Under-Utilisation of Land in Andhra Pradesh: Extent and Determinants

V. Ratna Reddy*

The fallacy of limited scope for further utilisation of land (extension of crop area) has hitherto shadowed the importance of under-utilised agricultural lands. The scant attention it received (and continues to receive) belies its magnitude and role in Indian agriculture. Besides, the level of under-utilisation of land reflects the allocative efficiency along with the decision-making process and in turn depends on various economic, climatic and institutional factors. Climatic and institutional factors are observed to be important in determining the extent of under-utilisation of land (see Nadkarni and Deshpande, 1979). But, apart from these factors, the extent of under-utilisation may also depend on technological changes over a period of time. The technological changes that took place in the late sixties are expected to have differential impact on under-utilisation of land, depending on the levels of adoption and the resource base of the farming society. In the initial stages the higher returns from farming due to new technology may lead to extensive cultivation and thus reduce under-utilisation. On the other hand, the capital intensive nature of modern inputs may result in high capital-output ratios when applied on less fertile lands which may not be conducive to extensive cultivation. In the case of drought-prone districts the main constraints would be the spread of new technology itself, because of its non-suitability to rainfed farming and the existing low resource base in these regions. However, within the given constraints, the impact of new technology on under-utilisation of land is expected to be akin to that on non-drought regions. In this background, it becomes pertinent to examine the trends in under-utilisation of land, especially after the advent of new technology and the factors influencing its spatial variations.

EXTENT OF UNDER-UTILISATION

The present study makes an attempt to examine the trends in under-utilisation of lands across the districts of Andhra Pradesh over a period of 33 years. Besides, an attempt is also made to analyse the factors responsible for the variations across the districts and across size-classes. The under-utilised land includes current fallows (CF), other fallows (OF), cultivable waste (CW) and grazing and pasture lands. However, for the present purpose, we are confining ourselves to the first three categories only. The data on these three categories of land utilisation (CF, OF and CW) have been collected for the past 33 years, i.e., from 1955-56 to 1987-88. The data are mainly drawn from Statistical Abstracts of India and Season and Crop Reports of Andhra Pradesh. As far as the size-classwise analysis is concerned, the data are obtained from the Agricultural Census of Andhra Pradesh. The methodology and estimation procedure are discussed in the relevant sections. However, before going into the details of the causes for under-utilisation of land, the following paragraphs examine its extent and trends over a period of time.

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Thanks are due to R.S. Deshpande for his valuable suggestions on the earlier drafts of the paper. The author is also thankful to the anonymous referee of the Journal for his constructive comments which helped in improving the paper substantially. However, the usual disclaimers apply.
This section, besides dealing with the magnitude of under-utilisation and its trends over a period of 33 years, makes an attempt to examine the pattern of under-utilisation in drought-prone and non-drought-prone districts separately. The data pertaining to the three time points on net sown area (NSA), CF, OF, CW, etc., are presented in Table I for Andhra Pradesh along with the data at the all-India level. The data indicate that more than 30 per cent of the cultivable area in Andhra Pradesh is being under-utilised. The extent of under-utilisation in Andhra Pradesh is larger than that at the all-India level which is less than 25 per cent. A major chunk of this is due to current fallows. Regarding the other two categories (OF and CW), there has been a change in their relative shares after 1970. However, over the period, the proportion of under-utilised land in Andhra Pradesh has recorded an increase after a marginal decline during the sixties while it showed a declining trend at the all-India level with a marginal increase in the eighties over the seventies. The decline in the proportion of net sown area in Andhra Pradesh is mainly due to the rise in the current and other fallow lands which recorded an increase of 46 per cent and 69 per cent respectively during the period of 33 years. It can be noted from Table I that the increase is much higher in the second period when compared to the first. Conversely, the proportion of area under culturable wastes has declined by 51 per cent during the same period.

### Table I: Extent of Under-utilisation of Land in Andhra Pradesh and India

<table>
<thead>
<tr>
<th>State</th>
<th>Year (quinquennium ending)</th>
<th>Net area sown (NSA) (000 hectares)</th>
<th>Current falls (CF)</th>
<th>Other falls (OF)</th>
<th>Culturable wastes (CW)</th>
<th>Total culturable land (3+4+5+6) (000 hectares)</th>
<th>Per cent of area underutilised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh</td>
<td>1960</td>
<td>11,124</td>
<td>2,020</td>
<td>854</td>
<td>1,784</td>
<td>15,782</td>
<td>29.5</td>
</tr>
<tr>
<td></td>
<td>1970</td>
<td>11,227</td>
<td>2,179</td>
<td>899</td>
<td>1,344</td>
<td>15,649</td>
<td>28.3</td>
</tr>
<tr>
<td></td>
<td>1988</td>
<td>10,574</td>
<td>2,965</td>
<td>1,441</td>
<td>871</td>
<td>15,851</td>
<td>33.3</td>
</tr>
<tr>
<td>India</td>
<td>1960</td>
<td>13,027</td>
<td>12,044</td>
<td>12,246</td>
<td>21,050</td>
<td>1,75,614</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>1970</td>
<td>13,027</td>
<td>12,044</td>
<td>12,246</td>
<td>21,050</td>
<td>1,75,614</td>
<td>21.9</td>
</tr>
<tr>
<td></td>
<td>1985*</td>
<td>14,1,306</td>
<td>14,434</td>
<td>9,494</td>
<td>16,133</td>
<td>1,81,367</td>
<td>22.1</td>
</tr>
</tbody>
</table>

*Source: Statistical Abstract of India and Season and Crop Report of Andhra Pradesh (for various years).  
*Excluding land under miscellaneous tree crops and forests.  
*+ At all-India level 1984-85 data are the latest available. It may be noted, however, that the proportion of under-utilised land in Andhra Pradesh during the same period was 29.6.  
*Figures in parentheses are percentages to column (7).  

Of these three categories, current fallows reflect the year to year rainfall variations with high inverse relationship. In other words, rainfall plays a dominant role in determining the extent of current fallow lands. Other falls are the continuation of current fallows for more than one year and up to 5 years (see Bansil, 1970, p. 38). The presence of other falls may represent the soil-climatic characters, resource base, unremunerativeness of farming and level of technology of the region. And culturable waste is the land once cultivated but not cultivated for five years in succession and is left out of cultivation mainly due to the resource constraints and economics of its cultivation. Of these three, current fallows can be left out as it depends mostly on year to year rainfall and also due to the reason that it is a part of the
crop rotation system followed by the farmers. Even after taking out this component, the extent of under-utilisation is as high as 15 per cent which is substantial in a land hungry and poverty stricken country.

As for the trends in these components over the period, they may be better understood in the context of technological changes that took place in the late sixties. In this regard the use of five-year averages may not reflect the actual trends. Therefore, we have estimated the linear growth rates for three different time periods (1956 to 1969, 1970 to 1988 and 1956 to 1988) representing pre- and post-green revolution periods and also for the past 33 years as a whole. These growth rates are estimated with respect to current fallows, other fallows, culturable wastes and net sown area. The estimates (Table II) more or less confirm the earlier analysis. It may be observed that the net sown area has declined significantly over the period of 33 years. This decline is mainly due to the post-green revolution period as the pre-green revolution period (1956-69) revealed a positive trend, though not significant. Current and other fallow lands have recorded a significant positive growth rate over the period with a non-significant trend in the first period for other fallows. It is interesting to note that the post-green revolution period has witnessed higher growth rates in both the cases. On the other hand, culturable wastes have showed a significant decline in both the periods, though the growth rate has fallen in the second period.

**TABLE II. ESTIMATES OF LINEAR GROWTH RATES FOR VARIOUS COMPONENTS OF LAND UNDER-UTILISATION IN ANDHRA PRADESH**

<table>
<thead>
<tr>
<th>Period (1)</th>
<th>Net sown area (2)</th>
<th>Current fallows (3)</th>
<th>Other fallows (4)</th>
<th>Culturable wastes (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1956-69</td>
<td>0.065</td>
<td>1.342**</td>
<td>0.626</td>
<td>-2.681*</td>
</tr>
<tr>
<td>N=14</td>
<td>(0.43)</td>
<td>(2.75)</td>
<td>(1.20)</td>
<td>(7.21)</td>
</tr>
<tr>
<td>1970-88</td>
<td>-0.723*</td>
<td>2.622*</td>
<td>2.906*</td>
<td>-1.938*</td>
</tr>
<tr>
<td>N=19</td>
<td>((5.10)</td>
<td>(4.02)</td>
<td>(9.78)</td>
<td>(9.04)</td>
</tr>
<tr>
<td>1956-88</td>
<td>-0.150**</td>
<td>1.142*</td>
<td>2.161*</td>
<td>-2.697*</td>
</tr>
<tr>
<td>N=33</td>
<td>(2.06)</td>
<td>(4.16)</td>
<td>(11.97)</td>
<td>(18.90)</td>
</tr>
</tbody>
</table>

Figures in parentheses are 't' values.
* and ** indicate levels of significance at 1 and 5 per cent respectively.

These estimates are in agreement with one of the earlier studies of fallow lands in Andhra Pradesh (Agro-Economic Research Centre, Andhra University, 1984). Theoretically, the decline in culturable wastes after 1970 indicates that the resource constraints of the cultivators must have eased off consequent to the improved yields brought in the wake of technological change. In the case of current and other fallow lands, it is observed that a fall in the rainfall with higher coefficient of variation in the post-green revolution period, when compared to the earlier period, might have caused their growth (Agro-Economic Research Centre, Andhra University, 1984). This argument looks plausible because the increase in fallow lands may not be attributed to the technological changes as the all-India picture does not show an overall increase in these lands, though their proportion has gone up in the second period after a decline in the first period (see Table I). At this juncture, the analysis of the extent of under-utilisation of land in drought-prone vis-a-vis non-drought-prone districts would be revealing and interesting.

Excluding Hyderabad, 22 districts of Andhra Pradesh are divided into drought-prone and non-drought-prone districts. Accordingly, eight of the 22 districts fall under drought-prone category and the remaining under non-drought-prone category. The data pertaining
to the magnitude of the three categories of under-utilisation are presented in Table III along with their growth rates for different periods. It can be observed from the table that the extent of under-utilisation is higher in the drought-prone districts than in the non-drought-prone districts. Moreover, its magnitude has increased over the period in both the drought and non-drought districts, though the increase is marginal in the non-drought districts. Further, it may be observed that the non-drought-prone districts have recorded a decline between 1960 and 1970 while the drought-prone districts have shown a marginal increase. On the whole, the gap between the magnitude of under-utilisation in the drought and non-drought districts has widened considerably over time.

### TABLE III. EXTENT AND TRENDS IN LAND UNDER-UTILISATION IN DROUGHT AND NON-DROUGHT DISTRICTS

<table>
<thead>
<tr>
<th>Variables</th>
<th>Quinquennium ending</th>
<th>Linear growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSA</td>
<td>69.6</td>
<td>68.2</td>
</tr>
<tr>
<td>CF</td>
<td>13.6</td>
<td>17.1</td>
</tr>
<tr>
<td>CW</td>
<td>11.8</td>
<td>8.4</td>
</tr>
<tr>
<td>Total</td>
<td>30.4</td>
<td>31.8</td>
</tr>
</tbody>
</table>

**Drought-prone districts**

**Non-drought-prone districts**

| NSA       | 71.2      | 74.8      | 70.1      | 0.306 (1.65) | -0.576* (4.32) | -0.053 (0.75) |
| CF        | 12.2      | 11.2      | 17.6      | -0.065 (0.08) | 2.284* (2.97) | 1.378* (4.30) |
| OF        | 5.8       | 5.3       | 7.2       | -0.561 (0.73) | 2.735* (4.23) | 1.149* (3.81) |
| CW        | 10.8      | 8.7       | 5.1       | -1.874* (4.10) | -1.738* (4.58) | -3.011* (14.40) |
| Total     | 28.8      | 25.2      | 29.9      | -           | -           | -           |

Figures in parentheses are 't' values.

* and ** indicate levels of significance at 1 and 5 per cent respectively.

*Note:* NSA = Net sown area, CF = Current fallows, OF = Other fallows, CW = Culturable wastes and Total = (CF+OF+CW).

The growth rates also indicate that there is a significant decline in the net sown area over the period in the drought-prone districts while the decline is not significant in the non-drought districts. On the other hand, both the groups recorded a significant decline in net sown area in the post-green revolution period. In the case of fallow lands the drought-prone districts experienced positive and significant growth rates in the pre- as well as post-green revolution periods whereas in the case of non-drought-prone districts they are significant in the post-green revolution period only. And cultivable wastes have revealed significantly negative growth rates for both the periods and for the groups of districts.

Though the extent of under-utilisation of land is expected to be higher in the drought regions, its considerable rise over the period needs some attention. The higher growth in the extent of under-utilised land in the drought-prone districts and the widening gap between...
the two groups of districts are mainly due to a substantial increase in the fallow lands. It can be observed from Table III that total fallow lands (CF + OF) have increased from 18.6 per cent in 1960 to 23.4 per cent in 1970 and further to 31 per cent in 1988 in the drought-prone districts while they have increased from 18 per cent in 1960 to 24.8 per cent in 1988 with a marginal decline of 1.5 per cent in 1970. Of these two categories, the growth in other fallow lands is substantially higher in the drought-prone districts when compared to the non-drought districts. This indicates the continuous monsoon failures in these districts resulting in the lands becoming increasingly uneconomical for cultivation over the period. The continuous failure of rains is also leading to the desertification of land, which is increasing in the recent years. Further, it is observed that high fallow districts are associated with relatively low irrigation, low draught (cattle) power, low mechanical power, lower rainfall and higher proportion of area under holdings of more than ten hectares (see Agro-Economic Research Centre, Andhra University, 1984, p. 95). And the higher growth rates in fallow lands in the second period in the drought as well as the non-drought districts may be attributed to the rainfall pattern in the second period observed in a study of Andhra Pradesh. On the other hand, the new technology may be more effective in the high rainfall and irrigated districts where the area under other fallows has increased only marginally (from 5.3 to 7.2 per cent) in the second period, irrespective of low and variant rainfall. It indicates that cultivation might have become more economical in these districts after the advent of new technology when compared to the drought districts where the proportion of other fallows increased from 6.3 to 11.1 per cent. In the case of cultivable wastes which recorded a fall in both the regions, it may be the components of new technology like tractors that might have facilitated the cultivation of these lands apart from the incentives of higher remuneration.

DETERMINANTS OF UNDER-UTILISATION: DISTRICTWISE ANALYSIS

The preceding analysis, which is based on averages, may not hold good for all the districts. Therefore, an attempt is made here to examine the factors influencing the variations in under-utilisation of land across districts with the help of multiple regression analysis. For this purpose, total fallows and cultivable wastes are used as dependent variables. Analysis of current fallows is not attempted separately presuming that it is the result of immediate adjustment to severe droughts or low rainfall and crop cycles. Instead, we have clubbed current fallows with other fallows (total fallows) as they are found to be highly correlated. These two dependent variables are regressed against a number of independent variables that include climatic, economic, technological and institutional factors.

Climatic factors, represented by rainfall, indicate the drought-proneness of the region. Following the intensive cultivation hypothesis, it is expected that high rainfall and irrigated districts would have more under-utilised land. According to this hypothesis, the availability of in situ moisture and irrigation leads to a concentration of efforts in irrigated and more fertile lands to the neglect of other less fertile lands. Small farmers, due to their limited resources, may concentrate on their irrigated portions while big farmers also may concentrate more on irrigated lands due to their profit motiveness (see Nadkarni and Deshpande, 1979, p. 7). The present study makes an attempt to test this hypothesis with the help of cross-section data. The level of economic development, reflected in various economic factors, is often correlated with irrigation and high rainfall and hence, tends to increase under-utilisation of
land. This hypothesis becomes important in the light of agricultural development that took place after the advent of the green revolution. On the other hand, the nature of technique deployed determines the impact of technological factors. For instance, tractorisation may lead to extensive cultivation due to its cost effectiveness as well as time-saving nature, while pump irrigation may result in concentration of efforts on irrigated areas at the expense of other areas. Therefore, it is pertinent to test the hypothesis regarding the impact of technological factors on land use pattern. Finally, institutional factors are represented by farm size and the level of tenancy. Under-utilisation of land is expected to go up along with farm size following the hypothesis of higher land use intensity on small holdings.\(^5\) Whereas the level of tenancy may have dual effects, viz., farmers may lease in fertile lands while leaving their less fertile lands uncultivated, or they may lease in more land in order to fill in the gap between 'desired cultivated area' (DCA) and actual area owned (see Bliss and Stern, 1982), which would result in lower under-utilisation of land. All these hypotheses are tested in the analyses that follow.

The analysis has been carried out for the year 1984-85. However, in order to test the robustness of the results, the estimates are presented for the earlier years of 1960-61 and 1970-71 also. The basic specification and variables used are as follows:

\[
\frac{TF}{CW} = \frac{(Climatic \ factors)}{(Economic \ factors) \times \frac{(Technological \ factors)}{(Institutional \ factors)}
\]

where \(TF\) = proportion of total fallow lands to total cultivable lands and

\(CW\) = proportion of cultivable waste to total cultivable land.

\((i)\) Climatic factors are represented by average rainfall of the district (RF).

\((ii)\) Economic factors include (1) percentage of area under irrigation (IRR), (2) percentage of area under well irrigation (WIRR); (3) man-land ratio (MLR), (4) proportion of area under cereal crops (AUC), (5) average yield rate of cereals in quintals per hectare (YOC), (6) average male wage rate (AMW), (7) Loans disbursed in rupees per hectare (LD) and (8) area under forest and pasture lands (AFPL).

\((iii)\) Technological factors include (1) number of tractors per thousand hectares (TRA) and (2) number of pumpsets per thousand hectares (PMP).

\((iv)\) (1) Farm size in hectares (FS) and (2) level of tenancy (TN) in terms of proportion of leased-in land represent the institutional factors.

Though all these variables are included in the preliminary analysis, some of them did not appear in the final equations because only those equations with higher explanatory power and with significant coefficients are retained for final analysis.\(^6\) The estimates of the selected equations are presented in Tables IV and V. The results are discussed separately for fallows and culturable wastes. Before going into the discussion, it may be mentioned at the outset that the specifications are not satisfactory in terms of their explanatory power, though quite a few explanatory variables confine to the theoretical expectations.
TABLE IV. FACTORS INFLUENCING TOTAL FALLOW LANDS ACROSS THE DISTRICTS IN 1961, 1971 AND 1985

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IRR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WIRR</td>
<td>0.339** (2.08)</td>
<td>0.298** (2.21)</td>
<td>0.282* (2.67)</td>
</tr>
<tr>
<td>MLR</td>
<td>-1.215 (0.76)</td>
<td>-1.938 (0.88)</td>
<td>-3.027 (1.60)</td>
</tr>
<tr>
<td>WR</td>
<td></td>
<td></td>
<td>-0.362 (0.40)</td>
</tr>
<tr>
<td>PMP</td>
<td></td>
<td></td>
<td>0.089** (2.18)</td>
</tr>
<tr>
<td>LD</td>
<td></td>
<td>0.083 (0.23)</td>
<td>0.021 (1.18)</td>
</tr>
<tr>
<td>AFPL</td>
<td>0.396** (2.29)</td>
<td>-0.081 (0.38)</td>
<td>0.246 (1.25)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.39</td>
<td>0.34</td>
<td>0.47</td>
</tr>
<tr>
<td>F-value</td>
<td>3.46</td>
<td>1.92</td>
<td>3.83</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
<td>22</td>
</tr>
</tbody>
</table>

Figures in parentheses are 't' values.

*, ** and *** indicate levels of significance at 1, 5, 10 per cent respectively.

Note: The specifications used are:

1. $TF_i = a + b_1 WIRR + b_2 MLR + b_3 AFPL$ Eqn. I (1960-61)
2. $TF_i = a + b_1 WIRR + b_2 MLR + b_3 AFPL + b_4 LD$ Eqn. I (1970-71)
3. $TF_i = a + b_1 WIRR + b_2 MLR + b_3 AFPL + b_4 LD$ Eqn. I (1984-85)
4. $TF_i = a + b_1 WIRR + b_3 AFPL + b_4 WR + b_5 PMP$ Eqn. II (1984-85)
5. $TF_i = a + b_2 MLR + b_3 AFPL + b_4 LD + b_5 IRR$ Eqn. III (1984-85)

Factors Influencing Total Fallow

Five specifications (one each for 1961 and 1971 and three for 1985) are retained for the purpose of explaining the variations in total fallow lands. The results indicate that four variables are significant in explaining the variations across the districts. They are area under well irrigation (WIRR), number of pumpsets per thousand hectares (PMP), man-land ratio (MLR) and percentage of area under forest and pasture lands (AFPL). The area under well irrigation (WIRR) revealed a positive association, indicating that well irrigation results in an increase in total fallow lands. This may be due to the reason that in the regions with well irrigation the availability of water is comparatively assured during most part of the year and also due to the farmers' control over water, more concentrated efforts are put in on irrigated and fertile lands to the neglect of less fertile lands. Moreover, unlike in the canal irrigated areas, the extent of area covered by well irrigation is very low. This observation holds good even in the case of Maharashtra and Karnataka (Nadkarni and Deshpande, 1979). Even in the case of Andhra Pradesh it was observed that the talukas with well irrigation are found to have lower proportions of total fallow lands, though the overall irrigation revealed an inverse relationship (Agro-Economic Research Centre, Andhra University, 1984, pp. 131-149). It is interesting to note that well irrigation exerts more influence on fallow lands than total irrigation (mainly canal). This may be due to the capital intensive nature of well irrigation which prompts the farmers to put in more efforts on these lands rather than diverting
their resources to less fertile lands. One more reason may be that the farmer would have been left with limited resources consequent to his investment on the well and the pumpset. The positive and significant coefficient of the variable number of pumpe sets per thousand hectares (PMP) in one of the specifications also lends support to this argument.

Man-land ratio (MLR) showed an inverse relationship with total fallow lands, indicating that the higher the availability of manpower, the lower will be the area under fallows. This hardly needs any explanation as more hands are required in order to bring more land under cultivation. However, this is in support of the results of an earlier study of Andhra Pradesh pertaining to the year 1980-81 (Agro-Economic Research Centre, Andhra University, 1984, p. 93). And the area under forest and pasture lands (AFPL) has a positive influence on total fallow lands which may be due to the reason that when alternative avenues for jobs, food, fuel, etc., are available, less fertile lands are neglected naturally.

**TABLE V. FACTORS INFLUENCING CULTIVABLE WASTES ACROSS THE DISTRICTS IN 1961, 1971 AND 1985**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
</tr>
<tr>
<td>RF</td>
<td></td>
<td></td>
<td>-0.001</td>
</tr>
<tr>
<td>IRR</td>
<td>-</td>
<td>0.218**</td>
<td>-</td>
</tr>
<tr>
<td>WI RR</td>
<td>0.268</td>
<td>(2.26)</td>
<td>-</td>
</tr>
<tr>
<td>MLR</td>
<td>0.564</td>
<td>(0.37)</td>
<td>-</td>
</tr>
<tr>
<td>WR</td>
<td>15.724*</td>
<td>0.007</td>
<td>-</td>
</tr>
<tr>
<td>AUC</td>
<td></td>
<td>(0.37)</td>
<td></td>
</tr>
<tr>
<td>YOC</td>
<td></td>
<td>-0.759</td>
<td>(1.63)</td>
</tr>
<tr>
<td>TRA</td>
<td></td>
<td>15.701*</td>
<td>(3.79)</td>
</tr>
<tr>
<td>PMP</td>
<td>0.218</td>
<td>0.236</td>
<td>-</td>
</tr>
<tr>
<td>AFPL</td>
<td>0.183</td>
<td>0.108</td>
<td>0.176**</td>
</tr>
<tr>
<td>R²</td>
<td>0.35</td>
<td>0.54</td>
<td>0.52</td>
</tr>
<tr>
<td>F-value</td>
<td>2.02</td>
<td>3.25</td>
<td>5.72</td>
</tr>
<tr>
<td>N</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Figures in parentheses are 't' values.
** and *** indicate levels of significance at 1, 5, 10 per cent respectively.

Note:- The specifications used are:

(1) \( CW = a + b_1 \text{ WIRR} + b_3 \text{ AFPL} + b_4 \text{ PMP} + b_5 \text{ WR} \), Eqn. I (1960-61)
(2) \( CW = a + b_1 \text{ MLR} + b_3 \text{ AFPL} + b_4 \text{ PMP} + b_5 \text{ IRR} \), Eqn. I (1970-71)
(3) \( CW = a + b_1 \text{ AFPL} + b_3 \text{ TRA} + b_5 \text{ YOC} \), Eqn. I (1970-71)
(4) \( CW = a + b_1 \text{ AFPL} + b_3 \text{ TRA} + b_5 \text{ AUC} + b_5 \text{ RF} \), Eqn. I (1984-85)
(5) \( CW = a + b_1 \text{ MLR} + b_3 \text{ AFPL} + b_4 \text{ WR} + b_5 \text{ PMP} + b_5 \text{ IRR} \), Eqn. I (1984-85)

As far as the robustness of the estimates are concerned, the results are consistent for all the three sets of data, i.e., 1960-61, 1970-71 and 1984-85. All the variables carry similar signs across specifications and years, though there are differences in the levels of significance. The only exception in this regard is in the case of AFPL in 1970-71 which
revealed a different sign from that of other specifications.

One interesting observation is that rainfall (RF) does not seem to have much influence on total fallow lands at all the three points in time, though a strong positive relation was observed between rainfall and other fallows in the time-series data. However, the simple correlation between rainfall and total fallow lands indicated that the sign has changed from time to time, i.e., it was 0.14 in 1960-61, -0.33 in 1970-71 and 0.10 in 1984-85. These results differ from the earlier two studies. The study of Karnataka and Maharashtra attributed an important role to rainfall in explaining the variations in fallow lands, though it was found to be significant with negative sign in one of the districts only (Nadkarni and Deshpande, 1979, p. 11). In the case of Andhra Pradesh it was observed that the south-west monsoon rainfall has negative association with total fallows though the coefficients were not significant both in terms of simple correlations and regression coefficients (Agro-Economic Research Centre, Andhra University, 1984, pp. 104-105). However, these idiosyncrasies in the results may be attributed to the differences in the reference periods of the studies.

Factors Influencing Cultivable Waste

In the case of culturable wastes, the number of tractors per thousand hectares (TRA), irrigation (IRR), wage rate (WR) and number of pumpsets per thousand hectares (PMP) have turned out to be significant from the selected specifications (see Table V). Interestingly, the area under culturable wastes seems to be more in areas of higher tractor intensity. Logically this particular variable is supposed to have a negative influence on culturable wastes, as it becomes easier to bring more land under the plough with the help of tractors. This is more applicable in the case of culturable wastes. The hard soils of culturable wastes make ploughing difficult with traditional plough. But tractorisation is always associated with irrigated and developed regions which in turn would have resulted in its positive influence. In other words, under-utilisation of land in terms of culturable wastes is higher in regions with higher tractor intensity, which are also highly irrigated. Hence, it may be irrigation rather than tractor that influences the level of under-utilisation. The positive and significant coefficient of irrigation supports this argument. This is true even in the case of total fallow lands, though it was well irrigation that was more prominent. Moreover, the coefficients of these two variables are consistent across the periods and hence the results are robust.

On the other hand, higher wages are detrimental to extensive cultivation which may obviously be due to higher costs involved consequent to the enormous amount of labour required to bring the culturable wastes under cultivation, especially in the absence of mechanisation. The number of pumpsets displayed a negative and significant sign which is hard to explain in the light of the positive association between irrigation and culturable wastes. However, the results of these two variables have to be treated with caution and needs further probing as they are not consistent over different points in time. As in the case of fallow lands, the proportion of area under forest and pasture lands (AFPL) revealed a positive association with culturable wastes which is consistent (except in one specification) over the period.

Thus the present analysis clearly brings out that rainfall does not seem to influence under-utilisation of land in terms of fallow lands and culturable wastes. Moreover, the sign
of its coefficient is not consistent for these two categories of under-utilisation. On the other hand, the economic and technological factors seem to play quite an important role in determining land utilisation. Though the present results are somewhat at variance with the earlier studies, they may be attributed to the differences in the reference periods. As far as the institutional factors are concerned, no evidence is being provided regarding their influence on land utilisation in the district level analysis. However, the size-classwise analysis which is taken up in the next section, is expected to bring out some of these issues clearly.

DETERMINANTS OF UNDER-UTILISATION: SIZE-CLASSWISE ANALYSIS

For the purpose of size-classwise analysis the data from Agricultural Census have been obtained, where all the land holdings in the state are grouped into 13 size-classes. Similar to the district level analysis, here also the factors influencing under-utilisation of land across size-classes are examined. However, here current fallows along with other fallows and culturable wastes are also taken separately as dependent variables. In the case of independent variables the technological factors like tractors and pumpsets are not included due to non-availability of data at size-class level. In the place of technological factors, the level of tenancy (TN) which is measured as the proportion of area under leased-in land and other under-utilised lands (OUL) which include two of the three categories of under-utilisation, i.e., either CF + OF, or CF + CW, or OF + CW, depending on the dependent variable. And the remaining variables are the same as in the districtwise analysis.

Here, the proportion of area under current fallows is included as a dependent variable in order to find out the factors influencing it in the absence of rainfall variations which play a major role in determining the extent of current fallows. Though we have tried an exhaustive list of specifications, only the appropriate specifications are retained for the purpose of analysis. The analysis is carried out for the year 1980-81, the latest year for which data are available for Andhra Pradesh and the results are presented in Table VI.

It can be observed from the table that the explanatory power of the equations is fairly good. Most of the specifications explain more than 80 per cent of the variations in the under-utilisation of land across size-classes. The results indicate that the area under cereal crops (AUC) plays a very important role in determining the extent of under-utilisation as it turned out to be significant for all the three dependent variables. This gives some new clues regarding under-utilisation of land. It revealed an inverse relationship in most of the cases, indicating that the higher the extent of cereal cropping, the lower would be the under-utilisation of land. If the area under cereal crops can be taken as a proxy for subsistence agriculture, it can be argued that subsistence agriculture reduces the extent of under-utilisation when compared to commercial agriculture. This can be explained in the following manner: farmers who go in for subsistence agriculture are usually poor and hence they try to eke out maximum foodgrains from the available land. It is more or less similar to the hypothesis that small farmers use all their labour to get maximum output irrespective of the efficiency of its allocation. Conversely, due to high investment costs in commercial agriculture, farmers tend to concentrate their limited resources on more fertile lands, which results in under-utilisation of land. This explanation is in support of our earlier argument with regard to well irrigation at the district level. However, the coefficient of AUC turned out to be positively significant in one of the cases which may be an exception.
### TABLE VI. FACTORS INFLUENCING UNDER-UTILISATION OF LAND ACROSS SIZE-CLASSES, 1980-81

<table>
<thead>
<tr>
<th>Eqn.No.</th>
<th>FS</th>
<th>TN</th>
<th>IRR</th>
<th>WIRR</th>
<th>AUC</th>
<th>OUL</th>
<th>R²</th>
<th>F-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
<td>(7)</td>
<td>(8)</td>
<td>(9)</td>
</tr>
</tbody>
</table>

#### Dependent variable: Current fallows

I  
-0.0850  
(1.07)
-  
1.0856  
(0.71)
-  
-0.4129*  
(5.43)
-  
0.85  
17.63

II  
-0.1119*  
(3.54)
-  
-  
-0.1537***  
(2.20)
-  
2.4608*  
(4.40)
-  
0.85  
58.63

#### Dependent variable: Other fallows

I  
0.0308*  
(3.16)
-  
0.5370*  
(2.85)
-  
-0.0573*  
(5.48)
-  
0.85  
123.92

II  
0.0573*  
(5.30)
3.1624*  
(3.08)
-0.0217  
(0.55)
-  
0.0691***  
(2.00)
-  
0.1413*  
(5.15)
-  
0.98  
91.17

#### Dependent variable: Culturable wastes

I  
-0.0106  
(0.44)
-  
0.1512  
(0.47)
-  
-0.0572*  
(3.60)
-  
0.78  
8.15

II  
0.0069  
(0.10)
-0.0090  
(0.12)
-  
0.0145  
(0.22)
-  
0.1373*  
(3.08)
-  
0.88  
15.57

**Notes:**

- (1) FS = Farm size; TN = Level of tenancy, i.e., proportion of leased-in area to total area; IRR = Proportion of area under irrigation (total); WIRR = Proportion of area under well irrigation; AUC = Area under cereal crops; OUL = Other under-utilised land, i.e., OF+CW in CF+OF in the case of CF as dependent variable, CF+CW in the case of OF as dependent variable and CF+OF in the case of CW as dependent variable.

- (2) Figures in parentheses indicate 't' values. N = 13 For all the equations.

- *, ** and *** indicate levels of significance at 1, 5, and 10 per cent respectively.

The specifications used are:

1. CF = a + b₁ WIRR + b₁₀ AUC + b₁₁ FS  
Eqn. I Current fallows
2. CF = a + b₁₀ AUC + b₁₁ FS  
Eqn. II Current fallows
3. OF = a + b₁ WIRR + b₁₀ AUC + b₁₁ FS  
Eqn. III Other fallows
4. OF = a + b₉ IRR + b₁₀ AUC + b₁₁ FS + b₁₂ OUL + b₁₃ TN  
Eqn. III Other fallows
5. CW = a + b₁ WIRR + b₁₀ AUC + b₁₁ FS  
Eqn. III Culturable wastes
6. CW = a + b₁ IRR + b₁₀ AUC + b₁₁ FS + b₁₃ OUL  
Eqn. III Culturable wastes

As expected, the institutional factors - farm size and tenancy - did become prominent in this analysis. Especially, farm size turned out significant in many cases, though it is not consistent in its sign. For instance, it revealed a negative association with current fallows while it showed a positive association with other fallows. This signifies that big farmers tend to use land more extensively than small farmers in terms of current fallows. Conversely, in the case of other fallows, which represent the lands that are kept fallow for more than one year and upto five years, small farmers seem to be doing better. And the relationship is not significant in the case of culturable wastes. The reasons for the inverse relationship between farm size and current fallow lands are that in the event of uncertain rainfall, small farmers may not take the risk of sowing seeds depending on the expected rainfall whereas big farmers can afford to take this risk to some extent. This, however, emphasises that higher land productivity on small farms is also due to their risk averting nature when compared to big farmers. This is especially true in dry regions with crops like groundnut which require substantial money for seeds. Besides, keeping current fallows is also a method of proper crop rotation which, in turn, enhances land productivity.

On the other hand, the positive relationship in the case of other fallows may be due to
the reason that the proportion of fertile lands with low capital-output ratios may be lower on large farms (Berry and Cline, 1979). This, in turn, deters the extensive use of land consequent to the profit maximising motive rather than the output maximising motive of the big farmers (Sen, 1966). The level of tenancy (TN) seems to have significant influence only on other fallows. Its positive association indicates that as the proportion of area under leased-in land increases, the area under other fallows (OF) goes up. In other words, farmers with more of their lands under OF appear to go for leasing in land. This may be due to the reason that farmers prefer leasing in more fertile land to cultivating their own but less fertile lands.

Of the other variables, the area under well irrigation turned out significant in the case of other fallows. Its positive sign is consistent with the districtwise analysis. And the variable other under-utilised lands (OUL) turned out significant for all the categories of under-utilisation. Its consistent positive sign indicates that the three categories of land under-utilisation are complementary to one another rather than substitutive.

The analysis of under-utilisation of land suggests expostulation of hitherto followed agricultural policies. The presence of more than 25 per cent of uncultivated lands even in the non-drought-prone districts makes the assumption: ‘limited scope for horizontal growth in production’ redundant. This, in turn, calls for improving the possibilities of extensive cultivation along with the intensive cultivation techniques presently followed. However, before doing so, one has to look into the socio-economic and institutional constraints operating at various levels that determine the under-utilisation of land. Though the present study provides some clues in this regard, there is a need for further research efforts.

CONCLUSIONS

This paper brings out clearly that the extent of under-utilisation of agricultural land is considerable and stresses the need for immediate concern in this regard. The advent of new technology did not make any dent on under-utilisation of land. On the contrary, it had aggravated the situation. Increase in under-utilised land is more prominent in the drought-prone districts whereas in the non-drought-prone districts it has increased marginally over the period of 33 years after a decline in the seventies. This decline in the non-drought districts as well as the marginal rise in the drought-prone districts during the sixties when compared to the seventies and the eighties may be attributed to the differential rainfall pattern in these two periods. However, the cross-sectional analysis (districtwise) did not provide any evidence regarding the importance of rainfall in determining under-utilisation of land, either in terms of total fallows or culturable wastes. On the other hand, economic and technological factors seem to play a dominant role. For instance, in the irrigated areas, especially well irrigation, farmers tend to go for intensive cultivation. Similarly, extensive cultivation practices are followed by those farmers who grow more of subsistence crops than commercial crops. The technological factors like tractors and pumpsets, which are closely related with development, lead to increased under-utilisation. And the institutional factors like farm size and tenancy also seem to play an important role.

The present analysis suggests that under-utilisation of land is associated with irrigation (especially well irrigation), tractors, commercialisation, etc., which can be attributed to the inability of the farmers to adjust to higher demand for resources. However, certain results pertaining to pumpsets and wage rates need to be taken with caution. The resource crunch faced by the farmers seems to have aggravated after the advent of new technology due to
the capital intensive nature of modern inputs. This has led to the concentration of limited resources on more fertile lands to the neglect of other lands. The concentration of resources is more prominent in the case of highly capital intensive farm activities like well irrigation, commercial cropping, etc. The resource constraints, that are responsible for larger areas under fallow lands, are well captured in a field study where most of the farmers expressed the need for providing investment finance for sinking of wells and deepening of existing wells (Agro-Economic Research Centre, Andhra University, 1984, p. 160).

Thus it may be concluded that the extent of land utilisation or under-utilisation largely depends on the availability of resources with the farmers and the nature of investment in relation with the expected returns from land. In this context, a new phase of technological changes which would not only enhance land productivities but also brings in stability, is expected to be helpful. This kind of technology would, in turn, result in pushing down the capital-output ratios in agriculture and also improve the resource base of the farm sector. Moreover, the growing apathy regarding increasing costs in agriculture (Nadkami, 1988) also calls for a fresh look at the development of more appropriate technologies.

Received November 1990. Revision accepted June 1991.

NOTES

1. This categorisation is made on the basis of number of taluks affected by drought in each district. Accordingly, the Bureau of Economics and Statistics of the Government of Andhra Pradesh provides information on the number of districts declared as drought-prone.

2. Though we have not analysed the rainfall pattern in the drought and non-drought districts separately, it is assumed that the rainfall pattern is the same in both these groups of districts and hence the drought districts are expected to receive less than normal rainfall in bad years resulting in much harsh conditions. See Agro-Economic Research Centre, Andhra University (1984).

3. We have estimated the relationship between current fallows and rainfall with the help of time-series data using simple regression. The estimated model is:

\[
CF = 3445.439 - 1.2287 RF^* \\
(R^2 = 0.15)
\]

\[
(t) = (7.06) \\
(2.35) \\
N = 33
\]

(* and ** indicate levels of significance at 1 and 5 per cent respectively.)

4. The estimated regression equation for these two variables is:

\[
CF = 1080.34 + 1.1628 OF^* \\
(R^2 = 0.42)
\]

\[
(t) = (4.05) \\
(4.74) \\
N = 33
\]

5. As reported by various Farm Management Studies and for a detailed analysis, also see Mehra (1976).

6. One such variable which did not appear is farm size.

REFERENCES


