Chapter – VI

SUMMARY, FINDINGS AND SUGGESTIONS

6.1 SUMMARY:

It is beyond any doubt that the role of water is felt in all walks of life. The scarcity of water causes drought and famine, and the excess of water brings about flood and may result in miserable conditions of life. Thus the water has a very complex impact on the physical, chemical and biological aspects of life. The eminent scholars have expressed that the agricultural land-use is and will remain the foremost user of water. Use and misuse of water have had its beneficial and harmful effects. The choice of the settlements and the early civilable. The judicious use of water is the urgent need of the present society.

Gadag district is situated in the western part of the northern karnataka and about 195 Km. away from the Arabian Sea. The district comes under the rain shadow region and thus experiences the semi-arid climatic conditions. The frequent drought and famine occurrence is a common phenomenon in the district. The average annual amount of rainfall is 612.5 mm. The district exhibits a rolling topography and has been drained by two rivers viz. the Malaprabha and the Tungabhadra and
their large number of non-perennial tributaries of various order. Due to dry conditions the natural vegetation cover is negligible and it is very sparse. However, the district possesses a vast area under agriculture and has considerable livestock resource.

The rolling topography and the medium to deep black soil and mixed red soils and red sandy soils are the other important characteristics of the district. The total geographical area of the district is 4656 Sq.Kms (465715 ha.) out of the total geographical area, the net sown area occupies 404457 ha. of land which accounts for 86.85 percent of the total geographical area. This fact alone indicates that the Gadag district has a predominant agricultural economy. Further, about 28644 ha. land is under fallow land, and it represents 6.15 percent of the total geographical area of the district. This fallow land can be brought under cultivation. The area under other land uses is negligible.

The climatic data particularly rainfall variability has proved the fact that the district experiences acute shortage of water and frequent drought conditions which has made the life highly miserable in the Gadag district. This fact naturally attracts the
need for watershed development in all five taluks. The drainage network characteristics are highly suitable for the watershed development. There is still a large scope for the watershed development through various methods of rainwater harvesting. Totally 54 new meso watersheds sites and 55 micro watersheds have been proposed for their development. It is hoped that the structures suggested are highly suitable to store the water during rainy season. However the watersheds are not free from the problems. Under different situations of land characteristics different problems are created. These are given in the continuing pages of this chapter. In order to overcome these problems some solutions are also being given. The authority of Watershed Development Programme must take keen interest to develop the proposed watersheds involving the farmers, users/beneficiaries and other agencies like NGO’s etc., in order to bring about a successful watershed development in a phased manner.

6.2 MAJOR FINDINGS:

After a detailed study and analysis of the data the researcher has come out with the following findings:
A) The district consists of more than 6.15 percent of the total geographical area under fallow land which has not been brought under cultivation due to acute shortage of water sources.

B) There has been an absence of natural vegetation in the district except in the area of kappatagudda hills spread in Gadag, Mundaragi and Shirahatti taluks and a small portion in Gajendraghad hills in Ron taluk.

C) Though a large number of minor irrigation tanks are existed in the district they are unable to meet the water requirements of the district.

D) The rainfall variability during 42 years (1971 to 2012) indicates that more or less for every four to five years there will be a severe drought followed by moderate droughts during the previous 1 or 2 years in the district, and hence, unless the rainwater is not managed and harvested, the district cannot come-out of the water problem. This would affect the agricultural sector badly.

E) The stream network (though non-perennial) has been well developed in all parts of the district in terms of stream
segments, orders, length etc. Thus the streams are quite able to supply sufficient water to store at favourable locations. The basin areas with rolling topography are also favourable to collect the water by checking the surface run-off.

F) Locations across the third order streams seem to be the favourable spots for the watershed development as at these points sufficient water can be accumulate.

G) In view of the above facts there is a greater need for the watershed development in the district to overcome the problem of water and for the regional economic development.

6.3 PROBLEMS IN WATERSHED DEVELOPMENT AND SOME SOLUTIONS:

Lenka D. has rightly traced out the general problems involved in watershed development and management. Some of these are as follows, and are applicable to the study area also. The type and intensity of vegetation cover greatly influence water yield through interception, infiltration, storage and attention. High and thick vegetation reduces evaporation intercepts rainfall, reduces its force of falling on the ground, allows more
time for infiltration and reduces runoff flow velocity and erosion and thereby increases total water yield. Infiltration is proportional to vegetation. Quality of water improves water yield too. Water flowing over denuded areas carries more sediment. Deforested catchments carries more sediment and reservoirs get silted and their life period is reduced. The rainfall water yield time relationship is also modified by soil, which is a function of climate organic matter, parent material and relief over time. The capacity of soil as a reservoir of water depends on its texture, structure, infiltrability and depth of the profile. Coarse textured soils have low direct runoff and high ground water recharge rates. Impermeable stratum below may result in high return flow rates. On the other hand high direct runoff and low return flow (ground water recharge) are associated with fine textured soil. Deep and fine textured soils possess high water capacity available for evaporation that keeps the climate cool. The chain is unending and the cause and effect relationship is complex.

When the problems of watershed through various studies are identified a work plan is prepared and action is taken on each item. The following is a rough categorization of the problems with the suggested management practices in respect of Gadag district
### Table - 6.1

**Nature of Problem and Solution**

<table>
<thead>
<tr>
<th>Taluk/Location</th>
<th>Situation</th>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central part of Shirahatti and western part of Nargund taluk</td>
<td>Medium to low slope agricultural lands.</td>
<td>Soil and water management, water retention, runoff, control and reuse.</td>
<td>Contour cultivation, strip cropping, buffer strip and border strips.</td>
</tr>
<tr>
<td>N-W part of Ron and S-W part of Shirahatti taluk</td>
<td>Moderate to low slope and plain irrigated bunds.</td>
<td>Water management.</td>
<td>Land leveling design and system of irrigation, irrigation depth and interval control, disposal of drainage water.</td>
</tr>
<tr>
<td>Eastern, Northern most, and southern most part of Nargund, Entire Ron taluk, northern part of Gadag, Eastern part of Mundaragi and western and southern part of Shirahatti taluk</td>
<td>Plain agricultural land and low lands.</td>
<td>Drainage disposal of water and reutilization.</td>
<td>Surface and sub-surface drainage recycling of water.</td>
</tr>
<tr>
<td>Southern part of Gadag, northern part most part of Shirahatti and western part of Mundaragi taluk</td>
<td>High slope and Stream Bank</td>
<td>Soil erosion, storage and disposal of excess water.</td>
<td>Stream bank protection, gully control protection of farm ponds, vegetation.</td>
</tr>
</tbody>
</table>

Problems and solutions are different with type and its purpose of utilization. The solutions are agronomic and soil water conservation engineering. Since the latter involves more expenditure and is time taking, the former should be attempted first to manage the watersheds.
6.4 SUGGESTIONS:

Due to the constraints of topography, uneven distribution of resources over space and time it is not possible to store all flash and peak flows in any area. The slope of the land in Gadag district is not much varying. There is a rolling topography in the district and the land in certain areas is plain and slope varies from low to moderate. Hence, the problems associated with watershed development involve the soil and water management, water retention, runoff, control etc., in medium to low slope areas. These problems are mainly found in the Malaprabha river basin and also in the Tungabhadra river basin particularly along the Malaprabha river bank. In these areas contour cultivation, strip cropping buffer strip and border strips are some of the effective measures to be taken by the concerned agencies, and farmers.

It is observed that along the stream banks of the Malaprabha and the Tungabhadra rivers soil erosion is a common problem along with the problem of water storage and disposal of excess water. These areas need stream bank protection, gully control protection of farm ponds and vegetation. These are the suitable solutions to the problem in the district.
In moderate slope areas such as Malaprabha and the central areas water management problems may be noticed. In these areas land leveling design and system of irrigation and disposal of drainage water are some of the solutions to overcome the water management problems.

In plain areas of agricultural lands of the Malaprabha, and some tracts of the Tungabhadra basin drainage disposal of water and reutilization of water are the most essential factors. The surface recycling of water is the most effective solution in these areas.

For the proper watershed development the structures suggested by experts (as shown in 5th chapter) should be developed. This would certainly reduce the problem of water storage. In case the proposed watersheds are developed properly in Gadag district the agricultural sector would certainly flourish and this can bring about a balanced economic development by reducing the spatial disparities in the district.