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<td>109-111</td>
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</tbody>
</table>
Introduction

In the State of Maharashtra, irrigation by wells occupies a prominent position. In 1969-70, out of 14,30,000 hectares of Net Irrigated Area in the State, nearly 8,20,000 hectares or 57 per cent of the net irrigated area is directly under well irrigation,* while the area under canal irrigation is only 3,12,100 hectares. It means that only 21 per cent of the net irrigated area comes under the canal (both the Government and Private) irrigation. In other words, the wells irrigate approximately 2.5 times more area than is irrigated by the canals.

And, hence, wells would be required to play a major role in the pattern of irrigation development in the State.

2. Hydrogeological Conditions in Maharashtra State

Geology of Maharashtra State is practically the geology of the Deccan Traps. Excepting the district of Bhandara, the State has been covered by this formation. The other geological formations older and younger than the Deccan Traps occur in the districts Bhandara, Chandrapur, Nagpur, Yeotmal, Wardha, Buldhana, Akola, Amravati, Dhulia, Jalgaon, Nanded, Kolhapur and Ratnagiri. In the remaining

* Maharashtra at a Glance, 1971-72, p. 38, published by the Director of Publicity, Maharashtra State.
thirteen districts, Deccan Traps are the only geological formations.

The geological formations occurring in the State differ widely in regard to their nature, hardness, degree of compaction, texture, structure, porosity, permeability, etc. All these factors have considerable influence on the water yielding characteristics of the different beds constituting these formations. From the point of view of characteristics like the ability to receive recharge, store and transmit ground water, the geological formation of the State can be rearranged in the following manner:

Table No. A1: Regrouping of the State

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Group</th>
<th>Area in square miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Deccan Traps</td>
<td>96,400</td>
</tr>
<tr>
<td>2.</td>
<td>Pleistocene and Quarternary alluvial sediments</td>
<td>5,617</td>
</tr>
<tr>
<td>3.</td>
<td>Lower and upper Gondwana sediments</td>
<td>1,850</td>
</tr>
<tr>
<td>4.</td>
<td>Archaeon metamorphic complex including Dharwars, Sausars and Sakolis</td>
<td>12,450</td>
</tr>
<tr>
<td>5.</td>
<td>Percambrian metamorphosed sediments such as Vindhyans, Kaladgis, Pakhals, etc.</td>
<td>2,400</td>
</tr>
</tbody>
</table>

Total: 1,18,717

3. Importance of Wells in Irrigation in Maharashtra

It has been stated earlier, in the introduction of this chapter, that 57 per cent of total net irrigated area comes under well irrigation. It establishes the predominance of well irrigation in the State. The following table No. 1 gives an account of development of well irrigation during the period of Third Five Year Plan in comparison with other sources of irrigation.

Table No. 1: Progressive Development of Well Irrigation in Maharashtra.
From 1961-62 to 1965-66
( Figures in Hundred Hectares )

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Sources</th>
<th>61-62</th>
<th>62-63</th>
<th>63-64</th>
<th>64-65</th>
<th>65-66</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>i. Canals</td>
<td>2,387.8</td>
<td>2,519.2</td>
<td>2,521.6</td>
<td>2,451.6</td>
<td>2,461.2</td>
</tr>
<tr>
<td></td>
<td>ii. Tanks</td>
<td>1,804.4</td>
<td>1,973.6</td>
<td>2,046.8</td>
<td>2,103.2</td>
<td>1,868.8</td>
</tr>
<tr>
<td></td>
<td>iii. Wells</td>
<td>6,037.2</td>
<td>6,242.4</td>
<td>6,430.4</td>
<td>6,747.2</td>
<td>7,024.4</td>
</tr>
<tr>
<td></td>
<td>iv. Other Sources</td>
<td>418.4</td>
<td>492.0</td>
<td>416.4</td>
<td>466.4</td>
<td>558.8</td>
</tr>
<tr>
<td></td>
<td>v. Net Irrigated Area</td>
<td>10,686.8</td>
<td>11,127.2</td>
<td>11,368.8</td>
<td>11,768.4</td>
<td>11,923.2</td>
</tr>
<tr>
<td></td>
<td>vi. Net Sown Area</td>
<td>1,78,442.8</td>
<td>1,78,036.8</td>
<td>1,79,680.8</td>
<td>1,80,426.4</td>
<td>1,79,233.2</td>
</tr>
<tr>
<td></td>
<td>vii. Percentage v to vi.</td>
<td>6.0 %</td>
<td>6.2 %</td>
<td>6.3 %</td>
<td>6.5 %</td>
<td>6.5 %</td>
</tr>
<tr>
<td></td>
<td>viii. Percentage iii to vi.</td>
<td>56.6 %</td>
<td>56.1 %</td>
<td>56.3 %</td>
<td>57.1 %</td>
<td>58.9 %</td>
</tr>
</tbody>
</table>

Period upto 1969-70

The following table No.2 presents a brief review of area irrigated by various sources in Maharashtra State between 1966 and 70. It would bring home the importance of wells. The table No.3 gives a consolidated statistics about the development of wells between 1961 and 71.

Table No. 2 : Progressive Development of Well Irrigation in Maharashtra.

From 1966-67 to 1969-70

( Figures in Hundred Hectares

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Canals</td>
<td>2,407.6</td>
<td>2,760.4</td>
<td>2,759.0</td>
<td>3,121.0</td>
</tr>
<tr>
<td>ii.</td>
<td>Tanks</td>
<td>2,104.2</td>
<td>2,159.2</td>
<td>2,243.0</td>
<td>2,251.0</td>
</tr>
<tr>
<td>iii.</td>
<td>Wells</td>
<td>6,900.8</td>
<td>7,126.8</td>
<td>7,964.0</td>
<td>8,211.0</td>
</tr>
<tr>
<td>iv.</td>
<td>Other Sources</td>
<td>616.2</td>
<td>559.6</td>
<td>779.0</td>
<td>729.0</td>
</tr>
<tr>
<td>v.</td>
<td>Net Irrigated Area</td>
<td>12,030.8</td>
<td>12,604.0</td>
<td>13,745.0</td>
<td>14,312.0</td>
</tr>
<tr>
<td>vi.</td>
<td>Net Sown Area</td>
<td>1,80,027.2</td>
<td>1,81,082.4</td>
<td>1,83,673.0</td>
<td>1,84,624.0</td>
</tr>
<tr>
<td>vii.</td>
<td>Percentage v to vi</td>
<td>6.7 %</td>
<td>7.0 %</td>
<td>7.5 %</td>
<td>7.7 %</td>
</tr>
<tr>
<td>viii.</td>
<td>Percentage iii to v</td>
<td>57.5 %</td>
<td>56.4 %</td>
<td>57.7 %</td>
<td>57.3 %</td>
</tr>
</tbody>
</table>

Department of Agriculture, Government of Maharashtra.
Table No. 3
Progressive Development of Wells in Maharashtra State

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Tube Wells</th>
<th>No. of Govt. Wells</th>
<th>No. of Private Wells</th>
<th>Total</th>
<th>Masonry Total</th>
<th>Non-Masonry Total</th>
<th>Masonry Total</th>
<th>Non-Masonry Total</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961-62</td>
<td>44</td>
<td>67</td>
<td>131</td>
<td>164</td>
<td>49</td>
<td>213</td>
<td>3,69,588</td>
<td>1,87,576</td>
<td>5,57,164</td>
</tr>
<tr>
<td>1962-63</td>
<td>42</td>
<td>66</td>
<td>108</td>
<td>220</td>
<td>56</td>
<td>276</td>
<td>3,85,272</td>
<td>1,86,086</td>
<td>5,71,358</td>
</tr>
<tr>
<td>1963-64</td>
<td>47</td>
<td>69</td>
<td>116</td>
<td>238</td>
<td>78</td>
<td>316</td>
<td>3,95,906</td>
<td>1,87,900</td>
<td>5,83,806</td>
</tr>
<tr>
<td>1964-65</td>
<td>51</td>
<td>117</td>
<td>168</td>
<td>258</td>
<td>69</td>
<td>327</td>
<td>4,14,691</td>
<td>1,88,654</td>
<td>6,03,345</td>
</tr>
<tr>
<td>1965-66</td>
<td>70</td>
<td>130</td>
<td>200</td>
<td>509</td>
<td>222</td>
<td>731</td>
<td>4,18,399</td>
<td>1,91,578</td>
<td>6,09,977</td>
</tr>
<tr>
<td>1966-67</td>
<td>96</td>
<td>254</td>
<td>350</td>
<td>549</td>
<td>280</td>
<td>829</td>
<td>4,33,340</td>
<td>1,97,108</td>
<td>6,20,448</td>
</tr>
<tr>
<td>1967-68</td>
<td>104</td>
<td>322</td>
<td>426</td>
<td>760</td>
<td>246</td>
<td>1006</td>
<td>4,47,950</td>
<td>1,93,514</td>
<td>6,41,464</td>
</tr>
<tr>
<td>1968-69</td>
<td>102</td>
<td>353</td>
<td>455</td>
<td>917</td>
<td>111</td>
<td>1028</td>
<td>4,75,933</td>
<td>1,67,551</td>
<td>6,43,486</td>
</tr>
<tr>
<td>1969-70</td>
<td>104</td>
<td>399</td>
<td>503</td>
<td>933</td>
<td>164</td>
<td>1097</td>
<td>4,77,606</td>
<td>2,01,842</td>
<td>6,79,448</td>
</tr>
<tr>
<td>1970-71</td>
<td>N.A.</td>
<td>N.A.</td>
<td>-</td>
<td>N.A.</td>
<td>-</td>
<td>N.A.</td>
<td>N.A.</td>
<td>N.A.</td>
<td>7,20,000 *</td>
</tr>
</tbody>
</table>

* Speech of Finance Minister, Government of Maharashtra, while submitting Budget for the year 1971-72 (Page No.8), Hon. Minister Shri Wankhede, published 1st April, 1971.

Table No. 4: Trend of Utilization of Oil Engines Pump Sets in Maharashtra.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Private Wells</th>
<th>No. of Pump sets</th>
<th>Percentage of 1 to 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1961-62</td>
<td>5,57,164</td>
<td>53,614</td>
<td>9.6 %</td>
</tr>
<tr>
<td>1962-63</td>
<td>6,71,358</td>
<td>60,569</td>
<td>10.6 %</td>
</tr>
<tr>
<td>1963-64</td>
<td>5,03,806</td>
<td>71,186</td>
<td>12.2 %</td>
</tr>
<tr>
<td>1964-65</td>
<td>6,03,345</td>
<td>77,232</td>
<td>12.8 %</td>
</tr>
<tr>
<td>1965-66</td>
<td>6,09,977</td>
<td>97,061</td>
<td>15.9 %</td>
</tr>
<tr>
<td>1966-67</td>
<td>6,20,948</td>
<td>1,10,026</td>
<td>17.7 %</td>
</tr>
<tr>
<td>1967-68</td>
<td>6,41,464</td>
<td>1,18,132</td>
<td>18.4 %</td>
</tr>
<tr>
<td>1968-69</td>
<td>6,63,486</td>
<td>1,28,039</td>
<td>19.3 %</td>
</tr>
<tr>
<td>1969-70</td>
<td>6,79,448</td>
<td>1,34,833</td>
<td>19.6 %</td>
</tr>
</tbody>
</table>


The statistics in a table No.4 shows that both wells and oil engine pump sets have increased. But the rate of growth of pump sets is quite low. The table No.4 shows that only 10 per cent more pump sets have been installed during the period of ten years. Thus, it means that on an average only 1 per cent increase has been achieved during the period under review.

Electric Pump Sets

During 1968-69, there were 64,240 electric pumps
in the State\textsuperscript{1}. The corresponding figure for 1969-70 was 93,010 \textsuperscript{2}. And, by the end of March 1971, the number of agricultural pumps electrified by the Maharashtra State Electricity Board was 2,10,300 \textsuperscript{3}.

Thus, during 1969-70, diesel and electric pumps taken together were 2,27,843. In other words, about 34 per cent of total private wells in the State were receiving pump set facilities. Out of which 14.40 per cent pumps were operated on electricity while 19.60 per cent were using diesel.

**Energizing of Pump Sets**

The State Government has also undertaken to energize these pump sets by two ways - (i) It has substantially stepped up the programmes of rural electrification for irrigation in its own plans, and (ii) the State Government has also obtained the financial help from the Agricultural Finance Corporation and the Rural Electrification Corporation of the Government of India.

**Achievement and Targets**

The Maharashtra State Electricity Board had energized 2,10,300 agricultural pump sets by the end of

\begin{enumerate}
\item Ibid, p. 24.
\item Maharashtra at a Glance, 1971-72, p. 103.
\end{enumerate}
March 1971.* During the Fourth Plan, the State Governments contemplates to energize about 1,00,000 pumps. The project submitted to the World Bank envisages to energize 80,000 pump sets in addition to the Fourth Plan targets. If implemented fully, both these projects would quicken the pace of irrigation and multiple cropping.

Suggestions

The foregoing discussion leads to the following suggestions –

i) In order to achieve maximum utilization of wells, water lifting capacity should be increased. And, hence, use of pump sets be encouraged.

ii) Launching Programme for Installation of Electrical Pump Sets

The cost of running the electrical pump sets is comparatively lower than diesel pump sets. Again, the pumping capacity of electrical pumps is also comparatively more than the diesel pump sets. And, hence, it would be advantageous to encourage the use of electrical pump sets by launching a special programme with the help of Maharashtra State Electricity Board.

In this connection it is noteworthy that the Government of Maharashtra has launched a special programme

* Maharashtra at a Glance 1971-72, p. 103.
for installation of pumping sets under the crash-Kharif Programme. An installation of pumping sets would be undertaken with the help of the Maharashtra State Electricity Board.*

iii) Use of Diesel Engines

In remote and isolated villages use of diesel engines can also be encouraged. The diesel pump can be converted into electrical pumps with modifications costing approximately Rs. 700 to Rs. 800 at current market rates. The suggestion has two aspects. As long as the electricity is not available, the use of diesel pump would help to increase the agricultural production and by incurring little more expenditure the operation of pumps can be switched over to electricity. Thus, the time involved in electrifying remote and isolated villages would not hamper the growth of agricultural productivity.

4. Financial Provision and Expenditure during Third Five Year Plan: on Wells and Pumping Sets

The Government of Maharashtra made a provision of Rs. 677.64 lakh in the Third Five Year Plan of the State for construction and improvement of wells and installation of pump sets. But an amount of Rs. 1,014.53 lakh was

During the last two years of the Third Plan, i.e., 1964-65 and 1965-66, the acute scarcity conditions were experienced by the State. In this connection, the State Government incurred an additional expenditure of Rs.29 crores.\(^2\)

In addition to this, an amount of Rs.11 crores was spent on famine relief and Tagai.\(^3\)

For Rural Electrification an amount of Rs.750 lakhs was provided while actual expenditure incurred amounted to Rs.1,916.34 lakhs including electrification of agricultural pump sets. These figures show that the Government has recognized properly importance of wells and pump sets.

Achievements during the Third Plan

During the Third Plan period 1.06 lakh new wells were dug, 0.36 lakh old wells were repaired and 0.61 lakh pump sets were installed.\(^4\)

Achievements during the Annual Plans

In the years of 1966-67 and 1967-68 about 0.40 lakh of new wells were dug, 0.21 lakh old wells were repaired and 0.34 lakh pumping sets were installed.¹

Provision in the Fourth Plan

The Fourth Five Year Plan for Maharashtra State has provided Rs.2,850 lakhs for construction and improvement of wells and installation of pump sets.²

For Rural Electrification an amount of Rs.4,500 lakhs has been provided in the Fourth Plan. It includes the expenditure likely to be incurred on energizing of agricultural pump sets.³

Expectations in Fifth Plan

The Fifth Five Year Plan of the State is still in the stage of preparation. But during the plan, emphasis would certainly be laid down on the object of achieving self sufficiency in food and, hence, the agriculture would receive top priority. Naturally, sinking of wells and repairs to old wells and installation

³ Ibid, p. 29.
of pump sets and energizing of agricultural pumps would again receive impetus. It would certainly be a good step leading to maximize irrigation benefits of wells. The step taken in this direction would certainly be proved as an insurance against famine, and would reduce its intensity.

5. Special Features of Wells in Maharashtra

The following are special features of wells in Maharashtra:

i) Heavy Concentration

This feature has following two aspects -

A) Concentration in Poona Division

Poona Division has maximum wells (Refer table No.5). According to Season and Crop Report 1969-70, Poona Division had 2,68,580 wells, Aurangabad Division had 1,58,915 wells, Bombay Division had 1,46,198 wells, while Nagpur Division had only 1,06,852 wells. Thus, the Poona Division topped the list while the Nagpur Division had listed at the bottom.

A heterogeneous water potential is responsible for such uneven distribution of wells.
B) **Heavy Concentration of Well Irrigation**

There are more than 6,80,545 wells in the State used for irrigation. But these are not fairly and uniformly distributed in all districts of the State. It has been observed that there is a heavy concentration of wells in eight districts of Ahmednagar, Sholapur, Aurangabad, Osmanabad, Satara, Jalgaon, Poona and Nasik which in the aggregate account for over 1.2 million acres under well irrigation out of the total of 1.6 million acres under wells in the State as a whole.

ii) **Wells Not in Use**

This is the most striking feature of wells in the State. According to Season and Crop Report, 1968-69, out of 6,64,514 wells in the State, 1,18,189 wells were not in use. Again according to Season and Crop Report, 1969-70, out of 6,80,545 wells, 1,19,656 wells were not in use due to some reason or other. In other words, on an average about 18 per cent of total wells were not in use in the State of Maharashtra during 1968-69 and 1969-70.

**Spread up of Wells not in Use**

The following table shows number of wells and wells not in use in four divisions of the State. It is self-explanatory.

---

Table No. 5: Total Wells and Wells not in use in four Divisions of Maharashtra State: During 1969-70.

<table>
<thead>
<tr>
<th>Divisions</th>
<th>Total Number of Wells</th>
<th>Wells Not in Use</th>
<th>Per cent of 3 to 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay</td>
<td>1,46,198</td>
<td>20,873</td>
<td>14.00</td>
</tr>
<tr>
<td>Poona</td>
<td>2,68,580</td>
<td>32,488</td>
<td>13.00</td>
</tr>
<tr>
<td>Aurangabad</td>
<td>1,58,915</td>
<td>13,741</td>
<td>9.00</td>
</tr>
<tr>
<td>Nagpur</td>
<td>1,06,852</td>
<td>52,554</td>
<td>49.30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,80,545</strong></td>
<td><strong>1,19,656</strong></td>
<td><strong>17.00</strong></td>
</tr>
</tbody>
</table>


Reasons Putting Wells out of Order

i) Inadequate financial resources to renovate or deepen the wells.

ii) Small holdings owned by poor cultivators.

iii) Bad conditions of wells.

iv) Wells having location at some distance from gaotan (Common village land).

v) Non-availability of electric power supply and unwillingness to go in for pump sets operated by oil engines.

vi) Absentee cultivation, and

vii) Inadequate water in wells.
Remedies to be Adopted

Financial Aid

The State Government has made available financial assistance in the form of tagai-loans to renovate or to improve the old wells. Again, the World Bank has also offered substantial financial aid for improving these old wells. This World Bank finance is made available through the Land Development Banks all over the State.

Consolidation of Lands

The Government of Maharashtra has launched the programme of consolidation of lands in order to withstand further fragmentation. But, unfortunately, the movement of consolidation of lands has not so far yielded desired results.

Supply of Electric Power

The difficulties created by the shortage of electric power are being overcome. The establishment of the Maharashtra State Electricity Board an autonomous body to look after generation and distribution of electric power, has improved the situation. The number of places electrified and pumps energized are constantly increasing. The World Bank has also rendered financial assistance for energizing agricultural pumps and the Agricultural Refinance Corporation has decided to help farmer to enable him to
keep necessary deposits with the Maharashtra State Electricity Board for obtaining power.

Tenancy Act

The Tenancy Act has been implemented in Maharashtra State in order to abolish absentee landlordship and to confer the right of ownership upon the tenant cultivators of lands. The State Government is rendering financial assistance from various sources to enable tenant-cultivators to undertake proper cultivation.

iii) Low Yield of Wells

This again is the most common and striking feature of wells in Maharashtra State. Most of the wells in the Alluvial Region yield between 5,000 to 20,000 gallons of water per day. This yield is considerably low. Same is the case with wells in the Deccan Trap Region. It has been observed that a large number of wells in this region yield only low to moderate yields, on account of the following reasons:

a) Wells are shallow in depth and small in diameter.

b) Old system of motes is used to lift water from wells.
Deepening and Boring to Increase Yields of Wells

Deepening and boring of wells are the solutions available to increase yields of wells wherever that would be technically feasible. It has been stated that normally wells are 40 to 50 ft. deep. And, hence, water tapping would be necessary to be undertaken beyond that depth. It would certainly help to increase the irrigation capacity of wells.

Drilling Slim Holes in Wells in Deccan Trap Region

There is a scope to increase yield of wells in the Deccan Trap region by drilling slim holes. Wherever, the wells are sufficiently deep but yielding low, these can be revitalized by drilling slim holes of 38-52 mm diameter to depths of 60 to 100 ft. from bottom.

Proper Designing of Wells in Alluvial Region

It has been pointed out that the wells in alluvial region are not properly designed. If these are properly designed, it is estimated that their yield would increase upto 40,000 gallons of water per day even during dry season.

6. Criticism and Suggestions on Well Construction Programme

The well construction programme has been criticized on the following ground -
A) Hit and Miss Method

It has been pointed out that while digging new wells the cultivator is running a great risk of losing the amount and energy expended. It is because a very crude method is being applied to detect the position of water bearing strata and movement of water currents. It has been described as the "Hit and Miss Method" as it does not give any guarantee that the well being sunk would yield any water. The newly sunk wells may yield either sufficient water, moderate quantity of water or may not yield any water at all resulting in a total failure of wells. And it is noteworthy that the number of totally failed wells is also quite large up to 30 per cent.

Suggestions

In order to minimise and if possible to avoid this loss of financial resources, the following suggestions can be made -

i) Preparing Maps showing Successful Wells

Villagewise maps can be prepared showing successful wells. And the spots showing such wells can be jointed. It would develop lines on the maps on isohetal pattern indicating areas where successful wells have been located. And in the vicinity of successful wells new wells can be successfully sunk.
Again the lines on isohetal pattern would also indicate the movement of underground water currents. This indication would maximise the scope of sinking of new wells.

ii) Hydrogeological Study of Areas of Successful Wells

After the preparation of village maps showing successful wells a detailed hydrogeological study of areas in which such wells have been located should be undertaken before sinking of new wells. This would minimise waste of expenditure.

iii) Establishing Field Units for Hydrogeological Survey

Small field units under the administrative and technical control of the Groundwater Survey and Development Agency be established on a large scale.

These units be asked to prepare village maps and undertake a hydrogeological study of areas where successful wells have been located. The activities of these units should aim at finding out new sites for sinking new wells successfully.

iv) Preparing Atlas of Investigated Sites for New Wells

An ultimate aim of establishing field-units is to prepare an atlas of investigated sites suitable for sinking new wells successfully. Such atlas should be
periodically published incorporating new changes and additions if any.

v) **Periodical Review of Newly Sunk Wells**

A periodical review of newly sunk wells be undertaken by either the village revenue authority, viz., Talathi or the Gramsevak. The review be kept in the Village Office for inspection and information and the copy of it be sent to the concerned field unit. The review should contain the information about success and failure of wells newly sunk in the village and in a particular period of time.

The field unit would be able to undertake further study in areas where most of the newly sunk wells have failed. This further study may help to reveal the causes of failure of wells and if possible remedies can be found out so that failed wells might be put to use again. Thus, this review would be useful to farmers.

vi) **Units to Survey Existing Wells**

The field unit be assigned particular areas in which it should visit all existing wells. It should record rise and fall of water levels in the wells. In case the wells are giving increasingly lower yield, the survey unit should suggest remedies so that yield would increase. The survey unit should render the technical
assistance to farmers in this connection. It can also assist farmers to protect their wells.

vii) Using Blasting Device and Sound Wave Recorder

Presently, farmers depend upon a very crude method while selecting site for sinking new wells. Consequently failed wells result and, hence, use of blasting device and sound wave recorder is advisable.

Method suggested for their Use

The following method can be suggested for use of blasting device and sound wave recorder.

Two pits or ditches be dug at the site of a proposed well. One ditch should be at the site proper with a depth of at least 10 to 15 ft. while another pit should be about 25 to 30 ft. away from first ditch with 5 to 6 ft. in depth. In this another smaller ditch sound wave recorder be placed so that it would not get damaged. The Sound Wave Recorder should have a capacity to record frequencies of sound waves passing at least 500 ft. deep in the earth.

In the deep ditch blasting be undertaken. Consequently, sound waves would be produced and some of which would pass in the earth. There would be a change in the frequencies of these waves when these would pass through rocks (i.e. solid medium) and water bearing
strata (i.e. liquid medium). The sound recorder would plot their frequencies on a paper rapped on it. These frequencies would indicate a change of medium through which waves have passed. It would help to locate the depth of water bearing strata from the surface of earth.

This method has two advantages namely, (a) it would help to indicate water available at a particular site and, (b) the depth of water bearing strata. The economics of wells can be easily judged from this information. It would avoid meaningless spending of funds.

viii) Control Over Digging of Wells

Excessive digging of wells lowers down the level of underground water table in the region. It is against the healthy practices of irrigation.

Under the circumstances, it is quite essential to have a control over the digging of wells. For this hydrogeological study of the areas be undertaken to assess the water potential. It would help to decide the maximum number of wells the region should have.

ix) Enactment of Law to Control Digging of Wells

At present, there is no law that can control digging of wells. Farmers are free to dig wells according to their wishes. It results in a concentration of wells and excessive digging in a particular region.
It is, therefore, suggested that the necessary law be enacted that would prohibit farmers from digging wells wherever they want or wish. This alone would control wasteful and excessive digging of wells.

x) Improvement of Wells put out of Use

Improvement or renovation of wells really is less costly than digging new wells. And, hence, the Government should encourage improvement of wells by all possible means.

7. Development of Community Wells

The marginal and sub-marginal cultivators who are not in a position to obtain any loan facility from the Co-operative Banks by mortgaging their own property, for a want of adequate security, are helped under this scheme by the State Government, to dug wells to be used commonly for irrigating their small pieces of lands. These wells are called "Community Wells".

A pilot project was launched in four districts of Sangli, Amraoti, Bhir and Dhulia in 1965-66.

Under the scheme, the Government bears the cost of construction of wells and pumping sets. It also constructs the wells and installs the pump. Thus, the wells are prepared by the Government for irrigation.
The Government then hands over these wells to the Zilla Parishads to look after. In turn, the Zilla Parishads hires out these wells to small farmers on collective basis.

During the year 1965-66 in all 313 community wells were constructed. In 1966-67, and 1967-68 again 269 such new wells were constructed. During 1968-69 and 1969-70 about 176 new Community wells were constructed. Thus on the beginning of 1971-72 there were in all 758 wells and the Government planned to construct 200 more wells during 1971-72.

The work of construction of Community Wells has also been undertaken as a part of Famine Relief Work. Upto 15th February, 1973, 3,500 community wells have been taken up under scarcity relief programme and by that time 450 community wells have been successfully completed.*

Conclusions

The foregoing discussion leads to the following conclusions:

1) The Government has taken all necessary steps and that too at a proper time.

* Scarcity Relief in Maharashtra - Booklet, p. 25. Published in March 1973, by Directorate of Publicity, Government of Maharashtra.
ii) Small holders have really received a very valuable assistance in the form of Community Wells. And, hence, its construction be encouraged.

8. Development of Tube Wells

It is known that the tube wells are common means of development of ground water from alluvial and other soft sedimentary formations as these contain large ground water resources in the different granular zones occurring within them. There are only two well known alluvial deposits in the State, viz., Tapi and Purna Valleys.

Hydrogeological conditions are favourable for construction of tube wells in these two zones. The agro-climatic conditions in these two areas emphasize the need for ground water utilization for agricultural purposes. There is a considerable potential for the development of cash crops like sugarcane, bananas, etc., requiring assured water supply which the tube wells only can provide.

Tube-Wells : Observations

These observations are based on the Table No.3.

i) Tube wells have increased at a very poor rate of increase.

ii) Upto 1965-66, the growth of tube wells was quite negligible.
iii) From 1966-67, speed of growth has increased. In this year 150 new tube wells were sunk.

iv) Private tube-wells have increased at a faster speed.

v) In 1969-70, the district Chandrapur had 159 tube wells, followed by Nagpur 145 and Bhandara 135 tube wells. There were 35 tube wells Wardha, 14 in Akola, 5 in Buldhana and 4 in Jalgaon. These figures are available from the Season and Crop Report, 1969-70.

It shows that almost all tube wells have been located in Nagpur division only. This observation gets supported from the Season and Crop Reports from 1961-62 to 1969-70.

Suggestion

The necessary help can be obtained from the Ground Water Survey and Development Agency established by the Government of Maharashtra in 1969. Under ground water potential can be assessed and well sinking programme can also be undertaken with the help of the said Agency.

Ground Water Exploration

For undertaking any kind of development programme it is very essential to make a quantitative assessment of recharge, discharge, reservoir characteristics
and other related hydrological aspects so as to work out the resources available for the future development. These details can be obtained by undertaking ground water exploration.