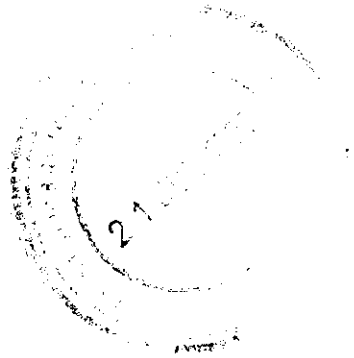
Report No. R-41.3

PILOT PROJECT FOR FARMER-MANAGED IRRIGATED AGRICULTURE UNDER THE LEFT BANK OUTFALL DRAIN STAGE I PROJECT, PAKISTAN



PRELIMINARY BUSINESS PLAN For HERAN DISTRIBUTARY

by

Niaz Hussain Sial
Mohsin Khatri
Syed Daniyal Haider

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FOREWORD

The Water Users Federation (WUF) for each pilot distributary was established in mid-December, 1996. Unfortunately, Mr. Amin Sohani, who was entrusted with the task of developing the Business Plans for these three Pilot Distributaries resigned in July 1997 to pursue a Ph.D, degree in the U.S.A.

After some search, I and Mr. Don J. Bandaragoda, Project Leader decided to request Syed Daniyal Haider, Finance Controller, IIMI-Pakistan to take up this task. He was joined by Mr. Mohsin Khatri a recent MBA and Mr. Niaz Hussain Sial, Field Research Assistant, Sanghar Field Station.

They started their work by conducting a comprehensive field survey to record the inventory of crops on 1 October 1997. This was not an easy task so the services of persons having the necessary skills and experience to undertake this survey were hired. This task took more than 75 days, but in the end, even the field staff felt good as this survey gave them in depth knowledge of the pilot distributaries.

This Preliminary Business Plan focuses on the irrigation network only, not the drainage system which is why I have preferred to call it as preliminary. After a comprehensive study of the drainage network, we shall come out with the Proposed Business Plan, which once tested in the field by the WUF will form the basis for the Final Business Plan.

I am very pleased about the outcome of this endeavor and find this report to be a good solid piece of work. Considering the enactment of the SIDA Act, I personally feel this report may provide a very valuable financial information on the affairs of both the Irrigation department and the viability of the WUF. Certainly, this combination of a professional accountant, a business administration graduate, and a field person has proved very effective.

Gaylord V. Skogerboe, Director
Pakistan National Program
International Irrigation Management Institute

ACKNOWLEDGEMENTS

The hypothesis for this report was that the farmers are paying more than what is required to maintain the present irrigation infrastructure at the minimum level. In the end, this hypothesis proves to be somewhat correct. The authors express their profound thanks to Dr. Muhammad S. Shafique, Senior Irrigation Specialist, IIMI-Pakistan, for this hypothesis and for providing guidance to them from time to time.

Thanks are due to Dr. Yameen Memon, who kept everyone in line and on the right track. Dr. Bakhshal Khan Lashari, Abdul Hakeem Khan, Robina Siddique, Dr. Shafquat Ejaz and Mehmood ul Hassan for sharing their knowledge with us. Zaigham Habib we thank for changing our whole data collection methodology by informing us that farmers seldom provide accurate information.

For the authors, this is a first report, and we are thankful to Prof. Gaylord V. Skogerboe, Director, IIMI-Pakistan, and Mr. Don J. Bandaragoda for their confidence in us.

The authors express their good fortunate having Mr. David A. Governey, Director Finance and Administration, IIMI, for his valuable comments. We acknowledge most of ours errors in judgment pointed out by him.

Tabrez Ahmad we thank for his secretarial support, which was indeed one of the most valuable inputs, while Verenia Duke did the most difficult task of editing this report. Special thanks to these two gentlepersons.

In the end, our gratitude has to be extended to two persons:(1) Dr. Muhammad Aslam for showing all the patience in the world listening to our ideas about Waterlogging, Salinity and Sodicity (which were non-existent most times) and for correcting our ideas; and (2) Ineke M. Kalwij, from whom we learned the way irrigation systems work, the basics of writing a research report and how to present and interpret the research results.

1 DESCRIPTION OF THE HERAN SECONDARY CANAL

1.1 LOCATION

The name of the secondary canal (distributary) selected for this Business Plan is the Heran Distributary, which is situated in District and *Tehsil* Sanghar.

The Heran Distributary off-takes from the head portion of the Main Nara Canal, and its total length is 10.6 km. Located in the Sindh Province, the distance of this distributary is 110 km from Hyderabad, and 260 km from the port city of Karachi.

1.1.1 Historical Background

The majority of the farmers estimate the approximate construction of this distributary to be somewhere between 1930 and 1940. The purpose, farmers say, was to provide irrigation water to the lands allotted to retired army personnel for the reason of penetrating the area against the influence of the famous 'Hurr' movement, which opposed British rule. However, the creation of Pakistan in 1947 eliminated the original objective and purpose of settlement, and people started living in a brotherly manner.

The local people state that the name of this distributary, *Heran* (Urdu), is derived from the high speed of the water flow, and is symbolic of the deer, an animal renowned for its speed. The pronunciation of this name changed to "Heeran" with the passage of time, a word similar in meaning in the Sindhi language.

1.1.2 Geographical Features

The head of this distributary is situated 19 km north of Sanghar City, whereas the tail section is only 5 km from the same city. The Heran Distributary flows towards the city, which the cultivators express is conducive to marketing their agricultural produce. The Culturable Command Area (CCA) is connected to the main roads.

1.2 ADMINISTRATIVE CONTROL

The Heran Distributary off-takes from Main Nara Canal at RD 129, which flows from the 1932-constructed Sukkur Barrage. The design discharge of the Sukkur Barrage is 65,000 cubic feet per second (cfs), and serves a Culturable Command Area of about 7.43 million acres (ma).

The Main Nara Canal has a discharge capacity of 13,602 cfs, but is currently flows at a discharge of 14,145 cfs. The Culturable Command Area of Nara Canal is about 2,069,200.00 acres (2.1 ma).

1.2.1 Location of Irrigation Offices

The divisional office of this distributary is located in Mirpurkhas, 60 km from Sanghar City. With the assistance of support staff, the main responsibilities of this divisional office are designated to a Chief Engineer, Divisional Accountant and a Divisional Draftsman.

The sub-divisional office of the Heran distributary is in Sanghar city, with the load of responsibility falling on a Sub-divisional Officer (SDO), Surveyor, *darogas*, gate operators, canal assistants, *Baildars* and other support staff.

The secondary canal level staff range from an Executive Engineer (XEN) to a *Baildar*; however, those most responsible for the operation of the distributary are the SDO, surveyor, *darogas*, and the gate operator.

1.3 PHYSICAL CHARACTERISTICS

This distributary has one sub-system, the Khadwari Minor, which is about 5 km in length. The Heran Distributary has twenty-four (24) outlets, and the Khadwari Minor, seven (7). Twenty-eight (28) of these watercourses are lined, while three (3) remain unlined.

The CCA of this secondary canal is 15,073 acres. The Heran distributary is still in its original condition, as it has not been remodeled, or changed in shape, and the flow condition is dependent on gravity.

The average actual discharge, as measured at the head regulator by the IIMI-Sanghar field team twice a week, or eight times per month, for the previous two years, is 106.00 cfs. The design discharge of this distributary is 58.00 cfs.

The banks and berms are in good condition. Vegetation problems occur mostly on the left side. The one main head regulator has three doors, of which only one is in working condition; the other two remain shut. The one cross regulator at RD 10 regulates the supply of water to the Khadwari Minor.

Estimated seepage losses for this distributary, using inflow and outflow tests, are 9.8 cfs/milli square ft.

Three piezometers have been installed by IIMI on each watercourse of the Heran Distributary's command area; at the head, middle and tail sections. These are for purposes of analysis of ground water, as well as to observe the variance in water table levels. The variances in the average depth of water tables from the ground surface was observed during the last six months is given in Table 1.

Table 1. Ground Water Table Depth from Surface.

Sr. #	Month	Ground water Table Depth from surface (feet)
1	May 97	2.98
2	June 97	2.83
3	July 97	2.60
4	August 97	2.62
5	October 97	2.5
6	November 97	2.06

This decrease in the water table depth is equivalent to the ground surface rise in water table elevation, and is due to peak season water requirements for the cultivation of rice, cotton and sugarcane crops during the months of September and October. Therefore, this area may be termed as waterlogged.

1.3.1 Soil Characteristics

In contrast to the sandy soils evident in the upper reaches of the Nara Canal, soils in the lower reaches are mixed silty and clay-type. The soil type of the Heran Distributary's CCA is yet to be determined through textural analysis. Generally, however, the soil is categorized as loamy, saline soil.

1.3.2 Climate

The mean daily summer temperature ranges from 39 to 41 degrees centigrade, and the maximum mean monthly temperature varies between 43 and 45 degrees centigrade. In winter, the mean daily minimum temperature is about 7 degrees centigrade, with the lowest mean monthly temperature registering at 2.5 centigrade.

The mean monthly summer rainfall varies from 32 mm in the north to 46 mm in the south. The winter season is practically devoid of rain. During the summer season, days are hot, nights are pleasant, and dust storms are quite common.

1.4 SOCIO-ECONOMIC CONDITIONS

The population living in the Heran Distributary command area is about 25,000; mainly Punjabis and Sindhis. There are four (4) *dehs* (hamlets) in the Heran Distributary, namely: *Chak* # 1; *Chak* # 2; *Chak* # 3; and *Chak* # 11. Although Islam is the dominant religion among the population, some non-Muslims also live alongside these villages.

1.4.1 Major Castes Residing in Heran Distributary Command Area

The majority of the people living here is retired army personnel. Major castes in this area are Malik, Awan, Shah, Raga, Arain, Khokhar, Waraich, Rajput, Jat, Baloch, Sulhari and Kayani. Agriculture is an indigenous science among these castes.

The literacy rate here is above 60 percent. Each caste has its own background, and although numerous castes cultivate the land, a good mutual understanding exists among them. People attempt solving caste-related problems on a community basis. Non-Muslims consist of Bheel and Kolhi, who are mostly tenants.

Two major communities residing along the Khadwari Minor are Muslims and non-Muslims. By caste, the Muslim community consists of Jamali, Chandia, Lashari, Machi, Soomro and Arian; non-Muslims are Bheel and Kolhi.

1.4.2 Land Holding

Originally, the land in this command area was allotted to retired army personnel, therefore, is also known as Army Colony. Initially, 32-acre plots were allotted, but, with the passage of time, there has been an exchange in the purchase and sale of land.

In most instances, the command area of the Heran Distributary is cultivated by the landowners themselves. These owner-cultivators are mostly educated, while the incidence of illiteracy among tenants is high. Average land holding sizes are about 16 acres and are categorised according to head, middle and tail sections, as given in Table 2.

Table 2. Distribution of Land Holdings.

Particulars	Head	Middle	Tail
Maximum Land Holding size	48	65	50
Minimum Land Holding size	2	2	2
Average Land Holding size	16	16	16

Source: IIMI Baseline Survey, 1996.

1.4.3 Methods of Irrigation

There are two methods of irrigation commonly used in this area, i.e., flooding (basin) and furrow methods. With flooding, one acre of land would be divided into four parts for cultivation, but during recent years, the furrow method has become widely used to cultivate the cotton crop.

1.4.4 Water Turn Practices

The *warabandi* (water turns) practice along the watercourses of the Heran Distributary is known as *pacci warabandi*. This type of *warabandi* is formulated with mutual consent from both, the *zamindars* (landowners) and the Irrigation Department. The water share list of *warabandi* turns is prepared by the farmers, signed by the SDO to make it official, and accordingly, *zamindars* are notified about their respective turns. The turns start from the head of the watercourse and finishes at the tail. Normally, a landowner would get one turn after every seven days. Occasionally, this *warabandi* share list is changed after about one year, whereby *zamindars* with a night turn swap their turns with those having a day turn.

1.4.5 Major Crops grown along Heran Distributary

Farmers in this command area are coherent with the principle of crop rotation, and therefore, cultivate different crops in the same soil. The main crops grown in this command area are cotton, wheat, sugarcane, oil seed, ground nut, maize, *juwar*, *juntar*, *barseem*, rice and fodder, as well as vegetables like onion, chillie, cabbage, etc.. Some *zamindars* also maintain mango, guava, *ber* (jujube) and *chikoo* gardens.

1.4.6 Loans and Credits

During baseline survey conducted by the IIMI field team during 1996, landowners informed that they had access to credit facilities and loans from the Agricultural Development Bank of Pakistan.

1.4.7 Gender

In this command area, a considerable number of women also participate in agricultural activities and perform almost every farming operation, except irrigating the fields and ploughing. Their normal tasks include that of cotton picking, harvesting wheat and sugarcane crops, fodder cutting, removing sugarcane heads and assisting in crushing sugarcane, as well as brown-sugar production. Hoeing vegetable and cotton plots, manual threshing of minor oil seed crops and pulses, milking animals, feeding livestock, removing animal-dung from livestock sites and providing meals to farm workers, are among their other activities.

1.4.8 Basic Infrastructure Facilities

People living here have access to almost all the basic infrastructure facilities in their *chaks* (villages). The main features pertaining to the available infrastructure are:

- Electricity is available in every village, even in the hamlets.
- There are two basic health centres within the command area. One is located in *Chak* # 8, where all the *chaks* converge; and the second was recently constructed with the assistance of a local NGO, Rural Women Organisation (RWWO). In addition, Fauji Foundation mobile medical vans also visit each village, for which announcements are made from mosques.
- Every *chak* has a sewerage system.

1.4.9 Education Facilities

Upon completion of secondary school education, male and female students have to undertake further studies in Sanghar City, as this command area lacks a college. Only primary, middle and high school facilities are available, the statistics of which are given in Table 3.

Table 3. Schools in Heran Distributary Command Area.

Description	Primary School	Middle School	High School
Boys	0	8	1
Girls	0	3	1
Boys and Girls	25	0	0

Source: Field observation by IIMI-Sanghar staff.

1.4.10 Communication

All the *chaks* have been well planned and constructed. Metallic roads are linked to the main roads. Small streets are brick paved, hence, farmers of this area do not face transportation problems.

Out of 15 *chaks*, 5 (namely *Chaks* 3, 4, 8, 9 and 10) have access to telephones with direct dialing facilities.

Three *chaks* (9, 10 and 11) have access to natural gas.

1.4.11 Water Users Organizations (WUOs)

In 1988, the On-Farm Water Management Directorate, Department of Agriculture and Wildlife, formed Water Users Associations (WUAs) at the watercourse level consisting of three office bearers, namely: (1) Chairman; (2) Finance Secretary; and (3) President. These WUA's supervised the lining of watercourses in their respective command areas. Farmers initially contributed 25% toward installment costs, but this amount was later reduced to 15%, payable in lump sums. Currently, however, these WUAs exist on paper only, as its objective has been accomplished.

IIMI-Pakistan started its field operations on this pilot secondary canal in 1995, with the objective of organizing farmers, both, at the watercourse and at the secondary canal levels. Initial setbacks were caused due to misunderstandings created by persons with vested interests. The hard work and consistent efforts of the IIMI field team and the Hyderabad office eventually paid off, when, at the end of 1996, WUAs at the watercourse level and a Water Users Federation (WUF) at the distributary level, respectively, were selected by the WUA member-farmers. The structure of these farmer organizations (FOs) consist of five office bearers, namely: (1) President; (2) Vice President; (3) General Secretary; (4) Joint Secretary; and (5) Finance Secretary, as well as two to three executive body members (six at the distributary level).

The main functions of these FOs are to solve problems, or actions, requiring collective approaches at the watercourse and distributary levels, e.g., collection of funds, desilting, filling breaches and constructing cross bridges along the watercourses. Normally, in such situations, the President, or the General Secretary, calls FO meetings. The list of office bearers for the Heran Distributary is given in Table 4.

Table 4. Names of Office Bearers.

Name of Office Bearer	Position
Haji Noor Ahmed Sulheri	President
Sajid Hanif	Vice President
Haji Khushi Mohammed	General Secretary
Malik Zafar Iqbal	Joint Secretary
Malik Haji Ahsan	Finance Secretary
Haji Mohammed Ashraf Gugar	Executive member
Arshad Mehmood	Executive member
Akhtar Kayani	Executive member
Habib - ur-Rehaman	Executive member
Ali Khan Jamali	Executive member
Abdullah Khokhar	Executive member

Source: Minutes of the General Body meeting of two nominees from each watercourse

1.5 DRAINAGE FACILITIES

There are two types of drainage system installed in this command area; surface drains and sub-surface drains (saline tubewells). Surface drains, namely, (1) Makhi Branch Drain (MBD); (2) Makhi One R (M1R); and (3) Makhi One RA (M1RA), are installed in the Heran Distributary command area, while S1R drain is installed along the Khadwari Minor command area. These drains end at Sanghar Drain, which, finally, concludes in the Main Drain, also known as the Spinal Drain. The detail of these surface drains is given in Table 5.

Table 5. Characteristics of Surface Drains.

Name of Drain	Design Discharge Cfs	Total Length (Feet)	Width (Feet)	Number of Inlets	Slopes (-)
MBD	96.60	67,994.40	11.00	5.00	1.25
M1R	79.50	76,391.20	8.00	5.00	1.25
M1RA	17.60	23,288.00	5.00	4.00	1.25
S1R	43.90	36,768.80	9.00	6.00	1.25

Source: Data from LBOD office, Sanghar.

The IIMI-Sanghar field team has been monitoring these surface drains since 1996 by measuring/conducting: (1) discharge at its disposal, and source, points in the command area; (2) vegetation growth survey; and (3) weak point surveys.

1.5.1 Discharge at Source and Disposal Points

The analysis of this data reveals that some of the excess irrigation water applied to the crops is flowing into these drains. The discharge difference between the source and disposal points, i.e., total contribution, is given in Table 6.

Table 6. Contribution of Excess Water to Surface Drains.

Months	M1RA Total Cont. (cusecs)	M1R Total Cont. (cusecs)	MBD Total Cont. (cusecs)	S1R Total Cont. (cusecs)
February	0.36	Not measured	Not measured	No flow
March	1.34	4.74	1.33	No flow
April	0.23	1.22	1.37	No flow
June	0.86	0.96	0.47	No flow
July	0.79	0.56	1.07	No flow
August	0.69	1.56	0.97	No flow
September	1.42	18.97	Not measured	No flow

Source: Monthly monitoring by IIMI-Sanghar staff.

Another interesting point to be noted is that during the months of peak crop water requirements, i.e., March and September, the total contribution in these drains increases suddenly.

The IIMI-Sanghar team measures, on a monthly basis, Parts Per Million (PPM) through EC meters of water at source and disposal points of the surface drains. The PPM observed at different intervals is given in Table 7.

Table 7. Salt Concentration (PPM) in Surface Drains at Source and Disposal points in the Heran Distributary Command Area.

Months	MBD W/Quality at Source (ppm)	MBD W/Quality at Disposal (ppm)	M -1RA W/Quality at Source (ppm)	M-1RA W/Quality at Disposal (ppm)	M-1R W/Quality at Source (ppm))	M-1R W/Quality at Disposal (ppm))
May	10,304.0	1,499.4	577.6	503.6	947.8	897.7
June	9,292.8	1,792.0	537.6	1,619.2	915.2	1,158.4
July	9,1520	2796.8	896.0	672.0	524.8	550.4

Thus, it appears that water flowing from the Heran Distributary command area into these drains is of better quality.

1.5.2 Vegetation Growth Survey

Two surveys (in July and November 1997) pertaining to vegetation growth in the four surface drains by the IIMI-Sanghar staff have been documented. The main findings of these surveys are given in Table 8.

Table 8. Vegetation Growth in the Surface Drains.

Month	MIRA			M1R			MBD			S1R		
	Left	Right	Bed	Right	Left	Bed	Right	Left	Bed	Right	Left	Bed
July	Clean	Clean	Thick	Clean	Clean	Thick	Clean	Clean	Thick	Clean	Clean	Thick
November	Clean	Clean	Half clean	Clean	Clean	Half clean	Clean	Clean	Half clean	Clean	Clean	Thick

Source: Monitoring by IIMI-Sanghar field staff.

Interesting to note is that, except for S1R surface drain, the beds of these drains have been partially cleaned during November 1997. On the one hand, the free flow of water has increased, while on the other, the beds have been lowered. Thus, the possibility of water flowing back into cultivated lands through the inlets of these drains has been eliminated.

1.5.3 Weak Point Survey

The IIMI-Sanghar staff, after every three months, conducts a survey of the surface drains in order to note the weak points that may have developed in the berms / banks of these drains. The purpose of this survey is also to note (if any) the flow of excess irrigation water diverted into these drains by some of the farmers. The main findings of these surveys are given in Table 9.

Table 9. Weak Points in the Surface Drains.

Months	M1RA		M1R		MBD		S1R	
	Banks	Berms	Banks	Berms	Banks	Berms	Banks	Berms
July	Good	Good	Good	Good	Good	Good	Good	Good
November	Good	Good	Good	Good	Good	Weak	Good	Good

Source: Survey by IIMI-Sanghar field staff.

Overall, the sub-surface (saline tubewells) drainage system installed is complete, except for electricity connections.

Scavenger tubewells are not installed in the Heran Distributary command area. The area surfaces of these, however, cover parts of land within the command area. Disposal channels are unlined, and staff is yet to be deputed for the operation and maintenance of saline tubewells and its related infrastructure.

1.5.4 Farmers' Perceptions about Drainage Facilities

Meetings with the farmers reveal that the vegetation problem remains inherent in these drains, particularly in the rainy season, when water collected from different sides starts flowing back into the cultivated fields through inlets provided for these drains, thus damaging the sown crops.

Farmers are adamant that this drainage system is advantageous for their land, and insist that once this system starts operating properly, that it will spare their land from the twin menace of waterlogging and salinity. However, they are not enthusiastic about taking responsibility for the operation and maintenance of this system themselves.

2 CURRENT FINANCIAL SITUATION

2.1 SOURCES OF INCOME

The Sindh Irrigation Department is responsible for supplying water to the farmers. The Government of Sindh (GoS) collects *abiana* (water charges) from the farmers, which forms part of the revenue to defray costs incurred for the upkeep of the irrigation infrastructure. Besides, *abiana*, the GoS has other sources of income, as explained in the proceeding paragraph.

The farmers along this distributary pay *abiana*, land revenue, *Usher*, agriculture tax and local cess. In the local language, *abiana*, local cess and agriculture tax are called *jamabandi* (assessment) items, while *Usher* and loan collection of banks are known as *Ghair Jamabandi* (non-assessment) items. Local cess is also called Local Board Fund, which is utilized by the local board (district council) for development schemes.

2.1.1 *Abiana*

Abiana is levied by the GoS to meet expenses incurred on the operation and maintenance of the irrigation system responsible for the supply of water to the cultivators. Rates of *abiana* are fixed by the GoS for each crop, and vary slightly from one area to another.

The rates of *abiana* applicable to this secondary canal command area for the different crops are given in Table 10.

Table 10. Rates of *Abiana* for 1996-97.

Name of Crops	*Abiana* Per Acre (Rs)
Cotton	80.95
Rice	77.20
Sugarcane	158.15
Fodder	34.65
Wheat	46.35
Vegetable	123.60
Orchard	123.60
Ground Nut	65.50

2.1.2 Land Revenue

This is actually a royalty payable for land ownership imposed on non-Muslims and *Shias* (a Muslim sect). Rates of land revenue are calculated according to average production capacities for each crop.

Rates of land tax vary according to the land size. Different rates are as follows:

Land Size	Rate
Up to 12 acres	1.5 times
13 to 25 acres	2 times
26 to 50 acres	3 times
Above 50 acres	4 times

2.1.3 *Usher*

As for land revenue, *Usher* is recovered on a production basis from Muslims, except from Shias. In Islam, the rate for *Usher* is fixed, i.e., one-tenth of production after deducting the usual expenses. In agriculture, however, the charge is one-fifth, due to the imposition of other charges.

Formula for calculating *Usher:*

Total amount of production (A) - Expenses (25%) (B) = Amount (Remaining 75%) (C)
Usher = 5 % of C
25 % expense reduction (cost of production) for canal irrigated land; and
33 % expense reduction (cost of production) for tube well irrigated land.
For example,
Rs 100.00 (A) – Rs 25.00 (B) = Rs 75.00 (C)
Usher = Rs 75.00 * 5% = 3.75

2.1.4 Agriculture Tax

During the year 1996-97, the GoS announced the levy of agriculture income tax for agriculture landowners owning twelve acres, or more.

The rates for land revenue, *Usher* and agriculture tax, for different crops, is given in Table 11.

Table 11. Rates for Land Revenue, *Usher* and Agriculture Tax for different crops, per acre, for 1996-97.

S #	Crops	Agriculture Tax	Land Revenue	*Usher*
1	Sugarcane	75.00	3.75	393.75
2	Rice	30.00	3.40	90.00
3	Tobacco, groundnuts and oil seeds	40.00	8.55	444.00
4	Cotton	73.00	1.50	360.00
5	Bajira, Maize and fodder	40.00	*Kharif* 2.25	75.00
6	Gardens and onions	300.00	*Rabi* 1.5	112.50
7	Wheat	40.00		102.00

2.2 TAX ASSESSMENT PROCEDURES

The settlement officer's ability to have a clear understanding of the principles and methods of assessment is necessary. A study of the agriculture tract is also necessary. Crop statistics are very important. The settlement officer's chief reliance must be to produce a fair assessment, as a wide diversity of agricultural conditions exist in most of the districts, e.g., plains or river valleys, etc.. In short, soil, rainfall, water depth, climate and the character of the cultivator, all contribute toward crop production.

Along the Heran Distributary, both, the Irrigation and Revenue Departments are responsible for the assessment of taxes. The Revenue Department assesses all taxes, like land revenue, *Usher*, agriculture tax and local cess, whereas, the Irrigation Department assesses *abiana* only. The *Tapedar* from the Revenue Department, and the *abdar* from the Irrigation Department, conduct the assessments. The procedure for assessment, for both, is similar. First, they go into the field and conduct a crop survey, which is entered into their field books. Summary sheets are compiled from these field books. Later, the Revenue Department compares its assessed *abiana* with that of the Irrigation Department before the *abiana* is finalized. However, Revenue Department supervisors verify assessments ascertained by the *Tapedars*, and present these to the *Mukhtiarkar*, who finally presents his report to the Assistant Commissioner of Sanghar.

2.2.1 Assessment of Land Revenue

The government levies payment on all land, regardless of purpose and situation, except:

a. Land wholly exempted by special contract with the Government, or by the provisions of any law in force at the time;
b. Land included in village sites for human habitation;
c. Land included in cantonment limits;
d. Land on which property tax (under the West Pakistan, Urban) is levied;
e. Where Immovable Property Tax Act 1958 is payable; and
f. Waste and barren land under cultivation for a continuous period of not less than six years.

Land revenue is assessed in terms of cash payments. The assessment of revenue is based on an estimate of the average money value of the gross.

2.2.2 Limits of Assessment

Assessment limits are ascertained according to the land revenue as a fixed annual charge, the amount of which is assessed in the form of a prescribed rate. The average amount, which, according to a written estimate, is approved by the government, or the Board of Revenue as the case may be, will be livable annually, shall not, in the case of an assessment circle, exceed one-fourth of the estimated money vale of the net assets of such assessment circle.

2.3 TAXES COLLECTION PROCEDURE

After receiving rates of *Abiana*, land revenue, usher and agriculture tax duly fixed by Board of Revenue. Invoices to the farmers are issued and the revenue department starts collection. Daily collection report is put before the *Mukhtiarkar* and the amount is credited to the Government account through bank challan. *Mukhtiarkar* supervises this recovery campaign.

The farmers pay taxes to the *Tapedar* in cash, who issues a receipt *in lieu* thereof. In some cases, the farmers prefer to deposit taxes directly with the *Mukhtiarkar*, obtaining their receipts directly from his office.

2.4 EXPENDITURES

The Irrigation Department requests budget estimates from staff above the SDO level each year. These cost estimates, pertaining to operations and maintenance and other irrigation expenditures, are compiled and communicated to the next higher office for onward transmission to the Provincial Irrigation Secretariat, which finally forwards these budget estimates to the Finance Department for approval from the Sindh Assembly. Upon approval from the Sindh Assembly, the Finance Department permits the Irrigation Department to incur expenditures within the approved budgetary amounts in the following manner:

- The Assistant Executive Engineer of the concerned sub-division submits an estimate for the operation and maintenance expenditures of canals, and sends it to the Executive Engineer of the concerned irrigation division.
- The accountant of that division checks this estimate, and reports it to the Executive Engineer.
- For an estimate less than Rs 25,000, the Executive Engineer is himself an approving authority, and can allocate money to the Assistant Executive Engineer to commence work.
- Estimates between Rs 25,000 and Rs 0.25 million require approval from the Superintending Engineer on the recommendation of the Executive Engineer.
- Any estimate in excess of Rs 0.25 million is routed to the Chief Engineer, who, after consulting the Secretary of Irrigation through the Finance Ministry, is authorized to release the money.

2.5 MAINTENANCE, IMPROVEMENT AND ESTABLISHMENT COSTS

Various types of expenses exist at the irrigation divisional level, and are normally categorized under three heads, namely, (1) Establishment cost; (2) Maintenance cost; and (3) Improvement and Extension costs.

1) Establishment cost is based on staff salaries and its related expenses.

2) Maintenance cost includes expenses like excavation, earthwork, cleaning vegetation growth, repair of canal gates, or outlets. Repair to culverts and bridges over the secondary canal are also grouped under maintenance cost.

3) Improvement and Extension cost includes provision for the extension of distributaries, new head regulators (if the old one is completely damaged, or the design discharge has been increased) and the construction of new outlets, etc.. The construction of new culverts and bridges over a secondary canal also falls under improvements and extension cost.

3 FARM INCOME ANALYSIS

3.1 BACKGROUND

A farmer derives his / her source of income by selling agricultural produce. Being conservative by nature, a farmer would only incur any additional expense, like that of an investment in his / her favor, if, in return, these additional expenses contribute towards the farm income.

In acknowledgement of this preference, a methodology, which is explained later in this chapter, was devised in order to calculate the net farm income, and to understand, in more detail, the different factors affecting farm income.

Generally, three techniques, namely, (a) farm income analysis; (b) fund flow analysis; and (c) farm investment analysis, are used to measure the performance of an agriculture project. Whereas the latter two techniques are used to determine the liquidity and attractiveness of a proposed investment, farm income analysis is normally used to evaluate the performance of a farm in a particular year (Gittinger 1992).

Farm income analysis technique has been favored in this report, as, at present, our primary objective is to test the financial viability of the FO's for a possible take-over of Operation and Maintenance of the Heran Distributary.

3.1.1 Cropping Intensity and Cropping Pattern - Importance

Cropping intensity is normally expressed in percentage, and is referred to as the cropped land within a given Culturable Command Area (CCA), while cropping pattern means identification of different crops in a given cropped area.

The values for these two are needed to calculate the following:

a) forming the basis to calculate crop yields;

b) forming the basis to calculate farm inputs; and

c) forming the basis to calculate *abiana*.

The foregoing are considered core requirements to ascertain the farm income. Furthermore, calculating *abiana* payable by a farmer also depends entirely on this information.

3.1.2 Information Collected on Cropping Intensities at Different Intervals

IIMI's field office in Mirpurkhas has been collecting information about cropping intensities since 1996. Information has also been obtained from the Revenue Department. Mr. Amin Sohani, Financial Analyst, conducted a special survey with the help of field

staff to collect this information. The information thus collated, utilizing different sources, is summarized in Table 12.

Table 12. Cropping Intensities for the Heran Distributary.

Crop Season	Cropping Intensity (in %)	Remarks
Kharif	28.00	Designed Intensity
Rabi	53.00	Designed Intensity
Rabi 95/96	60.00	Mean figures (A. Sohani)
Rabi 96/97	56.48	Survey by field team
Kharif 96	59.00	Mean figures (A. Sohani)
Kharif 96	30.70	Survey by field team
Kharif 97	64.84	Survey by field team

3.1.3 Farm Revenue and Farm Expenses Calculated by Amin Sohani

Amin Sohani (1997), reported the farm revenue and farm expenses for this distributary, as given in Table 13.

Table 13. Farm Revenue, Expenses and Income Calculated (Amin Sohani, 1997).

Season	Mean Farm Revenue (CCA Acre)	Mean Farm Expense (CCA Acre)	Mean Farm Income (CCA Acre)
Rabi 95-96	1,249	958	291
Kharif 96	2,401	1,634	767

Note: The above figures have been calculated for cropped area only, which, in the sample, has 981 acres.

3.2 JUSTIFICATION FOR REVIEW OF THE EXISTING DATA

One of the specific objectives in organizing the farmers is to promote their maximum involvement in the operation and maintenance of distributary / minor canals (Phase II Report, 1997). This preliminary Business Plan (financial framework) is intended to facilitate the Farmers Organizations of this distributary in managing its financial affairs amicably. Therefore, there is a need to ensure accuracy and reliability of the data which form the basis for this business plan.

The variance in the existing data is somewhat substantial, although the data collected the by IIMI field team sounds more reasonable. However, since this data is largely based on samples, therefore, the chances of inherent limitations are possible. Considering the sensitive nature of the final product involved, i.e., a preliminary framework (financial) which is also acceptable to the farmers, the authors of this report felt the need for a more comprehensive survey of this distributary.

Furthermore, the need to obtain more confidence by having indepth knowledge about this distributary was also felt, to enable, on one hand, extending maximum

assistance to FOs during negotiations in the Joint Management Agreement, and, on the other hand, to come up with the best possible financial solutions.

3.3 DATA COLLECTION AND DATA ENTRY METHODOLOGY

The first important step, as considered by the authors, was to become familiar with the IIMI-Sanghar field staff, as well as with the Heran Distributary. Therefore, a field visit was undertaken in August 1997. Mr. Naveed Khayal, Supervisory Social Organizer and head of IIMI-Sanghar field station, assisted by other members of his team, provided a detailed presentation of this distributary. Later, he accompanied the authors to a field visit of the command area. At the end of this visit, it was decided to have the authors of this business plan meet for a full day at the Hyderabad office.

The purpose for this meeting was to devise a preliminary strategy for the collection of necessary data. Since information on cropping intensities and patterns was considered essential, therefore, it was resolved to conduct a 100% detailed survey of this distributary by hiring the part-time services of *abdars*, who were to be equally assisted by IIMI-Sanghar field staff members.

This strategy was discussed in detail with Dr. Yameen Memon, IIMI-team leader for the Sindh Province, Mr. Don J. Bandaragoda, Project Leader, and Professor Gaylord V. Skogerboe, Director, IIMI-Pakistan, whereby it was decided to organize a one-day workshop in Hyderabad that would be attended by all the Sindh-based project staff.

The workshop started with the authors providing a simple introduction to the Business Plan, while Dr. Yameen Memon described the purpose of the proposed survey, as well as the expectations from field staff during this period. Later, an open session was held with participants, in order to gather different ideas to improve the quality of this survey, and corrective measures to be adopted when bottlenecks arose. Participants agreed to the suggestion of conducting this survey at the level of each watercourse, and to also to prepare maps at the same time. Accordingly, an initial proforma was developed. The recommendations of this workshop are as follows:

- Technical persons, adequately familiar with the command area, and with about 5 years' field experience, to be hired;
- One field staff person to accompany this technical person, for both to go to the fields for data collection and filling proformas together;
- Two proformas were suggested; one for mapping and the other for crop identification;
- Each member to be responsible for the accuracy and correctness of data, by comparing the two proformas with each other; and
- Supervisory Social Organiser (SSO) of the Sanghar field station to be responsible for the final verification of data, before sending it to the IIMI-Hyderabad office.

The proformas developed at the end of the workshop were pre-tested on the following day. In Sanghar, agriculture land is divided into blocks, therefore, pre-testing of the questionnaire was successful. However, due to certain problems faced in other pilot sites (Mirpurkhas and Nawabshah), a few modifications were made before a final version was agreed upon.

The salient features of this questionnaire are as follows:

- A one-page questionnaire in landscape format.
- Data is easy to record.
- One page can easily record information for 9 blocks.
- The basic information relating to cultivators includes: (1) watercourse number; (2) survey, or block number; (3) *deh* name; (4) holding, in acres; (5) owner's name; (6) managed by; (7) status; (8) number of tenants; (9) water allocation (hr.); and (10) day and time of water allocation.
- Information for each crop cultivated, including orchards and vegetables.
- Information about uncropped land, i.e., fallow.
- Information about waterlogged and salinized lands.
- Information about abandoned land.
- Information relating to drainage infrastructure.
- Information about lift pumps and piezometers situated in the area.
- The last column for use to record any special information.

Sanghar Field Station hired two persons, namely, Allah Bux and Banho Khan Chandio, to collect data. Both have been working with the Irrigation Department as *abdars* for the last fifteen years.

Each of the Heran Distributary's watercourses were equally distributed among the 6 field staff members, with each being responsible for one respective area for the collection of data. Accordingly, field staff attempted to complete their part of the work as early as possible, but due to the complexity of data, more time was consumed.

Only the mapping proforma was filled out in the field. The technical (hired) person and the associated staff member surveyed the watercourse acre-wise, and entered data according to their observations. The mapping proforma contained four blocks each, and further divided into sixteen acres. In Sanghar, the land distribution is mostly in blocks, therefore, it was easy to provide the information. In some blocks, drains, distributaries, roads, etc. have been constructed, therefore, *deh* maps were also consulted while filling in the proforma. The data has been calculated in a manner that would clearly capture the maximum information of a given watercourse.

Next to filled out, was the proforma for calculation, which was filled out with the help of the mapping proforma. This exercise required more time. After these had been completed, the SSO was responsible for rechecking this data, before sending it to the IIMI-Hyderabad office.

3.4 FARM REVENUE ANALYSIS

Farm revenue is calculated by multiplying the physical productivity with the per unit price of the commodity. The formula used to calculate the farm revenue is:

$$FR = (TYP * Pr) + (TYB * Pr).$$

Where,
FR = Farm Revenue
TYP= Total Yield of Principle Crop
TYB= Total Yield of Bi-product
Pr = Per Unit Price

3.4.1 Theory of Farm Revenue Analysis

Usually, one major objective for the financial analysis of a farm, is to judge how much farm families participating in farm work will have for living expenses. The analyst will need budget projections that estimate year-by-year future gross receipts and expenditures, including the costs associated with production and credit repayments farm families must make, in order to determine what compensation the family reaps for its own labor, management skills, and capital. Part of the income the family will receive may be in the form of food consumed in the household, so an estimate for this quantity and its value is necessary. Even if a family realizes a considerable increase in income, or 'net' incremental benefit by making an investment, its absolute income may still be so low that nearly all of the incremental production is consumed in the household.

A financial analysis must judge whether the family will then have sufficient cash to repay the cost of investment. If not, the analyst may have to make a policy judgment about the subsidy families with very low incomes may need.

The farm budget becomes the basis for shaping the credit terms to be made available. The analyst must judge whether farmers will need loans to finance on-farm investments to meet some production costs, and whether seasonal short-term credit should be provided for working capital to finance inputs and related expenses.

The analysis of farm income will also permit assessment of the incentives for farmers to participate in farm work.

- What will the probable change in the farm income be?
- What will the timing change in the farm be?
- How will the prices change, or, how severely could fluctuations affect farm income so that farmers will refuse to run the risk of participating in the farm work?
- What will the effect of subsidy arrangements on farm income be?

- What changes in government policy might affect the income earned by farmers?
- Will new subsidies be needed to provide sufficient incentive for the project to proceed?

For farm revenue analysis, every product produced on the farm is analyzed according to production, quantity and quality. For example, when wheat is produced, then the quantities of everything associated with wheat will be considered, according to the analysis of revenue cost collection.

A simple method of revenue analysis is to measure every quantity separately, e.g., for cotton crop, the production is differentiated between the quantity of cotton and the empty plants remaining, as a farmer can sell both, cotton as well as the empty cotton plants. Therefore, when analyzing farm revenue, both prices will be calculated.

Similarly, for sugarcane, the farmer obtains not only the price of cane from the mill, but also other left-overs of the sugarcane crop, as this can be used as fodder and manure. Another point to be noted for sugarcane crop, is that during harvest time, above work without wages in most cases, *in lieu* of which they take the remaining portion of this crop as fodder for their animals. Alternately, the rate of pay for laborers is Rs 100 per day.

In farm revenue analysis, a good rule for determining the market price for agriculture commodities produced on the farm, is to investigate the prices at "point of first sale". If the point of first sale is in a relatively competitive market, then the sale price of the commodity is probably a relatively good estimate of its value in economic, as well as in financial, terms. If the market is not reasonably competitive in the economic analysis, the financial analysis may have to be adjusted to reflect the opportunity cost, or value in use, of the commodity, better.

Farm revenue analysis was considered very important in order to make a business plan for the FOs. On the basis of these analyses, judgments could be formed about the financial efficiency, incentives, creditworthiness and liquidity. The following information is considered important to calculate farm revenue:

- Total land holding of a farmer.
- Cropping pattern.
- Cropping intensity.
- Total production.
- Farm-gate prices.

3.4.2 Farm-gate Prices

The best point of first sale to use is generally what the farmer receives when he sells his product at the boundary of the farm, i.e., farm-gate prices. The increased value, added to the product as it is processed and delivered to a market, arises upon payment for marketing services. This added value is not attributed to the investment to produce the commodity properly. Rather, it arises from the labor and capital engaged in the marketing services. Usually, the prices at point of first sale can be accepted as the farm-gate prices, even if this point is in a nearby village market where the farmer sells his output. Thus, he earns himself any fee that might be involved in transporting the commodity from the farm to the point of first sale. But, if any new equipment is necessary to enable the farm-gate price may be a poor indicator of the opportunity cost, the authors prefer to use in economic analysis. The farm-gate prices of crops are given in Table 14.

Table 14. Farm-gate Prices of various Crops in Heran Distributary, 1997.

S. No	Name of Crop	Farm-gate Price Rs/mds.
1	Cotton	792.80
2	Sugarcane	32.45
3	Rice	150.75
4	Fodder	26.24
5	Vegetables (approximate)	115.08
6	Oil Seed	684.60
7	Wheat	239.10

3.4.3 Land Affected by Salinity

Salinity is the presence of various cations (Ca, Mg, Nz, K) and anions (Cl, So_4, Co_3, Hco_3) of soluble salts evident in irrigation, and soil, water. The presence of these salts adversely affect the ability for plants to extract moisture from the soil, thereby reducing the agriculture productivity of land. Salinity levels are usually classified according to the measured electrical conductivity (EC) of the irrigation, or soil, moisture. Salinized soil contains an EC greater than 4 deci-siemens per meter (dS/m), and the exchangeable sodium percentage (ESP) is less than 15. For sodic soil, the EC is less than 4 dS/m, and the ESP is greater than 15. Sodic soil is rather difficult to reclaim when compared to saline soil[1].

Actually, in the Heran Distributary command area, the soil is yet to be analyzed chemically in order to determine its salinity / sodicity status. Therefore, the authors were unable to decide the percentage of soil affected by salinity / sodicity. However, farmers believe that soil in this command area is mostly salinized, because the per acre yield of salt tolerant crop varieties is better than that of the normal varieties.

[1] "Personal Communication" Dr. Muhammad Aslam.

Next >>

As the water table of the soil has reached approximately two to three feet, therefore, it is impossible to reduce the soil salts by leaching. Farmers, thus, grow mostly tolerance crops, like that of sugarcane, rice and *janter*. During data entry, the authors assumed salinized fields on the mapping proforma, i.e., only those portions of land on which a layer of white powder was visible, and where land was not being used for cultivation. These portions of land was calculated at about 1,673 acres.

3.4.4 Land Affected by Waterlogging

A substantial amount of irrigation water seeps underground from the canals, watercourses and fields. This seepage, with no natural means of escape, continues to accumulate underground, and the water table continues to rise, until eventually reaching the ground surface. This creates waterlogged conditions. At the same time, water from the shallow water tables flows through evapotranspiration. With this movement of water, salts also come up and are deposited in the root zone, thereby rendering the soils unproductive. Irrigation with water containing large amount of salts, or a high proportion of sodium, poorly-leveled land, improper irrigation management (inefficient irrigation and agricultural practices), the use of poor quality irrigation water and the lack of drainage, also cause salinization of the plant root zone[2].

The province of Sindh is known to have the biggest network of artificial canals in the world. The land slope from the sea towards the north is about 1 foot per mile. The Indus Plain is an arid and semi-arid region containing alluvial soils. Prior to the major conversion of inundation canals to weir controlled canals, the water table was eighty feet below the soil surface. Both, irrigation and drainage, are inversely proportional to each other, therefore, both are necessary for sustainable irrigated agriculture. In Sanghar District, a huge system dating back to very early irrigation methods is still in operation, but due to the absence of a drainage system, the water table rose, and soils became waterlogged. Although presently the drainage system has been installed under the LBOD project, it is not operational; consequently, the water table has risen to the soil surface. Furthermore, operational population pressure in this command area has caused intensive cultivation of land without adequate drainage facilities, thereby causing an increase in the elevation of the water tables.

During the survey, tracts of land where standing groundwater was evident on the surface, were categorized as waterlogged. In the command area of the Heran Distributary, the pounded regime portion is about 870 acres.

3.4.5 Land Affected due to Other Reasons

According to older farmers, the river Indus used to flow through the Sanghar District many years ago, hence, most of the land was covered with water, causing silt deposits. When the Indus River changed its course, and with the passage of time, these silt depositions formed into sand dunes. Later, farmers converted these sand dunes into

[2] "Personal Communication" Dr. Muhammad Aslam.

cultivatable fields. Currently, the sand dune-affected area is equivalent to about 1,802 acres, and for this survey's purposes, has been considered as abandoned.

3.5 · FARM LAND REVENUE OF HERAN DISTRIBUTARY

The information deemed necessary as explained in Section 3.4 was available at the end of this survey, in time for the *kharif* 1997 cropping season. However, the same information for *rabi* 96-97 was not possible through this survey. In order to form an opinion regarding the economic strength of the farmers, farm land revenue should be calculated for a period of one year. Therefore, field data collected by the IIMI-Sanghar team using the sampling method, has been relied upon to compute the figures for the *rabi* 96-97 cropping season.

The other important factor in arriving at the farm revenue, is crop yield per acre. Again, contact farmers were contacted from each watercourse, where land can be considered as fairly representative of the whole watercourse. The information provided by these farmers was further cross-checked with the information available for the other two pilot distributaries, and may be considered fairly reliable. The yield per acre for major crops in this command area, when compared with the national and international information, is given in Table 15.

Table 15. Comparison of Various Yields for Crops in different Countries.

Country	Cotton (kg/ha)	Wheat (kg/ha)	Maize (kg/ha)	Sugarcane (kg/ha)	Rice (Paddy) (kg/ha)
USA	1,902.25	2,566.25	7,450.00	76,846.25	6,377.50
China	2,302.25	3,229.75	4,375.25	-	5,664.75
Turkey	2,445.75	2,027.50	4,082.00	-	-
Mexico	2,351.25	4,102.50	1,944.75	-	-
Iran	1,883.00	1,473.25	-	-	-
India	742.50	2,298.00	1,558.25	63,680.75	2,617.50
Pakistan	1,865.25	1,900.50	1,386.00	42,176.75	2,323.75
Heran Distributary	1,535.35	2,574.72	-	62,908.92	3,772.18

Source: Agricultural Statistics of Pakistan, 1992-1993.

For the purposes of calculating farm land revenue, expenditure and income, it was assumed that a farmer hides actual cropped area; whereas, (s)he normally informs the correct crop yield, crop price and crop expenditure as other sources confirming, or negating, this readily-available information. Therefore, the main emphasis was to collect accurate information (maximum possible) regarding the cropped area and pattern.

Important information collected during data collection regarding crops, cropped area of these crops divided into maximum and minimum area, average water table depths, average water quality in parts per million, and average water duty, is given in Table 16. This information can be used to explain the farmers' preference for certain crops in their respective watercourses.

Table 16. Farmers' Preferences for Selected Crops along different Watercourses.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
W/course number	11R	2R	4R	K1L	16R	2R	11R	K1L	14L	K4R
Land:										
Crop cultivated in acres	388	8	199	1	426	35	104	11	74	1
Total crops in area acres	585	64	678	104	655	48	585	104	275	319
CCA in acres	1,068	224	931	408	675	224	1,038	408	322	658
W/quality (mS/m)	1,293	2,020	3,010	690	2,643	2,020	1,293	690	1,215	810
W/table depth (avg.)	3.74	2.29	1.79	3.76	2.86	2.29	3.74	3.76	1.89	2.66
W/duty (avg.)	7.31	5.88	8.16	5.83	5.28	5.88	7.31	5.83	8.84	4.04

Source: For cultivated area and crop identification survey by IIMI-Sanghar. For water quality, water table depth and water duty average of time-series data for the last 5 months collected by IIMI-Sanghar field staff.

In the case of cotton, the only reason for a high cropped area in Watercourse 11R, is a higher water table depth from the surface and plausible water quality, while low cotton cropped area in Watercourse 2R is due to low cropped area in this watercourse.

From the above table, it is interesting to note that in Watercourse 4R, cropped area for sugarcane is the highest, which can be attributed to a very high water duty, i.e., 8.16, and a lower water table depth from the surface, i.e., only 1.79 feet. Sugarcane is a very high water-consuming crop, and 18.20% of the total sugarcane cultivated in this command area is cultivated in this watercourse. While sugarcane is at an extreme low in Watercourse K1L, where water duty is 5.83, and which can be attributed to the interest of farmers towards other crops.

The high wheat cropped area in Watercourse 16R can be attributed to the farmers' interest in this crop, whereas a low cropped area for wheat in Watercourse 2R is due to its total cropped land, i.e., only 48 acres.

A study to: (1) identify groundwater contribution to the water requirements of major crops; (2) develop irrigation management strategies for major crops under different water table conditions; and (3) evaluate the effect of groundwater quality on soil salinization and crop yields under different water table depths, has been conducted by Mona Reclamation and Experimental Project (MREP), and Lower Indus (LIM), over a period of three years. The conclusions of this paper are as follows:

a. Low Water table depth from surface is, generally, not conductive for good crop yields. Water supplied to a crop by capillary rise from shallow groundwater can be an important resource. However, it reduces the depth of root zone and increases the threat of soil salinization, especially when ground water quality is inferior, and ultimately affects the crop yields.

b. The general practice of applying 5-6 irrigations to wheat and cotton crops is wasteful and unproductive on soils with water table less than 9 feet from the

ground surface. For good yields, 1-2 irrigations at a water table depth of 3 to 6 feet, and 2-3 irrigations at a water table depth of 6 to 9 feet, are required.

c. At shallow water tables, bed planting of crops not only provides better soil conditions during the rainy season, but also saves more water when compared to conventional flat / basin methods.

The results of LIM, based in the Sindh province, identifying groundwater contribution to the water requirement of major crops, is given in Table 17.

Table 17. Groundwater Contribution to Crop Water Requirement for Selected Crops.

	W/table depth Less than 3 ft.	W/table depth 3 to 6 feet.	W/table depth 6 to 9 feet.	W/table depth 9 to 12 feet.	Surface Water Application.
Total ET losses (cm)	77.9	53.8	50.7	55.5	
G/water cont. (% of total ET)	82.8	24.2	7.6	3.8	
Sub-irrigation (cm)	64.5	13.1	3.9	2.1	
Cotton (kg/acre)	196.4	279.4	620.2	736.0	30 cm or 4 irrig.
Sugarcane (kg/acre)	31,500.0	31,780.0	26,520.0	26,480.0	91 cm
Wheat yield (kg/acre)	446.2	579.8	1,323.9	1,545.7	30 cm or 4 irrig.

Source: Benefits of Shallow Drainage, Paper by MREP & LIM.

The data for watercourses of the Sanghar Distributary indicating maximum and minimum crop yields, water table depths from the surface, ground water quality and water duty, is given in Table 18.

Table 18. Crop Yields, Water Quality, Water Table Depth from Surface and Water Duty for Selected Crops.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
W/course number	K3L	K2R	17AL	11R	5L	K6T	3L	K2R	13R	11R
Yield in kg. Per acre	1,000	360	32,000	16,000	1,400	720	3,600	2,000	1800	1000
W/quality in mS/m (avg.)	1,250	1,867	1,030	1,293	2,850	1,307	1,843	1,867	1,460	1,293
W/table depth (avg.)	2.76	3.82	2.67	3.74	1.98	2.69	5.26	3.82	3.20	3.74
W/duty (Avg.)	4.95	3.83	6.09	7.31	8.81	4.54	6.90	3.83	4.51	7.31

The high sugarcane yields in this command area is nearly equal to those obtained by LIM under the relevant water table depths. True for sugarcane, is that higher yields in lowest water table depth from surface, and *vice versa*. However, results for cotton and wheat are different.

The farmers along this distributary normally sell their agriculture produce in the nearby grain market. However, sugarcane and cotton is usually sold to the sugar mills and cotton ginning factories, which are also nearby, while wheat is sold to food departments at rates established by the Government of Pakistan. Important information regarding maximum and minimum farm-gate prices for major crops, is given in Table 19.

Table 19. Farm-gate Prices, Water Quality, Water Table Depth from Surface and Water Duty for Selected Crops.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
W/course number	18AT	10R	15L	17AT	3L	14L	8AL	K5T	4R	9R
Price per kg. in Rupees	20.91	19.66	0.94	0.74	6.37	4.87	0.89	0.39	4.86	2.86
W/quality in mS/m (avg.)	1,000	870	963	2,023	1,843	1,215	867	2,110	3,010	837
W/table depth (avg.)	4.12	2.97	3.70	4.18	5.26	1.89	2.94	3.10	1.79	2.85
W/Duty (Avg.)	8.39	9.07	6.06	5.30	6.90	8.84	12.73	6.42	8.16	7.07

The mean farm-gate prices for these major crops are calculated at Rs 19.82 per kg. for cotton, Rs 0.81 per kg. for sugarcane, Rs 5.98 per kg. for wheat, Rs 0.66 per kg. for fodder, and Rs 3.77 per kg. for rice, even though the purchase price for wheat is fixed by the Government of Pakistan. The reasons for price fluctuations are: (1) initially, the price was fixed at Rs. 240 per 40 kgs, which was later reduced to Rs. 200 per 40 kgs; and (2) the quality of wheat in Watercourse 14L was not up to the mark, hence, it was sold at the low price of Rs. 195 per 40 kgs.

The prices a crop can fetch depend on its quality, which, in turn, depends on various factors, e.g., availability of water, soil conditions, quality of seed, quantity and quality of fertilizer, pesticides, and the farming practices. Therefore, the above analysis becomes more meaningful when seen together with the farm input costs, which is explained later in this chapter. Here, the purpose is to see the range of prices the farmers along this distributary fetch for major crops.

Although bi-products for crops like wheat and cotton are either sold by the farmers, or consumed domestically by them, the value of these bi-products has not been considered in this report. Thus, farm revenue, calculated by multiplying the physical productivity with the per unit farm-gate price of the commodity, for *rabi* 96/97, and *kharif* 97 cropping seasons for the Heran Distributary command area, amounts to Rs 4,530 and Rs 12,673, respectively, per cropped acre. This totals Rs. 17,202 per cropped acre. The important information derived from farm revenue analysis for this distributary is given in Table 20.

Table 20. Gross Agriculture Revenue Analysis.

Particulars	*Rabi* – 96-97	*Kharif* – 97	Total (one year)
Cropped Area in acres	8,513	9,323	17,836
Fallow Area in acres	2,215	1,405	--
Waterlogged Area in acres	870	870	--
Salinized Area in acres	1,673	1,673	--
Abandoned Area in acres	1,802	1,802	--
CCA in acres	15,073	15,073	--
Cropping Intensity (in %age)	56.48	64.84	121.32
Gross Revenue (Rupees)	38,563,030	118,142,975	156,706,005
Gross Revenue per cropped acre (Rupees)	4,530	12,673	17,202
Gross Revenue per CCA acre (Rupees)	2,558	7,838	10,396
Gross Revenue (US$)	876,433	2,685,068	3,561,500
Gross Revenue per cropped acre (US$)	103	288	391
Gross Revenue per CCA acre (US$)	58	178	236
Avg. price of land per acre (Rupees)	75,000	75,000	75,000
G/revenue to land (Crop) price in %age.	6.04	13.90	22.94
G/revenue to land (CCA) price in %age.	3.41	10.45	13.86

Rate applied: 1 US$ = Pakistan Rupees 44.00.

The total uncultivated land in this command area categorized as waterlogged, salinized, or abandoned, is 4,345 acres. The mean gross revenue per cultivated acre is Rs 17,202, hence, the farmers in this command area, in one cropping season, have lost a gross revenue of about Rs 74.743 million (US$ 1.699 million). This totals Rs 4,958.71 per CCA acre, and a decrease in the cropping intensity, by 28.83%, is noted.

The revenue for this command area, when compared to other available information for Pakistan, is given in Table 21.

Table 21. Gross Agriculture Revenue Comparison.

	All-Pakistan	LBOD Baseline	IIMI-Various	Heran Distributary
Gross Revenue (Rs/Acre)	3,644	5,263	3,240 - 10,120	10,396
Gross Revenue (US$/Acre)	83	120	74 – 230	236

Source: Consultancy Report, Dr. Christopher Perry.

The gross revenue for each watercourse of this distributary has been analyzed; important findings of this analysis summarizing the two watercourses with the highest gross revenue, when compared to the watercourse earning the minimum, and the mean, gross revenue is given in Table 22.

Table 22. Maximum, Minimum and Mean Gross Agriculture Revenue within Heran Distributary

Particulars	Revenue Max.		Revenue Max.		Revenue Min.		Revenue Mean	
	K-97	R-96	K-97	R-96	K-97	R-96	K-97	R-96
Watercourse no.	2R	5L	K3L	K3L	K2R	14L	Avg.	Avg.
Per cult. Acres	22,620	7,098	20,430	6,757	6,881	2,318	12,673	4,545
Per CCA Acres	6,481	6,068	12,838	3,511	2,639	1,793	7,838	2,562
Cropping Intensity	28.7	85.5	63.1	52.0	38.7	77.3	64.84	56.48
W/quality in PPM (avg.)	2,020	2,850	1,250	1,250	1,867	1,215	1,544	1,544
W/table depth (avg.)	2.29	1.98	2.76	2.76	3.82	1.89	3.27	3.27
W/duty (avg.)	5.88	8.81	4.95	4.95	3.83	8.84	6.72	6.72

In lowest gross farm revenue earning watercourses, Watercourse K2R has a low cropping intensity, coupled with the shortage of water. The main reason for Watercourse 14L's wheat rate being Rs 4.87 per kg, which is less than the mean rate of Rs. 5.98 per kg.

3.6 FARM EXPENDITURE ANALYSIS

In developed countries, where the process of economic and social integration between agriculture and other sectors of the economy is virtually complete, farming is a business, and farmers behave like businessmen, and keep a proper records of every expense. This record enables a farmer to keep track of total expenditure on the farm, and to calculate per acre cost for each crop (s)he cultivates. The amount of input rates expended on a farm to produce any product, depends largely on soil conditions, water supply for irrigation and the climatic conditions in that particular region.

In the command area of the Heran Distributary, the soil condition, supply of irrigation, marketing and machinery facilities do not differentiate significantly, therefore, the ratio of expenditures per acre is the same for similar crops. In calculating farm expenditures for *kharif* 1997, one to two farmers were interviewed from each watercourse, and details of different expenditures were obtained. The *zamindars* in this command area maintain proper records of total expenditures, the details of which are explained in the following paragraphs.

3.6.1 Seeds

Zamindars consider good seed for improved varieties as one of the most important agriculture inputs to obtain an increased crop production, and providing economic benefit to the growers. Thus, quality seed not only acts as an impetus to increased crop production, but also maintains the quality of production, which fetches higher value in the market.

The main criteria for describing seed quality, assuming that the seed is of an appropriate variety, is purity and seed viability. Purity is expressed on a percentage basis by weight. The seed viability expresses what production of the total number of seeds is

alive, or capable for germination, over a specific period which is determined through controlled tests, and actually counting the number of seeds that germinate. In some cases, the seed is not in a pure form, which directly affects the crop production. Normally, farmers obtain seed of different crops from the market, except for sugarcane. Sugarcane seed is produced in their fields, and likewise, some other crop seeds are also produced on their farms. Whether a farmer obtains ready seed from the market, or s(h)e prepares home-grown seed, the expenditure is incurred nevertheless, and therefore, should be calculated accordingly. The detail for seed costs for different crops in this command area is given in Table 23.

Table 23. Seed Costs for different Crops in the Heran Distributary Command Area.

Name of crop	Rates, in Rupees per kg	Total Amount on Per Acre
Cotton	31.00	200 to 300.00
Sugar cane	1.00	3000.0 to 4000.00
Rice	1.5	40.00 to 60 .00
Fodder	5.00 to 60.00	100.00 to 400.00
Vegetable	50.1000	300. 00 and above

3.6.2 Fertilizers

These inputs are considered very important and the farmer's concept is that the production of crops becomes zero if fertilizers are not used. That there are at least 16 nutrients essential for plant growth and productivity has already been established, and the deficiency of any nutrient affects crop growth and production is reduced. Farmers in this command area are adequately informed about these matters. Out of 16 nutrients, carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium and sulphur are needed in greater quantities, and are known as macro-nutrients, while micro-nutrients include copper, zinc, manganese, iron, boron, molybdenum and chlorine.

In this command area, farmers use mostly fertilizers like Urea, DAP, Potash, 23*23, Ammonium Nitrate, Single Super Phosphate (SSP) and Triple Super Phosphate (TSP). In certain cases, they may use green, and farm dairy cattle, manure also. The farmer uses different quantities of different fertilizers, according to the soil and crop types, which he believes is essential for plant growth. The details for the same are given as follows:

DAP In the command area, mostly used in all crops, but particularly in cotton, sugarcane, wheat and rice, at the rate of one bag per acre at the time of sowing.

Urea Used in all crops, at two to five times in one crop at different stages, like upon first irrigation, third irrigation, at flowering time, at reaping time, and used in high quantity.

Potash Used mostly in sugarcane, wheat, and in some instances, in cotton.

3.6.3 Pesticides

According to the farmers in this command area, as the water table increase, the soil condition and the cropping pattern are the same, therefore, the use of insecticides are on the increase. Government agencies have no proper mechanism to control crop diseases, therefore, farmers use pesticides according to their own judgment, or by consulting each other, without any proper knowledge about which pesticide to use for a particular crop. Therefore, the expenditure on pesticide, per acre, varies from Rs 500.00 to Rs 2,500.00. The farmer also uses weedicide to control weeds in crops.

Pesticide expenditure is classified according to the type of crop. The rate for different pesticides were calculated from information gathered from different farmers, who imparted detail pertaining to prices, pesticide brands, number of sprays and average expenditure per acre. Pesticides are used mostly on cotton crops and vegetables, and weedicide is used on different crops.

The names of different pesticides are given in Table 24.

Table 24. Different Pesticides.

Name of Pesticide	Rate per liter (Rs)	Quantity per acre
Ando Sulphan	340.00	1 lit/acre
R.6	340.00	1 lit/ acre
Arivoo	740.00	1 lit/ acre
Anthio	260.00	1 lit/ acre
Politrin C	780.00	1 lit/ acre
Tamaran	340.00	1 lit/ acre
Thiodan Nawacran	340.00+380.00	1 lit/ acre
Monophas	380.00	1 lit/ acre
Methametaphas	296.00	1 lit/ acre
Karatae	428.00	1 lit/ acre
Spark	340.00	1 lit/ acre

3.6.4 Machinery Rentals

Land preparation for crops, again, depends upon soil type and crops being cultivated. In former years, people used mostly bullocks for ploughing, threshing, cultivation and irrigation. At that time, one man could only cultivate half block (8 acres), which sued to be sufficient for him. Nowadays, agriculture machinery is used quite frequently. In the command area of the Heran Distributary, most farmers have there own machinery, and a few others use tractors, or hire machinery on rent.

Land preparation for each crop requires the same number of ploughs, land leveling and drilling by all farmers. The rate for the preparation of land is fixed on an hourly basis. The rate for machinery has been calculated in terms of preparation of land, sowing (drill), harvesting, threshing, loading and lift irrigation. In this command area,

nearly 70% of the *zamindars* have their own tractors. The common rate here is Rs 150 per hour, which includes all machinery required, i.e., tractors, threshers, drilling machines, disk-plows, disk-harrows, cultivators. etc..

3.6.5 Labor for Agriculture

Most land along the Heran Distributary is cultivated either by the owners themselves, or by the tenants, on a share cropping basis. In the case of share cropping, the agricultural produce shared between the two parties is distributed 50-50. In both cases, labor is required for land cultivation. The rate for labor for different crops is different in this command area. The detail for the labor rate for different crops is given in Table 25.

Table 25. Labor Rate for different Crops.

Particulars	Cotton	Sugarcane	Rice	Wheat
Sowing per acre	100 – 300	500-800	100	300
Cutting / Threshing per Mds	5	8	5	15 –20
Inter-culturing per acre	1000 – 2000	600		
Spraying 4 times	400			

These rates are subject to change, according to time and conditions. Under normal conditions, the charge for agricultural labor is Rs 100 per day. *Zamindars* only pay for labor costs when he cultivates himself, otherwise the tenant has to bear the full cost for labor.

3.7 TAXES TO THE GOVERNMENT OF SINDH

These are fixed by the Government on the basis of land holding, or on the basis of crops sown, and are jointly assessed by the Irrigation and Revenue Department, but are collected by the Revenue Department alone. The taxes paid to the Government are borne by the *zamindar* if he is an owner-cultivator, otherwise the tenant shares these expenses equally.

3.8 LABOR FOR DESILITING

Ever since its construction, the desilting process from watercourses and the distributary in this command area has been continuous. Previously, watercourses were desilted on a monthly basis, whereas the distributary was desilted only during its closure period. One responsible person along the watercourse (locally called chairman of watercourse) used to inform all the water users about arrangements to desilt the watercourses. When all the water users were gathered along the watercourse, the chairman distributed parts of the watercourse for desilting, according to the time allocation of each *zamindar's* water turn. Every water user used to be quite happy to clean his portion of the watercourse. If a water user was absent at the time of desilting, a fine was imposed; whereas, along the distributary, desilting was not a continuos process. Sometimes people came from the tail portion to desilt, sometimes from the head portion.

Actually, the farmer was under the impression that desilting was the responsibility of Government Departments, therefore, they did not take an active interest.

Since the formation of the Water Users Federation (WUF) along this distributary, water users, from head to tail, participate in desilting the distributary, along with their tenants without any considerations for charges.

3.9 FARM LAND EXPENDITURE OF HERAN DISTRIBUTARY

This information was collected from the farmers through interviews. The field staff was adequately briefed to understand the importance of accuracy in this information, thus, before the interview process, they went to the local markets to familiarize themselves with the different kinds of pesticides, fertilizers and seed qualities and prices.

Farmers in this command area keep a fairly good record of farm inputs. Most of the farmers interviewed had kept the original receipts for different inputs purchased. information regarding maximum and minimum costs per acre incurred by farmers on different farm inputs for key crops along this distributary's command area, is given in Table 26.

Table 26. Maximum and Minimum Agriculture Input Costs in Heran Distributary.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Land prep. Cost per acre	1,280	600	1,200	800	1,200	670	980	450	1,000	600
Seeds	300	150	4,000	3,000	450	300	400	150	60	40
Fertilizer	2,260	700	2,640	1,280	1,800	1,025	1,500	660	1,500	700
Pesticides	2,000	1,000	800	400	400	400	-	-	525	400
Labor	3,600	1,400	5,100	3,000	1,300	780	1,150	200	1,900	224

The range of costs per cropped acre for different key crops incurred by the farmers can be inferred from the above table. Furthermore, it is observed that farmers spend steep amounts on the land preparation for crops. Expenses for the purchase of seeds and fertilizers are comparatively high for sugarcane and cotton crops. Farmers also incur high costs on the purchase of pesticides for the cotton crop, while this expense is the lowest on wheat crop, and nil for fodder and oil seed. Farmers pay high rates for labor for sugarcane and cotton crops.

The information on maximum and minimum farm input costs by the farmers of this minor command area, grouped by watercourse numbers for major crops, is given in Table 27.

Table 27. Maximum and Minimum Agriculture Input Costs for Selected Crops.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
Watercourse number:	K3L	17BL	4R	17BL	16R	2R	K2R	15L	3L	9AR
Land prep. cost per acre	1,240	750	1,000	1,000	1,000	800	600	600	800	910
Seeds	200	250	3,500	3,000	350	350	300	300	50	40
Fertilizer	1,600	1,200	2,640	1,500	1,800	1,025	1,500	1,050	1,150	1,000
Pesticides	2,000	1,000	400	455	400	400	-	-	525	425
Labor	3,600	1,750	4,950	3,000	1,250	700	1,150	634	1,900	224
Total in Pakistan Rupees:	8,640	4,950	12,490	8,955	4,800	3,355	3,550	2,024	4,425	2,599
Total in US Dollars:	193	113	284	204	109	76	81	46	101	59

The mean costs for these major crops, per cropped acre, are (1) Cotton Rs 6,633 (US$ 83); (2) Sugarcane Rs 10,821 (US$ 246); (3) Wheat Rs 4,224 (US$ 96); (4) Fodder Rs 2,630 (US$ 60); and (5) Rice Rs 3,628 (US$ 82).

The mean cost per cropped acre for sugarcane, which is a year-round crop, is the highest among different crops, i.e., Rs 10,821 (US$ 246) per acre. Other crops are bi-annual. Farmers in this command area usually utilize their land by cultivating different combinations of crops during one cropped year. These different combinations, and accumulated mean costs per acre for these combinations in one year, is given in Table 28.

Table 28. Mean Agriculture Input Costs for different Crop Combinations.

Crop Combinations	Mean cost of Crop no. 1 in Rupees	Mean cost of Crop no. 2 in Rupees	Total mean cost of Crop in Rupees	Total Mean cost of Crop in US Dollars
Sugarcane only	10,821	-	10,821	246
Cotton + Fodder	6,633	2,630	9,263	211
Cotton + Wheat	6,633	4,224	10,857	247
Fodder + Rice	2,630	3,628	6,258	142
Fodder + Wheat	2,630	4,224	6,854	156

Therefore, when compared to the sugarcane crop, the combination of cotton and wheat is the most expensive, while that of fodder and rice is the least expensive combination.

The farm input costs, calculated by multiplying the crop inputs with the per unit cost of these inputs, for the *rabi* 96/97 and *kharif* 97 cropping seasons for the Heran Distributary command area, amounts to Rs 3,382 and Rs 6,582, respectively, per cropped acre. For one cropped year, this totals Rs 9,964 per cropped acre. The important information derived from farm input cost analysis for this distributary is given in Table 29.

Table 29. Agriculture Input Cost Analysis.

Particulars	*Rabi* – 96-97	*Kharif* – 97	Total (1 year)
Cropped Area in acres	8,513	9,323	17,836
Fallow Area in acres	2,215	1,405	-
Waterlogged Area in acres	870	870	-
Salinized Area in acres	1,673	1,673	-
Abandoned Area in acres	1,802	1,802	-
CCA in acres	15,073	15,073	-
Cropping Intensity (in %age)	56.48	64.84	121.32
Gross input costs (Rupees)	28,791,329	61,365,760	90,157,089
Gross input costs per cropped acre (Rupees)	3,382	6,582	9,964
Gross input costs per CCA acre (Rupees)	1,910	4,071	5,981
Gross input costs (US$)	654,348	1,394,676	2,,049,025
Gross input costs per cropped acre (US$)	77	150	226
Gross input costs per CCA acre (US$)	43	93	136
Avg. price of land per acre (Rupees)	75,000	75,000	75,000
Gross input cost to land (Crop) price in %age	4.51	8.78	13.29
Grossinput cost to land (CCA) price in %age	2.55	5.43	7.98

Rate applied: 1 US$ = Pakistan Rupees 44.00.

3.10 CALCULATION OF *ABIANA*, *USHER* AND TAXES PAYABLE IN HERAN DISTRIBUTARY

Abiana payable has been calculated by multiplying the cropping pattern of the Heran Distributary with the rates of *abiana* for this period. Similarly, local cess has been calculated by multiplying the area by the rate. However, in order to calculate agriculture tax, the data was arranged according to a farmer's total holding of agriculture land. The various taxes and their rates have been discussed in detail in Chapter 2. Information on these taxes is given in Table 30.

Table 30. Agriculture Land Tax Analysis.

Particulars	*Rabi* – 96-97		*Kharif* – 97		Total (1 year)	
Cropped Area in acres	8,513		9,323		17,836	
CCA in acres	2,215		1,405		-	
Cropping Intensity (in %age)	56.48		64.84		121.32	
Abiana total in rupees	429,314		801,871		1,231,185	
Agriculture tax total in rupees	228,068		713,925		941,993	
Local cess total in rupees	76,615		92,806		169,421	
Usher total in rupees	762,630		1,722,758		2,485,383	
Total Taxes in rupees:	1,496,627		3,331,355		4,827,982	
Total Taxes in US Dollars:	34,014		75,713		109,727	
	Per Crop Acre	Per CCA Acre	Per Crop Acre	Per CCA Acre	Per Crop Acre	Per CCA Acre
Abiana in rupees	50	28	86	54	136	82
Agriculture tax in rupees	27	15	76	47	103	62
Local cess in rupees	9	5	10	6	19	11
Usher in rupees	90	51	185	114	275	165
Total Taxes in rupees:	176	99	357	221	533	320
Total Taxes in US Dollars:	4	2	8	5	12	7

Therefore, *abiana* (water service charges) per cropped land payable for one year in the Heran Distributary amounts to Rs 136 (US$ 3.09) per acre, or Rs 336 (US$ 7.64) per hectare, while *abiana* per CCA comes to Rs 82 (US$ 1.86) per acre, or Rs 203 (US$ 4.61) per hectare. *Usher*, levied by Islam, is about 52% of the total taxes payable by the farmers in one year.

3.11 CALCULATION OF FARM INCOME IN HERAN DISTRIBUTARY

The information considered useful during farm income analysis, which can be used to identify the range of farm inputs and net farm income per kilogram of major crops, is given in Table 31.

Table 31. Net Agriculture Income Analysis in per Kilogram of Yield for Selected Crops.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
W/course number	K3L	K2R	1L	11R	5L	14L	15L	17AL	4R	16R
Revenue per kg in Rupees	21.66	19.66	0.79	0.76	6.37	4.87	0.76	0.74	4.86	3.61
Land Preparation/Kg (Rs)	1.24	2.36	0.028	0.060	0.64	1.05	0.14	0.35	0.63	0.80
Seed / Kg in Rupees	0.20	0.69	0.106	0.215	0.21	0.40	0.09	0.17	0.05	0.05
Fertilizer / Kg in Rupees	1.60	4.44	0.040	0.111	0.86	1.70	0.20	0.53	0.78	1.50
Pesticide / Kg in Rupees	2.00	5.00	0.013	0..028	0.29	0.53	-	-	0.25	0.43
Labor / Kg in Rupees	3.60	4.72	0.130	0.262	0.79	1.18	0.19	0.42	0.79	0.65
Total Cost / Kg:	8.64	17.21	0.317	0.676	2.79	4.86	0.62	1.47	2.50	3.43
Net return / Kg in Rupees	13.02	2.45	0.473	0.084	3.58	0.01	0.14	(0.73)	2.36	0.18

The reason for low profitability in Watercourse K2R has been explained earlier in this chapter; the low yield due to high water quality and pest attack on the cotton crop, are the main reasons. The observation from the table is that the lowest earning watercourse of each crop has nearly double the cost inputs when compared to the highest earning watercourses of each crop. Interesting to note is that the lowest earning watercourses have mostly incurred higher costs for fertilizers and pesticides to boost their production, but this, in fact, results in low profitability.

The mean net farm income of the farmers of the Heran Distributary for major crops has been calculated by multiplying the mean yield for these crops with the mean net return per kilogram of each crop. The results of these calculations are given in Table 32.

Table 32. Mean Profit Analysis of Selected Crops.

Particulars	Cotton	Sugarcane	Wheat	Fodder	Rice
Mean yield per acre in kg	621.71	25,469.33	1,042.50	2,607.41	1527.27
Mean price/kg in rupees	19.82	0.82	5.98	0.66	3.77
Mean costs/kg in rupees	10.67	1.42	4.05	1.01	2.38
Mean return/kg in rupees	9.15	0.39	1.93	(0.35)	1.39
Mean profit per acre	5,689.00	9,933.00	2,102.00	(913.00)	2,123.00

The main finding of this table is that as the sugarcane crop which is an annual crop, yields a much higher net farm income to the farmers of this command area. Even the combination of cotton crop and wheat crop, both of which are seasonal crops yields less farm income when compared with sugarcane crop.

Information derived during farm income analysis, which can be used to identify the factors that effect yields of major crops, is given in Table 33.

Table 33. Effects of Cost-of-Inputs, GW/Quality, WT/Depth and W/Duty on Yields of Selected Crops.

Particulars	Cotton		Sugarcane		Wheat		Fodder		Rice	
	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.
W/course number	K3L	K2R	4R	11R	5L	K6T	3L	K2R	3L	16R
Yield in kg. per acre	1,000	360	32,000	16,000	1,400	720	3,600	2,000	2,000	1,000
Land preparation p/acre Rs	1,240	850	1,000	965	890	800	600	600	800	800
Seed per acre Rs	200	250	3,500	3,433	300	450	300	300	50	50
Fertilizer per acre Rs	1,600	1,600	2,640	1,775	1,200	1,500	1,050	1,500	1,150	1,500
Pesticide per acre Rs	2,000	1,800	400	455	400	400	-	-	525	425
Labor per acre Rs	3,600	1,700	4,950	4,194	1,105	850	634	1,150	1,900	650
W/aqality in mS/m (avg.)	1,250	1,867	3,010	1,293	2,850	1,307	1,843	1,867	1,843	2,643
W/table depth (avg.)	2.76	3.82	1.79	3.74	1.98	2.69	5.26	3.82	5.26	2.86
W/Duty (avg.)	4.95	3.83	8.16	7.31	8.81	4.54	6.90	3.83	6.90	5.28

Reasons for low yield in different crops is mainly due to three reasons:

1. Less money spent on the purchase of pesticide i.e., less by Rs 200 per acre for cotton crop.
2. Less money spent on the purchase of fertilizer, i.e., less by Rs 865 per acre for sugarcane crop.
3. Less availability of water, i.e., less water duty by 1.12, 4.27 and 1.62 respectively, for cotton, wheat and rice crops.

The analysis of farm income for one year for all the watercourses of this command area reveals that there is a big disparity in the earning capacity of the farmers. The range of farm income for this distributary is given in Table 34.

Table 34. Maximum, Minimum and Mean Agriculture Net Revenue of Heran Distributary.

Particulars	Revenue Max.			Revenue Min.			Revenue Men.
	K-97	R-96	Total	K-97	R-96	Total	Total
Watercourse no.	4R	4R	4R	K2R	K2R	K2R	Total
Farm-gate revenue	11,158,351	2,551,844	13,710,195	1,435,445	551,743	994,945	**5,223,533**
Gross input costs	5,735,223	2,020,344	7,755,567	1,200,953	403,470	797,670	**3,005,236**
Gross taxes	238,208	97,346	335,554	90,760	19,262	36,752	**160,933**
Total expenditures	5,973,431	2,117,690	8,091,121	1,291,713	422,732	834,422	**3,166,169**
Net income	5,184,920	434,154	5,619,074	143,732	129,010	160,523	**2,057,364**
Per cultivated acre	**7,645**	**683**	**8,328**	**689**	**1,195**	**677**	**6,705**
Per CCA Acre	**5,567**	**466**	**6,033**	**264**	**316**	**295**	**4,095**

There are a total of 30 watercourses in the Heran Distributary. The net agriculture income for 17 watercourses is less than the mean farm income by approximately 34.65%. In the Heran Distributary, Watercourse 4R is the highest earning watercourse; the main reason is high water duty and high cropping intensity. Watercourse K2R is the lowest earning watercourse because of lower cropping intensity and low quality yields.

Farm income has been calculated by subtracting farm expenditure and farm taxes from the gross farm revenue. The total farm income for one crop year, and other important information, is given in Table 35.

Table 35. Net Agriculture Income Analysis.

Particulars	***Rabi* – 96-97**		***Kharif* – 97**		**Total (1 year)**	
Cropped Area in acres	8,513		9,323		17,836	
Fallow Area in acres	2,215		1,405		-	
Waterlogged Area in acres	870		870		-	
Salinized Area in acres	1,673		1,673		-	
Abandoned Area in acres	1,802		1,802		-	
CCA in acres	15,073		15,073		-	
Cropping Intensity (in %age)	56.48		64.84		121.32	
Gross Revenue (Rupees)	38,563,030		118,142,975		156,706,005	
Gross input costs (Rupees)	28,791,329		61,365,760		90,157,089	
Total Taxes (Rupees)	1,496,627		3,331,355		4,827,982	
Total Expenditure	30,287,956		64,697,115		94,985,071	
Farm Income (Rupees)	8,275,073		53,445,860		61,720,933	
Farm Income (before taxes) in percentage	25.34		48.06		42.47	
Farm Income (after taxes) in percentage	21.46		45.24		39.39	
Farm taxes to Farm income (Bef./tax) in %age	4.71		4.90		4.84	
	Per Crop Acre	Per CCA Acre	Per Crop Acre	Per CCA Acre	Per Crop Acre	Per CCA Acre
Gross Revenue (Rupees)	4,530	2,558	12,673	7,838	17,202	10,396
Gross input costs (Rupees)	3,382	1,910	6,582	4,071	9,964	5,981
Total Taxes (Rupees)	176	99	357	221	533	320
Total Expenditure	3,558	2,009	6,939	4,292	10,497	6,301
Farm Income (Rupees)	972	549	5,733	3,546	6,705	4,095
Farm Income (US Dollars)	22	12	130	81	152	93
Avg. price of land per acre (Rupees)	75,000		75,000		75,000	
Farm Income to land (crop) price in %age.	1.30		7.64		8.94	

Rate applied: 1 US$ = Pakistan Rupees 44.00.

The analysis of farm income for the Heran Distributary reveals the following facts:

a. Farm income percentage is high in the *kharif* season by 490%.

b. Although cropping intensity in *kharif* season is higher by 8.36% when compared to that of the *rabi* season, the farm income in *kharif* is more by 490%. Therefore, *kharif* season crops (cotton, sugarcane, rice etc.) are more revenue-generating when compared to that of the *rabi* season crops (wheat, fodder etc.).

c. Loss of farm income to the farmers of this command area due to non-cultivated land of about 4,345 acres is estimated at Rs 29.133 million (US$ 0.662 million). If this land is reclaimed, the per CCA farm income can increase to Rs. 6,028 per acre (US$ 137) when compared to that of the existing per CCA farm income of Rs 4,095 per acre (US$93).

d. The fixed deposit schemes of the banks generate a higher interest rate, i.e., about 17.5%, which, after tax and *Zakat* amounts to about 15.31%. Apart from these two taxes taken by the banks, an investor has also to pay wealth tax, the rates of which vary from 2.5% to 10%; assuming a rate of 5% for wealth tax, the effective rate of interest comes to 14.44%. At first glance, this rate appears to be quite lucrative. However, when we consider the time value of money with an inflation rate of 12%, in reality, the rate of return is only 2.44%. One year ago the average price for land in the Heran Distributary was approximately Rs 75,000 per acre. The net farm income before tax, per cropped acre to average land price, comes to 9.65%, and farm income after tax comes to 8.94%. Since the prices for land and crops increase nearly at par with the inflation rate, the farmers of the Heran Distributary can be considered to be earning fairly well.

e. The banks pay an interest rate of 12.5% on all Pakistan rupee saving accounts; however, by law, they deduct 12.5%. Wealth tax is 10% (plus *Zakat*, 2.5%) on the amount of interest earned on these accounts, thereby reducing the interest rate to 10.94%. Again, considering the time value of money by assuming an inflation rate of 12%, the effective interest rate comes to 1.06% negative.

f. The Income Tax authorities in Pakistan, for the purposes of income tax, consider a net profit (before tax) percentage of 20-30% as reasonable in the case of sole proprietorship and partnership concerns. In drawing the profit and loss accounts of sole proprietorship and partnership concerns, the salaries of partners are not considered as an expense. Therefore, for the purposes of comparison, the farming community can be considered as sole proprietorship or partnership concerns. In the Heran Distributary, the net farm income, in percentage, to the farm revenue, is 39.39%. This makes farming in the Heran Distributary a very reasonable profession.

4 NEED FOR A BUSINESS PLAN FOR HERAN DISTRIBUTARY

4.1 COUNTRY SETTING

Pakistan encompasses about 80 million ha. of land, of which about 26% is cultivated. Pakistan is divided into three hydrological regions; the Indus Basin, covering more than 56 million ha. (70% of the country's area), the Kharan Desert in the west of Balochistan, and the arid Makran coast along the A*Rabi*an Sea in southern Balochistan. The deserts in the south (Thar and Cholistan) have no water resources.

Pakistan's climate is arid to semi-arid. The annual rainfall over much of the Indus Plain is uneven and does not exceed 150 mm, while evaporation rates are high, varying from 1,250 to 2,800 mm. Agriculture is crucial to Pakistan's economy, but non-irrigated agriculture within the Indus Plain is impossible. The importance, therefore, of an efficient and effective irrigation network cannot be overstated.

Although Pakistan has substantial natural water resources, these are inadequate for crop production on all irrigable land. River flows are highly seasonal, with roughly 85% of annual flow occurring during the *kharif* season. Due to limitations on water availability, cropping intensities tend to be low. Furthermore, the majority of irrigation systems suffer from low delivery efficiencies, inequitable water distribution, inadequate system maintenance, insufficient cost recovery from beneficiaries and the need to improve drainage.

Despite Pakistan's growth being agriculturally based, parallel non-agricultural growth has occurred in areas with large employment bases. Wages have been increasing, in real terms, and absolute poverty has been declining.

4.2 POLICY REVIEW

Current national and provincial agricultural policies seek the same fundamental goals; raising rural incomes, reducing imports and increasing exports of raw materials and processed goods. However, the 1988 Report by the National Commission on Agriculture concludes that in order to meet the demands of Pakistan's high population growth rate (3% per annum), accelerated growth in agriculture production is essential. The present rate (estimated at 3.8% per annum in 1993) is inadequate; agricultural growth must rise by an average of 5% per annum if the GoP strategy of virtual self-sufficiency is to be achieved and sustained.

4.3 A FRAMEWORK FOR REFORMS

The institutional reforms, which are essential to safeguard future agriculture production, have been the focus of a major study sponsored by GoP and the World Bank (Institutional Reforms to Accelerated Irrigated Agriculture, 1994). The major conclusions and recommendations for policy reform arising from this study are:

- Fertilizer Policy:

Currently, fertilizer is grossly underused, and requires the implementation of policies that will bring effective competitive fertilizer supply and a distribution system that encourages private competition.

- Research and Extension:

There is gross under-investment in research, which requires the doubling of expenditure and the introduction of a large competitive grants program.

- Irrigation and Agriculture:

The deterioration of the irrigation infrastructure poses serious long term problems; the underlying causes of deterioration are effectively built into the operation procedures, and requires radical change by establishing farmers' irrigation groups, an irrigation commission to enforce efficient and equitable management, and shifting irrigation systems to semi-autonomous water authorities.

- Price Policy:

Import subsidy on wheat should be gradually removed and abolished; sugar prices should be decreased to promote a shift to higher value crops, and direct taxes on agriculture increased to support expenditures on rural infrastructure programs.

The radical change required for irrigation operation procedure was further discussed through a seminar on Participatory Irrigation Management (PIM) held in October 1994. This seminar was co-sponsored by the Economic Development Institute (EDI) of the World Bank, with the primary objective of identifying ways to increase food production through improved irrigation management. One of the products of the seminar was a series of provincial action plans prepared by WAPDA, using, as a starting point, current OFWM programs, but generally aiming for the pilot introduction of a WUA federation responsible for assessment, collection and disbursement of irrigation fees. Further, it was understood that the pilot turnover of a distributary, or minor canal, to water users will be implemented under the Left Bank Outfall Drain (LBOD) (North West Canal Remodeling Project, Interim Report, March 1995).

The LBOD project management, in consultation with the World Bank and Swiss Development Cooperation (SDC), entered into a consultancy agreement with the International Irrigation Management Institute (IIMI) to implement three pilot projects, in which Water Users Organizations (WUO's) would be established to operate and maintain (O&M) irrigation facilities in distributary/minor canal command areas (Inception Report, 1995).

4.4 CURRENT STATUS

The farmers of the Heran Distributary canal formed their federation with the assistance of IIMI-Pakistan and elected its office bearers in December 1996. The aspiration is for this WUF to operate and maintain their distributary canal in the future.

Specifically, it is anticipated that the WUF can achieve a more equitable distribution of water, improved reliability and timeliness of delivery, and through collaboration with the extension department, OFWM and IIMI-Pakistan, increased adoption of improved irrigation and agricultural practices.

With this policy and research background, the WUF needs to be assisted by testing its financial viability to bear the O&M costs of the irrigation facilities. And, by developing a framework for sound financial planning and management, including mobilization of resources in the achievement of the aforestated goals.

The importance of a financial framework for the WUF is further established with the fact that in 1997, the Sindh Assembly passed a bill to provide for the establishment of the irrigation and drainage authority (SIDA). For equitable distribution of irrigation water and effective drainage and flood control sustainable on a long term basis through participation of beneficiaries in the operation and management of irrigation drainage network, and to provide for matters connected therewith, or incidental thereto.

The relevant sections and sub-sections of this bill directly affecting the finances of the Heran Distributary WUF are reproduced as follows:

Section 21(2) The rates at which the Authority shall supply water shall be so fixed as to provide for meeting the operation and maintenance cost of the system within a period of seven to ten years; provided always that before proposing any enhancement in the existing rates and/or agreeing to the same, the Authority/AWBs concerned shall use their best endeavors to reduce the quantum of the following measures:

(i) reducing costs;
(ii) improving assessment and collection of water rates and drainage cess;
(iii) recovery of arrears;
(iv) recovery of cost for providing drainage flood control to non-farming beneficiaries; and
(v) dis-investment of fresh water tubewells in SCARP areas.

Section 21(3) The components of O&M to be recovered from the farmers in the form of *abiana* shall be the full O&M cost of Irrigation Canals and Secondary Drains.

Section 21 (4) The O&M cost of flood protection and public sector FWG tubewells will be excluded from *abiana*. A nominal proportion (say five to ten percent) of the O&M cost of SGW tubewells and/or main drains may, however, be borne by the farmers, should such a need be felt by the Authority.

Section 26 C (4) To collect the agreed water charges/other dues, if any, from its water users and pay the agreed consideration for supply of irrigation water and conveyance and/or disposal of drainage effluent to the SIDA or AWB concerned.

Section 26 C (5) To engage, hire or employ any consultants, advisors and employees as may be deemed necessary, or be otherwise reasonably required for the due and effective performance of various powers and functions on such terms and conditions as may be prescribed, including terms and conditions relevant to the conclusion or

premature termination of such engagement, etc., of any consultants, advisors or employees, as the case may be.

4.5 CURRENT EXPENDITURE ON IRRIGATION INFRASTRUCTURE BY THE GoS

The Finance Department of the GoS prepares a detailed budget for the province of Sindh each year, covering the period from July 1 to June 30 the following year. The budget for the Irrigation infrastructure appears in Volume III, containing demand numbers 25 to 50. Demand number 37 represents irrigation. For the year 1997-98, the total demand, and voted, is Rs. 1,236,691,240 or Rs. 1.237 billion, i.e., US Dollars 28.100 million.

These costs are mainly categorized under four heads of expenses, namely: (1) Irrigation Administration; (2) Irrigation Dams; (3) Machinery and Equipment; and (4) Repair and Maintenance. The breakdown of these heads of expenses in various sub-heads, and their rate per CCA acre for the province of Sindh, is presented in Tables 36, 37, 38 and 39.

Table 36. Irrigation Administration.

Description	Salaries and Benefits	Supplies and Services	Commun-ication	Utilities	Total	Per CCA acre
Irrigation Secretariat	13,360,810	1,210,460	446,980	450	15,018,700	1.14
Chief Engineers:						
Sukkur Barrage	6,634,230	629,060	290,010	79,480	7,632,780	0.58
Irrig. Development	2,822,030	213,700	66,000	61,000	3,162,730	0.24
Kotri Barrage	5,490,730	389,980	82,110	61,730	6,024,550	0.46
Guddu Barrage	2,932,330	334,610	150,150	30,240	3,447,330	0.26
Superin. Engineers:						
Superin. Engineers	19,559,750	839,600	346,680	144,800	20,890,830	1.58
Guddu Barrage	1,845,310	164,350	88,830	17,960	2,116,450	0.16
Executive Engineers:						
Executive Engineers	668,932,620	2,619,880	1,537,470	581,170	673,671,140	51.05
Guddu Barrage	90,283,620	498,240	211,560	63,900	91,057,320	6.90
Director Regulation	5,080,910	270,140	146,000	2,270	5,499,320	0.42
Spec. Revenue Est.:						
Spec. Revenue Est.	29,761,510	225,340	80,430	43,680	30,110,960	2.28
Guddu Barrage	5,253,650	61,950	5,990	5,250	5,326,840	0.40
Medical	589,410	56,970	2,250	2,700	651,330	0.05
Director Irr. Res.	5,283,260	190,260	57,540	2,730	5,533,790	0.42
Director Irr. Design	2,900,400	27,900	-	10,450	2,938,750	0.22
Total:	**860,730,570**	**7,732,440**	**3,512,000**	**1,107,810**	873,082,820	66.16
Per CCA acre	**65.23**	**0.27**	**0.08**	**0.59**	66.16	

The Provincial Irrigation Department spends about 70.60% of its total allocated budget (i.e., Rs. 1,236.691 million) on irrigation establishment. Other percentages within the establishment costs are Salaries and Benefits, 69.60%, office supplies (rent, rates, stationery, newspapers, maintenance etc.,), 0.63%, Communications, 0.28% and Utility bills, 0.09%.

The irrigation secretariat is situated in Karachi. The percentage share within the total establishment cost is about 2%, while the costs for Special Revenue Establishment is 4.06%.

The Provincial Irrigation Department spends about 3.00% of its total allocated budget (i.e., Rs. 1,236.691 million) on irrigation dams. Other percentages within the Irrigation Dams cost are Maintenance and Repairs; 2.56%. Stone Pitching and Repairs and Carriage make up the balance of 0.46%.

Table 37. Irrigation Dams.

Description	Maint. And Repairs	Recouping of Stone Pitching and apron of Ruk Loop Bund	Repairs and Carriage	Total	Per CCA acre
Sukkur Barrage	14,584,920	1,523,970		16,108,890	1.22
Kotri Barrage	5,784,870			5,784,870	0.44
Guddu Barrage	7,196,050			7,196,050	0.55
Machinery & Equipment:					
Research Division			52,390	52,390	0.00
Disch. Observation Cell			42,530	42,530	0.00
Embark. & Drainage Works:					
S.M.H.L	307,330			307,330	0.02
Kinjhar Lake	724,520			724,520	0.05
Machinery & Equipment			25,410	25,410	0.00
Other Charges:					
Ghar Inspect. Bungalow	291,060			291,060	0.02
Research Division	2,138,200			2,128,200	0.16
Disch. Observation Cell	94,920			94,920	0.01
Rest House at Lahore	65,830			65,830	0.00
Soil Mechanic & Hydraulic Lab.	506,100			506,100	0.04
Total:	31,693,800	1,523,970	120,330	33,338,100	2.53
Per CCA acre	2.40	0.12	0.01	2.53	

Table 38. Machinery & Equipment.

Description	Machinery & Equipment	Sukkur Barrage	Chief Engineer Irrigation Develop.	Kotri Barrage	Guddu Barrage	Total	Per CCA acres
Durable Goods	4,971,000					4,971,000	0.38
Repairs & Carriage		1,020,810	99,220	796,850	392,700	2,309,580	0.18
Total:	4,971,000	1,020,810	99,220	796,850	392,700	7,280,580	0.56
Per CCA acre	0.38	0.08	0.01	0.06	0.03	0.56	

Table 39. Repair and Maintenance.

Description	Sukkur Barrage	Guddu Barrage	Kotri Barrage	Silt Clearance	Makhi Dhand	Thatta Sajawal Road	Dadu Moro Road	Malir River	Total	Per CCA acres
Irrig. Head Works	5,754,520	5,635,980	2,675,930						**14,066,430**	**1.11**
Main Canal Feeders	91,470,220	27,603,660	34,921,420						**153,995,300**	**12.21**
Silt Clearance				116,644,500					**116,644,500**	**9.25**
Lift Irrigation Schemes:										
Maintenance & Repairs	9,332,000		701,510						**10,033,510**	**0.80**
Electricity Charges	10,120,640		2,252,250						**12,372,890**	**0.98**
Drainage Schemes			10,383,130		3,152,520				**13,535,650**	**1.07**
Bridges						1,045.590	950,570		**1,996,160**	**0.16**
Operat. & Maintenance								345,520	**345,240**	**0.03**
Total:	**116,677,380**	**33,239,640**	**50,934,240**	**116,644,500**	**3,152,520**	**1,045.590**	**950,570**	**345,520**	**322,989,680**	**24.48**
Per CCA acre	**8.84**	**2.52**	**3.86**	**8.84**	**0.24**	**0.08**	**0.07**	**0.03**	**24.48**	

The Provincial Irrigation Department spends about 26.00% of its total allocated budget (i.e., Rs. 1,236.691 million) on the Repair and Maintenance of Irrigation Canals. Other significant percentages within the Repair and Maintenance of Irrigation Canals are Sukkur Barrage, 9.00%, Guddu Barrage, 3.00%, Kotri Barrage, 4.00% and Silt Clearance, 9.00%.

The summary of costs for the four main budget line items for the Irrigation Department Government of Sindh, is presented in Table 40.

Table 40. Summary of Costs.

Description	Total Cost in Rupees	Rupees per CCA acre
Irrigation Administration	873,082,820	66.16
Irrigation Dams	33,338,100	2.53
Machinery & Equipment	7,280,580	0.56
Repairs & Maintenance	322,989,680	24.48
Total:	**1,236,691,180**	**93.73**
Irrigation Establishment	**873,082,820**	**66.16**
O&M without Establishment	**363,608,360**	**27.57**

Source: Estimates of Charged Expenditure and Demands for Current Grants.

The GoS spends a total of Rs. 1,236.691 million (Rs. 93.73 per CCA acre) on the Provincial Irrigation Department, out of which 71% (Rs. 66.16 per CCA acre) is spent on the irrigation establishment, while the rest, i.e., 29% (Rs. 27.57 per CCA acre), is spent on maintenance activities.

In 1986/87, a detailed Yard Stick for O&M costs was prepared by the Irrigation Department and submitted to the Government of Sindh. According to this Yard Stick in 1986/87, Rs. 25.16 per CCA acre was required for Irrigation O&M Costs to attain a reasonable efficiency level in the system.

Table 41. Reasonable Requirements for O&M of Irrigation Infrastructure.

	Quantity or Units	Unit Yard-Stick Rate	Amount (Millions Rs.)	Remarks
Irrigation Works.				
Flow Irrigation (including Irrigation Colonies)	14,865 Virtual Miles.	13,333	198.195	
Repair & Maintenance of Barrage Gates & other E&I works.	50,000*1,659		82.95	
Lift Irrigation (small Irrigation schemes):				
(a) On Rivers.	1,750 H. Power	4,963	8.685	
(b) On Canals.	3,155 H. Power	4,834	15.251	
Flood Embankments:				
(a) Main Bunds (River)	935.00	27,470	25.684	
(b) Loop Bunds (River)	339.00	21,131	7.164	
(c) Hill Torrent Bunds	198.50	19,967	3.963	
(d) Kinjhar Lake (Bund)	12.50	54,940	0.687	
Total Irrigation:			**342.579**	**Rs. In millions**
CCA (acres) of three barrages including Inundation canals & Lift Irrigation Schemes			**13.615**	**Acres in Millions**
Rate per CCA acre			**25.16**	**Rupees**

Although this Yard Stick is a good measurement for required O&M costs, it does not take into account the Establishment Cost, which is a major fixed proportion of the O&M costs. In order to calculate a true maintenance cost (based on Yard Stick), the recommended cost has been adjusted for the current prices by applying a GDP deflator, which is given in Table 42.

Table 42. Maintenance Cost based on Yard Stick.

Year	GDP- Deflator	Index	Per CCA acre of Irrigation O&M without Establishment Cost
86-87	142	1	25
96-97	387	2.7	68

This data is based on a 1986 analysis by NESPAK, updated as above to 1996-97 prices. In IIMI's opinion, these figures are a minimum level. A similar study in north India, in a state with similar infrastructure (Haryana Water Resources Consolidation Project, World Bank, 1995), but where costs and wage rates are somewhat higher, indicated costs approximately double those indicated above, but no more detailed analysis on current needs in Sindh is available (Dr. Christopher Perry, Status Report on Financial Feasibility Analysis).

Hence, a minimum estimate for maintenance costs amounts to Rs. 68 per acre, whereas, the Irrigation Department intends to spend only Rs. 27.57 per acre, thus, there is a shortfall of Rs. 40.43 per acre. In other words, the Sindh Irrigation Department is going to under-spend by 59% during the year 1997/98 on the maintenance of irrigation infrastructure.

Therefore, to maintain the irrigation infrastructure in order to meet the system adequately, so that the design service can be given on a continuing basis, the total O&M cost comes to Rs. 134.16 (US$3.04) per acre, or Rs. 331.38 (US$7.51) per hectare. However, this does not mean that the farmers have to pay for all of these costs, as the main cities of Sindh, i.e., Karachi and Hyderabad, also consume this water for domestic use. The total capacity of the Indus Basin Irrigation System is around 110 million area feet (MAF) per annum, out of which the share for Sindh is about 46 MAF. The cities in the Sindh province use about 3.3 MAF of water for domestic use, while about 10 MAF water goes into the A*Rabi*an Sea (Indian Ocean).

Hence, out of a total of 36 MAF (46-10) of water available for the Sindh province, about 9.17% is utilized for non-agricultural purposes. Non-agricultural use of water generates high economic returns, therefore, the rate for non-agricultural use is proposed to be comparatively higher, i.e., twice the rate that farmers are to be charged. These calculations are given in Table 43:

Table 43. Irrigation Water Consumed in Sindh Province.

Description	Amount in Millions	Water Available	Rate per MAF
Used in Sindh Province	1,236.70	36.0	34.35
Deduct: Maint. Cost	(363.61)	36.0	
Add: Y. Stick Maint. Cost	924.96	36.0	
Estimated O&M Cost	1,798.05	36.0	49.95
Non-irrig. Use at double rate	329.67	3.3	99.90
Irrig. Use cost	1,468.38	32.7	44.90

Therefore, the cost of water to the farmers amounts to around Rs. 108 per CCA acre (Rs. 1,468.38 m/13.615 ma), or Rs. 267 per hectare.

5 ORGANIZATIONAL AND OPERATIONAL COSTS OF THE HERAN DISTRIBUTARY WATER USERS FEDERATION

The Heran Distributary Secondary Canal has 30 watercourses. The water users of this command area have elected 30 Water Users Organizations, i.e., one for each watercourse, and 1 Water Users Federation at the level of this distributary itself. Presently, each WUO and the WUF each comprises of 5 members, besides the executive body members. The Presidents are administratively in-charge of these organizations and the federation.

Once this secondary canal is transferred to the Heran Distributary WUF, the overall management of the Secondary Canal command area will also become the responsibility of this federation. These responsibilities will include, but not be limited, to the following:

1. Levy of *abiana* mechanism on its members
2. Supervision of the staff hired
3. O&M of the secondary canal
4. Collection of *abiana* from its members
5. Payment of cost of water to the Area Water Board
6. Conflict resolution
7. Maintaining proper account books

5.1 LEVY OF *ABIANA* MECHANISM ON MEMBERS

Broadly, three mechanisms can be implemented, namely, (a) a crop-based charge, broadly relating the *abiana* to water consumption; (b) a volumetric charge; and (c) a flat rate, independent of crop type or cropping intensity.

a. A Crop-based Charge

This is the present mechanism in practice. The farmers pay according to the rates specified by the government for different crops. The line agencies claim that these rates have been developed in view of the crop water requirements for different crops. However, this system has two main flaws: (1) assessment of the cropping pattern of each farmer is required at the end of each cropping season; and (2) involvement of judgment, as precise assessment of the cropping pattern is not possible.

b. A Volumetric Charge

This is the most preferred mechanism by the engineers; water meters are installed, hence, water charges relate to the water consumed. This mechanism is not popularly installed around the world, although certain countries, e.g., Taiwan, South Korea and certain areas of Australia and America use this system. If installed, this system will require a complete overhaul of the present system, and a

huge investment. Two other methods resembling this mechanism favored by some consultants, and the farmers, are explained as follows:

i. The moghas (modules or outlets) should be of the open flume type to ensure proportional flow at varying water levels. Water level gauges should be installed and monitored, and the data processed on computer on a daily basis. A simple spreadsheet would enable a reasonable assessment of water delivered to the farmers.

ii. The moghas are calibrated and their designs noted down. Water users pay abiana according to the time of water allowed for their turn, the hourly rate of which will be calculated in view of the water discharge agreed with the Irrigation Department at the head of the regulator.

The first method involves the use of computers. The question of whether the Irrigation Department will agree with the daily data processed by the WUF, remains unanswered. The success of the second method will largely depend on a continuous and reliable water supply at the head regulator, as well as the effectiveness of the *warabandi* lists.

c. A Flat Rate Charge

This is a simple mechanism whereby farmers are charged a flat rate per acre, according to their individual land holdings. The success of this method depends on the ability of the WUF to provide water to its members on an equitable basis. Otherwise, the farmers at the tail reaches of the distributary will not agree with this method.

d. Another Approach

The World Bank (WB) staff Appraisal Report, Pakistan, for NDP, discusses the levy of *abiana* from a different angle under Section 1.31, as reproduced below:

Lessons from Research: The lessons from research on water rights in other countries are also of interest: (i) there are very substantial welfare and income gains from permitting trade in water, at whatever level; (ii) water rights should be separated from land; (iii) water rights should be allocated based on historical usage, and surplus amounts to usage should be auctioned off; (iv) transaction costs for trading in water is very low, and the availability of adjustable gates is helpful to facilitate such trading; (v) environmental regulations need to be enforced; (vi) the Government has a role to play in resolving the conflicts that could arise; and (vii) public subsidies for O&M of irrigation obstruct water markets development.

The historical water rights in Pakistan are based on the design of IBIS in 1932. Since then, the situation has changed due to the construction of new dams and storage facilities, which have increased the availability of water over the years. Auctioning of surplus water will certainly yield more economic returns, but then, only the wealthy will

benefit; poor farmers of this country will sell off their lands. This is what has happened in Mexico.

5.1.1 Suggested Mechanism for the Levy of *Abiana*

The WUF will be responsible for the collection of *abiana* from its members, therefore, a simple mechanism to charge a flat rate is suggested. However, the WUF will have to ensure that the watercourses receive their share of water in an equitable and reliable manner, and at the watercourse level, the WUO's will have to ensure that its members receive water according to their land holdings.

5.2 SUPERVISION OF THE STAFF HIRED

Currently, these organizations, and the federation, are collecting cash contributions for repairs and other expenses. However, the water users will eventually be managing their secondary canal command areas independently. Certainly, this will require a good set-up consisting of technical, secretarial and unskilled staff.

Based on the observations of the IIMI-Sanghar field staff, the following set of employees in the initial stages is suggested for the Heran Distributary WUF:

1. Assistant Engineer
2. Administrative Assistant
3. *Darogha*
4. *Tandail*
5. *Baildars*

The above-stated personnel, their qualifications, range of salaries and job descriptions are suggested as follows:

Assistant Engineer

Qualification: Diploma in Agricultural, or Civil Engineering.
Experience of rural areas will be preferred.
Age: Under 35 years.
Salary: Rs 5,500 to Rs 6,000, inclusive of all benefits.

Job Description:
This person will be answerable to the members of the WUF, and will act as the federation's right hand person; however, he will not deal with water users on his own, but rather, will only inform the WUF. The main duties of this person will be as follows:

a. To liaise with the Irrigation Department
b. Supervision of all O&M activities in this command area.
c. To record the water discharge at the head regulator, and to pursue a decrease with the ID.
d. To record the design (width and depth) of the outlets.

e. To record the discharge at the outlets.
f. To advise the WUF about the design, and discharge, of the outlets.
g. To ensure that the banks, berms and inspection paths of the distributary are in a reasonably good condition.
h. To advise the WUF on desilting timings.
i. To bring issues reported by the *Darogha* to the attention of the WUF.

Logistic Requirements:
1. Motorbike
2. Table, chair and chairs for visitors
3. Bookshelves

Darogha

Qualification: Intermediate, however, a diploma holder will be preferred.
Rural experience will be preferred.
Age: Under 40 years.
Salary: Rs 4,500 to Rs 5,000, inclusive of all benefits.

Job Description:
This person will be answerable to the Assistant Engineer, and will act as his right hand person. The main duties of this person will be as follows:

a. Take readings of the water discharge at the outlets.
b. Off and on, to verify the design of the outlets with that of the design list approved by the WUF, and to report any variations to the AE.
c. Regular monitoring of the banks, berms and inspection path, and to report serious cases to the AE immediately, as well as supervising *Baildars* for minor repairs.
d. Monitoring of the overhead bridge and culverts.
e. To report theft of trees along the inspection path, tampering of outlets, or insertion of dikes, to the AE immediately.
f. To supervise the *Baildars*.
g. To assist the WUF in the absence of the Assistant Engineer.

Logistic Requirements:
1. Bicycle
2. Water measuring devices

Administrative Assistant

Qualification: Intermediate.
Typing skills, computer-literacy will be preferred.
Age: Under 40 years.
Salary: Rs 3,500 to Rs 4,000, inclusive of all benefits.

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Job Description:
This person will be answerable to the Assistant Engineer. The main duties of this person will include:

a. Typing.
b. Maintaining files and related records.
c. WUF meeting letters and agenda.
d. Maintenance of mail and dispatch registers.
e. Record petty cash expenses.
f. Assist the Assistant Engineer in the maintenance of discharge readings for both, the head regulator and outlets.
g. Assist the WUF in the absence of the Assistant Engineer.

Logistic Requirements:
1. Typewriter
2. Table, chair and chairs for visitors
3. Bookshelves

Tandail (2, for 12-hour daily rotations)

Qualification: Primary or Middle.
Rural background with some mechanical work experience.
Age: Under 50 years.
Salary: Rs 3,000, inclusive of all benefits.

Job Description:
These persons will be answerable to the Assistant Engineer. Their main duties will include:

a. Maintaining the head regulator's gauge books on an hourly basis.
b. Operating the gate of the head regulator.
c. Greasing, oiling and cleaning the head regulator.
d. To report fluctuations in the water discharge to the AE, or the WUF.

Logistic Requirements:
1. Tool kit
2. Torch
3. Lubricants
4. Gauge book

***Baildar* (4, three at the head, middle and tail reaches of the Heran Distributary, and one for the Khadwari Minor)**

Qualification: Good physical health.
Rural background with some relevant work experience.
Age: Under 45 years.
Salary: Rs 3,000, inclusive of all benefits.

Job Description:
These persons will be answerable to the Darogha. Their main duties will be as follows:

a. Removing vegetation from the berms, banks and inspection paths.
b. Sprinkling water on the inspection paths.
c. Earth work repairs to the inspection paths.
d. Preventing animals from destroying the inspection paths.
e. Notice, and report, any instances of water theft.

Logistic Requirements:

1. Spade
2. Bucket
3. Axe
4. Earth work bowls

5.2.1 Establishment Cost of Heran Distributary

Based on the above-stated staff deployment and their logistic needs, the budget estimates for the first year are given in Table 44. The capital equipment costs will only appear in the first year. WUF establishment costs will be reduced in the subsequent periods, i.e., Rs 474,400 per annum (Rs 464,400 plus contingencies, Rs 10,000). Hence, the requirement for establishment cost below the head of this distributary will be Rs 31.47 per acre, which in the first year, will increase to Rs 37.68 per acre due to the investment required for the purchase of capital items.

Table 44. WUF Establishment Budget

Particulars	Period	Qty.	Base cost	Amount
Salaries				
Assistant Engineer	12 m.	1	6,000	72,000
Darogha	12 m.	1	5,000	60,000
Administrative Assistant	12 m.	1	4,000	48,000
Tandail	12 m.	2	3,000	72,000
Baildar	12 m	4	3,000	144,000
Subtotal:				**396,000**
Supplies & Services				
Utility bills for office	12 m	1	3,000	36,000
Stationery	12 m	1	500	6,000
Meeting exp. & other supplies	12 m	1	800	9,600
Subtotal:				**51,600**
Travel				
Maintenance of M/Bike	12 m	1	1,000	12,000
Local Travel	12 m	1	400	4,800
Subtotal:				**16,800**
Capital Equipment				
Motor Bike	1st year	1	70,000	70,000
Bi-cycle	- do -	1	3,000	3,000
Office furniture sets	- do -	2	6,500	13,000
Repairs & Maint. Equipment	- do -	Estimated	5,600	5,600
Typewriter	- do -	1	2,000	2,000
Subtotal:				**93,600**
Contingencies				10,000
Total:				**568,000**
Per CCA acre full costs				**37.68**
Per CCA acre w/o Capital Cost				**31.47**

5.3 MAINTENANCE AND IMPROVEMENT COSTS OF HERAN DISTRIBUTARY

A general description of the physical phenomenon occurring in the irrigation system needs to be presented in order to understand the relationship between the field maintenance inventory and the proposed solution contained in the form of maintenance needs, including activities, costs and manpower. From the diagnostic walk thru survey, different major, and minor, maintenance problems were observed. Most of these problems are inter-related. The inventory of these main problems is given below:

a. Essential Structural Maintenance
b. Sedimentation
c. Vegetation
d. Weak Banks
e. Erosion
f. Wider cross sections
g. Lack of Inspection Path

A. Essential Structural Maintenance

Essential Structural Maintenance (ESM) is considered to be the minimum level of investment that should be made in order to improve water deliveries. This maintenance requires correctness of all flow control structures (repair of gates), water measurement (repair of damaged outlet structures), or installing new structures. The major problems observed under ESM and Deferred Maintenance are as follows:

i. Head Regulator of Heran Distributary: The Head Regulator of Heran Distributary operates in good condition, it has rectangle type gate structure. There are three gates two of them located on the left and right sides, are not operational. Only the middle gate is operational.

ii. Head Regulator of Khadwari Minor: The Head Regulator of Khadwari Minor operates in good condition. This regulator is operated almost on a daily basis to maintaining flow of the Khadwari Minor.

iii. Outlet Structure: Heran Distributary has 30 outlets, in which 19 APM and 11 open flume type. The percentage of outlets tampered (changing design of its throat and crest) is very high i.e., 85%. Water users also tapered outlets by making side openings (called Wanghi in local language).

iv. Culverts: Culvert structures only 20% were observed as damaged, 24% of the outlets were either without culverts or these had been damaged completely while the remaining 56% were found to be partially damaged.

v. Bridges: Bridges over channels are used for crossing road near the villages. Heran Distributary has five bridges, all of which have RCC construction (only abutant). The abutant of these bridges are in a fairly good condition, whereas side raising walls are either missing or need repairs.

B,C, D & E. Sedimentation, Vegetation, Weak Banks and Erosion

The most serious problem in earthen channels is sedimentation, which is often the case for lined channels also. Erosion has also been observed in a few channels. Vegetative and aquatic growth also creates difficulties in the water flow. The farmers of this minor canal are aware of this problem, therefore they decided to desilt this secondary canal on a self-help basis.

F. Wider Cross Sections

Due to non-maintenance of this minor canal, the shape of this minor has changed, and its cross sections have widened with the passage of time. These wider cross sections are also one cause for the slow velocity of water in the distributary.

G. Lack of Inspection Path

Inspection paths serve a dual purpose: that of banks and conveyance path. The physical conditions of banks of the Heran Distributary is poor at many places.

The estimate of these costs is given in Table 45.

Table 45. Expected Maintenance Cost Requirement of Heran Distributary.

Type of Maintenance	Amount
Essential Structural Maintenance	153,736
Excavation of Sediment	61.770
Weak Bank Improvement	126,580
Dressing and Repairs of Inspection Path	48,280
Total:	**390,366**
Per CCA acre:	**25.90**

Therefore, it can safely be assumed that maintenance cost per acre requirement below the head of this minor will be Rs 25.90 per CCA acre.

5.3.1 Operation and Maintenance Cost of Heran Distributary

From Sections 5.2 and 5.3 it is estimated that O&M costs of the Heran Distributary shall be Rs 57.37 per CCA acre, i.e., establishment cost Rs 31.47 per acre, and maintenance cost Rs 25.90 per CCA acre. While, in the first year, this cost will be higher by Rs 6.21 per CCA acre due to the purchase of capital nature items. The share of O&M costs by the farmers of Sindh, to cover the costs of the irrigation infrastructure, comes to Rs 108 per acre (see Chapter 4 for more details). Therefore, O&M costs above the distributary are arrived at Rs 44.42 per acre. This total amount of Rs 108 per acre to the farmers may seem to on the higher side. And based on experience in Mexico, where,

after the introduction of farmer management, the staffing levels within the farmer-operated areas declined by as much as two-thirds. The experience in Senegal, where farmers demanded the right to hire their own staff, choosing SAED (the agency providing irrigation services) operators only if they had performed well (and even then reducing their salaries from the full civil service package). There is a reasonable chance that the same situation may also prevail in the province of Sindh. Therefore, a total O&M cost of Rs 100 per acre will be a reasonable recovery from the farmers.

These figures can be compared with the findings of Dr. Christopher Perry. In his status report, estimated requirement for O&M expenditures at the divisional level has been calculated at Rs 81 per CCA acre, the breakdown of which is Rs 43 below the distributary, and Rs 38 above the distributary.

5.3.2 Suggested Water Charges to the Heran Distributary WUF

Based on the analysis in Section 5.3.1, the Heran Distributary WUF is suggested to charge a flat rate of Rs 100 per acre to its members as water charges. In addition, it is also suggested that the WUF charge its members an annual membership fee of Rs 10 per acre. This additional amount should be treated as a reserve fund by the WUF, and may be used to pay for unusual expenditures like capital replacements, consultants' fees (for training), emergency repairs, etc..

5.3.3 Justification of the Water Charges Rate

The Revenue Department is responsible for the assessment and collection of *abiana*. However, the Irrigation Department assists the Revenue Department at the time of assessment. Their *modus operandi* has been explained in detail in Chapter 2 of this report.

The Revenue Department, upon request, provided the figures of various taxes assessed during the previous 5 years, i.e., from 1991-92 to 1995-96. The Revenue Department makes assessments on the basis of *dehs*, and not on the basis of hydrological boundaries of the Heran Distributary. The figures for the last 5 years are given in Table 46.

Table 46. Assessed Agriculture Land Taxes for Previous 5 Years.

Years	*Abiana*	Land Revenue	Local Cess	*Usher*	Mutation fee
1991-92	742,103	15,466	246,450	209,507	47,894
1992-93	736,472	21,579	244,353	287,214	41,293
1993-94	797,061	19,377	214,797	138,490	21,179
1994-95	944,710	18,250	219,900	175,785	710
1995-96	1,093,498	18,250	220,090	201,743	380
Average	862,769	18,564	229,518	202,548	22,291
CCA	39,737	39,737	39,737	39,737	39,737
Per CCA	21.71	0.47	5.78	5.10	0.56
Latest assessed	27.52	0.46	5.54	5.10	0.56

Source: Revenue Department, Sanghar.

The different taxes payable by the farmers of this secondary canal, per CCA acre, have been analyzed in Chapter 3. These values, when compared to that of the Revenue Departmen's assessed figures, are given in Table 47.

Table 47. Comparison of Agriculture Land Taxes Assessed and Payable.

	Abiana	Land Revenue	Local Cess	Usher	Mutation fee
Payable on the basis of survey per CCA	82.00	10.00	11.00	165.00	---
Revenue Dept. assess. (latest)	27.52	0.45	5.54	5.10	0.56
Unexplained difference	54.48	9.55	5.46	159.90	0.56

This unexplained difference of Rs 229.95 per CCA acre can be explained on the basis of the findings of the interim report captioned, "Financial Feasibility Analysis of Operation and Maintenance Costs for Water Users Federations on three Pilot Distributaries in Province of Sindh, Pakistan" (A.Sohani). Here, he concludes that farmers pay about Rs 70.22 per CCA acre as water-related charges (rent-seeking) to the Irrigation and Revenue Departments, and the remaining unexplained amount of Rs 159.73 per CCA acre can be considered as a saving in the farmers' payment of taxes.

5.3.3.1 Conclusion

The following points form the basis to conclude the justification of the water charges rate (Rs 100 per acre) suggested to the Heran Distributary WUF:

a. Presently, the *abiana* rate payable comes to Rs. 82 per acre. The suggested rate of Rs 100 per acre will increase *abiana* payable by Rs. 18, or by 22 %. Taking the examples of Senegal, where farmers paid an irrigation service fee 2 to 4 times as high after the transfer, and Mexico, where the fees increased by 400% to 600%. Comparatively, this suggested increase of 30% in *abiana,* is insignificant.

b. On average, the farmers are depositing Rs 27.52 per acre as *abiana* to the Revenue Department (1996-97). However, considering the amount of rent-seeking paid, along with this tax, the total amount comes to around Rs 97.74 per acre. Therefore, by collecting the *abiana* themselves, the farmers will save Rs 2.26 per acre (Rs 100 – Rs 97.74).

c. Apart from rent-seeking, the farmers' agriculture income is presently Rs 6,705 per cultivated acre, or Rs 4,095 per CCA acre (see Chapter 3 for details). The suggested rate will decrease this agricultural income by only Rs. 18, i.e., by 0.27% per cultivated acre, or 0.44% per CCA acre.

d. The analysis for agriculture income of the Heran Distributary reveals that the income of 17 watercourses, out of the total 30 watercourses, averages Rs 2,676 per CCA acre. The average income of the remaining 13 watercourses is Rs 5,826 per CCA acre. Transferring this distributary canal to the farmers

will certainly result in an increase of the agriculture income of the fore-stated 17 watercourses.

e. The WUF will keep Rs 57 per acre for the O&M of the Heran Distributary, while they will pay the Area Water Board Rs 43 per acre, which is Rs 15.48, or 56.25%, more than what is currently being collected from the farmers.

f. Presently, the Sindh Irrigation Department's cost is Rs. 94 per CCA acre. The estimated cost will be Rs 108 per CCA acre, which is inclusive of estimated costs below the head of the distributary / minors. The suggested abiana rate is Rs 100 per acre. Nearly all the current staff employed with the Irrigation Department will fit into the suggested staffing requirement of the Heran Distributary WUF. Therefore, the costs to maintain this distributary can be deducted from the total amount payable to the SIDA. Since the FO's are expected to be self sufficient within a period of seven years, therefore, in the interim period, the GoP is expected to finance the shortfall in the Irrigation Department's budgets.

5.4 COLLECTION OF *ABIANA* FROM WATER USERS

The farmers of Heran Distributary have been organized using the two-tier approach, i.e., Water User Organizations at the level of the watercourses, and a Water Users Federation at the level of the distributary itself. This is a very effective organizational setup, as delegation of authority takes place from top to bottom. In view of this setup, the following *modus operandi*, for the collection of *abiana*, is suggested:

a. The WUF to negotiate with the AWB for the supply of water at least equal to the average of what has been received in the previous year. The IIMI-Sanghar field station has the time series record of the discharge for the year 1997.

b. The WUF to distribute the sanctioned discharge among the different watercourses in proportion to the CCA of each watercourse. This discharge list to the various watercourses should be approved in the general meeting of the federation.

c. The *moghas* of all the watercourses to be designed in accordance with the water discharge calculated in step b. above. The *moghas* situated at the head and middle reaches of this distributary to be Adjustable Proportional Modules (APM), so that excess water received, if any, at the head of the distributary, does not flow into the fields. While the *moghas* in the tail reaches of the distributary are preferred as open flume type, since excess water, if any, may flow into the fields as no excess water escapes, have been provided in the existing system, and over-topping of water from the distributary may create major maintenance problems.

d. The physical condition of the minor canal should permit flow of water to the tail reach *moghas* freely.

e. The relevant WUO's to prepare *warabandi* lists (water share lists) of its members in proportion to the land holding of each farmer along their watercourse. These *warabandi* lists to be approved in the WUOs' general meeting, and a copy be given with the WUF for their record.

f. Once the lists of *warabandi* are approved, the farmers should be free to choose their own set of cropping patterns, and / or to sell their share of water time in part, or full, to other farmers, like water markets.

g. If lift machines are to be installed in certain fields, their capital and O&M costs will be the responsibility of the respective WUO.

h. Installation of the tubewells and conjunctive use of ground water and the canal water should be allowed only after obtaining permission from the WUF, which will normally grant approval, except in such cases where the ground water quality is not good for irrigation use. All expenses relating to tubewells should be the responsibility of individual farmers, and they will be free to buy or sell this water.

i. The WUF's financial year is suggested from July 1 to June 30 of the next year.

j. WUOs to collect *abiana* bi-annually from its members; at the start of the cropping season, i.e., in advance, while the annual membership fee should be collected once a year in the month of July each year.

k. The WUO's Finance Secretary should prepare bank *challan* forms of its bank account in triplicate, indicating the amount of *abiana*, membership fee and / or other charges payable in different columns, and after obtaining the organization's approval, issue these to the members. The members should deposit the amounts into the bank account through these *challans*, keep one copy for themselves, the bank will retain one copy, while the bank should be instructed to provide the third copy to the WUO's Finance Secretary.

l. A period of 10 days is to be given to the members for depositing these amounts into the bank account; failure to deposit the same will result in a surcharge of Rs 50 per day, up to a period of 10 days, to be levied on the members in default. On complaint from the WUO Finance Secretary, the WUO may consider to stop the water turn of any such member who does not deposit the amount within 20 days of the receipt of these bank *challans*. A WUO meeting to be called to decide ways in which this amount can be recovered.

m. The WUF Finance Secretary should prepare bank *challan* forms in triplicate of its bank account, indicating the amount of *abiana*, membership fee and / or other charges payable in different columns, and after obtaining the federation's approval, issue these *challans* to the relevant WUO's. The relevant WUOs should deposit the amounts into the bank account through these *challans*, keep one copy for their personal records, the bank will retain one copy, while the bank should be instructed to provide the third copy to the WUF's Finance Secretary.

n. A period of 30 days is to be given to the WUO's for depositing these amounts into the bank account: failure to deposit the same will result in a surcharge of Rs 100 per day, up to a period of 10 days, to WUO's in default. On complaint from the WUF Finance Secretary, the WUF may issue a warning to such WUOs who fail to deposit the amount within 40 days of the receipt of these bank challans. A meeting of the WUF be called to decide ways in which this amount can be recovered.

This system of depositing the payments into the bank accounts of the relevant WUOs and the WUF will ensure safety of *abiana* thus collected. Furthermore, a surcharge for late deposit of *abiana* will ensure timely collection from the water users and the WUO's. Also suggested, is that the Finance Secretaries of the relevant WUOs should present *abiana* collection status reports at the end of 20 days, in a special WUO meeting. Similarly, the WUF Finance Secretary should present an *abiana* collection status report at the end of 40 days in a special meeting of the WUF.

5.5 PAYMENT OF COST OF WATER TO THE AREA WATER BOARD

The major task of the WUF is to negotiate the allocation of water discharge for the Heran Distributary with the AWB, and deductions in *abiana* due to usage of lift machines and / or short delivery of water, if any. Once the discharge is approved, the WUF should maintain a proper record of the discharge being received at the head of the distributary. The discharge rating tables may need revision, and similarly, gauges installed may need to be replaced. This will primarily be the duty of the Assistant Engineer hired by the WUF, who, with the assistance of the *Tandails*, will monitor the discharge at the head regulator regularly.

The AE of this distributary will advise the WUF about the average discharge received from the AWB in writing, as well as his comments about whether agreed amounts of *abiana* should be paid in full, or certain deductions are to be made for short delivery *in lieu* thereof. In case of short delivery of water at certain intervals, the AE will be responsible for agreement, in writing, with the concerned AWB person.

The WUF Finance Secretary, based on the recommendation of the AE, and after obtaining approval from the WUF, will, at the end of each cropping season, deposit the agreed amount of up-stream *abiana* into the Government treasury. Subsequently, he will present a status report in the first next meeting of the WUF.

5.6 CONFLICT RESOLUTION

These may involve purely administrative issues. The WUF will have to act in accordance with its by-laws; however, certain issues may involve financial matters. Some of these issues, and the remedial actions to be taken, are suggested as follows:

5.6.1 Theft of Water

The irrigation system in Chile is considered a very good example to be cited for farmer-managed irrigation systems. In Chile, the water users groups are known as *Comunidad de Aguas* (CA), according to a report titled "Irrigation Water Management in the Irrigation System of the Diguillin River, Chile" (Ineke M. Kalwij, 1994). Water theft is the major cause of conflicts at canal, as well as field levels. The role of the CA in conflict management is limited. The president of the canal sometimes goes to the police and the judge for assistance.

There is a reasonable chance that this situation may also take place in this command area. Settling such conflicts through police and the judiciary requires both, time and money, therefore the Heran Distributary's WUF is suggested to consider this act very seriously, as this will mean breach of trust, which each water user member has towards the other. The *Darogha,* who is supposed to make a round of the minor canal on bicycle 3 to 4 times a day, and *Baildars* working in the three reaches of this canal should be able to notice it immediately, even if the theft takes place in the middle of the night. In such instances, a WUO meeting should be called immediately, and the farmer involved should be asked to explain his position. An estimate of the loss to the other farmer, due to this act, should be made, and after levying a surcharge equal to 100% of the loss assessed, the accused farmer should be penalized. The penalized farmer, however, should have a right to appeal to the WUF, which, in such cases, should hold an open inquiry and confirm, or may rescind, the decision of the WUO.

The SIDA act explains the Powers and Duties of the AWB under Chapter VI to this act, while it explains Powers and Duties of FOs under Chapter VII to this act. Interestingly, both these chapters are silent on this issue of water theft. However, Clause 6 of Section 26 under Part C, captioned "Functions and Powers of FO's", states that "Any other power and function not being inconsistent with the functions and powers given above which may be vested in the FO's under the By-laws and Regulations framed by the Authority". Since the FO's are responsible for obtaining water from SIDA, or the AWB, and supply the same to its members, and are also responsible to collect the agreed water charges / other dues, if any, from its members under the SIDA act. Therefore, in order to stop water theft, it is suggested that the Heran Distributary WUF obtain approval of its By-laws, with necessary clauses legalizing any actions that may be required to curb water theft.

5.6.2 Theft of Trees on the Inspection Paths

Certain areas around this distributary is supposed to be the property of the GoS, where the inspection path is also situated. Some instances of the theft of trees planted along the distributary, and besides the inspection path, have taken place in the past. Upon the transfer of this distributary to the farmers, the WUF will be responsible for safeguarding this property.

The WUF should make the *Darogha* hired for this distributary to keep a record of these trees, and to report any unauthorized cutting of trees to the AE immediately. The AE should inform the WUF, which should ask the WUO of that respective area to hold an inquiry and present its findings to the WUF. The farmer thus found guilty should be penalized for the market value of the trees, plus a fine equivalent to 100% of the market value of the trees.

5.6.3 Other Issues

The WUF should follow a strict policy of non-interference in the affairs of the WUOs. Any conflicts arising among the farmers of a watercourse should be the responsibility of the concerned WUO, and the WUF should encourage settlement of the disputes at the local level. However, the right of appeal to the WUF should be given to the farmers.

5.6.4 Honorarium to the Office Bearers of the WUO's and the WUF

The elected WUO, and WUF, office bearers will spend their time and efforts to maintain this distributary; logically, they should be compensated for their time and efforts. However, experiences in other parts of the world are different, and normally, the office bearers work on an honorary basis. The reasons may not be possible to quantify, as these are qualitative in nature. These reasons are explained as follows:

1. The office bearers have been elected, on the basis of their previous records, by the farmers, such as, their involvement and ability in the settlement of disputes, they are socially respected and have been involved in the social development of this command area, without expecting any monetary benefits in return. Hence, recognition is an incentive for these office bearers.
2. The office bearers elected have a voice in system management, i.e., feeling of importance, which is an incentive in itself.
3. The office bearers are elected from the grassroots level, if their performance is good, they can be elected as members to the AWB of the main canal also. This is another incentive for them.
4. On the basis of their performance, they can run for the parliament elections, which, to date has only been possible for people who are born with a golden spoon in their mouths.

Therefore, an honorarium to the office bearers of the WUOs and the WUF is not suggested. Furthermore, if the farmers are not satisfied with the performance of any of the office bearers, they should have the right to remove such office bearer by calling a general meeting of the concerned WUOs, or the WUF, as the case may be.

5.6.5 Equitable Distribution of Water

This is an issue, which, if not addressed properly, may result in the failure of the Farmer Organizations, and in turn, the whole financial framework in the future, despite system rehabilitation, or upgrading of physical facilities. Reduced costs to the farmers; in spite of the fact that *abiana* rates tend to increase, especially if proper O&M is undertaken; but, system transfer will reduce the need for side payments to the agency staff, resulting in a reduction in the costs of irrigation facilities. Better irrigation facilities, services, or even "voice" in system management, and most important, the ownership of the irrigation system, are very powerful incentives for the farmers to participate in the irrigation system's management and upkeep.

However, in the long run, the farmers of the Heran Distributary would certainly like to see a return to their investment of time, material and enhanced *abiana* rates in a more rational manner, which can be only in the form of an equitable water supply. The IBIS in Pakistan is not demand-based; rather, it is a supply-based irrigation system, therefore, equitable water distribution will take place only when water available at the head of the Heran Distributary is distributed among the farmers in proportion to their individual land holdings. This distribution of water will require re-sizing and re-calibration of the *moghas*, in view of the allowance of water required at the start, and end, of the *warabandi* turns. Once this water distribution issue is settled, the farmers will invest their confidence in the WUOs and the WUF.

The equitable distribution of water will result in a decrease of water supply to the farmers of this command area who have earlier been receiving water more than their share. Therefore, the WUF needs to engage specialists to train farmers in the efficient use of their water turns by changing their current irrigation methods and practices. IIMI's research in the Hasilpur, Punjab, area has revealed that by using bed-and-furrow method, instead of basin irrigation, savings in water application between 25% and 35% can be achieved, and crop yields can be enhanced by 20% to 75%.

5.7 MAINTAINING PROPER BOOKS OF ACCOUNTS

The relevant section of the SIDA act, which will be applicable to the Heran Distributary WUF upon transfer of this distributary, are as follows:

Section 27(1) The FO's, AWB and the Authority shall submit to Government as soon as possible after the end of every financial year but, before the expiry of a period of seven months of such end of the financial year a report on the conduct of their affairs for that year including audited financial statement for the year in question.

This act, under Section 22, Clauses 1, 3, 4 and 7, states that financial statements include: (1) a balance sheet; (2) income and expenditure account; and (3) a statement of changes in financial position, or statement of sources and application of funds. Furthermore, Accounting Standards of the Institute of Chartered Accountants Pakistan

(ICAP) rules will be followed, and commercial auditors will carry out audit in accordance with the professional standards of auditing, as prescribed by the ICAP.

Section 27 clearly says that the FOs will be bound to submit an audited financial statement to the GoS. However, this section is silent on the type and mechanism of these financial statements. Section 22 is applicable to the authority only, therefore, it is assumed that the FOs will be required to maintain simple accounts, and that their financial statement will only consist of a Balance Sheet and the Income and Expenditure account.

On the basis of the above, the following set of procedures is suggested for the Heran Distributary WUF and WUOs:

1. *Abiana* to be deposited by the water users to the bank account of the relevant WUOs, whereas the WUO's should deposit their share of *abiana* into the bank account of the WUF (see section 5.4 for more details).
2. Other miscellaneous cash receipts to the WUO's, or the WUF, should also be deposited into the bank on the first working day. Proper receipts be issued by the relevant Finance Secretaries *in lieu* thereof.
3. Proper receipt books and bank *challan* forms to be printed. On issue of receipts, the counterfoils also be signed by the depositors.
4. All expenses to be paid strictly by check. Only the administrative assistant hired by the WUF should be allowed petty expenses, for which a cash imprest of Rs 3,000 is suggested. The administrative assistant will settle his account on a bi-monthly basis.
5. Three office bearers are recommended as bank signatories; the Presidents, General Secretaries and Finance Secretaries. Each check will require at least two signatures before it can be honored.
6. Any expense in excess of Rs 3,000 will require the approval of all of the members of the federation, or of the relevant organization.
7. The federation will, from the portion of *abiana* kept for the O&M of this distributary, transfer any savings made in proportion, e.g., towards the cost of labor to all the WUOs, in proportion, at the end of each year. The WUOs will be free to spend these funds in a manner approved by their governing bodies.
8. Profit and Loss Saving accounts are recommended for the WUF and the WUOs.
9. The annual membership fee will be ascertained at the discretion of the WUF, and WUOs will have no claim to it. However, the WUF will ensure that the O&M costs of the lift machines, if any, are taken acre of.
10. The profit earned on these bank accounts will be at the discretion of the relevant WUOs and the WUF.

11. All invoices / bills for payment will require two signatures, and these should be kept in a separate file for the time being; later on, vouchers should be printed and these invoices / bills should be attached to them.
12. The following books of accounts are suggested for the WUO's and the WUF:
    a. Cash Book, single column; later, a cash book with bank column be introduced
    b. General Ledger
    c. Salary Register
13. A cash basis double entry book keeping system is suggested for the time being, which should be updated gradually using accrual method.
14. All kinds of receipts should be recorded on the receipt side of the cash book, and deposits into the bank account to be entered on the payment side of the cash book.
15. All expenditures to be recorded on the payment side of the cash book, while checks issued for these to be recorded on the receipt side of the cash book.
16. Cash book to be balanced on a daily basis, and cash-in-hand to be reconciled. Similarly, transactions recorded in the cash book to be posted into their ledger accounts on a daily basis.
17. A separate file containing lists of the water users and the amount of *abiana* payable to be maintained. The *challan* forms received from the bank to be reconciled with this list, and defaulters, if any, should be identified immediately. Once the Finance Secretaries become familiar with the accounting system, they should be encouraged to introduce party ledgers to keep track of members' contributions.
18. At the end of each month, the relevant Finance Secretaries should prepare bank reconciliation statements, lists of outstanding amounts and the trial balance. These documents should be discussed in the meetings, and decisions made, if any, should be implemented.

The introduction of this system will require specialized training for the Finance Secretaries. The WUF should make adequate arrangements to arrange for these training sessions, so that the Finance Secretaries are equipped to serve their respective WUOs and the WUF better, and can stand the audit queries at the end of each financial year.

5.8 PROJECTED CASH FLOWS

The following assumptions have been made in the preparation of the cash flow projections for the Heran Distributary for the next 10 years:

1. The farmers will pay Rs 10 per acre of land holding as an annual membership fee to the WUF. This rate will be revised after every two years and enhanced by Rs 5 per acre.

2. The farmers' *abiana* payable for the first year is suggested at Rs 100 per acre of land holding. The breakdown of this amount is Rs 48 towards establishment cost, and Rs 52 as Maintenance and Improvement (M&I) costs. Although it can be assumed that once the farmers are handed over the irrigation system, staff deployment will be reduced; however, it is expected that the salaries of the remaining staff will experience a sharp increase. Therefore, the salary cost of Rs 48 per acre has been inflated by 12.5% each year, while the Maintenance and Improvement cost has been inflated by 10% per year.
3. The assumption is that 10 farmers will be in default of depositing the *abiana* for a period of 10 days during the first year. Therefore, a surcharge of Rs 50 per day will be recovered from them. In the subsequent years, 6 farmers, for 10 days each per year, have been assumed in default.
4. The bank profit has been assumed at the rate of 10.5% per annum, and has been calculated as follows:
   a. Full year's profit on the previous year's closing balance.
   b. Full year's profit on the one tenth of the annual cash-inflow into the bank. Considering that abiana to the AWB will be paid bi-annually at the end of each cropping season, this assumption is considered reasonable.
5. The WUF will pay Rs 43 per acre to the AWB; Rs 17 towards the establishment cost and Rs 26 as M&I cost. As explained in 2 above, these amounts have been inflated by 12.5 % and 10%, respectively, per year.
6. Salaries to the staff hired by the WUF have been inflated by 12.5% per year.
7. Supplies and Services, WUF and office bearers' travel expenses, and / or the employed staff, Material and Machinery hired for M&I of the distributary, have been inflated by 10% each year.
8. The expectation is that only one-third of the labor cost will have to be paid by the WUF, as most of the farmers will assist with maintenance activities. This cost has also been inflated by 10% per year.
9. The WUF is expected to hire consultants to conduct different training courses for the benefit of its members. In the first two years, the estimate for this expense is high; this expense will then reduce, and is estimated at Rs 10,000 per year. During Year 6, it is expected that a major overhaul of this distributary will take place, hence, excessive consultants' services will be required.
10. Initially, the audit fee is expected at Rs 5,000; for subsequent years, this has been enhanced by Rs 1,000 per year.
11. Miscellaneous expenses include O&M of the lift machines installed, if any, and other incidental expenses. This amount is estimated at Rs 25,000 per year, and has not been inflated, except for in Year 6, when major M&I activities are expected.

12. The remaining two-thirds of the labor cost expected to be contributed by the farmers in kind. Therefore, this amount will be refunded to the WUOs in proportion to their CCA. The governing body will decide on the utilization of these amounts.
13. During the first year, certain capital items, like motorbikes, bicycles, furniture, tool kits and water measuring devices will be purchased; these items will be replaced in Year 6. During Year 3, it is assumed that the WUF will purchase a computer, printer and other accessories, and that this equipment will be replaced in Year 8.

Based on these assumptions, the projected cash flow statement for the Heran Distributary WUF, for a period of 10 years, is given in Table 48.

Furthermore, based on these cash flow projections, 10-year Income and Expenditure accounts, and the Balance Sheet that Farmer Organizations will be required to submit to the GoS annually, are given in Tables 49 and 50, respectively.

Table 48. Cash Flow Projections for Heran Distributary for a Period of 10 Years.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Particulars	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Abiana Rate per CCA acre	**100**	**111**	**124**	**138**	**154**	**172**	**191**	**212**	**236**	**263**
Receipts										
Membership fee	150730	150730	226095	226095	301460	301460	376825	376825	452190	452190
Abiana Collected	1507300	1673103	1869052	2080074	2321242	2592556	2878943	3195476	3557228	3964199
Penalties/Surcharge	5000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bank Profit	17462	22751	39243	55508	85582	126357	75363	124972	166313	234126
Cash inflow	1680492	1849584	2137390	2364677	2711284	3023373	3334131	3700273	4178731	4653515
Expenditure										
Abiana paid to AWB	648139	723504	798869	889307	994818	1100329	1220913	1356570	1507300	1673103
Salaries to staff	396000	445500	501188	563837	634317	713607	802808	903159	1016054	1143061
Supplies & Services	51600	56760	63855	71837	80817	90919	102284	115070	129454	145636
Travel	16800	18480	20328	22360	24596	27056	29762	32738	36012	39613
Material for O&M	66052	72657	79923	87915	96707	106378	117016	128718	141590	155749
Machinery rent for O&M	194192	213611	234972	258469	284316	312748	344023	378425	416268	457895
Labor 1/3 of estimated cost	43374	47711	52482	57730	63503	69853	76838	84522	92974	102271
Consultancy fees	20000	15000	10000	10000	10000	25000	10000	10000	10000	10000
Audit fee	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000
Miscellaneous expenses	25000	25000	25000	25000	25000	850000	25000	25000	25000	25000
Transferred to WUO's	86748	95423	104965	115462	127008	139709	153680	169048	185953	204548
Capital Purchase	93600	Nil	105000	Nil	Nil	99600	Nil	135000	Nil	Nil
Cash outflow	1646505	1719646	2003582	2109917	2350082	3545199	2893324	3350250	3573605	3970876
Net Cash Flow	33987	129938	133808	254760	361202	(521826)	440807	350023	605126	682639
Open. Cash&bank balance	0	33987	163925	297733	552493	913695	391869	832676	1182699	1787825
Clos. Cash & bank balance	33987	163925	297733	552493	913695	391869	832676	1182699	1787825	2470464

Table 49. Projected Income and Expenditure Accounts of Heran Distributary for a Period of 10 Years.

	Year 1 (Rs.)	Year 2 (Rs.)	Year 3 (Rs.)	Year 4 (Rs.)	Year 5 (Rs.)	Year 6 (Rs.)	Year 7 (Rs.)	Year 8 (Rs.)	Year 9 (Rs.)	Year 10 (Rs.)
Income										
Abiana Collected	1507300	1673103	1869052	2080074	2321242	2592556	2878943	3195476	3557228	3964199
Penalties/Surcharge	5000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Bank Profit	17462	22751	39243	55508	85582	126357	75363	124972	166313	234126
Profit on disposal of Assets	0	0	0	0	0	23400	0	25000	0	0
Gross Income	1529762	1698854	1911295	2138582	2409824	2745313	2957306	3348448	3726541	4201325
Expenditures										
Abiana paid to the AWB	648139	723504	798869	889307	994818	1100329	1220913	1356570	1507300	1673103
Transferred to WUO's	86748	95423	104965	115462	127008	139709	153680	169048	185953	204548
Salaries to Staff	396000	445500	501188	563837	634317	713607	802808	903159	1016054	1143061
Supplies & Services	51600	56760	63855	71837	80817	90919	102284	115070	129454	145636
Travel	16800	18480	20328	22360	24596	27056	29762	32738	36012	39613
M&I expenses	303618	333979	367377	404114	444526	488979	537877	591665	650832	715915
Consultancy fees	20000	15000	10000	10000	10000	25000	10000	10000	10000	10000
Depreciation	18720	18720	39720	39720	39720	45600	45600	56600	56600	56600
Audit fee	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000
Miscellaneous Expenses	25000	25000	25000	25000	25000	850000	25000	25000	25000	25000
Total expenses	1571625	1738366	1938302	2149637	2389802	3491199	2938924	3271850	3630205	4027476
Retained Earnings/(Loss)	(41863)	(39512)	(27007)	(11055)	20022	(745886)	18382	76598	96336	173849

Table 50. Projected Balance Sheets for Heran Distributary for a Period of 10 Years.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)	(Rs.)
Fixed Capital Expenditure										
Fixed Assets										
Motorbike	70000	70000	70000	70000	70000	91700	91700	91700	91700	91700
Bicycle	3000	3000	3000	3000	3000	3950	3950	3950	3950	3950
Furniture & Fixture	15000	15000	15000	15000	15000	19650	19650	19650	19650	19650
Field Equipment	5600	5600	5600	5600	5600	7700	7700	7700	7700	7700
Computer & Allied	0	0	105000	105000	105000	105000	105000	160000	160000	160000
Total Fixed Assets at Cost	93600	93600	198600	198600	198600	228000	228000	283000	283000	283000
Cash & Bank Balances										
Cash-in-hand	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Cash-at-Bank	30987	160925	294733	549493	910695	388869	829676	1179699	1784825	2467464
Total Cash & Bank Balance	33987	163925	297733	552493	913695	391869	832676	1182699	1787825	2470464
Total:	127587	257525	496333	751093	1112295	619869	1060676	1465699	2070825	2753464
Funds & Liabilities										
Accumulated Depreciation										
Motorbike	14000	28000	42000	56000	70000	18340	36680	55020	73360	91700
Bicycle	600	1200	1800	2400	3000	790	1580	2370	3160	3950
Furniture & Fixture	3000	6000	9000	12000	15000	3930	7860	11790	15720	19650
Field Equipment	1120	2240	3360	4480	5600	1540	3080	4620	6160	7700
Computer & Allied	0	0	21000	42000	63000	84000	105000	32000	64000	96000
Total Accum. Depreciation	18720	37440	77160	116880	156600	108600	154200	105800	162400	219000
Fund Balances										
Opening Balance	0	108867	220085	419173	634213	955695	511269	906476	1359899	1908425
Add: Membership fee	150730	150730	226095	226095	301460	301460	376825	376825	452190	452190
Less: Ret. Earnings/(Loss)	(41863)	(39512)	(27007)	(11055)	20022	(745886)	18382	76598	96336	173849
Total Fund Balance	108867	220085	419173	634213	955695	511269	906476	1359899	1908425	2534464
Total:	127587	257525	496333	751093	1112295	619869	1060676	1465699	2070825	2753464

HERAN DISTRIBUTARY WATER USERS FEDERATION

Accounting Policies

A summary of the more important accounting policies is set out below:

1. **Basis of Accounting**

   Accounts are prepared on the cash basis of accounting whereby the transactions are recorded on the dates when the assets were paid for, the liabilities were discharged and contributions from the members were actually received.

2. **Inventories**

   The cost of consumable stores purchased is charged to the Income and Expenditure Account in the year of purchase. The value of any inventory in hand at the year-end is therefore, not recognized in the accounts.

3. **Fixed Assets**

   All tangible assets of Rs. 3,000 or over in value and 3 years or over in life are capitalized as Fixed Assets.

   Fixed Assets are depreciated on the straight-line basis at 20% on cost, which is considered by the management to be appropriate to write off the cost of the respective assets over their useful lives to the Federation. Full year's depreciation is charged in the year of purchase and no depreciation is charged in the year of disposal.

6 SUMMARY OF MAIN FINDINGS

6.1 SOCIO-ECONOMIC SETUP

The population of the Heran Distributary amounts to about 25,000. A number of castes reside in this command area, of which 12 are deemed as having a noticeable effect on socio-economic relations, as well as the power balance. The majority of the people are retired army personnel, and most of the land in the command area of the Heran Distributary is cultivated by the landowners themselves. The average landownership in this area is 16 acres. The literacy rate among owner-cultivators is above 60%. The farmers follow a *pacci warabandi* (fixed water turn) schedule. This area is primarily a cotton zone, although sugarcane is also very commonly sown by the farmers.

All the villages have been well planned and constructed. Metallic roads are linked to the main roads, hence, farmers experience hardly any transportation problems. The villages in this command area have access to electricity and a sewerage system, and 5 out of the 15 villages have access to telephones. Schools (for both, girls and boys) up to the secondary level are also available, and two basic health centers, as well as Fauji Foundation mobile medical vans, provide regular health facilities.

Therefore, the socio-economic conditions within this area can be considered comparable with that of people living in the suburbs of large cities.

6.2 GENDER

A considerable number of women participate in agriculture work and perform almost every farming operation, except irrigating the fields and ploughing. Their role in decision-making and managing household resources is almost non-existent.

The role of women in livestock and poultry management should be strengthened, which would enable them to supplement family income and nutrition.

6.3 CREDIT FACILITIES

Loans and credit facilities are provided through the Agricultural Development Bank of Pakistan, and farmers in this command area avail the benefits of this facility.

6.4 DRAINAGE INFRASTRUCTURE

The water table depth from the surface, on average, ranges between 2.06 ft and 2.83 ft, hence, this command area may be termed as waterlogged. Two types of drainage facilities have been installed in this command area; surface drains and saline tubewells. However, tubewells are not operational due to the lack of electricity. Therefore, the need to make this drainage network operational does exist.

6.5 TAX COLLECTION AND ASSESSMENT PROCEDURES

The *abiana* payable, calculated in this report for the *Rabi* 96-97 and *kharif* 97 seasons, comes to Rs. 82 per acre. The average *abiana* assessed during the previous 5 years, as per the Revenue Department's records, is Rs. 22 per acre, while *abiana* assessed in 95-96 was Rs. 28 per acre; the *abiana* recovery rate is in the range of 63% to 65% of the assessed amount. Certainly, the present procedures cannot be termed as effective.

The Revenue Department's records indicate that their survey crop intensity of the command area is between 80% and 82%, i.e., equivalent to the design cropped intensity., whereas, in actuality, the crop intensity is 121%.

6.6 IRRIGATION DEPARTMENT RECORDS

During the field surveys it was noted that the names of certain landowners who have died are still appearing in the records of the Irrigation Department. Hence, there is a need to update the records of the Irrigation Department.

After the installation of the drainage network, the Irrigation Department's maps of the Heran Distributary have not been updated. The Irrigation Department should take steps to modify these maps.

6.7 WATERLOGGED, SALINIZED AND ABANDONED TRACTS OF LAND

The farmers consider tracts of land with groundwater standing on the surface as waterlogged (870 acres), tracts of land on which white layers of salts are visible as salinized (1,673 acres) and tracts of land with sand dunes, as abandoned (1,802 acres). The effect of waterlogging and salinity on the soil is unknown. Therefore, a comprehensive survey of these tracts of land should be undertaken in order to determine the extent of waterlogged and salinized areas, and to propose remedial measures that can be taken to reclaim these tracts of land. With a drainage network already in place, the answer probably lies in the availability of additional water to leach the salts from the soil profile of the affected lands.

The installation of saline tubewells and surface drains can control waterlogging, but soil salinity remains a problem, and in a few instances, sodicity is a main concern, which needs chemical amendments and leaching for reclamation. This means that a hydrological approach alone is insufficient for effective control of salinity, along with waterlogging. For this purpose, the farmers should be imparted awareness about employing chemical amendments like gypsum, or treatment of irrigation water with sulfuric acid and biological (e.g. salt tolerant crops) techniques and leaching requirements to reclaim salt-affected lands, besides lowering the water table through training measures.

Assuming the present cropping pattern, the estimated loss in net agriculture revenue to this distributary due to waterlogging, salinity and abandoned lands, is Rs. 29.13 million per annum.

6.8 CROP YIELDS

The crop yields for wheat and sugarcane for the *rabi* 96/97 and *kharif* 97 are better than the average yields for the same crops of Pakistan. The yield for cotton is on the lower side. The survey reveals that the crop yields of the five major crops among 30 watercourses vary between 1.5 and 5 times, and that about 35% of the watercourses have yields less than the mean yield of this distributary. One factor is attributed to high water tables and operational problems of the drainage network, and certainly, efficient cultural, agronomic and irrigation practices can also bridge this difference.

6.9 GROSS AGRICULTURE REVENUE

The gross agriculture revenue of the Heran Distributary is Rs. 10,396 per acre. When compared with all Pakistan figures (Rs. 3,644 per acre), the LBOD baseline figures (Rs. 5,263 per care) seem to be on the higher side. Various IIMI surveys have concluded gross revenue in the range of Rs. 3,240 to Rs. 10,120 per acre, therefore, the mean gross agriculture revenue for this distributary canal indicates that the incomes of farmers are very reasonable.

6.10 NET REVENUE FROM CROPS

Return on investment from sugarcane, which is an annual crop, is the highest (Rs. 9,933 per acre). The combination of cotton and wheat, both of which are seasonal crops, yield a lower agriculture income when compared with that of sugarcane.

6.11 NET AGRICULTURE INCOME

The farmers of the Heran Distributary earn a mean farm agriculture income, after taxes, of Rs. 6,705 per cropped acre, or Rs. 4,095 per CCA. The cost of agriculture land in this area was estimated at Rs. 75,000 per acre, thus, return on investment after taxes is 8.94% (6,705/75,000). This percentage is far better than investing this amount in a fixed deposit scheme, which generates an interest rate of 17.5%; however, after considering the time value of money and taxes, this drops to 2.44%.

The net to gross income percentage is 39.39%, which is very good and better than the small and medium-scale business concerns in the cities, where percentages vary between 25 and30%. Considering that the socio-economic conditions of this distributary are comparable with that of suburban areas in the big cities (see Section 6.1.1), farmers residing in this command area can be considered as comfortably placed.

6.12 EXPENDITURE ON THE PROVINCIAL IRRIGATION DEPARTMENT

The GoS spends a total of Rs. 1,236.691 million (Rs. 93.73 per acre) on the Provincial Irrigation Department, out of which 71% (Rs. 66.16 per acre) is spent on the irrigation establishment, while the rest i.e., 29% (Rs. 27.57 per acre) is spent on maintenance activities.

In 1986, NESPAK prepared a Maintenance Yardstick for the Irrigation Department, which, when updated to 1996-97 price levels, requires Rs. 924.96 million (Rs. 68 per acre) per annum for maintenance activities. In IIMI's opinion, these figures are a minimum level.

To maintain an irrigation infrastructure that would meet the system adequately, so that the design service can be given on an ongoing basis, the total O&M cost comes to Rs. 134.16 per acre. This consists of Rs. 66.16 per acre as establishment cost and Rs. 68 per acre as maintenance and improvement cost. Hence, the Irrigation Department will underspend by 59% on the maintenance activities during the year 1997-98.

6.13 SIDA ACT

On September 15, 1997, the Sindh Assembly passed a bill to provide for the establishment of the Irrigation and Drainage Authority (SIDA), which is meant to ensure the equitable distribution of irrigation water. Coupled with effective drainage and flood control on a long-term and sustainable basis through the participation of beneficiaries in the operation and management of the irrigation drainage network to provide for matters connected therewith or incidental thereto, the salient features of this act are as follows:

- SIDA will supply water to the AWB at rates that would meet the O&M cost of the system within a period of 7 to 10 years.
- The components of O&M to be recovered from farmers in the form of *abiana* shall be the full cost of Irrigation Canals and Secondary Canals.
- FOs shall collect water charges from its members, as well as for the supply of irrigation water to the concerned AWB or SIDA.
- FOs may hire, engage or employ any consultants, advisors and employees as may be deemed necessary for the due and effective performance of various powers and functions.
- FOs shall submit to government within a period of 7 months, at the end of each financial year, a conduct report and financial statement for the year in question.

6.14 *ABIANA* MECHANISM

Of the three mechanisms in practice, namely: (1) crop-based charge; (2) volumetric charge; and (3) flat rate charge, the simple mechanism of charging a flat rate is suggested. The success of this method will depend on the equitable distribution of water among the water users.

6.15 STAFFING REQUIREMENTS OF THE DISTRITURARY

The following set of employees is suggested for the Heran Distributary WUF in the initial stages:

Assistant Engineer	1	Administrative Assistant	1	
Darogha	1	*Tandail*		2
Baildars	4			

Based on the above-stated staff and their logistic needs, the operational budget estimate for the first year comes to Rs. 0.474 million (Rs. 31.47 per acre). This amount has been considered as an upstream establishment cost for the Heran Distributary.

6.16 MAINTENANCE COSTS OF THE DISTRIBUTARY

The maintenance costs of this distributary are estimated at Rs. 0.390 million (Rs. 25.90 per acre) per annum. These estimates are based on the maintenance surveys conducted by the IIMI-field staff. This amount has been considered as A downstream maintenance cost for the Heran Distributary.

6.17 SUGGESTED *ABIANA*

The estimated total O&M cost comes to Rs. 134.16 per acre for the Sindh Provincial Irrigation Department. The water consumed for non-agricultural purposes is about 9.17% of the water available for consumption to the province of Sindh (see Chapter 4 for details). As the non-agricultural use of water generates high economic returns, therefore, it has been assumed that this use be charged twice the rate for agricultural purposes. Thus, the cost of water to the farmers comes to Rs. 108 per acre. Considering the experiences in Mexico and Senegal, where staff employment was reduced upon transfer of the irrigation system to the farmers, a flat rate of Rs. 100 per acre (est. Rs. 48 and maint. Rs. 52) is suggested as the rate of *abiana* to be charged to the farmers.

The FOs will retain Rs. 57 per acre (est. Rs. 31 and maint. Rs. 26) as a downstream cost, while they will pay the AWB Rs. 43 per acre as an upstream cost.

In order to meet the O&M costs in future, an increase of 10.25% in the rate of *abiana* is suggested per annum.

In addition to *abiana*, the farmers will pay the federation an annual membership fee of Rs. 10 per acre. This fee will subsequently be increased by Rs. 5 per acre after every two years.

6.18 COLLECTION AND PAYMENT OF *ABIANA*

The same two-tier-system principle should be adopted, which has been used to organize the farmers of this canal command, and *abiana* should be collected from members by the relevant WUOs, then deposited with the WUF. The *abiana* should be collected in advance, at the start of each cropping season. The WUF should deposit *abiana* to the AWB at the end of each cropping season. This is in line with the current practice, whereby the assessment and collection of *abiana* takes place at the end of each cropping season.

The farmers should deposit their share of *abiana* into the bank, and the relevant Finance Secretaries should issue bank forms in triplicate and in advance.

A certain time limit should be given to the farmers for depositing this amount; a period of 10 days is suggested. Failing to meet this deadline will result in a penalty of Rs 50 per day per acre.

6.19 CONFLICT RESOLUTION

The WUF should follow a strict policy of non-interference into the affairs of the WUOs and should encourage settling disputes at the level of the concerned WUOs. However, the farmers should have a right to appeal to the WUF. Water theft should be taken seriously, as it means breach of trust. Based on the experiences in Chile, it is suggested that the WUF insert necessary clauses in its by-laws, so that it has the legal cover to settle these issues. Thus, aggrieved farmers would not have to waste their time and money by seeking justice through the police and judicial system.

6.20 HONORARIUM TO OFFICE BEARERS

The recognition and feeling of being important, as well as their chances of running for parliament and AWB membership on good performance are considered very strong qualitative incentives as returns to their investment of time and effort. Therefore, an honorarium to the office bearers of the farmer organizations is not suggested.

6.21 EQUITY IN WATER DISTRIBUTION

In the long run, it will be difficult to satisfy the majority of farmers with incentives like system rehabilitation, reduced costs by exterminating side payments to the agency staff, or even "voice" in system management and ownership of the irrigation system, or by keeping them occupied in various activities. They would certainly like to see a return to their investment of time, material and enhanced *abiana* rates in a more rational and tangible form. Better and equitable water supply will satisfy the majority and can transform these FOs into sustainable organizations that guarantee the success of a business plan.

The IBIS in Pakistan is not demand-based, rather, it is a supply-based irrigation system, therefore, equitable water distribution will take place only when water available at the head of the Heran Distributary is distributed among the farmers in proportion to their individual land holdings. This distribution of water will require re-sizing and re-calibration of the *moghas* (modules or outlets), in view of the allowance of water required at the start and at the end, of their *warabandi* turns.

6.22 BOOKS OF ACCOUNTS AND INFORMATION THESE CAN PROVIDE

Initially, a double entry bookkeeping system, consisting of one single column cashbook and a ledger on a cash basis, is suggested. All transactions should be routed through the bank, and cash transactions should not take place for any reason, except for an imprest to be kept with the administrative assistant of the WUF. Checks should require at least two signatories, and proper supporting documents for expenditures incurred should be kept.

The relevant Finance Secretaries should balance their books of accounts and draw trial balances at the end of each month. They should present accounts reports consisting of the position of the cash imprest and cash-at-bank, recoveries in default, collection of receipts and expenditure incurred during the period.

The projected cash-flow statement, income and expenditure account, and the balance sheet for a period of 10 years, have been prepared and are contained under Section 5.8 of this report.

The projected income and expenditure accounts reveal that each year the Heran Distributary WUF, on average, will incur a loss of Rs. 48,014. Therefore, in the near future, it will not be possible to levy income tax on this federation. The federation will cover this loss by collecting membership fees.

The cash flow projection statements give a good liquidity position of this federation over a period of 10 years. The farmers will be able to finance the expected major overhaul of the irrigation infrastructure of their distributary by incurring an estimated cost of Rs. 850,000 in Year 6.

6.23 COST BENEFIT ANALYSIS

The arguments below are to indicate that it is not possible to quantify the benefits of transfer of the irrigation management to the farmers. Further, an alternative approach and likely benefits arising thereto are discussed below.

6.23.1 Review of Available Literature

The main justification for transfer of irrigation management to farmer organizations appears to be to reduce the cost of irrigation management to the

government. Agency budget stringency has contributed to this movement, as well as the belief that farmers organizations can manage irrigation systems better, at least at the lower levels ("Impacts of Irrigation Management Transfer: A Review of the Evidence" by Douglas Vermillion, Research Report No. 11, IIMI, 1997).

In order, to evaluate the success, or failure, of irrigation management properly, researchers need a measure of irrigation performance. Unfortunately, there is not a single agreed-upon standard measure of irrigation performance. Not only does it depend on the perspective of the viewer, but also on the importance of certain variables in the context. "Success" to a farmer may mean reducing the cost of water while maintaining a certain level of service.

One[3] researcher has used adequacy of water supply, level of system maintenance and degree of rule conformance among cultivators. Another[4] used cropping intensity, status of infrastructure, and water availability (Herb Blank, Paper presented in the National Workshop on South Africa Water Law).

As a result of management transfer, increase in fee collection is often observed. Farmer organizations become more involved in making financial decisions, farmers get more voice in determining expenditures, and often there is more transparency in financial matters. The available evidence shows that where there is a subsidy, turnover increases cost to farmers (Dr. Vermillion).

Therefore, in the short run, it may not be possible to quantify the benefits of getting farmers organized. However, the GoS appears to benefit in economic terms as a result of management transfer; the *abiana* recovered from the Heran Distributary during the year 1996/97 was Rs. 27.52 per acre, while the estimated *abiana* suggested in this report comes to Rs. 100 per acre. Hence, the expenditure by the GoS on Non-development Budget (NDB) may be reduced by about Rs. 0.793 million, thus, in turn, reducing the overall budgetary deficit.

6.23.2 A Possible Alternative Approach

The authors believe that the benefits to the farmers as a result of management transfer are more likely possible to quantify in the arena of water resource management, especially when seen in the context of a worldwide concern for the sustainability of natural water resources. Also, emphasis has come on more efficient use of these

[3] "Institutions and Collective Action: Self-governance in Irrigation" by Shui Yan Tang. San Francisco, California, USA: Institute for Contemporary Studies Press, 1992

[4] "Institutions, Incentives and Irrigation in Nepal by Paul Benjamin, Wai Fung Lam, Elinor Ostrom, and Ganesh Shivakoti. Decentralization, Finance and Management Project, Burlington, Vermont, USA, Associates in Rural Development, 1994

resources[5]. To elaborate further, a few paragraphs from the World Bank Operations Evaluation Study are reproduced as follows:

The World Bank is encouraging *Water Resource Management* because it is widely believed that Farmers and irrigation-system operators will be facing more and more competition in the future for water from aquifers, streams, and lakes. Irrigators account for at least 70 percent of the water withdrawn from these sources today, but water almost invariably has a higher marginal value product for competing users, especially people who drink it and wash with it, and power companies that use it to generate electricity. Competition for water is already intense in the Middle East, in Central Asia, in North Africa, in growing parts of South, Southeast, and East Asia, and in Europe, and in western South and Meso-America.

Meanwhile, prospective sources of new irrigation water are becoming fewer. In general, the best dam and pumping sites have already been developed. Prospective sites for new dams, weirs, and pumps have become less attractive in economic terms. This means that larger dam and longer canals are needed per unit of water and per unit of land irrigated. Deeper drilling for pumping over greater vertical distances also becomes necessary. Like plant breeding and fertilizer use, irrigation faces the law of diminishing returns. At the same time, prices of foods and fibers that agriculture helps to produce are at historic lows.

This new environment is considerably different from that of the 1960s and early 1970s. Therefore, *future emphasis should be on upgrading existing irrigation,* a process that uses engineering and social science intensively to improve irrigation service to people, lower unit costs, and conserve water where it is scarce.

This does not mean simply rehabilitating irrigation systems to standards designed for an environment that no longer exists. This approach recognizes that irrigation serves a changing world. This growing emphasis, a challenge for engineers, agriculturists, economists, and other social scientists, is consistent with the thrust of the *Water Resources Management Policy Paper* (William I. Jones, The World Bank and Irrigation, A World Bank Operations Evaluation Study).

6.23.3 Findings of Alternative Approach

Having organized the farmers, management transfer is not the end product; rather it is the start of a new era. The farmers should learn about the strength of being organized, and how they can use it to their benefit. Many constraints remain within the farming system, e.g., lack of proper farm machinery, lack of good and timely availability

[5] "Personal Communication", Ineke M. Kalwij

of seed, fertilizers and pesticides, lack of agricultural produce storage facilities, and most important of all, efficient management of now-becoming scarce water resources[6].

Studies show that there tends to be a greater intensification of production after turnover (Dr. Vermillion). Based on this finding, a hypothesis was made; after having achieved equity (Section 6.22) the farmers, especially those whose water duty will be reduced, are likely to look for more efficient cultural, agronomic and irrigation management practices in order to retain their agriculture incomes to the present levels.

Research conducted in IIMI has revealed that by using improved methods of irrigation for the cotton crop, between 15% and 30% water application savings can be achieved. Hence, a farmer can irrigate more land during his *warabandi* turn, and crop yields may increase by 10% to 20% (some studies have shown 40% to 60%). Furthermore, for wheat, fodder and oil-seed, a corrugation (furrow) method of irrigation is expected to increase crop yields by 5% to 15%, and savings in water application is possible between 10% to 20%.

Although these are interim results, the research is continuing, and final recommendations will take some time. Considering the importance of water resource management in the post-equity period due to the reasons stated in the previous paragraphs, certain calculations based on these interim results were made. To be on a conservative side, percentage increases in yield, and more land irrigated due to savings made in the water application, are taken as the starting point of the given ranges. The results of these computations are given in Table 55.

Table 51. Expected Increase in Net Agriculture Income by Adopting Improved Water Management Techniques.

Particulars	Sugarcane	Cotton	Wheat	Fodder	Rice	Total
Total Cropped Land (acres)	1,092.83	5,714.75	5,390.00	1,501.50	423.73	--
Mean Yield per acre (kgs.)	25,469.33	621.71	1,042.50	2,607.41	1,527.27	--
Net Income before Tax per kgs. (Rs)	0.39	9.19	1.94	(0.35)	1.40	--
Net Income of Distributary (Rs)	10'855,122.68	32,651,309.27	10,901,005.50	(1,370,259.14)	906,010.16	53,943,188.47
Projected Cropped Land (acres)	1,202.11	6,571.96	5,229.00	1,651.65	466.10	
Projected Mean Yield per acre (Kgs.)	26,742,80	683.88	1,094.63	2,737.78	1,603.63	
Net Income before Tax per kgs. (Rs)	0.39	9.19	1.94	(0.35)	1.40	
Projected Net Income of Distributary (Rs)	12,537,637.05	41,303,830.12	12,590,718.86	(1,582,649.02)	1,046,432.72	65,895,969.73
Increase in Net Income (Rs.)	1,682,514.37	8,652,520.85	1,689,713.36	(212,389.88)	140,422.56	11,952,781.26
Increase in Income per CCA acre (Rs)	111.62	574.04	112.10	(14.09)	9.32	792.99

The following assumptions have been made for the above calculations:

- Cotton cropped area will increase by 15%, while cotton yield will increase by 10%: the net revenue per acre has been kept at the current level.
- For other crops in this table, area cropped has been increased by 10 %, while yields have been increased by 5%; net revenues remain unchanged from the current price level.

[6] "Personal Communication", Ineke M. Kalwij

Next >>

- Orchards, sugarcane and vegetable crops have not been considered in these computations.

Thus, by evolving improvements in on-farm water management, the Heran Distributary WUF may increase the mean agriculture income of the farmers of this command area by Rs. 793 per acre.

Similarly, arrangements for proper farm machinery, good and timely availability of seed, fertilizers and pesticides will result in the practice of intensive agriculture[7]. This area needs more data to calculate the change in the level of the agriculture incomes of the farmers, and may be considered during the preparation of the interim business plan.

Farmers lose a considerable amount of their revenues to the grain market agents. This happens around the world, and seemingly, farmers cannot get out of this circle. The Heran Distributary WUF can maximize the profits of its members by constructing storage facilities. Although agents will remain involved, the farmers will be able to obtain higher prices for their produce by selling them in the off-agriculture season. This area also needs more data to calculate change in the level of the agriculture incomes of the farmers.

Environmental Sustainability is another area in which the impact of the Heran Distributary WUF needs to be evaluated. "Only a few studies refer to impacts of management transfer on the environment. The problems that have been mentioned, for example, are waterlogging and salinization due to poor management practices of new and inexperienced managers hired by farmer associations" (Dr. Vermillion).

In Pakistan, at the turn of the century, the groundwater was usually more than 20 meters (62 feet) below the ground surface. Today, about 40 percent of the irrigated land has a groundwater table within 1.8 meters (10 feet) of the ground surface, with half of this land having the water table within 6 feet of the ground (WAPDA 1994).

In the Heran Distributary command area, the average groundwater table depth from the surface is within 2.5 feet. A drainage network is installed, but is not in working condition. The SIDA act speaks of recovery of full O&M costs of the irrigation and drainage network from the farmers. By using the installed drainage network with reasonable care, certainly the farmers can enhance the life of this network, which will result in the distribution of its capital cost over a period of more years, thus, reducing the annual burden on the farmers.

[7] "Personal Communication", Prof. Gaylord V. Skogerboe

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ANNEXURES

Heran Distributary, Sanghar
Gross Agriculture Revenue
For Kharif 1997

Yield per Acre (in Mounds)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	13.00	14.00	17.00	16.00	12.50	15.00	12.00	17.50	17.00	12.00	15.00	18.00	20.00	10.00	19.00	20.00	18.00	17.00	9.29	18.00	18.00	15.00	12.00	12.00	14.00	9.00	25.00	15.00	16.00	19.00	15.34
Sugarcane	636.73	400.00	600.00	636.73	600.00	700.00	636.73	800.00	600.00	480.00	636.73	700.00	800.00	636.73	571.00	600.00	700.00	636.73	636.73	700.00	636.73	500.00	600.00	636.73	636.73	636.73	636.73	636.73	636.73	636.73	636.73
Rice	35.00	25.00	45.00	38.18	38.18	38.18	25.00	38.18	38.18	38.18	38.18	38.18	40.00	40.00	50.00	40.00	38.18	38.18	38.18	40.00	38.18	40.00	40.00	38.18	38.18	38.18	38.18	38.18	38.18	38.18	38.18
Mango	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	100.00	95.00	95.00	90.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00	95.00
Lemon	60.00	60.00	60.00	60.00	60.00	60.00	60.00	110.00	60.00	60.00	60.00	60.00	10.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	80.00	60.00	60.00
Guava	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
Bhar	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00	80.00
Chilies	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	60.00	20.00	40.00	40.00
Vegetable Other	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	45.00	38.33	50.00	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	38.33	20.00	38.33	38.33	38.33
Fodder	60.00	55.00	65.00	65.19	82.00	65.00	70.00	60.00	75.00	70.00	65.00	80.00	60.00	50.00	80.00	80.00	75.00	65.19	70.00	60.00	65.19	50.00	60.00	60.00	60.00	50.00	60.00	50.00	88.00	80.00	65.19
Oil Seeds	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Wheat	25.00	30.00	26.06	19.00	26.06	19.00	26.06	26.06	26.06	26.06	26.06	26.06	30.00	20.00	26.00	26.06	35.00	26.06	28.00	34.00	26.06	22.00	30.00	26.06	26.06	26.06	30.00	30.00	19.00	18.00	26.06
Orchard other	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00

Farmgate Price per Mound (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	866.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	786.47	836.47	786.47	866.47	786.47	786.47	786.47	782.8033333
Sugarcane	32.45	30.45	35.45	32.45	37.45	31.45	32.45	31.45	29.45	31.45	32.45	31.45	31.45	32.45	31.45	31.45	36.45	32.45	32.45	33.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45	32.45
Rice	144.39	144.39	154.39	150.75	150.75	150.75	144.39	150.75	150.75	150.75	150.75	150.75	144.39	154.39	154.39	194.39	150.75	150.75	150.75	154.39	150.75	154.39	114.39	150.75	150.75	150.75	150.75	150.75	150.75	150.75	150.7536364
Mango	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	304.75	294.75	294.75	284.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75	294.75
Lemon	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75	384.75
Guava	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75	288.75
Bhar	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75	134.75
Chilies	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	241.75	191.75	291.75	241.75	241.75
Vegetable Other	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	29.08	115.08	23.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	115.08	293.08	115.08	115.08	115.08
Fodder	28.43	20.43	35.43	26.24	30.43	23.43	31.43	20.43	29.43	30.43	30.43	25.43	20.43	25.43	30.43	31.43	25.43	26.24	25.43	35.43	26.24	20.43	35.43	20.43	25.43	30.43	25.43	23.43	15.43	15.43	26.24461401
Oil Seeds	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.60	684.6
Wheat	244.75	244.75	231.22	194.75	231.22	244.75	231.22	231.22	231.22	231.22	231.22	231.22	244.75	254.75	254.75	231.22	254.75	231.22	244.75	244.75	231.22	254.75	244.75	231.22	231.22	231.22	254.75	254.75	244.75	254.75	239.1029412
Orchard other	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75	194.75

Area Cultivated for Kharif 1997 (in Acres)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	150.75	387.90	156.25	70.28	107.80	194.33	283.30	189.88	366.28	239.90	272.48	194.28	87.00	8.33	222.65	348.13	136.83	235.55	318.35	113.15	174.43	70.98	209.63	113.20	83.75	164.88	210.55	229.43	247.50	129.25
Rice	46.20	6.00	27.73	74.18	11.75	-	1.50	6.00	-	-	-	2.00	15.08	35.15	9.78	26.43	20.50	5.00	12.73	21.55	40.68	6.00	40.00	4.50	9.00	-	1.00	1.00	-	-
Sugarcane	61.15	54.33	37.75	87.03	30.75	26.00	41.38	67.50	8.25	16.00	15.60	12.78	11.60	6.45	43.08	196.18	28.50	16.45	35.30	81.38	95.55	13.63	91.33	10.00	1.00	7.00	-	6.00	-	-
Orchard	12.25	17.50	3.05	2.95	12.98	38.73	7.38	41.48	140.28	75.00	94.65	68.43	14.00	-	65.43	18.75	12.35	6.63	2.50	1.15	0.60	4.00	13.38	17.00	-	3.00	1.00	76.68	38.00	-
Vegetable	3.00	1.00	1.00	-	-	8.00	0.25	1.00	33.45	13.00	3.75	9.35	0.63	-	0.05	2.50	-	-	0.50	1.00	1.00	2.13	10.63	-	-	-	-	9.38	2.00	0.50
Oil seed	3.25	19.75	1.55	0.50	1.25	7.78	6.00	1.00	2.25	5.50	5.25	4.38	-	-	-	2.28	1.00	2.25	1.00	0.88	0.75	25.25	21.88	-	-	2.00	-	-	-	-
Fodder	56.55	104.26	54.85	40.00	31.88	69.73	74.85	78.88	102.70	58.10	64.30	67.80	15.33	14.25	38.98	99.18	32.75	56.55	94.80	45.68	64.40	17.38	69.00	27.50	10.50	31.75	13.38	24.63	37.50	14.50

Gross Agriculture Revenue for Kharif 1997 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	1,541,285	4,271,004	2,075,001	884,307	1,059,760	2,292,462	2,673,683	2,613,292	4,772,860	2,264,090	3,777,463	2,750,246	1,368,458	65,474	3,323,549	5,475,797	1,922,801	3,149,301	2,324,800	1,601,803	2,469,241	837,296	1,977,422	1,068,341	940,761	1,167,023	4,560,601	2,706,538	3,114,421	1,931,374	71,623,221
Rice	233,478	21,658	192,621	426,885	67,634	-	5,415	34,536	-	-	-	11,512	87,067	217,072	79,454	205,470	117,999	28,780	73,246	133,884	234,127	37,054	183,024	25,902	51,804	-	5,756	5,756	-	-	2,475,410
Sugarcane	1,896,961	961,879	862,943	1,798,110	690,053	572,390	854,690	1,694,309	110,438	241,536	322,327	281,242	289,340	133,270	773,938	5,011,243	707,228	339,890	728,368	1,905,286	1,974,284	221,066	1,778,698	206,620	20,662	144,634	-	123,972	-	-	23,650,248
Orchard	209,764	287,303	64,429	59,643	347,177	612,076	141,599	1,216,537	3,240,093	2,055,486	1,440,328	234,364	-	1,017,896	372,924	199,216	115,257	61,803	29,581	4,617	91,864	262,709	1,024,237	556,708	-	78,003	8,005	2,353,834	834,284	-	17,612,748
Vegetable	13,234	4,411	4,411	-	-	35,291	1,103	4,411	43,773	57,348	4,328	41,247	2,757	-	221	11,029	-	-	2,206	4,411	4,411	9,374	46,871	-	-	-	-	54,053	8,823	2,206	356,818
Chillies & Oil seed	8,900	54,083	4,245	1,369	3,423	21,291	13,892	2,736	6,161	15,061	14,377	11,961	-	-	-	6,230	2,738	6,161	2,738	2,396	2,054	69,145	59,903	-	-	5,477	-	-	-	-	314,163
Fodder	71,903	117,141	106,883	66,431	79,336	90,950	164,237	86,685	226,005	123,739	127,182	137,523	18,785	18,119	106,741	249,366	62,462	96,744	168,753	97,096	110,174	17,748	146,680	33,710	16,021	48,308	20,400	26,848	39,347	20,136	2,710,372
Total	3,125,431	5,617,370	3,251,222	3,236,815	2,146,491	3,624,460	3,854,519	5,664,361	8,399,700	4,757,200	5,686,004	3,466,917	1,766,407	1,451,831	4,654,432	11,158,351	2,928,485	3,682,480	3,330,883	3,748,804	4,885,265	1,454,391	5,116,235	1,891,348	1,069,248	1,433,445	4,595,130	5,275,901	4,996,875	1,953,716	118,142,975

Gross Agriculture Revenue
For Rabi 1996-97

Area Cultivated for Rabi 1996-97 (in Acres)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	121.0	318.0	187.0	131.0	80.0	151.0	425.0	115.0	241.0	220.0	352.0	161.0	83.0	35.0	141.0	322.0	187.0	217.5	330.0	123.0	207.0	81.0	174.5	122.0	87.0	152.0	152.0	175.0	213.0	77.0	5,390.0
Fodder	32.5	41.0	26.0	30.0	30.0	41.0	54.0	60.0	49.0	62.0	77.0	38.0	23.0	4.0	20.0	80.0	31.0	39.5	63.0	30.0	46.0	14.0	36.5	16.0	19.0	49.0	19.0	43.0	29.0	39.0	1,138.5
Orchard	3.0	19.0	3.0	2.0	-	34.0	14.0	-	89.0	51.0	72.0	50.0	-	6.0	7.0	-	-	6.0	-	3.0	4.0	-	-	-	-	-	-	102.0	42.0	26.0	533.0
Vegetable	26.5	6.0	13.0	7.0	8.0	-	88.0	17.0	25.0	84.0	33.0	7.0	11.0	-	17.5	93.0	35.0	10.5	4.0	7.0	13.0	22.0	40.5	-	-	1.0	15.0	18.0	12.0	14.0	666.0

Gross Agriculture Revenue for Rabi 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	740,369	2,334,915	1,126,897	484,733	482,893	782,186	2,567,133	693,811	1,452,311	1,373,971	2,121,216	970,216	609,428	178,325	1,003,783	1,940,432	1,667,338	1,310,896	2,261,490	1,023,545	1,247,421	453,865	1,281,266	735,195	524,274	915,800	1,161,660	1,337,430	990,983	353,884	34,846,874
Fodder	41,324	46,070	30,083	61,560	74,854	62,441	118,805	73,348	108,195	110,765	132,302	77,367	28,193	3,886	84,774	201,192	99,129	67,578	112,146	83,774	78,606	14,301	77,503	22,004	27,464	74,854	28,990	30,375	39,428	84,190	2,028,277
Vegetable	116,907	26,480	57,348	30,880	38,291	-	388,293	74,984	32,719	247,038	38,082	30,880	48,523	-	77,288	410,290	154,299	46,320	17,646	30,880	57,340	97,051	178,862	-	-	4,419	66,171	155,500	52,937	61,780	2,487,870
Total	898,595	2,407,453	1,234,810	577,200	592,344	784,629	3,074,164	841,333	1,593,101	1,731,774	2,311,802	1,078,463	686,146	183,411	1,137,737	2,551,844	1,800,063	1,424,591	2,391,282	1,118,199	1,383,484	565,316	1,537,520	757,250	531,743	994,845	1,256,821	1,483,321	1,073,868	499,902	39,363,030

Annexure 2

Heran Distributary, Sanghar
Gross Agriculture Revenue
For the Year 1996-97

Gross Agriculture Revenue for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	19R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton (Kharif)	1,841,285	4,271,204	2,075,891	884,307	1,858,788	2,292,462	2,673,683	2,613,292	4,772,860	2,264,080	3,777,463	2,750,246	1,368,456	65,474	3,325,549	5,475,797	1,922,801	3,149,301	2,324,890	1,901,803	2,469,241	837,296	1,977,422	1,048,341	980,761	1,187,023	4,580,681	2,706,838	3,114,421	1,931,374	71,232,221
Rice (Kharif)	233,479	21,659	192,821	426,958	67,634	-	5,415	34,536	-	-	-	11,512	87,067	217,072	75,458	205,479	117,999	26,780	73,246	133,084	234,127	37,054	183,024	25,902	51,804	-	5,796	5,796	-	-	2,478,419
Sugarcane (Kharif)	1,096,861	661,679	802,843	1,796,119	890,953	572,380	854,890	1,898,300	110,438	241,536	322,327	281,242	289,340	133,270	773,539	5,011,243	707,228	339,890	729,368	1,805,396	1,974,254	221,086	1,778,098	206,620	20,662	144,634	-	123,972	-	-	23,456,248
Orchard (Kharif)	208,762	267,393	64,429	59,843	247,177	612,076	141,599	1,216,537	3,240,093	2,055,496	1,440,329	234,264	-	1,017,896	372,824	199,216	115,257	81,603	29,651	4,617	81,004	262,709	1,924,237	556,796	-	-	70,093	8,085	2,355,834	934,284	-	17,812,745
Vegetable (Kharif)	13,234	4,411	4,411	-	-	35,291	1,103	4,411	43,773	57,348	4,328	41,247	2,757	-	221	11,029	-	-	2,206	4,411	4,411	9,374	45,871	-	-	-	-	54,953	8,823	2,206	336,818
Oil seeds (Kharif)	8,900	54,083	4,245	1,369	3,423	21,291	13,692	2,738	6,161	15,061	14,377	11,981	-	-	-	6,230	2,738	8,191	2,738	2,386	2,094	69,145	59,903	-	-	5,477	-	-	-	-	314,163
Fodder (Kharif)	71,903	117,141	106,883	68,431	78,536	80,958	164,237	86,685	226,585	123,759	121,182	137,525	18,785	18,119	106,741	249,386	62,462	86,744	168,753	87,096	110,174	17,745	146,886	33,710	16,021	48,308	20,406	28,848	36,347	20,136	2,710,372
Wheat (Rabi)	740,369	2,334,815	1,126,897	484,733	482,095	702,188	2,567,155	693,011	1,452,311	1,373,971	2,121,218	970,216	609,428	178,325	1,005,753	1,940,432	1,667,339	1,315,886	2,761,490	1,023,548	1,247,421	453,965	1,761,206	735,195	524,278	915,860	1,161,660	1,337,438	990,503	353,094	34,646,874
Wheat (Rabi)	41,324	46,070	50,665	51,588	74,856	52,441	118,905	73,548	108,155	110,765	152,302	77,307	28,193	5,098	54,774	261,152	58,125	67,576	112,148	52,774	76,696	14,301	77,562	22,064	27,464	74,554	28,990	50,375	30,426	54,159	2,828,277
Fodder (Rabi)	41,324	46,070	50,665	51,588	74,856	52,441	118,905	73,548	108,155	110,765	152,302	77,307	28,193	5,098	54,774	261,152	58,125	67,576	112,148	52,774	76,696	14,301	77,562	22,064	-	4,411	66,171	105,509	52,837	61,760	2,467,879
Vegetable (Rabi)	118,902	26,468	57,348	30,880	35,291	-	388,203	74,294	32,715	247,038	36,082	30,880	48,525	-	77,200	410,280	184,396	46,320	17,646	30,880	57,348	87,051	178,665	-	-	4,411	66,171	105,509	52,837	61,760	2,467,879
Total	4,634,839	7,824,823	4,496,132	3,816,013	2,740,735	4,369,097	6,928,783	8,506,654	9,992,880	6,488,064	7,997,605	4,546,429	2,452,594	1,635,942	5,792,158	13,716,186	4,869,349	5,101,079	5,722,185	4,667,902	6,268,729	2,019,788	7,633,794	2,648,627	1,620,995	2,439,390	5,851,951	6,769,222	5,176,743	2,423,718	156,706,993

Heran Distributary, Sanghar
Agriculture Input Costs
For Kharif 1997

Area Cultivated for Kharif 1997 (in Acres)

W/C No.	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	150.75	387.90	186.25	70.28	107.80	184.33	283.30	189.88	366.26	236.80	272.46	194.28	87.00	8.33	222.65	346.13	135.83	235.55	316.35	113.15	174.43	70.98	209.53	113.20	83.75	184.88	210.85	229.43	247.50	129.25	5714.75
Sugarcane	51.15	54.33	37.75	87.03	30.75	26.00	41.38	67.80	6.25	16.00	7.60	15.78	11.50	6.45	43.08	199.18	28.50	16.45	35.30	61.38	95.55	13.63	91.33	10.00	1.00	7.00	-	6.00	-	-	1092.83
Rice	46.20	6.00	27.73	74.18	11.75	-	1.50	6.00	-	-	-	2.00	15.08	35.15	9.75	26.43	20.50	5.00	12.73	21.55	40.68	6.00	40.00	4.50	9.00	-	1.00	1.00	-	-	423.73
Orchard	12.25	17.50	3.05	2.95	12.98	38.72	7.38	41.48	140.26	75.00	94.65	66.43	14.00	-	55.43	18.75	12.35	6.63	2.50	1.15	0.50	4.00	13.38	17.00	-	3.00	1.00	76.68	38.00	-	779.98
Vegetable	3.00	1.00	1.00	-	-	8.00	0.25	1.00	33.45	13.00	3.75	9.35	0.63	-	0.05	2.50	-	-	0.50	1.00	1.00	2.13	10.63	-	-	-	-	9.38	2.00	0.50	104.10
Fodder	56.55	104.25	54.85	40.00	31.88	69.72	74.65	78.88	102.70	58.10	64.30	67.60	15.33	14.25	36.88	89.18	32.75	56.55	94.80	45.68	64.40	17.38	69.00	27.50	10.50	31.75	13.38	24.63	37.80	14.50	1501.56
Oil seeds	3.25	19.75	1.55	0.50	1.25	7.78	5.00	1.00	2.25	5.50	5.25	4.38	-	-	-	2.28	1.00	2.25	1.00	0.88	0.75	25.25	21.88	-	-	2.00	-	-	-	-	114.73

Land Preparation (Rate per Acre in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	700.00	900.00	1,000.00	1,250.00	800.00	1,200.00	750.00	850.00	1,000.00	750.00	1,200.00	1,000.00	900.00	800.00	795.00	900.00	900.00	800.00	1,000.00	950.00	1,000.00	840.00	795.00	1,000.00	900.00	850.00	1,240.00	900.00	1,000.00	800.00	913.33
Sugarcane	964.67	964.67	900.00	960.00	850.00	1,200.00	964.67	910.00	964.67	1,000.00	964.67	900.00	900.00	964.67	800.00	1,000.00	1,000.00	850.00	964.67	1,200.00	964.67	1,000.00	1,000.00	964.67	964.67	964.67	964.67	964.67	964.67	964.67	964.67
Rice	800.00	700.00	850.00	836.92	836.92	836.92	800.00	836.92	836.92	836.92	836.92	836.92	1,000.00	1,000.00	800.00	1,000.00	836.92	836.92	700.00	870.00	850.00	810.00	800.00	836.92	836.92	836.92	836.92	836.92	836.92	836.92	836.92
Orchard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetable	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	1,000.00	900.00	1,000.00	900.00	900.00	900.00	800.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	700.00	900.00	900.00	900.00
Fodder	600.00	600.00	700.00	687.83	450.00	600.00	650.00	650.00	687.83	600.00	630.00	750.00	600.00	600.00	600.00	800.00	900.00	687.83	800.00	980.00	600.00	840.00	900.00	687.83	600.00	600.00	687.83	687.83	687.83	600.00	687.83
Oil Seed	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00	750.00
Wheat	1,000.00	1,000.00	1,000.00	800.00	886.25	900.00	1,000.00	900.00	800.00	886.25	700.00	800.00	700.00	800.00	886.25	886.25	886.25	1,000.00	1,200.00	1,000.00	886.25	910.00	800.00	1,000.00	670.00	886.25	1,000.00	1,000.00	700.00	800.00	886.25

Seed (Rate per Acre in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	200.00	300.00	300.00	240.00	280.00	150.00	280.00	225.00	250.00	250.00	300.00	300.00	250.00	250.00	300.00	300.00	250.00	300.00	200.00	270.00	300.00	200.00	250.00	240.00	250.00	250.00	200.00	200.00	250.00	200.00	248.50
Sugarcane	3,433.33	3,433.33	3,500.00	3,000.00	3,000.00	3,200.00	3,433.33	4,000.00	3,433.33	3,000.00	3,433.33	3,500.00	3,400.00	3,433.33	3,500.00	3,500.00	3,500.00	3,400.00	3,433.33	3,500.00	3,433.33	3,500.00	4,000.00	3,433.33	3,433.33	3,433.33	3,433.33	3,433.33	3,433.33	3,433.33	3,433.33
Rice	40.00	40.00	50.00	48.46	48.46	48.46	50.00	48.46	48.46	48.46	48.46	48.46	50.00	50.00	50.00	50.00	48.46	48.46	50.00	50.00	50.00	40.00	60.00	48.46	48.46	48.46	48.46	48.46	48.46	48.46	48.46
Orchard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetable	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	500.00	366.67	400.00	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	200.00	366.67
Fodder	300.00	280.00	400.00	291.74	280.00	150.00	300.00	280.00	291.74	300.00	350.00	300.00	260.00	300.00	300.00	300.00	350.00	291.74	280.00	190.00	380.00	150.00	300.00	291.74	380.00	300.00	291.74	291.74	291.74	280.00	291.74
Oil Seed	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Wheat	400.00	350.00	340.00	300.00	349.58	350.00	350.00	350.00	350.00	349.58	350.00	400.00	400.00	350.00	349.58	349.58	300.00	350.00	300.00	400.00	349.58	300.00	400.00	350.00	300.00	349.58	300.00	300.00	350.00	450.00	349.58

Fertilizers (Rate per Acre in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	1,000.00	1,200.00	1,800.00	1,850.00	700.00	1,080.00	1,200.00	1,280.00	1,500.00	1,200.00	1,800.00	1,800.00	2,250.00	1,200.00	1,074.00	1,640.00	1,950.00	1,800.00	1,120.00	1,500.00	1,200.00	700.00	910.00	1,800.00	1,500.00	1,800.00	1,800.00	1,280.00	1,500.00	1,800.00	1,494.33
Sugarcane	3,774.67	1,774.67	1,800.00	2,160.00	1,800.00	1,620.00	1,774.67	1,570.00	1,774.67	1,500.00	1,774.67	1,890.00	1,280.00	1,774.67	2,270.00	2,640.00	1,800.00	1,500.00	1,774.67	1,890.00	1,774.67	1,500.00	1,500.00	1,774.67	1,774.67	1,774.67	1,774.67	1,774.67	1,774.67	1,774.67	1,774.67
Rice	1,200.00	890.00	1,200.00	1,158.85	1,158.85	1,158.85	1,500.00	1,158.85	1,158.85	1,158.85	1,158.85	1,158.85	1,800.00	1,025.00	1,150.00	1,240.00	1,158.85	1,158.85	1,200.00	1,400.00	1,000.00	1,000.00	700.00	1,158.85	1,158.85	1,158.85	1,158.85	1,158.85	1,158.85	1,158.85	1,154.85
Orchard	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	2,000.00	1,483.33	980.00	1,483.33	1,890.00	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33	1,483.33
Vegetable	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,280.00	1,393.33	1,000.00	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33
Fodder	1,200.00	900.00	1,000.00	1,016.52	660.00	1,020.00	1,200.00	1,280.00	1,016.52	880.00	720.00	1,260.00	1,260.00	780.00	1,050.00	1,150.00	1,260.00	1,016.52	700.00	800.00	750.00	700.00	1,200.00	1,016.52	1,200.00	1,500.00	1,016.52	1,016.52	1,016.52	1,000.00	1,016.52
Oil Seed	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00	700.00
Wheat	1,500.00	1,200.00	1,500.00	1,250.00	1,480.00	1,500.00	1,800.00	1,400.00	1,500.00	1,480.00	1,500.00	1,500.00	1,800.00	1,025.00	1,480.00	1,480.00	1,200.00	1,500.00	1,125.00	1,500.00	1,480.00	1,200.00	1,380.00	1,700.00	1,500.00	1,480.00	1,800.00	1,800.00	1,800.00	1,500.00	1,480.00

Pesticides (Rate per Acre in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	1,280.00	1,600.00	2,000.00	1,770.00	1,800.00	1,800.00	1,800.00	1,800.00	1,870.00	1,000.00	1,500.00	1,680.00	1,800.00	1,600.00	1,880.00	1,800.00	2,000.00	1,500.00	1,428.00	2,000.00	1,500.00	1,220.00	1,125.00	1,500.00	1,680.00	1,800.00	2,000.00	1,800.00	1,800.00	2,000.00	1,824.43
Sugarcane	454.55	454.55	454.55	800.00	400.00	454.55	454.55	300.00	454.55	454.55	454.55	400.00	400.00	454.55	400.00	400.00	400.00	454.55	454.55	400.00	454.55	400.00	500.00	454.55	454.55	454.55	454.55	454.55	454.55	454.55	454.55
Rice	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	400.00	425.00	525.00	400.00	425.00	425.00	400.00	425.00	400.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00	425.00
Orchard	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,500.00	1,166.67	1,000.00	1,166.67	1,000.00	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67	1,166.67
Vegetable	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,000.00	1,233.33	1,200.00	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,800.00	1,233.33	1,233.33
Fodder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil Seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wheat	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00

Labor (Rate per Acre in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Cotton	2,190.00	2,480.00	3,190.00	2,450.00	2,050.00	2,200.00	1,780.00	2,650.00	2,350.00	1,750.00	2,350.00	2,050.00	2,900.00	1,400.00	2,800.00	3,300.00	2,700.00	2,600.00	2,200.00	3,100.00	2,690.00	2,680.00	2,850.00	2,050.00	2,100.00	1,700.00	3,800.00	2,290.00	2,500.00	1,650.00	2,641.33
Sugarcane	4,193.67	4,193.67	4,750.00	5,100.00	3,800.00	4,500.00	4,193.67	4,750.00	4,193.67	3,000.00	4,193.67	4,450.00	4,150.00	4,193.67	3,895.00	4,950.00	4,250.00	4,100.00	4,193.67	4,800.00	4,193.67	3,500.00	3,950.00	4,193.67	4,193.67	4,193.67	4,193.67	4,193.67	4,193.67	4,193.67	4,193.67
Rice	1,150.00	1,100.00	1,218.00	1,158.83	1,158.83	1,158.83	850.00	1,158.83	1,158.83	1,158.83	1,158.83	1,158.83	1,250.00	1,158.83	1,900.00	1,290.00	1,158.83	1,158.83	1,200.00	1,830.00	1,208.00	224.00	1,116.00	1,158.83	1,158.83	1,158.83	1,158.83	1,158.83	1,158.83	1,158.83	1,154.83
Orchard	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	1,700.00	4,850.00	5,800.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00	4,850.00
Vegetable	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	650.00	683.33	300.00	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	1,100.00	683.33	683.33
Fodder	634.00	634.00	634.00	634.00	634.00	634.00	634.00	1,000.00	634.00	634.00	634.00	634.00	634.00	634.00	634.00	290.00	634.00	634.00	634.00	320.00	634.00	500.00	634.00	634.00	1,150.00	634.00	634.00	634.00	634.00	634.00	634.00
Oil Seed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wheat	1,050.00	1,225.00	1,150.00	900.00	1,107.92	950.00	1,250.00	1,150.00	1,150.00	1,107.92	1,200.00	1,250.00	1,150.00	780.00	1,107.92	1,107.92	1,105.00	1,100.00	990.00	1,270.00	1,107.92	1,020.00	970.00	1,200.00	1,200.00	1,107.92	1,300.00	1,250.00	1,100.00	850.00	1,107.92

Annexure 3b

Heran Distributary, Sanghar
Agriculture Input Costs
For Kharif 1997

Total Land Preparation Cost (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	105,525	349,110	155,280	89,952	64,680	233,180	212,475	161,394	366,275	179,825	326,870	194,275	78,300	6,660	176,827	313,313	122,243	211,695	318,350	107,493	174,425	59,619	166,572	113,200	75,375	140,144	261,082	183,540	247,500	77,550	5,273,368
Sugarcane	49,343	52,466	33,975	83,544	26,138	31,200	39,813	91,425	6,029	16,000	15,049	11,466	10,350	5,222	34,460	199,175	28,900	13,963	34,063	97,650	92,174	13,825	91,325	9,647	965	6,753	-	5,788	-	-	1,871,167
Rice	27,720	4,200	23,566	62,079	9,834	-	1,200	5,022	-	-	-	1,874	15,076	35,160	7,820	26,425	17,157	4,185	5,908	18,749	34,574	5,460	32,000	3,786	7,532	-	937	937	-	-	353,766
Orchard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetable	2,700	900	900	-	-	7,200	225	900	33,450	11,700	2,750	8,415	563	-	45	2,250	-	-	450	900	900	1,913	9,563	-	-	-	-	6,563	1,800	450	93,535
Fodder	33,930	62,550	30,395	27,513	14,344	35,835	48,523	67,044	70,640	34,860	36,560	50,709	12,290	8,550	23,385	78,340	29,475	36,897	75,840	44,762	38,640	14,595	62,100	16,915	5,250	19,050	9,200	16,838	25,793	7,250	1,053,152
Oil seeds	2,438	14,813	1,163	375	938	5,831	3,750	750	1,688	4,125	3,938	3,281	-	-	-	1,706	750	1,688	750	656	563	12,938	16,406	-	-	1,500	-	-	-	-	86,844
Total	221,656	483,978	255,249	263,463	115,933	313,256	306,886	296,534	478,881	246,510	385,286	269,843	116,549	56,582	242,537	622,209	198,124	278,746	436,359	270,209	341,275	114,149	377,966	145,529	88,122	167,446	271,119	212,663	275,093	85,250	7,932,993

Total Seeds Cost (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	30,150	116,370	40,576	16,866	28,028	29,149	70,825	42,722	91,569	59,975	61,743	56,283	21,750	2,081	66,765	104,436	33,966	70,565	63,670	30,551	52,328	14,195	52,381	27,168	20,938	41,219	42,110	45,885	61,875	25,850	1,456,877
Sugarcane	178,615	186,516	132,125	261,075	92,290	83,200	142,054	270,000	21,488	48,000	53,560	44,713	39,100	22,145	150,783	697,113	99,750	56,930	121,197	284,813	328,055	47,868	365,300	34,333	3,433	24,033	-	20,800	-	-	3,884,518
Rice	1,848	240	1,386	3,595	569	-	75	281	-	-	-	97	754	1,756	469	1,321	983	242	636	1,078	2,024	240	2,400	218	436	-	48	48	-	-	39,797
Orchard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vegetable	1,100	367	367	-	-	2,933	92	367	13,725	4,767	1,500	3,428	229	-	18	917	-	-	183	367	367	779	3,896	-	-	-	-	1,875	733	183	41,183
Fodder	16,883	29,190	21,842	11,670	6,825	8,959	32,395	22,085	29,262	17,430	22,505	20,280	4,291	4,275	11,693	29,753	11,483	16,496	28,544	6,678	24,472	2,606	20,700	6,023	3,780	9,525	3,802	7,184	10,940	4,060	448,891
Oil seeds	325	1,875	155	50	125	778	500	100	225	550	525	438	-	-	-	228	100	225	100	88	75	2,525	2,188	-	-	200	-	-	-	-	11,473
Total	228,923	334,558	202,848	293,253	129,897	125,018	250,041	335,964	156,939	130,722	139,833	127,238	66,124	30,259	229,727	833,768	146,282	143,560	212,330	323,573	407,339	68,833	446,865	68,742	28,587	74,977	46,060	75,593	73,548	30,093	5,769,847

Total Fertilizers Cost (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	150,750	485,480	279,450	116,964	75,460	209,871	339,960	236,243	549,413	287,880	490,466	349,695	196,620	9,990	238,019	670,925	264,859	376,080	356,552	169,725	209,310	49,663	190,966	169,800	125,625	263,800	336,880	293,664	371,250	232,650	7,991,588
Sugarcane	90,774	96,499	67,950	107,974	58,425	42,120	73,427	105,875	11,092	24,000	27,085	24,145	14,720	11,447	87,780	525,822	45,800	24,675	62,646	153,799	169,569	20,436	136,968	17,747	1,778	12,423	-	10,648	-	-	2,116,650
Rice	95,440	5,340	23,270	85,957	13,616	-	2,250	9,963	-	-	-	2,310	22,613	36,029	11,241	32,767	23,756	5,784	16,034	30,170	40,675	6,000	28,000	5,215	10,430	-	1,159	1,159	-	-	476,183
Orchard	16,171	25,958	4,524	4,376	10,246	57,442	10,840	61,621	208,075	111,256	140,398	101,497	28,000	-	31,038	27,813	23,242	9,827	3,708	1,705	742	5,933	19,840	25,217	-	4,450	1,483	113,735	96,367	-	1,116,597
Vegetable	4,180	1,393	1,393	-	-	11,147	348	1,393	42,618	18,113	3,750	13,028	871	-	70	3,483	-	-	697	1,393	1,393	2,961	14,804	-	-	-	-	17,813	2,787	697	144,538
Fodder	67,860	93,825	64,950	40,861	21,038	80,920	99,580	89,383	104,397	51,709	46,296	65,178	19,310	9,975	40,924	114,081	41,265	57,484	86,360	36,540	48,300	12,163	82,800	27,854	12,600	47,625	13,596	25,032	38,126	14,500	1,334,291
Oil seeds	2,275	13,825	1,085	350	875	5,443	3,500	700	1,575	3,850	3,675	3,063	-	-	-	1,593	700	1,575	700	613	525	17,675	15,313	-	-	1,400	-	-	-	-	86,305
Total	399,450	782,320	442,823	435,372	180,660	396,942	529,883	513,148	917,367	496,892	712,236	578,921	282,133	67,448	429,072	1,376,454	399,522	476,234	566,696	393,945	470,514	114,832	488,412	245,832	150,429	329,898	353,118	462,650	468,523	247,847	13,439,469

Total Pesticides Cost (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	102,960	561,690	310,500	124,367	161,700	291,466	424,950	284,813	611,879	239,900	498,713	326,382	156,000	12,488	418,394	626,625	271,650	353,326	454,804	226,300	261,638	66,590	235,716	169,800	140,700	296,775	421,100	412,995	445,500	258,500	9,298,588
Sugarcane	23,250	24,893	17,156	69,620	12,300	11,818	18,807	33,750	2,841	7,273	7,091	5,110	4,800	2,932	17,230	79,670	11,400	7,477	16,045	32,550	43,432	5,456	45,663	4,545	455	3,182	-	2,727	-	-	511,879
Rice	19,035	2,550	11,783	31,524	4,964	-	638	2,550	-	-	-	850	6,030	14,939	5,132	10,370	8,713	2,125	5,080	9,159	16,270	2,550	17,000	1,913	3,825	-	425	425	-	-	176,668
Orchard	14,292	20,417	3,556	3,442	16,138	46,178	8,604	48,388	163,664	87,500	110,425	79,829	21,000	-	55,428	21,875	12,250	7,729	2,917	1,342	583	4,667	15,604	19,833	-	3,500	1,167	89,454	44,333	-	692,304
Vegetable	3,700	1,233	1,233	-	-	9,867	308	1,233	33,450	16,033	4,500	11,532	771	-	62	3,083	-	-	617	1,233	1,233	2,621	13,104	-	-	-	-	14,063	2,467	617	152,969
Fodder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oil seeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	253,837	638,743	344,234	228,973	194,131	359,332	453,307	370,733	811,824	350,706	530,728	423,703	188,601	30,359	496,243	741,623	304,113	370,656	479,373	276,584	323,156	101,877	327,086	196,091	144,980	303,457	422,692	519,634	492,300	259,117	10,823,510

Total Labor Cost (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	330,143	950,355	498,248	179,174	220,990	427,516	495,775	503,169	990,746	419,825	894,811	514,829	252,300	11,655	623,160	1,148,813	366,728	812,430	732,205	350,765	469,203	190,213	585,241	232,090	176,875	280,288	757,990	525,383	618,750	213,263	14,391,678
Sugarcane	214,506	227,821	179,313	443,828	92,250	117,000	175,813	320,625	26,210	48,000	65,421	56,849	47,725	27,048	197,429	986,916	121,125	67,445	148,036	390,600	400,705	47,868	360,734	41,037	4,184	29,356	-	25,182	-	-	4,820,443
Rice	83,130	6,600	33,798	86,956	13,616	-	975	8,963	-	-	-	2,310	18,844	40,733	18,573	33,296	23,756	5,784	15,270	36,127	49,135	7,344	44,640	5,216	10,430	-	1,159	1,159	-	-	567,780
Orchard	69,413	84,875	14,793	14,308	62,829	187,618	36,708	201,194	680,334	363,760	459,053	331,861	87,500	-	94,223	90,938	66,500	32,151	12,125	5,576	2,425	19,400	64,680	82,490	-	14,560	4,850	371,874	184,300	-	3,843,464
Vegetable	2,050	683	683	-	-	5,467	171	683	21,743	8,883	1,125	6,389	427	-	34	1,708	-	-	342	683	683	1,452	7,260	-	-	-	-	10,313	1,367	342	72,469
Fodder	35,853	738	686	674	686	894	709	1,079	737	582	686	702	649	648	673	299	667	691	729	366	690	517	703	662	645	1,182	647	650	672	649	55,884
Oil seeds	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	695,094	1,271,073	734,494	716,938	390,431	738,492	709,211	1,035,993	1,599,778	841,139	1,221,106	912,947	387,845	99,885	894,091	2,360,949	611,676	718,481	908,707	783,116	922,696	269,514	1,033,447	362,323	191,143	325,375	764,636	934,549	803,086	214,253	23,306,741

Agriculture input Costs for Kharif 1997 (in Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Land preparation	221,656	483,978	255,249	263,463	115,933	313,256	306,886	296,534	478,881	246,510	385,286	269,843	116,549	56,582	242,537	622,209	198,124	278,746	436,359	270,209	341,275	114,149	377,966	145,529	88,122	167,446	271,119	212,663	275,093	85,250	7,932,993
Seeds	228,923	334,558	202,848	293,253	129,897	125,018	250,041	335,964	156,939	130,722	139,833	127,238	66,124	30,259	229,727	833,768	146,282	143,560	212,330	323,573	407,339	68,833	446,865	68,742	28,587	74,977	46,060	75,593	73,548	30,093	5,769,847
Fertilizers	399,450	782,320	442,823	435,372	180,660	396,942	529,883	513,148	917,367	496,892	712,236	578,921	282,133	67,448	429,072	1,376,454	399,522	476,234	566,696	393,945	470,514	114,832	488,412	245,832	150,429	329,898	353,118	462,650	468,523	247,847	13,439,469
Pesticides	253,837	638,743	344,234	228,973	194,131	359,332	453,307	370,733	811,824	350,706	530,728	423,703	188,601	30,359	496,243	741,623	304,113	370,656	479,373	276,584	323,156	101,877	327,086	196,091	144,980	303,457	422,692	519,634	492,300	259,117	10,823,510
Labor	695,094	1,271,073	734,494	716,938	390,431	738,492	709,211	1,035,993	1,599,778	841,139	1,221,106	912,947	387,845	99,885	894,091	2,360,949	611,676	718,481	908,707	783,116	922,696	269,514	1,033,447	362,323	191,143	325,375	764,636	934,549	803,086	214,253	23,306,741
Total	1,799,029	3,422,662	1,987,647	1,937,982	1,010,972	1,932,990	2,249,328	2,552,372	3,964,789	2,065,969	3,011,214	2,312,651	1,041,252	284,533	2,292,790	5,935,003	1,659,896	1,979,669	2,543,466	2,045,429	2,465,179	669,205	2,673,776	1,019,517	684,260	1,200,953	1,857,425	2,205,486	2,114,553	836,356	61,363,760

Heran Distributary, Sanghar
Agriculture Input Costs
For Rabi 1996-97

Area Cultivated for Rabi 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Wheat	121.00	318.00	187.00	131.00	80.00	151.00	426.00	115.00	241.00	228.00	352.00	161.00	63.00	35.00	141.00	322.00	167.00	217.50	330.00	123.00	207.00	81.00	174.50	122.00	67.00	152.00	152.00	175.00	213.00	77.00
Orchard	3.00	19.00	3.00	2.00	-	34.00	14.00	-	89.00	61.00	72.00	50.00	-	6.00	7.00	-	-	6.00	-	3.00	4.00	-	-	-	-	-	-	102.00	42.00	26.00
Vegetable	26.50	6.00	13.00	7.00	8.00	-	68.00	17.00	25.00	56.00	33.00	7.00	11.00	-	17.50	93.00	35.00	10.50	4.00	7.00	13.00	22.00	40.50	-	-	1.00	15.00	18.00	12.00	14.00
Fodder	32.50	41.00	26.00	36.00	30.00	41.00	54.00	60.00	49.00	82.00	77.00	38.00	23.00	4.00	20.00	60.00	31.00	39.50	63.00	30.00	46.00	14.00	36.50	18.00	18.00	49.00	19.00	43.00	29.00	39.00

Land Preparation (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Wheat	1,000.00	1,000.00	1,000.00	800.00	886.25	800.00	1,000.00	900.00	800.00	886.25	700.00	800.00	700.00	800.00	886.25	886.25	890.00	1,000.00	1,200.00	1,000.00	886.25	910.00	800.00	1,000.00	670.00	886.25	1,000.00	1,000.00	700.00	800.00	886.25
Vegetable	800.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	1,000.00	900.00	1,000.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	900.00	700.00	900.00	900.00	900.00
Fodder	600.00	600.00	700.00	687.83	450.00	600.00	650.00	850.00	687.83	600.00	600.00	750.00	800.00	600.00	600.00	600.00	800.00	900.00	687.83	590.00	880.00	600.00	840.00	900.00	687.83	500.00	600.00	687.83	687.83	687.83	687.83

Seed (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Wheat	400.00	350.00	340.00	300.00	349.58	350.00	360.00	350.00	350.00	349.58	350.00	400.00	400.00	350.00	349.58	349.58	300.00	350.00	300.00	400.00	349.58	300.00	400.00	350.00	300.00	349.58	300.00	300.00	350.00	450.00	349.58
Vegetable	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	600.00	366.67	400.00	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	366.67	200.00	366.67	366.67	366.67
Fodder	300.00	280.00	400.00	291.74	280.00	150.00	300.00	280.00	291.74	300.00	350.00	300.00	280.00	300.00	300.00	300.00	350.00	291.74	280.00	190.00	380.00	150.00	300.00	291.74	360.00	300.00	291.74	291.74	291.74	280.00	291.74

Fertilizers (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Wheat	1,600.00	1,200.00	1,600.00	1,280.00	1,480.00	1,600.00	1,600.00	1,480.00	1,600.00	1,480.00	1,500.00	1,500.00	1,800.00	1,025.00	1,480.00	1,480.00	1,200.00	1,500.00	1,125.00	1,500.00	1,480.00	1,200.00	1,380.00	1,700.00	1,500.00	1,480.00	1,800.00	1,800.00	1,800.00	1,500.00	1,480.00
Vegetable	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,280.00	1,393.33	1,000.00	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,393.33	1,900.00	1,393.33	1,393.33	1,393.33
Fodder	1,200.00	900.00	1,000.00	1,016.52	880.00	1,020.00	1,200.00	1,280.00	1,016.52	880.00	720.00	1,280.00	1,280.00	700.00	1,050.00	1,150.00	1,280.00	1,016.52	700.00	800.00	760.00	700.00	1,200.00	1,016.52	1,200.00	1,600.00	1,016.52	1,016.52	1,016.52	1,000.00	1,016.52

Pesticides (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Wheat	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Vegetable	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,000.00	1,233.33	1,200.00	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,233.33	1,500.00	1,233.33	1,233.33	1,233.33
Fodder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Labor (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Wheat	1,050.00	1,225.00	1,150.00	900.00	1,107.92	950.00	1,250.00	1,150.00	1,150.00	1,107.92	1,200.00	1,250.00	1,180.00	780.00	1,107.92	1,107.92	1,105.50	1,100.00	990.00	1,270.00	1,107.92	1,020.00	970.00	1,200.00	1,200.00	1,107.92	1,300.00	1,250.00	1,100.00	850.00	1,107.92
Vegetable	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	650.00	683.33	300.00	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	683.33	1,100.00	683.33	683.33	683.33
Vegetable	634.00	634.00	634.00	634.00	634.00	634.00	634.00	1,000.00	634.00	634.00	634.00	634.00	634.00	634.00	634.00	200.00	634.00	634.00	634.00	320.00	634.00	500.00	634.00	634.00	634.00	1,150.00	634.00	634.00	634.00	634.00	634.00
Fodder																															

Annexure 4b

Heran Distributary, Sanghar
Agriculture Input Costs
For Rabi 1996-97

Total Land Preparation Cost (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	121,900	316,000	187,000	104,800	70,900	120,890	426,000	103,500	192,800	202,065	246,400	128,500	58,100	28,000	124,961	286,373	166,430	217,500	396,000	123,000	183,454	73,710	139,500	122,000	56,290	134,710	152,000	175,000	149,100	61,600	4,879,893
Vegetable	23,550	5,400	11,700	6,300	7,200	-	79,200	15,300	25,800	60,400	33,000	6,300	8,900	-	15,750	83,700	31,500	9,450	3,600	6,300	11,700	19,800	36,450	-	-	900	13,500	12,600	10,800	12,600	542,200
Fodder	19,500	24,800	18,200	24,752	13,500	24,800	35,100	51,000	33,703	31,200	46,200	28,500	18,400	2,400	12,000	64,000	27,900	27,189	50,450	29,400	27,600	11,760	32,850	12,381	9,000	29,400	13,068	29,577	19,947	19,500	787,617
Total	164,350	346,000	216,900	135,852	91,600	145,490	540,300	169,800	251,503	293,665	325,600	163,300	85,400	30,400	152,711	433,073	225,830	254,119	450,050	158,700	222,754	105,270	208,800	134,381	67,290	165,010	178,568	217,177	179,847	93,700	6,209,710

Total Seeds Cost (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	46,400	111,300	63,580	39,300	27,067	52,650	149,100	40,250	84,350	79,705	123,200	64,400	33,200	12,250	49,291	112,566	56,100	76,125	99,000	49,200	72,364	24,300	69,500	42,700	26,100	53,137	45,600	52,500	74,550	34,650	1,667,634
Vegetable	9,717	2,200	4,767	2,567	2,933	-	32,267	6,233	12,500	20,533	13,200	2,567	4,033	-	6,417	34,100	12,833	3,850	1,467	2,567	4,767	8,067	14,850	-	-	367	5,500	3,600	4,400	5,133	221,493
Fodder	9,750	11,480	10,400	10,503	6,400	6,150	16,200	16,800	14,295	15,600	25,950	11,400	6,440	1,200	6,000	24,000	10,650	11,524	17,640	5,700	17,480	2,100	10,950	5,253	6,480	14,700	5,543	12,545	8,460	10,920	333,711
Total	67,867	124,980	78,747	52,369	39,399	58,800	197,567	63,283	111,145	115,836	163,350	78,367	43,673	13,450	61,708	170,666	79,783	91,499	118,107	57,467	94,610	34,467	95,500	47,951	32,580	68,203	56,643	68,645	87,410	50,703	2,424,978

Total Fertilizers Cost (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	181,500	381,600	280,500	188,990	118,400	226,500	766,800	161,000	361,900	337,440	528,000	241,600	149,400	35,875	208,680	476,560	224,400	326,250	371,250	184,500	306,360	97,200	240,810	297,400	130,500	224,980	273,600	345,000	383,400	115,500	8,625,375
Vegetable	36,923	8,360	18,113	9,753	11,147	-	122,613	23,687	32,000	78,027	33,000	9,753	15,327	-	24,383	129,580	48,767	14,630	5,573	9,753	18,113	30,653	56,430	-	-	1,393	20,900	34,200	16,720	19,507	629,387
Fodder	39,000	36,900	26,000	36,595	19,900	41,620	94,800	75,600	49,810	46,280	55,440	47,880	28,980	2,800	21,000	92,000	39,000	40,153	44,100	24,000	34,500	9,800	43,000	18,297	21,600	73,600	18,314	43,710	29,479	39,000	1,165,618
Total	257,423	426,860	324,613	215,338	149,347	268,120	994,213	260,287	443,710	461,747	616,440	299,133	193,707	38,675	254,063	698,140	312,227	381,033	420,923	218,253	358,973	137,653	340,240	315,697	152,100	299,973	312,814	392,910	429,599	174,007	10,419,880

Total Pesticides Cost (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	46,400	127,200	74,800	52,400	32,900	60,490	170,400	46,000	96,400	81,200	140,800	64,400	33,200	14,000	86,400	128,800	74,800	87,000	132,000	49,200	82,800	32,400	69,800	48,800	34,800	60,800	60,800	70,000	85,200	30,800	2,156,000
Vegetable	32,883	7,400	16,033	8,633	9,867	-	108,533	20,967	29,000	69,067	35,600	8,633	13,567	-	21,583	114,700	43,167	12,950	4,933	8,633	16,033	27,133	49,950	-	-	1,233	18,500	27,000	14,800	17,267	737,667
Fodder	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	81,083	134,600	90,833	61,033	41,867	60,490	278,933	66,967	121,400	150,267	180,400	73,033	46,767	14,000	77,983	243,500	117,967	99,950	136,933	57,833	98,833	59,533	119,750	48,800	34,800	62,033	79,300	97,000	100,000	48,067	2,893,667

Total Labor Cost (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	127,050	302,550	215,050	117,900	85,633	143,450	532,500	132,250	277,150	252,605	422,400	201,250	97,940	27,300	156,216	356,749	205,635	259,250	326,700	156,210	229,330	62,820	189,265	146,400	104,400	168,403	197,600	218,750	234,300	65,450	6,883,316
Vegetable	18,108	4,100	8,883	4,783	5,467	-	60,133	11,617	16,250	38,267	8,900	4,783	7,517	-	11,958	63,650	23,917	7,175	2,733	4,783	8,883	15,033	27,675	-	-	683	10,250	19,800	8,200	9,567	484,617
Fodder	22,208	28,017	17,767	24,600	20,500	28,017	39,900	41,900	31,850	35,533	23,100	25,967	15,717	2,733	13,667	54,667	21,183	26,992	45,050	20,600	31,433	9,567	24,842	12,300	12,300	33,483	12,983	47,300	19,817	26,650	784,742
Total	167,367	421,667	241,700	147,283	114,600	171,467	629,533	184,667	325,250	326,405	455,400	232,000	121,173	30,033	181,841	474,966	251,735	273,417	372,483	181,493	269,655	107,220	221,882	158,700	116,700	202,570	220,833	285,850	262,317	101,667	7,252,674

Total Farm Land Input Costs for Rabi 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Land preparation	164,350	346,000	216,900	135,852	91,600	145,490	540,300	169,800	251,503	293,665	325,600	163,300	85,400	30,400	152,711	433,073	225,830	254,119	450,050	158,700	222,754	105,270	208,800	134,381	67,290	165,010	178,568	217,177	179,847	93,700	6,209,710
Seeds	67,867	124,980	78,747	52,369	39,399	58,800	197,567	63,283	111,145	115,836	163,350	78,367	43,673	13,450	61,708	170,666	79,783	91,499	118,107	57,467	94,610	34,467	95,500	47,951	32,580	68,203	56,643	68,645	87,410	50,703	2,424,978
Fertilizers	257,423	426,860	324,613	215,338	149,347	268,120	994,213	260,287	443,710	461,747	616,440	299,133	193,707	38,675	254,063	698,140	312,227	381,033	420,923	218,253	358,973	137,653	340,240	315,697	152,100	299,973	312,814	392,910	429,599	174,007	10,419,880
Pesticides	81,083	134,600	90,833	61,033	41,867	60,490	278,933	66,967	121,400	150,267	180,400	73,033	46,767	14,000	77,983	243,500	117,967	99,950	136,933	57,833	98,833	59,533	119,750	48,800	34,800	62,033	79,300	97,000	100,000	48,067	2,893,667
Labour	167,367	421,667	241,700	147,283	114,600	171,467	629,533	184,667	325,250	326,405	455,400	232,000	121,173	30,033	181,841	474,966	251,735	273,417	372,483	181,493	269,655	107,220	221,882	158,700	116,700	202,570	220,833	285,850	262,317	101,667	7,252,674
Total	739,090	1,454,107	952,793	611,875	436,713	704,367	2,640,547	745,003	1,252,988	1,347,922	1,741,190	846,133	491,720	126,558	728,307	2,020,344	987,542	1,100,017	1,498,447	673,747	1,044,826	444,143	987,972	619,530	403,470	797,870	848,199	1,061,542	1,059,173	468,143	28,791,329
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Heran Distributary, Sanghar
Agriculture Input Costs
For the Year 1996-97

Agriculture input Costs for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Land preparation	386,005	631,978	470,149	399,325	207,533	458,656	846,366	466,334	729,585	530,275	713,886	433,443	202,848	86,942	395,349	1,055,261	423,954	824,885	888,350	428,906	964,029	216,419	586,866	276,909	186,412	332,456	449,667	430,842	454,940	178,950	14,153,793
Seeds	293,870	459,638	281,265	345,624	169,197	184,018	433,508	396,848	271,084	246,560	323,185	205,804	109,787	43,709	291,435	1,004,434	326,046	235,059	330,437	363,040	501,840	102,500	542,465	117,694	61,167	143,180	102,704	144,237	160,959	80,797	8,194,626
Fertilizers	646,873	1,129,090	787,136	650,610	336,007	655,262	1,474,218	775,454	1,360,876	958,549	1,328,698	878,054	475,840	106,115	674,135	1,974,594	711,748	857,268	927,670	812,199	829,488	252,505	829,452	471,630	302,529	629,561	686,932	854,960	898,122	421,863	23,456,188
Pesticides	334,820	785,343	435,067	290,006	235,998	416,752	732,240	457,700	933,024	510,973	711,128	496,736	235,766	44,358	574,226	985,323	422,079	470,606	616,206	328,417	421,989	161,410	446,836	244,891	179,780	365,490	501,992	616,634	592,300	307,183	13,817,377
Labor	862,460	1,692,739	966,194	864,273	505,051	909,956	1,336,445	1,218,529	1,915,020	1,167,555	1,674,508	1,144,947	509,018	110,118	1,078,923	2,735,936	862,810	991,806	1,281,100	964,611	1,192,506	367,834	1,255,329	521,023	307,643	827,945	985,470	1,220,396	1,067,405	315,919	30,132,813
Total	2,324,129	4,676,788	2,919,849	2,549,798	1,453,786	2,625,646	4,822,796	3,296,865	5,209,589	3,413,912	4,753,404	3,158,784	1,333,279	391,283	3,011,067	7,755,567	2,646,636	3,079,796	4,043,803	2,717,174	3,509,952	1,103,668	3,660,948	1,633,147	1,097,730	1,898,623	2,726,784	3,267,672	3,173,726	1,304,793	90,197,699

Heran Distributary, Sanghar
Agriculture Land Taxes
For Kharif 1997

Acres Cultivated for Kharif 1997 (in Acres)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	146.75	382.15	152.70	69.26	103.80	188.33	278.30	174.88	291.73	205.90	219.70	158.28	77.00	8.33	184.80	336.38	126.48	231.65	318.35	113.15	174.43	68.98	202.90	101.20	83.75	162.88	209.55	202.93	241.50	129.25
Rice	46.20	6.00	27.73	74.18	11.75	0.00	1.50	6.00	0.00	0.00	0.00	2.00	15.06	35.15	9.78	26.43	20.80	5.00	12.73	21.55	40.88	6.00	40.00	4.50	9.00	0.00	1.00	1.00	6.00	0.00
Sugarcane	51.15	54.33	37.75	86.08	30.75	26.00	41.38	67.50	6.25	16.00	15.60	12.25	9.50	6.45	43.08	188.18	28.50	18.45	35.30	81.38	95.65	12.00	89.83	19.00	1.00	7.00	0.00	6.00	0.00	0.00
Orchard	12.25	17.50	3.06	2.95	12.98	38.73	7.38	41.48	140.28	75.00	84.65	68.43	14.00	0.00	55.43	18.75	12.35	6.63	2.50	1.15	0.88	4.00	13.38	17.00	0.00	3.00	1.00	76.68	38.00	0.00
Vegetable	3.00	1.00	1.00	0.00	0.00	8.00	0.25	1.00	16.98	13.00	3.75	9.35	0.63	0.00	0.05	1.50	0.00	0.00	0.50	1.00	1.00	2.13	10.63	0.00	0.00	0.00	0.00	7.38	2.00	0.50
Oil seeds	3.25	19.75	1.55	0.50	1.25	7.25	5.00	1.00	2.25	5.50	4.25	4.38	0.00	0.00	0.00	1.75	1.00	2.25	1.00	0.88	0.75	25.25	21.88	0.00	0.00	2.00	0.00	0.00	0.00	0.00
Fodder	55.55	103.25	54.65	40.00	28.88	54.73	73.65	74.88	93.70	55.10	58.15	56.60	14.83	14.25	35.80	95.18	29.75	55.43	94.80	45.68	64.40	16.50	84.75	27.50	10.50	31.75	13.38	24.13	37.50	14.50

Abiana (Rate per Acre in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95	80.95
Rice	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20	77.20
Sugarcane	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15	158.15
Orchard	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60
Vegetable	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60
Oil Seeds	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50	65.50
Fodder	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65
Wheat	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35

Liable for Agriculture Tax (in Acres)

W/C #	10R	11R	13L	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	140.25	381.15	133.68	64.26	101.80	171.08	278.30	161.93	282.48	186.63	194.95	153.03	49.23	8.33	167.80	291.65	117.33	167.65	264.28	91.43	165.48	68.98	202.90	101.20	71.75	143.88	164.05	202.93	185.50	86.75
Rice	80.90	84.33	32.75	71.58	30.75	24.38	41.38	67.50	6.25	16.00	14.35	12.25	4.00	6.45	43.08	183.75	28.50	11.70	32.80	58.38	95.65	12.00	89.83	19.00	1.00	6.50	-	6.00	-	-
Sugarcane	32.70	8.00	18.23	70.18	11.75	-	1.50	6.00	-	-	-	2.00	6.13	35.15	9.78	26.43	19.00	3.90	11.50	14.25	40.68	6.00	40.00	4.50	9.00	-	0.50	1.00	-	-
Orchard	12.25	16.50	3.06	2.95	12.98	33.23	7.38	39.48	136.28	75.00	66.90	68.43	13.00	-	55.43	18.75	12.35	6.13	2.50	1.15	0.88	4.00	13.38	17.00	-	3.00	1.00	76.68	31.00	-
Vegetable	3.00	1.00	1.00	-	-	8.00	0.25	1.00	14.48	12.50	3.25	9.35	0.63	-	0.05	-	-	-	0.50	0.50	1.00	2.13	10.63	-	-	-	-	7.38	2.00	-
Oil seed	0.50	18.25	-	-	0.80	4.98	4.50	1.00	2.25	5.50	2.80	3.13	-	-	-	1.50	-	2.25	-	-	-	25.25	21.75	-	-	2.00	-	-	-	-
Fodder	47.05	97.75	52.35	32.00	26.85	51.23	73.65	70.40	91.90	52.60	55.15	55.80	7.00	14.25	35.43	87.78	28.63	39.43	71.03	35.23	60.83	16.50	84.75	26.00	9.00	31.75	11.38	24.13	29.50	8.50
Total	286.65	572.98	240.95	240.95	185.85	292.98	406.95	347.30	523.63	348.23	357.10	304.00	78.99	64.18	331.55	606.85	205.80	230.16	372.60	200.93	364.13	134.85	443.23	158.70	88.25	187.13	176.93	318.10	248.00	95.25

Agriculture Tax (Rate per Acre in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00	73.00
Rice	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Sugarcane	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Orchard	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
Vegetable	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
Oil Seeds	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Fodder	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Wheat	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00

Local Cess (Rate per Acre in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Rice	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Sugarcane	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Orchard	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Vegetable	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Oil Seeds	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Fodder	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Wheat	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Total Intercropped Land (in Acres)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	150.75	397.90	158.25	70.26	107.80	194.33	283.30	189.88	298.23	239.90	272.48	184.28	87.00	8.33	222.55	348.13	138.83	235.55	318.35	113.15	174.43	70.98	209.53	113.20	83.75	164.88	210.55	229.43	247.50	129.25
Sugarcane	81.15	84.33	37.75	87.03	30.75	26.00	41.38	67.50	6.25	16.00	15.60	12.25	11.50	6.45	43.08	188.18	28.50	18.45	35.30	81.38	95.65	13.63	91.33	19.00	1.00	7.00	-	6.00	-	-
Rice	46.20	6.00	27.73	74.18	11.75	-	1.50	6.00	-	-	-	2.00	15.06	35.15	9.78	26.43	20.80	5.00	12.73	21.55	40.88	6.00	40.00	4.50	9.00	-	1.00	1.00	-	-
Orchard	12.25	17.50	3.06	2.95	12.98	38.73	7.38	41.48	140.28	75.00	84.65	68.43	14.00	-	55.43	18.75	12.35	6.63	2.50	1.15	0.88	4.00	13.38	17.00	-	3.00	1.00	76.68	38.00	-
Vegetable	3.00	1.00	1.00	-	-	8.00	0.25	1.00	33.45	13.00	3.75	9.35	0.63	-	0.05	2.50	-	-	0.50	1.00	1.00	2.13	10.63	-	-	-	-	9.38	2.00	0.50
Fodder	58.55	104.25	54.65	40.00	31.88	59.73	74.65	78.88	102.70	58.10	64.30	67.60	15.33	14.25	38.88	99.18	32.75	56.55	94.80	45.68	64.40	17.38	89.00	27.50	10.50	31.75	13.38	24.63	37.50	14.50
Oil seed	3.25	19.75	1.55	0.50	1.25	7.75	5.00	1.00	2.25	5.50	5.25	4.38	-	-	-	2.25	1.00	2.25	1.00	0.88	0.75	25.25	21.88	-	-	2.00	-	-	-	-

Usher (Rate per Acre in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Cotton	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
Rice	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Sugarcane	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75	393.75
Orchard	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50
Vegetable	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50
Oil Seeds	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00	444.00
Fodder	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00
Wheat	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00

Annexure 6b

Heran Distributary, Sanghar
Agriculture Land Taxes
For Kharif 1997

Total Abiana (in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	11,879	30,035	12,361	5,608	8,403	16,245	22,528	14,156	23,515	16,868	17,785	12,812	6,233	674	15,769	27,230	10,238	18,744	25,770	9,159	14,120	5,584	18,425	8,192	6,780	13,185	16,963	16,427	19,649	10,463	433,499
Rice	3,567	463	2,140	5,726	907	-	116	463	-	-	-	154	1,164	2,714	755	2,040	1,583	386	982	1,664	3,140	463	3,088	347	695	-	77	77	-	-	32,732
Sugarcane	8,089	8,891	5,970	13,613	4,863	4,112	6,543	10,875	988	2,530	2,467	1,941	1,502	1,020	6,812	31,341	4,507	2,602	5,583	12,069	15,111	1,695	14,206	1,592	158	1,107	-	949	-	-	171,632
Orchard	1,514	2,163	377	366	1,604	4,786	912	5,126	17,338	9,270	11,689	8,457	1,730	-	6,851	2,316	1,626	819	309	142	62	494	1,653	2,101	-	371	124	9,477	4,697	-	86,264
Vegetable	371	124	124	-	-	989	31	124	2,099	1,607	464	1,156	77	-	6	145	-	-	62	124	124	263	1,313	-	-	-	-	912	247	62	10,466
Oil Seeds	213	1,284	102	33	82	477	328	66	147	360	278	287	-	-	-	118	66	147	66	57	49	1,654	1,433	-	-	131	-	-	-	-	7,380
Fodder	1,925	3,578	1,801	1,386	1,001	1,896	2,552	2,594	3,247	1,909	2,015	1,966	614	494	1,240	3,298	1,031	1,920	3,285	1,583	2,231	572	3,244	883	364	1,100	463	836	1,299	502	48,980
Total	27,598	47,148	22,874	26,730	16,859	27,505	33,010	33,304	47,434	33,344	34,707	26,776	11,321	4,901	31,433	86,528	18,951	24,618	36,057	25,598	34,837	10,827	46,361	13,175	7,996	15,894	17,627	28,677	25,793	11,027	901,871

Total Agriculture Tax (in Rupees)

W/C #	10R	11R	13L	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	10,236	27,824	8,751	4,692	7,431	12,486	20,316	11,621	20,621	13,624	14,231	11,171	3,583	606	13,709	21,290	8,565	12,238	16,582	6,674	12,080	5,038	14,812	7,388	5,238	10,503	11,976	14,814	13,542	6,333	351,167
Rice	1,527	1,630	983	2,147	823	731	1,241	2,028	188	480	431	366	120	194	1,792	5,513	865	351	984	1,791	2,667	360	2,695	300	30	195	-	180	-	-	36,359
Sugarcane	2,453	460	1,367	5,263	881	-	113	480	-	-	-	150	384	2,636	733	1,907	1,425	225	863	1,069	3,051	450	3,000	338	466	-	38	75	-	-	27,896
Orchard	3,675	4,690	916	885	3,893	9,968	2,213	11,843	40,883	22,500	26,070	20,528	3,900	-	16,628	5,625	3,705	1,838	750	345	150	1,200	4,013	5,100	-	900	300	23,003	9,300	-	224,775
Oil seed	20	730	-	-	20	199	180	40	90	220	106	125	-	-	-	-	-	90	-	-	-	-	-	-	-	-	-	2,213	600	-	33,588
Fodder	1,882	3,810	2,094	1,280	1,166	2,049	2,946	2,516	3,676	2,104	2,206	2,232	280	570	1,417	3,611	1,146	1,877	2,841	1,409	2,437	660	2,690	1,040	390	1,270	455	966	1,180	540	52,397
Total	29,885	39,494	15,469	14,267	14,303	27,833	27,883	29,294	69,799	42,878	44,913	37,379	8,468	4,007	33,784	37,966	15,695	16,319	24,156	11,388	20,884	9,253	31,166	14,165	6,115	12,948	12,768	41,249	24,622	6,873	713,925

Total Local Cess (in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	1,468	3,822	1,527	693	1,039	1,883	2,783	1,749	2,917	2,089	2,197	1,583	770	83	1,948	3,364	1,265	2,316	3,184	1,137	1,744	690	2,029	1,012	836	1,629	2,096	2,029	2,418	1,293	53,552
Rice	462	80	277	742	118	-	16	80	-	-	-	20	151	352	98	264	205	50	127	216	407	80	400	45	90	-	10	10	-	-	4,237
Sugarcane	512	643	378	861	308	260	414	675	93	160	156	123	95	65	431	1,982	285	185	353	814	956	120	896	100	10	70	-	90	-	-	16,853
Orchard	123	175	31	30	130	387	74	418	1,403	750	947	684	140	-	554	188	124	66	25	12	5	40	134	170	-	30	10	767	380	-	7,799
Oil Seeds	33	198	16	5	13	73	60	10	23	55	43	44	-	-	1	15	-	-	5	10	10	21	105	-	-	-	-	74	20	5	846
Fodder	556	1,033	540	400	289	547	737	749	937	551	562	568	148	143	358	952	286	664	948	407	644	185	646	275	185	318	134	241	375	145	14,461
Total	3,152	5,949	2,769	2,730	1,894	3,231	4,075	3,687	5,512	3,705	3,961	3,115	1,310	642	3,389	6,782	2,166	3,173	4,652	2,646	3,773	1,349	4,434	1,602	1,043	2,066	2,249	3,161	3,190	1,443	92,696

Total Usher (in Rupees)

W/C No.	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton	27,135	72,657	27,945	14,810	28,733	39,068	65,448	39,759	71,892	43,182	49,046	34,970	19,506	1,499	47,714	73,643	32,715	42,399	63,963	32,099	33,197	20,018	93,286	20,376	25,245	53,863	58,505	60,246	72,585	37,035	1,273,230
Rice	2,079	270	1,248	3,683	743	-	68	270	-	-	-	90	1,089	1,663	609	1,650	1,146	226	573	1,217	2,148	540	3,128	203	675	-	68	45	-	-	23,396
Sugarcane	10,070	10,695	7,432	21,942	9,549	5,734	10,041	15,652	1,230	3,150	3,071	2,515	2,786	1,457	10,646	45,552	6,298	3,238	6,950	24,245	19,505	4,380	30,422	1,969	197	2,650	-	2,284	-	-	293,729
Orchard	889	984	172	332	1,235	2,275	443	2,756	8,453	4,219	5,324	3,849	844	-	3,118	1,161	827	373	169	68	28	422	1,160	956	-	338	113	7,431	4,278	-	52,027
Oil Seeds	722	4,829	344	111	389	2,004	1,887	222	800	1,221	1,196	871	-	-	-	805	222	800	222	194	167	10,884	7,187	-	-	888	-	-	-	-	34,832
Fodder	2,121	3,947	2,057	1,725	1,840	2,656	3,860	3,182	4,133	2,179	2,411	2,535	814	703	1,955	4,321	1,627	2,121	3,781	2,531	2,585	1,111	4,861	1,089	788	2,306	595	1,327	2,363	863	66,171
Total	42,984	93,438	39,293	42,573	42,487	52,293	81,774	61,894	86,239	54,952	61,229	45,436	25,081	5,331	64,043	126,893	42,936	49,157	75,695	60,435	57,691	36,235	140,889	24,591	26,904	59,852	59,286	73,316	79,448	37,934	1,722,753

Total Agriculture Land Taxes for Kharif 1997 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Abiana	27,598	47,148	22,874	26,730	16,859	27,505	33,010	33,304	47,434	33,344	34,707	26,776	11,321	4,901	31,433	86,528	18,951	24,618	36,057	25,598	34,837	10,827	46,361	13,175	7,996	15,894	17,627	28,677	25,793	11,027	901,871
Agriculture Tax	29,885	39,494	15,469	14,267	14,303	27,833	27,883	29,294	69,799	42,878	44,913	37,379	8,468	4,007	33,784	37,966	15,695	16,319	24,156	11,388	20,884	9,253	31,166	14,165	6,115	12,948	12,768	41,249	24,622	6,873	713,925
Local Cess	3,152	5,949	2,769	2,730	1,894	3,231	4,075	3,687	5,512	3,705	3,961	3,115	1,310	642	3,389	6,782	2,166	3,173	4,652	2,646	3,773	1,349	4,434	1,602	1,043	2,066	2,249	3,161	3,190	1,443	92,696
Usher	42,984	93,438	39,293	42,573	42,487	52,293	81,774	61,894	86,239	54,952	61,229	45,436	25,081	5,331	64,043	126,893	42,936	49,157	75,695	60,435	57,691	36,235	140,889	24,591	26,904	59,852	59,286	73,316	79,448	37,934	1,722,753
Total	94,419	185,910	80,423	86,299	75,543	110,774	146,941	126,899	211,983	133,879	143,810	112,725	46,077	14,882	132,649	258,169	79,748	93,267	140,563	100,068	117,185	59,664	226,851	53,533	42,058	90,760	91,929	146,403	133,052	57,277	3,431,245

Annexure 7a

Heran Distributary, Sanghar
Agriculture Land Taxes
For Rabi 1996-97

Area Cultivated for Rabi 1997-96 (in Acres)

W/C #	10R	11-12R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	121.60	318.00	187.00	131.00	80.00	151.00	426.00	115.00	241.00	228.00	352.00	161.00	83.00	35.00	141.00	322.00	187.00	217.50	330.00	123.00	207.00	81.00	174.60	122.00	87.00	152.00	152.00	175.00	213.00	77.00	3,380.00
Orchard	3.80	19.00	3.80	2.00	-	34.00	14.00	-	88.00	51.00	72.00	50.00	-	6.00	7.00	-	-	6.00	-	3.00	4.00	-	-	-	-	-	-	102.00	42.00	26.00	333.80
Vegetable	26.60	8.00	13.00	7.00	6.00	-	86.00	17.00	25.00	56.00	33.00	7.00	11.00	-	17.50	93.00	35.00	10.50	4.00	7.00	13.00	22.00	40.50	-	-	1.00	15.00	18.00	12.00	14.00	600.00
Fodder	32.50	41.00	26.00	36.00	30.00	41.00	54.00	60.00	48.00	52.00	77.00	38.00	23.00	4.00	20.00	80.00	31.00	39.50	63.00	30.00	46.00	14.00	36.50	18.00	18.00	48.00	19.00	43.00	29.00	39.00	1,138.50
Cotton	150.30	387.36	154.50	70.11	107.32	194.13	283.12	189.35	385.61	239.36	271.56	194.11	87.00	8.13	221.62	347.45	135.33	235.22	318.14	113.06	174.17	70.36	208.61	113.06	83.30	164.35	210.22	228.57	247.20	129.10	5,791.76

Abiana (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Wheat	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35	46.35
Orchard	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60
Vegetable	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60	123.60
Fodder	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65	34.65

Agriculture Tax (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Wheat	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00
Orchard	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
Vegetable	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
Fodder	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00

Usher (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Wheat	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00	102.00
Orchard	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50
Vegetable	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50	112.50
Fodder	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00	75.00

Local Cess (Rate per Acre in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T
Wheat	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Orchard	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Vegetable	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00
Fodder	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00

Annexure 7b

Heran Distributary, Sanghar
Agriculture Land Taxes
For Rabi 1996-97

Total Abiana (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	8,608	14,739	8,667	6,072	3,708	6,999	19,746	5,330	11,170	10,566	16,315	7,462	3,847	1,622	6,535	14,925	8,667	10,061	15,296	5,701	9,594	3,754	8,088	5,655	4,032	7,045	7,045	8,111	9,873	3,569	249,827
Orchard	371	2,346	371	247	-	4,207	1,730	-	11,000	6,384	8,899	6,180	-	742	865	-	-	742	-	371	494	-	-	-	-	-	-	12,607	5,191	3,214	65,879
Vegetable	3,275	742	1,607	865	988	-	10,877	2,101	3,090	6,922	4,079	865	1,360	-	2,163	11,495	4,326	1,298	494	865	1,607	2,719	5,006	-	-	124	1,854	2,225	1,483	1,730	74,160
Fodder	1,126	1,421	901	1,247	1,040	1,421	1,871	2,979	1,696	1,802	2,666	1,317	797	139	693	2,772	1,074	1,369	2,183	1,040	1,594	485	1,265	624	624	1,698	858	1,490	1,005	1,351	39,449
Total	13,381	19,250	11,546	8,432	5,736	12,622	34,223	9,510	26,959	25,585	31,961	15,824	6,004	2,502	10,257	29,192	14,068	13,469	17,973	7,977	13,290	6,959	14,359	6,278	4,656	8,867	9,558	24,433	17,552	8,864	429,314

Total Agriculture Tax

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	6,612	15,494	6,180	2,884	4,293	7,765	11,325	7,574	14,620	9,574	19,864	7,764	3,480	325	8,865	13,898	5,413	9,409	12,726	4,522	6,967	2,816	8,344	4,523	3,332	6,574	6,499	9,143	9,888	5,164	228,068
Total	6,612	15,494	6,180	2,884	4,293	7,765	11,325	7,574	14,620	9,574	19,864	7,764	3,480	325	8,865	13,898	5,413	9,409	12,726	4,522	6,967	2,816	8,344	4,523	3,332	6,574	6,499	9,143	9,888	5,164	228,068

Total Local Cess (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	1,210	3,180	1,870	1,310	800	1,510	4,260	1,150	2,410	2,280	3,520	1,610	830	350	1,410	3,220	1,870	2,175	3,300	1,230	2,070	810	1,745	1,220	870	1,520	1,520	1,750	2,130	770	53,900
Orchard	30	190	30	20	-	340	140	-	890	510	720	500	-	60	70	-	-	60	-	30	40	-	-	-	-	-	-	1,020	420	260	5,330
Vegetable	265	60	130	70	80	-	880	170	250	560	330	70	110	-	175	930	350	105	40	70	130	220	405	-	-	10	150	160	120	140	5,900
Fodder	325	410	260	360	300	410	540	600	490	520	770	380	230	40	200	800	310	395	630	300	460	140	365	180	180	490	190	430	290	390	11,369
Total	1,830	3,840	2,290	1,760	1,180	2,260	5,820	1,920	4,040	3,870	5,340	2,560	1,170	450	1,853	4,950	2,530	2,735	3,970	1,630	2,700	1,170	2,515	1,400	1,050	2,020	1,860	3,380	2,860	1,560	76,613

Total Usher (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	12,342	32,436	19,074	13,362	8,160	15,402	43,462	11,730	24,582	23,256	35,904	16,422	8,466	3,570	14,382	32,844	19,074	22,185	33,660	12,546	21,114	8,262	17,799	12,444	8,874	15,504	15,504	17,850	21,726	7,854	549,780
Orchard	330	2,136	330	225	-	3,825	1,575	-	10,010	5,736	8,100	5,625	-	675	788	-	-	675	-	336	450	-	-	-	-	-	-	11,475	4,725	2,925	59,963
Vegetable	2,981	675	1,463	788	900	-	9,900	1,913	2,813	6,300	3,713	788	1,238	-	1,969	10,463	3,938	1,181	450	788	1,463	2,475	4,556	-	-	113	1,688	2,025	1,350	1,575	67,500
Fodder	2,438	3,076	1,950	2,700	2,250	3,075	4,050	4,500	3,675	3,900	5,775	2,850	1,725	300	1,500	6,000	2,325	2,963	4,725	2,250	3,450	1,050	2,738	1,350	1,350	3,675	1,425	3,225	2,175	2,925	85,388
Total	18,090	38,324	22,824	17,075	11,310	22,302	58,977	18,143	41,082	39,194	53,492	25,685	11,429	4,545	18,638	49,307	25,337	27,004	38,835	15,921	26,477	11,787	25,093	13,794	10,224	19,292	18,617	34,575	29,976	15,279	762,630

Total Farm Land Taxes for Rabi 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Abiana	13,381	19,250	11,546	8,432	5,736	12,622	34,223	9,510	26,959	25,585	31,961	15,824	6,004	2,502	10,257	29,192	14,068	13,469	17,973	7,977	13,290	6,959	14,359	6,278	4,656	8,867	9,558	24,433	17,552	8,864	429,314
Agriculture Tax	6,612	15,494	6,180	2,884	4,293	7,765	11,325	7,574	14,620	9,574	19,864	7,764	3,480	325	8,865	13,898	5,413	9,409	12,726	4,522	6,967	2,816	8,344	4,523	3,332	6,574	6,499	9,143	9,888	5,164	228,068
Local Cess	1,830	3,840	2,290	1,760	1,180	2,260	5,820	1,920	4,040	3,870	5,340	2,560	1,170	450	1,853	4,950	2,530	2,735	3,970	1,630	2,700	1,170	2,515	1,400	1,050	2,020	1,860	3,380	2,860	1,560	76,613
Usher	18,090	38,324	22,824	17,075	11,310	22,302	58,977	18,143	41,082	39,194	53,492	25,685	11,429	4,545	18,638	49,307	25,337	27,004	38,835	15,921	26,477	11,787	25,093	13,794	10,224	19,292	18,617	34,575	29,976	15,279	762,630
Total	38,321	76,908	42,840	30,071	22,519	44,949	110,345	37,147	86,701	78,223	101,656	51,833	22,082	7,823	39,615	97,346	47,347	52,617	73,503	30,050	49,433	22,731	50,311	25,995	19,262	36,753	36,443	71,531	60,276	31,867	1,496,627

Annexure 8

Heran Distributary, Sanghar
Agriculture Land Taxes
For the Year 1996-97

Agriculture Land Taxes for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Abiana	37,939	66,398	34,520	35,162	22,695	40,127	67,233	42,715	74,392	97,939	95,669	42,600	17,224	7,404	41,690	95,719	33,018	38,107	54,029	33,575	46,127	17,866	54,720	19,454	12,652	24,760	27,185	53,111	43,345	20,891	1,231,188
Agriculture Tax	28,707	54,986	21,569	17,072	18,595	35,600	39,408	36,668	84,420	52,252	54,676	45,143	11,945	4,333	42,659	51,804	21,109	25,726	36,676	15,920	27,851	12,165	38,511	18,668	9,447	18,522	21,177	50,391	34,510	11,637	941,993
Local Cess	5,012	9,680	5,076	4,490	3,074	5,491	9,895	5,887	9,552	7,676	9,301	5,675	2,480	1,092	5,244	11,732	4,716	5,909	8,622	4,276	6,473	2,519	6,949	3,002	2,093	4,086	4,109	6,561	6,150	3,003	166,421
Usher	61,082	131,762	62,077	59,646	53,797	74,505	140,751	80,037	139,340	83,675	114,720	71,140	36,509	9,876	82,882	176,289	68,273	75,859	114,530	76,356	84,188	50,023	135,073	38,385	37,128	79,144	77,896	108,893	109,424	53,233	2,485,383
Total	130,739	262,827	123,263	116,370	98,062	155,723	256,286	165,307	307,703	211,641	243,666	164,558	68,159	22,704	172,275	335,554	127,116	145,602	214,857	130,128	166,618	82,573	237,152	79,509	61,321	127,512	130,367	216,956	193,428	88,963	4,827,992

Analysis of Cotton for Kharif 1997 of Heran Distributary, Sanghar

W/C #	16R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Yield per acre (Kg)	520.00	560.00	680.00	640.00	500.00	600.00	480.00	700.00	680.00	480.00	640.00	720.00	800.00	400.00	780.00	800.00	720.00	680.00	371.43	720.00	720.00	600.00	480.00	480.00	560.00	360.00	1000.00	800.00	640.00	780.00	631.71
Farmgate price per Kg (Rs)	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.16	19.66	21.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	19.66	20.91	19.66	21.66	19.66	19.66	19.66	19.62
Gross Agriculture Revenue per acre (Rs)	10224.11	11010.59	13369.99	12583.52	9830.88	11797.05	9437.64	13763.23	13029.99	9437.64	13963.82	14156.46	15729.40	7864.70	14942.93	15729.40	14156.46	13369.99	7302.94	14156.46	14156.46	11797.05	9437.64	9437.64	11710.58	7076.23	21961.75	11797.05	12563.52	14942.93	12343.32
Land Preparation per acre (Rs)	700	900	1,000	1,200	800	1,200	750	850	1,000	750	1,200	1,000	800	800	795	900	900	900	1,000	950	1,000	840	795	1,000	900	850	1,240	800	1,000	800	913
Seed per acre (Rs)	200	300	300	240	280	150	250	225	250	250	300	300	250	250	300	300	250	300	200	270	300	200	250	240	250	250	200	200	250	200	256
Fertilizer per acre (Rs)	1,000	1,200	1,800	1,650	700	1,080	1,200	1,200	1,500	1,200	1,800	1,800	2,280	1,200	1,074	1,640	1,950	1,800	1,120	1,500	1,200	700	810	1,500	1,500	1,800	1,800	1,800	1,800	2,000	1,494
Pesticides per acre (Rs)	1,280	1,800	2,000	1,776	1,500	1,800	1,800	1,800	1,670	1,000	1,800	1,680	1,800	1,800	1,880	1,800	2,000	1,800	1,428	2,000	1,800	1,220	1,126	1,500	1,680	1,800	2,000	1,800	1,800	2,000	1,634
Labor per acre (Rs)	2,190	2,450	3,190	2,450	2,050	2,200	1,750	2,660	2,350	1,750	2,550	2,660	2,900	1,400	2,800	3,300	2,700	2,800	2,300	3,100	2,890	2,680	2,650	2,050	2,100	1,700	3,800	2,290	2,500	1,650	2,443
Total Agriculture Input Costs per acre (Rs)	5,370	6,350	8,290	7,360	5,130	6,130	5,450	6,485	6,770	4,950	7,350	7,430	8,110	5,150	6,849	7,940	7,800	6,800	6,048	7,820	6,890	5,640	5,730	6,290	6,430	6,200	8,840	6,370	7,050	6,250	6,833
Net Agriculture Income per acre (Rs)	4,854	4,661	5,080	5,184	4,721	5,667	3,988	7,278	6,260	4,488	6,614	6,726	7,619	2,719	8,094	7,790	6,356	6,570	1,255	6,336	7,266	6,157	3,799	3,148	5,281	876	13,022	5,427	5,534	8,693	5,713

W/C #	16R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total/ Mean
Area Cultivated per w/c (Acre)	150.75	367.9	196.25	70.275	107.8	194.325	283.3	189.875	366.275	239.9	272.475	194.275	87	8.325	222.55	348.125	135.825	235.55	318.35	113.15	174.425	70.875	209.525	113.2	83.75	164.875	210.58	229.425	247.5	129.25	5714.75
Gross Agriculture Revenue per w/c (Rs)	1,541,265	4,271,004	2,675,891	884,307	1,059,768	2,292,462	2,673,663	2,613,292	4,772,560	2,264,080	3,777,463	2,750,246	1,368,458	65,474	3,326,549	5,478,797	1,922,801	3,149,301	2,324,890	1,601,803	2,469,241	637,298	1,977,422	1,068,341	980,761	1,167,023	4,560,881	2,706,536	3,114,421	1,931,374	2,367,441
Cost Inputs:																															
Land Preparation per w/c	105,525	348,110	195,250	89,952	64,560	233,190	212,475	161,364	366,275	179,925	326,970	194,275	78,300	6,660	176,827	313,313	122,243	211,995	318,350	107,463	174,425	59,619	186,572	113,200	75,375	140,144	261,082	183,540	247,500	77,550	175,777
Seed per w/c	30,150	116,370	46,975	16,896	28,028	29,149	70,826	42,722	91,569	59,975	81,743	58,283	21,750	2,081	66,765	104,438	33,956	70,665	63,670	30,551	52,328	14,195	52,381	27,199	20,938	41,219	42,110	45,885	61,875	25,850	48,236
Fertilizer per w/c	150,750	465,480	279,450	115,964	75,460	209,871	339,960	239,243	548,413	287,880	490,455	349,696	196,820	9,990	238,019	570,926	264,869	376,860	356,552	169,726	209,310	49,683	180,868	169,800	125,625	263,800	396,880	283,064	371,250	232,660	286,939
Pesticides per w/c	192,960	661,860	310,800	124,387	161,700	291,468	424,950	284,813	611,679	239,900	408,713	326,382	156,600	12,488	418,364	626,625	271,650	353,325	454,604	226,300	261,638	88,560	235,716	169,800	140,700	296,775	421,100	412,955	445,500	256,500	306,953
Labor per w/c	330,143	950,355	495,248	172,174	220,990	427,515	495,775	503,189	880,746	419,825	694,811	514,829	252,300	11,655	623,140	1,148,813	386,728	612,430	732,205	380,765	488,203	180,213	555,241	232,080	175,875	280,288	757,980	525,383	618,750	213,263	473,399
Total Agriculture Cost Inputs per w/c	809,528	2,463,165	1,287,023	519,332	550,856	1,191,212	1,543,985	1,231,330	2,479,682	1,187,505	2,002,691	1,443,463	705,570	42,874	1,524,245	2,764,113	1,059,435	1,625,295	1,925,381	884,833	1,186,903	400,299	1,200,578	712,026	538,513	1,022,226	1,819,152	1,461,437	1,744,875	807,813	1,370,512
Taxes																															
Abiana per w/c	11,879	30,935	12,361	5,808	9,403	16,245	22,526	14,156	23,615	16,668	17,765	12,812	6,233	674	15,788	27,230	10,238	18,744	25,770	9,159	14,120	5,584	16,425	8,192	6,780	13,185	16,963	16,427	19,549	10,463	14,489
Agriculture Tax per w/c	10,236	27,824	9,751	4,882	7,431	12,485	20,316	11,821	20,621	13,624	14,231	11,171	3,563	608	13,709	21,290	8,565	12,230	18,562	6,674	12,080	5,035	14,812	7,388	5,236	10,603	11,976	14,814	13,542	6,333	11,706
Agriculture Tax per w/c	1,468	3,822	1,327	683	1,038	1,883	2,783	1,749	2,917	2,058	2,187	1,583	770	83	1,948	3,364	1,265	2,316	3,184	1,132	1,744	690	2,029	1,012	838	1,629	2,095	2,029	2,415	1,293	1,785
Local Cess per w/c	27,135	72,667	27,945	14,810	20,733	36,085	55,446	39,756	71,892	43,152	49,048	34,970	19,508	1,498	47,714	73,643	32,715	42,399	63,963	32,069	33,197	20,916	63,268	20,376	25,245	53,663	58,505	60,246	72,585	37,036	42,441
Lumpsum per w/c	50,720	135,237	51,384	25,902	45,609	68,681	111,075	67,483	119,045	75,532	83,236	60,535	30,104	2,863	79,140	126,526	52,763	75,667	111,479	49,064	61,140	32,224	96,553	36,968	38,100	78,979	89,539	93,516	108,091	55,123	76,382
Total Agriculture Land Taxes per w/c	861,837	1,872,881	737,884	339,172	463,366	1,022,388	1,818,623	1,314,478	2,173,833	1,661,853	1,861,513	1,246,248	632,784	19,736	1,722,184	2,586,156	810,364	1,446,309	268,026	667,867	1,241,197	464,772	680,290	319,345	484,148	65,818	2,652,191	1,151,565	1,261,435	1,066,438	1,026,347

W/C #	16R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Water Duty	9.41	5.62	4.41	9.45	6.12	5.95	4.72	6.14	5.39	4.85	6.61	4.56	6.34	5.83	9.67	7.06	6.11	12.53	8.18	12.81	10.82	4.85	6.73	6.67	6.44	3.86	4.79	4.15	6.62	4.25	6.73

Source: Physical assessment survey by IMI field staff, Sanghar during 10 October to 10 December

Analysis of Sugarcane for Kharif 1997 of Heran Distributary, Sanghar

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Yield per acre (Kg)	25469.33	16000.00	24000.00	25469.33	24000.00	28000.00	25469.33	32000.00	24000.00	19200.00	25469.33	28000.00	32000.00	25469.33	22840.00	32000.00	28000.00	25469.33	25469.33	28000.00	25469.33	20000.00	24000.00	25469.33	25469.33	25469.33	25469.33	25469.33	25469.33	25469.33	25469.33	25469.33
Farmgate price per Kg (Re)	0.81	0.76	0.89	0.81	0.94	0.79	0.81	0.79	0.74	0.79	0.81	0.79	0.79	0.81	0.79	0.79	0.89	0.81	0.81	0.84	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Gross Agriculture Revenue per acre (Rs)	20662.00	12160.00	21270.00	20662.00	22470.00	22015.00	20662.00	25160.00	17670.00	15096.00	20662.00	22015.00	25160.00	20662.00	17957.95	25160.00	24815.00	20662.00	20662.00	23415.00	20662.00	16225.00	19470.00	20662.00	20662.00	20662.00	20662.00	20662.00	20662.00	20662.00	20662.00	20666.96
Land Preparation per acre (Rs)	965	965	900	960	850	1,200	965	910	965	1,000	965	900	900	965	500	1,000	1,000	850	965	1,200	965	1,000	1,000	965	965	965	965	965	965	965	965
Seed per acre (Rs)	3,433	3,433	3,500	3,000	3,000	3,200	3,433	4,900	3,433	3,000	3,433	3,500	3,400	3,433	3,500	3,500	3,500	3,400	3,433	3,900	3,433	3,500	4,000	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433	3,433
Fertilizer per acre (Rs)	1,775	1,775	1,800	2,180	1,800	1,620	1,775	1,570	1,775	1,500	1,775	1,890	1,280	1,775	2,270	2,640	1,600	1,500	1,775	1,890	1,775	1,500	1,500	1,775	1,775	1,775	1,775	1,775	1,776	1,775	1,775	1,775
Pesticides per acre (Rs)	455	455	455	800	400	455	455	500	455	455	455	400	400	455	400	400	400	455	455	400	455	400	500	455	455	455	455	455	455	455	455	435
Labor per acre (Rs)	4,194	4,194	4,750	5,100	3,000	4,500	4,194	4,750	4,194	3,000	4,194	4,450	4,150	4,194	3,655	4,950	4,250	4,100	4,194	4,800	4,194	3,500	3,950	4,194	4,194	4,194	4,194	4,194	4,194	4,194	4,194	4,194
Total Agriculture Input Costs per acre (Rs)	10,821	10,821	11,405	12,020	9,150	10,975	10,821	11,730	10,821	8,955	10,821	11,140	10,130	10,821	10,625	12,490	10,750	10,305	10,821	11,790	10,821	9,900	10,950	10,821	10,821	10,821	10,821	10,821	10,821	10,821	10,821	10,821
Net Agriculture Income per acre (Rs)	9,841	1,339	9,865	8,642	13,320	11,040	9,841	13,430	6,849	6,141	9,841	10,875	15,030	9,841	7,333	12,670	14,065	10,357	9,841	11,625	9,841	6,325	8,520	9,841	9,841	9,841	9,841	9,841	9,841	9,841	9,841	9,846

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total/ Mean
Area Cultivated per w/c (Acre)	51.15	54.33	37.75	67.03	30.75	26.00	41.38	67.50	6.25	16.00	15.60	12.78	11.50	6.45	43.08	199.15	28.50	16.45	35.30	81.38	95.55	13.63	91.33	10.00	1.00	7.00	0.00	6.00	0.00	0.00	1092.83
Gross Agriculture Revenue per w/c (Rs)	1,056,861	661,679	802,943	1,796,110	690,953	572,390	854,890	1,696,800	110,436	241,536	322,327	281,242	289,340	133,270	773,539	5,011,243	707,228	339,690	729,368	1,905,396	1,974,254	221,066	1,776,098	206,620	20,662	144,634	-	123,972	-	-	781,675
Cost Inputs:																															
Land Preparation per w/c	49,343	52,406	33,975	63,544	26,136	31,200	39,913	61,425	6,029	16,000	15,049	11,498	10,350	6,222	34,460	199,175	28,500	13,983	34,053	97,650	92,174	13,625	91,325	9,647	965	6,753	-	5,788	-	-	38,706
Seed per w/c	175,615	186,518	132,125	201,075	92,250	83,200	142,054	270,000	21,458	48,000	53,560	44,713	39,100	22,145	150,763	697,113	99,750	55,930	121,197	284,813	328,055	47,688	365,300	34,333	3,433	24,033	-	20,600	-	-	126,827
Fertilizer per w/c	90,774	96,409	67,950	167,974	56,425	42,120	73,427	105,975	11,092	24,000	27,685	24,145	14,720	11,447	97,780	525,822	45,600	24,675	62,646	153,799	186,569	20,438	136,988	17,747	1,775	12,423	-	10,648	-	-	70,335
Pesticides per w/c	23,250	24,693	17,150	69,620	12,300	11,818	18,807	33,750	2,841	7,273	7,091	5,110	4,600	2,932	17,230	79,670	11,400	7,477	16,045	32,550	43,432	5,450	45,663	4,545	455	3,182	-	2,727	-	-	17,936
Labor per w/c	214,506	227,821	179,313	443,828	92,250	117,000	173,513	320,625	26,219	48,000	65,421	56,849	47,725	27,049	157,438	985,916	121,125	67,445	148,036	390,600	400,705	47,688	360,734	41,937	4,194	29,356	-	25,162	-	-	169,682
Total Agriculture Cost Inputs per w/c	553,488	587,844	430,522	1,046,041	281,363	285,338	447,714	791,776	67,630	143,273	168,806	142,314	116,495	69,795	457,672	2,487,696	306,375	169,510	381,977	959,411	1,033,935	134,888	1,000,009	108,209	10,821	75,746	-	64,925	-	-	418,786
Taxes																															
Abiana per w/c	8,086	6,591	5,970	13,613	4,663	4,112	6,543	10,575	988	2,530	2,467	1,941	1,502	1,020	6,812	31,341	4,507	2,602	5,583	12,866	15,111	1,898	14,206	1,582	158	1,107	-	949	-	-	5,721
Agriculture Tax per w/c	2,453	450	1,367	5,263	681	-	113	450	-	-	-	150	384	2,636	733	1,907	1,425	225	663	1,089	3,051	450	3,000	338	488	38	-	80	-	-	827
Local Cess per w/c	512	543	378	981	306	260	414	676	63	160	156	123	95	85	431	1,982	285	165	383	814	956	120	898	100	10	70	-	80	-	-	962
Usher per w/c	10,070	10,895	7,432	21,942	9,848	5,734	10,041	15,652	1,230	3,150	3,071	2,515	2,756	1,467	10,646	45,552	6,398	3,239	6,950	24,245	19,505	4,380	30,422	1,969	197	2,656	-	2,264	-	-	8,781
Total Agriculture Land Taxes per w/c	21,124	20,280	15,147	41,878	15,600	10,106	17,110	27,492	2,281	5,840	5,694	4,729	4,738	5,188	18,622	80,782	12,616	6,230	13,746	38,997	38,623	6,848	48,526	3,988	853	3,872	-	3,348	-	-	15,881
Net Agriculture Income per w/c	482,250	53,554	397,274	719,391	393,998	276,946	390,066	679,073	44,526	92,423	147,827	134,199	168,107	59,285	297,245	3,442,765	386,237	184,150	333,644	886,997	901,696	79,330	729,363	94,423	8,989	65,619	-	55,699	-	-	355,089

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Water Duty	9.41	5.62	4.41	9.45	6.12	5.95	4.72	6.14	5.39	4.95	6.61	4.55	5.34	5.83	9.67	7.96	6.11	12.53	8.15	12.81	10.62	4.85	6.73	6.57	6.44	3.85	4.79	4.15	6.62	4.25	6.73

Source: Physical assessment survey by IIMI field staff, Sanghar during 10 October to 10 December

Analysis of Rice for Kharif 1997 of Heran Distributary, Sanghar

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	19R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Yield per acre (Kg)	1400.00	1000.00	1800.00	1527.27	1527.27	1527.27	1000.00	1527.27	1527.27	1527.27	1527.27	1527.27	1600.00	1600.00	2000.00	1600.00	1527.27	1527.27	1527.27	1600.00	1527.27	1600.00	1600.00	1527.27	1527.27	1527.27	1527.27	1527.27	1527.27	1527.27	1537.27
Farmgate price per Kg (Rs)	3.61	3.61	3.86	3.77	3.77	3.77	3.61	3.77	3.77	3.77	3.77	3.77	3.61	3.86	3.86	4.86	3.77	3.77	3.77	3.86	3.77	3.86	2.86	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77
Gross Agriculture Revenue per acre (Rs)	5063.65	3609.75	6947.55	5756.05	5756.05	5756.05	3609.75	5756.05	5756.05	5756.05	5756.05	5756.05	5775.60	6175.60	7719.50	7775.60	5756.05	5756.05	5756.05	6175.60	5756.05	6175.60	4575.80	5756.05	5756.05	5756.05	5756.05	5756.05	5756.05	5756.05	5768.29
Land Preparation per acre (Rs)	600	700	850	837	837	837	800	837	837	837	837	837	1,000	1,000	800	1,000	837	837	700	870	850	910	800	837	837	837	837	837	837	837	837
Seed per acre (Rs)	40	40	50	46	46	46	50	46	46	46	46	46	50	50	50	50	46	46	50	50	50	40	50	46	46	46	46	46	46	46	46
Fertilizer per acre (Rs)	1,200	890	1,200	1,159	1,159	1,159	1,800	1,159	1,159	1,159	1,159	1,159	1,500	1,025	1,150	1,240	1,159	1,159	1,280	1,400	1,000	1,000	700	1,159	1,159	1,159	1,159	1,159	1,159	1,159	1,159
Pesticides per acre (Rs)	425	425	425	425	425	425	425	425	425	425	425	425	400	425	525	400	425	425	400	425	400	425	425	425	425	425	425	425	425	425	425
Labor per acre (Rs)	1,180	1,100	1,218	1,159	1,159	1,159	860	1,159	1,159	1,159	1,159	1,159	1,250	1,159	1,900	1,260	1,159	1,159	1,200	1,630	1,208	224	1,116	1,159	1,159	1,159	1,159	1,159	1,159	1,159	1,159
Total Agriculture Input Costs per acre (Rs)	3,416	3,155	3,743	3,628	3,628	3,628	3,425	3,628	3,628	3,628	3,628	3,628	4,200	3,659	4,425	3,950	3,625	3,625	3,610	4,375	3,508	2,599	3,101	3,628	3,628	3,628	3,628	3,628	3,628	3,628	3,628
Net Agriculture Income per acre (Rs)	1,638	439	3,203	2,128	2,128	2,128	183	2,128	2,128	2,128	2,128	2,128	1,376	2,517	3,295	3,826	2,128	2,128	2,146	1,801	2,248	3,577	1,475	2,128	2,128	2,128	2,128	2,128	2,128	2,128	2,137

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	19R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total/ Mean
Area Cultivated per w/c (Acre)	46.20	6.00	27.73	74.18	11.75	0.00	1.50	6.00	0.00	0.00	0.00	2.00	16.08	35.15	9.75	26.43	20.50	5.00	12.73	21.65	40.68	6.00	40.00	4.50	9.00	0.00	1.00	1.00	0.00	0.00	423.73
Gross Agriculture Revenue per w/c (Rs)	233,479	21,659	192,621	426,958	67,634	-	5,416	34,536	-	-	-	11,512	87,067	217,072	75,458	205,470	117,999	28,780	73,246	133,084	234,127	37,054	183,024	25,902	51,804	-	5,756	5,756	-	-	82,314
Cost Inputs:																															
Land Preparation per w/c	27,720	4,200	23,586	62,079	9,834	-	1,200	5,022	-	-	-	1,674	16,075	35,150	7,020	26,425	17,157	4,185	8,908	18,749	34,574	5,460	32,000	3,766	7,532	-	837	837	-	-	11,792
Seed per w/c	1,848	240	1,386	3,588	569	-	75	291	-	-	-	97	764	1,758	488	1,321	993	242	636	1,078	2,034	240	2,400	218	436	-	46	46	-	-	693
Fertilizer per w/c	55,440	5,340	33,270	86,967	13,616	-	2,250	6,953	-	-	-	2,318	22,613	36,029	11,241	32,767	23,786	5,794	16,034	30,170	40,675	6,000	28,000	5,215	10,430	-	1,159	1,159	-	-	15,673
Pesticides per w/c	19,635	2,550	11,783	31,524	4,894	-	638	2,550	-	-	-	850	6,030	14,938	5,132	10,570	8,713	2,125	5,090	9,158	16,270	2,550	17,000	1,913	3,825	-	425	425	-	-	5,836
Labor per w/c	52,130	6,600	33,769	85,856	13,616	-	975	6,953	-	-	-	2,318	16,844	40,733	18,573	33,296	23,756	5,794	15,270	35,127	48,136	1,344	44,640	5,215	10,430	-	1,159	1,159	-	-	16,926
Total Agriculture Cost Inputs per w/c	157,773	18,930	103,775	269,112	42,630	-	5,138	21,768	-	-	-	7,256	63,315	128,608	43,254	104,379	74,375	18,140	45,937	94,281	142,688	15,594	124,040	16,326	32,663	-	3,626	3,626	-	-	51,241
Taxes:																															
Abiana per w/c	3,567	463	2,140	5,726	907	-	116	463	-	-	-	154	1,164	2,714	755	2,040	1,583	386	982	1,684	3,140	463	3,088	347	695	-	77	77	-	-	1,996
Agriculture Tax per w/c	1,527	1,630	983	2,147	923	-	1,241	2,025	-	-	-	388	129	194	1,282	5,513	455	351	984	1,751	2,867	360	2,699	300	30	-	-	180	-	-	944
Local Cess per w/c	462	60	277	742	118	-	16	60	-	-	-	20	151	352	96	264	205	50	127	218	407	60	400	45	90	-	10	10	-	-	141
Usher per w/c	2,079	270	1,248	3,653	743	-	68	270	-	-	-	90	1,089	1,663	609	1,650	1,148	225	573	1,217	2,146	540	3,128	203	675	-	68	45	-	-	788
Total Agriculture Land Taxes per w/c	7,635	2,423	4,648	12,268	2,690	-	1,440	2,818	-	-	-	633	2,524	4,921	2,753	9,467	3,790	1,012	2,686	4,848	8,559	1,423	9,315	895	1,490	-	155	312	-	-	3,956
Net Agriculture Income per w/c	68,071	396	84,198	148,578	22,314	-	(1,162)	9,950	-	-	-	3,623	21,229	63,543	29,459	91,624	39,834	9,628	24,642	33,955	82,881	20,836	49,674	8,881	17,662	-	1,973	1,816	-	-	29,317

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	19R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	9AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Water Duty	9.41	6.62	4.41	9.45	6.12	5.95	4.72	6.14	5.39	4.95	6.61	4.56	5.34	6.83	9.67	7.96	6.11	12.53	8.15	12.81	10.82	4.95	6.73	6.57	6.44	3.86	4.79	4.15	6.62	4.25	6.73

Source: Physical assessment survey by IIMI field staff, Sanghar during 10 October to 10 December

Analysis of Fodder for Kharif 1997 of Heran Distributary, Sanghar

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Yield per acre (Kg)	2000.00	2200.00	2200.00	2667.41	3280.00	2600.00	2800.00	2400.00	3000.00	2800.00	2600.00	3200.00	2400.00	2000.00	3600.00	3200.00	3000.00	2667.41	2800.00	2400.00	2667.41	2000.00	2400.00	2400.00	2400.00	2000.00	2400.00	2000.00	2720.00	3600.00	2607.41
Farmgate price per Kg (Rs)	0.64	0.51	0.89	0.66	0.76	0.59	0.79	0.51	0.74	0.76	0.76	0.64	0.51	0.64	0.76	0.79	0.64	0.66	0.64	0.89	0.66	0.51	0.89	0.51	0.64	0.76	0.64	0.59	0.39	0.39	0.66
Gross Agriculture Revenue per acre (Rs)	1271.50	1123.65	1948.65	1710.77	2495.26	1522.95	2200.10	1225.80	2207.25	2130.10	1977.95	2034.40	1225.80	1271.50	2738.70	2514.40	1907.25	1710.77	1786.10	2125.80	1710.77	1021.50	2125.80	1225.80	1525.80	1621.50	1525.80	1171.50	1049.24	1388.70	1712.97
Land Preparation per acre (Rs)	600	600	700	668	450	600	650	650	668	600	600	750	800	800	600	600	900	668	800	950	600	840	900	668	500	600	668	568	668	500	668
Seed per acre (Rs)	300	280	400	292	280	150	300	280	292	300	350	300	280	300	300	300	350	292	280	190	380	150	300	292	360	300	292	292	292	280	293
Fertilizer per acre (Rs)	1,200	900	1,000	1,017	680	1,020	1,200	1,260	1,017	890	720	1,260	1,260	700	1,050	1,150	1,260	1,017	700	800	750	700	1,200	1,017	1,200	1,500	1,017	1,017	1,017	1,000	1,017
Pesticides per acre (Rs)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labor per acre (Rs)	634	634	634	634	634	634	634	634	634	634	634	634	634	634	634	200	634	634	634	320	634	600	634	634	634	1,150	634	634	634	634	634
Total Agriculture Input Costs per acre (Rs)	2,734	2,414	2,734	2,630	2,024	2,404	2,784	3,390	2,630	2,424	2,304	2,944	2,974	2,234	2,584	2,450	3,144	2,630	2,414	2,260	2,364	2,190	3,034	2,630	2,694	3,550	2,630	2,630	2,630	2,414	2,630
Net Agriculture Income per acre (Rs)	(1,463)	(1,290)	(785)	(919)	471	(881)	(584)	(2,164)	(423)	(294)	(326)	(910)	(1,748)	(963)	155	64	(1,237)	(919)	(634)	(134)	(653)	(1,169)	(908)	(1,404)	(1,188)	(2,029)	(1,104)	(1,458)	(1,581)	(1,025)	(917)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total/ Mean
Area Cultivated per w/c (Acre)	56.55	104.25	54.85	40.00	31.88	59.73	74.65	78.88	102.70	58.10	64.30	67.60	15.33	14.25	38.95	99.18	32.75	56.55	94.80	45.66	64.40	17.38	69.00	27.50	10.50	31.75	13.38	24.63	37.50	14.50	1201.50
Gross Agriculture Revenue per w/c (Rs)	71,903	117,141	106,883	68,431	79,536	90,958	164,237	96,685	226,685	123,759	127,182	137,525	18,785	18,119	106,741	249,366	62,462	96,744	168,753	97,096	110,174	17,749	146,680	33,710	16,021	48,306	20,408	28,848	39,347	20,136	80,346
Cost inputs																															
Land Preparation per w/c	33,930	62,550	38,395	27,513	14,344	35,836	48,523	67,044	70,640	34,860	38,880	50,700	12,260	8,550	23,385	79,340	29,475	35,697	75,840	44,762	38,640	14,595	62,100	18,915	5,250	19,050	9,200	16,936	25,793	7,250	35,185
Seed per w/c	16,965	29,190	21,940	11,670	8,925	8,959	22,395	22,085	29,962	17,430	22,506	20,280	4,291	4,275	11,693	29,753	11,483	16,498	26,544	8,678	24,472	2,606	20,700	8,023	3,780	9,525	3,902	7,184	10,940	4,060	14,690
Fertilizer per w/c	67,860	93,825	54,850	40,661	21,038	60,920	89,580	99,383	104,397	51,709	46,296	85,176	19,310	9,975	40,924	114,051	41,265	57,484	66,360	36,540	48,300	12,163	82,800	27,954	12,600	47,625	13,596	25,032	38,120	14,500	50,818
Pesticides per w/c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Labor per w/c	35,853	738	689	674	666	694	709	1,079	737	692	698	702	649	648	673	299	667	691	729	366	698	517	703	662	645	1,182	647	659	672	649	1,856
Total Agriculture Cost Inputs per w/c	154,608	186,303	115,874	80,517	44,972	106,407	161,206	189,590	205,736	104,691	108,079	156,858	36,510	23,448	76,674	223,443	82,869	113,569	169,473	90,345	112,110	29,881	166,303	55,554	22,275	77,382	27,345	49,812	76,525	26,459	182,461
Taxes																															
Abiana per w/c	1,925	3,678	1,901	1,356	1,001	1,896	2,552	2,594	3,247	1,909	2,015	1,965	514	494	1,240	3,298	1,031	1,920	3,285	1,583	2,231	572	2,244	953	364	1,100	463	836	1,299	502	1,663
Agriculture Tax per w/c	1,882	3,910	2,084	1,280	1,165	2,049	2,946	2,816	3,676	2,104	2,206	2,232	280	570	1,417	3,511	1,145	1,577	2,841	1,409	2,437	660	2,590	1,040	360	1,270	455	965	1,180	340	1,747
Local Cess per w/c	556	1,033	549	400	288	547	737	749	937	551	582	568	148	143	358	952	298	554	948	457	644	165	648	276	105	318	134	241	376	145	488
Usher per w/c	2,121	3,947	2,057	1,725	1,840	2,555	3,660	3,187	4,133	2,179	2,411	2,535	814	703	1,956	4,321	1,627	2,121	3,791	2,531	2,565	1,111	4,661	1,088	756	2,306	595	1,327	2,363	863	2,272
Total Agriculture Land Taxes per w/c	6,483	12,467	6,600	4,761	4,295	7,147	10,094	9,341	11,992	6,743	7,214	7,303	1,756	1,909	4,970	12,082	4,100	6,172	10,865	5,980	7,877	2,508	10,142	3,356	1,616	4,994	1,648	3,369	5,217	1,850	6,162
Net Agriculture Income per w/c	(82,704)	(69,163)	(8,990)	(12,087)	34,564	(15,449)	3,031	(92,905)	20,950	19,068	19,103	(19,332)	(17,724)	(5,329)	30,067	25,923	(20,407)	(16,825)	(719)	6,750	(1,937)	(12,133)	(19,623)	(21,844)	(6,254)	(29,074)	(6,937)	(20,964)	(36,178)	(6,322)	(12,115)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Water Duty	9.41	6.62	4.41	9.45	6.12	5.95	4.72	6.14	5.39	4.95	6.61	4.65	5.34	5.63	9.67	7.96	6.11	12.53	8.15	12.61	10.82	4.85	6.73	6.57	6.44	3.65	4.79	4.15	6.62	4.25	6.73

Source: Physical assessment survey by IIMI field staff, Sanghar during 10 October to 16 December

Analysis of Wheat for Rabi 1997 of Heran Distributary, Sanghar

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Yield per acre (Kg)	1000.00	1200.00	1042.50	780.00	1042.50	780.00	1042.50	1042.50	1042.50	1042.50	1042.50	1042.50	1200.00	800.00	1120.00	1042.50	1400.00	1042.50	1120.00	1360.00	1042.50	880.00	1200.00	1042.50	1042.50	1042.50	1200.00	1200.00	780.00	720.00	1042.50
Farmgate price per Kg (Rs)	6.12	6.12	5.78	4.87	5.78	6.12	5.78	5.78	5.78	5.78	5.78	5.78	6.12	6.37	6.37	5.78	6.37	5.78	6.12	6.12	5.78	6.37	6.12	5.78	5.78	5.78	6.37	6.37	6.12	6.37	5.98
Gross Agriculture Revenue per acre (Rs)	6118.75	7342.50	6026.19	3790.25	6026.19	4650.25	6026.19	6026.19	6026.19	6026.19	6026.19	6026.19	7342.50	5095.00	7133.00	6026.19	8916.25	6026.19	6853.00	8321.50	6026.19	5604.50	7342.50	6026.19	6026.19	6026.19	7642.50	7642.50	4650.25	4585.50	6243.58
Land Preparation per acre (Rs)	1,000	1,000	1,000	800	886	800	1,000	900	800	886	700	800	700	800	886	886	890	1,000	1,200	1,000	886	910	800	1,000	670	886	1,000	1,000	700	800	886
Seed per acre (Rs)	400	350	340	300	350	350	350	350	350	350	350	400	400	350	350	350	300	350	300	400	350	300	400	350	300	350	300	300	350	450	350
Fertilizer per acre (Rs)	1,800	1,200	1,500	1,290	1,480	1,500	1,800	1,400	1,500	1,480	1,500	1,500	1,800	1,025	1,480	1,480	1,200	1,500	1,125	1,500	1,480	1,200	1,380	1,700	1,500	1,480	1,800	1,800	1,800	1,500	1,486
Pesticides per acre (Rs)	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
Labor per acre (Rs)	1,050	1,225	1,150	900	1,108	950	1,250	1,150	1,150	1,108	1,200	1,250	1,180	780	1,108	1,108	1,105	1,100	990	1,270	1,108	1,020	970	1,200	1,200	1,108	1,300	1,250	1,100	850	1,196
Total Agriculture Input Costs per acre (Rs)	4,350	4,175	4,390	3,690	4,224	4,000	4,800	4,200	4,200	4,224	4,150	4,350	4,480	3,355	4,224	4,224	3,895	4,350	4,015	4,670	4,224	3,830	3,950	4,650	4,070	4,224	4,800	4,750	4,350	4,000	4,224
Net Agriculture Income per acre (Rs)	1,769	3,168	1,636	10	1,802	650	1,226	1,826	1,826	1,802	1,876	1,676	2,863	1,740	2,809	1,802	5,021	1,676	2,838	3,752	1,802	1,774	3,393	1,376	1,956	1,802	2,843	2,893	350	585	2,020

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total/ Mean
Area Cultivated per w/c (Acre)	121.00	318.00	187.00	131.00	80.00	151.00	426.00	115.00	241.00	228.00	352.00	161.00	83.00	35.00	141.00	322.00	187.00	217.50	330.00	123.00	207.00	81.00	174.50	122.00	87.00	152.00	152.00	175.00	213.00	77.00	5390.00
Gross Agriculture Revenue per w/c (Rs)	740,369	2,334,915	1,126,897	494,733	482,095	702,188	2,567,155	693,011	1,452,311	1,373,971	2,121,218	970,216	609,428	178,325	1,005,753	1,940,432	1,667,339	1,310,696	2,261,490	1,023,645	1,247,421	453,965	1,281,266	735,196	524,278	915,980	1,161,660	1,337,438	990,503	353,064	1,134,896
Cost Inputs																															
Land Preparation per w/c	121,000	318,000	187,000	104,800	70,900	120,800	426,000	103,500	192,600	202,065	246,400	128,800	58,100	28,000	124,961	285,373	166,430	217,500	396,000	123,000	183,454	73,710	139,800	122,000	68,290	134,710	152,000	175,000	149,100	61,600	182,363
Seed per w/c	48,400	111,300	63,580	39,300	27,987	52,650	149,100	40,250	84,350	79,705	123,200	64,400	33,200	12,250	49,291	112,566	66,100	76,125	99,000	49,200	72,364	24,300	69,800	42,700	26,100	53,137	45,600	52,500	74,550	34,650	62,261
Fertilizer per w/c	181,500	381,600	280,500	168,990	118,400	226,500	766,800	161,000	361,500	337,440	528,000	241,500	149,400	35,875	208,680	476,560	224,400	326,250	371,250	184,500	306,360	97,200	240,810	207,400	130,500	224,960	273,600	315,000	383,400	115,500	267,513
Pesticides per w/c	48,400	127,200	74,800	52,400	32,000	60,400	170,400	46,000	96,400	91,200	140,800	64,400	33,200	14,000	56,400	128,800	74,800	87,000	132,000	49,200	82,800	32,400	69,800	48,800	34,800	60,800	60,800	70,000	85,200	30,800	71,867
Labor per w/c	127,050	389,550	218,050	117,900	86,633	143,450	532,500	132,250	277,150	252,605	422,400	201,250	97,940	27,300	156,216	356,749	206,635	239,250	326,700	156,210	229,338	82,620	169,265	146,400	104,400	168,403	197,600	218,750	234,300	65,450	202,777
Total Agriculture Cost Inputs per w/c	526,350	1,327,650	820,930	483,390	337,900	604,000	2,044,800	483,000	1,012,200	963,016	1,460,800	700,350	371,840	117,425	595,549	1,360,048	738,365	946,125	1,324,950	562,110	874,316	310,230	669,275	567,300	364,090	642,010	729,600	831,250	926,550	308,000	786,781
Taxes																															
Abiana per w/c	5,808	14,739	8,667	6,072	3,708	6,960	19,745	5,330	11,170	10,568	16,315	7,462	3,847	1,622	6,535	14,925	8,667	10,081	15,296	5,701	9,594	3,754	8,088	5,656	4,032	7,045	7,045	8,111	9,873	3,569	8,338
Agriculture Tax per w/c	6,012	15,494	8,180	2,804	4,293	7,765	11,325	7,574	14,820	9,574	10,864	7,764	3,480	325	8,865	13,898	5,413	9,409	12,726	4,522	6,967	2,816	8,344	4,523	3,332	6,574	8,409	9,143	9,886	5,164	7,802
Local Cess per w/c	1,210	3,180	1,870	1,310	800	1,510	4,260	1,150	2,410	2,280	3,520	1,610	830	350	1,410	3,220	1,870	2,175	3,300	1,230	2,070	810	1,745	1,220	870	1,520	1,520	1,750	2,130	770	1,797
Usher per w/c	12,342	32,436	19,074	13,362	8,180	15,402	43,452	11,730	24,582	23,256	35,904	16,422	8,466	3,570	14,382	32,844	19,074	22,185	33,660	12,546	21,114	8,262	17,799	12,444	8,874	15,504	15,504	17,850	21,726	7,854	18,326
Total Agriculture Land Taxes per w/c	25,172	65,850	35,791	23,548	16,981	31,676	78,782	25,784	52,783	45,678	66,603	33,259	16,623	5,867	31,192	64,887	35,025	43,850	64,981	23,999	39,745	15,642	35,976	23,842	17,108	30,643	32,478	36,854	43,617	17,357	36,052
Net Agriculture Income per w/c	186,846	941,415	270,175	(22,206)	127,234	66,512	443,574	184,227	387,328	365,277	593,815	236,607	220,964	56,033	379,012	515,498	903,949	320,721	871,559	437,435	333,359	126,093	566,015	144,053	153,080	243,327	399,582	469,333	20,337	27,727	332,653

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Mean
Water Duty	9.41	6.62	4.41	9.45	6.12	5.85	4.72	6.14	5.39	4.95	6.61	4.55	5.34	5.83	9.67	7.95	6.11	12.53	8.15	12.81	10.82	4.85	6.73	6.57	6.44	3.85	4.79	4.15	6.62	4.25	6.73

Source: Farmers Interview for Rabi 1996-97

Heran Distributary, Sanghar
Net Agriculture Income
For Kharif 1997

Gross Agriculture Revenue for Kharif 1997 (In Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-6T	K-8T	Total
Cotton	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rice	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sugarcane	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Orchard	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vegetables	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oil seeds	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fodder	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Agriculture Input Costs for Kharif 1997 (In Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-6T	K-8T	Total
Land preparation	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Seeds	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fertilizers	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pesticides	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Labour	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Agriculture Land Taxes for Kharif 1997 (In Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-6T	K-8T	Total
Abiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Tax	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Local Cess	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ushar	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Net Agriculture Income for Kharif 1997 (In Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-6T	K-8T	Total
Gross Agriculture Revenue	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Input Costs	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Land Taxes	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net Agriculture Income	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Detail Analysis (In Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-6T	K-8T	Total
Total Cropped Area	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total CCA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gross Agriculture Revenue per Cropped acre	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Gross Agriculture Revenue per CCA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Input Costs per Cropped acre	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Input Costs per CCA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Land Taxes per Cropped acre	[illegible]	[illegible]	[illegible]	314	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Agriculture Land Taxes per CCA	[illegible]	174	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net Agriculture Income per Cropped acre	[illegible]	[illegible]	[illegible]	4,417	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Net Agriculture Income per CCA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Heran Distributary, Sanghar
Net Agriculture Income
For Rabi 1996-97

Gross Agriculture Revenue for Rabi 1996-97 (In Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Wheat	740,369	2,334,915	1,126,897	484,733	462,095	702,188	2,967,155	603,011	1,452,311	1,373,971	2,121,215	970,216	805,428	178,325	1,005,753	1,840,432	1,667,339	1,310,696	2,261,490	1,022,545	1,247,421	453,965	1,281,266	735,195	524,278	915,990	1,161,880	1,337,458	990,603	353,084	34,646,874
Fodder	41,334	48,070	80,865	61,586	74,858	62,441	116,809	73,548	108,156	110,765	152,302	77,307	28,193	5,096	54,774	201,162	90,125	67,578	112,146	63,774	78,696	14,301	77,582	22,064	27,464	74,554	28,990	50,376	30,426	54,169	2,828,777
Sugarcane	116,902	26,468	67,345	30,850	35,291	-	366,203	74,984	33,715	247,036	38,082	30,880	46,526	-	77,200	410,260	154,399	46,320	17,646	30,850	67,348	87,051	178,862	-	-	4,411	66,171	105,509	52,837	51,760	2,467,879
Total	899,605	2,407,453	1,254,819	577,200	582,244	764,629	3,874,164	841,553	1,593,181	1,731,774	2,311,602	1,078,403	886,146	183,411	1,137,727	2,551,844	1,880,863	1,424,591	2,391,282	1,116,166	1,393,464	565,316	1,537,530	757,259	551,743	994,945	1,256,821	1,493,321	1,073,866	469,992	39,943,530

Agriculture Input Costs for Rabi 1996-97 (In Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Land preparation	184,350	348,000	216,900	135,862	91,600	145,400	540,300	169,800	251,503	293,665	325,600	163,600	86,400	30,400	152,711	433,073	225,630	254,119	450,000	156,700	222,754	105,270	206,900	134,361	67,280	166,010	176,569	217,177	179,847	93,700	6,399,710
Seeds	67,867	124,800	78,747	62,369	39,300	59,000	197,967	62,283	111,145	116,836	163,350	78,367	43,673	13,480	81,706	170,666	79,783	91,499	118,107	67,467	84,610	34,467	95,800	47,951	32,580	68,203	66,643	68,645	67,410	50,703	2,424,979
Fertilizers	257,423	426,800	324,613	215,238	149,247	266,320	954,213	280,267	443,310	481,747	616,440	299,133	193,707	36,875	284,063	686,140	312,227	361,033	420,923	218,253	356,973	137,853	341,040	225,997	162,100	299,853	313,814	382,910	429,599	174,007	10,018,099
Pesticides	81,083	134,800	90,833	61,033	41,867	80,400	278,833	90,867	121,400	160,267	180,400	73,033	46,767	14,000	77,983	243,500	117,867	99,950	136,933	67,833	98,833	59,533	119,750	46,800	34,800	82,033	79,300	87,000	100,000	48,067	2,883,867
Labour	167,367	421,867	241,700	147,283	114,600	171,467	629,533	184,867	325,290	326,405	455,400	232,800	121,173	30,033	181,641	474,966	251,235	273,417	372,483	181,493	289,655	107,220	221,882	156,700	116,700	202,870	220,833	295,850	262,317	101,867	7,253,674
Total	736,090	1,456,167	952,793	611,886	436,713	764,587	2,600,847	748,283	1,252,668	1,347,922	1,741,190	846,133	491,739	126,588	726,397	2,009,344	987,542	1,199,017	1,498,447	673,747	1,044,826	444,143	967,172	615,539	463,479	797,870	849,199	1,051,582	1,039,173	468,143	29,781,329

Agriculture Land Taxes for Rabi 1996-97 (In Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Abiana	10,381	19,250	11,546	8,433	5,736	12,522	34,223	9,510	26,956	25,995	31,981	15,624	6,004	2,502	10,257	29,192	14,088	13,489	17,973	7,977	13,290	6,959	14,350	6,278	4,656	8,867	9,568	24,433	17,552	9,864	429,314
Agriculture Tax	6,012	15,484	6,180	2,804	4,283	7,786	11,325	7,874	14,620	8,574	10,864	7,764	3,480	325	6,865	13,866	5,413	8,409	12,726	4,522	6,967	2,816	8,344	4,523	3,332	6,574	8,406	8,143	9,866	5,184	226,866
Local Cess	1,830	3,840	2,290	1,790	1,180	2,290	5,820	1,820	4,040	3,870	5,340	2,580	1,170	450	1,855	4,950	2,530	2,735	3,970	1,630	2,700	1,170	2,515	1,400	1,050	2,020	1,860	3,360	2,960	1,980	76,615
Water	18,098	36,324	22,824	17,078	11,310	22,302	56,977	18,143	41,662	39,194	53,492	25,585	11,429	4,545	18,638	49,307	26,337	27,004	36,836	15,921	26,477	11,787	25,866	13,784	10,224	19,292	18,617	34,576	29,076	15,279	762,639
Total	36,321	76,898	42,840	30,071	22,319	44,900	108,345	37,347	86,701	78,233	101,656	51,833	22,082	7,823	36,615	97,346	47,347	52,637	73,903	30,050	49,433	22,731	50,311	25,986	19,262	36,752	38,443	71,531	59,376	31,867	1,495,627

Net Agriculture Income for Rabi 1996-97 (In Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Gross Agriculture Revenue	899,605	2,407,453	1,254,819	577,200	582,244	764,629	3,874,164	841,553	1,593,181	1,731,774	2,311,602	1,078,403	886,146	183,411	1,137,727	2,551,844	1,880,863	1,424,591	2,391,282	1,116,166	1,393,464	565,316	1,537,530	757,259	551,743	994,945	1,256,821	1,493,321	1,073,866	469,992	39,943,530
Agriculture Input Costs	736,090	1,456,167	952,793	611,886	436,713	764,587	2,600,847	748,283	1,252,668	1,347,922	1,741,190	846,133	491,739	126,588	726,397	2,009,344	987,542	1,199,017	1,498,447	673,747	1,044,826	444,143	967,172	615,539	463,479	797,870	849,199	1,051,582	1,039,173	468,143	29,781,329
Agriculture Land Taxes	36,321	76,898	42,840	30,071	22,319	44,900	108,345	37,347	86,701	78,233	101,656	51,833	22,082	7,823	36,615	97,346	47,347	52,637	73,903	30,050	49,433	22,731	50,311	25,986	19,262	36,752	38,443	71,531	59,376	31,867	1,495,627
Net Agriculture Income	124,194	874,439	259,277	(64,756)	123,211	15,093	365,272	55,923	253,812	305,620	468,755	180,437	372,344	48,999	374,715	445,154	845,974	171,937	819,332	414,462	299,205	98,442	520,047	115,734	69,019	160,323	309,219	380,208	(45,683)	(31,068)	8,273,573

Detail Analysis (In Rupees)

W/C #	10R	11R	12R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	9R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Total Cropped Area	210.00	422.00	277.00	249.00	164.00	244.00	656.00	217.00	405.00	399.50	545.00	267.00	125.00	48.00	197.50	636.00	265.00	286.50	387.00	273.00	352.00	117.00	310.00	140.50	108.00	237.00	186.00	338.00	296.00	156.00	9,513.00
Total CCA	581.10	1,067.62	903.28	321.93	316.70	479.60	674.73	580.95	702.15	496.48	562.86	490.16	236.43	223.88	430.40	831.33	309.95	527.30	565.66	287.93	419.10	438.85	802.98	425.45	408.25	543.93	357.93	656.33	443.36	290.45	15,873.15
Gross Agriculture Revenue per Cropped acre	4,279	5,705	4,456	2,314	3,648	3,134	4,693	3,878	3,934	4,335	4,241	4,039	3,469	3,821	3,761	4,012	7,098	4,972	6,023	4,098	3,939	4,632	4,960	5,390	5,109	4,196	6,757	4,416	3,626	3,006	4,530
Gross Agriculture Revenue per CCA	1,548	2,259	2,494	1,799	1,858	1,564	4,556	1,449	2,269	3,487	3,966	2,200	2,916	819	2,643	2,748	6,068	3,782	4,227	3,864	3,361	1,286	1,915	1,780	1,351	1,829	3,511	2,268	2,422	1,961	2,556
Agriculture Input Costs per Cropped acre	3,515	3,450	3,440	2,457	2,636	2,888	3,979	3,454	3,993	3,374	3,195	3,168	3,934	2,637	3,688	3,177	3,727	3,649	3,774	2,468	2,968	3,796	3,164	4,381	3,736	3,366	4,563	3,141	3,978	3,881	3,342
Agriculture Input Costs per CCA	1,279	1,364	1,693	1,991	1,378	1,469	3,854	1,293	1,784	2,899	2,867	1,726	2,889	963	1,692	2,988	3,186	2,006	2,649	2,349	2,493	1,912	1,229	1,447	988	1,467	2,372	1,613	2,389	1,797	1,910
Agriculture Land Taxes per Cropped acre	173	182	155	121	146	184	166	171	214	196	167	194	177	163	201	183	179	184	185	110	140	194	162	185	178	155	207	212	204	204	176
Agriculture Land Taxes per CCA	63	72	85	93	75	94	164	64	123	157	174	109	94	35	93	165	153	109	130	104	118	52	63	61	47	68	107	109	138	122	99
Net Agriculture Income per Cropped acre	591	2,072	864	(260)	864	62	555	273	627	765	860	676	1,379	1,021	1,872	883	3,192	949	2,964	1,518	822	841	1,613	824	1,185	677	1,985	1,886	(154)	(199)	972
Net Agriculture Income per CCA	214	819	479	(291)	417	31	538	162	362	612	864	368	732	219	638	466	2,729	516	1,448	1,448	690	224	623	272	316	295	1,632	547	(363)	(119)	548

Heran Distributary, Sanghar
Net Agriculture Income
For the Year 1996-97

Gross Agriculture Revenue for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Cotton (Kharif)	1,541,285	4,271,004	2,075,891	884,307	1,059,768	2,292,462	2,673,653	2,813,292	4,772,560	2,264,396	3,777,463	2,750,246	1,368,458	66,474	3,325,549	5,475,797	1,922,801	3,149,301	2,324,890	1,601,803	2,459,241	837,296	1,977,422	1,068,341	980,761	1,167,023	4,560,881	2,706,536	3,114,421	1,931,374	71,023,221
Rice (Kharif)	233,479	21,658	192,621	426,995	67,634	-	5,415	34,536	-	-	-	11,612	67,087	217,072	75,458	205,470	117,999	28,780	73,245	133,084	204,127	37,054	183,024	25,902	51,804	-	5,756	5,756	-	-	2,430,245
Sugarcane (Kharif)	1,056,861	661,675	802,943	1,796,110	890,953	572,380	864,890	1,698,300	110,438	241,536	322,527	261,242	289,340	133,270	773,536	5,011,243	707,226	339,890	729,366	1,905,396	1,974,254	221,066	1,778,098	206,820	20,662	144,634	-	123,972	-	-	17,812,745
Orchard (Kharif)	209,764	29,381	84,429	39,643	247,177	612,076	141,500	1,216,537	3,240,083	2,056,496	1,440,328	234,264	-	1,017,690	199,218	116,257	116,257	61,603	29,681	4,817	91,004	262,709	1,924,237	556,799	-	70,003	8,085	2,355,834	934,284	-	10,812,745
Vegetables (Kharif)	13,234	4,411	4,411	-	-	35,291	1,103	4,411	43,773	57,349	4,328	41,247	2,757	-	221	11,029	-	-	2,206	4,411	4,411	6,374	45,871	-	-	-	5,477	-	-	-	314,163
Oilseeds (Kharif)	8,900	54,063	4,245	1,389	3,420	21,291	13,882	2,756	8,161	15,061	14,377	11,981	-	-	-	6,230	2,736	6,161	2,738	2,396	2,054	80,145	56,803	-	-	-	-	-	-	-	2,710,372
Fodder (Kharif)	71,903	111,141	106,863	58,431	79,536	90,956	164,227	96,685	226,585	122,799	127,182	137,525	18,785	18,119	106,741	249,386	62,462	96,744	168,753	97,096	110,174	17,749	146,680	33,710	16,021	48,308	20,408	28,846	39,347	20,136	3,710,372
Wheat (Rabi)	740,386	2,334,815	1,126,897	464,733	462,095	702,198	2,567,155	993,011	1,452,311	1,373,871	2,121,218	970,216	609,428	178,325	1,005,783	1,840,432	1,667,339	1,310,696	2,261,490	1,020,545	1,247,421	453,965	1,281,266	735,195	524,278	915,880	1,161,660	1,337,436	990,500	353,094	34,846,674
Fodder (Rabi)	41,324	66,070	50,665	61,568	74,858	52,441	118,805	73,548	108,155	110,765	152,302	77,307	28,193	5,066	54,774	201,152	59,125	67,578	112,146	63,774	78,696	14,301	77,592	22,064	27,464	14,554	28,990	50,375	30,425	54,759	2,028,277
Vegetables (Rabi)	116,902	26,458	57,348	30,880	36,291	-	388,203	74,994	32,715	247,038	38,082	30,880	48,525	-	77,200	410,290	154,399	46,320	17,646	30,880	57,348	97,051	178,662	-	-	-	5,477	-	-	-	2,487,879
Total	4,036,838	7,824,823	4,466,132	3,816,619	2,740,733	4,389,097	6,836,783	6,908,054	8,882,880	6,449,964	7,997,965	4,346,420	2,452,594	1,635,042	5,782,150	13,710,195	4,809,348	5,107,979	5,732,165	4,667,802	6,268,729	2,019,708	7,653,754	2,648,627	1,620,991	2,430,390	5,851,951	6,769,222	5,176,743	2,422,718	156,706,805

Agriculture Input Costs for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Land preparation	386,006	831,979	470,149	399,325	207,533	458,856	846,386	486,334	729,565	530,275	713,886	433,643	202,948	66,962	395,349	1,055,281	423,954	524,866	886,350	426,909	564,029	219,419	586,866	279,909	156,412	332,466	449,887	430,842	454,940	178,950	14,133,703
Seeds	293,870	459,532	261,295	345,624	189,187	184,018	430,508	396,848	271,084	246,966	323,153	205,604	109,797	43,799	291,435	1,004,434	226,048	235,959	330,437	383,040	501,940	102,500	542,466	117,894	61,167	143,180	102,704	144,237	180,959	80,797	8,194,026
Fertilizers	846,873	1,129,990	767,136	950,610	336,007	655,282	1,474,218	775,464	1,360,878	958,549	1,328,669	878,054	475,840	106,115	874,135	1,974,584	711,748	857,268	927,620	612,196	829,456	252,505	929,452	471,630	302,529	629,551	696,932	854,980	899,122	421,853	23,459,168
Pesticides	334,820	765,343	435,067	280,006	235,998	418,752	750,240	437,700	833,024	510,973	711,128	496,736	235,768	44,356	574,226	985,323	422,079	470,806	616,206	328,417	421,869	161,410	446,836	244,891	179,780	365,496	501,992	616,634	582,300	307,183	13,817,377
Labor	862,480	1,801,738	986,194	864,223	503,051	909,956	1,306,445	1,218,529	1,915,020	1,167,555	1,676,508	1,144,947	509,018	110,139	1,075,923	2,735,935	862,810	991,908	1,281,190	964,611	1,192,506	367,834	1,255,329	521,023	307,843	527,945	985,470	1,220,399	1,067,405	315,019	30,552,815
Total	2,924,129	4,878,782	2,919,840	2,849,788	1,493,796	2,626,846	4,822,798	3,296,865	5,209,569	3,413,912	4,753,444	3,158,784	1,533,376	391,283	3,811,067	7,755,567	2,646,638	3,079,796	4,043,803	2,717,178	3,509,952	1,103,668	3,660,948	1,635,147	1,007,730	1,998,623	2,796,734	3,267,072	3,173,726	1,364,703	90,157,889

Agriculture Land Taxes for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Abiana	37,936	86,398	34,520	35,162	22,895	40,127	87,233	42,715	74,392	51,839	66,669	42,600	17,224	7,494	41,660	95,719	33,018	38,107	54,025	33,575	48,127	17,886	54,720	19,454	12,652	24,789	27,185	53,111	43,345	20,891	1,251,185
Agriculture Tax	26,707	54,956	21,589	17,072	16,595	35,800	38,408	35,868	84,420	52,295	54,576	45,143	11,045	4,333	42,559	81,804	21,106	25,728	36,875	15,820	27,851	12,166	36,511	18,688	9,447	19,522	21,177	50,391	34,510	11,837	841,993
Local Cess	5,012	9,660	5,078	4,480	3,074	6,491	9,895	5,587	9,552	7,575	9,301	5,875	2,480	1,092	5,244	11,732	4,716	5,808	8,622	4,278	6,470	2,515	6,949	3,002	2,093	4,086	4,109	6,561	6,150	3,003	169,423
Urban Cess	61,062	131,760	62,077	58,646	53,797	74,505	140,751	80,037	129,340	92,875	114,720	71,140	36,509	8,876	82,662	176,299	58,273	75,658	114,530	76,356	94,186	50,023	135,973	36,385	37,128	79,144	77,896	106,893	109,424	53,233	2,445,383
Total	130,738	282,827	123,263	115,379	96,362	155,123	276,286	164,207	297,703	211,641	245,266	164,758	69,159	22,794	172,275	365,554	127,113	145,602	214,057	130,129	166,618	82,593	237,152	79,529	61,321	127,512	130,367	216,956	193,428	88,963	4,827,982

Net Agriculture Income for the Year 1996-97 (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Gross Agriculture Revenue	4,036,838	7,824,823	4,466,132	3,816,619	2,740,733	4,389,097	6,836,783	6,908,054	8,882,880	6,449,964	7,997,965	4,346,420	2,452,594	1,635,042	5,782,150	13,710,195	4,809,348	5,107,979	5,732,165	4,667,802	6,268,729	2,019,708	7,653,754	2,648,627	1,620,991	2,430,390	5,851,951	6,769,222	5,176,743	2,422,718	156,706,805
Agriculture Input Costs	2,924,129	4,878,782	2,919,840	2,849,788	1,493,796	2,626,846	4,822,798	3,296,865	5,209,569	3,413,912	4,753,444	3,158,784	1,533,376	391,283	3,811,067	7,755,567	2,646,638	3,079,796	4,043,803	2,717,178	3,509,952	1,103,668	3,660,948	1,635,147	1,007,730	1,998,623	2,796,734	3,267,072	3,173,726	1,364,703	90,157,889
Agriculture Land Taxes	130,738	282,827	123,263	115,379	96,362	155,123	276,286	164,207	297,703	211,641	245,266	164,758	69,159	22,794	172,275	365,554	127,113	145,602	214,057	130,129	166,618	82,593	237,152	79,529	61,321	127,512	130,367	216,956	193,428	88,963	4,827,982
Net Agriculture Income	1,379,152	2,663,207	1,443,029	1,149,538	1,186,867	1,606,728	1,849,791	3,043,982	4,485,796	2,963,310	2,998,636	1,222,877	851,025	1,221,054	2,909,617	5,619,074	2,035,597	1,881,762	1,464,305	2,019,897	2,592,158	833,444	3,755,655	933,952	551,940	304,255	2,924,850	3,285,194	1,863,589	1,029,052	61,720,933

Detail Analysis (in Rupees)

W/C #	10R	11R	13R	14L	15L	16AR	16R	17AL	17AT	17BL	18AT	18R	1L	2R	3L	4R	5L	6L	7L	8AL	8L	8AR	8R	K-1AL	K-1L	K-2R	K-3L	K-4R	K-5T	K-6T	Total
Total Cropped Area	537.65	1,000.92	556.63	523.86	343.40	566.05	1,062.45	583.73	967.18	771.00	941.10	580.50	267.03	112.18	536.43	1,314.18	483.56	613.43	864.18	544.78	729.80	251.85	753.35	300.70	212.25	445.63	410.93	657.10	515.00	300.75	17,835.73
Total CCA	561.10	1,067.82	603.29	321.85	218.70	479.60	874.75	580.95	702.15	496.48	582.88	490.15	235.43	222.96	430.40	931.33	309.96	527.30	565.66	287.88	419.10	436.85	802.98	425.48	408.25	543.93	357.93	656.33	443.38	260.45	15,873.18
Gross Agriculture Revenue per Cropped acre	13,848	14,986	16,685	14,997	15,189	14,319	14,154	19,330	19,146	17,149	18,596	15,191	18,889	26,441	19,494	20,486	28,486	16,236	13,153	17,890	16,861	13,617	18,755	17,196	15,365	11,079	27,187	20,952	16,471	16,504	17,282
Gross Agriculture Revenue per CCA	6,942	7,329	8,914	11,854	9,609	9,152	10,289	11,203	14,232	12,962	13,721	9,276	10,418	7,360	13,458	14,721	15,515	9,683	10,116	16,907	14,958	4,903	9,532	6,225	3,971	4,488	16,350	10,292	11,662	9,302	10,396
Agriculture Input Costs per Cropped acre	5,966	5,301	10,674	9,305	9,216	8,819	8,424	10,383	10,259	8,833	10,800	10,346	11,824	6,763	10,423	11,833	11,317	8,895	9,223	9,967	8,493	8,667	9,215	10,748	9,532	8,122	12,824	10,052	10,207	8,780	9,964
Agriculture Input Costs per CCA	4,344	4,579	5,802	7,939	4,968	5,477	7,146	5,675	7,418	6,835	8,155	6,445	6,913	1,747	8,896	8,327	8,538	5,841	7,149	9,439	8,375	2,515	4,358	3,843	2,468	3,674	7,362	4,963	7,158	5,009	5,961
Agriculture Land Taxes per Cropped acre	461	560	443	435	545	526	527	539	396	555	539	554	526	395	992	504	544	466	486	478	431	538	384	519	582	596	615	687	621	588	533
Agriculture Land Taxes per CCA	225	246	248	361	396	325	388	284	424	424	421	336	280	161	400	380	419	276	378	452	396	188	295	187	156	234	364	330	436	343	329
Net Agriculture Income per Cropped acre	4,422	5,164	5,169	4,157	5,428	4,974	4,269	8,417	8,281	7,656	7,247	4,992	6,519	19,284	5,479	8,328	8,635	5,873	5,444	7,425	6,917	6,292	8,956	5,931	5,251	1,366	13,747	10,332	5,643	7,125	6,795
Net Agriculture Income per CCA	2,373	2,519	2,867	3,972	3,724	3,259	2,741	5,243	6,389	5,733	5,145	2,495	3,615	5,482	6,961	6,033	6,567	3,568	2,588	7,916	6,185	1,899	4,677	2,195	1,352	559	8,425	4,966	4,066	3,951	4,895

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