Hydro-ecology and its impact on animal species in some water bodies of parsa, saran (Bihar): a case study of parsa- bnakerwa, dighra and latrahiya ponds

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Abstract

The area of Parsa is full of water bodies such as like, chaur, ditches, nala, ponds. These water bodies' harbaur rich aquatic fauna and flora constituting food chain. This study is based on primary and secondary survey assisted by the sources of data. The primary information has been calculated through questionnaires survey. The suitable static technique like z-score and composite mean using method has been applied to make the presentation realistic and successful.

Keywords- Hydro-ecology, fauna, flora, chaur, ponds, z-score and composite mean

Introduction

However, ponds, river and chaurs acquire special significance as they are usually surrounded by thick population of low income and middle income group of people affecting the aquaculture in general and Pisciculture in particular. These ponds and river exhibit environmental conditions where soil texture, temperature, pH of water, and other abiotic and biotic factors keep on changing throughout the year. The biological exploitation of the ponds, river and chaurs etc. therefore, can go a long way inhancing fish production with these point of view three ponds of Parsa (Tehsil) have been selected for the present investigation as these ponds are perennial and chief sources of water are rain and affluent coming from catchment area.

According to Boss (1971), Chakraworthy (1985), Singh (1978), Ray (1978), Shark (1980-1987), Singh and Singh (1984-1986), Srivastav (1980) have given references of limnology, hydro-ecology and fish culture. In some water bodies but no detail works seems

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to have been done at the hydro-ecology fish culture. In some water bodies and its impact on animal species. This is true in case of Parsa water bodies. The subject of present study will be helpful boasting of aquaculture in general & pisciculture in particular which will have impact on Socio-economic condition of the poor people of the locality.

Materials and methods

The present study is based on primary and secondary sources of data collected through extensive ponds survey with the help of questionnaires prepared covering the aspects of fish production and socio-economic development in rural areas. A comprehensive ponds survey in part by part (three ponds) from Parsa (Tehsil) was conducted during the month of Feb. 2016 - March 2017 based on regular random sampling.The Hydro-ecology and its impact on some water bodies have been computed based on z-score method as follows.

Model of z-score-

$$Z = \frac{xi - \overline{x}}{SD}$$

Where,

Z = score of indicators
Xi = original value of individual indicators.
$\overline{X}$ = mean of individual indicators of x
S.D. = Standard deviation of indicators
Models of composite mean z - score

$$Cs = \sum zij/N$$

Where,

Cs = Composite mean z-score
$\sum zij$ = z- score of indicators
J = In observation i

N = Number of indicators.

Applying the above technique composite mean z-score was calculated for all three ponds of Parsa. Calculated values were divided into three categories- high, medium and low.
The Hydro-ecology and its impact on some water bodies were calculated by selecting fourteen indicators of Hydro-ecology and its impact on some water bodies.

Results and discussions

Kind of fish, scientific and common name- Aspidoporia noror (Chilwa), *Catla catla* (Catla), Carrbinus, mrigala (Naini), Cirrbinus reba (rewa), Lebeo Calbashu (Basori) *Labeo robita* (Rohu), Oxygaster, bacaila (Chalbowa), Pontius, Sarana (Darabi), *Pontius sophore*. (Pothia), *Nystus*

vittatus (Tengra), *Wallago attu* (Borari) *Clarias badrochus* (Mangwe), *Xenentodon cancila* (Kauwa), *Heteropneusters fossilis* (Singhi), *Channa punctatus* (Garai), *Channa striatus* (Sauri) *Amphipnous cuchina* (Bami), *Chanda nama* (Katari) *Glassogobius giuris* (Bulla) *Macrognathus aculeatus* (Potya), Notopteras, Chitala (Moya).

Table-1 The Hydro-ecology and its impact on some water bodies

S.No.	Indicators	Descriptive indicators	Selected Ponds - Original value				
1	2	3	4	5	6	**7**	8
			P_{1*}	P_{2**}	P_{3***}	Mean	S.D.
1	X_1	Area of ponds(katha)	52	41	6.5	52.66	9.80
2	X_2	Depth of ponds (fit.)	25	20	15	20.00	4.08
3	X_3	Kinds of fish[1]	15	18	12	15	2.45
4	X_4	Number of fish population	60000	44.000	52.000	52000	6531.97
5	X_5	Density of fish population (per katha)	1153	1073	800	1008	151.12
6	X_6	Growth of different fish (2016-17)	33.33	37.5	20.22	30.27	7.46
7	X_7	Name of the feeding materials[2] of fish	17	12	9	12.66	3.30
8	X_8	Source of air & Temperature (^0C)	23.41	18.71	21.71	21.27	4.18
9	X_9	Rain fall (cm.)	113	113	113	113	0
10	X_{10}	pH of water	7.41	6.8	7.9	6.87	0.67
11	X_{11}	O_2 of water (mg/L)	6.25	7.25	5.95	6.48	0.55
12	X_{12}	CO_2 of water (%)	47.0	44/32	42.09	44.45	2.00
13	X_{13}	Chlorine of water (mg/L)	47	44	47.9	46.5	1.66
14	X_{14}	Total alkalinity of water (%)	149	150	145	148	2.16

1.Oscillataria limnosa, 2. Phormidium retzil 3. Ana baena backil 4. Microcystis aeragenosa 5. Gleocapsa Spriruline Sp 6. Aphanocapa negali 7. Spirogyra negleta 8. Cladophora glomerata 9. Oedogonium oblongam 10. Scenedesmus ormatus 11. Actinostrum hantzschil 12. Volvox Sp. 13. Pandorina Sp. 14. Eudorina Sp. 15. Ulothrix zonata 16. Chlorella Sp. 17. Coelastrum Sp. 18. Microspora Sp. 19. Oocystis macuosporci 20. Dimorphococcus Sp. 21. Diclyosphaerium Sp.

P1 * For BankerwaPond, P2** For Dighara Pond and P3*** For Latrahiya Pond

Table-2 The Hydro-ecology composition of some water bodies

SL.	Indicators	Descriptive indicators	Selected ponds z-score value		
			P_1	P_2	P_3
1	X_1	Area of ponds (katha)	-0.067	+1.189	-1.26
2	X_2	Depth of Ponds (fit.)	+1.22	+0	-1.22
3	X_3	kind of fish	0	+1.22	+1.22
4	X_4	Number of fish population	1.22	-1.224	0
5	X_5	Density of fish population (per katha)	+0.959	+0.430	-1.37
6	X_6	Growth of different fish (2016-17)	+0.428	+1.01	1.44
7	X_7	Name of the feeding materials of fish	+1.34	-0.2	-1.10
8	X_8	Source of air& Temperature(^{0}c)	+0.51	-0.61	+0.105
9	X_9	Rain fall (cm.)	00	00	00
10	X_{10}	pH Of water	+0.80	-0.10	+1.54
11	X_{11}	O_2 of water (mg/L)	-0.42	+1.4	-0.96
12	X_{12}	CO_2 of water (%)	+1.27	-0.06	-1.18
13	X_{13}	Chlorine of water (mg/L)	+0.42	-1.38	+0.96
14	X_{14}	Total alkalinity of water (%)	+0.46	+0.925	+1.39
		Composite mean	+0.58	+0.14	-024

The value of falling in between high, and low categories would fall in medium categories of Hydro-ecology and its impact on animal species (fish production) in some water bodies Table-2. Here three ponds having value of 0.58 and above are incorporated under high fish production. Where as pond having calculated value of in between 0.58 and 0.14 fall under medium and the ponds have value below – 0.24 come under low level of Hydro-ecology and its impact on animal species of some water bodies (fish production). The lines divided into three broad zones- high, medium and low.

(i) **High fish production** - In this zone fish production value 0.581. This high level of fish production may be ascribed to the fact that there has been substantial area under pisci-culture aquaculture in most ponds of Parsa (Saran) district Table -2 column -4.

(ii) **Medium fish production**- The ponds under medium level of fish production is P_2 belongs to Parsa of (Saran) district the fish production has decreased due to the

closer of feeding materials & environmental condition in these ponds because of low returns therefore many of the farmers have shifted to the cultivation of pisciculture aquaculture to get better returns. Table-2. Columman-5.

(iii) **Low fish production-** The pond of P_3 fall under low level of fish production and value -0.24. Fish production has decreased due to the closer of market pisci-culture and aquaculture practices are traditional facilities limit. Neither have they sufficient pH of water to adopt fish production nor have out water resources of ponds P_3 due to the lack of assured water supply, the production of fish in P_3 is quite low table-2. Colum-6.

Conclusion

The study of the hydro ecology and its impact on animal species of water bodies (fish production). The lines are broadly divided into three types of ponds. High, medium and low. P_1 Pond is for high fish production, where as P_2 Pond have medium fish production due to lack of feeding materials of fish and water pollution. P_3 Pond has very low fish production because of lack of assured water supply, huge water pollution in this pond therefore fish production is quite low.

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