



## केंद्रीय भूमि जल बोर्ड

जल संसाधन, नदी विकास और गंगा संरक्षण मंत्रालय

भारत सरकार

Central Ground Water Board

Ministry of Water Resources, River Development and Ganga

Rejuvenation

Government of India

Report on

## **AQUIFER MAPPING AND MANAGEMENT PLAN**

**Madhugiri Taluk, Tumkur District, Karnataka**

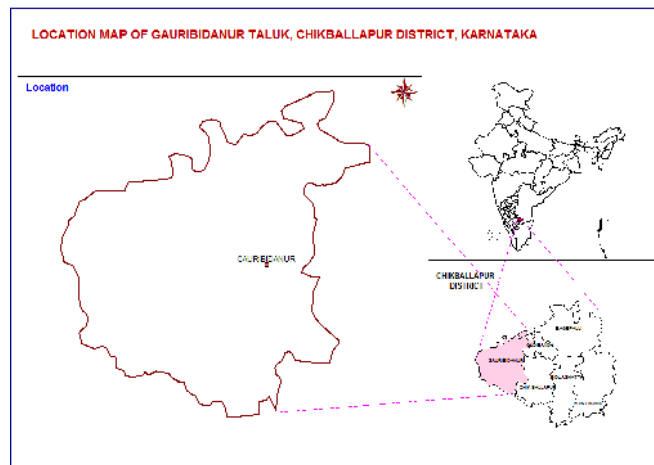
दक्षिण पश्चिमी क्षेत्र, बैंगलोर

South Western Region, Bengaluru



**Government of India  
Ministry of Water Resources, River Development  
& Ganga Rejuvenation  
Central Ground Water Board**

**MADHUGIRI TALUK AQUIFER MAPS AND  
MANAGEMENT PLAN, TUMKUR DISTRICT,  
KARNATAKA**



**BY**

**Dr. S.S.Vittala  
Asst. Hydrogeologist**

**Central Ground Water Board  
South Western Region  
Bangalore  
February 2017**



**MADHUGIRI TALUK AQUIFER MAPS AND MANAGEMENT PLANS,  
TUMKUR DISTRICT, KARNATAKA**

**CONTENTS**

<b>SL. NO.</b>	<b>CHAPTER TITLE</b>	<b>PAGE NO.</b>
<b>1</b>	<b>SALIENT INFORMATION</b>	<b>1</b>
<b>2</b>	<b>AQUIFER DISPOSITION</b>	<b>6</b>
<b>3</b>	<b>GROUND WATER RESOURCE, EXTRACTION, CONTAMINATION AND OTHER ISSUES</b>	<b>10</b>
<b>4</b>	<b>GROUND WATER RESOURCE ENHANCEMENT</b>	<b>11</b>
<b>5</b>	<b>DEMAND SIDE INTERVENTIONS</b>	<b>12</b>

# MADHUGIRI TALUK AQUIFER MAPS AND MANAGEMENT PLANS, TUMKUR DISTRICT, KARNATAKA

## 1. SALIENT INFORMATION

1.1 Name of the Taluk : Madhugiri (Location map in Fig 1)

**District** : Tumkur  
**State** : Karnataka  
**Area** : 1118 sq.kms  
**Population** : 267866

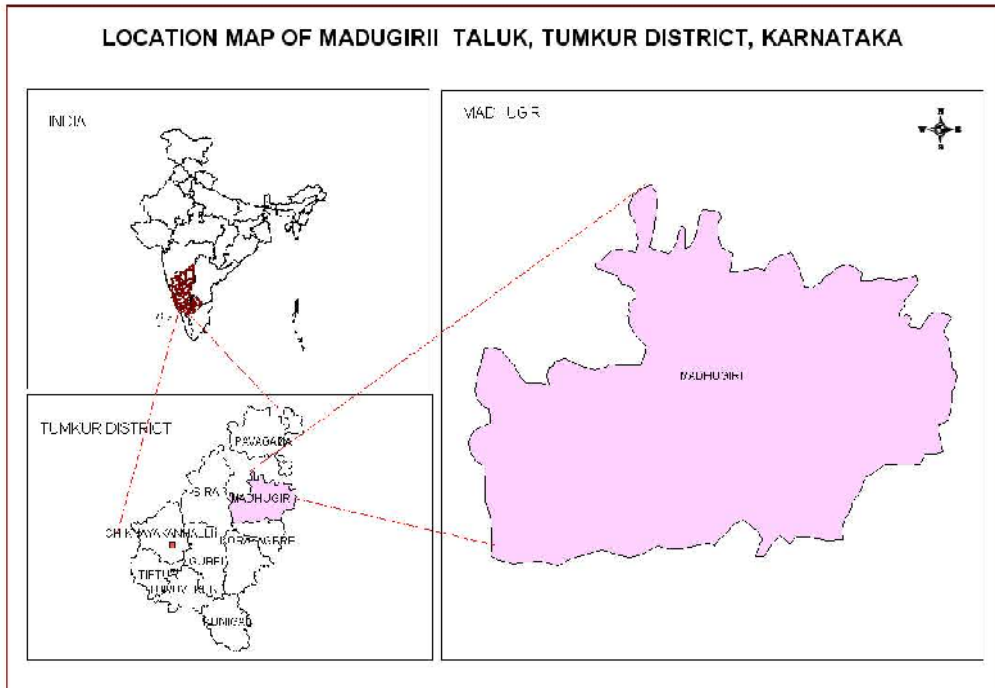


Fig. 1: Administrative map of Madhugiri taluk

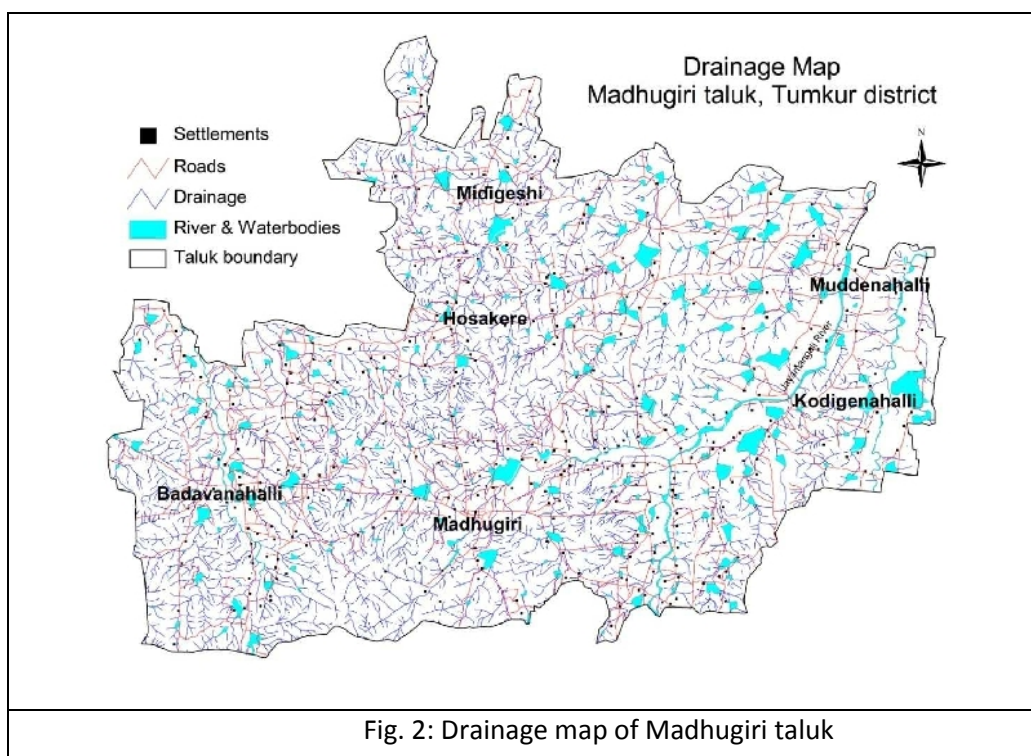
1.2 **Area** : 1118 sq.kms  
**Coordinates** : 77° 00' 02.02" - 77° 29' 26.10" N and 13° 34' 25.57" - 13° 55' 56.88" E.  
**SOI Toposheets** : 57 G/1, G/2, G/5 and G/6  
1.3 **Population** : As per 2011 Census

Taluk/Area	Rural	Urban	Total	Decadal Growth rate (%)	Density of Population/sq.km
Madhugiri taluk/ 1118 sq.km	238707	29159	267866	0.75	240
Tumkur district/ 10,597 sq.km	2079902	599078	2678980	3.65	253
For the year 2025, the projected population for Madhugiri taluk is 270641					
For the year 2025, the projected population for Tumkur district is 2810957					

#### 1.4 Normal Rainfall: (1981-2010) in mm

Taluk	Annual normal Rainfall	Normal monsoon Rainfall	Normal Non-monsoon rainfall
Madhugiri	709	408	301

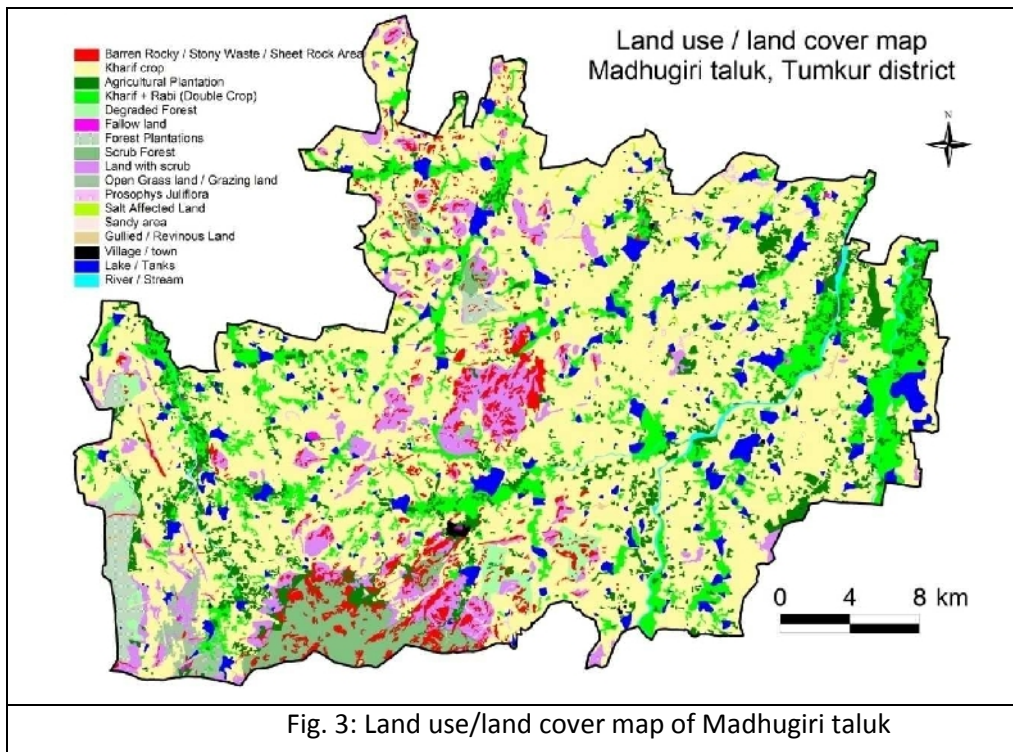
Drainage map is given in fig 2.



#### 1.5 Agriculture and Irrigation (Area in Ha):

Principal crops	Net sown Area	Gross sown Area	Cropping Intensity	Area under Irrigation
Maize, Ragi, Pulses, Oil seeds, Total fruits, Total vegetables, Paddy	38259	43110	-	10078

Land use map is given in fig 3.



**1.6 Groundwater Resources Availability and Extraction as on 2011 March (ham):**  
(Aquifer wise up to 200 m depth)

Taluk	Annual replenishable GW resources	Fresh in-storage GW resources		Total availability of fresh GW resources
		Phreatic	Fractured (Down to 200 m)	Dynamic + Phreatic in-storage + fractured
Madhugiri	7608	15641	2724	25973

**Extraction:**

Taluk	Net annual GW availability	Total draft for all uses	Stage of GW development (%)	Category
Madhugiri	7608	9710	128	Over Exploited

**1.7 Existing and future water demands**

- No scope for further irrigation from ground water except few patches where ground water level still shallower throughout the year.
- Existing Domestic and Industrial sector demand: 5.99 MCM (as GEC – 2011)

**1.8 Water level behaviour (as on 2016)**

**Depth to water level**

**Aquifer – I**

- Pre-monsoon: 1.92 to 8.48 m bgl
- Post-monsoon: 1.55 to 7.55 m bgl

- Fluctuation: Rise: 0.39 to 2.63, Fall: 0.14 to 3.78 m bgl

**Aquifer – II**

- Pre-monsoon: 1.15 to 44.65 m bgl
- Post-monsoon: 3.50 to 44.80 m bgl
- Fluctuation: Rise: Nil, Fall: 0.15 to 5.67 m bgl

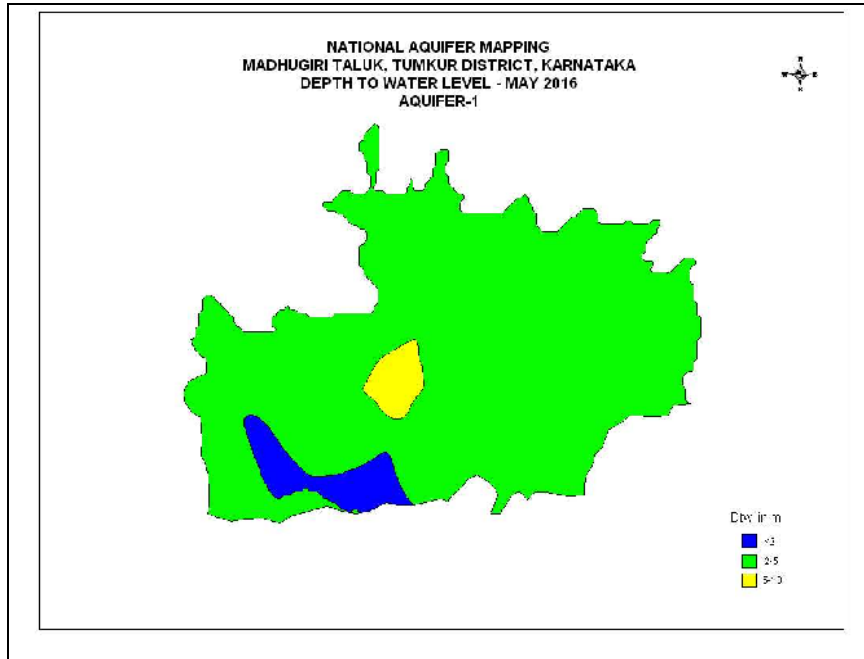


Fig. 4: Pre-monsoon depth to water level map – Aquifer I

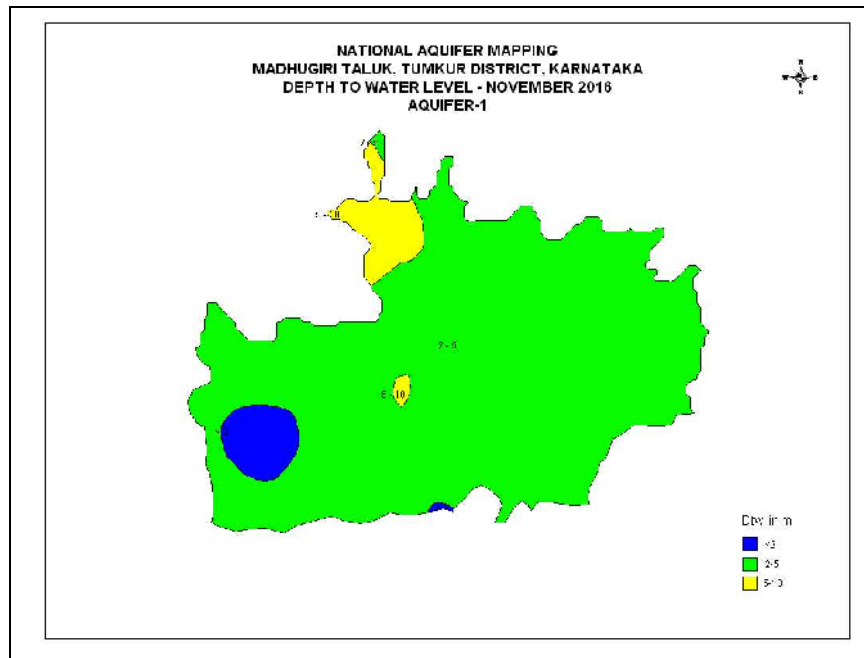


Fig. 5: Post-monsoon depth to water level map – Aquifer I

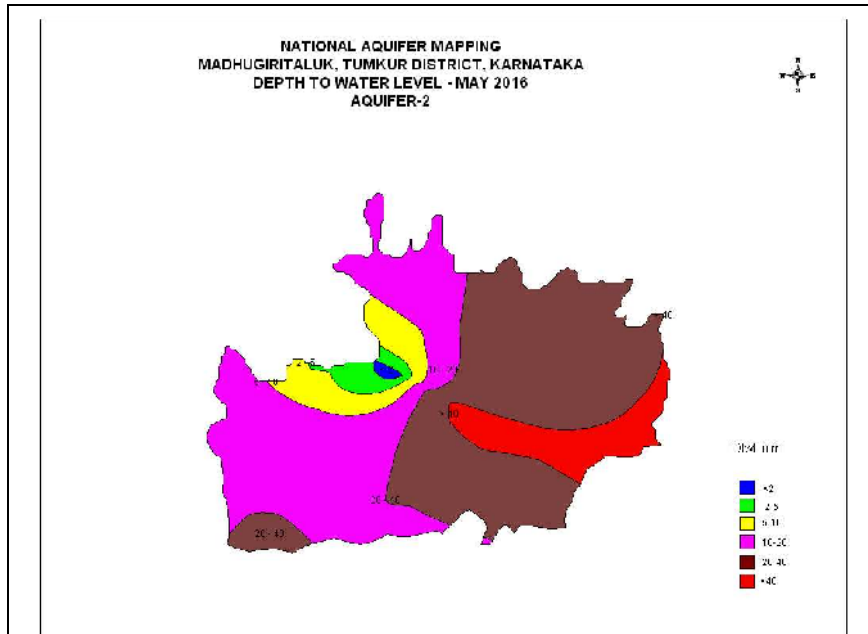


Fig. 6: Pre-monsoon depth to water level map – Aquifer II

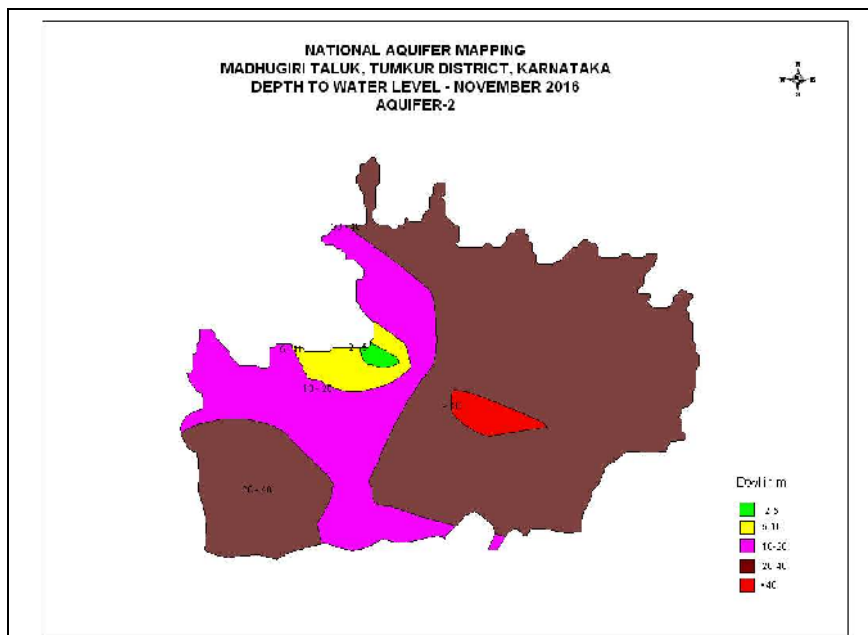
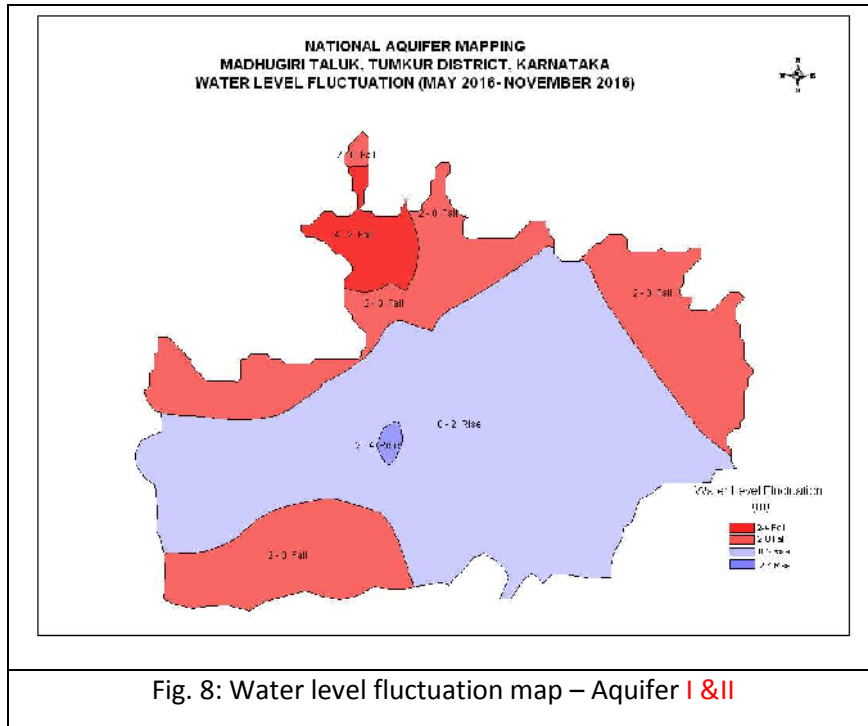


Fig. 7: Post-monsoon depth to water level map – Aquifer II

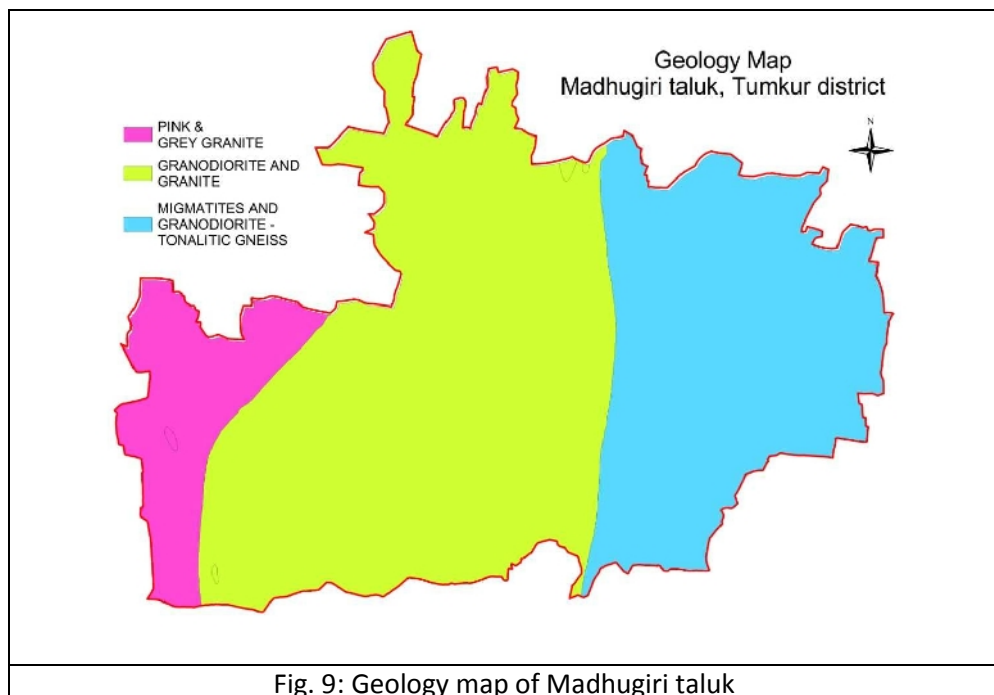


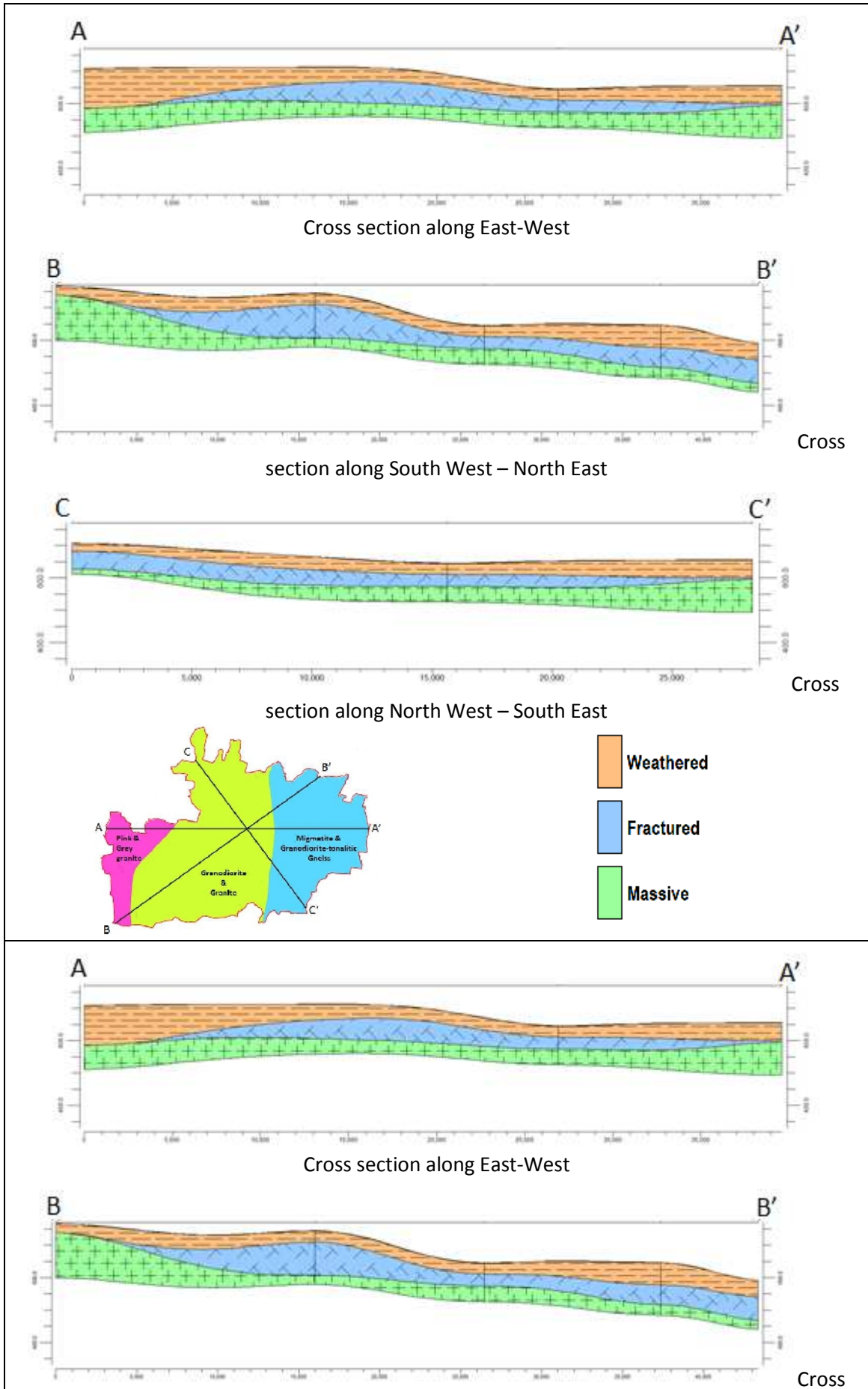


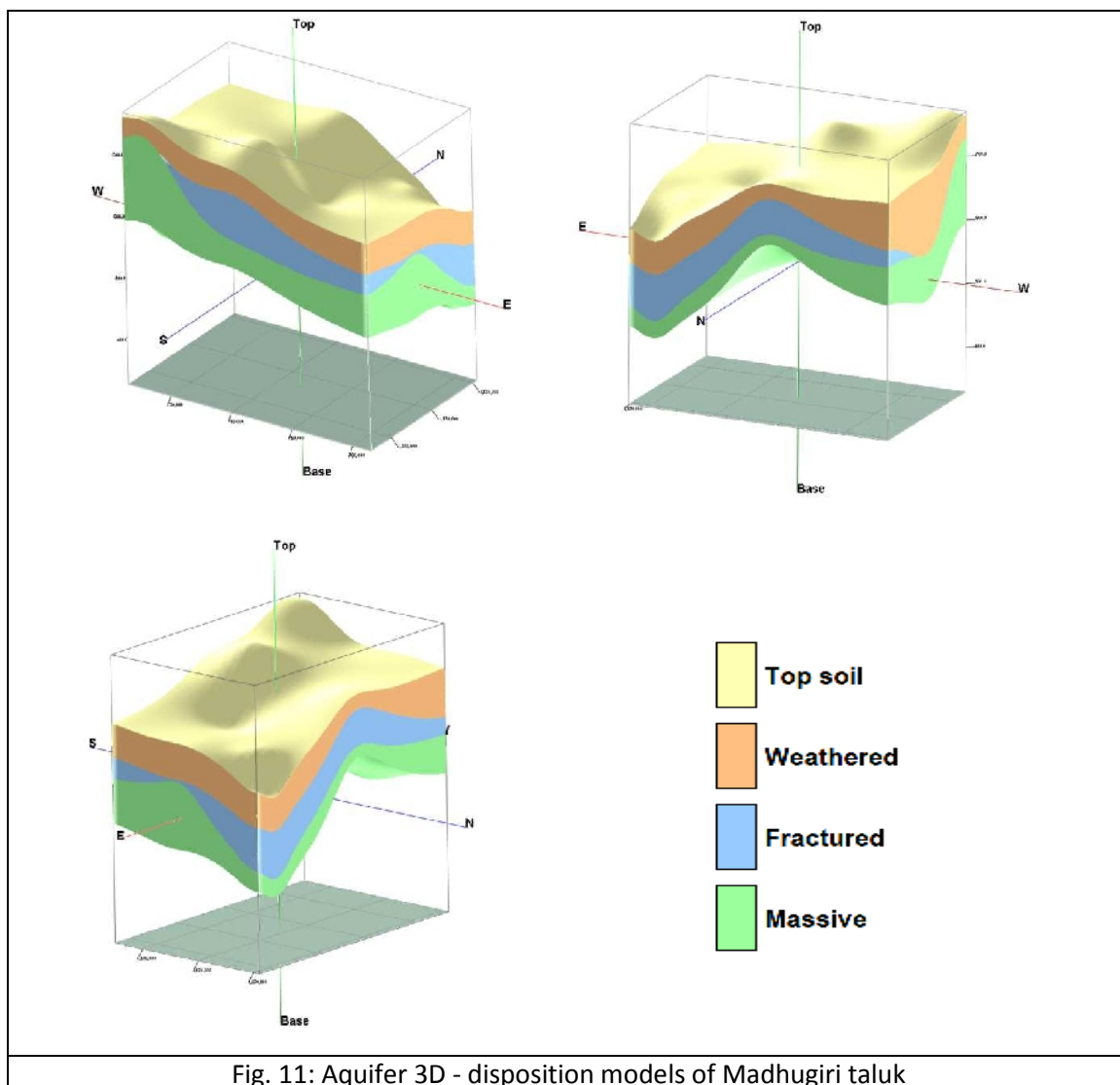
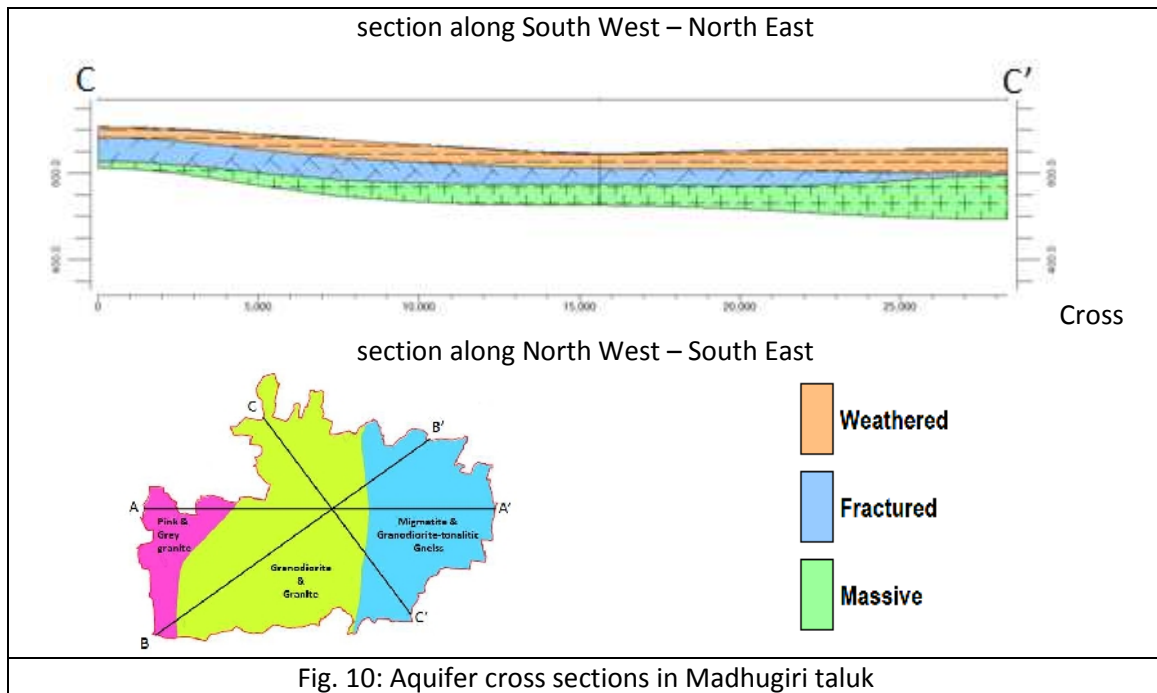
## 2. AQUIFER DISPOSITION

In the area, there are mainly two types of aquifer systems:

- i) Aquifer – I (Phreatic aquifer) comprising weathered gneiss and granites.
- ii) Aquifer – II (Fractured, multi-aquifer system) comprising fractured gneiss and granite







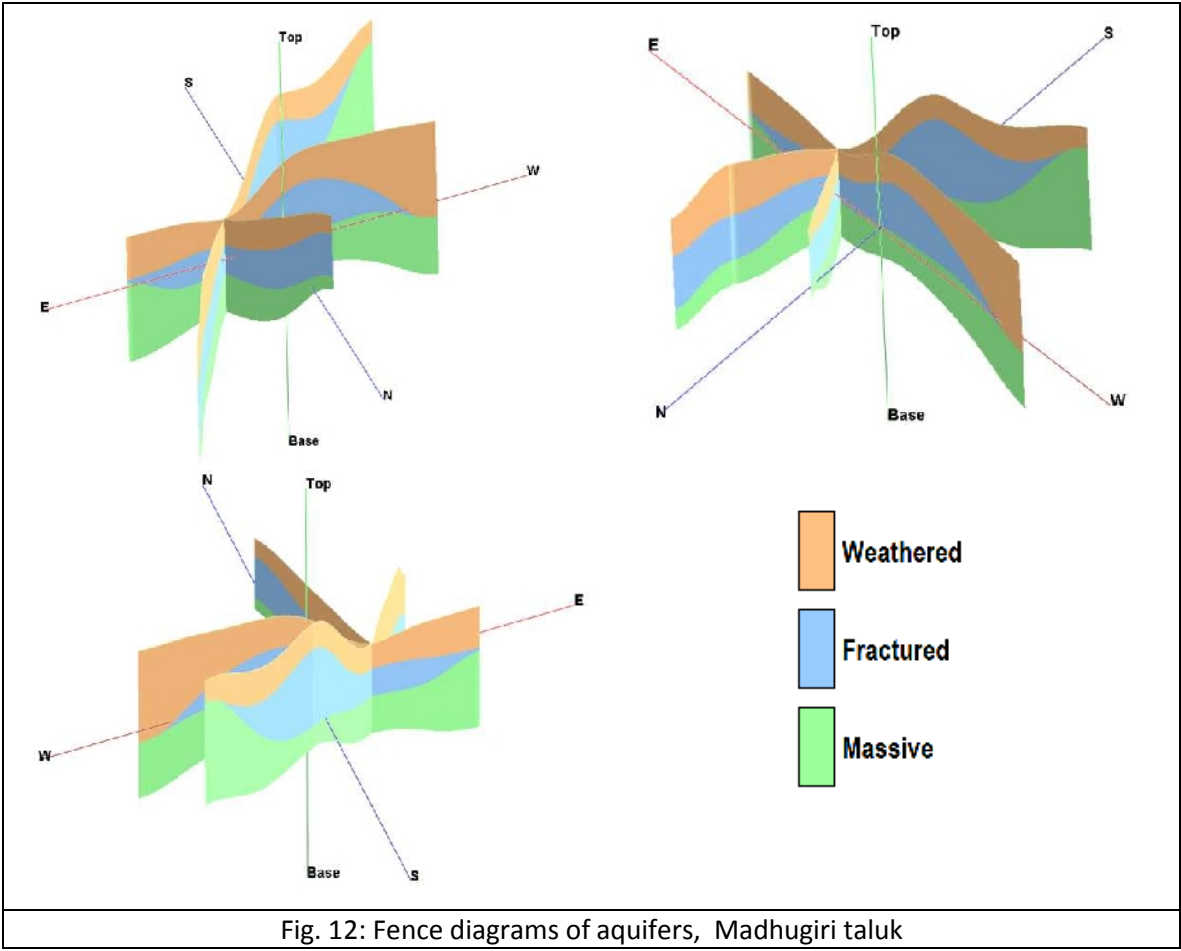


Fig. 12: Fence diagrams of aquifers, Madhugiri taluk

### 3. GROUND WATER RESOURCES, EXTRACTION, CONTAMINATION AND OTHER ISSUES

#### 3.1 Groundwater Resource (2011) (Ha m):

Taluk	Net annual GW availability	Total draft for all uses	Stage of GW development (%)	Category
Madhugiri	7608	9710	128	Over Exploited

#### Total GW Resources (2009) (Ha m)

Taluk	Annual replenishable GW resources	Fresh In-storage GW resources		Total availability of fresh GW resources
		Phreatic	Fractured	Dynamic + Phreatic in-storage + Fractured
Madhugiri	8109	15641	2724	26474

#### 3.2 Groundwater Quality (May 2014):

Generally the ground water is good and potable.

EC Range: 210 – 1530  $\mu\text{S}/\text{cm}$  at 25°C

Fluoride range: 0.38 – 1.60 mg/l

Nitrate range: 8 – 70 mg/l

#### 3.3 Poor sustainability:

- Ground water is the sole source
- Rainfall is the only source of recharge
- Deep borewells of more than 1200 feet with deep seated fractures are not sustainable under OE condition
- Deep fractured aquifers are not annually getting recharged and hence, due to prevailing heavy over-draft condition, fractured aquifers are not sustainable.

#### 4. GROUND WATER RESOURCES ENHANCEMENT

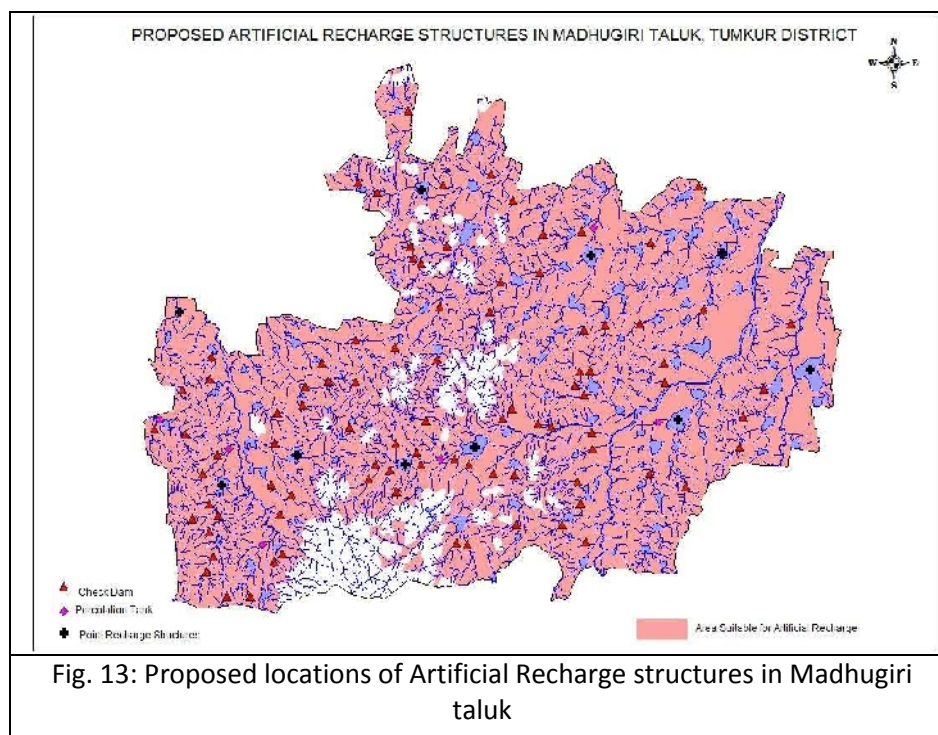
##### 4.1 Aquifer wise space available for recharge and proposed interventions:

Quantity of water available through non-committed surface runoff and artificial recharge structures feasible

Artificial Recharge Structures Proposed	Madhugiri taluk
Non committed monsoon runoff available (Ham)	1370
Number of Check Dams	84
Number of Percolation Tanks	6
Number of Point Recharge structures	9
Tentative total cost of the project (Rs. in lakhs)	314
Expected recharge (MCM)	7.741
Expected rise in water level (m)	0.406
Cost Benefit Ratio (Rupees/ cu.m. of water harvested)	4.255

##### 4.2 Improvement in groundwater availability due to recharge:

Taluk	GW availability (ham)	Stage of GW development (%)	Expected additional recharge from non committed monsoon runoff	Expected increase in GW availability	Expected stage of GW development after recharge (%)
Madhugiri	7608	128	218	-	124



##### 4.3 Other interventions proposed, if any: - Nil



## 5. DEMAND SIDE INTERVENTIONS

### 5.1 Advanced irrigation practices:

- Efficient irrigation practices like drip irrigation and sprinkler are already adopted by farmers in few pockets of the area.
- Existing ground water draft for irrigation is 9111 has as on GEC 2011

### 5.2 Change in cropping pattern:

Not necessary as due to water scarcity, heavy duty crops are not grown in the taluk.

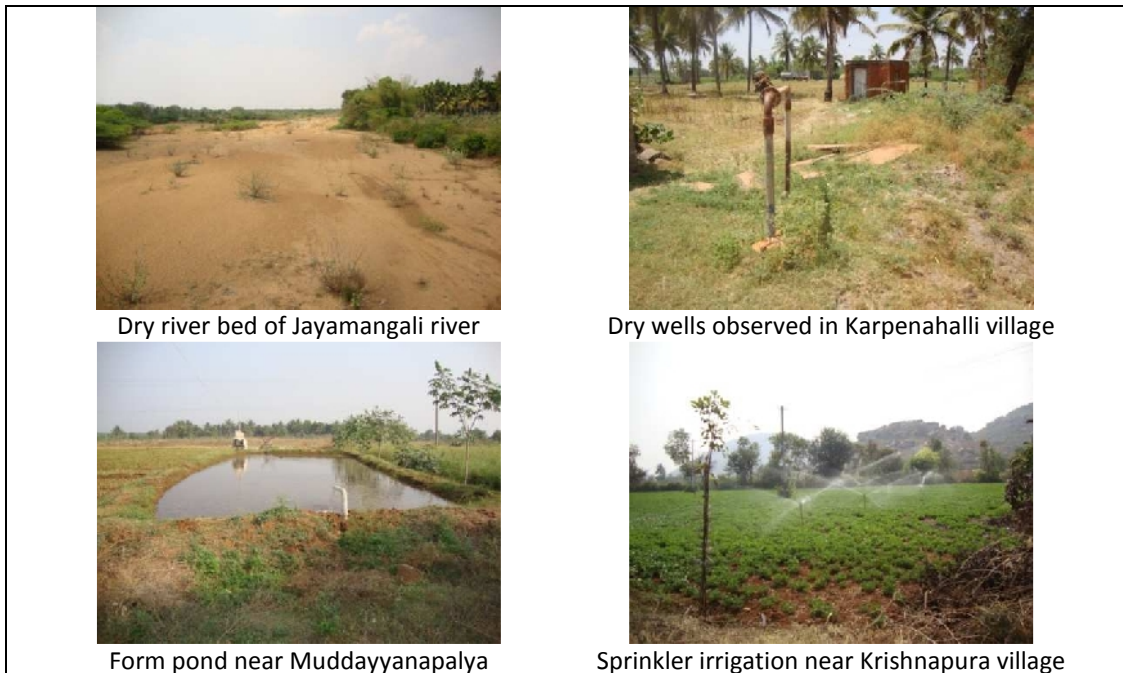
### 5.3 Alternative water sources:

- Inter-basin transfer from west-flowing river of Yettinahole project (taluk wise quantity to be assessed)
- Transporting tertiary treated water from Bangalore city and filling minor irrigation tanks for ground water recharge (taluk wise quantity to be assessed)

### 5.4 Regulation and Control:

It is notified by Karnataka Ground Water Authority.

### 5.5 Other interventions proposed, if any: - Nil





Mulching system near Tippapura village (before)



Mulching system near Tippapura village (after)



Ragi cropping using ground water irrigation



Mulching system adopted near Yeragunte village



Flower harvesting at Virachinnenahalli village



Data collection with farmer in Sankapura village

Fig. 14: Field photographs showing various groundwater scenarios in Madhugiri taluk



