Working Paper No. 183

Efficiency of Water Use in Indian Agriculture

by

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January 2004

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Abstract

Increase in the demand for water in all sectors especially in agriculture, and dwindling nature of the per capita availability of its supply in recent decades induced scientists and researchers to focus their attention more on efficient use of available water. Informed discussion of the problem and its solutions is impeded by the lack of adequate and reliable knowledge of how much water is used, where, for what purpose and how efficiently. This paper is a modest attempt to fill this gap.

This paper presents estimates of the 'consumptive use' of water in crop production; the ratio of consumptive use to gross water utilization; and productivity per unit of consumptive use. This is done separately for different crop groups in irrigated and rain-fed lands, by states and agro-climatic regions and major river basins. The estimates cover major crop groups for different territorial units (agro-climatic regions and river basins) at two points of time namely 1966-68 and 1991-93. It shows that considerable amount of the relevant data are available in the public domain and that, despite their inadequacies and doubtful reliability, can be used to give us a conceptually well-grounded and comparable picture of the characteristics of agricultural water use. The picture, though necessarily approximate and leaves room for refinement, is nevertheless useful and can serve as a basis for a more informed discussion of the problems of this sector.

Our estimates suggest that **the total consumptive use of water by crops in the early nineties is around 660 bcm per annum. Irrigated crops comprise about 40 percent of total crop area but** - they use much more water per unit area - **they account for some 55 percent of total consumptive use.** Somewhat, over half of the total consumptive use by irrigated crops is contributed by irrigation and the balance from rainfall. Rice, wheat and annual crops account for nearly 80 percent of total use by irrigated crops compared to less than 20 percent in the case of rain-fed crops. **The large inter-regional variations in consumptive use rates reflect the combined effect of climate, extent of irrigation and crop patterns.**

Productivity of irrigated crops is everywhere higher than that of un-irrigated crops but again in varying degrees. Surprisingly, however, productivity per mm of consumptive use is not always higher in irrigated compared to rain-fed crops. Even where the former is higher the difference appears far less striking than one would expect.

The ratio of consumptive use from irrigation to gross utilization of water from surface and ground water (a measure of technical efficiency of irrigation) is around 38 percent for the selected basins taken as a whole. It is relatively less (26-27 percent) in the basins of east flowing peninsular rivers, 40 to 50 percent in Ganges and Indus basins; and 55 percent in basins of west flowing rivers (excluding the west coast rivers). Differences in the extent of groundwater use seem to account for these differences to some extent.

Significant changes in volume and sources of water use as well as technical efficiency of irrigation have taken place between the mid sixties and early nineties. Total consumptive use has increased by about 18 percent; consumptive use by un-irrigated crops has marginally declined and that of irrigated crops increased by some 90 percent overall. Consumptive use of irrigation water has nearly doubled. **Rainfed crop patterns seem to have become on the average slightly more water intensive and those of irrigated crops slightly less water intensive over this period.** The picture however varies across states. The technical efficiency of irrigation has increased in all - but one basin group - but unevenly.

The current estimates of water use are subject to several qualifications and must be viewed as first approximations. They are being presented in order to elicit comments on the underlying assumptions and estimating procedures. Clearly there is need and scope for more refined and detailed work on both methodology and estimation. Some directions of further research to this end are indicated.

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* This study was greatly facilitated by ICRISAT's detailed compilation of district-wise time series data on land use, area and production of crops. We thank ICRISAT for making this compilation readily available for our use.
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Efficiency of Water Use in Indian Agriculture

1. Introduction

India's agricultural growth during the last five decades has been made possible by the near doubling of irrigated area accompanied by the introduction and rapid spread of high yielding varieties of major crops and increasing application of plant nutrients mostly in the form of chemical fertilisers. That there is a strong complementarity and synergy between these inputs is common knowledge. However, of late there are concerns that the steam is running out of the green revolution technology, that the pace of growth in agricultural output, which now depends almost entirely on productivity growth, seems to have hit a plateau and may even be slackening in some areas. At the same time, the demand for food and fibre likely to be generated in the coming decade or two to sustain the targeted growth of GDP calls for a faster increase in agricultural production accompanied by significant diversification in its pattern. There are well-grounded apprehensions about feasibility: research is not increasing the potential yield 'frontier' at the rate achieved by the advent of the HYVs; yield increases are not only **not** commensurate with the increase in fertilizer use but there are indications that excessive and unbalanced use of chemical fertilizers is causing serious damage to soil health and that cropping systems adopted for intensively irrigated areas (notably in north western parts of the country) are not sustainable.

Projections of long term prospects of Indian agricultural growth (see for example GOI: 1999) are cautiously optimistic about the prospects of tackling these problems and achieving required growth of agricultural production. This optimism is predicated on (i) a sustained and substantial expansion of irrigated area and cropping intensity; and (ii) a significant improvement in irrigation efficiency by more intensive recycling of seepage and regeneration of water from canals and reducing wasteful use. Even so, with non agricultural uses growing rapidly, they caution that the total water requirements will approach the limits of utilizable supplies in the course of the next two decades and that the potentials may well be exhausted by mid century. Some others are of the view that supplies will be inadequate to meet requirements, that India will have to import sizeable amounts of food and that scarcity will lead to an intensification of conflicts over water. The more alarmist predictions foresee the conflicts over water as threatening peace and stability in other parts of the world.

How much water will be needed in the coming decades and to what extent and in what ways they can be met is therefore an issue of critical importance. Assessments of the future water

scenario depend crucially on (a) the technically feasible and economically viable augmentation of the quantum of surface and groundwater available for use; (b) the quantum of water needed to meet the requirements of consumptive use for crops and for various non-agricultural uses; (c) the ratio of consumptive use to gross utilization in different uses (which is one measure of water use efficiency), the scope for and prospects of increasing this ratio; and (d) increasing the productivity per unit of consumptive use in agriculture which is accounts for the bulk of present and future demand for water. A closer scrutiny of the basis of various projections raises questions about the concepts, the empirical basis and the assumptions on which they are built. These are discussed at some length in an earlier paper on the proposal for interlinking of rivers (Vaidyanathan 2003).

This paper seeks to estimate (a) the 'consumptive use' of water in crop production; (b) the ratio of consumptive use to gross water utilization; and (c) productivity per unit of consumptive use. This is done separately for different crop groups in irrigated and rain-fed lands by states and agro-climatic regions and major river basins. The estimates cover major crop groups for different territorial units (agro-climatic regions and river basins) at two points of time namely 1966-68 and 1991-93.

The next section outlines the methodology and assumptions underlying the exercise. The main findings regarding total consumptive use by irrigated and rain-fed crops and their variations across regions and over the selected period are presented in Section 3. The relation between consumptive use and gross utilization across different groups of river basins and their changes are reviewed in section 4. This is followed, in section 5, by a discussion of the spatial and temporal variations in output per unit of consumptive use under irrigated and rain-fed conditions. The concluding section highlights the significance of the findings and their limitations and points to directions in which they need to be refined.

2. Methodology and Assumptions

'Consumptive use' in the case of agriculture refers to the amount of water which crops transpire in the course of their growth and which evaporates from the bare surface in the fields where crops are grown. Together they constitute evapotranspiration. Direct measurement of consumptive use of water by crops across regions covering extensive areas and for diverse crops is difficult, if not impossible. The organisational effort and cost involved are simply too great. There is however ample theoretical and empirical basis to show that there is an **upper**

limit to the quantum of evapotranspiration and that, for most field crops, it is equal to the potential evaporation from a free, open surface of water.

Potential evaporation, being a function of measurable climatic variables (sunshine, temperature, humidity, etc.), can be empirically estimated from available climatic data. Indian Meteorological department has estimated PE on the basis of climatic data for different met stations from all over the country. Based on these estimates, the (now defunct) Agro climatic Regional Planning Unit of the Planning Commission has estimated PE and rainfall by agro-climatic regions. These estimates (presented in Appendix 1), taken from the Report of the Committee on Pricing of Irrigation Water (GOI, 1992: 394), have been used in the present exercise.

'Consumptive use' or evapo-transpiration in any given region varies widely between crops depending on season(s) in which they are grown and the duration between planting and harvesting. It also varies between different stages of growth of any given crop. Actual evapo-transpiration is considerably less than potential evaporation in the early phases (when the plants do not cover the entire field) and during the maturing phases before harvest (when crops have stopped transpiration). In any given location therefore, for most crops, actual ET over the growing season is expected to be less than PET. The extent of the difference between potential and actual evapo transpiration however varies from crop to crop.

FAO (1986) has worked out the ratio of actual to potential evaporation (called 'crop coefficients') for major crops in different climatic regions on certain assumptions about planting and harvesting dates and the duration of growth phases in between. The values range between .75 and .95 for different seasonal crops; 0.9 for citrus and 1 for sugarcane. The exception is paddy which uses a lot of water in preparing the land for transplantation and needs standing water or wet, moisture saturated soil for much of its growth cycle. For this reason the 'crop coefficient' for rice is greater than unity. Its value under tropical conditions is taken at 1.2. We have used the FAO crop coefficients in the present exercise.

Total consumptive use of each crop (crop category) is taken as equal to PET*crop coefficient for that crop (category) under irrigated conditions. For crops dependent wholly on rainfall, consumptive use is taken PET or effective rainfall (80% of total rainfall in the relevant period) whichever is less.

For purposes of estimation we grouped crops into the following categories based primarily on

the crop coefficients and water intensity. Rice and annual crops are far more water intensive than other seasonal crops:

Rice Kharif; Rice Rabi; Rice Summer; Annual crops (Sugarcane and fruits); Wheat; Cotton; All others Kharif; All others Rabi

The difference between total consumptive use of each crop under irrigated conditions and under rain-fed conditions must have been met from irrigation and is the basis for estimating consumptive use of irrigation water. The values of consumptive use parameters under irrigated and rain-fed conditions for each of these crops in various agro-climatic regions, and their underlying assumptions, are detailed in Appendix 2.

It should be noted that actual ET will also be less than PET when the soil moisture is not at the saturation level as is likely to be the case when effective rainfall and or irrigation is insufficient to maintain soil moisture at field capacity. Both eventualities are common. But it is not possible with the available data to assess their magnitude as it depends on the quantum and time pattern of rainfall and irrigation supplies both of which are variable between regions. The coefficients used in the present estimate should therefore be taken as being close to the upper limit of consumptive use.

Districts have been grouped into agro-climatic regions (ACRs) based on classifications done by the Agro-climatic regional planning unit. District-wise land use and crop-wise total and irrigated areas collated by the ICRISAT for the period 1970 –1993 from DE&S publications have been used to get estimates by ACRs. This compilation gives season-wise distribution of total area under some crops (cereals other than rice and wheat, total pulses and total oil seeds); wheat is a rabi crop; sugarcane and fruits are annual crops. For others we have made a rough determination based on information on sowing and harvesting dates published by the DE&S. Adjustments have also been made for changes in the seasonal classification of area under rice.

Except for fruits and several of the crops included under ‘all others’, official statistics give total and irrigated areas. The difference between total and irrigated areas gives the un-irrigated area. Where this information is not available (as is the case for numerous minor crops as well as annual and perennial crops) the distribution between irrigated and rain-fed areas was estimated on the basis of certain assumptions. These assumptions and the detailed estimates relating to two periods, namely 1966-68 and 1991-93 are presented in Appendix 3. (In some cases, e.g. Orissa, Bihar and West Bengal, lack of data necessitated a change in the two periods).

Total consumptive use of irrigated and un-irrigated area under each crop category and agro climatic region is simply the product of the area under the areas and consumptive use parameters. Total consumptive use on irrigated area is broken up into the contribution of rainfall and irrigation. These are then aggregated at the basin, state and national levels. (Details are presented in Appendix 4)

3. Estimates of Consumptive Use

Magnitudes

In the early nineties, taking the country as a whole, total annual consumptive use of all crops in the country works out to 660 bcm of water. Un-irrigated crops use up 293 bcm and irrigated crops 366 bcm. Irrigated crops use considerably more water than rain-fed ones (5.5 tcm per hectare compared to 2.7 tcm per hectare of un-irrigated crops). Therefore their share in total consumptive use (55 percent) is considerably higher than their share in gross cropped area (37 percent). A little over half the consumptive use of irrigated crops is derived from irrigation; the rest from rainfall. (Table 1).

Table 1. Volume and Composition of Consumptive Use of Water by Crops in India 1991-93

		1960s			1990s		
Details	**Unit**	**Irrigated**	**UI**	**Total**	**Irrigated**	**UI**	**Total**
Crop area	MHA	33.4	117.9	151.3	66.7	107.1	173.8
Cons use Total	BCM	189.1	316.9	506	366	293.1	659.2
Consuse RFD	BCM	88.5	316.9	405.4	169.3	293.1	462.4
Consuse IRR	BCM	100.6	0	100.6	196.8	0	196.8
Per ha Total	MM	566	269	334	549	274	379
Per ha RFD	MM	265	269	268	254	274	266
Per ha IRR	MM	301	0	66	295	0	113

Note: UI = Unirrigated. RFD = Rainfed. IRR = Irrigation.

Salient Features

Nearly half the consumptive use is accounted by other cereals, pulses, oilseeds and other seasonal crops. Rice being much more water intensive accounts for a much higher proportion of total consumptive use than its share in crop area. Rice accounts for a little over a fifth of total consumptive use of all crops; wheat for about 14 percent and annuals and perennials for about one eighths. The major part– around 65 percent - of the total is in the kharif season.

The crop-wise and seasonal distributions in un-irrigated and irrigated are strikingly different: Nearly 90 percent of consumptive use by un-irrigated crops occurs during kharif much of it by cereals (mostly the 'coarse cereals'), pulses and oilseeds and other seasonal crops. Of total consumptive use by irrigated crops, nearly a third is accounted by rice, somewhat under a fourth by annuals and perennials and around 19 percent by wheat. Kharif crops account for 38 percent of total use, rabi crops for 36 percent and annuals/perennials for 23 percent.

The contrast is even more striking when we look at consumptive use of irrigation water: About 30 per cent of it is accounted by wheat, followed by rice 27 percent and annuals/ perennials (24 percent). Other seasonal crops use less than a fifth of the total with rabi seasonal crops alone accounting for over 55 per cent of total consumptive use of irrigated crops (compared to a mere 8 percent of total consumptive use by rain-fed crops). (Table 2).

Table 2: Distribution of Consumptive Use of Water by different Crop Groups on Irrigated and Rain-fed Areas in India, 1991-93

Details	Unit	RiceK	RiceR	RiceS	Wheat	Cotton	OthersK	OthersR	SCane	Fruits	All
Irrigated											
Gia	percent	15.4	10	2.4	31.6	4..8	18	9.4	4.9	3.6	100
Conuse t	percent	18.7	10.9	2.8	18.8	4.8	14.7	6.3	13.7	9.2	100
Conuse irr	percent	6.5	16.1	4.2	29.6	4.	5.4	9.9	14.3	9.9	100
CUR it	MM	669	595	639	327	551	448	372	1536	1402	548
CUR ii	MM	125	474	527	277	249	89	312	861	806	295
Unirrigated											
Guia	percent	8	8.5	.8	3	4.7	52.3	22.7	.3	-.3	100
conuse ui	percent	15.9	2.9	.1	1.2	8.5	65.1	4.8	1.2	.2	100
CUR rf	MM	562	90	185	58	421	352	59	692	379	274

Note: K = Kharif. R = Rabi. S = Summer. S.Cane = Sugarcane. Conuse = Consumptive Use.
t = Total. irr = Irrigation. CUR = Consumptive Use Rate. it = Irrigated Total.
ii = Irrigation in Irrigated. ui = Unirrigated. rf = Rainfall.

Regional Variations

Across states (Table 3) consumptive use rates on **irrigated areas** ranged in 1991-3 between 450mm and 750 mm. The use rate of irrigation water on irrigated land rate of use varied between 218 mm to 420 mm and its share in total use from 43 to 74 percent. The range of variation in all these respects was more or less the same in 1966 –8.

Based on simple correlations, it would seem that in both years variations in total consumptive use rate of irrigated areas and their consumptive use rate from irrigation follow more or less similar patterns. This similarity is also noticed, but in a weaker measure, between the use rate of irrigation water on the one hand and the dependence on irrigation water and the importance of water intensive crops. In other words states with a higher use rate of consumptive use on irrigated areas also tend to have a higher use rate of irrigation water, depend on irrigation to a larger extent and also tend to devote a larger proportion of irrigated area to water intensive crops. The use rates from irrigation and rainfall are poorly correlated in both years but interestingly it was somewhat stronger and negative in the earlier period. It would seem that in the sixties states with low consumptive use from rain tended, in some limited degree, to have larger access to irrigation.

Table 3: Consumptive Use of Water by Irrigated Crops and Associated Variables in Major States of India, 1966 to 68 and 1991 to 93

State	CUR i t (mm)		CUR i (mm)		Share of Irrigation in tot cons use %		Share in cons use from irrigation %		Share of GIA under Rabi, sum, annuals	
	1966-68	1991-93	1966-68	1991-93	1966-68	1991-93	1966-68	1991-93	1966-68	1991-93
AP	687	658	376	351	54.7	53.2	16.1	10.3	57.9	55.2
BIH	545	462	405	343	74.4	74.4	10.8	7.6	90.4	88.7
GUJ	526	629	234	272	44.4	43.3	2.7	4.2	39.5	38.7
HAR	511	463	273	245	53.5	52.9	4.0	4.9	52.3	58.7
KAR	719	651	366	339	50.8	52.2	5.1	5.3	49.5	48.2
MAH	682	753	366	421	53.7	56.0	5.7	7.2	60.6	65.5
MP	564	477	170	218	30.1	45.8	2.1	6.1	38.0	57.7
ORI	579	635	339	336	58.5	53.0	5.5	5.6	72.1	67.4
PUN	463	494	245	237	53.0	47.8	6.9	8.7	56.2	52.1
RAJ	439	452	277	290	63.1	64.1	4.6	6.1	49.6	51.9
TN	717	747	309	345	43.1	46.1	11.7	6.5	30.9	39.2
UP	520	523	261	286	50.3	54.6	19.1	24.4	71.2	79.3
WB	519	504	331	273	63.8	54.2	5.7	2.9	72.5	62.9

Note: CUR = Consumptive Use Rate. it = Irrigated Total. i = Irrigation.
For more details see Appendix. 6.

Table 4 gives the frequency distribution by the intensity of water use by irrigated and un-irrigated crops at a more disaggregated level by agro-climatic regions. In the early 90's the mean value of crop evapo-transpiration for un-irrigated crops does not exceed 600 mm in any zone. It ranges between 200 and 400 mm in about 80 per cent of the districts. The distribution for irrigated areas shows (a) a wider range of variation – from 200 mm to over 700 mm – and

a wider dispersion around the mean; (b) the value exceeds 300 mm in all but one of the 75 regions and 600 mm In 30 of them; and (c) consumptive use rate for irrigation water is less than 400 mm in 80 percent of the regions and less than 200 mm in about a fifth of them. The contribution of irrigation to total consumptive use of irrigated areas ranges from less than 5 percent to 70 percent or more the modal value being 40 to 60 percent.

Table: 4 Frequency Distribution of Agro-Climatic Regions by Rates of Consumptive Use

	<200	200-300	300-400	400-500	500-600	600-700	>700	Total
1966-68								
Irrigated								
Total	0	1	3	19	18	18	16	75
Irrigation	15	24	23	12	1	0	0	75
Un-irrigated	11	40	20	4	0	0	0	75
1991-93								
Irrigated								
Total	0	1	7	18	19	17	13	75
Irrigation	13	25	29	6	2	0	0	75
Un-irrigated	9	37	24	5	0	0	0	75

These variations are a function of several factors including climate, seasonal distribution of crops and the proportion of water intensive crops. Across agro-climatic regions, in irrigated areas, there is a strong positive correlation between overall consumptive use rate and that of irrigation water. Correlations between overall use rates on the one hand and the share of irrigation to total use and the share of rabi, summer and annual/perennial crops are non-significant.

However it is found (see Table 5) that the level of the consumptive use rate from irrigation is significantly and positively correlated with (a) the contribution of irrigation to total consumptive use of irrigated areas and (b) the share of rabi/summer and annual crops in total irrigated area. The relation between the level of consumptive use from rainfall and the contribution of irrigation to total use as well as the share of rabi/summer/annuals in irrigated area is significantly negative. This suggests that across regions, higher the consumptive use rate from irrigation and higher the proportion of rabi/summer/annual crops in irrigated area, the larger (smaller) will be the contribution of irrigation (rainfall) to total consumptive use. Also noteworthy is the statistically significant positive correlation between the share of irrigation in total consumptive use and the share of rabi/summer/annual crops. These relations hold both in the sixties and in the nineties.

Table 5: Correlations between Consumptive Use Rates of Irrigated Areas from Different Sources, Contribution of Irrigation and Crop Patterns across Agro-Climatic Regions: India

Contributing Factor	1966-68 : Consumptive Use Rate from			1991-93 : Consumptive Use Rate from		
	Both Sources	Rainfall	Irrigation	Both Sources	Rainfall	Irrigation
% of Irrigation to Total Use	-0.175	-0.795	+.878	-0.084	-0.748	+.795
Share of rabi/ Sum/annuals in gia	+.071	-0.257	+.443	-0.03	-0.423	+.447

Changes over time

Between 1966-8 and 1991-3, the two periods covered by this study, gross crop area increased some 15 percent (from 151 million ha to 174 million ha) and total consumptive use by crops by about a third (from 506 bcm to 660 bcm). Average consumptive use rate has thus increased 14 percent. Almost the entire increase in the volume of consumptive use is accounted by irrigated area which has nearly doubled in this period. The increase in the volume of consumptive use being somewhat less than that in irrigated area, consumptive use rate – overall, as well as from rainfall and irrigation- show a slight decline. While total consumptive use of un-irrigated crops shows a marginal decline, their average consumptive use rate increased even if only marginally (These estimates are given in Table 1).

These changes reflect significant changes in irrigated crop patterns. (Table 6) The share of water intensive crops (rice and annuals/perennials) in irrigated crop area, and hence their share in total consumptive use and consumptive use of irrigation, have declined substantially. The seasonal distribution of crop area has also changed with the share of rabi crops increasing from 31 percent to 51 percent. Most of this is on account of expansion of wheat area in regions with a cool winter and relatively low moisture deficits. This may be part of the explanation for the relatively modest rise fall overall irrigated consumptive use rate.

Un-irrigated crops are predominantly grown in the kharif season. The share of kharif crops has increased even as that of rabi has come down sharply (largely reflecting the shrinkage of wheat area). Whether this could have a made a significant difference to overall consumptive use rate is open to question. It seems more likely that it may have more to do with changes in the spatial distribution of rain-fed cultivation and of rain-fed crops. Regional shifts might also have contributed to the change in consumptive use rates of irrigated areas.

Table 6: Distribution of Area and Consumptive Use by Crops and Seasons in India: 1966-68 and 1991-93

Crops	Un-irrigated				Irrigated					
	1966-68		1991-93		1966-68			1991-93		
	Area	Cons use	Area	Cons use	Area	Cons use		Area	Cons use	
						Total	Irri		Total	Irri
Rice	16.6	19.7	17.3	18.9	36.6	40.9	38.6	27.8	32.4	26.8
Wheat	6.1	0.6	0.3	1.2	21.3	12.2	19.4	31.6	18.8	29.6
Annuals/perennials	0.5	0.3	0.0	1.4	7.8	20.6	22.1	8.5	23.0	24.2
Other seasonals	76.8	79.4	79.7	78.4	34.3	26.5	9.9	32.1	25.8	19.3
All	100	100	100	100	100	100	100	100	100	100
Kharif	62.1	90.8	65.0	89.5	41.1	39.7	17.2	38.2	38.2	15.9
Rabi	37.2	8.3	34.2	8.9	31.4	36.9	56.0	50.9	36.0	55.6
Summer	0.5	0.5	0.8	0.1	2.5	4.6	4.6	2.4	2.8	4.2
Annuals/perennials	3.0	0.3	0.0	1.4	7.8	20.5	22.1	8.5	23.0	24.2
Percentage	100	100	100	100	100	100	100	100	100	100

Note: Cons use = Consumptive Use. Irri = Irrigation.

Changes in consumptive use rates differ widely across regions (see Tables 3 and 4). Consumptive use rates of irrigated areas, both overall and from irrigation water, fell in half the states and rose in the others. Even use rates of rainfall by irrigated areas fell in some 5 states. Disparities in the share of irrigation in total use have come down. The share of irrigation in total consumptive use rate of irrigated areas, as well as the share of water intensive crops in total use, fell in as many as 8 states. This trend is also reflected in the shift in the frequency distribution of agro-climatic regions by total consumptive use rates to wards lower end. All these point to a move towards less water intensive crop patterns in irrigated areas. In un-irrigated areas however (as can be seen from Table 4) the shift in the distribution is towards higher intensities.

4. Efficiency of Water Use

"Efficiency" of water use has to be assessed in at least three ways: "Irrigation" efficiency as conventionally defined by engineers relates to the ratio of consumptive use of irrigation to gross irrigation supplies. "Productive" efficiency, that is the quantum of production per unit of water utilized, can be measured with reference to consumptive use, for irrigated and rain-fed areas separately or in combination, and in physical terms (yields or better crop biomass) for individual crops or in terms of value for total crop production. "Economic" efficiency is measured by comparing the outcomes of the current allocation and use of available water (and associated inputs) compare with their 'optimum' allocation and use given technology, prices of inputs and

outputs, and weights attached to different social objectives. On the basis of currently available data utilized in this exercise it is possible to get some idea of the first two measures of efficiency.

Technical Efficiency

In order to estimate technical efficiency we need data on the total volume of water utilized for irrigation. The available data and their limitations detailed in Appendix 7. Briefly stated, the main problems are: (1) the concepts and methodology underlying the estimates and the years to which the estimates relate are not made clear; (2) estimates of surface water utilisation are not available for some basins while in others they imply a reduction in the volume reported to be utilised per unit of live storage or even an absolute decline in utilization despite an increase in storage; (3) the estimates do not make a clear distinction between groundwater used as the sole source of irrigation and as a supplement to surface water through conjunctive use of the two sources: and (4) estimates of the CGWB for groundwater utilization – the latest of which relates to the late eighties – are much smaller (nearly half) the estimate of the Report of the National Commission for Integrated Water Resource development (the Hashim Commission).

Because of these problems, we have had to rework the utilization estimate for 1991-93. For this purpose it is assumed that, in all the 14 major basins for which data are available, the volume surface water utilization for irrigation between the two periods selected for this exercise has increased in the same proportion as the official estimate of live storage capacity of completed projects. Basin-wise estimates of groundwater utilization are taken as reported by CGWB and cited in Reddy (1992). Furthermore, since it was not possible to estimate consumptive use of irrigation water by agriculture for the 14 basins – largely because we do not have sufficiently detailed data of the basin-wise distribution of land use, crop-wise irrigated and un-irrigated areas – it was necessary to group the 14 basins into five groups.

Table 7 gives the estimated utilisation of water and consumptive use of irrigation for the five basin groups in the two periods. For the country as a whole gross utilization of irrigation from surface and groundwater, according to latest available official estimates, in the early nineties, was 523 bcm. Total consumptive use of irrigation water works out to 197 bcm implying an overall irrigation efficiency of about 38 percent.

Table 7: Estimates of the Technical Efficiency of Consumptive Use of Irrigation Water

	1966-68					1991-93				
	Utilisation			Cons. Use Efficiency		Utilisation			Cons. Use Efficiency	
	Surface	Ground	Total			Surface	Ground	Total		
	bcm	bcm	bcm	bcm	percent	bcm	bcm	bcm	bcm	percent
Basin group										
Indus	46	8.5	54.5	15.0	32.5	44	18.2	62.2	29.6	47.6
Ganges	132	41.0	173	40.3	23.3	145	49.6	194.6	84.5	43.4
Krishna, Godhavari, Mahanadhi etc	125	12.9	138	24.8	18.0	156	14.6	170.6	45.1	26.4
Cauvery etc	40	7.2	47	13.4	28.5	39.9	16.3	56.2	15.5	27.6
Tapi, Narmada, etc	17	12.7	20	7.2	36.0	28	11.4	39.4	22.1	55.4
Total	360	82.3	442.3	100.6	22.7	412.9	110.1	523	196.8	37.6

Note: bcm = Billion Cubic Meters. Cons.use = Consumptive Use.
For more details see Appendix. 5.

Between the mid-sixties and the early nineties, total consumptive use of irrigation water nearly doubled while gross utilization rose by barely 20 percent. This implies a large increase in the technical efficiency of irrigation water use in the country taken as whole from around 23 percent in the sixties to nearly 38 per cent in the early nineties.

Overall efficiency varies from 25 percent to 50 percent across the basin groups with Tapi-Narmada group showing the highest followed by Indus and then Ganges. The remaining two have roughly the same levels of efficiency. Efficiency has increased in all but one of them – it shows a marginal decline in the Cauvery group - but at very different rates: the increase is lowest in the Krishna-Godhavari group (around 40 percent) and highest in the Ganges where it has nearly doubled.

It is not possible, given lack of data and the complexity of the determinants of water use efficiency, to assess with confidence whether the above estimates give a reasonably accurate picture of water use efficiency and what factors have contributed to it. There are questions about the accuracy of reported figures for both the numerator (total consumptive use of irrigation) and the denominator (total volume of water utilized). There is reason to believe that the total area, and area under water intensive crops actually irrigated maybe larger than what is reported

in official statistics. Thus the area under sugar cane reported by the Irrigation department is invariably larger, in some cases substantially, than reported by village revenue officials. Un-authorised use of water from surface systems by pumping directly from canals and rivers, and indirectly by tapping them to recharge wells, is quite widespread. Being un-authorised, and even illegal, these are not reported as 'irrigated' in the village records. Its extent is not known though in one small river of Tamilnadu actual irrigation is estimated at twice or thrice the extent reported in official statistics. For this reason, estimates of consumptive use of irrigation based on official data on irrigated and rain-fed crop areas may have a significant downward bias. Countervailing this is the possibility that actual consumptive use rates of crops is likely, for reasons cited earlier, to be less than the potential.

On the other hand we need to allow for the possibility, for reasons cited in the appendix, that the above figures understate the quantum groundwater use and especially its growth during the last two three decades. In that case the area irrigated and, therefore, also the quantum of consumptive use to be higher than our estimates. There is also the fact that we have little by way of hard, validated information on the technical efficiency of surface irrigation and of the extent to which groundwater is used as a sole source and as a supplement to surface water. There is really no way in which we can, in the present state of knowledge, assess what the real situation and trends are. Estimates of technical efficiency of irrigation at the basin level are noisier and therefore to be interpreted with even greater caution.

Pending further analysis we may, however, note that increase in efficiency indicated by the available data is consistent with the increase in the importance of groundwater as a source of irrigation. The figures we have used – subjects to caveats mentioned above and detailed in Appendix 7 – imply that groundwater use for irrigation has increased by about a third even as that of surface water has increased by less than 15 percent. Conveyance and application losses in the use of groundwater for irrigation are much less than in surface systems especially those serving extensive areas. Technical efficiencies can be as high as high as 70-80 percent. If we assume, somewhat speculatively, that groundwater has been used at a 50 percent efficiency in both periods, the implied efficiency of surface water use works out to 33 percent in 1991-93 and around 16-17 percent in 1966-68. Whether these give a reasonably approximate indication of the efficiency of surface water use, and of improvements in it, cannot be judged without reliable estimates of the break up of groundwater use as a sole source and in conjunction with surface water on canal irrigated areas; and proper measurements of the magnitude of conveyance and application losses and sheer waste of water in surface systems.

Production efficiency

Estimates of gross value of crop production at constant prices are available for both periods from National Income Statistics. Estimates of per hectare yields under irrigated and un-irrigated conditions, based on sample crop cutting surveys, are also available but only for some important crops at the state level. Crops for which the latter information is not available can be grouped into those that are predominantly irrigated and those that are predominantly rain-fed. It is therefore possible to estimate the overall crop productivity (in terms of market value) of under irrigated and rain-fed areas for most major states. At the time of writing we have made these estimates only for 1991-93. (Details of the assumptions and procedures are set out in Appendix 8). These are presented in Table 8.

Output per hectare is invariably higher on irrigated areas than on rain-fed areas. Taking the 12 states as a whole, a hectare of irrigated area yielded, in 1991-3, around Rs. 5300 nearly 2.2 times that of un-irrigated crops (Rs. 2400 per hectare). The extent of yield differential however varied widely across states: the absolute yield differential ranging from a mere Rs. 707 in Punjab to Rs 4800 in Karnataka; and the yield ratio of irrigated to un-irrigated crops from 1.16 to 3.5.

Table 8: Output per Hectare and Per mm of consumptive use of Irrigated and Rain-fed crops 1991-93

State		Irrigated area		Unirrigated areas			Ratio of		Output/ha
	gvpi/gia	CUR it	gvpi/mm	gvpui/guia	CUR ui	gvpui/mm	output/mm	output/ha	irr -unirr
	Rs	mm	Rs	Rs	mm	Rs	irr/unirr	irr/unirr	Rs
ap	6331	659	9.6	2565	321	8.0	1.20	2.47	3766
bih	5694	462	12.3	1778	210	8.5	1.46	3.20	3916
guj	5271	629	8.4	2175	273	8.0	1.05	2.42	3096
har	4655	464	10.0	2789	255	10.9	0.92	1.67	1866
kar	6769	651	10.4	1946	260	7.5	1.39	3.48	4823
mah	6378	753	8.5	2264	320	7.1	1.20	2.82	4114
mp	3975	477	8.3	1829	324	5.6	1.48	2.17	2146
ori	4230	635	6.7	2067	236	8.8	0.76	2.05	2163
pun	5105	495	10.3	4398	303	14.5	0.71	1.16	707
raj	3545	452	7.8	1725	177	9.7	0.80	2.06	1820
tn	6582	748	8.8	2962	281	10.5	0.83	2.22	3620
up	5159	523	9.9	2429	317	7.7	1.29	2.12	2730

Note: gvpi = Gross Value of Production Irrigated. CUR it = Consumptive Use Rate irrigated total. gvpui=Gross Value of Production Unirrigated. irr = Irrigated. unirr = Unirrigated.

Since irrigated yields are higher than un-irrigated yields everywhere, one would expect that interstate variations in overall crop yields to be strongly correlated with variations in the extent of irrigation. This is indeed the case. (corr coeff 0.84). There is also a fairly high positive correlation between yield per hectare of gross cropped area on the one hand and per mm of consumptive use for total crop area on the other (Corr coeff 0.74). But the association between consumptive use rate and yield per mm of use is weak (corr coeff .14).

Inter-state variations of un-irrigated yields show a positive association with consumptive use rates but the correlation coefficient (0.41) is low and non significant. On the other hand the correlation between yield per ha and yield per mm of consumptive use (0.82) is much stronger and statistically significant. This means that higher yields tend to go with higher productivity per unit of consumptive use. The association between yield per mm of consumptive use and consumptive use rate is weakly negative (corr coeff –0.29).

In the case of irrigated areas, by contrast, per hectare yields show a strong positive relation (corr. Coeff 0.71) to the consumptive use rate and the correlation between yields and yield per mm of consumptive use (0.41) though positive is much weaker. Yields are a function not only of the quantum of consumptive use but its distribution over different phases of the crop growth cycle, and also crop patterns. One might expect that, since well irrigation permits much better regulation of quantum and timing of water allocation, areas with a higher proportion of irrigated area under wells will show a better performance in terms of both yields and yield per unit of consumptive use. This is not borne out. In fact the association between these two yield indices and the proportion of area under wells is negative though non significant. Nor is there a significant relation between the relation between the proportion of area under dry season and annual crops on the one hand and average irrigated yields and output per unit of consumptive use on the other.

Considering that irrigated areas have more water and more assured water and that this increases the scope for and efficiency of nutrient absorption, one would expect productivity per unit water in irrigated areas to be higher (and substantially so) than under rain-fed conditions. This difference should be greater in areas that depend more on groundwater irrigation. But surprisingly, our estimates belie this expectation. While yields per unit of irrigated area are higher than on un-irrigated areas, yields per unit of consumptive use are not always higher in irrigated areas. In fact they are 10 to 30 percent lower compared to un-irrigated areas. And among others, in which irrigated areas produce more per unit of consumptive use, the difference is less than 20

percent in 2 and less than 40 percent in 5. In 5 states the additional output per hectare of irrigated over un-irrigated area per unit of consumptive use of irrigation water is less than output per unit of consumptive use on rain-fed land.

Given the limited number of observations and the accuracy of the data on crop patterns as well as on the quantum and sources of water for irrigated areas, we cannot draw definitive conclusion on the above basis. Also the factors affecting yield levels and production per unit of consumptive use are more complex than common sense might suggest. Rainfall distribution, cropping patterns, differences in yield-consumptive use relations across crops and regions are some of the other factors that need to be brought in. Perhaps we ought to look at these relationships at a more disaggregated regional level and at the level of individual crops and in terms of physical biomass rather than value aggregates. These point to the directions for future research.

5. Summary and Conclusions

The purpose of this study was to focus on the huge gaps in our knowledge of how much water is 'consumed' by crops in India and how efficiently it is used and to explore possibilities of filling the gap with available data. It is shown that it is possible to do so not only in the aggregate but also by crop and region and by irrigated and un-irrigated areas. Some of the main findings are as under:

- **T**he total consumptive use of water by crops is around 660 bcm of which 55 percent is accounted by irrigated crops and the remaining by un-irrigated crops. About 53-54 percent of consumptive use by irrigated crops is contributed by irrigation.
- the consumptive use rate per unit of irrigated area (CUR) is about twice that of rain-fed crops.
- Rice, wheat and annual crops account for nearly 80 percent of total use by irrigated crops compared to less than 20 percent in the case of rain-fed crops.
- Nearly 90 percent of consumptive use on un-irrigated areas is by kharif crops compared to 38 percent of total use, and barely 16 percent of consumptive use of irrigation water, by irrigated crops.
- Regional variations in CURs are large. In un-irrigated areas these are largely a function of rainfall. On irrigated areas, the variations are a function of both rainfall and irrigation.
- The ratio of consumptive use from irrigation to gross utilization of water from surface and ground water (a measure of technical efficiency of irrigation) is

around 38 percent. It is relatively less (26-27 percent) in the basins of east flowing peninsular rivers, 40 to 50 percent in Ganges and Indus basins; and 55 percent in basins of west flowing rivers (excluding the west coast rivers)

- Proper measurements of efficiency by source are not available. Groundwater Efficiency is known to be high which is as high as 80 percent. One can estimate surface water efficiency for assumed values of groundwater efficiency. The latter is very sensitive to the assumptions.
- Estimates of source-wise efficiency need to be interpreted with caution because of the fuzziness in the source classification and well-grounded doubts about the reliability of source-wise utilization and consumptive use. There is reason to believe that both may be underestimate but in different degrees.
- Inter-state differences in output per unit of total crop area, yields are strongly correlated to the irrigation ratio (gia/gca). Higher yields go with higher more productive use of water (yield/mm of consumptive use) both overall and on un-irrigated land.
- These associations are not as pronounced in irrigated areas. Nor do the data bear out the expected influence of irrigation quality (measured by the proportion of irrigated area served by groundwater) or the proportion of high value/dry season crops on the productivity of irrigated land. Its determinants are evidently more complex than common sense would suggest.
- That productivity per unit of consumptive use on irrigated areas is lower than in rain-fed crops is a surprising finding; so is the fact that even in states where the former is higher the differential is not as striking as one would expect. Here again data limitations warrant caution in interpreting the findings and emphasise the need for further, more careful research.
- Significant changes in volume and sources of water use as well as technical efficiency of irrigation have taken place between the mid sixties and early nineties.
- Total consumptive use has increased by about 18 percent; consumptive use by un-irrigated crops has marginally declined and that of irrigated crops increased by some 90 percent overall.
- Consumptive use of both rainfall and irrigation on irrigated areas have increased by roughly the same proportion.
- CURs for total crop area has increased largely on account of the increase in the irrigation ratio.
- The rate has also increased slightly in un-irrigated areas but in irrigated areas the ratio has come down again slightly overall as well as from rainfall and irrigation.
- These changes reflect (a) a shift in the distribution of regions towards higher rates in the case of un-irrigated areas and towards lower rates in the case of irrigated areas; and (b) a sharp increase in the share of wheat a relatively less water intensive crop grown in cooler regions.

Limitations and Possible Refinements

It must be emphasized that our estimates are subject to several caveats:

- they do not cover all districts in all states; also in two or three states not for the same periods.
- The consumptive use norms are based on mean year values of rainfall and PET: Properly speaking, since both vary from year to year, we should use the parameter values estimated on the basis of values of these variables for each period.
- They do not take into account the fact that there is a considerable spread in the sowing and harvesting dates of most crops, across crops, seasons and regions; nor of the considerable changes that are known to be taking place in these respects over the last three decades and more.
- In so far as soil moisture is not, or cannot be, maintained at saturation levels, actual evapo-transpiration is likely to be less than the potential rate. This means our estimates of actual consumptive use may be less, and technical and production efficiencies greater, than estimated in this paper.

- There is also reason to believe that the official estimates of irrigated and un-irrigated areas under various crops as well as quantum of surface and groundwater utilisation are not wholly reliable and that their reliability may be deteriorating.

The fact that the estimated values are approximate does not vitiate their utility as a basis for getting a broad picture of regional variations in water use in agriculture, overall efficiency of irrigation (both in terms of the proportion of gross supplies which are effectively used by crops and of output per unit of water consumed across crops, between irrigated and un-irrigated areas). The current estimates must however be viewed as first approximations. They are being presented in order to elicit comments on the underlying assumptions and estimating procedures and suggestions for improving the estimates within the limits of available basic data. But clearly much more refined and detailed work on both methodology and estimation is essential.

Such refinements are possible by (a) computing consumptive use norms using the actual values of climate and rainfall observed in the selected periods; (b) more systematic compilation of data on the distribution of area under different crops/varieties according to sowing and harvesting dates; and (c) get an independent and objective estimate of irrigated and un-irrigated areas

under different crops or as a next best alternative of the extent of green cover at different points of time in each season. (a) is possible by using the daily weather observations made by the Indian Meteorological Department. The Cost of Cultivation surveys are a rich source of data on sowing and harvesting dates by crop and region, and under irrigated and rain-fed conditions as well as the changes in these respects over time. Satellite imagery, which is available for at least the last 30 years, can be used to compile independent estimates of irrigated and rain-fed crop areas in different seasons at different points of time. The effort in preparing this paper will be amply rewarded if it stimulates a wider body of engineers, economists and water professionals and those who collect relevant data to join together to exploit these potentials for fruitful research in this important area.

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Abbreviations

ACRs	=	Agro-Climatic Regions.
BCM	=	Billion Cubic Meters.
Con Use Rate	=	Consumptive Use Rate.
Cons Use t	=	Consumptive Use Total.
Cons Use it	=	Consumptive Use Irrigation Total.
Cons Use rf	=	Consumptive Use Rainfall.
CGWB	=	Central Ground Water Board.
CUR	=	Consumptive Use Rate.
DE&S	=	Directorate of Economics and Statistics.
EFRB M&P	=	East Flowing Rivers between Mahanadhi and Pennar.
EFRB P&KK	=	East Flowing Rivers between Pennar and Kanyakumari
ET	=	Evapo-Transpiration.
FAO	=	Food and Agricultural Organisation.
GCA	=	Gross Cropped Area.
GIA	=	Gross Irrigated Area.
GUIA	=	Gross Unirrigated Area.
GVP	=	Gross Value of Production.
GVPI	=	Gross Value of Production Irrigated.
GVPUI	=	Gross Value of Production Unirrigated.
GDP	=	Gross Domestic Product.
GOI	=	Government of India.
Ha	=	Hectare.
HYVs	=	High Yielding Varieties.
ICRISAT	=	International Crops Research Institute for Semi-Arid Tropics.
I	=	Irrigated – Irrigation.
IT	=	Irrigated Total.
KGM	=	Krishna, Godavari and Mahanadi
MCM	=	Million Cubic Meters.
MM	=	Milli Meter.
PE	=	Potential Evaporation.
PET	=	Potential Evapo-Transpiration.
RF or Rfall	=	Rainfall.
TNM	=	Tapi, Narmada and Mahe
TCM	=	Thousand Cubic Meters.
WFR of Kutch etc.	=	West Flowing Rivers of Kutch, Saurashtra including Luni.

Appendix 1: Estimates of mean rainfall and Potential Evapo-transpiration (PET)

Estimates of mean monthly rainfall and PET for various agro-climatic zones and sub-zones in the 13 states covered by this paper are presented in Table A.1.1.

These estimates, made by the (now defunct) Agro-climatic Regional Planning Unit set up by the Planning Commission on the basis of data and estimates prepared by the Indian Meteorological Department, have been reproduced from the Report of the Expert Committee on Pricing of Irrigation Water – (GOI: 1992: Annexure 7.2. Table 1).

Table A.1.2. gives the calculation of seasonwise PET, effective rainfall and moisture deficits. For this purpose the year is divided into three seasons – June 15 to October 15: October 15 to March 15 and March 15 to June 15 – Corresponding to the three main cropping seasons namely kharif, rabi and summer. Effective rainfall is taken at 80 percent of actual rainfall. Moisture from rainfall is assumed to be 80 percent of rainfall available by month and by season. When the consumptive use requirements of crops in a season month (which depends on PET and the nature of the crop) exceed the effective rainfall, irrigation will be required to ensure optimum conditions for growth of crops.

Table A 1.1: Potential Evapo-Transpiration and Rainfall by States and Agro-Climatic Regions

Sl. no.	State	Agro-climatic Zones	sub-zones	PET RF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**ANNUAL**
1	AP	10	2	PET	121	137	181	182	187	158	141	138	127	116	105	104	**1697**
				RF	5	5	6	24	66	68	94	102	135	123	58	18	**704**
			3	PET	115	131	179	190	209	177	132	127	118	122	110	105	**1715**
				RF	4	6	9	24	39	113	212	169	197	82	19	7	**881**
			4	PET	108	127	175	193	215	174	127	122	115	120	102	93	**1671**
				RF	7	9	12	21	28	150	273	218	194	76	21	7	**1016**
		11	2	PET	100	114	160	166	199	138	122	123	115	119	108	97	**1561**
				RF	10	18	13	18	49	117	152	163	182	232	89	14	**1057**
			3	PET	113	125	168	178	199	176	134	137	123	117	110	195	**1775**
				RF	4	8	10	15	48	98	173	142	152	188	89	20	**947**
			4	PET	113	123	163	171	185	170	155	153	142	120	105	105	**1705**
				RF	29	8	9	21	47	48	82	117	117	257	331	112	**1178**
2	Bihar	4	4	PET	50	70	125	168	201	159	123	116	110	112	71	48	**1353**
				RF	14	14	11	15	46	170	303	301	211	56	7	2	**1150**
			5	PET	55	77	132	168	179	134	117	113	109	112	74	52	**1322**
				RF	6	11	30	27	75	256	345	250	41	41	5	1	**1088**
			6	PET	64	90	150	195	220	167	124	113	114	117	81	60	**1495**
				RF	16	13	9	11	31	141	247	253	207	68	11	4	**1011**
		7	3	PET	76	97	154	187	196	155	115	109	104	110	86	70	**1459**
				RF	19	23	19	20	57	193	335	333	228	92	13	4	**1336**
			4	PET	70	89	138	170	192	145	108	102	102	108	80	63	**1367**
				RF	20	28	22	23	43	188	338	333	225	75	75	4	**1374**
3	Gujarat	13	2	PET	99	130	165	193	220	166	119	113	124	143	113	97	**1682**
				RF	2	1	1	2	8	163	393	228	183	33	88	1	**1103**
			3	PET	90	106	154	187	237	191	124	115	127	137	102	85	**1655**
				RF	2	1	4	1	3	105	297	224	166	20	7	4	**834**
			4	PET	87	105	161	196	241	208	143	122	136	139	99	76	**1713**
				RF	2	2	3	1	5	73	292	208	134	151	3	2	**876**
			5	PET	93	110	163	209	266	226	168	154	160	158	108	82	**1897**
				RF	2	5	3	1	6	30	163	88	46	8	2	1	**355**
			6	PET	108	122	176	208	242	202	150	138	140	151	122	103	**1862**
				RF	2	2	2	3	6	70	210	125	79	16	5	2	**522**
			7	PET	115	124	168	181	183	160	123	114	128	149	126	113	**1684**
				RF	1	2	1	2	6	112	256	123	70	18	5	2	**598**
4	Haryana	6	1	PET	41	63	115	161	213	216	157	133	133	104	60	40	**1436**
				RF	64	44	39	17	16	62	341	338	182	72	7	22	**1204**
			2	PET	46	69	119	165	216	223	166	142	140	110	64	44	**1504**
				RF	22	24	22	8	15	44	223	208	126	23	4	15	**734**
			3	PET	42	64	113	158	209	227	203	171	151	111	59	39	**1547**
				RF	11	9	16	7	20	38	140	133	87	8	4	12	**485**
5	Karnataka	10	1	PET	122	136	180	189	202	159	135	132	123	127	115	112	**1732**
				RF	4	4	8	28	50	101	162	128	157	96	32	7	**777**
			2	PET	121	137	181	182	187	158	141	138	127	116	105	104	**1697**
				RF	6	5	6	24	66	68	94	102	135	123	58	18	**705**
			5	PET	126	135	171	160	155	127	117	119	119	112	105	112	**1558**
				RF	6	7	12	56	121	74	110	106	117	171	76	21	**877**
		12	1	PET	120	126	162	167	164	121	105	106	109	123	116	117	**1536**
				RF	4	3	4	9	50	605	625	480	304	91	27	8	**2210**
			2	PET	142	141	165	151	140	111	113	119	121	119	117	129	**1568**
				RF	18	20	42	114	253	583	566	325	218	282	152	46	**2619**
			4	PET	96	101	134	127	122	96	88	92	94	92	86	89	**1217**
				RF	14	12	24	83	131	407	849	515	235	205	94	36	**2605**

Contd...

Sl. no.	State	Agro-climatic Zones	sub-zones	PET RF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**ANNUAL**
6	Kerala	12	2	PET	142	141	165	151	140	111	113	119	121	119	117	129	**1568**
				RF	18	20	42	114	253	583	566	325	218	282	152	46	**2619**
			3	PET	166	162	192	163	151	108	100	112	123	115	122	149	**1663**
				RF	4	8	25	75	174	382	568	314	156	219	100	31	**2056**
			4	PET	96	101	134	127	122	96	88	92	94	92	86	89	**1217**
				RF	14	12	24	83	131	407	849	515	235	205	94	36	**2605**
7	MP	7	1	PET	84	104	152	180	210	164	112	108	108	114	89	76	**1501**
				RF	12	21	22	19	25	194	401	371	226	67	12	8	**1378**
			2	PET	73	94	141	173	205	170	112	104	106	111	81	66	**1436**
				RF	18	21	16	18	44	249	421	393	259	72	11	5	**1527**
			5	PET	84	104	147	167	180	137	102	102	100	106	87	77	**1393**
				RF	8	10	15	30	47	181	397	313	241	80	15	11	**1348**
		8	2	PET	59	81	129	163	209	193	127	111	119	114	71	53	**1429**
				RF	29	21	8	2	5	85	334	346	137	16	17	4	**1004**
			3	PET	66	84	125	153	186	159	102	95	101	101	73	59	**1304**
				RF	24	15	33	12	8	148	456	433	217	45	5	22	**1418**
			4	PET	71	91	139	169	204	172	109	102	109	114	80	64	**1424**
				RF	23	19	19	8	21	131	351	350	205	35	15	11	**1188**
			5	PET	80	100	152	185	229	187	113	102	113	122	90	75	**1548**
				RF	18	8	10	4	9	108	372	374	211	30	15	10	**1169**
			6	PET	79	98	141	166	197	159	103	95	101	108	83	71	**1401**
				RF	11	7	18	9	13	141	326	275	230	48	18	13	**1109**
			7	PET	80	96	140	166	202	166	106	98	106	116	85	73	**1434**
				RF	15	13	13	7	10	142	430	440	251	26	12	16	**1375**
			8	PET	63	84	134	173	224	212	133	111	121	116	74	57	**1502**
				RF	16	6	7	3	8	71	305	318	169	26	8	7	**944**
		9	1	PET	102	117	163	180	194	135	103	101	102	118	104	97	**1516**
				RF	3	2	5	16	40	291	484	235	266	89	29	7	**1467**
			3	PET	94	114	166	200	253	198	130	119	122	129	98	84	**1707**
				RF	9	4	6	5	11	118	239	241	187	31	25	8	**884**
8	Maharastra	7	1	PET	84	104	152	180	210	164	112	108	108	114	89	76	**1501**
				RF	12	21	22	19	25	194	401	371	226	67	12	8	**1378**
		9	1	PET	102	117	163	180	194	135	103	101	102	118	104	97	**1516**
				RF	3	2	5	16	40	291	484	235	266	89	29	7	**1467**
			2	PET	112	127	172	191	211	155	130	125	121	132	115	106	**1697**
				RF	4	2	4	15	31	96	146	110	149	71	27	7	**662**
			3	PET	94	114	166	200	253	198	130	119	122	129	98	84	**1707**
				RF	9	4	6	5	11	118	239	241	187	31	25	8	**884**
			4	PET	112	133	182	206	252	199	126	117	118	125	106	99	**1775**
				RF	10	8	20	16	16	183	300	251	203	40	14	17	**1078**
		12	1	PET	120	126	162	167	164	121	105	106	109	123	116	117	**1536**
				RF	4	3	4	9	50	605	625	480	304	91	27	8	**2210**
9	Orissa	7	1	PET	84	104	152	180	210	164	112	108	108	114	89	76	**1501**
				RF	12	21	22	19	25	194	401	371	226	67	12	8	**1378**
			2	PET	73	94	141	173	205	170	112	104	106	111	81	66	**1436**
				RF	18	21	16	18	44	249	421	393	259	72	11	5	**1527**
			5	PET	84	104	147	167	180	137	102	102	100	106	87	77	**1393**
				RF	8	10	15	30	47	181	397	313	241	80	15	11	**1348**
		11	1	PET	92	112	162	180	230	141	119	118	113	117	99	86	**1569**
				RF	14	27	24	31	74	205	317	313	257	185	56	6	**1509**
			2	PET	100	114	160	166	199	138	122	123	115	119	108	97	**1561**
				RF	10	18	13	18	49	117	152	163	182	232	89	14	**1057**

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Sl. no.	State	Agro-climatic Zones	sub-zones	PET RF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**ANNUAL**
10	Punjab	6	1	PET	41	63	115	161	213	216	157	133	133	104	60	40	**1436**
				RF	64	44	39	17	16	62	341	338	182	72	7	22	**1204**
			2	PET	46	69	119	165	216	223	166	142	140	110	64	44	**1504**
				RF	22	24	22	8	15	44	223	208	126	23	4	15	**734**
			3	PET	42	64	113	158	209	227	203	171	151	111	59	39	**1547**
				RF	11	9	16	7	20	38	140	133	87	8	4	12	**485**
11	Rajasthan	6	3	PET	42	64	113	158	209	227	203	171	151	111	59	39	**1547**
				RF	11	9	16	7	20	38	140	133	87	8	4	12	**485**
		8	9	PET	62	80	131	167	225	210	139	121	133	122	75	58	**1523**
				RF	8	4	5	4	10	68	277	256	122	15	6	4	**779**
			10	PET	62	81	126	158	195	154	96	84	99	107	70	57	**1289**
				RF	1	0	6	0	7	89	206	206	129	0	0	13	**657**
			11	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	5	5	5	2	16	100	590	600	231	17	5	3	**1579**
			12	PET	59	79	125	159	204	178	120	102	115	112	71	55	**1379**
				RF	4	3	8	3	8	64	173	207	112	12	3	4	**601**
			13	PET	65	87	141	185	250	236	159	127	143	126	76	59	**1654**
				RF	7	8	6	3	15	47	184	204	91	12	4	5	**586**
			14	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	11	8	10	3	18	49	217	295	153	37	4	8	**813**
		9	3	PET	94	114	166	200	253	198	130	119	122	129	98	84	**1707**
				RF	9	4	6	5	11	118	239	241	187	31	25	8	**884**
		14	1	PET	68	89	146	188	251	258	199	168	165	133	80	63	**1808**
				RF	4	5	6	3	10	24	99	110	44	6	2	4	**317**
12	Tamilnadu	10	5	PET	126	135	171	160	155	127	117	119	119	112	105	112	**1558**
				RF	6	7	12	56	121	74	110	106	117	171	76	21	**877**
			6	PET	125	132	168	158	168	167	165	160	150	123	104	113	**1733**
				RF	30	12	19	64	81	47	58	87	102	184	147	69	**900**
		11	4	PET	113	123	163	171	185	170	155	153	142	120	105	105	**1705**
				RF	29	8	9	21	47	48	82	117	117	257	331	112	**1178**
			5	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	71	20	22	36	43	28	48	86	81	252	418	261	**1366**
			6	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	na	na	na	na	na	na	na	na	na	na	na	na	**na**
		12	2	PET	142	141	165	151	140	111	113	119	121	119	117	129	**1568**
				RF	18	20	42	114	253	583	566	325	218	282	152	46	**2619**
			4	PET	96	101	134	127	122	96	88	92	94	92	86	89	**1217**
				RF	14	12	24	83	131	407	849	515	235	205	94	36	**2605**
13	UP	1	4	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	78	68	71	48	58	137	366	360	195	49	15	37	**1482**
		4	1	PET	52	75	133	177	209	181	131	118	119	114	70	49	**1428**
				RF	21	16	11	8	30	159	341	329	224	64	4	6	**1213**
			2	PET	62	92	154	199	239	195	130	115	120	122	80	58	**1566**
				RF	18	12	10	5	19	92	293	300	186	55	8	5	**1003**
			3	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	na	na	na	na	na	na	na	na	na	na	na	na	**na**
		5	1	PET	57	78	134	176	211	196	130	117	121	115	71	50	**1456**
				RF	21	13	9	4	17	91	299	308	183	61	2	6	**1014**
			2	PET	48	69	121	165	210	204	143	127	129	107	62	42	**1427**
				RF	32	23	17	7	14	77	303	318	171	40	3	12	**1017**
			3	PET	54	78	135	177	223	211	144	124	132	119	72	51	**1520**
				RF	15	14	9	6	11	59	218	249	151	31	4	7	**774**

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Sl. no.	State	Agro-climatic Zones	sub-zones	PET RF	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**ANNUAL**
		8	1	PET	59	83	139	176	221	206	140	120	130	122	76	55	**1527**
				RF	18	9	8	3	8	76	279	321	170	45	7	8	**952**
14	W.Bengal	2	1	PET	31	41	69	87	83	71	71	71	63	61	42	31	**721**
				RF	16	23	46	90	171	493	710	558	378	113	20	5	**2623**
			5	PET	51	71	113	133	132	116	121	114	105	98	71	52	**1177**
				RF	16	30	74	192	361	588	605	532	429	164	23	7	**3021**
		3	1	PET	63	84	139	174	188	129	118	110	107	112	77	61	**1362**
				RF	11	13	19	38	118	256	311	254	244	122	14	1	**1401**
			2	PET	74	94	149	179	208	138	117	113	109	114	87	69	**1451**
				RF	9	17	25	41	89	217	259	290	261	117	22	3	**1350**
			3	PET	75	95	151	175	108	128	113	108	105	112	89	70	**1329**
				RF	15	18	27	48	101	280	312	319	279	133	20	3	**1555**
			4	PET	na	na	na	na	na	na	na	na	na	na	na	na	**na**
				RF	16	18	23	31	79	224	285	289	225	110	15	2	**1317**
		7	4	PET	70	89	138	170	192	145	108	102	102	108	80	63	**1367**
				RF	20	28	22	23	43	188	338	333	225	75	15	4	**1314**

Source: GOI. Report of the Committee on Pricing of Irrigation Water. PC. New Delhi. 1992. PP.394-400. Annuxure (7.2: Table 1). na = not available.

Table A 1.2 : Seasonal Distribution of PET, Rainfall and Effective Rainfall by States and Agro-climatic Zones

State	Zones	sub-zones	Seasonal factors	Kharif June-15 Oct-15	Rabi Oct-15 March15	HW Mar-15 June-15
AP	10	2	PET	543.0	615.5	538.5
			.8% of RF	341.2	120.4	101.6
		3	PET	526.5	611.5	577.0
			.8% of RF	540.4	65.2	99.2
		4	PET	511.0	577.5	582.5
			.8% of RF	638.4	70.4	104.0
	11	2	PET	488.5	558.5	514.0
			.8% of RF	537.2	202.8	105.6
		3	PET	540.5	685.5	549.0
			.8% of RF	488.0	176.0	93.6
		4	PET	595.0	587.5	522.5
			.8% of RF	374.8	490.4	77.2
Bihar	4	4	PET	484.5	357.5	511.0
			.8% of RF	742.4	56.4	121.2
		5	PET	462.0	380.0	480.0
			.8% of RF	627.6	46.8	196.0
		6	PET	493.0	428.5	573.5
			.8% of RF	649.2	66.0	93.6
	7	3	PET	460.5	461.0	537.5
			.8% of RF	830.8	91.6	146.4
		4	PET	438.5	425.0	503.5
			.8% of RF	822.0	140.4	136.8
Gujarat	13	2	PET	510.5	593.0	578.5
			.8% of RF	721.6	87.2	73.6
		3	PET	530.0	528.5	596.5
			.8% of RF	599.6	20.8	46.8
		4	PET	574.5	517.0	621.5
			.8% of RF	596.8	68.8	35.2
		5	PET	674.0	553.5	669.5
			.8% of RF	252.8	12.4	18.8
		6	PET	604.5	618.5	639.0
			.8% of RF	365.6	16.0	36.0
		7	PET	519.5	636.5	528.0
			.8% of RF	411.2	15.6	51.6
Haryana	6	1	PET	583.0	313.5	539.5
			.8% of RF	742.4	154.0	66.8
		2	PET	614.5	337.5	552.0
			.8% of RF	472.4	70.0	44.8
		3	PET	694.0	316.0	537.0
			.8% of RF	306.4	38.4	43.2
Karnataka	10	1	PET	533.0	638.5	560.5
			.8% of RF	436.4	79.2	106.0
		2	PET	543.0	615.5	538.5
			.8% of RF	341.2	121.2	101.6
		5	PET	474.5	619.5	464.0
			.8% of RF	364.4	161.2	176.0
	12	1	PET	442.0	621.5	472.5
			.8% of RF	1405.6	71.6	290.8
		2	PET	468.0	671.0	429.0
			.8% of RF	1233.2	318.4	543.6
		4	PET	368.0	485.0	364.0
			.8% of RF	1524.0	216.4	343.6
Kerala	12	2	PET	468.0	671.0	429.0
			.8% of RF	1233.2	318.4	543.6
		3	PET	446.5	752.5	464.0
			.8% of RF	1070.8	212.0	362.0
		4	PET	368.0	485.0	364.0
			.8% of RF	1524.0	216.4	343.6
MP	7	1	PET	467.0	486.0	548.0
			.8% of RF	902.8	78.0	121.6
		2	PET	462.5	440.0	533.5
			.8% of RF	986.8	79.2	155.6
		5	PET	425.5	478.5	489.0
			.8% of RF	865.2	73.2	140.0
	8	2	PET	510.5	385.5	533.0
			.8% of RF	694.0	66.4	42.8
		3	PET	428.0	395.0	481.0
			.8% of RF	962.0	84.0	88.4
		4	PET	463.0	432.5	528.5
			.8% of RF	791.2	76.0	83.2
		5	PET	482.5	482.0	583.5
			.8% of RF	820.8	56.8	57.6
		6	PET	432.5	455.5	513.0
			.8% of RF	740.4	65.6	81.2
		7	PET	451.0	462.0	521.0
			.8% of RF	964.0	60.4	75.6
		8	PET	529.0	403.0	570.0
			.8% of RF	672.4	42.8	40.0
	9	1	PET	432.5	560.5	523.0
			.8% of RF	940.0	70.4	163.2
		3	PET	534.5	537.5	635.0
			.8% of RF	593.2	51.6	62.4
MAH	7	1	PET	467.0	486.0	548.0
			.8% of RF	902.8	78.0	121.6
	9	1	PET	432.5	560.5	523.0
			.8% of RF	940.0	70.4	163.2
		2	PET	519.5	612.0	565.5
			.8% of RF	390.8	62.0	76.8
		3	PET	534.5	537.5	635.0
			.8% of RF	593.2	51.6	62.4
		4	PET	523.0	603.5	648.5
			.8% of RF	692.4	63.2	106.8

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State	Zones	sub-zones	Seasonal factors	Kharif June-15 Oct-15	Rabi Oct-15 March15	HW Mar-15 June-15
	12	1	PET	442.0	621.5	472.5
			.8% of RF	1405.6	71.6	290.8
Orissa	7	1	PET	467.0	486.0	548.0
			.8% of RF	902.8	78.0	121.6
		2	PET	462.5	440.0	533.5
			.8% of RF	986.8	79.2	155.6
		5	PET	425.5	478.5	489.0
			.8% of RF	865.2	73.2	140.0
	11	1	PET	479.0	528.5	561.5
			.8% of RF	865.6	166.0	175.6
		2	PET	488.5	558.5	514.0
			.8% of RF	537.2	202.8	105.6
Punjab	6	1	PET	583.0	313.5	539.5
			.8% of RF	742.4	154.0	66.8
		2	PET	614.5	337.5	552.0
			.8% of RF	472.4	70.0	44.8
		3	PET	694.0	316.0	537.0
			.8% of RF	306.4	38.4	43.2
Rajasthan	6	3	PET	694.0	316.0	537.0
			.8% of RF	306.4	38.4	43.2
	8	9	PET	559.0	401.5	562.5
			.8% of RF	557.2	25.6	40.4
		10	PET	409.5	386.5	493.0
			.8% of RF	468.4	13.6	43.6
		11	PET	NA	NA	NA
			.8% of RF	1183.6	23.2	56.4
		12	PET	482.0	382.5	514.5
			.8% of RF	424.0	19.2	37.6
		13	PET	610.0	420.5	623.5
			.8% of RF	406.8	26.4	35.6
		14	PET	NA	NA	NA
			.8% of RF	566.4	43.6	40.4
	9	3	PET	534.5	537.5	635.0
			.8% of RF	593.2	51.6	62.4
	14	1	PET	727.5	439.5	641.0
			.8% of RF	214.4	16.8	22.4
TN	10	5	PET	474.5	619.5	464.0
			.8% of RF	364.4	161.2	176.0
		6	PET	620.0	619.5	493.5
			.8% of RF	290.0	287.6	142.4
	11	4	PET	595.0	587.5	522.5
			.8% of RF	374.8	490.4	77.2
		5	PET	NA	NA	NA
			.8% of RF	284.0	725.6	83.2
		6	PET	484.5	357.5	511.0
			.8% of RF	742.4	56.4	121.2
	12	2	PET	468.0	671.0	429.0
			.8% of RF	1233.2	318.4	543.6
		4	PET	368.0	485.0	364.0
			.8% of RF	1524.0	216.4	343.6
UP	1	4	PET	NA	NA	NA
			.8% of RF	811.2	206.4	168.0
	4	1	PET	515.5	369.5	543.0
			.8% of RF	804.4	67.6	98.4
		2	PET	523.5	430.0	612.5
			.8% of RF	682.0	60.4	60.0
		3	PET	460.5	461.0	537.5
			.8% of RF	830.8	91.6	146.4
	5	1	PET	523.5	380.5	552.0
			.8% of RF	692.8	61.6	56.8
		2	PET	554.5	335.0	537.5
			.8% of RF	680.4	78.8	54.4
		3	PET	565.0	382.0	573.0
			.8% of RF	530.4	48.0	40.8
	8	1	PET	554.0	403.5	569.5
			.8% of RF	664.4	54.8	42.4
WB	2	1	PET	271.0	210.0	240.0
			.8% of RF	1559.2	114.8	424.4
		5	PET	447.0	350.5	379.5
			.8% of RF	1553.6	156.0	707.2
	3	1	PET	455.5	410.5	496.0
			.8% of RF	798.4	87.6	234.8
		2	PET	465.0	455.5	530.5
			.8% of RF	781.6	97.6	200.8
		3	PET	446.0	460.5	422.5
			.8% of RF	893.2	108.8	242.0
		4	PET	NA	NA	NA
			.8% of RF	772.8	94.0	186.8
	7	4	PET	438.5	425.0	503.5
			.8% of RF	822.0	92.4	136.8

Note: Wherever PET - 0.80% rainfall figure is negative, it means that PET is less than the available crop moisture requirement. In other words, the crop does not require irrigation in that season. For a few ACR zones PET are not available for all three seasons, however rainfall figures are given, so that we have taken the PET figures very close to that of similar zones for comparable purpose. NA = Not Available.

Appendix 2: Estimates of consumptive use of water (in mm per hectare) of different crop categories under irrigated and rainfed conditions in different agro climatic zones and sub zones.

Consumptive use varies depending on the nature of crop, season in which they are grown and their duration. Crops differ in all these respects and also across regions. However available information on these aspects is extremely limited. Official statistics distinguish three main crop seasons: they are Kharif (June-Oct), Rabi (Oct - March); and Summer (March - June).

They also give the seasonal distribution of area for most crops. Sugarcane and perennials consume water all through the year.

Consumptive use is not always equal to PET: it is considerably less than PET during the early stages of crop growth (when the green cover is not fully established) and during the maturity stage (when transpiration rate is relatively low).

The ratio of consumptive use to PET varies between crops. FAO has worked out this ratio under certain assumptions about sowing and harvesting dates, duration, phases of plant growth and season for a number of crops in different climatic regimes. Under Indian conditions this ratio (called the 'crop factor') varies from 0.8 to 1.2: For most seasonal crops the value ranges between 0.8 and 0.11.

For detailed discussion of the estimates and their underlying rationale see FAO, 1998).

The ratio for most crops lies in the range of 0.8 to 1. Rice is an exception: it consumes more than PET mainly because it needs standing water.

We have classified crops into the following seven groups based on crop factor and season:
Rice; wheat; cotton; sugarcane, perennials; and all other kharif and all others rabi.
The consumptive use rates are estimated by season and crop separately for irrigated and rainfed conditions.

1. Consumptive use of irrigated crops = PET in relevant season * crop factor

2.Unirrigated consumptive use is taken as PET*crop factor or 80% of rainfall whichever is less. This obviously will not take care of residual soil moisture carried over from one season to another. This could be important in several parts of the country during the rabi season. To that extent our estimates of consumptive use have a downward bias.

On the other hand, actual evaporation in the early and maturity stages of crop growth is considerably less than PET; also actual evaporation tends to fall below PET when soil moisture stock is less than the capacity. This biases our estimates of consumptive use upward.

We cannot determine, with available information, the balance between the two biases.
It seems reasonable to assume that the estimates of consumptive use are nearer, if not at, the upper limit.

There is also widespread variation in duration, sowing and harvesting dates even for a given crop in a given region, certainly across regions and possibly between irrigated and un-irrigated areas. These distributions have also been changing significantly over time. There is no way we can handle this problem now. Perhaps detailed tabulations of COCS data will give us a clear and perfect idea of these aspects and permit more refined estimates.

For the above reasons, the current estimates must be taken as gross first approximations that need to be refined using better data and more detailed analyses thereof.

Table A 2.1. Estimates of Consumptive Use Rates of Water (in MM per unit area) for Different Crop Categories under Irrigated Conditions in Different Agro-Climatic Zones and Sub Zones.

			PET				Consumptive use for Irrigated crops (mm)								
			Kharif	Rabi	HW		Crop Factor								
			June-15	Oct-15	Mar-15	Annual									
Sl.			Oct-15	March15	June-15		1.2	1.2	1.2	0.85	0.85	0.8	0.8	1.0	0.9
no.	State	AcrNo					Rice k	Rice r	Rice s	Wheat r	Cotton	Other k	Other r	Scane	Fruits
1	AP	10.2	543.0	615.5	538.5	1697.0	651.6	738.6	646.2	523.2	461.6	434.4	492.4	1697.0	1527.3
2	AP	10.3	526.5	611.5	577.0	1715.0	631.8	733.8	692.4	519.8	447.5	421.2	489.2	1715.0	1543.5
3	AP	10.4	511.0	577.5	582.5	1671.0	613.2	693.0	699.0	490.9	434.4	408.8	462.0	1671.0	1503.9
4	AP	11.2	488.5	558.5	514.0	1561.0	561.6	805.2	514.8	570.4	397.8	374.4	536.8	1568.0	1411.2
5	AP	11.3	540.5	685.5	549.0	1775.0	648.6	822.6	658.8	582.7	459.4	432.4	548.4	1775.0	1597.5
6	BIH	4.2	523.5	430.0	612.5	1566.0	628.2	516.0	735.0	365.5	445.0	418.8	344.0	1566.0	1409.4
7	BIH	7.3	460.5	461.0	537.5	1459.0	552.6	553.2	645.0	391.9	391.4	368.4	368.8	1459.0	1313.1
8	BIH	7.4	438.5	425.0	503.5	1367.0	526.2	510.0	604.2	361.3	372.7	350.8	340.0	1367.0	1230.3
9	GUJ	13.2	510.5	593.0	578.5	1682.0	612.6	711.6	694.2	504.1	433.9	408.4	474.4	1682.0	1513.8
10	GUJ	13.3	530.0	528.5	596.5	1655.0	636.0	634.2	715.8	449.2	450.5	424.0	422.8	1655.0	1489.5
11	GUJ	13.4	574.5	517.0	621.5	1713.0	689.4	620.4	745.8	439.5	488.3	459.6	413.6	1713.0	1541.7
12	GUJ	13.5	674.0	553.5	669.5	1897.0	808.8	664.2	803.4	470.5	572.9	539.2	442.8	1897.0	1707.3
13	GUJ	13.6	604.5	618.5	639.0	1862.0	725.4	742.2	766.8	525.7	513.8	483.6	494.8	1862.0	1675.8
14	GUJ	13.7	519.5	636.5	528.0	1684.0	623.4	763.8	633.6	541.0	441.6	415.6	509.2	1684.0	1515.6
15	HAR	6.1	583.0	313.5	539.5	1436.0	699.6	376.2	647.4	266.5	495.6	466.4	250.8	1436.0	1292.4
16	HAR	6.2	614.5	337.5	552.0	1504.0	737.4	405.0	662.4	286.9	522.3	491.6	270.0	1504.0	1353.6
17	HAR	6.3	694.0	316.0	537.0	1547.0	832.8	379.2	644.4	268.6	589.9	555.2	252.8	1547.0	1392.3
18	KAR	10.1	533.0	638.5	560.5	1732.0	639.6	766.2	672.6	542.7	453.1	426.4	510.8	1732.0	1558.8
19	KAR	10.2	543.0	615.5	538.5	1697.0	651.6	738.6	646.2	523.2	461.6	434.4	492.4	1697.0	1527.3
20	KAR	10.5	474.5	619.5	464.0	1558.0	569.4	743.4	556.8	526.6	403.3	379.6	495.6	1558.0	1402.2
21	KAR	12.1	442.0	621.5	472.5	1536.0	530.4	745.8	567.0	528.3	375.7	353.6	497.2	1536.0	1382.4
22	KAR	12.4	368.0	485.0	364.0	1217.0	441.6	582.0	436.8	412.3	312.8	294.4	388.0	1217.0	1095.3
23	MAH	7.1	467.0	486.0	548.0	1501.0	560.4	583.2	657.6	413.1	397.0	373.6	388.8	1501.0	1350.9
24	MAH	9.1	432.5	560.5	523.0	1516.0	519.0	672.6	627.6	476.4	367.6	346.0	448.4	1516.0	1364.4
25	MAH	9.2	519.5	612.0	565.5	1697.0	623.4	734.4	678.6	520.2	441.6	415.6	489.6	1697.0	1527.3
26	MAH	9.3	534.5	537.5	635.0	1707.0	641.4	645.0	762.0	456.9	454.3	427.6	430.0	1707.0	1536.3
27	MAH	9.4	523.0	603.5	648.5	1775.0	627.6	724.2	778.2	513.0	444.6	418.4	482.8	1775.0	1597.5
28	MAH	12.1	442.0	621.5	472.5	1536.0	530.4	745.8	567.0	528.3	375.7	353.6	497.2	1536.0	1382.4
29	MP	7.1	467.0	486.0	548.0	1501.0	560.4	583.2	657.6	413.1	397.0	373.6	388.8	1501.0	1350.9
30	MP	7.2	462.5	440.0	533.5	1436.0	555.0	528.0	640.2	374.0	393.1	370.0	352.0	1436.0	1292.4
31	MP	7.5	425.5	478.5	489.0	1393.0	510.6	574.2	586.8	406.7	361.7	340.4	382.8	1393.0	1253.7
32	MP	8.2	510.5	385.5	533.0	1429.0	612.6	462.6	639.6	327.7	433.9	408.4	308.4	1429.0	1286.1
33	MP	8.3	428.0	395.0	481.0	1304.0	513.6	474.0	577.2	335.8	363.8	342.4	316.0	1304.0	1173.6
34	MP	8.4	463.0	432.5	528.5	1424.0	555.6	519.0	634.2	367.6	393.6	370.4	346.0	1424.0	1281.6
35	MP	8.5	482.5	482.0	583.5	1548.0	579.0	578.4	700.2	409.7	410.1	386.0	385.6	1548.0	1393.2
36	MP	8.6	432.5	455.5	513.0	1401.0	519.0	546.6	615.6	387.2	367.6	346.0	364.4	1401.0	1260.9
37	MP	8.7	451.0	462.0	521.0	1434.0	541.2	554.4	625.2	392.7	383.4	360.8	369.6	1434.0	1290.6
38	MP	8.8	529.0	403.0	570.0	1502.0	634.8	483.6	684.0	342.6	449.7	423.2	322.4	1502.0	1351.8
39	MP	9.1	432.5	560.5	523.0	1516.0	519.0	672.6	627.6	476.4	367.6	346.0	448.4	1516.0	1364.4
40	MP	9.3	534.5	537.5	635.0	1707.0	641.4	645.0	762.0	456.9	454.3	427.6	430.0	1707.0	1536.3
41	ORI	7.1	467.0	486.0	548.0	1501.0	560.4	583.2	657.6	413.1	397.0	373.6	388.8	1501.0	1350.9
42	ORI	7.2	462.5	440.0	533.5	1436.0	555.0	528.0	640.2	374.0	393.1	370.0	352.0	1436.0	1292.4
43	ORI	7.5	425.5	478.5	489.0	1393.0	510.6	574.2	586.8	406.7	361.7	340.4	382.8	1393.0	1253.7
44	ORI	11.1	479.0	528.5	561.5	1569.0	574.8	634.2	673.8	449.2	407.2	383.2	422.8	1569.0	1412.1
45	ORI	11.2	488.5	558.5	514.0	1561.0	561.6	805.2	514.8	570.4	397.8	374.4	536.8	1568.0	1411.2
46	PUN	6.1	583.0	313.5	539.5	1436.0	699.6	376.2	647.4	266.5	495.6	466.4	250.8	1436.0	1292.4
47	PUN	6.2	614.5	337.5	552.0	1504.0	737.4	405.0	662.4	286.9	522.3	491.6	270.0	1504.0	1353.6
48	PUN	6.3	694.0	316.0	537.0	1547.0	832.8	379.2	644.4	268.6	589.9	555.2	252.8	1547.0	1392.3
49	RAJ	6.3	694.0	316.0	537.0	1547.0	832.8	379.2	644.4	268.6	589.9	555.2	252.8	1547.0	1392.3
50	RAJ	8.9	559.0	401.5	562.5	1523.0	670.8	481.8	675.0	341.3	475.2	447.2	321.2	1523.0	1370.7

Contd...

Sl. no.	State	Acr No	PET Kharif June-15 Oct-15	PET Rabi Oct-15 March15	PET HW Mar-15 June-15	PET Annual	Consumptive use for Irrigated crops (mm) Crop Factor 1.2 Rice k	1.2 Rice r	1.2 Rice s	0.85 Wheat r	0.85 Cotton	0.8 Other k	0.8 Other r	1.0 Scane	0.9 Fruits
51	RAJ	9.3	534.5	537.5	635.0	1707.0	641.4	645.0	762.0	456.9	454.3	427.6	430.0	1707.0	1536.3
52	RAJ	8.10	409.5	386.5	493.0	1289.0	491.4	463.8	591.6	328.5	348.1	327.6	309.2	1289.0	1160.1
53	RAJ	8.11	460.5	461.0	537.5	1459.0	552.6	553.2	645.0	391.9	391.4	368.4	368.8	1459.0	1313.1
54	RAJ	8.12	482.0	382.5	514.5	1379.0	578.4	459.0	617.4	325.1	409.7	385.6	306.0	1379.0	1241.1
55	RAJ	8.13	610.0	420.5	623.5	1654.0	732.0	504.6	748.2	357.4	518.5	488.0	336.4	1654.0	1488.6
56	RAJ	8.14	610.0	420.5	623.5	1654.0	732.0	504.6	748.2	357.4	518.5	488.0	336.4	1654.0	1488.6
57	RAJ	14.1	727.5	439.5	641.0	1808.0	873.0	527.4	769.2	373.6	618.4	582.0	351.6	1808.0	1627.2
58	TN	10.5	474.5	619.5	464.0	1558.0	569.4	743.4	556.8	526.6	403.3	379.6	495.6	1558.0	1402.2
59	TN	10.6	620.0	619.5	493.5	1733.0	744.0	743.4	592.2	526.6	527.0	496.0	495.6	1733.0	1559.7
60	TN	11.4	595.0	587.5	522.5	1705.0	714.0	705.0	627.0	499.4	505.8	476.0	470.0	1705.0	1534.5
61	TN	11.5	595.0	587.5	522.5	1705.0	714.0	705.0	627.0	499.4	505.8	476.0	470.0	1705.0	1534.5
62	TN	11.6	484.5	357.5	511.0	1353.0	714.0	705.0	627.0	499.4	505.8	476.0	470.0	1705.0	1534.5
63	TN	12.2	468.0	671.0	429.0	1568.0	561.6	805.2	514.8	570.4	397.8	374.4	536.8	1568.0	1411.2
64	TN	12.4	368.0	485.0	364.0	1217.0	441.6	582.0	436.8	412.3	312.8	294.4	388.0	1217.0	1095.3
65	UP	4.1	515.5	369.5	543.0	1428.0	618.6	443.4	651.6	314.1	438.2	412.4	295.6	1428.0	1285.2
66	UP	5.1	523.5	380.5	552.0	1456.0	628.2	456.6	662.4	323.4	445.0	418.8	304.4	1456.0	1310.4
67	UP	5.2	554.5	335.0	537.5	1427.0	665.4	402.0	645.0	284.8	471.3	443.6	268.0	1427.0	1284.3
68	UP	5.3	565.0	382.0	573.0	1520.0	678.0	458.4	687.6	324.7	480.3	452.0	305.6	1520.0	1368.0
69	UP	8.1	554.0	403.5	569.5	1527.0	664.8	484.2	683.4	343.0	470.9	443.2	322.8	1527.0	1374.3
70	WB	2.1	271.0	210.0	240.0	721.0	325.2	252.0	288.0	178.5	230.4	216.8	168.0	721.0	648.9
71	WB	3.1	455.5	410.5	496.0	1362.0	547.0	493.0	595.0	410.0	387.8	365.0	328.4	1362.0	1229.9
72	WB	3.2	465.0	455.5	530.5	1451.0	558.0	546.6	636.6	387.2	395.3	372.0	364.4	1451.0	1305.9
73	WB	3.3	446.0	460.5	422.5	1329.0	535.2	552.0	507.0	379.1	391.0	356.8	368.4	1329.0	1196.1
74	WB	3.4	465.0	455.5	530.5	1451.0	558.0	546.6	636.6	387.2	395.3	372.0	364.4	1451.0	1305.9
75	WB	7.4	438.5	425.0	503.5	1367.0	526.2	510.0	604.2	361.3	372.7	350.8	340.0	1367.0	1230.3

Note: Based on Potential Evapo-Transpiration and Effective Rainfall estimates as Given in Appendix A1.1 and A.1.2. Crop Factor Based on the Food and Agriculture Organisation, 1986.

Table A 2.2 : Estimates of Consumptive Use Rates of Water (in MM per unit area) for Different Crop Categories under Unirrigated Conditions in Different Agro-Climatic Zones and Sub Zones.

			PET ui*				Consumptive use for Unirrigated crops (mm)								
			Kharif	Rabi	HW		Crop Factor								
Sl.			June-15	Oct-15	Mar-15	Annual	**1.2**	**1.0**	**1.0**	**0.85**	**0.85**	**0.8**	**0.8**	**1.0**	**0.9**
no.	State	AcrNo	Oct-15	March15	June-15		Rice k	Rice r	Rice s	Wheat r	Cotton	Other k	Other r	Scane	Fruits
1	AP	10.2	341.2	121.2	101.6	564.0	409.4	121.2	101.6	103.0	290.0	273.0	97.0	564.0	507.6
2	AP	10.3	526.5	65.2	99.2	690.9	631.8	65.2	99.2	55.4	447.5	421.2	52.2	690.9	621.8
3	AP	10.4	511.0	70.4	104.0	685.4	613.2	70.4	104.0	59.8	434.4	408.8	56.3	685.4	616.9
4	AP	11.2	488.5	202.8	105.6	796.9	586.2	202.8	105.6	172.4	415.2	390.8	162.2	796.9	717.2
5	AP	11.3	488.0	176.0	93.6	757.6	585.6	176.0	93.6	149.6	414.8	390.4	140.8	757.6	681.8
6	BIH	4.2	523.5	60.4	60.0	643.9	628.2	60.4	60.0	51.3	445.0	418.8	48.3	643.9	579.5
7	BIH	7.3	460.5	91.6	146.4	698.5	552.6	91.6	146.4	77.9	391.4	368.4	73.3	698.5	628.7
8	BIH	7.4	438.5	92.4	136.8	667.7	526.2	92.4	136.8	78.5	372.7	350.8	73.9	667.7	600.9
9	GUJ	13.2	510.5	87.2	73.6	671.3	612.6	87.2	73.6	74.1	433.9	408.4	69.8	671.3	604.2
10	GUJ	13.3	530.0	20.8	46.8	597.6	636.0	20.8	46.8	17.7	450.5	424.0	16.6	597.6	537.8
11	GUJ	13.4	574.5	68.8	35.2	678.5	689.4	68.8	35.2	58.5	488.3	459.6	55.0	678.5	610.7
12	GUJ	13.5	252.8	12.4	18.8	284.0	303.4	12.4	18.8	10.5	214.9	202.2	9.9	284.0	255.6
13	GUJ	13.6	365.6	16.0	36.0	417.6	438.7	16.0	36.0	13.6	310.8	292.5	12.8	417.6	375.8
14	GUJ	13.7	411.2	15.6	51.6	478.4	493.4	15.6	51.6	13.3	349.5	329.0	12.5	478.4	430.6
15	HAR	6.1	583.0	154.0	66.8	803.8	699.6	154.0	66.8	130.9	495.6	466.4	123.2	803.8	723.4
16	HAR	6.2	472.4	70.0	44.8	587.2	566.9	70.0	44.8	59.5	401.5	377.9	56.0	587.2	528.5
17	HAR	6.3	306.4	38.4	43.2	388.0	367.7	38.4	43.2	32.6	260.4	245.1	30.7	388.0	349.2
18	KAR	10.1	436.4	79.2	106.0	621.6	523.7	79.2	106.0	67.3	370.9	349.1	63.4	621.6	559.4
19	KAR	10.2	341.2	121.2	101.6	564.0	409.4	121.2	101.6	103.0	290.0	273.0	97.0	564.0	507.6
20	KAR	10.5	364.4	161.2	176.0	701.6	437.3	161.2	176.0	137.0	309.7	291.5	129.0	701.6	631.4
21	KAR	12.1	442.0	71.6	290.8	804.4	530.4	71.6	290.8	60.9	375.7	353.6	57.3	804.4	724.0
22	KAR	12.4	368.0	216.4	343.6	928.0	441.6	216.4	343.6	183.9	312.8	294.4	173.1	928.0	835.2
23	MAH	7.1	467.0	78.0	121.6	666.6	560.4	78.0	121.6	66.3	397.0	373.6	62.4	666.6	599.9
24	MAH	9.1	432.5	70.4	163.2	666.1	519.0	70.4	163.2	59.8	367.6	346.0	56.3	666.1	599.5
25	MAH	9.2	390.8	62.0	76.8	529.6	469.0	62.0	76.8	52.7	332.2	312.6	49.6	529.6	476.6
26	MAH	9.3	534.5	51.6	62.4	648.5	641.4	51.6	62.4	43.9	454.3	427.6	41.3	648.5	583.7
27	MAH	9.4	523.0	63.2	106.8	693.0	627.6	63.2	106.8	53.7	444.6	418.4	50.6	693.0	623.7
28	MAH	12.1	442.0	71.6	290.8	804.4	530.4	71.6	290.8	60.9	375.7	353.6	57.3	804.4	724.0
29	MP	7.1	467.0	78.0	121.6	666.6	560.4	78.0	121.6	66.3	397.0	373.6	62.4	666.6	599.9
30	MP	7.2	462.5	79.2	155.6	697.3	555.0	79.2	155.6	67.3	393.1	370.0	63.4	697.3	627.6
31	MP	7.5	425.5	73.2	140.0	638.7	510.6	73.2	140.0	62.2	361.7	340.4	58.6	638.7	574.8
32	MP	8.2	510.5	66.4	42.8	619.7	612.6	66.4	42.8	56.4	433.9	408.4	53.1	619.7	557.7
33	MP	8.3	428.0	84.0	88.4	600.4	513.6	84.0	88.4	71.4	363.8	342.4	67.2	600.4	540.4
34	MP	8.4	463.0	76.0	83.2	622.2	555.6	76.0	83.2	64.6	393.6	370.4	60.8	622.2	560.0
35	MP	8.5	482.5	56.8	57.6	596.9	579.0	56.8	57.6	48.3	410.1	386.0	45.4	596.9	537.2
36	MP	8.6	432.5	65.6	81.2	579.3	519.0	65.6	81.2	55.8	367.6	346.0	52.5	579.3	521.4
37	MP	8.7	451.0	60.4	75.6	587.0	541.2	60.4	75.6	51.3	383.4	360.8	48.3	587.0	528.3
38	MP	8.8	529.0	42.8	40.0	611.8	634.8	42.8	40.0	36.4	449.7	423.2	34.2	611.8	550.6
39	MP	9.1	432.5	70.4	163.2	666.1	519.0	70.4	163.2	59.8	367.6	346.0	56.3	666.1	599.5
40	MP	9.3	534.5	51.6	62.4	648.5	641.4	51.6	62.4	43.9	454.3	427.6	41.3	648.5	583.7
41	ORI	7.1	467.0	78.0	121.6	666.6	560.4	78.0	121.6	66.3	397.0	373.6	62.4	666.6	599.9
42	ORI	7.2	462.5	79.2	155.6	697.3	555.0	79.2	155.6	67.3	393.1	370.0	63.4	697.3	627.6
43	ORI	7.5	425.5	73.2	140.0	638.7	510.6	73.2	140.0	62.2	361.7	340.4	58.6	638.7	574.8
44	ORI	11.1	479.0	166.0	175.6	820.6	574.8	166.0	175.6	141.1	407.2	383.2	132.8	820.6	738.5
45	ORI	11.2	488.5	202.8	105.6	796.9	586.2	202.8	105.6	172.4	415.2	390.8	162.2	796.9	717.2
46	PUN	6.1	583.0	154.0	66.8	803.8	699.6	154.0	66.8	130.9	495.6	466.4	123.2	803.8	723.4

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			PET ui*				Consumptive use for Unirrigated crops (mm)								
			Kharif	Rabi	HW		Crop Factor								
Sl.			June-15	Oct-15	Mar-15	Annual	**1.2**	**1.0**	**1.0**	**0.85**	**0.85**	**0.8**	**0.8**	**1.0**	**0.9**
no.	State	AcrNo	Oct-15	March15	June-15		Rice k	Rice r	Rice s	Wheat r	Cotton	Other k	Other r	Scane	Fruits
47	PUN	6.2	472.4	70.0	44.8	587.2	566.9	70.0	44.8	59.5	401.5	377.9	56.0	587.2	528.5
48	PUN	6.3	306.4	38.4	43.2	388.0	367.7	38.4	43.2	32.6	260.4	245.1	30.7	388.0	349.2
49	RAJ	6.3	306.4	38.4	43.2	388.0	367.7	38.4	43.2	32.6	260.4	245.1	30.7	388.0	349.2
50	RAJ	8.9	557.2	25.6	40.4	623.2	668.6	25.6	40.4	21.8	473.6	445.8	20.5	623.2	560.9
51	RAJ	9.3	534.5	51.6	62.4	648.5	641.4	51.6	62.4	43.9	454.3	427.6	41.3	648.5	583.7
52	RAJ	8.10	409.5	13.6	43.6	466.7	491.4	13.6	43.6	11.6	348.1	327.6	10.9	466.7	420.0
53	RAJ	8.11	409.5	23.2	56.4	489.1	491.4	23.2	56.4	19.7	348.1	327.6	18.6	489.1	440.2
54	RAJ	8.12	424.0	19.2	37.6	480.8	508.8	19.2	37.6	16.3	360.4	339.2	15.4	480.8	432.7
55	RAJ	8.13	406.8	26.4	35.6	468.8	488.2	26.4	35.6	22.4	345.8	325.4	21.1	468.8	421.9
56	RAJ	8.14	535.0	43.6	40.4	619.0	642.0	43.6	40.4	37.1	454.8	428.0	34.9	619.0	557.1
57	RAJ	14.1	214.4	16.8	22.4	253.6	257.3	16.8	22.4	14.3	182.2	171.5	13.4	253.6	228.2
58	TN	10.5	364.4	161.2	176.0	701.6	437.3	161.2	176.0	137.0	309.7	291.5	129.0	701.6	631.4
59	TN	10.6	290.0	287.6	142.4	720.0	348.0	287.6	142.4	244.5	246.5	232.0	230.1	720.0	648.0
60	TN	11.4	374.8	490.4	77.2	942.4	449.8	490.4	77.2	416.8	318.6	299.8	392.3	942.4	848.2
61	TN	11.5	284.0	290.0	83.2	657.2	340.8	290.0	83.2	246.5	241.4	227.2	232.0	657.2	591.5
62	TN	11.6	484.5	56.4	121.2	662.1	581.4	56.4	121.2	47.9	411.8	387.6	45.1	662.1	595.9
63	TN	12.2	468.0	318.4	429.0	1215.4	561.6	318.4	429.0	270.6	397.8	374.4	254.7	1215.4	1093.9
64	TN	12.4	368.0	216.4	343.6	928.0	441.6	216.4	343.6	183.9	312.8	294.4	173.1	928.0	835.2
65	UP	4.1	515.5	67.6	98.4	681.5	618.6	67.6	98.4	57.5	438.2	412.4	54.1	681.5	613.4
66	UP	5.1	523.5	61.6	56.8	641.9	628.2	61.6	56.8	52.4	445.0	418.8	49.3	641.9	577.7
67	UP	5.2	554.5	78.8	54.4	687.7	665.4	78.8	54.4	67.0	471.3	443.6	63.0	687.7	618.9
68	UP	5.3	530.4	48.0	40.8	619.2	636.5	48.0	40.8	40.8	450.8	424.3	38.4	619.2	557.3
69	UP	8.1	554.0	54.8	42.4	651.2	664.8	54.8	42.4	46.6	470.9	443.2	43.8	651.2	586.1
70	WB	2.1	271.0	114.8	240.0	625.8	325.2	114.8	240.0	97.6	230.4	216.8	91.8	625.8	563.2
71	WB	3.1	455.5	87.6	234.8	777.9	546.6	87.6	234.8	74.5	387.2	364.4	70.1	777.9	700.1
72	WB	3.2	465.0	97.6	200.8	763.4	558.0	97.6	200.8	83.0	395.3	372.0	78.1	763.4	687.1
73	WB	3.3	446.0	108.8	242.0	796.8	535.2	108.8	242.0	92.5	379.1	356.8	87.0	796.8	717.1
74	WB	3.4	465.0	94.0	186.8	745.8	558.0	94.0	186.8	79.9	395.3	372.0	75.2	745.8	671.2
75	WB	7.4	438.5	92.4	136.8	667.7	526.2	92.4	136.8	78.5	372.7	350.8	73.9	667.7	600.9

Note: PETui * = 0.8 % of rainfall or estimated PET when moisture deficit is not constrained. When PET = 0.8 RF - as is normally the case in autum and hot weather. Total evaporation can not exceed 0.8 RF. Therefore in the case of rice, the crop factor is taken as 1.0. Where PET ui is less than 0.8 RF (as is the case in kharif), crop factor can exceed 1.0. Therefore, for kharif rice Consumptive Use Rates are taken as PET ui X 1.2. (Strictly speaking, it shall be PET ui X 1.2 subject to a maximum level by 0.8 RF (we have not made this refinement at this stage.

Appendix 3: Estimates of irrigated and un-irrigated areas by crop groups by agro-climatic Regions 1966-8 and 1990-92

These estimates are built from district level data on land use, total and irrigated areas under different crops compiled from official publications by ICRISAT. These compilations, made freely available by that institution, greatly facilitated our task.

The present exercise covers districts in 13 major states. (Those not covered include Assam, J & K, Himachal Pradesh, and Kerala as well as the north eastern states and union territories). These states and coastal districts of Karnataka and Maharashtra have been excluded mainly because they have relatively low irrigation ratios and are relatively unimportant in the country's irrigated agriculture. Districts have been grouped by state and agro-climatic region (acr). Crop-wise estimates of area (total and irrigated) for each state-acr group are obtained by aggregating the district level data.

Crop-wise gross cropped area figures are available for many more crops than for gross irrigated area. The crop classifications also differ. For purposes of this study crops have been grouped into the following categories mainly on the basis of their relative water intensities:

Rice
- Kharif
- Rabi
- Summer

Wheat

Cotton

Other seasonal crops kharif

Other seasonal crops rabi

Sugarcane

Other annuals and perennials

Residual others

Season wise distribution of gross crop area under rice, cereals other than rice and wheat as well as pulses and oil seeds are available. Wheat is clearly a rabi crop. Cotton is taken as a kharif crop. Sugarcane, other annuals/perennials (including fruits, and plantations) consume water throughout the year. Data on annuals and perennials are however inadequate. Therefore the last two categories are merged into 'residual others' in arriving at the distribution of gross crop area.

In the case of irrigated area, season-wise figures are available for rice, total coarse cereals, total pulses and total oilseeds. Estimates for rice for 1960's distinguish between three seasons: kharif, rabi and summer. However for the 90's estimates are given for kharif and rabi combined and for summer. The former is distributed between kharif and rabi in the same proportion as reported in 1966-68.

We also have figures for irrigated area under ‘total fruits and vegetables’. This information is not available for total cropped areas. Fruits being mostly annual or perennial crops have relatively high rates of consumptive use. They are also grown mainly, if not wholly, under irrigated conditions. However, the available data are not sufficiently disaggregated to estimate the area under fruits separately. We have taken the entire irrigated area under this group as ‘annual crops’ for estimating consumptive use. This introduces an upward bias in our estimates of consumptive use on irrigated areas.

The area under ‘residual other’ is derived as the difference between total cropped (irrigated) areas and the sum of the cropped (irrigated) areas under specified crop groups. Note that this residual category covers fruits and vegetables area in the case of gross cropped area but excludes it in the case of irrigated cropped area. Because of this the ‘residual others’ in the estimated distribution of gross cropped area is considerably larger than in the distribution of irrigated area. This also accounts in part for the negative figures in this category in the irrigated area distribution.

The category ‘residual others’ consists wholly of seasonal crops. In the absence of any further information, we assume that they are grown only in the kharif or the rabi seasons and that it is distributed between the two seasons in the same proportion as the total of seasonal distribution of area under ‘coarse’ cereals, pulses and oilseeds. Information on the seasonal distribution of each of these groups is available at the state level. This is used to estimate their respective distributions within each of the constituent agro climatic regions of each state. The seasonal distribution of irrigated area under these groups is assumed, again for want of data, to be same as the distribution of the total area under these categories in each acr.

It must be noted that the above procedure assumes that the kharif - rabi- summer classification of seasons is the same for all crops and regions division. In point of fact, however, the seasons area not so clearly and sharply marked between crops and regions. There is also a considerable spread in terms of sowing and harvesting dates (and therefore of duration) of particular crops in the same region and possibly between irrigated and rain-fed areas. The pattern in all these respects are also known to vary over time on account of the introduction of shorter duration varieties and varieties with varying degrees of photo sensitivity.. Variations on account of the abovementioned factors are likely to make a difference to the estimates of consumptive use. But there is no way of judging, with currently available information, the direction and magnitude of the difference.

We recognize that the assumptions regarding seasonal distribution of crop area are grossly simplified. That there is scope and need for substantial improvement and refinement needs no emphasis. The current estimates are the best that can be done with currently available information. Though approximate it seems worthwhile to look at the pattern of spatial and temporal variations indicated by the estimates and their implications for the efficiency of water use.

Table A 3.1. Distribution of Gross Irrigated Area by Crop Groups States and Agro-climatic Zones 1966-68

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Tot. Irri-gated Area ('000 ha)
1	AP	10.2	MH	91.4	95.4	56.5	1.5	1.4	135.7	59.2	21.6	4.7	467.4
2	AP	10.3	LH	102.6	107.0	63.4	0.6	0.0	27.8	12.2	1.0	2.7	317.3
3	AP	10.4	HL	189.6	197.8	117.2	1.4	0.0	64.7	30.2	32.6	2.1	635.8
4	AP	11.2	HH	132.6	138.4	81.9	0.0	0.0	24.6	11.5	22.5	0.5	412.1
5	AP	11.3	HH	596.1	622.0	368.3	0.4	7.7	229.4	95.5	49.2	3.8	1972.4
6	BIH	4.2	HL	131.3	1389.4	33.6	423.0	0.0	87.8	68.2	33.0	86.3	2252.5
7	BIH	7.3	HL	1.2	13.1	0.3	4.7	0.0	1.2	1.5	2.0	10.5	34.5
8	BIH	7.4	HL	6.3	67.0	1.6	6.3	0.0	2.6	3.6	2.3	12.6	102.4
9	GUJ	13.2	ML	18.8	0.0	0.0	7.9	30.3	23.4	8.0	5.6	0.0	94.1
10	GUJ	13.3	ML	56.3	0.0	0.0	39.7	32.1	71.3	15.4	2.3	0.0	217.0
11	GUJ	13.4	ML	39.8	0.0	0.0	153.3	60.9	146.7	31.5	3.1	0.0	435.2
12	GUJ	13.5	LL	0.0	0.0	0.0	10.67	6.23	25.3	10.8	0.23	0.00	53.2
13	GUJ	13.6	LL	9.9	0.0	0.0	88.9	70.0	62.3	12.6	16.1	0.0	259.8
14	GUJ	13.7	LL	6.4	0.0	0.0	27.40	14.03	24.2	17.4	5.70	0.00	95.2
15	HAR	6.1	ML	9.7	0.0	0.0	17.53	0.43	27.2	21.8	6.03	1.00	83.8
16	HAR	6.2	LL	136.5	0.0	0.0	388.1	52.3	243.5	116.3	97.8	13.7	1048.2
17	HAR	6.3	LL	13.0	0.0	0.0	157.7	152.8	239.7	116.2	18.7	4.5	702.7
18	KAR	10.1	ML	84.1	49.5	5.9	15.2	42.5	73.3	77.8	51.8	31.6	431.8
19	KAR	10.2	ML	71.1	41.8	5.0	0.4	3.8	80.0	37.2	12.4	34.7	286.3
20	KAR	10.5	ML	96.2	56.7	6.8	0.0	0.3	23.7	10.8	21.3	10.0	225.7
21	KAR	12.1	HL	37.8	22.2	2.6	0.0	0.0	1.8	1.0	3.9	31.4	100.6
22	KAR	12.4	HL	109.6	64.5	7.7	0.1	0.3	12.3	6.3	6.3	9.4	216.4
23	MAH	7.1	HL	215.0	0.0	1.5	2.5	0.0	9.6	5.2	0.7	2.6	237.1
24	MAH	9.1	ML	23.3	0.0	0.2	46.2	12.1	69.8	111.7	70.9	36.3	370.4
25	MAH	9.2	ML	13.6	0.0	0.1	73.0	17.5	79.2	161.3	71.6	16.5	432.8
26	MAH	9.3	ML	12.0	0.0	0.1	81.3	16.8	70.4	112.2	22.8	38.1	353.7
27	MAH	9.4	ML	15.2	0.0	0.1	15.7	4.8	11.9	5.9	4.8	13.1	71.4
28	MAH	12.1	HL	7.4	0.0	0.1	0.0	0.0	8.3	4.4	0.4	4.2	24.8
29	MP	7.1	HL	506.2	0.0	0.0	2.2	0.0	2.4	1.4	4.4	10.1	526.8
30	MP	7.2	HL	8.1	0.0	0.0	1.7	0.0	1.3	0.7	2.0	5.2	19.0
31	MP	7.5	HL	10.2	0.0	0.0	0.03	0.00	0.4	0.2	0.73	0.93	12.5
32	MP	8.2	MH	1.1	0.0	0.0	58.4	0.0	38.8	18.4	2.3	2.3	121.3
33	MP	8.3	HL	0.6	0.0	0.0	0.20	0.00	0.0	0.0	0.73	0.67	2.2
34	MP	8.4	ML	34.3	0.0	0.0	6.7	0.0	2.5	1.3	1.0	5.0	50.7
35	MP	8.5	HL	6.7	0.0	0.0	14.4	0.0	3.4	1.8	4.3	5.1	35.6
36	MP	8.6	HL	0.0	0.0	0.0	17.7	0.3	5.8	2.9	4.6	6.5	37.8
37	MP	8.7	HL	0.4	0.0	0.0	8.3	0.0	0.7	0.4	1.1	2.5	13.4
38	MP	8.8	MH	28.2	0.0	0.0	98.0	0.0	43.5	21.1	9.0	6.0	205.7
39	MP	9.1	ML	0.0	0.0	0.0	2.20	1.20	1.5	0.8	0.17	0.20	6.1
40	MP	9.3	HL	1.3	0.0	0.0	71.2	4.6	48.9	26.5	11.1	18.3	181.8
41	ORI	7.1	HL	50.2	257.9	0.0	18.6	0.0	31.9	9.8	2.6	6.2	377.2
42	ORI	7.2	HL	13.3	68.1	0.0	8.7	0.0	24.7	7.4	1.3	1.2	124.5
43	ORI	7.5	HL	6.2	31.8	0.0	1.9	0.0	24.2	7.2	0.9	1.5	73.7
44	ORI	11.1	HL	75.0	385.0	0.0	9.8	0.0	105.3	33.8	3.9	16.5	629.3
45	ORI	11.2	HH	28.1	144.2	0.0	0.5	0.0	42.8	13.0	0.8	7.4	236.6
46	PUN	6.1	MH	76.2	0.0	0.0	95.3	4.3	50.2	25.8	26.2	10.0	288.0
47	PUN	6.2	LH	143.4	0.0	0.0	808.9	127.4	509.0	257.8	77.7	26.7	1950.8
48	PUN	6.3	LH	47.8	0.0	0.0	456.9	267.8	325.6	167.7	22.1	18.1	1306.0
49	RAJ	6.3	LH	56.7	0.0	0.0	574.7	385.1	576.3	213.7	31.2	23.1	1860.9
50	RAJ	8.9	LL	7.9	0.0	0.0	89.6	0.0	68.7	26.5	3.9	2.6	199.2

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Tot. Irri-gated Area ('000 ha)**
51	RAJ	9.3	ML	0.3	0.0	0.0	9.27	0.03	15.0	5.1	0.80	0.87	31.4
52	RAJ	8.10	ML	3.8	0.0	0.0	12.4	0.1	6.1	2.4	0.8	0.6	26.2
53	RAJ	8.11	LH	0.0	0.0	0.0	81.6	9.8	57.5	23.0	0.0	1.5	173.4
54	RAJ	8.12	MH	1.1	0.0	0.0	102.0	42.2	150.1	62.7	8.2	2.7	368.8
55	RAJ	8.13	LH	0.0	0.0	0.0	89.7	14.5	194.7	82.6	1.2	11.0	393.8
56	RAJ	8.14	LL	6.8	0.0	0.0	124.6	0.0	126.6	52.6	3.7	5.6	319.9
57	RAJ	14.1	LL	0.0	0.0	0.0	91.1	1.6	75.3	28.9	0.0	4.2	201.2
58	TN	10.5	MH	93.9	29.8	2.8	0.00	3.73	44.9	21.8	12.63	25.83	235.5
59	TN	10.6	MH	334.7	106.3	10.2	0.0	57.1	192.2	84.1	51.7	38.5	874.8
60	TN	11.4	MH	582.0	184.8	17.7	0.0	0.6	125.8	55.9	46.9	7.9	1021.5
61	TN	11.5	MH	444.6	141.2	13.5	0.00	0.00	15.9	6.1	6.10	5.63	632.9
62	TN	11.6	LH	254.0	80.7	7.7	0.0	19.9	77.2	30.0	5.3	13.5	488.2
63	TN	12.2	HH	42.2	13.4	1.3	0.00	0.00	0.3	0.0	0.00	2.17	59.4
64	TN	12.4	HL	0.0	0.0	0.0	0.00	0.00	0.0	0.0	0.00	0.73	0.7
65	UP	4.1	MH	83.4	69.5	4.9	634.6	0.0	576.4	277.7	190.2	49.1	1885.8
66	UP	5.1	ML	83.5	69.6	4.9	473.8	0.0	241.9	135.1	88.5	54.0	1151.2
67	UP	5.2	ML	110.2	91.9	6.5	710.4	29.0	268.0	235.6	403.8	42.7	1898.1
68	UP	5.3	MH	54.9	45.8	3.2	729.6	24.9	388.6	221.1	65.4	85.7	1619.2
69	UP	8.1	ML	34.3	28.6	2.0	126.3	0.0	91.8	44.8	3.5	4.6	336.1
70	WB	2.1	HL	12.3	64.4	0.9	0.2	0.0	7.3	1.3	0.0	0.0	86.4
71	WB	3.1	HL	4.8	25.0	0.4	1.0	0.0	6.8	0.3	0.1	0.0	38.3
72	WB	3.2	HL	119.1	623.8	9.2	17.6	0.0	80.1	0.6	6.9	0.0	857.3
73	WB	3.3	HH	7.7	40.3	0.6	1.5	0.0	13.4	0.0	1.1	0.0	64.5
74	WB	3.4	HH	58.7	307.6	4.5	9.2	0.0	16.1	0.2	3.7	0.0	400.1
75	WB	7.4	HL	11.2	58.4	0.9	0.0	0.0	4.2	0.3	0.0	0.0	74.9
				5672.3	5732.8	843.9	7124.2	1520.4	6561.3	3376.0	1699.0	903.5	33433.6

Table A 3.2. Distribution of Gross Unirrigated Area by Crop Groups States and Agro-climatic Zones 1966-68

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Unirrigated Area ('000 ha)
1	AP	10.2	MH	4.4	4.6	2.7	0.0	45.3	898.9	423.6	1.3	39.1	1419.9
2	AP	10.3	LH	5.3	5.5	3.3	1.2	12.5	1183.3	551.8	0.0	0.2	1763.1
3	AP	10.4	HL	27.4	28.6	16.9	7.3	83.7	1390.7	650.7	-1.8	6.9	2210.5
4	AP	11.2	HH	29.5	30.8	18.2	0.0	0.0	362.3	167.1	2.6	32.9	643.4
5	AP	11.3	HH	30.5	31.8	18.9	1.0	160.0	1671.0	785.2	0.6	98.1	2797.3
6	BIH	4.2	HL	194.7	2059.2	49.8	551.2	0.0	2243.8	919.0	101.5	50.1	6169.1
7	BIH	7.3	HL	22.8	241.6	5.8	1.4	0.0	125.1	51.4	0.6	-9.9	438.9
8	BIH	7.4	HL	69.0	730.0	17.6	9.8	0.0	366.0	156.7	0.0	-5.4	1343.8
9	GUJ	13.2	ML	64.5	0.0	0.0	15.6	303.6	303.2	143.3	0.0	10.2	840.4
10	GUJ	13.3	ML	268.9	0.0	0.0	32.7	324.1	743.7	363.1	0.1	19.8	1752.4
11	GUJ	13.4	ML	34.0	0.0	0.0	88.4	378.9	1282.4	636.1	0.0	8.3	2428.1
12	GUJ	13.5	LL	0.0	0.0	0.0	0.1	53.2	335.0	158.0	0.0	0.4	546.6
13	GUJ	13.6	LL	0.4	0.0	0.0	29.7	397.3	1709.3	816.8	-0.3	2.8	2955.9
14	GUJ	13.7	LL	-0.1	0.0	0.0	0.5	21.4	350.5	157.5	0.0	4.2	534.0
15	HAR	6.1	ML	8.5	0.0	0.0	70.7	5.4	93.2	33.8	23.3	0.9	235.8
16	HAR	6.2	LL	20.1	0.0	0.0	203.5	2.4	811.3	372.5	5.9	-8.2	1407.5
17	HAR	6.3	LL	0.1	0.0	0.0	5.2	0.8	764.1	354.3	0.0	-1.5	1123.1
18	KAR	10.1	ML	77.6	45.7	5.4	292.1	861.8	3558.0	1619.5	-0.9	-24.0	6435.3
19	KAR	10.2	ML	10.5	6.2	0.7	0.5	35.1	792.7	364.2	-0.1	-17.6	1192.1
20	KAR	10.5	ML	15.9	9.4	1.1	0.0	4.9	565.5	262.5	1.3	-3.9	856.8
21	KAR	12.1	HL	137.2	80.8	9.6	0.0	0.0	68.2	26.7	0.2	-13.0	309.8
22	KAR	12.4	HL	49.7	29.2	3.5	0.2	7.6	225.6	104.0	0.0	5.4	425.2
23	MAH	7.1	HL	270.7	0.0	1.9	68.1	30.8	404.6	187.5	0.0	-1.1	962.6
24	MAH	9.1	ML	187.2	0.0	1.3	75.1	11.2	1833.2	762.1	2.2	-29.7	2842.7
25	MAH	9.2	ML	41.4	0.0	0.3	45.4	106.9	2394.1	994.1	-2.5	-8.4	3571.3
26	MAH	9.3	ML	74.6	0.0	0.5	306.8	1702.6	3418.1	1521.6	2.4	1.6	7028.1
27	MAH	9.4	ML	59.4	0.0	0.4	132.6	776.6	1024.4	476.5	0.1	0.4	2470.4
28	MAH	12.1	HL	404.9	0.0	2.8	0.3	0.0	319.7	147.8	0.0	12.4	887.8
29	MP	7.1	HL	1608.7	0.0	0.0	89.3	0.0	953.6	435.1	2.4	2.7	3091.8
30	MP	7.2	HL	795.0	0.0	0.0	34.3	2.2	487.5	225.0	0.2	-2.2	1541.9
31	MP	7.5	HL	404.2	0.0	0.0	2.1	0.0	189.3	87.5	0.2	1.0	684.3
32	MP	8.2	MH	37.0	0.0	0.0	78.1	0.0	296.9	138.3	0.0	-1.6	548.8
33	MP	8.3	HL	111.2	0.0	0.0	44.7	0.0	202.6	94.8	0.1	-0.3	453.1
34	MP	8.4	ML	421.2	0.0	0.0	379.6	0.1	919.4	429.4	0.9	5.0	2155.6
35	MP	8.5	HL	67.3	0.0	0.0	803.6	16.4	816.0	381.0	0.4	-2.9	2081.8
36	MP	8.6	HL	42.8	0.0	0.0	90.3	9.6	501.4	233.5	0.0	-4.3	873.3
37	MP	8.7	HL	26.3	0.0	0.0	149.1	34.4	322.0	150.2	0.1	-0.2	681.8
38	MP	8.8	MH	12.2	0.0	0.0	276.3	0.0	897.9	419.2	0.7	-4.4	1602.0
39	MP	9.1	ML	18.3	0.0	0.0	1.5	23.5	194.9	91.0	0.1	-0.2	329.2
40	MP	9.3	HL	67.5	0.0	0.0	369.2	660.9	2016.7	937.6	0.4	-9.8	4042.5
41	ORI	7.1	HL	146.6	752.9	0.0	4.3	0.5	276.2	100.2	7.0	7.1	1294.9
42	ORI	7.2	HL	182.3	936.1	0.0	6.8	0.3	420.2	164.7	6.7	15.1	1732.2
43	ORI	7.5	HL	50.8	260.6	0.0	2.0	0.2	254.1	105.3	4.7	2.4	680.1
44	ORI	11.1	HL	158.5	813.7	0.0	3.3	0.2	384.9	140.0	8.3	16.3	1525.2
45	ORI	11.2	HH	30.3	155.8	0.0	0.4	0.0	180.4	79.6	2.4	-2.7	446.2
46	PUN	6.1	MH	29.2	0.0	0.0	188.2	5.4	220.9	96.4	19.2	-6.7	552.4
47	PUN	6.2	LH	17.8	0.0	0.0	209.1	2.6	331.9	126.7	3.7	-22.4	669.4
48	PUN	6.3	LH	0.3	0.0	0.0	120.5	4.8	265.9	145.5	1.3	-4.8	533.4
49	RAJ	6.3	LH	0.3	0.0	0.0	136.6	4.9	800.1	433.4	0.9	-19.3	1356.9
50	RAJ	8.9	LL	0.7	0.0	0.0	113.7	0.0	362.0	175.0	-0.2	-2.0	649.1

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Unirrigated Area ('000 ha)**
51	RAJ	9.3	ML	0.6	0.0	0.0	20.9	23.4	163.6	78.6	0.2	-0.7	286.6
52	RAJ	8.10	ML	53.0	0.0	0.0	10.1	19.5	178.6	84.1	0.8	-0.6	345.4
53	RAJ	8.11	LH	0.0	0.0	0.0	-7.4	2.4	436.1	208.5	0.0	-1.0	638.6
54	RAJ	8.12	MH	13.0	0.0	0.0	41.3	22.3	476.3	230.9	0.5	-1.8	782.5
55	RAJ	8.13	LH	0.1	0.0	0.0	76.8	2.9	865.9	411.9	1.0	-8.3	1350.2
56	RAJ	8.14	LL	4.6	0.0	0.0	96.7	0.1	900.8	428.1	1.4	-4.2	1427.4
57	RAJ	14.1	LL	0.0	0.0	0.0	26.0	0.3	4650.5	2192.7	0.1	-3.8	6865.8
58	TN	10.5	MH	0.4	0.1	0.0	0.1	6.1	477.1	210.2	0.0	-15.1	679.0
59	TN	10.6	MH	19.6	6.2	0.6	0.2	69.0	880.0	408.5	0.1	13.3	1397.3
60	TN	11.4	MH	61.5	19.5	1.9	0.0	2.0	446.9	209.1	0.0	20.7	761.4
61	TN	11.5	MH	17.8	5.6	0.5	0.0	0.3	111.3	52.8	0.0	9.3	197.6
62	TN	11.6	LH	54.4	17.3	1.7	0.0	135.9	346.3	165.8	0.0	2.2	723.6
63	TN	12.2	HH	-0.1	0.0	0.0	0.0	0.0	36.2	9.8	0.0	7.3	53.1
64	TN	12.4	HL	2.2	0.7	0.1	0.1	0.0	35.5	11.9	0.0	0.3	50.8
65	UP	4.1	MH	989.1	824.9	58.2	309.6	0.0	1423.8	630.1	89.9	-36.2	4289.5
66	UP	5.1	ML	507.5	423.2	29.9	403.2	0.0	1594.0	694.7	112.4	-20.5	3744.3
67	UP	5.2	ML	208.4	173.8	12.3	488.4	5.0	1091.6	382.4	118.0	-16.1	2463.9
68	UP	5.3	MH	82.9	69.1	4.9	250.1	1.6	1413.7	583.9	16.3	-63.3	2359.2
69	UP	8.1	ML	10.4	8.7	0.6	336.8	0.0	862.8	401.9	0.2	-3.1	1618.3
70	WB	2.1	HL	29.6	155.1	2.3	1.3	0.0	128.9	61.1	0.3	0.4	379.1
71	WB	3.1	HL	93.2	488.1	7.2	5.5	0.0	242.3	113.8	4.3	0.3	954.7
72	WB	3.2	HL	207.4	1086.2	16.0	31.0	0.0	523.2	245.9	9.5	1.8	2121.0
73	WB	3.3	HH	89.3	467.8	6.9	1.0	0.0	97.5	39.2	0.5	13.2	715.4
74	WB	3.4	HH	47.1	246.5	3.6	8.9	0.0	61.6	27.2	2.2	0.1	397.2
75	WB	7.4	HL	28.7	150.0	2.2	0.2	0.0	28.9	13.1	0.4	0.1	223.6
				8858.3	10365.5	309.6	7142.9	6383.2	58005.9	26292.9	554.1	31.2	117943.6

Table A 3.3. Distribution of Gross Irrigated Area by Crop Groups States and Agro-climatic Zones 1991-93

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Tot. Irrigated Area ('000 ha)
1	AP	10.2	MH	75.54	78.82	54.12	0.5	9.72	195.9	88.1	24.5	3.1	530.2
2	AP	10.3	LH	140.85	146.96	100.91	2.1	4.57	90.4	41.5	2.9	2.3	532.5
3	AP	10.4	HL	241.02	251.47	172.68	4.9	42.97	273.0	122.5	45.8	2.2	1156.5
4	AP	11.2	HH	133.30	139.08	95.50	0.0	0.08	63.6	27.6	38.7	1.1	499.1
5	AP	11.3	HH	678.59	708.02	486.17	0.1	41.28	318.9	146.7	57.1	5.8	2442.7
6	Bihar	4.2	HL	126.97	1343.13	30.77	1616.6	0.00	293.9	252.5	12.7	69.3	3745.9
7	Bihar	7.3	HL	0.14	1.47	0.03	12.5	0.00	5.9	8.8	1.8	4.9	35.4
8	Bihar	7.4	HL	5.02	53.06	1.22	20.5	0.00	7.0	10.5	1.1	15.5	113.8
9	Gujrat	13.2	ML	42.30			15.3	17.30	28.0	10.1	126.9	27.8	267.6
10	Gujrat	13.3	ML	212.30			85.6	62.47	227.8	65.9	36.2	82.9	773.2
11	Gujrat	13.4	ML	95.34			212.9	56.47	654.9	192.0	1.4	43.9	1256.8
12	Gujrat	13.5	LL	0.00			10.83	6.90	72.8	26.2	0.30	5.23	122.2
13	Gujrat	13.6	LL	0.77			89.8	205.63	149.3	41.8	11.0	32.8	531.1
14	Gujrat	13.7	LL	0.60			41.43	14.77	30.6	7.3	8.27	10.53	113.5
15	HAR	6.1	ML	101.67			130.33	0.00	13.7	17.4	46.00	6.89	316.0
16	HAR	6.2	LL	526.7	0.0	0.0	1150.7	70.3	287.4	250.6	81.3	16.4	2383.4
17	HAR	6.3	LL	68.00			603.0	461.67	313.3	281.5	5.0	10.8	1743.2
18	KAR	10.1	ML	119.08	70.09	53.14	79.3	137.09	587.9	344.1	185.8	39.4	1615.9
19	KAR	10.2	ML	78.53	46.22	35.04	0.5	10.58	198.2	96.5	15.3	22.2	503.1
20	KAR	10.5	ML	117.68	69.26	52.51	0.1	2.38	57.6	27.8	55.8	5.3	388.4
21	KAR	12.1	HL	30.94	18.21	13.81	0.0	0.00	31.6	17.0	5.5	10.8	127.8
22	KAR	12.4	HL	75.30	44.32	33.60	0.0	0.91	35.1	18.0	18.8	2.8	228.9
23	MAH	7.1	HL	316.73			12.2	0.03	10.6	5.6	1.8	7.1	354.1
24	MAH	9.1	ML	20.97			126.6	1.37	120.1	182.6	192.0	110.5	754.1
25	MAH	9.2	ML	9.00			108.7	13.90	192.6	251.5	151.1	51.7	778.5
26	MAH	9.3	ML	7.97			189.1	50.73	273.6	307.2	122.3	129.3	1080.1
27	MAH	9.4	ML	24.97			67.5	1.67	55.4	28.1	22.5	42.5	242.7
28	MAH	12.1	HL	15.93			0.1	0.00	10.8	5.4	0.1	21.9	54.2
29	MP	7.1	HL	1039.09			31.3	0.01	9.2	4.9	3.6	23.6	1111.8
30	MP	7.2	HL	35.0	0.0	0.0	38.2	0.0	5.1	2.5	1.9	12.1	94.7
31	MP	7.5	HL	20.74			0.93	0.00	0.6	0.3	0.20	2.43	25.2
32	MP	8.2	MH	0.07			234.2	0.00	62.8	31.3	3.0	7.0	338.3
33	MP	8.3	HL	4.25			8.87	0.00	1.0	0.5	3.34	1.11	19.1
34	MP	8.4	ML	40.91			280.3	0.00	28.6	13.8	1.1	11.5	376.2
35	MP	8.5	HL	4.14			343.8	0.00	97.4	46.4	6.2	8.2	506.2
36	MP	8.6	HL	0.00			107.6	0.21	15.0	7.6	8.2	13.8	152.4
37	MP	8.7	HL	0.71			223.3	1.72	102.9	49.4	5.6	4.4	388.1
38	MP	8.8	MH	27.03			409.6	0.00	193.7	94.2	9.8	7.5	741.9
39	MP	9.1	ML	0.03			29.27	3.53	15.7	7.6	0.05	0.54	56.7
40	MP	9.3	HL	0.4	0.0	0.0	591.4	127.0	309.6	160.0	19.9	49.6	1257.9
41	ORI	7.1	HL	61.65	316.58	21.55	8.6	0.00	138.2	54.7	12.1	111.4	724.8
42	ORI	7.2	HL	42.5	218.5	14.9	6.2	0.0	192.0	67.2	7.8	74.9	624.1
43	ORI	7.5	HL	14.8	75.8	5.2	1.4	0.0	62.1	21.8	4.9	27.8	213.8
44	ORI	11.1	HL	103.00	528.91	36.00	5.2	0.00	344.9	128.9	11.8	151.4	1310.0
45	ORI	11.2	HH	30.18	154.99	10.55	0.1	0.00	47.2	18.5	5.8	40.7	308.0
46	PUN	6.1	MH	259.17			347.0	0.13	73.9	42.3	35.2	20.3	778.0
47	PUN	6.2	LH	1381.4	0.0	0.0	1682.6	49.1	346.5	207.2	51.1	40.7	3758.5
48	PUN	6.3	LH	450.8	0.0	0.0	1140.0	604.4	261.1	134.5	8.4	19.6	2618.7
49	RAJ	6.3	LH	467.4	0.0	0.0	1470.4	1010.3	560.4	245.9	11.4	26.6	3792.5
50	RAJ	8.9	LL	21.60			210.5	0.00	214.4	96.4	9.0	4.8	556.6

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Tot. Irrigated Area ('000 ha)**
51	RAJ	9.3	ML	0.03			44.05	0.09	52.0	22.1	0.46	2.06	120.8
52	RAJ	8.10	ML	3.6	0.0	0.0	71.8	0.1	23.1	10.8	1.5	0.5	111.4
53	RAJ	8.11	LH	0.0	0.0	0.0	92.4	18.0	141.4	65.1	0.0	2.8	319.8
54	RAJ	8.12	MH	0.7	0.0	0.0	264.5	18.7	206.0	94.4	9.5	4.4	598.2
55	RAJ	8.13	LH	0.0	0.0	0.0	293.8	7.0	277.1	127.6	0.6	19.4	725.5
56	RAJ	8.14	LL	2.5	0.0	0.0	340.5	2.7	254.7	119.0	0.7	14.2	734.2
57	RAJ	14.1	LL	0.00			235.1	24.04	576.7	259.0	0.1	13.9	1108.8
58	TN	10.5	MH	82.74	26.40	14.89	0.00	12.78	89.0	36.9	28.38	33.76	324.8
59	TN	10.6	MH	274.40	87.14	51.27	0.0	35.29	242.0	85.0	60.9	70.0	906.0
60	TN	11.4	MH	407.81	129.51	76.20	0.0	12.77	190.0	80.1	99.2	37.1	1032.8
61	TN	11.5	HH	346.97	110.18	64.83	0.00	4.85	25.9	11.3	20.48	7.27	591.8
62	TN	11.6	LH	193.73	61.52	36.20	0.0	21.59	58.4	16.3	12.1	31.3	431.2
63	TN	12.2	HH	26.18	8.31	4.89	0.00	0.00	3.5	0.7	0.00	4.01	47.6
64	TN	12.4	HL	0.10	0.03	0.02	0.00	0.00	0.1	0.0	0.00	0.34	0.6
65	UP	4.1	MH	389.91	325.19	0.43	2263.0	0.00	182.6	91.3	231.9	138.2	3622.5
66	UP	5.1	ML	534.65	445.89	0.59	1892.3	0.00	154.1	86.1	215.1	149.0	3477.7
67	UP	5.2	ML	379.24	316.29	0.42	1663.7	4.47	517.4	334.6	1025.7	164.7	4406.5
68	UP	5.3	MH	160.67	134.00	0.18	1626.6	6.41	717.1	375.1	63.0	213.6	3296.7
69	UP	8.1	ML	33.00	27.53	0.04	456.5	0.00	142.7	68.3	4.3	8.7	741.1
70	WB	2.1	HL	0.37	1.92	0.28	3.0	0.00	95.4	0.1	0.0	2.2	103.4
71	WB	3.1	HL	4.18	21.87	3.19	2.6	0.00	4.4	0.5	0.0	0.4	37.1
72	WB	3.2	HL	100.31	525.24	76.60	53.5	0.00	260.7	20.1	4.1	33.8	1074.4
73	WB	3.3	HH	5.38	28.20	4.11	4.6	0.00	27.5	1.8	0.2	2.8	74.6
74	WB	3.4	HH	36.50	191.14	27.88	23.0	0.00	69.9	14.7	1.6	10.6	375.4
75	WB	7.4	HL	0.40	2.11	0.31	3.0	0.00	25.1	0.3	0.4	0.7	32.3
ALL STATES				10254.4	6707.3	1580.0	21086.1	3178.0	12018.6	6232.3	3272.4	2410.7	66739.7

Table A 3.4. Distribution of Gross Unirrigated Area by Crop Groups States and Agro-climatic Zones 1991-93

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Unirrigated Area ('000 ha)
1	AP	10.2	MH	2.15	2.24	1.54	-0.2	9.3	934.9	434.9	2.6	62.0	1449.6
2	AP	10.3	LH	2.73	2.85	1.96	0.1	71.6	788.5	361.9	-0.8	13.8	1242.7
3	AP	10.4	HL	25.16	26.25	18.02	1.7	269.1	880.8	413.4	-6.7	53.9	1681.7
4	AP	11.2	HH	26.31	27.45	18.85	0.0	0.1	454.4	207.1	11.2	73.2	818.6
5	AP	11.3	HH	13.49	14.08	9.67	0.5	297.6	1359.0	607.7	7.4	215.2	2524.7
6	Bihar	4.2	HL	159.77	1690.14	38.72	239.5	0.2	1322.5	391.2	107.7	59.9	4009.6
7	Bihar	7.3	HL	17.44	184.49	4.23	0.9	0.0	69.2	16.0	0.0	-4.7	287.6
8	Bihar	7.4	HL	64.15	678.66	15.55	5.5	0.0	239.9	83.4	0.1	-11.2	1076.1
9	Gujrat	13.2	ML	57.8	0.0	0.0	8.8	73.3	337.8	156.5	0.0	-9.2	625.0
10	Gujrat	13.3	ML	243.03			28.6	103.6	658.1	335.1	0.0	-28.7	1339.8
11	Gujrat	13.4	ML	18.93			55.3	218.7	1054.4	596.5	0.0	-29.6	1914.1
12	Gujrat	13.5	LL	0.00			0.0	37.6	284.7	141.2	0.0	-1.7	461.8
13	Gujrat	13.6	LL	0.00			8.8	378.1	1638.1	788.0	0.0	-23.6	2789.3
14	Gujrat	13.7	LL	0.00			0.0	15.2	349.7	170.0	0.0	-3.5	531.4
15	HAR	6.1	ML	2.70			24.5	0.7	71.1	18.0	4.6	-5.9	115.7
16	HAR	6.2	LL	0.5			11.8	-0.3	355.6	38.7	0.3	-8.7	397.9
17	HAR	6.3	LL	0.26			0.7	1.5	630.8	158.9	0.1	-2.4	789.8
18	KAR	10.1	ML	69.82	41.13	31.16	139.5	325.8	3631.0	1600.9	0.8	-20.6	5819.5
19	KAR	10.2	ML	7.63	4.51	3.40	0.1	23.1	1139.6	514.8	0.0	27.7	1720.8
20	KAR	10.5	ML	0.73	0.45	0.33	0.0	44.4	649.9	297.3	0.0	0.9	994.0
21	KAR	12.1	HL	86.65	51.02	38.66	0.0	6.4	55.5	20.0	0.0	43.5	301.6
22	KAR	12.4	HL	62.25	36.66	27.78	0.4	45.0	318.7	145.5	0.5	11.9	648.7
23	MAH	7.1	HL	307.20			30.8	60.8	311.3	140.5	-0.3	-5.6	844.6
24	MAH	9.1	ML	227.37			28.3	0.4	1745.8	643.9	-23.8	-78.2	2543.8
25	MAH	9.2	ML	46.77			45.2	59.3	2181.7	851.4	-31.9	-25.8	3126.7
26	MAH	9.3	ML	87.23			55.0	1547.4	4386.7	1858.8	-21.5	-33.2	7880.3
27	MAH	9.4	ML	55.47			29.2	837.2	1060.5	486.2	-5.1	-10.2	2453.2
28	MAH	12.1	HL	436.03			-0.1	0.0	264.9	120.7	0.0	33.9	855.5
29	MP	7.1	HL	1446.51			65.4	0.0	934.7	418.7	-0.4	-9.7	2855.2
30	MP	7.2	HL	959.4			39.0	0.0	462.0	208.1	-0.3	-9.3	1659.0
31	MP	7.5	HL	569.93			0.9	0.0	205.8	93.2	0.3	-0.2	870.1
32	MP	8.2	MH	44.89			51.0	0.0	339.2	153.8	-0.8	-6.5	581.6
33	MP	8.3	HL	154.59			61.0	0.0	198.2	92.6	-1.9	-0.9	503.7
34	MP	8.4	ML	553.49			425.9	0.0	837.1	385.6	1.2	-1.3	2202.0
35	MP	8.5	HL	69.79			579.9	4.4	1072.9	499.3	-2.7	-7.0	2216.6
36	MP	8.6	HL	49.83			27.3	10.6	560.9	259.0	-4.9	-8.3	894.5
37	MP	8.7	HL	20.86			16.3	18.7	412.6	190.7	-2.8	-2.6	653.9
38	MP	8.8	MH	5.54			186.9	0.0	931.0	431.6	-4.1	-6.2	1544.7
39	MP	9.1	ML	28.33			1.7	13.1	245.5	114.9	0.3	-0.4	403.5
40	MP	9.3	HL	55.8			34.4	323.3	2793.2	1285.4	-9.7	-26.9	4455.5
41	ORI	7.1	HL	108.32	556.23	37.86	0.0	0.5	670.8	232.1	-1.9	-58.8	1545.1
42	ORI	7.2	HL	142.0	729.2	49.7	0.0	2.4	733.8	261.9	0.0	-0.8	1918.2
43	ORI	7.5	HL	53.7	275.7	18.8	0.0	1.8	456.3	185.0	0.0	-8.0	983.3
44	ORI	11.1	HL	110.86	569.29	38.75	0.0	0.0	531.9	149.5	-0.1	-58.2	1342.1
45	ORI	11.2	HH	20.37	104.59	7.12	0.0	0.6	310.6	121.2	0.0	-10.5	554.0
46	PUN	6.1	MH	13.83			102.4	0.3	122.7	45.1	4.4	3.4	292.0
47	PUN	6.2	LH	2.3			11.1	0.1	81.5	-23.7	0.5	-13.9	57.8
48	PUN	6.3	LH	0.23			1.6	4.2	14.9	34.1	0.0	6.1	61.3
49	RAJ	6.3	LH	0.34			17.1	5.4	461.6	233.8	0.0	-22.0	696.2
50	RAJ	8.9	LL	0.15			16.1	0.0	338.6	161.7	0.0	-4.2	512.3

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Tot. Irrigated Area ('000 ha)**
51	RAJ	9.3	ML	0.23			3.2	1.0	210.4	100.9	0.0	-0.9	314.8
52	RAJ	8.10	ML	76.1			9.8	8.3	197.8	92.9	1.1	-0.3	385.6
53	RAJ	8.11	LH	0.02			5.9	0.0	393.8	185.5	0.0	-2.3	583.0
54	RAJ	8.12	MH	15.8			1.1	1.8	628.8	296.4	-0.7	-3.7	939.5
55	RAJ	8.13	LH	0.07			48.8	0.8	930.4	432.5	0.1	-14.9	1397.8
56	RAJ	8.14	LL	3.0			13.7	0.1	859.7	398.9	0.0	-12.0	1263.4
57	RAJ	14.1	LL	0.00			17.5	0.0	5199.3	2452.8	0.0	-12.4	7657.2
58	TN	10.5	MH	1.4	0.3	0.8	0.0	21.6	562.3	241.5	4.5	-6.5	825.9
59	TN	10.6	MH	11.6	3.7	2.2	0.0	47.4	750.6	361.8	5.7	22.1	1205.1
60	TN	11.4	MH	24.26	7.70	4.53	0.0	8.3	496.1	230.5	3.0	18.1	792.5
61	TN	11.5	HH	11.90	3.78	2.22	0.0	0.4	144.7	68.2	-1.4	8.2	238.1
62	TN	11.6	LH	70.8	22.5	13.2	0.0	95.1	226.2	113.7	2.1	0.3	544.0
63	TN	12.2	HH	0.71	0.23	0.13	0.0	0.0	40.9	15.6	0.0	4.2	61.8
64	TN	12.4	HL	1.11	0.35	0.21	0.0	0.0	48.8	19.9	0.0	1.3	71.7
65	UP	4.1	MH	966.07	805.70	1.06	242.6	0.0	985.0	398.8	82.4	-64.5	3417.2
66	UP	5.1	ML	272.49	227.25	0.30	103.7	0.0	976.8	384.2	116.2	-60.7	2020.3
67	UP	5.2	ML	24.70	20.60	0.03	57.2	1.1	542.2	113.0	53.0	-75.3	736.6
68	UP	5.3	MH	36.03	30.05	0.04	11.0	0.4	977.2	346.3	10.3	-167.5	1243.8
69	UP	8.1	ML	12.89	10.75	0.01	168.5	0.0	842.8	390.1	0.2	-7.5	1417.7
70	WB	2.1	HL	44.17	231.28	33.73	12.7	0.0	84.8	78.1	0.1	1.7	486.5
71	WB	3.1	HL	94.17	493.11	71.92	68.6	0.0	246.4	101.1	2.4	27.4	1105.2
72	WB	3.2	HL	244.02	1277.70	186.35	114.4	0.0	534.6	287.6	6.4	0.6	2651.6
73	WB	3.3	HH	91.6	479.8	70.0	4.8	0.0	132.0	72.8	0.6	2.7	854.3
74	WB	3.4	HH	66.4	347.5	50.7	4.7	0.0	48.4	23.1	0.6	-7.4	533.8
75	WB	7.4	HL	34.85	182.48	26.61	-0.2	0.0	16.2	12.8	0.1	1.2	274.0
ALL STATES				8537.1	9139.7	826.0	3240.8	4997.8	55967.4	24351.2	309.4	-301.3	107068.1

Appendix 4: Estimates of total and per hectare consumptive use by region

For each crop group and region the consumptive use by irrigated crops and its distribution between rainfall and irrigation is the product of the area under the crop(as given in Appendix 3) and the consumptive use parameters (given in Appendix 2). The sum of the crop group-wise estimates in each region gives the total consumptive use (and its break up between rainfall and irrigation) for that region. Per hectare consumptive used is the ratio of total consumptive use to total gross irrigated area.

Consumptive use of rain-fed areas is estimated in the same manner.

The attached tables give estimates, by state and acr, for 1966-68 and 1991-93.

Table A.4.1. Total Consumptive Use (MCM) of Irrigated Crops, 1966-68

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Total Con. Use
1	AP	10.2	MH	595.8	704.6	365.1	7.8	6.5	589.5	291.3	366.6	72.3	2999.5
2	AP	10.3	LH	648.0	785.2	438.8	3.3	0.0	117.2	59.7	17.2	42.2	2111.5
3	AP	10.4	HL	1162.8	1371.1	819.0	7.0	0.0	264.7	139.5	545.3	32.1	4341.4
4	AP	11.2	HH	744.7	1114.1	421.8	0.0	0.0	92.2	62.0	352.3	7.5	2794.5
5	AP	11.3	HH	3866.4	5116.3	2426.5	2.3	35.5	991.9	523.6	873.3	60.2	13896.0
6	BIH	4.2	HL	825.1	7169.4	246.8	1546.1	0.0	367.5	234.5	516.8	1215.8	12122.0
7	BIH	7.3	HL	6.8	72.5	2.0	18.3	0.0	4.3	5.5	29.2	138.3	276.9
8	BIH	7.4	HL	33.3	341.9	9.8	22.9	0.0	9.1	12.1	31.9	154.7	615.7
9	GUJ	13.2	ML	115.2	0.0	0.0	39.7	131.6	95.6	38.1	94.8	0.0	514.9
10	GUJ	13.3	ML	357.9	0.0	0.0	178.2	144.8	302.2	65.0	38.6	0.0	1086.6
11	GUJ	13.4	ML	274.4	0.0	0.0	673.8	297.2	674.1	130.2	52.5	0.0	2102.3
12	GUJ	13.5	LL	0.0	0.0	0.0	50.2	35.7	136.2	48.0	4.4	0.0	274.5
13	GUJ	13.6	LL	72.1	0.0	0.0	467.2	359.7	301.2	62.3	300.4	0.0	1562.8
14	GUJ	13.7	LL	39.9	0.0	0.0	148.2	62.0	100.7	88.6	96.0	0.0	535.4
15	HAR	6.1	ML	68.1	0.0	0.0	46.7	2.1	127.1	54.6	86.6	12.9	398.2
16	HAR	6.2	LL	1006.8	0.0	0.0	1113.3	273.0	1197.0	313.9	1471.4	185.4	5560.9
17	HAR	6.3	LL	108.3	0.0	0.0	423.7	901.2	1330.9	293.7	289.8	63.1	3410.6
18	KAR	10.1	ML	538.0	379.4	39.7	82.5	192.4	312.6	397.5	897.2	493.1	3332.4
19	KAR	10.2	ML	463.0	309.0	32.2	1.9	17.4	347.4	183.2	209.9	530.2	2094.2
20	KAR	10.5	ML	547.9	421.2	37.6	0.0	1.2	89.8	53.4	331.3	140.7	1623.2
21	KAR	12.1	HL	200.3	165.8	15.0	0.0	0.0	6.2	4.8	59.9	433.9	885.9
22	KAR	12.4	HL	483.9	375.5	33.6	0.3	0.9	36.2	24.3	76.3	102.9	1134.0
23	MAH	7.1	HL	1205.1	0.0	9.8	10.5	0.0	35.7	20.2	11.0	34.7	1326.9
24	MAH	9.1	ML	120.8	0.0	1.0	220.1	44.5	241.6	500.9	1074.3	494.8	2698.0
25	MAH	9.2	ML	85.0	0.0	0.6	379.9	77.3	329.1	789.7	1214.5	252.5	3128.6
26	MAH	9.3	ML	77.3	0.0	0.6	371.3	76.5	301.0	482.5	388.6	585.8	2283.6
27	MAH	9.4	ML	95.2	0.0	0.8	80.7	21.3	49.8	28.5	84.6	208.7	569.6
28	MAH	12.1	HL	39.2	0.0	0.3	0.0	0.0	29.5	21.7	6.7	58.5	155.8
29	MP	7.1	HL	2836.7	0.0	0.0	9.2	0.0	8.9	5.4	66.5	136.9	3063.7
30	MP	7.2	HL	45.0	0.0	0.0	6.2	0.0	4.8	2.5	29.2	67.2	154.9
31	MP	7.5	HL	52.3	0.0	0.0	0.1	0.0	1.3	0.8	10.2	11.7	76.4
32	MP	8.2	MH	6.5	0.0	0.0	191.3	0.0	158.6	56.8	32.9	30.0	476.1
33	MP	8.3	HL	3.1	0.0	0.0	0.7	0.0	0.1	0.0	9.6	7.8	21.3
34	MP	8.4	ML	190.4	0.0	0.0	24.5	0.0	9.4	4.5	14.2	63.7	306.7
35	MP	8.5	HL	38.6	0.0	0.0	58.9	0.0	13.0	6.9	66.0	71.5	254.8
36	MP	8.6	HL	0.2	0.0	0.0	68.5	1.0	20.0	10.5	64.4	82.0	246.6
37	MP	8.7	HL	2.0	0.0	0.0	32.7	0.1	2.5	1.4	15.8	32.3	86.8
38	MP	8.8	MH	179.0	0.0	0.0	335.6	0.0	183.9	68.1	135.2	80.7	982.4
39	MP	9.1	ML	0.2	0.0	0.0	10.5	4.4	5.2	3.4	2.5	2.7	28.9
40	MP	9.3	HL	8.6	0.0	0.0	325.3	20.9	208.9	113.8	188.9	280.6	1147.0
41	ORI	7.1	HL	281.4	1504.0	0.0	76.8	0.0	119.3	38.2	38.7	83.4	2142.0
42	ORI	7.2	HL	73.6	359.4	0.0	32.4	0.0	91.5	26.1	18.2	14.9	616.0
43	ORI	7.5	HL	31.6	182.5	0.0	7.8	0.0	82.2	27.6	13.1	19.1	364.0
44	ORI	11.1	HL	430.9	2441.5	0.0	43.9	0.0	403.5	143.1	60.9	233.3	3757.1
45	ORI	11.2	HH	164.6	966.2	0.0	2.2	0.0	167.2	58.0	12.0	103.5	1473.6
46	PUN	6.1	MH	532.9	0.0	0.0	254.0	21.3	234.2	64.6	376.2	129.2	1612.5
47	PUN	6.2	LH	1057.4	0.0	0.0	2320.6	665.3	2502.0	696.0	1168.1	361.0	8770.4
48	PUN	6.3	LH	398.4	0.0	0.0	1227.1	1579.9	1807.6	424.0	341.9	252.0	6031.0
49	RAJ	6.3	LH	472.5	0.0	0.0	1543.7	2271.9	3199.7	540.3	482.1	321.6	8831.9
50	RAJ	8.9	LL	53.0	0.0	0.0	305.9	0.0	307.2	85.1	58.9	35.6	845.8

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Total** Con. Use
51	RAJ	9.3	ML	2.1	0.0	0.0	42.3	0.2	64.1	21.8	13.7	13.3	157.5
52	RAJ	8.10	ML	25.5	0.0	0.0	42.4	0.5	26.8	7.9	12.2	8.7	124.0
53	RAJ	8.11	LH	0.0	0.0	0.0	268.2	34.1	188.3	71.2	0.0	16.6	578.3
54	RAJ	8.12	MH	6.2	0.0	0.0	331.5	172.8	578.7	191.9	112.6	33.1	1426.8
55	RAJ	8.13	LH	0.2	0.0	0.0	320.6	75.0	950.3	278.0	19.8	163.7	1807.7
56	RAJ	8.14	LL	49.5	0.0	0.0	445.5	0.2	617.8	176.9	60.6	83.9	1434.4
57	RAJ	14.1	LL	0.0	0.0	0.0	340.3	9.7	438.4	101.8	0.0	68.9	959.1
58	TN	10.5	MH	534.5	221.6	15.9	0.0	15.1	170.5	108.2	196.8	362.2	1624.7
59	TN	10.6	MH	2490.5	790.3	60.1	0.0	301.1	953.1	416.7	896.5	601.0	6509.3
60	TN	11.4	MH	4155.6	1303.0	110.7	0.0	3.0	598.7	262.5	799.1	121.7	7354.4
61	TN	11.5	MH	3174.2	995.3	84.5	0.0	0.0	75.6	28.6	104.0	86.4	4548.7
62	TN	11.6	LH	1813.4	568.6	48.3	0.0	100.5	367.3	141.0	90.9	207.7	3337.7
63	TN	12.2	HH	237.2	108.0	6.6	0.0	0.0	1.0	0.2	0.0	30.6	383.6
64	TN	12.4	HL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.0	8.0
65	UP	4.1	MH	515.7	308.3	32.0	1993.0	0.0	2377.3	820.9	2715.6	631.0	9393.8
66	UP	5.1	ML	524.3	317.8	32.5	1532.3	0.1	1012.9	411.4	1288.1	707.2	5826.5
67	UP	5.2	ML	733.1	369.4	41.8	2023.0	136.8	1189.0	631.4	5761.8	548.8	11435.0
68	UP	5.3	MH	372.2	209.8	22.2	2369.1	119.4	1756.4	675.7	994.1	1172.8	7691.7
69	UP	8.1	ML	228.2	138.6	13.8	433.3	0.0	406.9	144.6	54.0	63.7	1483.0
70	WB	2.1	HL	40.0	162.3	2.7	0.4	0.0	15.7	2.2	0.0	0.0	223.3
71	WB	3.1	HL	26.1	123.4	2.2	4.0	0.0	24.9	0.9	1.1	0.0	182.6
72	WB	3.2	HL	664.7	3409.5	58.4	68.0	0.0	298.1	2.3	100.1	0.0	4601.2
73	WB	3.3	HH	41.2	222.5	3.0	5.6	0.0	47.6	0.1	14.4	0.0	334.4
74	WB	3.4	HH	324.9	1669.2	28.7	35.4	0.0	59.6	0.7	53.8	0.0	2172.2
75	WB	7.4	HL	58.7	297.8	5.2	0.0	0.0	14.8	1.0	0.4	0.0	377.8
				36657.7	34994.9	5469.7	23028.9	8214.1	30244.9	11804.2	26016.4	12670.7	189101.6

Table A.4.2. Consumptive Use (MCM) of Irrigated Crops from Irrigation 1966-68

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Tot. Irrign. Con. Use
1	AP	10.2	MH	221.4	589.0	307.7	6.3	2.4	219.1	233.9	244.7	48.3	1872.8
2	AP	10.3	LH	0.0	715.4	375.9	2.9	0.0	0.0	53.4	10.2	25.2	1183.1
3	AP	10.4	HL	0.0	1231.8	697.1	6.2	0.0	0.0	122.5	321.6	18.9	2398.1
4	AP	11.2	HH	-32.6	833.5	335.3	0.0	0.0	-4.0	43.2	173.2	3.7	1352.3
5	AP	11.3	HH	375.5	4021.6	2081.8	1.7	3.5	96.3	389.2	500.6	34.5	7504.7
6	BIH	4.2	HL	0.0	6330.2	226.6	1328.9	0.0	0.0	201.6	304.3	715.9	9107.5
7	BIH	7.3	HL	0.0	60.5	1.6	14.7	0.0	0.0	4.4	15.2	72.1	168.4
8	BIH	7.4	HL	0.0	280.0	7.6	17.9	0.0	0.0	9.5	16.3	79.1	410.4
9	GUJ	13.2	ML	0.0	0.0	0.0	33.8	0.0	0.0	32.5	56.9	0.0	123.2
10	GUJ	13.3	ML	0.0	0.0	0.0	171.2	0.0	0.0	62.4	24.7	0.0	258.3
11	GUJ	13.4	ML	0.0	0.0	0.0	584.2	0.0	0.0	112.9	31.7	0.0	728.8
12	GUJ	13.5	LL	0.0	0.0	0.0	49.1	22.3	85.1	46.9	3.8	0.0	207.2
13	GUJ	13.6	LL	28.5	0.0	0.0	455.1	142.1	119.0	60.7	233.0	0.0	1038.5
14	GUJ	13.7	LL	8.3	0.0	0.0	144.6	12.9	21.0	86.4	68.7	0.0	342.0
15	HAR	6.1	ML	0.0	0.0	0.0	23.8	0.0	0.0	27.8	38.1	5.7	95.4
16	HAR	6.2	LL	232.8	0.0	0.0	882.4	63.1	276.8	248.8	896.9	113.0	2713.9
17	HAR	6.3	LL	60.5	0.0	0.0	372.2	503.3	743.3	258.0	217.1	47.3	2201.7
18	KAR	10.1	ML	97.5	340.2	33.4	72.3	34.9	56.7	348.2	575.2	316.1	1874.4
19	KAR	10.2	ML	172.1	258.3	27.2	1.5	6.5	129.1	147.1	140.1	354.0	1235.8
20	KAR	10.5	ML	127.1	329.8	25.7	0.0	0.3	20.8	39.5	182.1	77.4	802.8
21	KAR	12.1	HL	0.0	149.9	7.3	0.0	0.0	0.0	4.2	28.5	206.7	396.6
22	KAR	12.4	HL	0.0	235.9	7.2	0.2	0.0	0.0	13.5	18.1	24.4	299.2
23	MAH	7.1	HL	0.0	0.0	8.0	8.8	0.0	0.0	16.9	6.1	19.3	59.1
24	MAH	9.1	ML	0.0	0.0	0.8	192.5	0.0	0.0	438.0	602.3	277.4	1510.9
25	MAH	9.2	ML	21.1	0.0	0.6	341.4	19.1	81.5	709.7	835.5	173.7	2182.6
26	MAH	9.3	ML	0.0	0.0	0.6	335.6	0.0	0.0	436.1	241.0	363.3	1376.6
27	MAH	9.4	ML	0.0	0.0	0.7	72.3	0.0	0.0	25.5	51.6	127.2	277.3
28	MAH	12.1	HL	0.0	0.0	0.1	0.0	0.0	0.0	19.2	3.2	27.9	50.4
29	MP	7.1	HL	0.0	0.0	0.0	7.7	0.0	0.0	4.5	37.0	76.1	125.3
30	MP	7.2	HL	0.0	0.0	0.0	5.1	0.0	0.0	2.0	15.0	34.6	56.7
31	MP	7.5	HL	0.0	0.0	0.0	0.1	0.0	0.0	0.7	5.5	6.3	12.7
32	MP	8.2	MH	0.0	0.0	0.0	158.3	0.0	0.0	47.0	18.6	17.0	241.0
33	MP	8.3	HL	0.0	0.0	0.0	0.5	0.0	0.0	0.0	5.2	4.2	9.9
34	MP	8.4	ML	0.0	0.0	0.0	20.2	0.0	0.0	3.7	8.0	35.8	67.8
35	MP	8.5	HL	0.0	0.0	0.0	51.9	0.0	0.0	6.0	40.6	43.9	142.5
36	MP	8.6	HL	0.0	0.0	0.0	58.7	0.0	0.0	9.0	37.8	48.1	153.5
37	MP	8.7	HL	0.0	0.0	0.0	28.4	0.0	0.0	1.2	9.3	19.1	58.0
38	MP	8.8	MH	0.0	0.0	0.0	299.9	0.0	0.0	60.8	80.1	47.8	488.7
39	MP	9.1	ML	0.0	0.0	0.0	9.2	0.0	0.0	3.0	1.4	1.5	15.1
40	MP	9.3	HL	0.0	0.0	0.0	294.1	0.0	0.0	102.9	117.1	174.0	688.1
41	ORI	7.1	HL	0.0	1302.9	0.0	64.5	0.0	0.0	32.1	21.5	46.4	1467.4
42	ORI	7.2	HL	0.0	305.5	0.0	26.6	0.0	0.0	21.4	9.4	7.6	370.4
43	ORI	7.5	HL	0.0	159.2	0.0	6.6	0.0	0.0	23.4	7.1	10.3	206.7
44	ORI	11.1	HL	0.0	1802.4	0.0	30.1	0.0	0.0	98.1	29.0	111.3	2071.0
45	ORI	11.2	HH	0.0	673.8	0.0	1.4	0.0	0.0	36.9	5.9	50.7	768.7
46	PUN	6.1	MH	0.0	0.0	0.0	129.2	0.0	0.0	32.9	165.6	56.9	384.7
47	PUN	6.2	LH	244.5	0.0	0.0	1839.3	153.8	578.6	551.6	712.0	220.0	4300.0
48	PUN	6.3	LH	222.5	0.0	0.0	1078.0	882.4	1009.6	372.5	256.1	188.8	4009.9
49	RAJ	6.3	LH	263.9	0.0	0.0	1356.1	1268.9	1787.1	474.6	361.2	241.0	5752.7
50	RAJ	8.9	LL	0.2	0.0	0.0	286.4	0.0	1.0	79.7	34.8	21.1	423.1

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Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Tot. Irrign. Con. Use
51	RAJ	9.3	ML	0.0	0.0	0.0	38.3	0.0	0.0	19.8	8.5	8.3	74.7
52	RAJ	8.10	ML	6.6	0.0	0.0	41.0	0.1	7.0	7.6	8.5	6.0	76.9
53	RAJ	8.11	LH	0.0	0.0	0.0	252.1	0.0	0.0	66.9	0.0	10.0	329.0
54	RAJ	8.12	MH	0.7	0.0	0.0	314.9	20.8	69.6	182.3	73.4	21.6	683.2
55	RAJ	8.13	LH	0.1	0.0	0.0	300.5	25.0	316.6	260.5	14.2	117.3	1034.2
56	RAJ	8.14	LL	6.1	0.0	0.0	399.3	0.0	76.0	158.6	38.0	52.5	730.4
57	RAJ	14.1	LL	0.0	0.0	0.0	327.3	6.8	309.2	97.9	0.0	59.2	800.4
58	TN	10.5	MH	124.0	173.6	10.8	0.0	3.5	39.6	80.0	108.2	199.1	738.8
59	TN	10.6	MH	1325.6	484.5	45.7	0.0	160.3	507.3	223.2	524.1	351.3	3621.9
60	TN	11.4	MH	1537.9	396.6	97.0	0.0	1.1	221.6	43.4	357.4	54.4	2709.6
61	TN	11.5	MH	1659.1	-29.1	73.3	0.0	0.0	39.5	-6.7	37.3	31.0	1804.5
62	TN	11.6	LH	336.8	523.1	39.0	0.0	18.7	68.2	127.5	55.6	127.0	1295.9
63	TN	12.2	HH	0.0	65.3	1.1	0.0	0.0	0.0	0.1	0.0	6.9	73.4
64	TN	12.4	HL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.9
65	UP	4.1	MH	0.0	261.3	27.1	1628.4	0.0	0.0	670.8	1419.6	329.9	4337.0
66	UP	5.1	ML	0.0	274.9	29.8	1284.2	0.0	0.0	344.8	720.2	395.4	3049.3
67	UP	5.2	ML	0.0	297.0	38.3	1547.1	0.0	0.0	482.9	2985.0	284.3	5634.7
68	UP	5.3	MH	22.8	187.9	20.9	2071.4	7.3	107.6	590.8	589.1	695.1	4292.8
69	UP	8.1	ML	0.0	122.9	13.0	374.4	0.0	0.0	124.9	30.9	36.5	702.7
70	WB	2.1	HL	0.0	88.4	0.5	0.2	0.0	0.0	1.0	0.0	0.0	90.0
71	WB	3.1	HL	0.0	101.5	1.3	3.3	0.0	0.0	0.7	0.5	0.0	107.3
72	WB	3.2	HL	0.0	2800.7	40.0	53.5	0.0	0.0	1.8	47.4	0.0	2943.4
73	WB	3.3	HH	0.0	178.7	1.6	4.2	0.0	0.0	0.1	5.7	0.0	190.3
74	WB	3.4	HH	-2.8	1380.1	20.2	28.0	0.0	-0.4	0.5	26.1	0.0	1451.7
75	WB	7.4	HL	0.0	243.8	4.0	0.0	0.0	0.0	0.8	0.2	0.0	248.8
				7060.3	27171.0	4608.6	19540.0	3359.1	6982.7	9636.4	14869.3	7381.4	100608.8

Table A.4.3. Total Consumptive Use (MCM) of Unirrigated Crops, 1966-68

Sl. no.	DIST.	AcrNo	Zone	RICEUKI	RICEURI	RICEUSI	WHTUI	COTNUI	OthrsKI	OthrsRI	SCANUI	TFVUI	Tot.Rfall. Con. Use
1	AP	10.2	MH	18.1	5.6	2.8	0.0	131.3	2453.5	410.7	7.1	198.6	3227.7
2	AP	10.3	LH	33.3	3.6	3.2	0.7	56.1	4984.1	287.8	-0.2	1.2	5369.8
3	AP	10.4	HL	168.0	20.1	17.6	4.4	363.4	5685.2	366.5	-12.3	42.8	6655.7
4	AP	11.2	HH	173.0	62.4	19.3	0.0	0.1	1415.7	271.1	20.7	236.2	2198.5
5	AP	11.3	HH	178.8	56.1	17.7	1.5	663.8	6523.6	1105.6	4.8	668.9	9220.7
6	BIH	4.2	HL	1222.8	1243.7	29.9	283.0	0.0	9397.0	444.1	653.3	290.2	13563.9
7	BIH	7.3	HL	126.2	221.3	8.5	1.1	0.0	461.0	37.7	4.1	-61.9	798.0
8	BIH	7.4	HL	363.1	674.5	24.1	7.7	0.0	1283.9	115.9	-0.2	-32.2	2436.8
9	GUJ	13.2	ML	395.3	0.0	0.0	11.6	1317.4	1238.4	99.9	0.0	61.4	3124.1
10	GUJ	13.3	ML	1710.2	0.0	0.0	5.8	1460.2	3153.1	60.4	0.8	106.3	6496.9
11	GUJ	13.4	ML	234.4	0.0	0.0	51.7	1850.4	5893.9	350.1	0.0	50.8	8431.3
12	GUJ	13.5	LL	0.0	0.0	0.0	0.0	114.3	677.4	15.7	0.0	0.9	808.4
13	GUJ	13.6	LL	1.9	0.0	0.0	4.0	1234.8	4999.3	104.5	-1.4	10.4	6353.5
14	GUJ	13.7	LL	-0.7	0.0	0.0	0.1	74.7	1153.0	19.7	0.0	18.1	1264.9
15	HAR	6.1	ML	59.5	0.0	0.0	92.6	26.9	434.6	41.6	187.0	6.5	848.7
16	HAR	6.2	LL	114.1	0.0	0.0	121.1	9.6	3066.0	208.6	34.6	-43.3	3510.8
17	HAR	6.3	LL	0.4	0.0	0.0	1.7	2.2	1873.0	108.8	0.1	-5.3	1980.9
18	KAR	10.1	ML	406.6	36.2	5.8	196.6	3196.9	12421.7	1026.1	-5.4	-134.3	17150.2
19	KAR	10.2	ML	42.9	7.5	0.7	0.5	101.7	2163.7	353.1	-0.8	-89.2	2580.1
20	KAR	10.5	ML	69.7	15.1	2.0	0.0	15.3	1648.5	338.6	8.9	-24.6	2073.4
21	KAR	12.1	HL	727.8	57.8	28.0	0.0	0.0	241.2	15.3	1.6	-93.8	978.0
22	KAR	12.4	HL	219.3	63.3	12.0	0.4	23.9	664.1	180.0	0.3	45.0	1208.4
23	MAH	7.1	HL	1517.1	0.0	2.3	45.2	122.1	1511.8	117.0	0.0	-6.4	3309.1
24	MAH	9.1	ML	971.7	0.0	2.1	44.9	41.3	6342.9	429.2	14.9	-177.9	7669.2
25	MAH	9.2	ML	194.2	0.0	0.2	23.9	355.1	7484.9	493.1	-13.2	-40.2	8498.0
26	MAH	9.3	ML	478.6	0.0	0.3	134.5	7735.2	14615.8	628.1	15.6	9.3	23617.4
27	MAH	9.4	ML	372.5	0.0	0.4	71.2	3452.5	4286.1	240.9	0.9	2.5	8427.1
28	MAH	12.1	HL	2147.3	0.0	8.2	0.2	0.0	1130.3	84.7	0.0	89.7	3460.4
29	MP	7.1	HL	9015.2	0.0	0.0	59.2	0.0	3562.6	271.5	16.0	16.4	12940.9
30	MP	7.2	HL	4412.4	0.0	0.0	23.1	8.6	1803.7	142.5	1.2	-14.1	6377.4
31	MP	7.5	HL	2063.7	0.0	0.0	1.3	0.0	644.5	51.3	1.3	5.6	2767.6
32	MP	8.2	MH	226.7	0.0	0.0	44.1	0.0	1212.6	73.4	0.2	-8.6	1548.4
33	MP	8.3	HL	571.0	0.0	0.0	31.9	0.0	693.8	63.7	0.6	-1.5	1359.5
34	MP	8.4	ML	2340.2	0.0	0.0	245.2	0.5	3405.5	261.1	5.6	27.9	6286.0
35	MP	8.5	HL	389.7	0.0	0.0	388.0	67.1	3149.9	173.1	2.2	-15.3	4154.6
36	MP	8.6	HL	222.3	0.0	0.0	50.4	35.3	1735.0	122.5	0.0	-22.3	2143.1
37	MP	8.7	HL	142.5	0.0	0.0	76.5	131.7	1161.7	72.6	0.6	-1.2	1584.4
38	MP	8.8	MH	77.2	0.0	0.0	100.5	0.1	3799.8	143.5	4.5	-24.1	4101.6
39	MP	9.1	ML	95.2	0.0	0.0	0.9	86.4	674.2	51.3	0.7	-1.0	907.6
40	MP	9.3	HL	432.7	0.0	0.0	161.9	3002.6	8623.5	387.0	2.8	-57.4	12553.2
41	ORI	7.1	HL	821.7	587.3	0.0	2.8	2.1	1031.9	62.5	46.8	42.9	2598.0
42	ORI	7.2	HL	1011.7	741.4	0.0	4.6	1.1	1554.6	104.3	46.9	95.0	3559.6
43	ORI	7.5	HL	259.1	190.8	0.0	1.3	0.6	865.1	61.7	29.9	13.7	1422.1
44	ORI	11.1	HL	910.8	1350.7	0.0	4.7	0.9	1475.0	186.0	68.1	120.6	4116.6
45	ORI	11.2	HH	177.8	315.9	0.0	0.7	0.0	705.0	129.1	19.0	-19.6	1328.0
46	PUN	6.1	MH	204.5	0.0	0.0	246.3	26.6	1030.1	118.7	154.1	-48.7	1731.6
47	PUN	6.2	LH	100.9	0.0	0.0	124.4	10.3	1254.4	70.9	21.9	-118.4	1464.5
48	PUN	6.3	LH	1.0	0.0	0.0	39.3	12.6	651.8	44.7	5.0	-16.8	737.6
49	RAJ	6.3	LH	1.0	0.0	0.0	44.6	12.7	1961.3	133.1	3.5	-67.3	2088.8
50	RAJ	8.9	LL	4.5	0.0	0.0	24.7	0.2	1613.5	35.8	-1.2	-11.5	1666.0

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Sl. no.	DIST.	AcrNo	Zone	RICEUKI	RICEURI	RICEUSI	WHTUI	COTNUI	OthrsKI	OthrsRI	SCANUI	TFVUI	**Tot.Rfall. Con. Use**
51	RAJ	9.3	ML	4.1	0.0	0.0	9.2	106.5	699.7	32.4	1.3	-4.3	848.9
52	RAJ	8.10	ML	260.3	0.0	0.0	1.2	68.0	585.0	9.2	3.6	-2.5	924.7
53	RAJ	8.11	LH	0.2	0.0	0.0	-1.5	8.5	1428.7	38.7	0.0	-4.5	1470.0
54	RAJ	8.12	MH	66.1	0.0	0.0	6.7	80.4	1615.5	35.5	2.4	-7.7	1798.9
55	RAJ	8.13	LH	0.7	0.0	0.0	17.2	9.9	2818.1	87.0	4.7	-35.2	2902.4
56	RAJ	8.14	LL	29.3	0.0	0.0	35.8	0.5	3855.3	149.3	8.5	-23.5	4055.2
57	RAJ	14.1	LL	0.0	0.0	0.0	3.7	0.5	7976.6	294.7	0.3	-8.7	8267.0
58	TN	10.5	MH	1.7	0.2	0.0	0.1	18.9	1391.0	271.1	0.0	-95.0	1588.0
59	TN	10.6	MH	68.1	17.9	0.8	0.4	170.0	2041.5	939.9	0.5	86.1	3325.2
60	TN	11.4	MH	276.4	95.7	1.4	0.0	6.3	1339.9	820.2	0.3	175.3	2715.5
61	TN	11.5	MH	60.5	16.4	0.4	0.0	0.8	252.8	122.4	0.0	55.1	508.4
62	TN	11.6	LH	316.3	9.7	2.0	0.0	559.7	1342.4	74.8	0.2	13.3	2318.4
63	TN	12.2	HH	-0.6	-0.1	0.0	0.0	0.0	135.4	24.9	0.0	79.7	239.4
64	TN	12.4	HL	9.8	1.5	0.2	0.2	0.0	104.4	20.7	0.0	2.2	139.1
65	UP	4.1	MH	6118.6	557.6	57.3	177.9	0.0	5871.6	340.8	612.9	-222.0	13514.7
66	UP	5.1	ML	3187.9	260.7	17.0	211.1	0.0	6675.5	342.4	721.3	-118.3	11297.6
67	UP	5.2	ML	1387.0	137.0	6.7	327.2	23.7	4842.1	241.1	811.7	-99.7	7676.8
68	UP	5.3	MH	527.4	33.2	2.0	102.1	7.4	5998.6	224.2	100.7	-352.7	6642.8
69	UP	8.1	ML	69.4	4.8	0.3	156.9	0.0	3823.8	176.2	1.5	-17.9	4214.9
70	WB	2.1	HL	96.3	178.1	5.5	1.2	0.0	279.5	56.1	2.1	2.0	621.0
71	WB	3.1	HL	509.5	427.6	16.9	4.1	0.0	883.1	79.7	33.8	2.0	1956.5
72	WB	3.2	HL	1157.5	1060.1	32.1	25.7	0.0	1946.4	192.0	72.1	12.7	4498.6
73	WB	3.3	HH	478.2	509.0	16.7	0.9	0.0	347.8	34.1	4.0	94.5	1485.2
74	WB	3.4	HH	262.7	231.7	6.8	7.1	0.0	229.3	20.4	16.1	1.0	775.1
75	WB	7.4	HL	150.8	138.6	3.0	0.1	0.0	101.3	9.7	2.7	0.7	406.9
				50466.1	9333.0	354.1	3868.2	26809.6	206398.5	15352.9	3751.4	556.4	316890.2

Table A.4.4. Total Consumptive Use (MCM) of Irrigated Crops, 1991-93

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Total Con. Use
1	AP	10.2	MH	492.2	582.1	349.7	2.8	44.9	850.9	433.6	415.0	47.8	3218.9
2	AP	10.3	LH	889.9	1078.4	698.7	10.8	20.5	380.7	203.0	50.1	35.6	3367.6
3	AP	10.4	HL	1477.9	1742.7	1207.0	24.1	186.6	1115.9	565.9	765.1	33.1	7118.4
4	AP	11.2	HH	748.6	1119.9	491.6	0.0	0.3	238.2	148.4	607.3	15.4	3369.8
5	AP	11.3	HH	4401.3	5824.2	3202.9	0.6	189.7	1379.1	804.7	1014.0	92.3	16908.7
6	Bihar	4.2	HL	797.6	6930.6	226.1	5908.6	0.0	1230.8	868.6	198.9	977.4	17138.7
7	Bihar	7.3	HL	0.8	8.1	0.2	48.9	0.0	21.6	32.4	25.7	63.7	201.3
8	Bihar	7.4	HL	26.4	270.6	7.3	73.9	0.0	24.6	35.8	14.6	190.3	643.5
9	Gujrat	13.2	ML	259.1	0.0	0.0	77.0	75.1	114.2	48.0	2133.9	420.8	3128.2
10	Gujrat	13.3	ML	1350.2	0.0	0.0	384.7	281.4	965.8	278.7	599.1	1234.3	5094.2
11	Gujrat	13.4	ML	657.3	0.0	0.0	935.6	275.7	3009.8	794.2	23.4	676.3	6372.3
12	Gujrat	13.5	LL	0.0	0.0	0.0	51.0	39.5	392.4	115.8	5.7	89.3	693.8
13	Gujrat	13.6	LL	5.6	0.0	0.0	472.1	1056.6	721.9	206.9	204.8	550.2	3218.1
14	Gujrat	13.7	LL	3.7	0.0	0.0	224.2	65.2	127.1	37.3	139.2	159.6	756.3
15	HAR	6.1	ML	711.3	0.0	0.0	347.3	0.0	63.7	43.8	660.6	89.1	1915.7
16	HAR	6.2	LL	3883.6	0.0	0.0	3301.0	367.4	1412.8	676.7	1223.3	222.3	11087.0
17	HAR	6.3	LL	566.3	0.0	0.0	1619.6	2723.4	1739.5	711.5	77.4	150.4	7588.1
18	KAR	10.1	ML	761.7	537.0	357.4	430.4	621.1	2506.8	1757.8	3217.4	614.8	10804.4
19	KAR	10.2	ML	511.7	341.4	226.4	2.5	48.8	861.2	475.2	259.9	339.4	3066.5
20	KAR	10.5	ML	670.1	514.9	292.4	0.3	9.6	218.7	137.8	868.6	74.8	2787.2
21	KAR	12.1	HL	164.1	135.8	78.3	0.0	0.0	111.7	84.4	83.8	149.9	808.1
22	KAR	12.4	HL	332.5	257.9	146.8	0.2	2.8	103.4	69.9	229.3	30.7	1173.4
23	MAH	7.1	HL	1775.0	0.0	0.0	50.5	0.1	39.7	21.8	27.0	95.9	2010.1
24	MAH	9.1	ML	108.8	0.0	0.0	603.2	5.0	415.6	818.7	2911.2	1507.2	6369.7
25	MAH	9.2	ML	56.1	0.0	0.0	565.5	61.4	800.2	1231.6	2563.6	789.6	6068.0
26	MAH	9.3	ML	51.1	0.0	0.0	863.8	230.5	1170.1	1320.8	2087.1	1986.4	7709.8
27	MAH	9.4	ML	156.7	0.0	0.0	346.4	7.4	231.7	135.8	399.4	678.9	1956.3
28	MAH	12.1	HL	84.5	0.0	0.0	0.5	0.0	38.2	26.8	1.0	302.7	453.8
29	MP	7.1	HL	5823.1	0.0	0.0	129.4	0.1	34.5	19.1	54.2	319.0	6379.3
30	MP	7.2	HL	194.0	0.0	0.0	142.7	0.0	18.7	8.8	27.0	156.7	547.9
31	MP	7.5	HL	105.9	0.0	0.0	3.8	0.0	2.0	1.3	2.8	30.5	146.3
32	MP	8.2	MH	0.4	0.0	0.0	767.3	0.0	256.6	96.6	42.2	89.8	1253.0
33	MP	8.3	HL	21.8	0.0	0.0	29.8	0.0	3.5	1.6	43.6	13.0	113.3
34	MP	8.4	ML	227.3	0.0	0.0	1030.5	0.0	105.9	47.7	15.7	147.1	1574.1
35	MP	8.5	HL	24.0	0.0	0.0	1408.7	0.0	376.0	178.9	96.4	114.4	2198.4
36	MP	8.6	HL	0.0	0.0	0.0	416.7	0.8	51.8	27.6	114.8	174.2	785.9
37	MP	8.7	HL	3.8	0.0	0.0	877.0	6.6	371.2	182.7	80.7	56.6	1578.7
38	MP	8.8	MH	171.6	0.0	0.0	1403.2	0.0	819.8	303.6	147.8	101.4	2947.4
39	MP	9.1	ML	0.2	0.0	0.0	139.4	13.0	54.3	34.1	0.7	7.3	249.0
40	MP	9.3	HL	2.7	0.0	0.0	2702.1	577.0	1323.8	687.9	339.5	761.7	6394.7
41	ORI	7.1	HL	345.5	1846.3	141.7	35.4	0.0	516.2	212.7	181.9	1505.2	4784.9
42	ORI	7.2	HL	236.1	1153.6	95.2	23.2	0.0	710.5	236.5	112.0	968.6	3535.7
43	ORI	7.5	HL	75.4	435.2	30.3	5.8	0.0	211.5	83.4	68.3	348.5	1258.3
44	ORI	11.1	HL	592.0	3354.3	242.6	23.3	0.0	1321.6	544.9	184.6	2138.1	8401.4
45	ORI	11.2	HH	176.9	1038.8	65.1	0.6	0.0	184.4	82.6	91.0	571.4	2210.8
46	PUN	6.1	MH	1813.1	0.0	0.0	924.6	0.7	344.8	106.1	505.0	262.5	3956.7
47	PUN	6.2	LH	10186.2	0.0	0.0	4827.0	256.6	1703.5	559.4	768.1	550.5	18851.2
48	PUN	6.3	LH	3754.0	0.0	0.0	3062.1	3565.2	1449.5	340.0	130.5	272.4	12573.7
49	RAJ	6.3	LH	3892.8	0.0	0.0	3949.5	5959.7	3111.5	621.6	176.8	370.1	18082.0
50	RAJ	8.9	LL	144.9	0.0	0.0	718.4	0.0	958.8	309.5	136.8	65.7	2334.0

Contd...

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Total** Con. Use
51	RAJ	9.3	ML	0.2	0.0	0.0	201.3	0.4	222.2	95.1	7.8	31.6	558.6
52	RAJ	8.10	ML	24.1	0.0	0.0	246.1	0.5	102.3	34.8	23.5	6.9	438.2
53	RAJ	8.11	LH	0.0	0.0	0.0	303.5	62.6	463.2	201.4	0.3	31.2	1062.2
54	RAJ	8.12	MH	4.1	0.0	0.0	860.0	76.7	794.2	288.7	130.7	54.9	2209.4
55	RAJ	8.13	LH	0.1	0.0	0.0	1050.1	36.5	1352.2	429.3	10.0	288.4	3166.6
56	RAJ	8.14	LL	18.3	0.0	0.0	1216.9	13.8	1242.8	400.5	10.9	210.9	3114.0
57	RAJ	14.1	LL	0.0	0.0	0.0	878.4	148.6	3356.3	910.7	1.4	225.7	5521.2
58	TN	10.5	MH	471.1	196.3	82.9	0.0	51.5	337.7	182.8	442.2	473.4	2237.9
59	TN	10.6	MH	2041.6	647.8	303.6	0.1	186.0	1200.4	421.4	1055.1	1091.1	6947.0
60	TN	11.4	MH	2911.8	913.0	477.8	0.0	64.6	904.3	376.7	1691.6	569.9	7909.6
61	TN	11.5	HH	2477.4	776.8	406.5	0.0	24.5	123.1	53.2	349.1	111.6	4322.2
62	TN	11.6	LH	1383.3	433.7	227.0	0.0	109.2	277.8	76.8	206.6	480.4	3194.8
63	TN	12.2	HH	147.0	66.9	25.2	0.0	0.0	13.2	3.9	0.0	56.5	312.7
64	TN	12.4	HL	0.4	0.2	0.1	0.0	0.0	0.3	0.2	0.0	3.7	4.9
65	UP	4.1	MH	2412.0	1441.9	2.8	7107.4	0.0	753.0	270.0	3311.7	1775.8	17074.5
66	UP	5.1	ML	3358.6	2035.9	3.9	6120.2	0.0	645.2	262.1	3132.3	1952.5	17510.8
67	UP	5.2	ML	2523.5	1271.5	2.7	4737.3	21.1	2295.3	896.7	14636.8	2114.8	28499.7
68	UP	5.3	MH	1089.4	614.3	1.2	5281.6	30.8	3241.1	1146.3	957.7	2922.1	15284.5
69	UP	8.1	ML	219.4	133.3	0.2	1565.7	0.0	632.2	220.4	66.4	119.9	2957.6
70	WB	2.1	HL	1.2	4.8	0.8	5.4	0.0	206.9	0.2	0.0	14.5	233.9
71	WB	3.1	HL	22.8	107.8	19.0	10.5	0.0	16.2	1.5	0.0	5.0	182.9
72	WB	3.2	HL	559.7	2870.9	487.7	207.2	0.0	969.8	73.4	59.2	441.6	5669.5
73	WB	3.3	HH	28.8	155.6	20.8	17.6	0.0	98.1	6.6	2.7	33.5	363.7
74	WB	3.4	HH	201.9	1037.3	176.5	88.6	0.0	258.3	53.2	23.2	137.9	1977.0
75	WB	7.4	HL	2.1	10.8	1.9	11.0	0.0	88.1	1.0	4.9	8.5	128.2
ALL STATES				68634.4	39890.5	10100.4	68874.9	17519.5	53811.0	23179.3	50250.8	33805.3	366066.3

Table A.4.5. Consumptive Use (MCM) of Irrigated Crops from Irrigation, 1991-93

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	Tot.Irrign. Con. Use
1	AP	10.2	MH	182.9	486.6	294.7	2.3	16.7	316.2	348.2	277.1	31.9	1956.5
2	AP	10.3	LH	0.0	982.6	598.6	9.7	0.0	0.0	181.3	29.9	21.3	1823.4
3	AP	10.4	HL	0.0	1565.7	1027.4	21.2	0.0	0.0	496.9	451.3	19.5	3582.0
4	AP	11.2	HH	-32.8	837.8	390.8	0.0	0.0	-10.4	103.6	298.6	7.6	1595.2
5	AP	11.3	HH	427.5	4578.1	2747.9	0.5	18.4	134.0	598.1	581.2	52.9	9138.4
6	Bihar	4.2	HL	0.0	6119.3	207.7	5078.7	0.0	0.0	746.6	117.1	575.5	12844.9
7	Bihar	7.3	HL	0.0	6.8	0.2	39.2	0.0	0.0	25.9	13.4	33.2	118.6
8	Bihar	7.4	HL	0.0	221.6	5.7	57.9	0.0	0.0	28.0	7.5	97.3	417.9
9	Gujrat	13.2	ML	0.0	0.0	0.0	65.6	0.0	0.0	41.0	1282.2	252.9	1641.7
10	Gujrat	13.3	ML	0.0	0.0	0.0	369.5	0.0	0.0	267.7	382.8	788.6	1808.6
11	Gujrat	13.4	ML	0.0	0.0	0.0	811.1	0.0	0.0	688.5	14.1	408.4	1922.2
12	Gujrat	13.5	LL	0.0	0.0	0.0	49.8	24.7	245.2	113.2	4.8	76.0	513.8
13	Gujrat	13.6	LL	2.2	0.0	0.0	459.9	417.6	285.3	201.6	158.9	426.8	1952.2
14	Gujrat	13.7	LL	0.8	0.0	0.0	218.7	13.6	26.5	36.4	99.7	114.3	509.9
15	HAR	6.1	ML	0.0	0.0	0.0	176.7	0.0	0.0	22.3	290.8	39.2	529.0
16	HAR	6.2	LL	898.1	0.0	0.0	2616.4	85.0	326.7	536.3	745.7	135.5	5343.6
17	HAR	6.3	LL	316.3	0.0	0.0	1422.8	1521.0	971.5	625.1	58.0	112.7	5027.3
18	KAR	10.1	ML	138.0	481.5	301.1	377.0	112.6	454.3	1539.7	2062.7	394.1	5861.2
19	KAR	10.2	ML	190.2	285.3	190.8	2.0	18.1	320.0	381.6	173.5	226.6	1788.3
20	KAR	10.5	ML	155.5	403.2	200.0	0.2	2.2	50.7	101.9	477.5	41.1	1432.4
21	KAR	12.1	HL	0.0	122.8	38.1	0.0	0.0	0.0	74.7	39.9	71.4	346.9
22	KAR	12.4	HL	0.0	162.0	31.3	0.1	0.0	0.0	38.7	54.5	7.3	293.9
23	MAH	7.1	HL	0.0	0.0	0.0	42.4	0.0	0.0	18.3	15.0	53.3	129.0
24	MAH	9.1	ML	0.0	0.0	0.0	527.4	0.0	0.0	715.9	1632.1	845.0	3720.4
25	MAH	9.2	ML	13.9	0.0	0.0	508.2	15.2	198.2	1106.8	1763.6	543.2	4149.1
26	MAH	9.3	ML	0.0	0.0	0.0	780.9	0.0	0.0	1194.0	1294.2	1231.8	4500.9
27	MAH	9.4	ML	0.0	0.0	0.0	310.2	0.0	0.0	121.6	243.5	413.9	1089.0
28	MAH	12.1	HL	0.0	0.0	0.0	0.5	0.0	0.0	23.7	0.5	144.2	168.9
29	MP	7.1	HL	0.0	0.0	0.0	108.6	0.0	0.0	16.0	30.1	177.4	332.1
30	MP	7.2	HL	0.0	0.0	0.0	117.0	0.0	0.0	7.2	13.9	80.6	218.7
31	MP	7.5	HL	0.0	0.0	0.0	3.2	0.0	0.0	1.1	1.5	16.5	22.3
32	MP	8.2	MH	0.0	0.0	0.0	635.2	0.0	0.0	79.9	23.9	50.9	789.9
33	MP	8.3	HL	0.0	0.0	0.0	23.4	0.0	0.0	1.3	23.5	7.0	55.2
34	MP	8.4	ML	0.0	0.0	0.0	849.4	0.0	0.0	39.3	8.8	82.8	980.4
35	MP	8.5	HL	0.0	0.0	0.0	1242.7	0.0	0.0	157.8	59.2	70.3	1530.0
36	MP	8.6	HL	0.0	0.0	0.0	356.7	0.0	0.0	23.7	67.4	102.2	549.9
37	MP	8.7	HL	0.0	0.0	0.0	762.4	0.0	0.0	158.8	47.7	33.4	1002.3
38	MP	8.8	MH	0.0	0.0	0.0	1254.1	0.0	0.0	271.3	87.6	60.1	1673.2
39	MP	9.1	ML	0.0	0.0	0.0	121.9	0.0	0.0	29.8	0.4	4.1	156.2
40	MP	9.3	HL	0.0	0.0	0.0	2442.7	0.0	0.0	621.9	210.5	472.3	3747.4
41	ORI	7.1	HL	0.0	1599.4	115.5	29.7	0.0	0.0	178.5	101.1	836.7	2861.0
42	ORI	7.2	HL	0.0	980.5	72.1	19.0	0.0	0.0	194.0	57.6	498.2	1821.5
43	ORI	7.5	HL	0.0	379.7	23.1	4.9	0.0	0.0	70.7	37.0	188.7	704.0
44	ORI	11.1	HL	0.0	2476.3	179.4	16.0	0.0	0.0	373.7	88.0	1019.9	4153.3
45	ORI	11.2	HH	0.0	724.4	53.9	0.4	0.0	0.0	52.6	44.5	279.7	1155.6
46	PUN	6.1	MH	0.0	0.0	0.0	470.4	0.0	0.0	54.0	222.3	115.6	862.2
47	PUN	6.2	LH	2355.5	0.0	0.0	3825.8	59.3	393.9	443.4	468.2	335.5	7881.7
48	PUN	6.3	LH	2096.6	0.0	0.0	2690.0	1991.1	809.6	298.7	97.7	204.1	8187.8
49	RAJ	6.3	LH	2174.1	0.0	0.0	3469.6	3328.5	1737.8	546.1	132.4	277.3	11665.8
50	RAJ	8.9	LL	0.5	0.0	0.0	672.6	0.0	3.1	289.8	80.8	38.8	1085.5
51	RAJ	9.3	ML	0.0	0.0	0.0	181.9	0.0	0.0	85.9	4.8	19.6	292.3
52	RAJ	8.10	ML	6.3	0.0	0.0	237.8	0.1	26.7	33.6	16.3	4.8	325.7

contd...

Sl. no.	DIST.	AcrNo	Zone	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	OthrsKI	OthrsRI	SCAN_I	TFV_I	**Tot.Irrign.** Con. Use
53	RAJ	8.11	LH	0.0	0.0	0.0	285.3	0.0	0.0	189.3	0.2	18.8	493.6
54	RAJ	8.12	MH	0.5	0.0	0.0	816.8	9.2	95.6	274.3	85.1	35.8	1317.3
55	RAJ	8.13	LH	0.0	0.0	0.0	984.1	12.2	450.4	402.4	7.2	206.7	2063.0
56	RAJ	8.14	LL	2.2	0.0	0.0	1090.8	1.7	152.8	358.9	6.8	132.0	1745.2
57	RAJ	14.1	LL	0.0	0.0	0.0	844.8	104.8	2367.2	875.9	1.2	194.0	4388.1
58	TN	10.5	MH	109.3	153.7	56.7	0.0	12.0	78.4	135.2	243.0	260.2	1048.5
59	TN	10.6	MH	1086.6	397.2	230.6	0.0	99.0	638.9	225.8	616.7	637.8	3932.7
60	TN	11.4	MH	1077.6	277.9	418.9	0.0	23.9	334.7	62.3	756.6	254.9	3206.8
61	TN	11.5	HH	1294.9	-22.7	352.5	0.0	12.8	64.3	-12.5	125.4	40.1	1854.8
62	TN	11.6	LH	256.9	399.0	183.1	0.0	20.3	51.6	69.4	126.4	293.8	1400.6
63	TN	12.2	HH	0.0	40.5	4.2	0.0	0.0	0.0	2.0	0.0	12.7	59.4
64	TN	12.4	HL	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.9	1.1
65	UP	4.1	MH	0.0	1222.0	2.4	5807.1	0.0	0.0	220.6	1731.2	928.3	9911.6
66	UP	5.1	ML	0.0	1761.3	3.6	5129.4	0.0	0.0	219.6	1751.4	1091.7	9957.0
67	UP	5.2	ML	0.0	1022.2	2.5	3623.0	0.0	0.0	685.8	7583.0	1095.6	14012.2
68	UP	5.3	MH	66.7	549.9	1.1	4618.0	1.9	198.5	1002.3	567.5	1731.7	8737.7
69	UP	8.1	ML	0.0	118.2	0.2	1353.0	0.0	0.0	190.5	38.1	68.8	1768.8
70	WB	2.1	HL	0.0	2.6	0.1	2.4	0.0	0.0	0.1	0.0	1.9	7.2
71	WB	3.1	HL	0.0	88.6	11.5	8.6	0.0	0.0	1.2	0.0	2.2	112.1
72	WB	3.2	HL	0.0	2358.3	333.8	162.8	0.0	0.0	57.7	28.0	209.3	3149.9
73	WB	3.3	HH	0.0	125.0	10.9	13.3	0.0	0.0	5.0	1.1	13.4	168.7
74	WB	3.4	HH	-1.8	857.6	124.5	70.2	0.0	-1.7	42.2	11.3	66.8	1169.0
75	WB	7.4	HL	0.0	8.8	1.4	8.6	0.0	0.0	0.7	2.5	4.4	26.5
ALL STATES				12818.6	31774.1	8216.4	58302.5	7921.9	10720.0	19415.6	28178.3	19443.6	196791.1

Table A.4.6. Total Consumptive Use (MCM) of Unirrigated Crops, 1991-93

Sl. no.	DIST.	AcrNo	Zone	RICEUKI	RICEURI	RICEUSI	WHTUI	COTNUI	OthrsKI	OthrsRI	SCANUI	TFVUI	Tot.Rfall. Con. Use
1	AP	10.2	MH	8.8	2.7	1.6	-0.2	27.0	2552.0	421.7	14.8	314.9	3343.4
2	AP	10.3	LH	17.2	1.9	1.9	0.0	320.5	3321.2	188.8	-5.6	86.1	3932.0
3	AP	10.4	HL	154.3	18.5	18.7	1.0	1169.0	3600.9	232.8	-45.7	332.3	5481.8
4	AP	11.2	HH	154.2	55.7	19.9	0.0	0.6	1776.0	335.9	89.3	524.9	2956.4
5	AP	11.3	HH	79.0	24.8	9.0	0.8	1234.5	5305.6	855.6	56.2	1467.0	9032.5
6	Bihar	4.2	HL	1003.7	1020.8	23.2	123.0	0.8	5538.6	189.0	693.2	347.4	8939.7
7	Bihar	7.3	HL	96.4	169.0	6.2	0.7	0.0	255.0	11.7	0.1	-29.3	509.8
8	Bihar	7.4	HL	337.6	627.1	21.3	4.3	0.1	841.5	61.6	0.4	-67.2	1826.7
9	Gujrat	13.2	ML	353.9	0.0	0.0	6.5	318.1	1379.7	109.2	0.0	-55.8	2111.5
10	Gujrat	13.3	ML	1545.7	0.0	0.0	5.1	466.9	2790.5	55.8	0.0	-154.5	4709.4
11	Gujrat	13.4	ML	130.5	0.0	0.0	32.3	1067.8	4846.1	328.3	0.0	-181.0	6224.1
12	Gujrat	13.5	LL	0.0	0.0	0.0	0.0	80.8	575.8	14.0	0.0	-4.4	666.2
13	Gujrat	13.6	LL	0.0	0.0	0.0	1.2	1174.9	4791.1	100.9	0.0	-88.8	5979.2
14	Gujrat	13.7	LL	0.0	0.0	0.0	0.0	53.1	1150.5	21.2	0.0	-15.1	1209.8
15	HAR	6.1	ML	18.9	0.0	0.0	32.0	3.6	331.5	22.1	37.2	-42.9	402.6
16	HAR	6.2	LL	2.9	0.0	0.0	7.0	-1.3	1343.9	21.7	2.0	-46.1	1330.0
17	HAR	6.3	LL	1.0	0.0	0.0	0.2	3.8	1546.2	48.8	0.3	-8.3	1592.0
18	KAR	10.1	ML	365.6	32.6	33.0	93.9	1208.4	12676.7	1014.3	5.0	-115.0	15314.5
19	KAR	10.2	ML	31.2	5.5	3.5	0.1	67.0	3110.5	499.1	0.1	140.8	3857.8
20	KAR	10.5	ML	3.2	0.7	0.6	0.0	137.7	1894.6	383.4	0.0	5.5	2425.6
21	KAR	12.1	HL	459.6	36.5	112.4	0.0	23.9	196.1	11.5	0.1	314.6	1154.6
22	KAR	12.4	HL	274.9	79.3	95.4	0.7	140.8	938.2	252.0	4.6	99.6	1885.4
23	MAH	7.1	HL	1721.5	0.0	0.0	20.4	241.2	1163.1	87.7	-2.2	-33.6	3198.1
24	MAH	9.1	ML	1180.0	0.0	0.0	16.9	1.6	6040.6	362.6	-158.5	-468.6	6974.7
25	MAH	9.2	ML	219.3	0.0	0.0	23.8	197.1	6821.0	422.3	-169.1	-123.0	7391.4
26	MAH	9.3	ML	559.5	0.0	0.0	24.1	7030.1	18757.4	767.3	-139.4	-193.8	26805.2
27	MAH	9.4	ML	348.1	0.0	0.0	15.7	3721.6	4437.0	245.8	-35.3	-63.6	8669.3
28	MAH	12.1	HL	2312.7	0.0	0.0	0.0	0.0	936.7	69.1	0.3	245.4	3564.3
29	MP	7.1	HL	8106.2	0.0	0.0	43.4	0.0	3492.0	261.2	-2.8	-58.1	11842.0
30	MP	7.2	HL	5324.8	0.0	0.0	26.3	0.0	1709.5	131.9	-2.0	-58.2	7132.2
31	MP	7.5	HL	2910.0	0.0	0.0	0.6	0.0	700.6	54.6	2.1	-0.9	3667.0
32	MP	8.2	MH	275.0	0.0	0.0	28.8	0.0	1385.1	81.7	-4.8	-36.3	1729.5
33	MP	8.3	HL	794.0	0.0	0.0	43.6	0.0	678.6	62.2	-11.2	-4.8	1562.4
34	MP	8.4	ML	3075.2	0.0	0.0	275.1	0.0	3100.6	234.4	7.7	-7.0	6686.1
35	MP	8.5	HL	404.1	0.0	0.0	280.0	18.1	4141.3	226.9	-15.9	-37.7	5016.7
36	MP	8.6	HL	258.6	0.0	0.0	15.2	38.9	1940.7	135.9	-28.3	-43.1	2318.0
37	MP	8.7	HL	112.9	0.0	0.0	8.3	71.8	1488.7	92.2	-16.2	-13.5	1744.2
38	MP	8.8	MH	35.2	0.0	0.0	68.0	0.0	3939.9	147.8	-25.0	-34.3	4131.5
39	MP	9.1	ML	147.1	0.0	0.0	1.0	48.2	849.4	64.7	2.0	-2.6	1109.9
40	MP	9.3	HL	358.0	0.0	0.0	15.1	1468.9	11943.7	530.6	-63.1	-157.2	14096.0
41	ORI	7.1	HL	607.0	433.9	46.0	0.0	1.8	2506.0	144.8	-12.4	-352.6	3374.6
42	ORI	7.2	HL	788.2	577.6	77.3	0.0	9.3	2715.2	166.0	0.0	-5.3	4328.2
43	ORI	7.5	HL	274.1	201.8	26.3	0.0	6.6	1553.1	108.4	0.2	-45.9	2124.4
44	ORI	11.1	HL	637.3	945.0	68.0	0.0	0.0	2038.4	198.5	-0.5	-430.0	3456.7
45	ORI	11.2	HH	119.4	212.1	7.5	0.0	2.3	1214.0	196.7	0.0	-75.2	1676.8
46	PUN	6.1	MH	96.8	0.0	0.0	134.0	1.5	572.4	55.6	35.1	24.2	919.5
47	PUN	6.2	LH	13.0	0.0	0.0	6.6	0.3	308.1	-13.3	2.9	-73.7	244.0
48	PUN	6.3	LH	0.9	0.0	0.0	0.5	11.0	36.6	10.5	0.0	21.5	80.9
49	RAJ	6.3	LH	1.3	0.0	0.0	5.6	14.2	1131.5	71.8	-0.1	-76.9	1147.3
50	RAJ	8.9	LL	1.0	0.0	0.0	3.5	0.0	1509.4	33.1	0.0	-23.7	1523.3

Contd...

Sl. no.	DIST.	AcrNo	Zone	RICEUKI	RICEURI	RICEUSI	WHTUI	COTNUI	OthrsKI	OthrsRI	SCANUI	TFVUI	**Tot.Rfall. Con. Use**
51	RAJ	9.3	ML	1.5	0.0	0.0	1.4	4.3	899.9	41.6	0.0	-5.4	943.4
52	RAJ	8.10	ML	373.8	0.0	0.0	1.1	28.9	647.9	10.1	5.0	-1.1	1065.7
53	RAJ	8.11	LH	0.1	0.0	0.0	1.2	0.1	1290.2	34.4	0.0	-10.1	1315.9
54	RAJ	8.12	MH	80.5	0.0	0.0	0.2	6.3	2132.8	45.5	-3.2	-16.1	2246.1
55	RAJ	8.13	LH	0.3	0.0	0.0	10.9	2.8	3027.8	91.3	0.6	-62.7	3071.2
56	RAJ	8.14	LL	19.4	0.0	0.0	5.1	0.3	3679.6	139.2	0.1	-66.9	3776.9
57	RAJ	14.1	LL	0.0	0.0	0.0	2.5	0.0	8917.9	329.7	0.1	-28.2	9221.9
58	TN	10.5	MH	6.1	0.5	1.4	0.0	67.0	1639.2	311.4	31.5	-41.1	2016.1
59	TN	10.6	MH	40.4	10.6	3.1	0.1	116.9	1741.3	832.4	41.0	143.0	2928.9
60	TN	11.4	MH	109.1	37.8	3.5	0.0	26.4	1487.5	904.2	28.4	153.2	2750.2
61	TN	11.5	HH	40.5	11.0	1.8	0.0	0.9	328.8	158.3	-8.9	48.7	581.1
62	TN	11.6	LH	411.6	12.7	16.0	0.0	391.8	876.9	51.3	13.6	1.7	1775.7
63	TN	12.2	HH	4.0	0.7	0.6	0.0	0.0	153.3	39.7	0.0	45.5	243.8
64	TN	12.4	HL	4.9	0.8	0.7	0.1	0.0	143.6	34.5	0.0	10.7	195.2
65	UP	4.1	MH	5976.1	544.7	1.0	139.4	0.1	4062.0	215.7	561.9	-395.4	11105.3
66	UP	5.1	ML	1711.8	140.0	0.2	54.3	0.0	4090.7	189.3	746.0	-350.6	6581.7
67	UP	5.2	ML	164.4	16.2	0.0	38.3	5.0	2405.2	71.3	364.7	-465.8	2599.3
68	UP	5.3	MH	229.4	14.4	0.0	4.5	1.9	4146.5	133.0	64.0	-933.4	3660.2
69	UP	8.1	ML	85.7	5.9	0.0	78.5	0.0	3735.2	171.0	1.1	-44.1	4033.3
70	WB	2.1	HL	143.6	265.5	81.0	12.4	0.0	183.7	71.7	0.3	9.6	767.9
71	WB	3.1	HL	514.8	432.0	168.9	51.1	0.0	897.9	70.9	19.0	192.0	2346.4
72	WB	3.2	HL	1361.6	1247.0	374.2	94.9	0.0	1988.6	224.6	48.6	3.9	5343.5
73	WB	3.3	HH	490.4	522.0	169.3	4.5	0.0	470.9	63.4	4.8	19.5	1744.7
74	WB	3.4	HH	370.3	326.6	94.7	3.7	0.0	180.1	17.3	4.1	-50.0	947.0
75	WB	7.4	HL	183.4	168.6	36.4	-0.2	0.0	56.7	9.5	0.8	7.1	462.4
ALL STATES				48043.4	8202.3	1524.8	1869.2	21035.1	197057.3	14391.9	2138.8	-1139.7	293123.4

Table A.4. 7. Estimated Volume (MCM) of Consumptive Use of Irrigated Areas, 1966-68

Sl.No	State	AcrNo	GIA 000 ha.	Consumptive Use of Irrigated Areas			Cons. Use Rate		GUIA 000 ha.	Consumptive Use of Unirrigated Areas	
				Total	Rainfall	Irrigation	Total	Irrigation		Total	per Ha
				<—— Million Cubic Meters ——>			<—— Meter ——>			MCM	Meter
1	AP	10.2	467.4	2999.5	1126.7	1872.8	0.6417	0.4007	1419.9	3227.7	0.2273
	AP	10.3	317.3	2111.5	928.4	1183.1	0.6654	0.3728	1763.1	5369.8	0.3046
	AP	10.4	635.8	4341.4	1943.3	2398.1	0.6829	0.3772	2210.5	6655.7	0.3011
	AP	11.2	412.1	2794.5	1442.3	1352.3	0.6782	0.3282	643.4	2198.5	0.3417
	AP	11.3	1972.4	13896.0	6391.3	7504.7	0.7045	0.3805	2797.3	9220.7	0.3296
	AP		3805.0	26142.9	11831.9	14311.0	0.6871	0.3761	8834.1	26672.5	0.3019
2	BIH	4.2	2252.5	12122.0	3014.5	9107.5	0.5381	0.4043	6169.1	13563.9	0.2199
	BIH	7.3	34.5	276.9	108.5	168.4	0.8025	0.4881	438.9	798.0	0.1818
	BIH	7.4	102.4	615.7	205.4	410.4	0.6013	0.4007	1343.8	2436.8	0.1813
	BIH		2389.4	13014.6	3328.3	9686.3	0.5447	0.4054	7951.8	16798.7	0.2113
3	GUJ	13.2	94.1	514.9	391.6	123.2	0.5473	0.1310	840.4	3124.1	0.3717
	GUJ	13.3	217.0	1086.6	828.3	258.3	0.5006	0.1190	1752.4	6496.9	0.3707
	GUJ	13.4	435.2	2102.3	1373.6	728.8	0.4830	0.1674	2428.1	8431.3	0.3472
	GUJ	13.5	53.2	274.5	67.3	207.2	0.5157	0.3892	546.6	808.4	0.1479
	GUJ	13.6	259.8	1562.8	524.3	1038.5	0.6015	0.3997	2955.9	6353.5	0.2149
	GUJ	13.7	95.2	535.4	193.4	342.0	0.5626	0.3593	534.0	1264.9	0.2369
	GUJ		1154.5	6076.5	3378.6	2697.9	0.5263	0.2337	9057.4	26479.0	0.2923
4	HAR	6.1	83.8	398.2	302.8	95.4	0.4754	0.1139	235.8	848.7	0.3599
	HAR	6.2	1048.2	5560.9	2847.0	2713.9	0.5305	0.2589	1407.5	3510.8	0.2494
	HAR	6.3	702.7	3410.6	1208.9	2201.7	0.4854	0.3133	1123.1	1980.9	0.1764
	HAR		1834.6	9369.8	4358.7	5011.0	0.5107	0.2731	2766.4	6340.4	0.2292
5	KAR	10.1	431.8	3332.4	1457.9	1874.4	0.7718	0.4341	6435.3	17150.2	0.2665
	KAR	10.2	286.3	2094.2	858.3	1235.8	0.7315	0.4317	1192.1	2580.1	0.2164
	KAR	10.5	225.7	1623.2	820.4	802.8	0.7193	0.3557	856.8	2073.4	0.2420
	KAR	12.1	100.6	885.9	489.2	396.6	0.8803	0.3941	309.8	978.0	0.3157
	KAR	12.4	216.4	1134.0	834.8	299.2	0.5240	0.1383	425.2	1208.4	0.2842
	KAR		1260.7	9069.5	4460.6	4608.9	0.7194	0.3656	9219.2	23990.1	0.2602
6	MAH	7.1	237.1	1326.9	1267.8	59.1	0.5596	0.0249	962.6	3309.1	0.3438
	MAH	9.1	370.4	2698.0	1187.1	1510.9	0.7284	0.4079	2842.7	7669.2	0.2698
	MAH	9.2	432.8	3128.6	946.0	2182.6	0.7228	0.5043	3571.3	8498.0	0.2380
	MAH	9.3	353.7	2283.6	907.0	1376.6	0.6456	0.3892	7028.1	23617.4	0.3360
	MAH	9.4	71.4	569.6	292.3	277.3	0.7975	0.3882	2470.4	8427.1	0.3411
	MAH	12.1	24.8	155.8	105.4	50.4	0.6282	0.2031	887.8	3460.4	0.3898
	MAH		1490.3	10162.6	4705.7	5456.9	0.6819	0.3662	17763.0	54981.1	0.3095
7	MP	7.1	526.8	3063.7	2938.3	125.3	0.5816	0.0238	3091.8	12940.9	0.4186
	MP	7.2	19.0	154.9	98.1	56.7	0.8151	0.2986	1541.9	6377.4	0.4136
	MP	7.5	12.5	76.4	63.7	12.7	0.6099	0.1013	684.3	2767.6	0.4045
	MP	8.2	121.3	476.1	235.2	241.0	0.3924	0.1986	548.8	1548.4	0.2822
	MP	8.3	2.2	21.3	11.3	9.9	0.9515	0.4451	453.1	1359.5	0.3000
	MP	8.4	50.7	306.7	238.9	67.8	0.6045	0.1336	2155.6	6286.0	0.2916
	MP	8.5	35.6	254.8	112.3	142.5	0.7165	0.4006	2081.8	4154.6	0.1996
	MP	8.6	37.8	246.6	93.1	153.5	0.6530	0.4065	873.3	2143.1	0.2454
	MP	8.7	13.4	86.8	28.7	58.0	0.6474	0.4331	681.8	1584.4	0.2324
	MP	8.8	205.7	982.4	493.7	488.7	0.4776	0.2376	1602.0	4101.6	0.2560
	MP	9.1	6.1	28.9	13.8	15.1	0.4772	0.2492	329.2	907.6	0.2757
	MP	9.3	181.8	1147.0	458.9	688.1	0.6309	0.3785	4042.5	12553.2	0.3105
	MP		1212.9	6845.6	4786.1	2059.5	0.5644	0.1698	18086.1	56724.4	0.3136
8	ORI	7.1	377.2	2142.0	674.6	1467.4	0.5678	0.3890	1294.9	2598.0	0.2006
	ORI	7.2	124.5	616.0	245.5	370.4	0.4946	0.2974	1732.2	3559.6	0.2055
	ORI	7.5	73.7	364.0	157.3	206.7	0.4936	0.2803	680.1	1422.1	0.2091

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Sl.No	State	AcrNo	GIA 000 ha.	Consumptive Use of Irrigated Areas			Cons. Use Rate		GUIA 000 ha.	Consumptive Use of Unirrigated Areas	
				Total	Rainfall	Irrigation	Total	Irrigation		Total	per Ha
				<—— Million Cubic Meters ——>			<—— Meter ——>			MCM	Meter
	ORI	11.1	629.3	3757.1	1686.1	2071.0	0.5971	0.3291	1525.2	4116.6	0.2699
	ORI	11.2	236.6	1473.6	704.9	768.7	0.6228	0.3249	446.2	1328.0	0.2977
	ORI		1441.4	8352.7	3468.5	4884.2	0.5795	0.3389	5678.6	13024.4	0.2294
9	PUN	6.1	288.0	1612.5	1227.8	384.7	0.5599	0.1336	552.4	1731.6	0.3134
	PUN	6.2	1950.8	8770.4	4470.4	4300.0	0.4496	0.2204	669.4	1464.5	0.2188
	PUN	6.3	1306.0	6031.0	2021.1	4009.9	0.4618	0.3070	533.4	737.6	0.1383
	PUN		3544.8	16413.8	7719.3	8694.5	0.4630	0.2453	1755.3	3933.7	0.2241
10	RAJ	6.3	1860.9	8831.9	3079.2	5752.7	0.4746	0.3091	1356.9	2088.8	0.1539
	RAJ	8.9	199.2	845.8	422.6	423.1	0.4246	0.2124	649.1	1666.0	0.2566
	RAJ	9.3	31.4	157.5	82.8	74.7	0.5022	0.2383	286.6	848.9	0.2962
	RAJ	8.10	26.2	124.0	47.1	76.9	0.4727	0.2932	345.4	924.7	0.2677
	RAJ	8.11	173.4	578.3	249.4	329.0	0.3335	0.1897	638.6	1470.0	0.2302
	RAJ	8.12	368.8	1426.8	743.6	683.2	0.3868	0.1852	782.5	1798.9	0.2299
	RAJ	8.13	393.8	1807.7	773.5	1034.2	0.4591	0.2626	1350.2	2902.4	0.2150
	RAJ	8.14	319.9	1434.4	704.1	730.4	0.4484	0.2283	1427.4	4055.2	0.2841
	RAJ	14.1	201.2	959.1	158.6	800.4	0.4767	0.3979	6865.8	8267.0	0.1204
	RAJ		3574.8	16165.5	6260.8	9904.7	0.4522	0.2771	13702.7	24022.0	0.1753
11	TN	10.5	235.5	1624.7	885.9	738.8	0.6900	0.3138	679.0	1588.0	0.2339
	TN	10.6	874.8	6509.3	2887.4	3621.9	0.7441	0.4140	1397.3	3325.2	0.2380
	TN	11.4	1021.5	7354.4	4644.9	2709.6	0.7199	0.2652	761.4	2715.5	0.3566
	TN	11.5	632.9	4548.7	2744.2	1804.5	0.7187	0.2851	197.6	508.4	0.2573
	TN	11.6	488.2	3337.7	2041.8	1295.9	0.6836	0.2654	723.6	2318.4	0.3204
	TN	12.2	59.4	383.6	310.2	73.4	0.6457	0.1235	53.1	239.4	0.4508
	TN	12.4	0.7	8.0	6.1	1.9	1.0953	0.2601	50.8	139.1	0.2739
	TN		3313.1	23766.5	13520.5	10246.0	0.7173	0.3093	3862.9	10833.9	0.2805
12	UP	4.1	1885.8	9393.8	5056.7	4337.0	0.4981	0.2300	4289.5	13514.7	0.3151
	UP	5.1	1151.2	5826.5	2777.3	3049.3	0.5061	0.2649	3744.3	11297.6	0.3017
	UP	5.2	1898.1	11435.0	5800.4	5634.7	0.6024	0.2969	2463.9	7676.8	0.3116
	UP	5.3	1619.2	7691.7	3398.9	4292.8	0.4750	0.2651	2359.2	6642.8	0.2816
	UP	8.1	336.1	1483.0	780.3	702.7	0.4413	0.2091	1618.3	4214.9	0.2604
	UP		6890.4	35830.0	17813.5	18016.5	0.5200	0.2615	14475.3	43346.8	0.2995
13	WB	2.1	86.4	223.3	133.3	90.0	0.2584	0.1041	379.1	621.0	0.1638
	WB	3.1	38.3	182.6	75.3	107.3	0.4764	0.2799	954.7	1956.5	0.2049
	WB	3.2	857.3	4601.2	1657.8	2943.4	0.5367	0.3433	2121.0	4498.6	0.2121
	WB	3.3	64.5	334.4	144.1	190.3	0.5182	0.2949	715.4	1485.2	0.2076
	WB	3.4	400.1	2172.2	720.5	1451.7	0.5430	0.3629	397.2	775.1	0.1951
	WB	7.4	74.9	377.8	129.0	248.8	0.5042	0.3320	223.6	406.9	0.1820
	WB		1521.6	7891.6	2860.1	5031.5	0.5186	0.3307	4790.9	9743.2	0.2034
All States MCM			33433.6	189101.6	88492.8	100608.8	0.5656	0.3009	117943.6	316890.2	0.2687
All States CKM				33.4	189.1	88.5	100.6			117.9	316.9

Table A.4. 8. Estimated Volume (MCM) of Consumptive Use of Irrigated Areas, 1991-93

St.No	State	AcrNo	GIA 000 ha.	Consumptive Use of Irrigated Areas			Cons. Use Rate		GUIA 000 ha.	Consumptive Use of Unirrigated Areas	
				Total	Rainfall	Irrigation	Total	Irrigation		Total	per Ha
				<—— Million Cubic Meters ——>			<—— Meter ——>			MCM	Meter
1	AP	10.2	530.2	3218.9	1262.4	1956.5	0.6071	0.3690	1449.6	3343.4	0.2306
	AP	10.3	532.5	3367.6	1544.3	1823.4	0.6325	0.3424	1242.7	3932.0	0.3164
	AP	10.4	1156.5	7118.4	3536.4	3582.0	0.6155	0.3097	1681.7	5481.8	0.3260
	AP	11.2	499.1	3369.8	1774.7	1595.2	0.6752	0.3196	818.6	2956.4	0.3611
	AP	11.3	2442.7	16908.7	7770.3	9138.4	0.6922	0.3741	2524.7	9032.5	0.3578
	AP		5161.0	33983.4	15888.0	18095.5	0.6585	0.3506	7717.3	24746.1	0.3207
2	BIH	4.2	3745.9	17138.7	4293.7	12844.9	0.4575	0.3429	4009.6	8939.7	0.2230
	BIH	7.3	35.4	201.3	82.7	118.6	0.5693	0.3354	287.6	509.8	0.1773
	BIH	7.4	113.8	643.5	225.6	417.9	0.5653	0.3671	1076.1	1826.7	0.1698
	BIH		3895.1	17983.5	4602.1	13381.5	0.4617	0.3435	5373.3	11276.3	0.2099
3	GUJ	13.2	267.6	3128.2	1486.4	1641.7	1.1688	0.6134	625.0	2111.5	0.3379
	GUJ	13.3	773.2	5094.2	3285.6	1808.6	0.6589	0.2339	1339.8	4709.4	0.3515
	GUJ	13.4	1256.8	6372.3	4450.1	1922.2	0.5070	0.1529	1914.1	6224.1	0.3252
	GUJ	13.5	122.2	693.8	180.0	513.8	0.5677	0.4205	461.8	666.2	0.1443
	GUJ	13.6	531.1	3218.1	1265.9	1952.2	0.6059	0.3676	2789.3	5979.2	0.2144
	GUJ	13.7	113.5	756.3	246.5	509.9	0.6664	0.4492	531.4	1209.8	0.2277
	GUJ		3064.5	19262.9	10914.5	8348.5	0.6286	0.2724	7661.4	20900.1	0.2728
4	HAR	6.1	316.0	1915.7	1386.7	529.0	0.6062	0.1674	115.7	402.6	0.3481
	HAR	6.2	2383.4	11087.0	5743.4	5343.6	0.4652	0.2242	397.9	1330.0	0.3342
	HAR	6.3	1743.2	7588.1	2560.8	5027.3	0.4353	0.2884	789.8	1592.0	0.2016
	HAR		4442.7	20590.8	9690.9	10899.9	0.4635	0.2453	1303.4	3324.7	0.2551
5	KAR	10.1	1615.9	10804.4	4943.2	5861.2	0.6686	0.3627	5819.5	15314.5	0.2632
	KAR	10.2	503.1	3066.5	1278.2	1788.3	0.6095	0.3554	1720.8	3857.8	0.2242
	KAR	10.5	388.4	2787.2	1354.8	1432.4	0.7176	0.3688	994.0	2425.6	0.2440
	KAR	12.1	127.8	808.1	461.2	346.9	0.6321	0.2714	301.6	1154.6	0.3828
	KAR	12.4	228.9	1173.4	879.6	293.9	0.5126	0.1284	648.7	1885.4	0.2906
	KAR		2864.2	18639.6	8916.9	9722.6	0.6508	0.3395	9484.7	24638.0	0.2598
6	MAH	7.1	354.1	2010.1	1881.0	129.0	0.5676	0.0364	844.6	3198.1	0.3786
	MAH	9.1	754.1	6369.7	2649.4	3720.4	0.8446	0.4933	2543.8	6974.7	0.2742
	MAH	9.2	778.5	6068.0	1918.9	4149.1	0.7795	0.5330	3126.7	7391.4	0.2364
	MAH	9.3	1080.1	7709.8	3208.9	4500.9	0.7138	0.4167	7880.3	26805.2	0.3402
	MAH	9.4	242.7	1956.3	867.3	1089.0	0.8062	0.4488	2453.2	8669.3	0.3534
	MAH	12.1	54.2	453.8	284.9	168.9	0.8373	0.3116	855.5	3564.3	0.4166
	MAH		3263.7	24567.8	10810.5	13757.3	0.7528	0.4215	17704.3	56603.0	0.3197
7	MP	7.1	1111.8	6379.3	6047.2	332.1	0.5738	0.0299	2855.2	11842.0	0.4148
	MP	7.2	94.7	547.9	329.2	218.7	0.5788	0.2310	1659.0	7132.2	0.4299
	MP	7.5	25.2	146.3	124.0	22.3	0.5797	0.0885	870.1	3667.0	0.4215
	MP	8.2	338.3	1253.0	463.1	789.9	0.3703	0.2335	581.6	1729.5	0.2974
	MP	8.3	19.1	113.3	58.0	55.2	0.5930	0.2891	503.7	1562.4	0.3102
	MP	8.4	376.2	1574.1	593.7	980.4	0.4185	0.2606	2202.0	6686.1	0.3036
	MP	8.5	506.2	2198.4	668.4	1530.0	0.4343	0.3022	2216.6	5016.7	0.2263
	MP	8.6	152.4	785.9	236.1	549.9	0.5157	0.3608	894.5	2318.0	0.2591
	MP	8.7	388.1	1578.7	576.4	1002.3	0.4068	0.2583	653.9	1744.2	0.2668
	MP	8.8	741.9	2947.4	1274.2	1673.2	0.3973	0.2255	1544.7	4131.5	0.2675
	MP	9.1	56.7	249.0	92.7	156.2	0.4391	0.2755	403.5	1109.9	0.2751
	MP	9.3	1257.9	6394.7	2647.3	3747.4	0.5084	0.2979	4455.5	14096.0	0.3164
	MP		5068.5	24168.0	13110.2	11057.8	0.4768	0.2182	18840.2	61035.7	0.3240
8	ORI	7.1	724.8	4784.9	1923.9	2861.0	0.6602	0.3947	1545.1	3374.6	0.2184
	ORI	7.2	624.1	3535.7	1714.2	1821.5	0.5666	0.2919	1918.2	4328.2	0.2256
	ORI	7.5	213.8	1258.3	554.3	704.0	0.5886	0.3293	983.3	2124.4	0.2161

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St.No	State	AcrNo	GIA 000 ha.	Consumptive Use of Irrigated Areas			Cons. Use Rate		GUIA 000 ha.	Consumptive Use of Unirrigated Areas	
				Total	Rainfall	Irrigation	Total	Irrigation		Total	per Ha
				<—— Million Cubic Meters ——>			<—— Meter ——>			MCM	Meter
	ORI	11.1	1310.0	8401.4	4248.1	4153.3	0.6413	0.3170	1342.1	3456.7	0.2576
	ORI	11.2	308.0	2210.8	1055.2	1155.6	0.7177	0.3751	554.0	1676.8	0.3027
	ORI		3180.6	20191.0	9495.7	10695.3	0.6348	0.3363	6342.6	14960.8	0.2359
9	PUN	6.1	778.0	3956.7	3094.5	862.2	0.5086	0.1108	292.0	919.5	0.3149
	PUN	6.2	3758.5	18851.2	10969.5	7881.7	0.5016	0.2097	57.8	244.0	0.4218
	PUN	6.3	2618.7	12573.7	4385.8	8187.8	0.4801	0.3127	61.3	80.9	0.1321
	PUN		7155.2	35381.6	18449.8	16931.8	0.4945	0.2366	411.1	1244.4	0.3027
10	RAJ	6.3	3792.5	18082.0	6416.2	11665.8	0.4768	0.3076	696.2	1147.3	0.1648
	RAJ	8.9	556.6	2334.0	1248.5	1085.5	0.4193	0.1950	512.3	1523.3	0.2973
	RAJ	9.3	120.8	558.6	266.3	292.3	0.4625	0.2420	314.8	943.4	0.2996
	RAJ	8.10	111.4	438.2	112.6	325.7	0.3934	0.2923	385.6	1065.7	0.2764
	RAJ	8.11	319.8	1062.2	568.7	493.6	0.3322	0.1543	583.0	1315.9	0.2257
	RAJ	8.12	598.2	2209.4	892.1	1317.3	0.3694	0.2202	939.5	2246.1	0.2391
	RAJ	8.13	725.5	3166.6	1103.6	2063.0	0.4365	0.2843	1397.8	3071.2	0.2197
	RAJ	8.14	734.2	3114.0	1368.8	1745.2	0.4242	0.2377	1263.4	3776.9	0.2989
	RAJ	14.1	1108.8	5521.2	1133.2	4388.1	0.4979	0.3957	7657.2	9221.9	0.1204
	RAJ		8067.7	36486.3	13109.9	23376.3	0.4522	0.2898	13749.8	24311.6	0.1768
11	TN	10.5	324.8	2237.9	1189.3	1048.5	0.6890	0.3228	825.9	2016.1	0.2441
	TN	10.6	906.0	6947.0	3014.3	3932.7	0.7668	0.4341	1205.1	2928.9	0.2430
	TN	11.4	1032.8	7909.6	4702.8	3206.8	0.7659	0.3105	792.5	2750.2	0.3470
	TN	11.5	591.8	4322.2	2467.4	1854.8	0.7304	0.3134	238.1	581.1	0.2441
	TN	11.6	431.2	3194.8	1794.2	1400.6	0.7410	0.3248	544.0	1775.7	0.3264
	TN	12.2	47.6	312.7	253.3	59.4	0.6566	0.1247	61.8	243.8	0.3947
	TN	12.4	0.6	4.9	3.8	1.1	0.7719	0.1756	71.7	195.2	0.2723
	TN		3334.8	24929.2	13425.2	11504.0	0.7476	0.3450	3738.9	10490.9	0.2806
12	UP	4.1	3622.5	17074.5	7162.9	9911.6	0.4713	0.2736	3417.2	11105.3	0.3250
	UP	5.1	3477.7	17510.8	7553.8	9957.0	0.5035	0.2863	2020.3	6581.7	0.3258
	UP	5.2	4406.5	28499.7	14487.5	14012.2	0.6468	0.3180	736.6	2599.3	0.3529
	UP	5.3	3296.7	15284.5	6546.8	8737.7	0.4636	0.2650	1243.8	3660.2	0.2943
	UP	8.1	741.1	2957.6	1188.8	1768.8	0.3991	0.2387	1417.7	4033.3	0.2845
	UP		15544.5	81327.1	36939.8	44387.3	0.5232	0.2856	8835.7	27979.9	0.3167
13	WB	2.1	103.4	233.9	226.7	7.2	0.2262	0.0070	486.5	767.9	0.1578
	WB	3.1	37.1	182.9	70.8	112.1	0.4929	0.3022	1105.2	2346.4	0.2123
	WB	3.2	1074.4	5669.5	2519.6	3149.9	0.5277	0.2932	2651.6	5343.5	0.2015
	WB	3.3	74.6	363.7	195.0	168.7	0.4875	0.2261	854.3	1744.7	0.2042
	WB	3.4	375.4	1977.0	808.0	1169.0	0.5267	0.3114	533.8	947.0	0.1774
	WB	7.4	32.3	128.2	101.7	26.5	0.3969	0.0820	274.0	462.4	0.1687
	WB		1697.2	8555.1	3921.7	4633.4	0.5041	0.2730	5905.5	11611.9	0.1966
All States MCM			66739.7	366066.3	169275.2	196791.1	0.5485	0.2949	107068.1	293123.4	0.2738
All States CKM			66.7	366.1	169.3	196.8			107.1	293.1	

Appendix 5: Basinwise distribution of consumptive use from irrigation

The basic unit for estimating consumptive use in this exercise is the agro climatic region. River basins and states would be more appropriate as units for mapping and analysis of variations in intensity and efficiency of water use.

The available district-level data are however too aggregated to permit estimation of the distribution of land use, irrigation and cropping data by individual river basins as per the CWC classification which distinguishes between 18 major basins. West flowing rivers south of Narmada, Brahmaputra and Barak are not covered in this study. The rest are divided into the following five groups:

1. Ganges and its sub-basins
2. Indus
3. Tapi, Narmada, Mahe, Sabarmati, Luni and other west flowing rivers of Saurashtra and Kutch
4. Rivers between Ganges and Mahanadhi, Mahanadhi, Godhavari and Krishna and rivers between them and Between Krishna and Pennar
5. Rivers between Pennar and Kanyakumari.

Districts in most of the agro-climatic zones covered in the present exercise clearly fall in one or the other of the above groups. However districts in some (17) zones fall in different groups. These have been identified. District-wise gross irrigated area estimates being available, it is possible to calculate the distribution of total gross irrigated area and consumptive use within each of these zones between different basins. The consumptive use norms for districts within each zone are assumed to be the same as the zone average.

These estimates have been made for both periods which form the focus of this study.

Table A.5.1. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Irrigated Total 1966-68

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	794.0	2205.5				2999.5
	AP	10.3	**KGM**	2111.5					2111.5
	AP	10.4	KGM	4341.4					4341.4
	AP	11.2	**KGM**	2794.5					2794.5
	AP	11.3	KGM	13896.0					13896.0
	AP			23937.4	2205.5	0.0	0.0	0.0	26142.9
2	BIH	4.2	Ganga			12122.0			12122.0
	BIH	7.3	**Ganga**			276.9			276.9
	BIH	7.4	**Ganga; KGM**	133.3		482.5			615.7
	BIH			133.3	0.0	12881.3	0.0	0.0	13014.6
3	GUJ	13.2	**TNM**				514.9		514.9
	GUJ	13.3	**TNM**				1086.6		1086.6
	GUJ	13.4	**TNM**				2102.3		2102.3
	GUJ	13.5	**TNM**				274.5		274.5
	GUJ	13.6	TNM				1562.8		1562.8
	GUJ	13.7	**TNM**				535.4		535.4
	GUJ			0.0	0.0	0.0	6076.5	0.0	6076.5
4	HAR	6.1	Ganga			398.2			398.2
	HAR	6.2	**Indus; GANGA**			4580.3		980.6	5560.9
	HAR	6.3	**Ganga**			3410.6			3410.6
	HAR			0.0	0.0	8389.2	0.0	980.6	9369.8
5	KAR	10.1	KGM	3332.4					3332.4
	KAR	10.2	**CAU; KGM**	634.2	1459.9				2094.2
	KAR	10.5	**CAU**		1623.2				1623.2
	KAR	12.1	**TNM**				885.9		885.9
	KAR	12.4	**KGM; CAU**	856.6	277.4				1134.0
	KAR			4823.2	3360.5	0.0	885.9	0.0	9069.5
6	MAH	7.1	**KGM**	1326.9					1326.9
	MAH	9.1	**KGM; TNM**	2038.3			659.7		2698.0
	MAH	9.2	**KGM**	3128.6					3128.6
	MAH	9.3	**TNM; KGM**	972.5			1311.2		2283.6
	MAH	9.4	**KGM**	569.6					569.6
	MAH	12.1	**KGM**	155.8					155.8
	MAH			8191.7	0.0	0.0	1970.9	0.0	10162.6
7	MP	7.1	**TNM;KGM;GANGA**	1128.7		767.9	1167.1		3063.7
	MP	7.2	**KGM; GANGA**	91.0		63.8			154.9
	MP	7.5	**KGM**	76.4					76.4
	MP	8.2	**GANGA**			476.1			476.1
	MP	8.3	GANGA			21.3			21.3
	MP	8.4	GANGA; TNM			161.8	144.9		306.7
	MP	8.5	GANGA			228.1	26.7		254.8
	MP	8.6	**GANGA; TNM**			109.5	137.1		246.6
	MP	8.7	**TNM**				86.8		86.8
	MP	8.8	GANGA			982.4			982.4
	MP	9.1	TNM				28.9		28.9
	MP	9.3	GANGA; TNM	0.0	0.0	674.5	472.6	0.0	1147.0
	MP			1296.1	0.0	3485.3	2064.1	0.0	6845.6
8	ORI	7.1	**KGM**	2142.0					2142.0
	ORI	7.2	**KGM**	616.0					616.0
	ORI	7.5	**KGM**	364.0					364.0
	ORI	11.1	**KGM**	3757.1					3757.1
	ORI	11.2	KGM	1473.6					1473.6
	ORI			8352.7	0.0	0.0	0.0	0.0	8352.7

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St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					1612.5	1612.5
	PUN	6.2	INDUS					8770.4	8770.4
	PUN	6.3	INDUS					6030.8	6030.8
	PUN			0.0	0.0	0.0	0.0	16413.7	16413.7
10	RAJ	6.3	**INDUS**					8831.9	8831.9
	RAJ	8.9	**GANGA**			845.8			845.8
	RAJ	9.3	GANGA			157.5			157.5
	RAJ	8.10	**TNM**				124.0		124.0
	RAJ	8.11	**TNM**				578.3		578.3
	RAJ	8.12	**TNM; GANGA**			587.0	839.8		1426.8
	RAJ	8.13	**TNM; GANGA**			320.4	1487.3		1807.7
	RAJ	8.14	**GANGA**			1434.4			1434.4
	RAJ	14.1	**TNM**				959.1		959.1
	RAJ			0.0	0.0	3345.1	3988.5	8831.9	16165.5
11	TN	10.5	**CAU**		1624.7				1624.7
	TN	10.6	**CAU**		6509.3				6509.3
	TN	11.4	**CAU**		7354.4				7354.4
	TN	11.5	**CAU**		4548.7				4548.7
	TN	11.6	**CAU**		3337.7				3337.7
	TN	12.2	CAU		383.6				383.6
	TN	12.4	CAU		8.0				8.0
	TN			0.0	23766.5	0.0	0.0	0.0	23766.5
12	UP	4.1	GANGA			9393.8			9393.8
	UP	5.1	GANGA			5826.5			5826.5
	UP	5.2	**GANGA**			11435.0			11435.0
	UP	5.3	**GANGA**			7691.7			7691.7
	UP	8.1	**GANGA**			1483.0			1483.0
	UP			0.0	0.0	35830.0	0.0	0.0	35830.0
13	WB	2.1	GANGA			223.3			223.3
	WB	3.1	**GANGA**			182.6			182.6
	WB	3.2	GANGA			4601.2			4601.2
	WB	3.3	GANGA			334.4			334.4
	WB	3.4	**GANGA**			2172.2			2172.2
	WB	7.4	**GANGA**			377.8			377.8
	WB			0.0	0.0	7891.5	0.0	0.0	7891.5
All States (MCM)				46734.4	29332.4	71822.5	14985.9	26226.2	189101.3
All States (CKM)				46.73	29.33	71.82	14.99	26.23	189.10

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Table A.5.2. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Irrigation 1966-68

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	495.8	1377.1				1872.8
	AP	10.3	**KGM**	1183.1					1183.1
	AP	10.4	KGM	2398.1					2398.1
	AP	11.2	**KGM**	1352.3					1352.3
	AP	11.3	KGM	7504.7					7504.7
	AP			12933.9	1377.1	0.0	0.0	0.0	14311.0
2	BIH	4.2	Ganga			9107.5			9107.5
	BIH	7.3	**Ganga**			168.4			168.4
	BIH	7.4	**Ganga; KGM**	88.8		321.5			410.4
	BIH			88.8	0.0	9597.4	0.0	0.0	9686.3
3	GUJ	13.2	**TNM**				123.2		123.2
	GUJ	13.3	**TNM**				258.3		258.3
	GUJ	13.4	**TNM**				728.8		728.8
	GUJ	13.5	**TNM**				207.2		207.2
	GUJ	13.6	TNM				1038.5		1038.5
	GUJ	13.7	**TNM**				342.0		342.0
	GUJ			0.0	0.0	0.0	2697.9	0.0	2697.9
4	HAR	6.1	Ganga			95.4			95.4
	HAR	6.2	**Indus; GANGA**			2235.3		478.6	2713.9
	HAR	6.3	**Ganga**			2201.7			2201.7
	HAR			0.0	0.0	4532.4	0.0	478.6	5011.0
5	KAR	10.1	KGM	1874.4					1874.4
	KAR	10.2	**CAU; KGM**	374.3	861.5				1235.8
	KAR	10.5	**CAU**		802.8				802.8
	KAR	12.1	**TNM**				396.6		396.6
	KAR	12.4	**KGM; CAU**	226.0	73.2				299.2
	KAR			2474.8	1737.5	0.0	396.6	0.0	4608.9
6	MAH	7.1	**KGM**	59.1					59.1
	MAH	9.1	**KGM; TNM**	1141.5			369.4		1510.9
	MAH	9.2	**KGM**	2182.6					2182.6
	MAH	9.3	**TNM; KGM**	586.2			790.4		1376.6
	MAH	9.4	**KGM**	277.3					277.3
	MAH	12.1	**KGM**	50.4					50.4
	MAH			4297.1	0.0	0.0	1159.8	0.0	5456.9
7	MP	7.1	**TNM;KGM; GANGA**	46.2		31.4	47.7		125.3
	MP	7.2	**KGM; GANGA**	33.3		23.4			56.7
	MP	7.5	**KGM**	12.7					12.7
	MP	8.2	**GANGA**			241.0			241.0
	MP	8.3	GANGA			9.9			9.9
	MP	8.4	GANGA; TNM			35.8	32.0		67.8
	MP	8.5	GANGA			127.5	15.0		142.5
	MP	8.6	**GANGA; TNM**			68.2	85.4		153.5
	MP	8.7	**TNM**			0.0	58.0		58.0
	MP	8.8	GANGA			488.7			488.7
	MP	9.1	TNM				15.1		15.1
	MP	9.3	GANGA; TNM			404.6	283.5		688.1
	MP			92.2	0.0	1430.5	536.7	0.0	2059.5
8	ORI	7.1	**KGM**	1467.4					1467.4
	ORI	7.2	**KGM**	370.4					370.4
	ORI	7.5	**KGM**	206.7					206.7
	ORI	11.1	**KGM**	2071.0					2071.0
	ORI	11.2	KGM	768.7					768.7
	ORI			4884.2	0.0	0.0	0.0	0.0	4884.2

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St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					384.7	384.7
	PUN	6.2	INDUS					4300.0	4300.0
	PUN	6.3	INDUS					4009.8	4009.8
	PUN			0.0	0.0	0.0	0.0	8694.4	8694.4
10	RAJ	6.3	**INDUS**					5752.7	5752.7
	RAJ	8.9	**GANGA**			423.1			423.1
	RAJ	9.3	GANGA			74.7			74.7
	RAJ	8.10	**TNM**			0.0	76.9		76.9
	RAJ	8.11	**TNM**			0.0	329.0		329.0
	RAJ	8.12	**TNM; GANGA**			281.1	402.2		683.2
	RAJ	8.13	**TNM; GANGA**			183.3	850.9		1034.2
	RAJ	8.14	**GANGA**			730.4			730.4
	RAJ	14.1	**TNM**			0.0	800.4		800.4
	RAJ			0.0	0.0	1692.6	2459.4	5752.7	9904.7
11	TN	10.5	**CAU**		738.8				738.8
	TN	10.6	**CAU**		3621.9				3621.9
	TN	11.4	**CAU**		2709.6				2709.6
	TN	11.5	**CAU**		1804.5				1804.5
	TN	11.6	**CAU**		1295.9				1295.9
	TN	12.2	CAU		73.4				73.4
	TN	12.4	CAU		1.9				1.9
	TN			0.0	10246.0	0.0	0.0	0.0	10246.0
12	UP	4.1	GANGA			4337.0			4337.0
	UP	5.1	GANGA			3049.3			3049.3
	UP	5.2	**GANGA**			5634.7			5634.7
	UP	5.3	**GANGA**			4292.8			4292.8
	UP	8.1	**GANGA**			702.7			702.7
	UP			0.0	0.0	18016.5	0.0	0.0	18016.5
13	WB	2.1	GANGA			90.0			90.0
	WB	3.1	**GANGA**			107.3			107.3
	WB	3.2	GANGA			2943.4			2943.4
	WB	3.3	GANGA			190.3			190.3
	WB	3.4	**GANGA**			1451.7			1451.7
	WB	7.4	**GANGA**			248.8			248.8
	WB			0.0	0.0	5031.4	0.0	0.0	5031.4
All States (MCM)				24771.0	13360.6	40300.9	7250.4	14925.7	100608.6
All States (CKM)				24.77	13.36	40.30	7.25	14.93	100.61

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Table A.5.3. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Unirrigated 1966-68

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	1823.0	1404.7				3227.7
	AP	10.3	**KGM**	5369.7					5369.7
	AP	10.4	KGM	6655.5					6655.5
	AP	11.2	**KGM**	2198.4					2198.4
	AP	11.3	KGM	9220.2					9220.2
	AP			25266.8	1404.7	0.0	0.0	0.0	26671.4
2	BIH	4.2	Ganga			13564.0			13564.0
	BIH	7.3	**Ganga**			798.0			798.0
	BIH	7.4	**Ganga; KGM**	1380.2		1056.6			2436.8
	BIH			1380.2	0.0	15418.5	0.0	0.0	16798.7
3	GUJ	13.2	**TNM**				3124.1		3124.1
	GUJ	13.3	**TNM**				6496.9		6496.9
	GUJ	13.4	**TNM**				8431.3		8431.3
	GUJ	13.5	**TNM**				808.4		808.4
	GUJ	13.6	TNM				6353.5		6353.5
	GUJ	13.7	**TNM**				1264.9		1264.9
	GUJ			0.0	0.0	0.0	26478.9	0.0	26478.9
4	HAR	6.1	Ganga			848.7			848.7
	HAR	6.2	**Indus; GANGA**			3165.8		345.0	3510.8
	HAR	6.3	**Ganga**			1980.9			1980.9
	HAR			0.0	0.0	5995.4	0.0	345.0	6340.4
5	KAR	10.1	KGM	17150.2					17150.2
	KAR	10.2	**CAU; KGM**	657.3	1922.8				2580.1
	KAR	10.5	**CAU**		2073.4				2073.4
	KAR	12.1	**TNM**				978.0		978.0
	KAR	12.4	**KGM; CAU**	405.7	802.7				1208.4
	KAR			18213.2	4798.9	0.0	978.0	0.0	23990.1
6	MAH	7.1	**KGM**	3309.1					3309.1
	MAH	9.1	**KGM; TNM**	5302.2			2367.0		7669.2
	MAH	9.2	**KGM**	8498.0					8498.0
	MAH	9.3	**TNM; KGM**	9237.1			14380.3		23617.3
	MAH	9.4	**KGM**	8427.1					8427.1
	MAH	12.1	**KGM**	3460.4					3460.4
	MAH			38233.8	0.0	0.0	16747.3	0.0	54981.1
7	MP	7.1	**TNM;KGM;GANGA**	3639.4		3463.6	5837.8		12940.9
	MP	7.2	**KGM; GANGA**	2152.7		4224.7			6377.4
	MP	7.5	**KGM**	2767.7					2767.7
	MP	8.2	**GANGA**			1548.4			1548.4
	MP	8.3	GANGA			1359.5			1359.5
	MP	8.4	GANGA; TNM			5203.5	1082.6		6286.0
	MP	8.5	GANGA			3433.8	720.8		4154.6
	MP	8.6	**GANGA; TNM**			1192.0	951.0		2143.1
	MP	8.7	**TNM**			0.0	1584.4		1584.4
	MP	8.8	GANGA			4101.6			4101.6
	MP	9.1	TNM				907.6		907.6
	MP	9.3	GANGA; TNM			7333.5	5219.6		12553.2
	MP			8559.8	0.0	31860.6	16303.8	0.0	56724.3
8	ORI	7.1	**KGM**	2598.0					2598.0
	ORI	7.2	**KGM**	3559.6					3559.6
	ORI	7.5	**KGM**	1422.1					1422.1
	ORI	11.1	**KGM**	4116.6					4116.6
	ORI	11.2	KGM	1328.1					1328.1
	ORI			13024.3	0.0	0.0	0.0	0.0	13024.3

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St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					1731.6	1731.6
	PUN	6.2	INDUS					1464.5	1464.5
	PUN	6.3	INDUS					737.6	737.6
	PUN			0.0	0.0	0.0	0.0	3933.7	3933.7
10	RAJ	6.3	**INDUS**					2088.8	2088.8
	RAJ	8.9	**GANGA**			1666.0			1666.0
	RAJ	9.3	GANGA			848.9			848.9
	RAJ	8.10	**TNM**				924.7		924.7
	RAJ	8.11	**TNM**				1470.0		1470.0
	RAJ	8.12	**TNM; GANGA**			474.2	1324.7		1798.9
	RAJ	8.13	**TNM; GANGA**			821.6	2080.9		2902.4
	RAJ	8.14	**GANGA**			4055.2			4055.2
	RAJ	14.1	**TNM**				8267.0		8267.0
	RAJ			0.0	0.0	7865.8	14067.3	2088.8	24022.0
11	TN	10.5	**CAU**		1588.0				1588.0
	TN	10.6	**CAU**		3325.2				3325.2
	TN	11.4	**CAU**		2715.5				2715.5
	TN	11.5	**CAU**		508.4				508.4
	TN	11.6	**CAU**		2318.4				2318.4
	TN	12.2	CAU		239.4				239.4
	TN	12.4	CAU		139.1				139.1
	TN			0.0	10833.9	0.0	0.0	0.0	10833.9
12	UP	4.1	GANGA			13514.6			13514.6
	UP	5.1	GANGA			11297.6			11297.6
	UP	5.2	**GANGA**			7676.8			7676.8
	UP	5.3	**GANGA**			6642.7			6642.7
	UP	8.1	**GANGA**			4214.9			4214.9
	UP			0.0	0.0	43346.7	0.0	0.0	43346.7
13	WB	2.1	GANGA			621.0			621.0
	WB	3.1	**GANGA**			1956.6			1956.6
	WB	3.2	GANGA			4498.6			4498.6
	WB	3.3	GANGA			1485.2			1485.2
	WB	3.4	**GANGA**			775.1			775.1
	WB	7.4	**GANGA**			406.9			406.9
	WB			0.0	0.0	9743.3	0.0	0.0	9743.3
All States (MCM)				104678.1	17037.5	114230.4	74575.4	6367.5	316888.9
All States (CKM)				104.68	17.04	114.23	74.58	6.37	316.89

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Table A.5.4. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Irrigated Total 1991-1993

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	1047.2	2171.7				3218.9
	AP	10.3	**KGM**	3367.6					3367.6
	AP	10.4	KGM	7118.4					7118.4
	AP	11.2	**KGM**	3369.8					3369.8
	AP	11.3	KGM	16908.7					16908.7
	AP			31811.7	2171.7	0.0	0.0	0.0	33983.4
2	BIH	4.2	Ganga			17138.7			17138.7
	BIH	7.3	**Ganga**			201.3			201.3
	BIH	7.4	**Ganga; KGM**	203.3		440.2			643.5
	BIH			203.3	0.0	17780.2	0.0	0.0	17983.5
3	GUJ	13.2	**TNM**				3128.2		3128.2
	GUJ	13.3	**TNM**				5094.2		5094.2
	GUJ	13.4	**TNM**				6372.3		6372.3
	GUJ	13.5	**TNM**				693.8		693.8
	GUJ	13.6	TNM				3218.1		3218.1
	GUJ	13.7	**TNM**				756.3		756.3
	GUJ			0.0	0.0	0.0	19262.9	0.0	19262.9
4	HAR	6.1	Ganga			1915.7			1915.7
	HAR	6.2	**Indus; GANGA**			9056.8		2030.2	11087.0
	HAR	6.3	**Ganga**			7588.1			7588.1
	HAR			0.0	0.0	18560.7	0.0	2030.2	20590.8
5	KAR	10.1	KGM	10804.4					10804.4
	KAR	10.2	**CAU; KGM**	1064.4	2002.2				3066.5
	KAR	10.5	**CAU**		2787.2				2787.2
	KAR	12.1	**TNM**				808.1		808.1
	KAR	12.4	**KGM; CAU**	962.3	211.2				1173.5
	KAR			12831.0	5000.5	0.0	808.1	0.0	18639.7
6	MAH	7.1	**KGM**	2010.1					2010.1
	MAH	9.1	**KGM; TNM**	4782.4			1587.4		6369.7
	MAH	9.2	**KGM**	6068.0					6068.0
	MAH	9.3	**TNM; KGM**	3785.7			3924.1		7709.8
	MAH	9.4	**KGM**	1956.3					1956.3
	MAH	12.1	**KGM**	453.8					453.8
	MAH			19056.3	0.0	0.0	5511.5	0.0	24567.8
7	MP	7.1	**TNM;KGM;GANGA**	2435.7		1512.9	2430.7		6379.3
	MP	7.2	**KGM; GANGA**	240.4		307.5			547.9
	MP	7.5	**KGM**	146.3					146.3
	MP	8.2	**GANGA**			1253.0			1253.0
	MP	8.3	GANGA			113.3			113.3
	MP	8.4	GANGA; TNM			1347.9	226.3		1574.1
	MP	8.5	GANGA			1740.0	458.4		2198.4
	MP	8.6	**GANGA; TNM**			395.6	390.4		785.9
	MP	8.7	**TNM**				1578.7		1578.7
	MP	8.8	GANGA			2947.4			2947.4
	MP	9.1	TNM				249.0		249.0
	MP	9.3	GANGA; TNM			4105.5	2289.2		6394.7
	MP			2822.4	0.0	13723.0	7622.7	0.0	24168.0
8	ORI	7.1	**KGM**	4784.9					4784.9
	ORI	7.2	**KGM**	3535.7					3535.7
	ORI	7.5	**KGM**	1258.3					1258.3
	ORI	11.1	**KGM**	8401.4					8401.4
	ORI	11.2	KGM	2210.8					2210.8
	ORI			20191.1	0.0	0.0	0.0	0.0	20191.1

Contd...

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					3956.7	3956.7
	PUN	6.2	INDUS					18851.2	18851.2
	PUN	6.3	INDUS					12573.5	12573.5
	PUN			0.0	0.0	0.0	0.0	35381.4	35381.4
10	RAJ	6.3	**INDUS**					18082.1	18082.1
	RAJ	8.9	**GANGA**			2334.0			2334.0
	RAJ	9.3	GANGA			558.6			558.6
	RAJ	8.10	**TNM**				438.2		438.2
	RAJ	8.11	**TNM**				1062.2		1062.2
	RAJ	8.12	**TNM; GANGA**			682.7	1526.7		2209.4
	RAJ	8.13	**TNM; GANGA**			2067.2	1099.4		3166.6
	RAJ	8.14	**GANGA**			3114.0			3114.0
	RAJ	14.1	**TNM**				5521.2		5521.2
	RAJ			0.0	0.0	8756.5	9647.8	18082.1	36486.4
11	TN	10.5	**CAU**		2237.9				2237.9
	TN	10.6	**CAU**		6947.0				6947.0
	TN	11.4	**CAU**		7909.6				7909.6
	TN	11.5	**CAU**		4322.2				4322.2
	TN	11.6	**CAU**		3194.8				3194.8
	TN	12.2	CAU		312.7				312.7
	TN	12.4	CAU		4.9				4.9
	TN			0.0	24929.2	0.0	0.0	0.0	24929.2
12	UP	4.1	GANGA			17074.5			17074.5
	UP	5.1	GANGA			17510.8			17510.8
	UP	5.2	**GANGA**			28499.7			28499.7
	UP	5.3	**GANGA**			15284.5			15284.5
	UP	8.1	**GANGA**			2957.6			2957.6
	UP			0.0	0.0	81327.1	0.0	0.0	81327.1
13	WB	2.1	GANGA			233.9			233.9
	WB	3.1	**GANGA**			182.9			182.9
	WB	3.2	GANGA			5669.5			5669.5
	WB	3.3	GANGA			363.7			363.7
	WB	3.4	**GANGA**			1977.1			1977.1
	WB	7.4	**GANGA**			128.2			128.2
	WB			0.0	0.0	8555.2	0.0	0.0	8555.2
All States (MCM)				86915.9	32101.4	148702.6	42853.0	55493.7	366066.6
All States (CKM)				86.92	32.10	148.70	42.85	55.49	366.07

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Table A.5.5. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Irrigation 1991-93

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	636.5	1320.0				1956.5
	AP	10.3	**KGM**	1823.4					1823.4
	AP	10.4	KGM	3582.0					3582.0
	AP	11.2	**KGM**	1595.2					1595.2
	AP	11.3	KGM	9138.4					9138.4
	AP			16775.4	1320.0	0.0	0.0	0.0	18095.5
2	BIH	4.2	Ganga			12844.9			12844.9
	BIH	7.3	**Ganga**			118.6			118.6
	BIH	7.4	**Ganga; KGM**	132.0		285.9			417.9
	BIH			132.0	0.0	13249.4	0.0	0.0	13381.5
3	GUJ	13.2	**TNM**				1641.7		1641.7
	GUJ	13.3	**TNM**				1808.6		1808.6
	GUJ	13.4	**TNM**				1922.2		1922.2
	GUJ	13.5	**TNM**				513.8		513.8
	GUJ	13.6	TNM				1952.2		1952.2
	GUJ	13.7	**TNM**				509.9		509.9
	GUJ			0.0	0.0	0.0	8348.5	0.0	8348.5
4	HAR	6.1	Ganga			529.0			529.0
	HAR	6.2	**Indus; GANGA**			4365.1		978.5	5343.6
	HAR	6.3	**Ganga**			5027.3			5027.3
	HAR			0.0	0.0	9921.4	0.0	978.5	10899.9
5	KAR	10.1	KGM	5861.2					5861.2
	KAR	10.2	**CAU; KGM**	620.7	1167.6				1788.3
	KAR	10.5	**CAU**		1432.4				1432.4
	KAR	12.1	**TNM**				346.9		346.9
	KAR	12.4	**KGM; CAU**	241.0	52.9				293.9
	KAR			6722.9	2652.9	0.0	346.9	0.0	9722.7
6	MAH	7.1	**KGM**	129.0					129.0
	MAH	9.1	**KGM; TNM**	2793.2			927.1		3720.4
	MAH	9.2	**KGM**	4149.1					4149.1
	MAH	9.3	**TNM; KGM**	2210.0			2290.9		4500.9
	MAH	9.4	**KGM**	1089.0					1089.0
	MAH	12.1	**KGM**	168.9					168.9
	MAH			10539.3	0.0	0.0	3218.0	0.0	13757.3
7	MP	7.1	**TNM;KGM;GANGA**	126.8		78.8	126.6		332.1
	MP	7.2	**KGM; GANGA**	96.0		122.8			218.7
	MP	7.5	**KGM**	22.3					22.3
	MP	8.2	**GANGA**			789.9			789.9
	MP	8.3	GANGA			55.2			55.2
	MP	8.4	GANGA; TNM			839.5	140.9		980.4
	MP	8.5	GANGA			1211.0	319.1		1530.0
	MP	8.6	**GANGA; TNM**			276.7	273.1		549.9
	MP	8.7	**TNM**				1002.3		1002.3
	MP	8.8	GANGA			1673.2			1673.2
	MP	9.1	TNM				156.2		156.2
	MP	9.3	GANGA; TNM			2405.9	1341.5		3747.4
	MP			245.1	0.0	7452.9	3359.7	0.0	11057.8
8	ORI	7.1	**KGM**	2861.0					2861.0
	ORI	7.2	**KGM**	1821.5					1821.5
	ORI	7.5	**KGM**	704.0					704.0
	ORI	11.1	**KGM**	4153.3					4153.3
	ORI	11.2	KGM	1155.6					1155.6
	ORI			10695.4	0.0	0.0	0.0	0.0	10695.4

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St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					862.2	862.2
	PUN	6.2	INDUS					7881.7	7881.7
	PUN	6.3	INDUS					8187.7	8187.7
	PUN			0.0	0.0	0.0	0.0	16931.7	16931.7
10	RAJ	6.3	**INDUS**					11665.9	11665.9
	RAJ	8.9	**GANGA**			1085.5			1085.5
	RAJ	9.3	GANGA			292.3			292.3
	RAJ	8.10	**TNM**				325.7		325.7
	RAJ	8.11	**TNM**				493.6		493.6
	RAJ	8.12	**TNM; GANGA**			407.0	910.3		1317.3
	RAJ	8.13	**TNM; GANGA**			1346.7	716.2		2063.0
	RAJ	8.14	**GANGA**			1745.2			1745.2
	RAJ	14.1	**TNM**				4388.1		4388.1
	RAJ			0.0	0.0	4876.8	6833.8	11665.9	23376.4
11	TN	10.5	**CAU**		1048.5				1048.5
	TN	10.6	**CAU**		3932.7				3932.7
	TN	11.4	**CAU**		3206.8				3206.8
	TN	11.5	**CAU**		1854.8				1854.8
	TN	11.6	**CAU**		1400.6				1400.6
	TN	12.2	CAU		59.4				59.4
	TN	12.4	CAU		1.1				1.1
	TN			0.0	11504.0	0.0	0.0	0.0	11504.0
12	UP	4.1	GANGA			9911.6			9911.6
	UP	5.1	GANGA			9957.0			9957.0
	UP	5.2	**GANGA**			14012.2			14012.2
	UP	5.3	**GANGA**			8737.7			8737.7
	UP	8.1	**GANGA**			1768.8			1768.8
	UP			0.0	0.0	44387.3	0.0	0.0	44387.3
13	WB	2.1	GANGA			7.2			7.2
	WB	3.1	**GANGA**			112.1			112.1
	WB	3.2	GANGA			3149.9			3149.9
	WB	3.3	GANGA			168.7			168.7
	WB	3.4	**GANGA**			1169.1			1169.1
	WB	7.4	**GANGA**			26.5			26.5
	WB			0.0	0.0	4633.4	0.0	0.0	4633.4
All States (MCM)				45110.2	15476.9	84521.3	22106.8	29576.0	196791.2
All States (CKM)				45.11	15.48	84.52	22.11	29.58	196.79

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Table A.5.6. ACR wise - Basin wise Estimate of Consumptive Use (MCM), Unirrigated 1991-93

St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
1	AP	10.2	**CAU; KGM**	1922.2	1421.2				3343.4
	AP	10.3	**KGM**	3931.9					3931.9
	AP	10.4	KGM	5481.7					5481.7
	AP	11.2	**KGM**	2956.4					2956.4
	AP	11.3	KGM	9032.6					9032.6
	AP			23324.9	1421.2	0.0	0.0	0.0	24746.1
2	BIH	4.2	Ganga			8939.7			8939.7
	BIH	7.3	**Ganga**			509.8			509.8
	BIH	7.4	**Ganga; KGM**	973.0		853.7			1826.7
	BIH			973.0	0.0	10303.2	0.0	0.0	11276.2
3	GUJ	13.2	**TNM**				2111.5		2111.5
	GUJ	13.3	**TNM**				4709.4		4709.4
	GUJ	13.4	**TNM**				6224.1		6224.1
	GUJ	13.5	**TNM**				666.2		666.2
	GUJ	13.6	TNM				5979.2		5979.2
	GUJ	13.7	**TNM**				1209.8		1209.8
	GUJ			0.0	0.0	0.0	20900.1	0.0	20900.1
4	HAR	6.1	Ganga			402.6			402.6
	HAR	6.2	**Indus; GANGA**			1175.4		154.6	1330.0
	HAR	6.3	**Ganga**			1592.0			1592.0
	HAR			0.0	0.0	3170.0	0.0	154.6	3324.6
5	KAR	10.1	KGM	15314.4					15314.4
	KAR	10.2	**CAU; KGM**	1283.7	2573.7				3857.4
	KAR	10.5	**CAU**		2425.6				2425.6
	KAR	12.1	**TNM**				1154.6		1154.6
	KAR	12.4	**KGM; CAU**	614.7	1270.6				1885.3
	KAR			17212.8	6269.9	0.0	1154.6	0.0	24637.3
6	MAH	7.1	**KGM**	3198.1					3198.1
	MAH	9.1	**KGM; TNM**	4820.5			2154.1		6974.7
	MAH	9.2	**KGM**	7391.4					7391.4
	MAH	9.3	**TNM; KGM**	10063.3			16741.9		26805.2
	MAH	9.4	**KGM**	8669.3					8669.3
	MAH	12.1	**KGM**	3564.3					3564.3
	MAH			37707.0	0.0	0.0	18896.0	0.0	56603.0
7	MP	7.1	**TNM;KGM;GANGA**	3153.5		3249.3	5439.2		11842.0
	MP	7.2	**KGM; GANGA**	2315.5		4816.8			7132.2
	MP	7.5	**KGM**	3667.0					3667.0
	MP	8.2	**GANGA**			1729.5			1729.5
	MP	8.3	GANGA			1562.4			1562.4
	MP	8.4	GANGA; TNM			5583.4	1102.7		6686.1
	MP	8.5	GANGA			4092.4	924.4		5016.8
	MP	8.6	**GANGA; TNM**			1239.9	1078.1		2318.0
	MP	8.7	**TNM**				1744.2		1744.2
	MP	8.8	GANGA			4131.5			4131.5
	MP	9.1	TNM				1109.9		1109.9
	MP	9.3	GANGA; TNM			8610.2	5485.8		14096.0
	MP			9136.0	0.0	35015.2	16884.4	0.0	61035.6
8	ORI	7.1	**KGM**	3374.6					3374.6
	ORI	7.2	**KGM**	4328.2					4328.2
	ORI	7.5	**KGM**	2124.4					2124.4
	ORI	11.1	**KGM**	3456.8					3456.8
	ORI	11.2	KGM	1676.8					1676.8
	ORI			14960.8	0.0	0.0	0.0	0.0	14960.8

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St. No	State	AcrNo	BASIN	KGM	CAU	GANGA	TNM	INDUS	TOTAL
9	PUN	6.1	**INDUS**					919.5	919.5
	PUN	6.2	INDUS					244.0	244.0
	PUN	6.3	INDUS					81.0	81.0
	PUN			0.0	0.0	0.0	0.0	1244.5	1244.5
10	RAJ	6.3	**INDUS**					1147.4	1147.4
	RAJ	8.9	**GANGA**			1523.3			1523.3
	RAJ	9.3	GANGA			943.4			943.4
	RAJ	8.10	**TNM**				1065.7		1065.7
	RAJ	8.11	**TNM**				1316.0		1316.0
	RAJ	8.12	**TNM; GANGA**			747.9	1498.1		2246.1
	RAJ	8.13	**TNM; GANGA**			1448.5	1622.7		3071.2
	RAJ	8.14	**GANGA**			3776.8			3776.8
	RAJ	14.1	**TNM**				9221.9		9221.9
	RAJ			0.0	0.0	8439.9	14724.4	1147.4	24311.7
11	TN	10.5	**CAU**		2016.0				2016.0
	TN	10.6	**CAU**		2928.9				2928.9
	TN	11.4	**CAU**		2750.2				2750.2
	TN	11.5	**CAU**		581.1				581.1
	TN	11.6	**CAU**		1775.7				1775.7
	TN	12.2	CAU		243.8				243.8
	TN	12.4	CAU		195.2				195.2
	TN			0.0	10490.9	0.0	0.0	0.0	10490.9
12	UP	4.1	GANGA			11105.3			11105.3
	UP	5.1	GANGA			6581.7			6581.7
	UP	5.2	**GANGA**			2599.3			2599.3
	UP	5.3	**GANGA**			3660.1			3660.1
	UP	8.1	**GANGA**			4033.3			4033.3
	UP			0.0	0.0	27979.8	0.0	0.0	27979.8
13	WB	2.1	GANGA			767.9			767.9
	WB	3.1	**GANGA**			2346.4			2346.4
	WB	3.2	GANGA			5343.5			5343.5
	WB	3.3	GANGA			1744.7			1744.7
	WB	3.4	**GANGA**			947.0			947.0
	WB	7.4	**GANGA**			462.3			462.3
	WB			0.0	0.0	11611.8	0.0	0.0	11611.8
All States (MCM)				103314.4	18182.0	96519.9	72559.5	2546.5	293122.3
All States (CKM)				103.31	18.18	96.52	72.56	2.55	293.12

Note: KGM = Krishna, Godavary and Mahanadhi. CAU = Cauvery. TNM = Tapi, Narmada, and Mahe.

Appendix 6: Cropwise distribution of consumptive use of Irrigation by State and agro-climatic region.

Tables A6.1-A6.6 give an idea of the spatial distribution of consumptive use as well the relative shares of different crop groups and their changes over time.

Appendix: 6.1. Statewise & Cropwise % Distribution of Consumptive Use of Irrigated Areas, 1966-68

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Total Con.Use	CUR Meter / Ha
AP	26.8	34.8	17.1	0.1	0.2	7.9	4.1	8.2	0.8	100.0	0.6871
BIH	6.6	58.3	2.0	12.2	0.0	2.9	1.9	4.4	11.6	100.0	0.5447
GUJ	14.1	0.0	0.0	25.6	17.0	26.5	7.1	9.7	0.0	100.0	0.5263
HAR	12.6	0.0	0.0	16.9	12.6	28.3	7.1	19.7	2.8	100.0	0.5107
KAR	24.6	18.2	1.7	0.9	2.3	8.7	7.3	17.4	18.8	100.0	0.7194
MAH	16.0	0.0	0.1	10.5	2.2	9.7	18.1	27.4	16.1	100.0	0.6819
MP	49.1	0.0	0.0	15.5	0.4	9.0	4.0	9.3	12.7	100.0	0.5644
ORI	11.8	65.3	0.0	2.0	0.0	10.3	3.5	1.7	5.4	100.0	0.5795
PUN	12.1	0.0	0.0	23.2	13.8	27.7	7.2	11.5	4.5	100.0	0.4630
RAJ	3.8	0.0	0.0	22.5	15.9	39.4	9.1	4.7	4.6	100.0	0.4522
TN	52.2	16.8	1.4	0.0	1.8	9.1	4.0	8.8	6.0	100.0	0.7173
UP	6.6	3.8	0.4	23.3	0.7	18.8	7.5	30.2	8.7	100.0	0.5200
WB	14.6	74.6	1.3	1.4	0.0	5.8	0.1	2.2	0.0	100.0	0.5186
All States	19.4	18.5	2.9	12.2	4.3	16.0	6.2	13.8	6.7	100.0	0.5656

Appendix: 6.2. Statewise & Cropwise % Distribution of Consumptive Use of Irrigated Areas, 1966-68

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Irrigation Con.Use	CUR Meter / Ha
AP	3.9	51.6	26.5	0.1	0.0	2.2	5.9	8.7	0.9	100.0	0.3761
BIH	0.0	68.9	2.4	14.1	0.0	0.0	2.2	3.5	9.0	100.0	0.4054
GUJ	1.4	0.0	0.0	53.3	6.6	8.3	14.9	15.5	0.0	100.0	0.2337
HAR	5.9	0.0	0.0	25.5	11.3	20.4	10.7	23.0	3.3	100.0	0.2731
KAR	8.6	28.5	2.2	1.6	0.9	4.5	12.0	20.5	21.2	100.0	0.3656
MAH	0.4	0.0	0.2	17.4	0.4	1.5	30.2	31.9	18.1	100.0	0.3662
MP	0.0	0.0	0.0	45.4	0.0	0.0	11.7	18.2	24.7	100.0	0.1698
ORI	0.0	86.9	0.0	2.6	0.0	0.0	4.3	1.5	4.6	100.0	0.3389
PUN	5.4	0.0	0.0	35.0	11.9	18.3	11.0	13.0	5.4	100.0	0.2453
RAJ	2.8	0.0	0.0	33.5	13.3	25.9	13.6	5.4	5.4	100.0	0.2771
TN	48.6	15.8	2.6	0.0	1.8	8.6	4.6	10.6	7.5	100.0	0.3093
UP	0.1	6.3	0.7	38.3	0.0	0.6	12.3	31.9	9.7	100.0	0.2615
WB	-0.1	95.3	1.3	1.8	0.0	0.0	0.1	1.6	0.0	100.0	0.3307
All States	7.0	27.0	4.6	19.4	3.3	6.9	9.6	14.8	7.3	100.0	0.3009

Appendix: 6.3. Statewise & Cropwise % Distribution of Consumptive Use of Unirrigated Areas, 1966-68

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Rainfall Con.Use	CUR Meter / Ha
AP	1.7	0.4	0.2	0.0	11.1	66.9	8.2	0.4	11.0	100.0	0.3019
BIH	12.7	16.1	0.4	1.1	0.0	58.8	2.3	6.2	2.2	100.0	0.2113
GUJ	9.7	0.0	0.0	0.2	15.1	74.3	3.0	0.0	-2.4	100.0	0.2923
HAR	0.7	0.0	0.0	1.2	0.2	96.9	2.8	1.2	-2.9	100.0	0.2292
KAR	4.6	0.6	1.0	0.4	6.4	76.4	8.8	0.0	1.8	100.0	0.2602
MAH	11.2	0.0	0.0	0.2	19.8	67.4	3.5	-0.9	-1.1	100.0	0.3095
MP	35.7	0.0	0.0	1.3	2.7	58.0	3.3	-0.3	-0.7	100.0	0.3136
ORI	16.2	15.8	1.5	0.0	0.1	67.0	5.4	-0.1	-6.1	100.0	0.2294
PUN	8.9	0.0	0.0	11.3	1.0	73.7	4.2	3.1	-2.2	100.0	0.2241
RAJ	2.0	0.0	0.0	0.1	0.2	95.6	3.3	0.0	-1.2	100.0	0.1753
TN	5.9	0.7	0.3	0.0	5.7	60.7	22.2	1.0	3.4	100.0	0.2805
UP	29.2	2.6	0.0	1.1	0.0	65.9	2.8	6.2	-7.8	100.0	0.2995
WB	26.4	25.5	8.0	1.4	0.0	32.5	3.9	0.7	1.6	100.0	0.2034
All States	16.4	2.8	0.5	0.6	7.2	67.2	4.9	0.7	-0.4	100.0	0.2687

Appendix: 6.4. Statewise & Cropwise % Distribution of Consumptive Use of Irrigated Areas, 1991-93

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Total Con.Use	Overall Con. Use Rate Meter / Ha
AP	26.8	34.8	17.1	0.1	0.2	7.9	4.1	8.2	0.8	100.0	0.6871
BIH	6.6	58.3	2.0	12.2	0.0	2.9	1.9	4.4	11.6	100.0	0.5447
GUJ	14.1	0.0	0.0	25.6	17.0	26.5	7.1	9.7	0.0	100.0	0.5263
HAR	12.6	0.0	0.0	16.9	12.6	28.3	7.1	19.7	2.8	100.0	0.5107
KAR	24.6	18.2	1.7	0.9	2.3	8.7	7.3	17.4	18.8	100.0	0.7194
MAH	16.0	0.0	0.1	10.5	2.2	9.7	18.1	27.4	16.1	100.0	0.6819
MP	49.1	0.0	0.0	15.5	0.4	9.0	4.0	9.3	12.7	100.0	0.5644
ORI	11.8	65.3	0.0	2.0	0.0	10.3	3.5	1.7	5.4	100.0	0.5795
PUN	12.1	0.0	0.0	23.2	13.8	27.7	7.2	11.5	4.5	100.0	0.4630
RAJ	3.8	0.0	0.0	22.5	15.9	39.4	9.1	4.7	4.6	100.0	0.4522
TN	52.2	16.8	1.4	0.0	1.8	9.1	4.0	8.8	6.0	100.0	0.7173
UP	6.6	3.8	0.4	23.3	0.7	18.8	7.5	30.2	8.7	100.0	0.5200
WB	14.6	74.6	1.3	1.4	0.0	5.8	0.1	2.2	0.0	100.0	0.5186
All States	19.4	18.5	2.9	12.2	4.3	16.0	6.2	13.8	6.7	100.0	0.5656

Appendix: 6.5. Statewise & Cropwise % Distribution of Consumptive Use of Irrigated Areas, 1991-93

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Irrigation Con.Use	Overall Con. Use Rate Meter / Ha
AP	3.2	46.7	28.0	0.2	0.2	2.4	9.5	9.1	0.7	100.0	0.3506
BIH	0.0	47.4	1.6	38.7	0.0	0.0	6.0	1.0	5.3	100.0	0.3435
GUJ	0.0	0.0	0.0	23.7	5.5	6.7	16.2	23.3	24.8	100.0	0.2724
HAR	11.1	0.0	0.0	38.7	14.7	11.9	10.9	10.0	2.6	100.0	0.2453
KAR	5.0	15.0	7.8	3.9	1.4	8.5	22.0	28.9	7.6	100.0	0.3395
MAH	0.1	0.0	0.0	15.8	0.1	1.4	23.1	36.0	23.5	100.0	0.4215
MP	0.0	0.0	0.0	71.6	0.0	0.0	12.7	5.2	10.5	100.0	0.2182
ORI	0.0	57.6	4.2	0.7	0.0	0.0	8.1	3.1	26.4	100.0	0.3363
PUN	26.3	0.0	0.0	41.3	12.1	7.1	4.7	4.7	3.9	100.0	0.2366
RAJ	9.3	0.0	0.0	36.7	14.8	20.7	13.1	1.4	4.0	100.0	0.2898
TN	33.3	10.8	10.8	0.0	1.5	10.2	4.2	16.2	13.0	100.0	0.3450
UP	0.2	10.5	0.0	46.3	0.0	0.4	5.2	26.3	11.1	100.0	0.2856
WB	0.0	74.3	10.4	5.7	0.0	0.0	2.3	0.9	6.4	100.0	0.2730
All States	6.5	16.1	4.2	29.6	4.0	5.4	9.9	14.3	9.9	100.0	0.2949

Appendix: 6.6. Statewise & Cropwise % Distribution of Consumptive Use of Unirrigated Areas, 1991-93

State	RICE_KI	RICE_RI	RICE_SI	WHT_I	COTN_I	Others KI	Others RI	SCAN_I	TFV_I	Rainfall Con.Use	Overall Con. Use Rate Meter / Ha
AP	2.1	0.6	0.2	0.0	4.6	79.0	9.2	0.1	4.3	100.0	0.3207
BIH	10.2	12.7	0.4	1.7	0.0	66.3	3.6	3.9	1.2	100.0	0.2099
GUJ	8.8	0.0	0.0	0.3	22.9	64.6	2.5	0.0	0.9	100.0	0.2728
HAR	2.7	0.0	0.0	3.4	0.6	84.8	5.7	3.5	-0.7	100.0	0.2551
KAR	6.1	0.7	0.2	0.8	13.9	71.4	8.0	0.0	-1.2	100.0	0.2598
MAH	10.3	0.0	0.0	0.6	21.3	64.3	3.6	0.0	-0.2	100.0	0.3197
MP	35.2	0.0	0.0	2.1	5.9	53.7	3.2	0.1	-0.2	100.0	0.3240
ORI	24.4	24.5	0.0	0.1	0.0	43.2	4.2	1.6	1.9	100.0	0.2359
PUN	7.8	0.0	0.0	10.4	1.3	74.6	6.0	4.6	-4.7	100.0	0.3027
RAJ	1.5	0.0	0.0	0.6	1.2	93.9	3.4	0.1	-0.7	100.0	0.1768
TN	6.8	1.3	0.0	0.0	7.0	61.0	21.0	0.0	2.9	100.0	0.2806
UP	26.0	2.3	0.2	2.2	0.1	62.8	3.1	5.2	-1.9	100.0	0.3167
WB	27.2	26.1	0.8	0.4	0.0	38.9	4.0	1.3	1.2	100.0	0.1966
All States	15.9	2.9	0.1	1.2	8.5	65.1	4.8	1.2	0.2	100.0	0.2738

Appendix 7: Basinwise estimates of surface and groundwater utilization.

Surface Water

The CWC is responsible for compiling data on the live storage capacity of completed projects and projects under construction as well as the estimate of the volume of surface water utilization. These data are however not published regularly nor are they complete. The Irrigation Commission (1972) in their report gives these data for all basins as reported by CWC. The date of reference is not indicated. It is presumed that the data relate to the late 1960's.

For subsequent years the published data are both irregular and incomplete. The latest available estimates (published in "Water related statistics: 1998") give basin wise data on storage capacity but utilization estimates are not indicated for Ganges and several other basins. The year to which these data relate are also not indicated. We presume that they relate to the late eighties or early nineties.

In several cases (as can be seen from Table A 7.1) the changes in utilization are out of line with the changes in live storage capacity : in some the increase in the former are less than that of the latter; in some others though storage capacity has increased utilization is reported to have actually fallen. Overall considering only basins for which estimates of storage and utilisation are given for both periods, while storage capacity increased by 10 percent, utilized volumes fell by 10 percent. There is no indication of how these data or put together nor any comment on the reasons for the fall in the utilization to capacity ratio.

Groundwater

In 1990, according to estimates of the Central Groundwater Board, the total extraction was 106 bcm compared to an estimated net draft of around 58 bcm in the early seventies, an increase of somewhat less than 40 percent.(Table A.7.2). This is much lower than other indicators of groundwater development: Thus between the early 70's and 1990, the number of wells and tube wells nearly doubled, that of tube wells increased fourfold, and the number of energized pump sets by more than four times. Area irrigated by groundwater is reported to have doubled.

One would expect that with the growing importance of tube wells and rapid increase in energized pumping, the area irrigated and the amount of water lifted per well to increase. But the figures

point to a significant reduction in the area irrigated per well. On the other hand, comparisons of official estimates for the early 70's and 1990 – the former based on estimates of an expert group of the Planning Commission and the latter from a report of a Working group of the Ministry of Water Resources (1989) – imply a decline in the extraction rate per well in a majority of states and an increase is some. In the hard rock and low rainfall regions, with relatively poor endowment of groundwater, rapid expansion of energized well irrigation may be expected to reduce yield per well. But this is not always the case: yield per well in Tamilnadu and Karnataka have, according these figures, increased over the period. On the other hand, in the groundwater rich Indo-Gangetic plain where the tube wells have become an increasingly important and now dominant source of groundwater supplies, one would expect an increase in yield per well. This is apparent in Bihar and markedly so in the Punjab. But in Haryana the implied yield per well has not changed while it has fallen sharply in UP.

More recent estimates place the volume of groundwater use at much higher levels. The Hashim Commission places the figure (in 1998) at 206 bcm which is nearly twice the CGWB estimate for 1990. But the report gives no basis for this revision nor does it give any breakup by basin or state.

Estimates of groundwater extraction thus leave much to be desired. For purposes of the present exercise we assume the total net draft of groundwater in the basins covered by this study to be 150 bcm.

Appendix 7.1 Estimate of water Utilisation by Basins, BCM

Basin	Surface water				Groundwater	
	Live Capacity of Completed Storages		Volume of water Utilised		Volume of ater Utilised	
	1969-74	1989	1969-74	1989	1969-74	1989
INDUS	**14.4**	**13.83**	**46**	**40**	**8.5**	**18.2**
GANGA	**33.5**	**36.84**	**132**	**na**	**41**	**49.6**
Godhavari	14.9	19.51	32.7	38	5.4	6.0
Krishna	29.9	34.48	52.4	47	6.5	6.3
EFRB M & P	0.8	1.63	8.8	na	0.7	0.8
Mahanadhi	7.9	8.49	21.3	17	0.3	1.0
Brahmani& Baitharani	4.3	4.76	9.6	na	na	0.5
Subarnarekkha		0.66				
KGM	**57.8**	**69.53**	**124.8**	**102**	**12.9**	**14.6**
Cauvery	5.5	7.43	17.9	18	2.6	5.8
Pennar and				5		
EFRB P & K	2.5	1.8	21.9	na	4.6	10.5
Cauvery	**8**	**9.23**	**39.8**	**23**	**7.2**	**16.3**
Mahi	4.3	4.75	3.9	2.5	1.2	2
WFR of kutch etc	1.8	4.31	3.8	na	8.4	4.8
Narmada	2.6	6.6	2.8	8	1.4	1.3
Tapi	8.1	8.53	5.4	na	1.6	2
Sabarmati		1.35	1.5	1.8	0.1	1.3
TNM	**16.8**	**24.19**	**17.4**	**12.3**	**12.7**	**11.4**

Source : 1.1969-74 Figures from Chaturvedi, 1976 cited in Vaidyanathan 1999.
2. Figures of capacity and utilsation for 1989 are from CWC, Water and Related Statistics (1990 :13) and (1998: pp17-18). Utilisation assuming that utilisation to capacity ratio is the same as in 1969-74.

Appendix 7.2 Net Area Irrigated by Groundwater (Wells + Tubewells) and Volume (BCM) of Net Draft

Area / State	Volume 1970-71	Area 1970-71	Volume 1990-91	Volume 1990-91	1990@	(Area in '000 ha.) Development of Different Types of Wells: Dug wells		Tubewells #		Electric Pumpsets		(Wells in '000 Nos.) Diesel Engines	
	000ha	BCM*	000ha	BCM **	BCM	1968-9	1989-90	1968-9	1989-90	1968-9	1989-90	1968-9	1989-90
Andhra Pradesh	508	4.4	1303	7.4	11.3	660	1075.9	16.0	7972.6	123.2	1121.1	38.1	215.2
Bihar	716	2.9	1519	6.8	6.1	225	417.8	1285.0	6941.8	50.0	251.2	28.0	173.0
Gujarat	1082	5.1	1989	6.4	9.4	565	709.1	928.0	5096.3	42.1	426.3	215.0	733.0
Haryana	574	0.9	1247	1.9	1.9	65	42.4	980.0	2234.0	45.4	340.4	2.6	101.1
Karnataka	259	1.3	713	4.7	3.5	280	512.7	0.0	35.0	91.8	672.1	31.4	58.0
Madhya Pradesh	562	5.2	1132	6.3	10.5	610	1307.1	72.0	1439.2	24.6	776.4	24.8	131.8
Maharashtra	769	4.2	2147	7.1	11.7	665	1116.0	0.3	0.1	125.0	1468.3	128.0	173.1
Orissa	126	0.2	741	1	1.2	15	543.8	213.0	5275.2	0.5	46.7	5.0	18.7
Punjab	1591	4.1	2243	15.2	5.7	170	93.5	958.5	2483.6	59.2	553.5	29.1	308.0
Rajasthan	1083	2.6	2341	4.9	5.6	605	835.3	39.4	93.9	18.4	341.8	18.0	71.5
Tamil Nadu	774	4.3	1029	12	5.9	1115	1446.6	25.6	135.0	410.0	1265.8	66.7	271.3
Uttar Pradesh	4033	22.1	6933	24.9	38	1120	1145.7	9066.0	29664.5	77.7	637.0	85.0	1895.5
West Bengal	0.36	0.4	70	2.9	0.4	Neg.	49.2	1320.0	6349.0	1.2	79.6	30.0	133.5
All States	12077	57.6	23407	101.5	111.3	6095.0	9295.1	14903.8	67720.2	1069.1	7980.2	701.7	4283.7

Notes: *estimate for 1967-68 by an expert group of the Planning Commission 1972

**Chaturvedi (1972) cites a figure of 68 bcm for basins (excluding Brahmaputra, Barak and west flowing rivers below Tapi) as the groundwater utilisation (average for 1969-73) in the country (for all river basins excluding Brahmaputra, Barak and west flowing rivers south of Tapi). This figure is reported to be taken from the Report of the Irrigation Commission (1972). 1990 figures from CMIE Report. @1990 assuming that extraction increased in the same proportion as irrigated area. Well Details from Statistics of Minor Irrigation Development, CBIP, New Delhi, 1989. Pp.1928. # Tubewells represent shallow as well as public tubewells.

Appendix 8 Estimation of irrigated and un-irrigated output in selected states

The estimates relate to 1991-3 and cover 13 major states.(Estimation for other years is in process)

These estimates, published in the DE&S annual publication "Estimates of Area, Production and Yield of Crops", cover 6 to 12 major crops. Though only a fraction of the crops in terms of number, these include crops in which a significant proportion of their total area is under irrigation. They also account for the bulk of the irrigated area.

The DE&S also publishes detailed crop-wise data on area sown, area irrigated and total production. They are the basis for computing the proportion of irrigated to total area under different crops. The level of crop-wise detail for irrigated area is considerably less than for total crop area. The classification also does not match especially in respect of a number of crops.

Because of these limitations, crops have been grouped into the following categories for purposes of this exercise:

1. Crops for which estimates of both area and yield for irrigated and rain-fed conditions are available;
2. Crops for which only irrigated and un-irrigated area or yield estimates are available; and
3. Those for which neither is available.

In the first category per hectare irrigated yield and the share of irrigated area in total production is estimated as follows

$y = p/a$

yi/yu = ratio of irrigated to un-irrigated yield (denoted as X)

Ai/a proportion of area under the crop which is irrigated (denoted as Z).

$y = ai*yi + au*yu$

$y = X*Z*yu + (1-ai)yu = yu(X*Z + 1-X)$

$yu = X*yu = X*y/(X*Z+1-X)$

Share of irrigated area in total production of the crop $pi/p = ai*yi/a*y = (yi*a*Z)/a*y$

$= ((yi*a*ai/a)/(yi/yu*ai/a+1-ai/a))$

$pu/p = 1- pi/p$

(note: In the case of rice, whose water requirements as well a yields differ widely between seasons, pi/p is estimated separately for autumn (kharif and rabi) and summer in states where

the crop is grown in different seasons and season-wise area and yield estimates are available . It is assumed, in all these cases, that summer rice is wholly irrigated. Irrigated area in autumn season is taken as the difference between total irrigated area under rice and the summer rice area. Though season-wise distribution of area is given for some other crops - notably jowar, maize and groundnut – the season-wise yield figures are not available.)

The above proportions are applied to the estimated value of total output of each of these crops to obtain the value of their respective irrigated and un-irrigated output. In the case of UP estimates of yi and yu are not available for any crop for they many years including 1991-3. We have used the ratios for MP – which is closest in terms of climate –for estimating irrigated and un-irrigated output of major crops in UP.

State-wise estimates of crop-wise output value have been published by the national Income Unit of the Central Statistical Organisation for every year from 1960-61 through 1996-7. The estimates for 19601 to 10970-1 are at 1960-1 prices; for 1970-1 to 1980-1 at 1970-1 prices; for 1980-1 to 1990-1 at 1980-1 prices and thereafter at 1993-4 prices.

We have converted the series for the entire period at 1980-81 prices. A further adjustment has been made for changes in the coverage and estimation of some crops in the latest revision on the basis of the ratio of the estimates for 1990-1 at 1980-1 from the old series and that for the same year at 1993-4 prices.

As for category 2, wherever yi/yu ratio is not available, crops have been treated as un-irrigated (when the irrigation ratio is less than 50 percent) and as irrigated when the ratio exceeds 50%.

In the case of category 3 we have treated, on the basis of informed judgment, the entire area under some crops as un-irrigated and the entire area under others as irrigated. The following is a list

Un-irrigated: small millets; pulses other than gram and arhar; oil seeds other than groundnut, sesame, rape and mustard and linseed; fibres other than cotton; indigo, D&T materials; tea; coffee; rubber; guar seed; and miscellaneous crops

Irrigated: chillies; pepper; ginger; turmeric; coriander; arecanut; other spices; banana; potato; sweet potato; tapioca; onions, and other fruits

The gross value of total output from irrigated and un-irrigated areas is the sum of the crop-wise values in these two categories estimated as above.

Table A.8: Statewise Estimates of the Gross Value of Output of Different Crop Groups in 1991-93

Rs Lakhs at 1980-81 prices

Total / Irrigated and Unirrigated Areas	Paddy	Wheat	tot oth cereals	total pulses	total oilseed	Sugar cane	Kapas	tot oth fibres	tobacco	condimnt spices	tot frt veg	all others	Total
ANDRA PRADESH													
Total	179792	157	24698	19435	102202	32529	36937	1585	24101	36962	41523	24637	524557
Irrigated	175297	157	4562		21429	32529	6759	0	9689	36962	39334	0	326719
Unirrigated	4495		20134	19435	80773		30178	1585	14412	0	2189	24555	197756
Bihar													
Total	88759	58653	18206	20940	5871	13265	4	2721	1681	811	116618	3194	330724
Irrigated	45356	52377	8668		1282	1884		0	1681	811	116618	0	228678
Unirrigated	43403	6186	9537	20940	4588	11381	4	2721		0	0	3194	101955
Gujarat													
Total	17291	23314	30283	21340	87213	26042	43826	118	8039	8812	35796	26166	328241
Irrigated	12553	22428	743	1194	28178	26042	25770	0	8039	8812	35796	0	169555
Unirrigated	4738	886	29540	20145	59036	0	18056	118		0	0	26166	158686
Haryana													
Total	36130	90288	10046	14595	27426	16646	26151	41		1151	10003	10661	243137
Irrigated	36130	90288	3782	4584	18050	16646	26151	0		1151	10003	0	206783
Unirrigated			6264	10012	9376			41		0	0	10661	36354
Karnataka													
Total	58928	3490	59202	14105	70885	65959	17471	64	4411	22969	35939	25583	379006
Irrigated	42782	2272	12487	394	8082	65959	6831	0		21734	33653	0	194192
Unirrigated	16146	1218	46716	14668	62803		10630	64	4411	1235	2286	25583	185761
MADYA PRADESH													
Total	101266	104505	42136	91631	108224	2686	10495	86	49	7133	40487	37450	546147
Irrigated	33620	79946		19220	14655	2686	3684	0	49	7133	40487	0	201480
Unirrigated	67646	24559	42136	72410	93569		6811	86		0	0	37450	344668
MAHARASTRA													
Total	51853	19350	141867	63277	86031	84773	56798	314	1106	6235	73961	12844	598409
Irrigated	15037	14725	1099	4564	8095	84773		0		6235	73011	0	207540
Unirrigated	36816	4625	140768	58713	77936		56798	314	1106	0	949	12844	390870

Total / Irrigated and Unirrigated Areas	Paddy	Wheat	tot oth cereals	total pulses	total oilseed	Sugar cane	Kapas	tot oth fibres	tobacco	condimnt spices	tot frt veg	all others	Total
Orissa													
Total	101027	327	3279	19420	20814	4472	169	2303	1022	9826	52882	2024	217564
Irrigated	44149	327		0	804	4472		0		9826	52067	0	111643
Unirrigated	56878		3279	19420	20009		169	2303	1022	0	815	2024	105920
Punjab													
Total	114182	164874	1361	2981	7183	14284	42071	30	0	693	24561	6355	378575
Irrigated	114182	164874	1208	419	2987	12482	42071	0		0	24561	0	362785
Unirrigated			153	2561	4196	1802		30	0	693	0	6355	15790
Rajasthan													
Total	2632	71487	67036	58350	105452	3500	21049	146	579	20367	10940	68179	429716
Irrigated	1495	71487	4837	5548	53903	3500	21049	0		20367	10940	0	193124
Unirrigated	1137		62199	52802	51550			146	579	0	0	68179	236592
Tamilnadu													
Total	111011	2	14119	8239	74781	49399	8271	54	796	8887	40313	15180	331052
Irrigated	99022	2	3016	0	18512	49399	4218	0	796	8415	39071	0	222452
Unirrigated	11989		11103	8239	56269		4053	54		472	1241	15180	108601
UTTAR PRADESH													
Total	171008	264177	50868	79742	57209	255607	254	126	5246	5018	137992	28030	1055276
Irrigated	107393	252817	13015	7063	30990	255607	254	0	5246	5018	137992	0	815395
Unirrigated	63615	11360	37853	72679	26219	0	0	126		0	0	28030	239882