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Ground Water Level: A Comparative Study of Punjab and Haryana (Pre-Monsoon Session 2018)

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ABSTRACT

The ground water is an important resource, it is used for many purpose. Generally, we used it for drinking purpose, because it is found pure and clean rather than other sources of water like, ocean, sea, lake, pond and river etc. Ground water is the main source of domestic and commercial use for many countries all over the world. Availability of ground water in a region is like a Blessing. It is a major Economic Changer for many countries. The importance of this resource is reflected in the reality that a person must access one cubic meter of high quality water for drinking each year and needs about 1000 times more than this amount to raise food for individual consumption. Ground water gives the soil moisture for plantation and growing seeds. So, it is very important aspect for food security of a nation. With 230 billion meter cube of ground water drawn out each year for irrigating agriculture lands in India, many parts of the country are experiencing rapid depletion of ground water. The total estimated ground water depletion in India is in the range of 122-199 billion meter cube The Indo-Gangetic plain, northwestern ,central and western parts of India account for most intensive ground water based irrigation. And among these regions, western India and the Indo-Gangetic Plain have more than 90% of the area irrigated using ground water. The preview of the present study is to examine the ground water level of Punjab and Haryana in 2018year (pre-monsoon season).

1. Introduction

The water which is gathered under the earth surface with the process of infiltration and percolation by vertical and horizontal movements of surface water is called ground water. Or in other words, Ground water is the water present beneath Earth's surface in soil pore and in the fractures of rock formations. The total amount of water present in the Hydrosphere (100%), only 0.623% of it is in Ground water storage. 0.618% of total ground storage is in form of ground water and 0.0005% as in unsaturated zone. The volume of ground water with in the depth of 0.8 km is 0.309% and rest 0.309% is between 0.8to 4 km depth. It is estimated that if the ground water is spread on earth surface, the earth surface is turn into a 150 meter deep ocean. The importance of the ground water resource can be measured from the fact that more than 75% of India's rural domestic water requirements, 50% of its urban requirements and more than 50% of irrigation needs are met from groundwater resources. But from last few years over exploitation of groundwater results decline in ground water table. It is believed that the main cause of groundwater depletion in Haryana-Punjab region is the introduction of water intensive crops like paddy, wheat, and sugarcane. The main cause of the popularity of these water intensive crops is high price policy of the Government. But cultivation of these crops over a period of time results massive decline in ground water. The increase in number of tube wells in this region also causes depletion in groundwater table.

2. Objectives

1. Comparative study of ground water level depletion in Punjab and Haryana.
2. To find out the main causes of ground water depletion and to suggest some ideas

3. Database and Methodology

1. For comparative study of ground water level in Punjab & Haryana secondary data of central ground water board of India (CGWB) is used.

2. The data has been processed, tabulated, and analyzed using suitable statistical and cartographic techniques. Standard deviation and co-efficient of variation formulas are used for calculation .where, formulas are:

$$S.D=\frac{\sqrt{\sum(X-X)^2}}{N}$$

$$C.V=\frac{\sigma}{\bar{Y}}$$

4. Study Area

The present study includes the area of both Punjab and Haryana. Punjab lies between 29 degree 39" north to 32 degree 32 " north and73*55" to 76*50" E .the geographical Extension of Haryana is 27*39"-30*35" north latitudes and 74*54"-77*40" East longitudes. The total area of Punjab and Haryana is 94524 sq. km. Both states situated in the vast plain of north India and foothills of Himalayan region. Punjab and Haryana are commonly known as agricultural developed states of India because of their fertile alluvial soil and technological equipments of agriculture. These two states contributing the major share in food basket of India because of their plain geographical land along with high irrigation facilities. Both states lies in arid and semi-arid climatic zone with average

rainfall of 50 to 100 cm Administratively both Punjab and Haryana have 22 districts each. As per census of India 2011, the population of Punjab and Haryana are 27,743,338 and 25,351,462 persons respectively.

Table 1 : State-Wise Irrigation types, Capacity and Actual

State	Total crop area (million hectares)	Ground water irrigation crop area (million hectares)	Canal irrigation crop area (million hectares)	Total crop area actually irrigated (million hectares)
Andhra Pradesh	14.3	2.5	2.7	4.9
Arunachal Pradesh	0.4	-	0.07	0.05
Assam	3.2	0.13	0.1	0.22
Bihar	6.4	2.2	1.3	3.5
Chhattisgarh	5.1	0.17	0.74	0.85
Goa	0.1	-	0.1	0.1
Gujarat	9.9	3.1	0.5	3.2
Haryana	**3.6**	**1.99**	**1.27**	**3.26**
Himachal Pradesh	1.0	0.02	0.09	0.11
Jammu & Kashmir	0.9	0.02	0.38	0.37
Jharkhand	3.2	0.11	0.13	0.24
Karnataka	12.2	1.43	1.33	2.38
Kerala	1.5	0.18	0.21	0.39
Madhya Pradesh	15.8	2.74	1.70	4.19
Maharashtra	19.8	3.12	1.03	3.36
Manipur	0.2	-	0.05	0.05
Meghalaya	0.3	-	0.06	0.06
Mizoram	0.1	-	0.01	0.01
Nagaland	1.1	-	0.1	0.07
Orissa	4.9	0.17	1.07	1.24
Punjab	**4.0**	**3.06**	**0.94**	**3.96**
Rajasthan	21.1	3.98	1.52	5.12
Sikkim	0.1	-	0.01	0.01
Tamil Nadu	6.5	1.61	1.43	2.66
Tripura	0.3	0.02	0.05	0.07
Uttar Pradesh	17.6	10.64	4.21	14.49
Uttarakhand	0.8	0.22	0.14	0.35
West Bengal	5.5	2.09	1.22	2.98
INDIA	**159.6**	**39.43**	**22.48**	**58.13**

Source: Net irrigated area, FAO, United Nations

Table 1 revels state wise irrigation types, capacity and actual area under irrigation. India's total crop area is 159.6 million hectares (MH). Out of which 58.13 MH area is actually irrigated, 39.43 MH is irrigated from ground water and 22.48 MH area is under canal irrigation. In Punjab 3.96 MH (total 4.0 MH) area is actually irrigated, 3.06 MH from ground water and 0.96 MH from canals. On the other side in Haryana, total area is 3.6 MH out of that 3.26 MH area is under irrigation. 1.99 MH area is served by ground water and 1.32 MH area is under canal irrigation. Irrigated area (99%) in Punjab is higher than off Haryana (90.55%). In Punjab's total irrigated area 77.27% area is from ground water using tube wells and 23.73 % area is irrigated through canal system. But in Haryana less area (61.04%) than Punjab is irrigated from ground water and 38.95 % of total irrigated area is under canal irrigation which is higher than the Punjab.

Table2. Ground Water Level in Haryana and Punjab (2018)

Haryana 2018				Punjab 2018			
Districts	Max.(mbgl)	d	D^2	Districts	Max.	D(Y-$\overline{Y}$)	D^2
Ambala	50.00	14.07	197.96	**Amritsar**	25.74	-1.49	2.22
Bhiwani	81.83	45.9	2106.81	**Barnala**	38.71	11.48	131.79
Faridabad	29.00	-6.93	48.02	**Bathinda**	29.51	2.28	5.19
Fatehabad	8.89	-27.04	731.16	**Faridkot**	19.53	-7.7	59.29
Gurugram	40.20	4.27	18.23	**Fatehgarh sahib**	41.29	14.06	197.68
Hisar	22.43	-13.5	182.25	**Fazilka**	17.37	-9.86	97.21
Jhajjar	5.91	-30.02	901.20	**Firozpur**	18.35	-8.88	78.85
Jind	27.35	-8.58	73.61	**Gurdaspur**	20.06	-7.17	51.40
Kaithal	43.10	-7.17	51.40	**Hoshiarpur**	23.92	-3.31	10.95
Karnal	35.90	-0.03	0.0009	**Jalandhar**	36.59	9.36	87.60
Kurukshetra	39.33	3.4	11.56	**Kapurthala**	27.78	0.55	0.3025
Mahendergarh	55.30	19.37	375.19	**Ludhiana**	29.87	2.64	6.96
Nuh	5.54	-30.39	923.55	**Mansa**	18.02	-9.21	84.82
Palwal	18.55	-17.38	302.06	**Moga**	33.65	6.42	41.21
Panchkula	29.48	-6.45	41.60	**Muktsar**	9.65	-17.58	309.05
Panipat	36.08	0.15	0.0225	**Pathankot**	13.50	-13.73	188.51
Rewari	69.40	33.47	1120.24	**Patiala**	42.18	14.95	223.50
Rohtak	7.90	-28.03	785.68	**Rupnagar**	39.65	12.42	154.25
Sirsa	48.77	12.84	164.86	**Sangrur**	40.80	13.57	184.14
Sonepat	39.60	3.67	13.46	**SAS Nagar**	16.59	-10.64	113.20
Yamunanager	32.58	-3.35	11.22	SBS Nagar	35.13	7.9	62.41
Charkhidadri	63.52	27.59	761.20	Taran taran	21.33	-5.9	34.81
	∑790.66		∑8821.28		∑599.22		2125.34

$\bar{X} = \frac{\sum X}{N}$ $\frac{790.66}{22} = 35.93$ (σ) = $\frac{\sqrt{\sum(X-X)^2}}{N} = \frac{\sqrt{8821.28}}{22} = 400.96$ C.V = $\frac{\sigma}{\bar{X}}$ $\frac{20.02}{35.93}$×100 =55.71

$\bar{Y} = \frac{\sum Y}{N}$ $\frac{599.22}{22} = 27.23$ S.D = $\frac{\sqrt{\sum(Y-\bar{Y})^2}}{N} = \frac{\sqrt{2125.34}}{22} = 9.82$ C.V = $\frac{\sigma}{\bar{Y}}$ = $\frac{9.82}{27.73}$×100=36.06

5. Discussion

The co-efficient of variation (CV) is a statistical measure of dispersion of data points in a data series around the mean. The coefficient of variation represents the ratio of the standard deviation to the mean, and it is a useful statistic for comparing the degree of variation from one data to another. The CV of Haryana and Punjab is 55.71 and 36.06 respectively. High CV reflects variability and low CV denotes consistency of any attribute . The CV of Punjab(36.06) is consistent against Haryana (55.71) , as CV of Punjab is consistent. Jhajjar , nuh , rohtak ,Fatehabad and Palwal are the main districts of Haryana who shows high deviation from the mean 35.93 of the state. The muktsar district of Punjab shows highest deviation from mean of the state 36.06 and other districts are pathankot, SAS Nagar and gurdaspur.

6. Conclusion of the study

The study reveals that the ground water depletion in Haryana is higher than Punjab. The CGWB carries out an assessment of Underground water level with state government in 2017, and it was revealed that 78 out of 128 blocks in the state (Haryana) were “over-exploited”. The depleting ground water level in Haryana can be mainly attributed to extensive paddy farming in the state. 5389 liters of water is required for every kilogram of rice production. Government should put hold on new tube well connections in the over exploited areas like jhajjar , mewat, rohtak and fatehabad where ground water depletion is very high. Ground water level of Punjab is also declining at a faster rate but the rate of ground water depletion is lower than of Haryana, lack of perennial rivers in Haryana and presence of perennial rivers in Punjab is the biggest cause of this. Perennial rivers continuously recharge the

ground water in Punjab. If groundwater is depleted and the Haryana-Punjab region experiences drought for two three years consecutively, than the availability of drinking water will be a huge problem. Natural recharge during monsoon may not help much if ground water level becomes acute. The government should promote such crops (gram, bajra, maize ,musterd) which requires relatively less amount of water then paddy and sugarcane. The farmer's who cultivate such crops (bajra, maize etc.) should be rewarded by government and appropriate minimum support prices should be given to farmers. Crop diversification is an important option to attain natural resources sustainability.

References

1. D.R Khullar, Measures of Dispersion
2. Dr. Ranjan Aneja 2017, Ground water level in Haryana: a challenge for sustainability
3. Net irrigated area, FAO, United Nations
4. Irrigation in India, FAO, United Nations
5. Ministry of water resources, government of India
6. Prihar, S S, S D khepar, Raghbir singh, S S Grewal and S K. Sodhi (1990): water Resources of Punjab: A Critical Concern for the Future of its Agriculture, Punjab Agricultural University, Ludhiana.
7. Central ground water board, 2018

