPAP-watersheds.

ii) To compare the socio-economic profile of the farmers in the DPAP-watersheds and non-watersheds areas.

iii) To quantify the differences in water availability of various use and expenditure pattern on borewell irrigation in the programme and non-programme implementing areas.

iv) To assess the changes in soil fertility, productivity and cropping pattern of the beneficiaries and non-beneficiaries.
v) To find out the adoption level of improved farm practice and resource use efficiency by the farmers within the watersheds and outside the watersheds.

vi) To suggest corrective measures for the inadequacies and difficulties observed.

1.8 HYPOTHESES OF THE STUDY

The study is undertaken with the following specific hypotheses:

i) DPAP-Watersheds have improved the socio-economic condition of the sample farmers.

ii) There is a significant difference in water availability and expenditure on bore well irrigation between the beneficiaries and non-beneficiaries.

iii) There is improvement in soil fertility, productivity, and cropping pattern of the farmers within the watersheds than outside the watersheds.

iv) DPAP-Watersheds have significantly contributed for the adoption of improved farm practice and more efficiently use of resource.

1.9 LIMITATIONS OF THE STUDY

The present study had the time and resources constraint as usually faced by the investigator. However, considerable care has been taken while conducting the study. Even though, the following limitations are applicable for this research work.

i) The productivity of perennial crops has not been calculated.

ii) For calculating cost and returns, and resource use efficiency of only two rainfed crops i.e. groundnut and ragi in Kharif season have been taken.
iii) While quantifying the differences of expenditure on irrigation only borewell expenditure has been considered.

iv) The study is region specific, it may not hold good to another drought-hit region. Hence, it cannot be generalized.

v) The secrecy that often shrouds the unpublished data; it may limit the study to that extent, while evaluating the DPAP.

vi) While collecting primary data, farmers may not co-operate with us in giving proper information. Reliability of data may suffer to that extent only.

1.10 DESIGN OF THE STUDY

The study is presented in eight chapters. The introduction, statement of the problem, scope and need for the study, objectives, hypotheses, limitations and chapter design of the study are presented in the first chapter. The relevant review of literature is presented in the second chapter i.e. Review of Literature. The third chapter contains selection of the study area, types of data, method of data collection, analytical techniques and statistical tool adopted for testing the variables. The fourth chapter discusses structure and function of DPAP-watersheds in India. Chapter fifth explains the drought in Karnataka, initiation of DPAP and present status of DPAP in Karnataka. The sixth chapter delineates benchmark information of DPAP in Chitradurga District. Chapter seventh covers Result and Discussion. Lastly chapter eighth provides the Summary and Conclusions.