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NATURE AND LEVEL OF CROPS DAMAGES BY FLOODS ALONG THE RIVER JHELUM

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ABSTRACT

In this research the effects of floods on crops assessed. Flood is a natural hazard which effect on crops. Due to drastic change in the climatic condition the hazard of flood enhance which devastate the property of the farmers and their agricultural lands alongside the river. This study carried out along the river Jhelum. For this research primary and secondary method was used to collect the data from the farmers who had their agriculture lands in the study area. The secondary data was obtained from Agriculture Extension Department Jhelum. Three hundred farmers were choosed for sampling. To collect the data questionnaire was developed. The questionnaire was in open and close ended form. There were fifteen union councils which laying along the river. For collecting the data stratified random sampling technique was used. After the collection of data SPSS software was utilized and descriptive statistical analysis performed. During the interview ninety percent farmers replied that floods effects on the crops production while ten percent farmers were against from them they replied that flood is a blessing for agriculture land.

Keywords: Crops, Damage, Floods, Level, Nature, River

1. INTRODUCTION

Agriculture is a backbone of Pakistan. Most of the people economy depends upon agriculture sector. But floods create threat for the farmers and disturb the life on the earth surface. When floods take place water stand in the farm lands. In Jhelum district river flood occur and destroy the land of agriculture which called *"Bella"*. The major crops of the study area were wheat, rice, sugarcane, millet and fodder. In the kharif season the floods occur so most of the farmers cultivated rice crops because rice crop can bear the standing water in the field. The sugar cane was also dominant crop in the flooded area. The millet and fodder crops cannot bear the excessive water in the farms.

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Irmak and Rathje (2008) described that the excess water impact on the growth of crops and the production disturb, due to this hazard fertility of the soil also changed. The surplus of water losses yield of the crops and caused root rotting diseases. Wassmann, Hien, Hoanh, and Tuong (2004) found the impact of climate change on rise of sea level in the Vietnamese Mekong Delta. They measured sea level during the flood occurrence when flood intensity at the high level and they used hydraulic model to find out the water level. In the research GIS techniques were used to demarcate areas with different levels of vulnerability. In the central part of VMD due to the long period and high intensity of flood rice crops affected and adverse impact of floods also effected three cropping season; main rain fed crop, Winter- Spring and Summer- Autumn. Rosenzweig, Tubiello, Goldberg, Mills, and Bloomfield (2002) highlighted that in US the current data shows due to the high precipitation the crops damage and other floods related destruction had seen. Due to climatic change there is probability of high intensification of floods and agriculture destruction would increase as compare to the present. The study also focused on abundance of soil moisture negative effect on the production of crops. Gilbert, Rainbolt, Morris, and McCray (2008) stated that sugarcane is a vital crop of Florida in flood prone areas due to the interrelate effects of soil subsidence, tropical storms and pumping restrictions. But long time flooding creates demolition and reduced leaf nutrient content. Bukhari and Rizvi (2017) indentified that 1992-2010 floods were more dangerous and destroyed standing crops over an area of 1.93 million acres in Pakistan. During the year 2010 eighty percent of the people economy depends upon agriculture sector. The floods and torrential rainfall not only demolished the farmlands but also destroyed the property and infrastructure of the roads, houses and irrigation system. It has been estimated that total loss by flood was 429 billion rupees from this 89 percent loss was from the agriculture sector. Lauer (2004) described that standing water in the agriculture land caused water logging in the soil due to this roots injured. Floods reduced the exchange of oxygen between soil and atmosphere at the end leading to decreased total root volume. If flood do not effect on the roots of crops than it disturb the production of the crops. Mandal (2014) pointed out that there were two main risk which disturbed the farmers, these risks were production risk and price risk. The production risks derived due to the weather related circumstance such as flood, drought and rainfall. These risks created pest and diseases of crops. On the other hand price risk generate with supply and demand factors. He also illustrated that the 75% population of Assam state depend on agriculture sector. But agriculture is under the threat of flood risk due to the variation in the flood frequency, intensity and flood timing. Mahesh (1999) described that to cope the productivity and price risk the diversification in the cropping pattern is an important approach. Khan (2011) pointed out that the history of the natural hazard and disaster indicates Pakistan is one of the most susceptible country of the world for the natural disaster. In Pakistan there are many kind of disaster like floods, landslide, drought, and earthquake. But floods are more dangerous which cause to damage the human lives and their

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properties. In Pakistan floods occur due to the torrential rain fall in monsoon. Sometimes snow melt and increase the water intensity which flow from the banks of the rivers than this factor cause insensitive flooding in most of the Indus basin areas and its tributaries which are Jhelum, Chenab, Ravi and Sutlej in Pakistan. In this research floods effects on the nature and level of crop was found. In the study area two nala flows which join the river Jhelum. These two nallas are *Nala Gahan* and *Nala Banaha* which adversely affect the crops and also affect the fertility of the soil. In the research floods economic impact on the farmer's community was also ascertained.

2. MATERIALS AND METHODS

The research based on primary and secondary data sources. The primary data was collected through the questionnaire. The respondents of this study were farmers who had their agriculture lands along the river Jhelum. The questionnaire was both in open and close ended form. In the questionnaire farmers were categorized on the base of their quantity of land. The farmers who had the land 0-5 acres called small scale farmers, 5-10 acres semi medium farmers, 10-15 acres medium farmers and those farmers who had the land more than 15 acres they entitled large scale farmers. The data was collected from three hundred farmers through stratified random sampling technique. There were 15 union council's farmers who had agriculture land along the river. From each union council twenty questionnaire were filled. The secondary data was obtained from the Agriculture Extension Department Jhelum. All the data which was collected with the help of primary data sources was analyzed by the SPSS and Microsoft Excel software. On this data descriptive statistical analysis was performed. The study area map was made by the Arc GIS software.

2.1 Study Area:

The research was conducted in Jhelum District, Punjab Pakistan. District Jhelum is situated in the northern part of Punjab province, and is comprised of four Subdivisions: namely Jhelum, Dina, Pind Dadan Khan and Sohawa. River Jhelum forms a natural boundary with Gujrat, Mandi Bahauddin and Sargodha districts on the east and south side, whereas on the west, Rawalpindi and Chakwal districts and in north Mangla reservoir and Mirpur district of Azad Kashmir are situated.

Geographically Jhelum is laying 32◦ 56' North latitude and 73◦ 44' East longitude. Tehsil Jhelum and tehsil PD khan is bounded east and south east by the Jhelum river and effected by the floods. In tehsil Jhelum two main tributaries also affected the agriculture lands their names are Nala Gahan and Nala Banaha. Jhelum District has a total area of 858,767 acres (3,475.31 km^2), out of which 316,815 acres (1,282.10 km^2) are cultivated. The tehsil Pind Dadan Khan laying between 32◦ 27' and 32◦ 50' N and 72◦ 32' and 73◦ 29' E with an area of 875 square miles.

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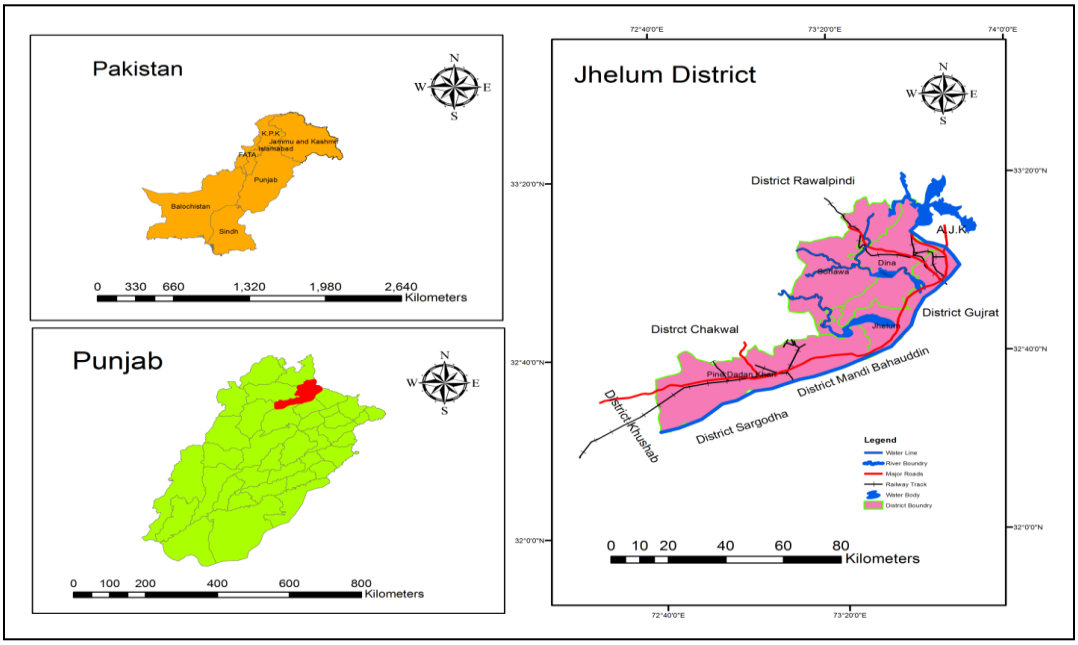

(Study Area Map)

3. RESULTS AND DISCUSSION

In the result and discussion there is all the data which gained from the farmers presented by tables and figures. The data was analyzed by descriptive statistical method. The description of all the data which had been analyzed are as under.

3.1 Farmer's Economy Related to Agriculture Activity

Agriculture is a basic need for food and economy growth. In Jhelum most of the farmers have small agriculture areas due to the unconsolidation of lands that's why the agriculture activity of the farmers was at middle level. The main Socio-economic hinders addressed through parameter like size of landholding, literacy, tenure status, household size. The small farmers of the area mostly practice subsistence farming and employ family labors to save expenditure. It is assumed that adopting modern agriculture is not easy for small scale farmer due to farm size. This research shows the economic activity of the farmers through the following table:

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Table: 3.1 Economy Related to Agriculture Activity

Economic Condition	Frequency	Percent
0-25%	89	29.7
26-50%	128	42.7
51-75%	60	20
76-100	23	7.7
Total	300	100

This table indicates that the respondents of this research had 89 farmers those who had economic activity between 0 to 25%, 128 farmers were those whose economic dependencies upon agriculture were 26-50%. In this range the farmers were more than others. Most of the farmers partially income depend upon agriculture. In 51-75% range the numbers of the farmers were sixty and 23 farmers were those who totally depend upon agriculture. Their main occupation or activity was related to agriculture. The ranges of those farmers were 76-100%.

3.2 Economic Impact of Floods on the Farmer's Community

The economic impacts of flood among the farmers alongside the river Jhelum have different views which they bear during the flooded year. The following diagram shows the economic impact of flood on the farmer's community.

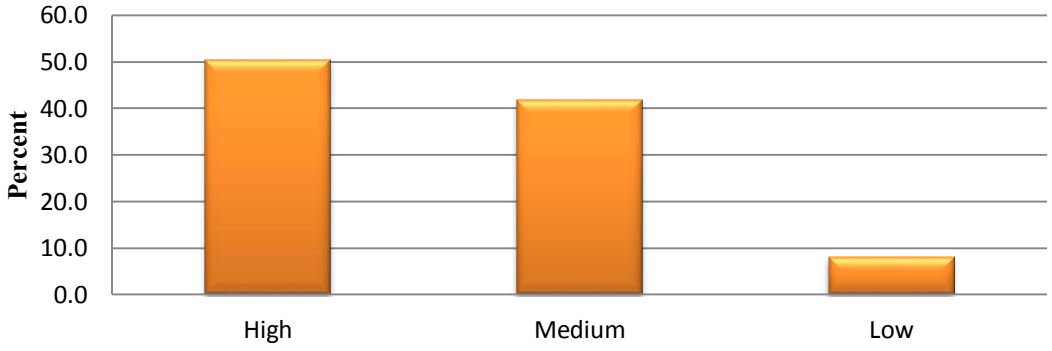

Figure: 3.1 Economic Impact of Flood on Farmer's Community

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The figure (3.1) indicates that 50.3% farmers were those who replied that when the floods occur than economically impact highly on their community. Their expectation became eradicate which they connect with the production of crops. Some of the farmers were those whose response was that during the flood they have to bear floods economic impact at medium level their percentages were 41.7%. In this type of classification the farmers who have to face at low level economic impact they were 8%.

3.3 Farmers Recognition about the Flood Effect on Crop Production:

During the data collection farmer's recognition were taken that the flood effected on crop production. The following table show clearly about it.

Table: 3.2 Floods Effects on Crop Production

Flood Recognition	Frequency	Percent
Yes	270	90
No	30	10

During the interview 90% farmers were those who response that flood is the curse for the agriculture lands because it disturbed the production of crops. While 10% farmers were those who replied that flood was the blessing because it deposited the fluvial material and increased the fertility of the soil.

3.4 Major Crops Effects by Floods

The flood occurs mostly when kharif crops have been grown. During the flood the crops which mostly destroyed their explanation are as under:

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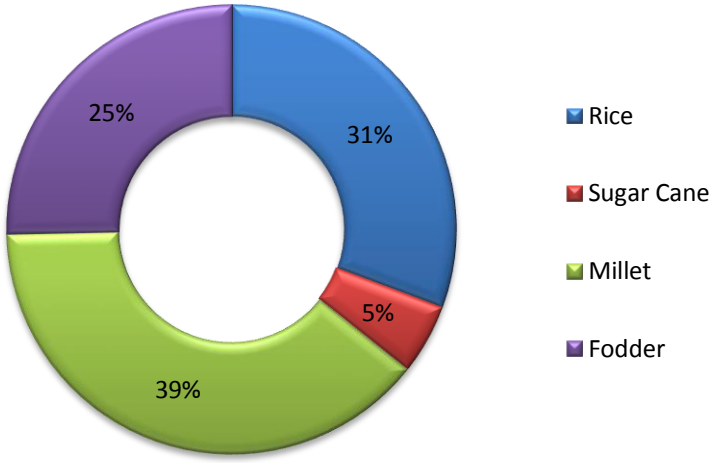

Figure: 3. 2 Major Crops Effect by Floods

The above diagram (3.2) shows 31% farmer's responses were that during the flood their rice crops destroyed. However the rice is that crops which can bear the standing water but due to the more intensity of flood and standing of water for a long time the roots of rice plants demolished. About the crops of sugar cane 5% farmer's replied were that their sugar cane crops destroyed during the flood. Millet and fodders were those crops which cannot bear the pressure and standing the water. These crops are in that nature their roots are very soft and fall the crops abruptly. The farmers who answered that millet crops destroyed during the flood their percentage were 39 and about the fodder 25% farmers were respondents. During the interview the farmers said that if flood occur the millet and fodder crops do not fell down than due to the standing of water crops involved into the crops diseases.

3.5 Crops Affected Areas in Acres

The areas which effect through flood their description are given below with the help of a diagram:

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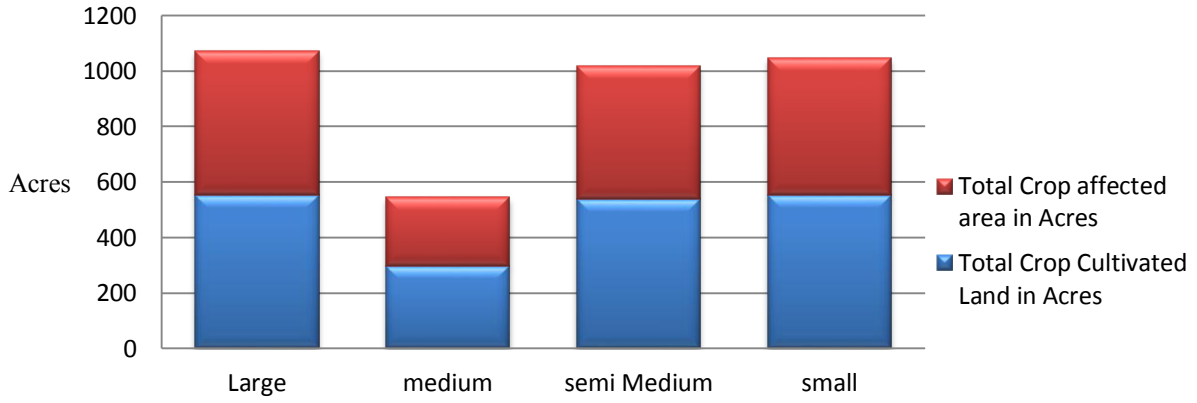

Figure: 3.3 Major Crops Affect Areas in Acres

This diagram shows that the farmer's conditions have been categorized on the base of their agriculture land areas. Those farmers who had land 0-5 acres called small farmers. The small farmers had total cultivated land 553.12 acres and their crops affected areas were 493.12 acres. The farmers who had land 5-10 acres they called semi medium farmers. The total cultivated lands of semi medium farmers had 538.5 acres and affected areas were 478.5 acres. The medium farmers had land 10-15 acres the sum of the cultivated land of the medium farmers have 297.5 acre and the crops damage areas were 247.25 acres. The farmers who had areas more than 15 acres have been named in the category of "large farmers". The large farmer total cultivated areas were 554 acres and their crop affected areas were 518.5 acres.

3.6 Crops Affected Area (Secondary Data Source)

The secondary data obtained from the Agriculture Extension Department Jhelum. They collected data when flood occur in 2014. In this flood Chief Minister Punjab, Pakistan Mian Shahbaz Sharif allotted fund for those farmers whose agriculture land was affected and their crops destroyed by flood. This project was allocated at union council level and handled by the districts agriculture departments. In Jhelum all the farmers were those whose agriculture lands were along the river. Their losses are as under:

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Table: 3.3 Crop Affected Area by Flood

Sr. No	Tehsil	UC	Name of Village Affected	Crop Area Affected (Acres)	Total Land of Farmer (Acres)
1	PD Khan	PD Khan	PD Khan	1031.35	8944
2	PD Khan	Jalal Pur Sharif	Jalal Pur Sharif	77.5	3721
3	PD Khan	Pindi Saidpur	Saidanwala	129.275	658
4	PD Khan	Pindi Saidpur	Shaker Pur	54.5	714
5	PD Khan	Pindi Saidpur	Admana	7.5	99
6	PD Khan	Pindi Saidpur	Abdullah Pur	115.5	1246
7	PD Khan	Pindi Saidpur	Khewyanwala	63	558
8	PD Khan	Pindi Saidpur	Sherpur	5	821
9	PD Khan	Pindi Saidpur	Bhabanwala	1.5	275
10	PD Khan	Pindi Saidpur	Saghar Pur	113.25	2031
11	PD Khan	Dharyala Jalip	Daryala Jalip	30.225	1992
12	PD Khan	Dharyala Jalip	Chak Mujahid	22.2	839
13	PD Khan	Dharyala Jalip	Khothian	49.175	906
14	PD Khan	Dharyala Jalip	Karim Pur	151.75	756
15	PD Khan	Dharyala Jalip	Mirza Pur	56.5	364
16	PD Khan	Dharyala Jalip	Jaiti Pur	528.325	2570
17	PD Khan	Daryala Jalip	Ahzam Pur	20.5	687
18	PD Khan	Sodi Gujjar	Lokri Bagowal	90	1748
19	PD Khan	Sodi Gujjar	Kalas Baila	153	1747
20	PD Khan	Sodi Gujjar	Naij	217.1	569
21	PD Khan	Sodi Gujjar	Qamar	239.5	1872
22	PD Khan	Sodi Gujjar	Daffar	138	1342
23	PD Khan	Sodi Gujjar	Khicchi	44	247
24	PD Khan	Kandwal	Bagga	428.35	3576
25	PD Khan	Kandwal	Siyal	77	3541
26	PD Khan	Chak Shadi	Nawanlok	39.2	1000
27	PD Khan	Chak Shadi	Mirzaabad	16.9	590
28	PD Khan	Chak Shadi	Jhugyan	56	1755
29	PD Khan	Chak Shadi	Nawalok	85.35	1511
30	PD Khan	Chak Shadi	Pinanwal	117.725	5200
31	PD Khan	Chak Shadi	Chak Shadi	18.5	694
32	PD Khan	Chak Shadi	Karyala Jalip	13	228
33	PD Khan	Chak Shadi	Dewanpur	25.9	1012
34	PD Khan	Chak Shadi	Burj Ahmad Din	78	1740
35	PD Khan	Chak Shadi	Kahanaian Wala	168.475	1137
36	PD Khan	Haranpur	Adowal	686.05	2336
37	PD Khan	Haranpur	Fateh Abad	183	834
38	PD Khan	Haranpur	Usaman	98.35	1215

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39	PD Khan	Ahmadabad	Dhok Vanis	5	2333
40	PD Khan	Ahmadabad	Salah Wana	76.9	267
41	PD Khan	Ahmadabad	Malyar	528.575	1090
42	PD Khan	Ahmadabad	Rajar Jatto	95	1004
43	PD Khan	Ahmadabad	Raj Ser	326	1004
44	PD Khan	Ahmadabad	Ahmadabad	472.15	8518
45	PD Khan	Ahmedabad	Chamel Pur	69.625	169
46	PD Khan	Ahmedabad	Lebhna	78.1	496
47	PD Khan	Ahmedabad	Nasar Ullah Pur	9.5	436
48	PD Khan	Ahmedabad	Said Rahman	16.1	51
49	PD Khan	Ahmedabad	Kotla Syedan	2.7	68
50	PD Khan	Ahmedabad	Qadarpur	233	388
51	PD Khan	Ahmedabad	Essawal	110.375	2052
52	PD Khan	Ahmedabad	Dhok Noora	364.55	1515
53	PD Khan	Golpur	Sahotra	243.95	1660
54	PD Khan	Golpur	Hattar	299.8	2333
55	PD Khan	Golpur	Pither Kalan	187.6	329
56	PD Khan	Golpur	Pither Nadi	596.2	2573
57	PD Khan	Golpur	Quli Wal	72	1660
58	PD Khan	Golpur	Korra	614.9	5190
59	PD Khan	Golpur	Chanan Pur	137.1	669
60	PD Khan	Golpur	Kot Kacha	504.7	1883
61	Jhelum	Chottala	Bhimber	187.275	2269
62	Jhelum	Chottala	Khurd	140.05	4393
63	Jhelum	Kotla Faqir	Beli Baherwal	11.85	316
64	Jhelum	Darapur	Maryala	30.5	2928
65	Jhelum	Darapur	Shah Pur Saydan	48.75	872
66	Jhelum	Darapur	Shah Khamir	18	2050
67	Jhelum	Darapur	Malikpur	159.5	3339
68	Jhelum	Darapur	Darapur	436.1	4817
69	Jhelum	Darapur	Maryala	98	2928
70	Jhelum	Sanghoi	Naugran	5.35	2034

Source: Agriculture Extension Department District Jhelum, Punjab, Pakistan

4. CONCLUSION

The study concludes that most of the farmer's economy related to agriculture sector. They earn money after the selling of crops. But floods destroyed the crops. Mostly crops which demolished were rice, sugarcane, millet and fodder. In the research ninety percent farmers respond was that flood was curse for the agriculture. The other farmers consider it was blessing because floods deposited fluvial material and increase the soil fertility.

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