WATERSHED
WATERSHED

4.5.0. GENERAL:

Government of India in the year 1987 gave high priority for the watershed development. The Drought Prone Areas Programme, popularly known as DPAP and the Desert Development Programme (DDP) followed the development of watershed. Further, the Integrated Wasteland Development Board also adopted the watershed programmes for the development of wastelands. The National Watershed Development Programme in Rainfed Areas (NWDPRA) has also followed the concept of watershed.

Watershed is an hydrological unit that encompasses all land and water within a basin identified by a drainage divide. The Ministry of Rural development in fact looks after the developmental activities based on the development of watershed. In fact this can be a watershed based ecosystem that takes care of the conservation and biomass production. (Jensen, et al 1996). The table No 4-4 is self explanatory. It reflects the involvement and responsibilities of the Centre, State, District and Village level governing bodies that are answerable to the public in respect of watershed development. Further, the table No.4-5 also indicates the administrative hierarchy in the development of watershed at the district level. Both the said tables are self explanatory and point to the responsibilities of official at different levels, who has to supervise for the better implementation of the developmental activities.

Watershed is the most convenient unit to determine the relationship between precipitation and the distribution into various components like, run-off, infiltration and evaporation etc. in a hydrological cycle. Identification of micro-watershed is an important parameter in the direction of the assessment of water resource.

Micro watershed has an area of 500-1000ha and is represented by a an alphabet of lower case (like 'c') and a mini watershed has an area of 5000ha and is indicated by a numeral (like 2). It covers number of micro-watersheds. A macro-watershed (sub-watershed) is similar to river basin and has thousands of hectares.
Table No. 4.4 Administrative Hierarchy for projects under the New Guidelines

Central
Ministry of Rural Areas and Employment
- Integrated Watershed Development programme
- Employment Assurance Scheme
- Drought prone Areas programme
- Desert Development Programme

State
State Watershed programme Implementation and Review committee

District
District watershed Development Advisory committee

Village
Gram panchayat (elected assembly)

Watershed Association

User groups Self Help Groups

Appoint members

Watershed Committee

Project Implementing Agency

District Rural development Agency / Zilla parishad

Watershed Development Team
- agriculture
- engineering
- social forestry
- social mobiliser

Appoints Members

Central Supervises
State Supervises
District Funds
Village

95
Table No. 4.5 Administrative Hierarchy for the Watershed Development projects under Guidelines District level

<table>
<thead>
<tr>
<th>District Level</th>
<th>Divisional Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPAP (now named as District Water Management Agency) (DWMA)</td>
<td>MDT Multi Disciplinary Team</td>
</tr>
<tr>
<td>PIA Project Implementing Agency</td>
<td>WDT Watershed Development Team</td>
</tr>
</tbody>
</table>

1. Voluntary Organisations
2. Government Departments
3. Non Governmental Organisations

1. Agriculture
2. Engineering
3. Social Forestry
4. Social Mobiliser

4.5.2. Administrative Hierarchy for the Watershed Development.
4. 5. 3. Watershed map:

The watershed map, (Fig. 4-5) is prepared using the drainage map following the ridge and valley concept. All India Soil and Land Use Surveys (AIS&LUS) classification and coding is adopted in the preparation of this map. The watershed code is alphanumerical number representing all the units of watershed, namely, Region, Basin, Catchment, Sub-Catchment, Watershed, Mini-watershed, Micro-watershed and Nano-watershed. This coding is done on the basis of number of hydrological units at various stages of separation of the unit. The highest unit is the ‘Region’ and the lowest unit is the ‘Nano-watershed’. An example is given in the following table for better understanding.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Unit</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Region</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Basin</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>Catchment</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Sub-Catchment</td>
<td>D</td>
</tr>
<tr>
<td>5</td>
<td>Watershed</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Sub-Watershed</td>
<td>P</td>
</tr>
<tr>
<td>7</td>
<td>Mini-Watershed</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>Micro-Watershed</td>
<td>C</td>
</tr>
<tr>
<td>9</td>
<td>Nano-Watershed</td>
<td>1</td>
</tr>
</tbody>
</table>

Nano - Watershed is not considered in the present work.
4.5.4. Surface water sources:

The surface water sources can be classified as rivers, tanks and wells that are briefly stated below.

4.5.4a. Rivers:

There is no major river in the area under report. The river Swarnamukhi just skirts the eastern tip of the Valagalamanda river basin. As stated earlier, the river Valagalamanda is a tributary to the river Swarnamukhi and debouches into it at the distance of eight km north of SriKalahasti. There is a major stream, known as Yerlapudi Kalva that drains the northern most part of the basin. There is yet another major stream that drains the central and south eastern part of the basin. This stream joins the former stream near the mouth of the basin to form the river Valagalamanda. (Fig. 4-5). All the said streams and the river Valagamanda are ephemeral.

4.5.4b. Tanks:

In the topographical map, number of dry tanks are noticed. The depth of these tanks range from 3m to 8m on the bund side. The tanks, are mostly wet and very few are dry.

![An almost dry tank](image)

Fig. 4-6. A few wet tanks and a dry tank in the study area in the month of March
4. 5. 4c. Canal:

There is a canal in this area draining the Valagalamanda river basin. The canal is still being executed. (Fig. 4-7).

![Fig. 4-7. A canal in the study area.]

4. 5. 5. Subsurface water sources:

4. 5. 5a. Wells:

All the wells present in the topographical map and in the field have been marked. This map, (Fig. 4-4) clearly reflects the density of wells. It is transparently evident why there is concentration of wells in certain parts. There are dug wells as well as bore wells. Some of the dug wells are lined and some are not. The water level in the dug wells is quite high reflecting the shallow water table in the month of March and beginning of April. (Fig. 4-8 )

![Fig4-8. The type of dug wells. The last two figures reflect the old style of dug wells]
4. 5. 6. Development of Watershed:

The development of watershed is very essential especially for rural areas. Ramakrishna Reddy (2007) in his doctoral thesis presented a table indicating the importance of allotting points to each village. The allotment is based on; land Use and Land Cover (40 points), slope, (15 points), Net Village (15 points), Ground water Prospects (20 points), Surface water (20 points), Well Status (20 points) and Socio-Economic condition (20 points). In fact this analysis is based on the watershed details. The following aspects should be considered for any watershed development.

1. Ground water recharge and development: The normal practice in the rural areas is to drill a bore well, for irrigation and or for drinking. But the most important aspect of recharge is totally ignored. As a result, the yield gradually comes down. Hence, recharge structures have to be planned properly.

2. Water Management: This involves lining of water courses if necessary, land leveling for the easy flow of water and proper layouts of the field for planning

3. Storage and recycling of run-off: Generally the run-off is not considered for recycling and it is allowed to go waste. Proper measures should be used to store the run-off in tanks and or sub-surface reservoirs. This should be recycled and used.

The conservation of soil is one of the most important aspects in the development of watershed. The soil should be prevented from erosion. The moisture retention capacity of the soil should be maintained properly by adopting the modern technique of developing percolation tanks etc.

5. Land Use: The land use pattern should be properly planned and if needed it should be modified for betterment by using appropriate cultivation methods and cropping system.

6. Development of live stock: This should be practiced in addition to other activities like improvement of fuel – fodder production and horticulture.
4.5. 7. The Structures that help in the Development of watershed:

4.5.8. Check Dam

Check-dams are small barriers built across the direction of water flow (Fig. 4-9) on shallow rivers and streams for the purpose of water harvesting. These dams retain excess water flow during monsoon rains from a small catchment area. The water impounded gets percolated and helps in the recharge the main use of the water from the check dam is for irrigation and it can also be used for.

The advantages of the check dam are that it prevents flooding of crop lands during floods and it has cost- benefit ratio. Check dams are constructed on third order streams

Fig. 4-9. A Check Dam in the field

4.5.9. Gully Control:

Gullies develop on the slopes of the lands and where the soil is unprotected and loose. The run-off first initiates rills and subsequently gullies develop. This will cause soil erosion. The soil erosion can be protected by plantation along the soil boundary and also cutting small benches supported by the development of vegetative growth on it.

4.5.10. Percolation Tank

As the name reflects the percolation (Fig. 4-10) is the downward movement of the water though the soil due to force of gravity. The water goes deep into the soil and meets the free water table. Rapid percolation helps in some respects and in some cases it dissolves the plant nutrients like calcium and magnesium being carried deep.
Percolation tanks are essential for the recharge of wells of both types and helps in better recuperation of the wells that are located towards the downstream side. These are constructed across streams and big gullies.

Fig. 4-10. A Percolation tank in the field

4.5.11. Farm Pond:

This helps the individual farmers in the conservation of soil and water. This will be more useful when the rains are scanty. In addition to these, the bunding and subsurface dykes are also useful in watershed.