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Economic valuation of multiple use wetlands water system of periphery of Raipur city

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Abstract
A field experiment was conducted at the College of Agriculture Indira Gandhi Krishi Vishwavidyalaya Raipur (Chhattisgarh). During August 2022 with a view to study the "Economic valuation of multiple use wetlands water system of periphery of Raipur city". The study is based on the wetlands of Raipur city. Mahanadi and Kharun are the major rivers of Raipur district. Mahanadi is the most important river of Chhattisgarh. The area includes Kanhar, Dorsa, Matasi, Kachar and Bhatha lands with a PH average of 6.5 to 7.5 which is considered very useful for agriculture. Out of 32 district of Chhattisgarh states, urban wetland areas of Raipur city was be selected purposively for the present study. Out of 5 groups 2 groups were selected randomly from Mahant Talab (Near bas stand), out of 50 farmers 25 farmers were selected randomly from Dongia Dabri (WRS Colony), and 1 farmer were selected from Doomar Talab (Railway track) wetland Raipur to know the impact of wetland cultivation. The data were collected through primary survey method. The major tools used for data collection were interview schedule (structured and semi-structured), focused group discussion, observation and secondary sources (reports, literature published by various government/ non-government agencies and reference material available on websites). Primary and secondary data were collected for this study. The secondary data sources obtained from books, journals, records from Web resources, and National Wetland Atlas: Chhattisgarh etc. The primary data were obtained through questionnaires, field observations, focus group discussion (FGD) using checklists of probe questions. The data collected included the general condition of crop farming, types of food grown in the wetlands and uplands, and size of wetland farmland.

Keywords: Wetlands, Kanhar, dorsa, Matasi, Kachar and Bhatha lands, Mahant Talab, Dongia Dabri, Doomar Talab, wetland cultivation

1. Introduction
Wetlands are the most important natural feature that modifies the human history as well as culture. Wetlands are the area of earth surface that taught the human beings the art of cultivation about 10000 years back. The wetland and human beings are in tandem from time immemorial. It is true to say that human beings are moulded and human cultures were modified in the vicinity of wetlands. (Wade and Lopez-Gunn, 1999) [13].

In India the total wetland area estimated has over 757,000 wetlands with a total wetland area of 15.3 million ha, accounting for nearly 4.7% of the total geographical area of the country. (ISRO, 2020). With rapid population rise and increasing pressure on water resources, the need to conserve these wetland resources assumes much importance. At present conservation and wise use of wetlands is being ensured through various legal instruments like legislations, policies and plans in India. The Government of India is implementing the National Wetlands Conservation Programme (NWCP) in close collaboration with the State/Union Territories since the year 1985-86. Under this programme, one hundred and fifteen wetlands have been identified which require urgent conservation and management interventions. India is also a signatory to the Ramsar Convention on Wetlands and the Convention of Biological Diversity.

The importance of wetlands in Chhattisgarh is also exemplified by the most staple food of the state rice. Chhattisgarh is also known as Rice bowl of India and wetlands play an important role in the cultivation of rice. Wetlands contribute to the economy of Chhattisgarh, firstly through agricultural production, forestry and fisheries; secondly and increasingly for water supply (for domestic use as well as for irrigation). Other economic and ecological benefits of wetlands include groundwater replenishment, maintenance of water tables for agriculture, flood control, shoreline protection and stabilisation, climate change mitigation, sediment and nutrient retention, water purification and habitats for biodiversity.

2. Materials and Methods

The field experiment was conducted at the College of Agriculture Indira Gandhi Krishi Vishwavidyalaya Raipur (Chhattisgarh). Raipur being Geographically Located almost at the centre of the Chhattisgarh state, was made its capital. District Raipur Extends from latitude 21° 23″ to longitude 81° 65″. Mahanadi and Kharun are the major rivers of Raipur district. Mahanadi is the most important river of Chhattisgarh, originating from Shrungi mountains in Sihawa Tehsil of Dhamtari district. Kharun is another important river flowing in Raipur and Durg districts which originates in the hills of Petchuva in Durg district. The area includes Kanhar, Dorsa, Matasi, Kachar and Bhatha lands with a PH average of 6.5 to 7.5 which is considered very useful for agriculture.

Out of 32 district of Chhattisgarh states, Urban wetland areas of Raipur city was be selected purposively for the present study. Because of the available surface and ground water resources have not yet been adequately utilized, rather than deficient rain. Out of 5 groups 2 groups were selected randomly from Mahant talab (Near bas stand), out of 50 farmers 25 farmers were selected randomly from Dongia dabri (WRS Colony), and 1 farmer were selected from Doomar talab (Railway track) wetland Raipur to know the impact of wetland cultivation. Field observations by the researcher are significant because they said the researcher to contrast the information given by respondents and the actual situation in the field (Kajembe and Wiersum 1998) [15]. The data collected included the general condition of crop farming, types of food grown in the wetlands and uplands, and size of wetland farmland.

3. Results and Discussion

Data pertaining to wetlands influenced by various study has been given in table 1, 2 & 3 and fig 1(a), (b), (c) & 2 (a), (b), (c).

The operating cost of vegetable production of selected wetlands *i.e.*, Mahant Talab, Doomar talab (Railway track) and Dongiadabri (WRS Colony) of Raipur town and its periphery clearly reveals that the yearly total operating cost of vegetable production of Mahant talab was Rs.58,464. Similarly, the total operating cost of vegetable production of Doomar talab (Railway track) was found higher than Mahant talab and it was recorded Rs. 59,450 per year. The Dongiadabri (WRS Colony) was found highest operating cost of vegetable production compare to other two studied wetland, and it was recorded Rs. 60,700 per year.

The total primary vegetable production of selected wetlands i.e., Mahant Talab, Doomar talab (Railway track) and Dongiadabri (WRS Colony) of Raipur town and its periphery. Primary productivity of the vegetable was recorded for Lotus Flower, Lotus Rhizome, Karmatta Bhaji and Chunchuniya Bhaji. In mahant talab, total production no. for lotus flower were recorded 27,000 per ha. The lotus rhizome was recorded 90 kg. Karmatta bhaji were recorded 60 kg and chunchuniya bhaji were recorded 37 kg. In Doomar talab data presented that, the lotus flower were noted 22000 per ha. The lotus rhizome were recorded 90 kg per ha. Karmatta bhaji were recorded 35 kg and chunchuniya bhaji were recorded 30 kg per ha. The Dongia dabri data revealed that, the lotus flower were noted 27000 kg per ha. The lotus rhizome were recorded 97 kg. Karmatta bhaji were recorded 65 kg and chunchuniya bhaji were recorded 43 kg per ha.

Economics analysis of selected wetlands of Raipur town and its periphery was recorded for cost of cultivation (Rs. ha^{-1}), gross return (Rs. ha^{-1}), net return (Rs. ha^{-1}), input: output ratio and B: C ratio. The highest cost of cultivation (60700 Rs. ha^{-1}) was recorded in Dongiadabri wetland followed by Doomar talab (59450 Rs. ha^{-1}). The lowest cost of cultivation (58464 Rs. ha^{-1}) was recorded in the treatment Mahant Talab wetland. The highest gross returns (151000 Rs. ha^{-1}) were recorded in Dongiadabri wetland followed by Mahant Talab (145020 Rs. ha^{-1}). The lowest gross return (118420 Rs. ha^{-1}) was recorded in Doomar talab wetland. The highest net return (90300 Rs. ha^{-1}) was recorded in Dongia dabri wetland followed by Mahant Talab (86556 Rs. ha^{-1}). The lowest net return (58970 Rs. ha^{-1}) was recorded in the treatment Doomar talab wetland. The highest Input: Output ratio (1: 99) was recorded in Doomar talab wetland followed by Mahant Talab and Dongiadabri (1: 2.48) was recorded. The highest B: C ratio (1.99) was recorded in Doomar talab wetland followed by Mahant Talab and Dongiadabri (1.48) was recorded.

Table 1: Operating cost of vegetable production of selected wetlands of Raipur town and its periphery (per ha)

		Mahant Talab(Near bas stand)			Doomar talab (Railway track)			Dongiadabri (WRS Colony)		
S. No.	Particulars	Labour Charges (Rs.)	Variable Cost (Rs.)	Total cost (Rs.)	Labour Charges (Rs.)	Variable Cost (Rs.)	Total cost (Rs.)	Labour Charges (Rs.)	Variable Cost (Rs.)	Total cost (Rs.)
1	Lease in rent / rental value of land		10,000	10,000		11,000	11,000		12,000	12,000
2	Land preparation (labour)	6300		6300	6300		6300	6500		6500
3	Application of manure and Fertilizer (in Rs.)	500	5550	6050	350	5400	5750	300	6000	6300
4	Planting under ground Stem (in Rs.)		6750	6750		6500	6500		6700	6700
5	Intercultural operation (Weeding) (in Rs.)	3300		3300	3500		3500	3200		3200
6	Plant protection (in Rs.)	300	6514	6814	400	6000	6400	500	6000	6500
7	Harvesting (in Rs.)	13,250		13250	13,500		13500	13,300		13,300
8	Transportation (in Rs.)		4,000	4000		4,500	4500		4,200	4200
9	Miscellaneous (in Rs.)		2000	2000		2000	2000		2000	2000
Total				58,464			59,450			60,700

Table 2: Total primary vegetable production of selected wetlands of Raipur town and its periphery (per ha)

S. No.	Name	Mahant Talab (Near Bas Statnd)			Doomar talab (Railway track)			Dongiadabri (WRS Colony)		
		Total Kahrif Production No. / kg per ha	Total Rabi Production No. / kg per ha	Total Production No. / kg per ha	Total Kahrif Production No. / kg per ha	Total Rabi Production No. / kg per ha	Total Production No. / kg per ha	Total Kahrif Production No. / kg per ha	Total Rabi Production No. / kg per ha	Total Production No. / kg per ha
1	Lotus Flower	12000	15000	27000	9000	13000	22000	16000	12000	27000
2	Lotus Rhizome	50 kg	40 kg	90 kg	42 kg	45 kg	90 kg	55 kg	42 kg	97 kg
3	Karmatta Bhaji	25 kg	35 kg	60 kg	15 kg	20 kg	35 kg	25 kg	40 kg	65 kg
4	Chunchuniya Bhaji	15 kg	22 kg	37 kg	12 kg	18 kg	30 kg	18 kg	25 kg	43 kg

Table 3: Economics analysis of selected wetlands of Raipur town and its periphery (per ha)

S. No.	Variable		Mahant Talab(Near Bas Statnd) Economics (Rs.)	Doomar Talab (Railway track) Economics (Rs.)	Dongiadabri (WRS Colony) Economics (Rs.)
1.	Total cost of cultivation (Rs. / ha)		58464	59450	60700
2.	Gross returns (Rs. / ha)	Lotus Flower	135000	110000	140000
		Lotus Rhizome	5400	5220	5820
		Karmatta Bhaji	2400	1400	2600
		Chunchuniya Bhaji	2220	1800	2580
		Total	145020	118420	151000
4.	Net returns (Rs. / ha)		86556	58970	90300
5.	Input: Output ratio		1:2.48	1: 1.99	1: 2.48
6.	B:C ratio		1.48	1.99	1.48

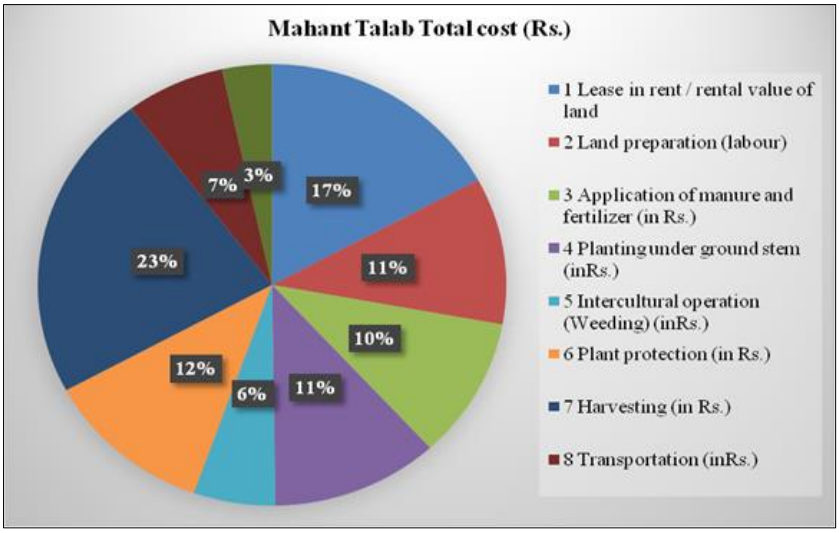

Fig 1: (a) Mahant Talab Total cost (Rs.)

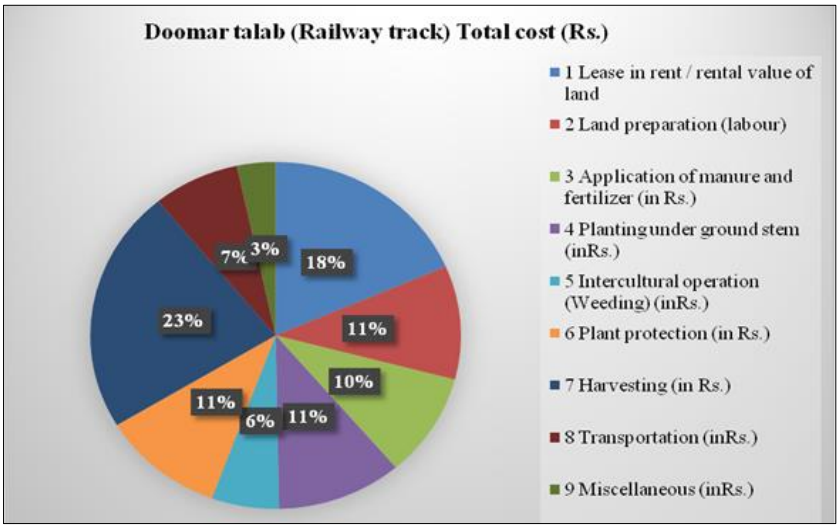

Fig 1: (b) Doomar talab (Railway track) Total cost (Rs.)

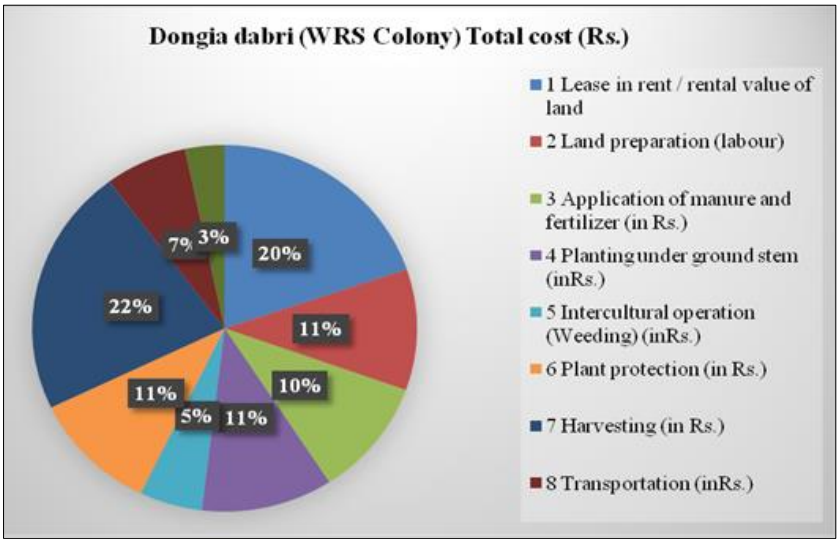

Fig 1: (c) Dongia dabri (WRS Colony) Total cost (Rs.)

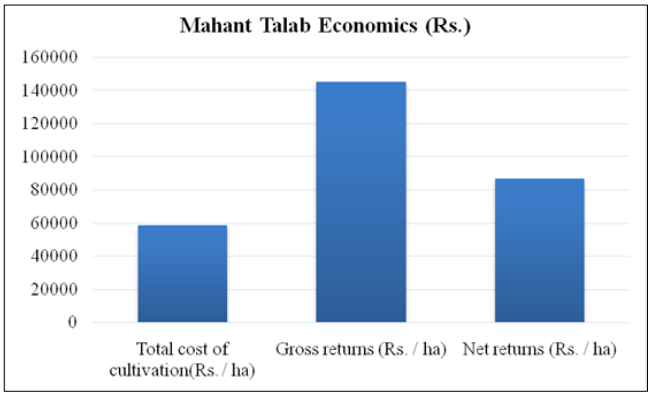

Fig 2: (a) Economics analysis of Mahant Talab

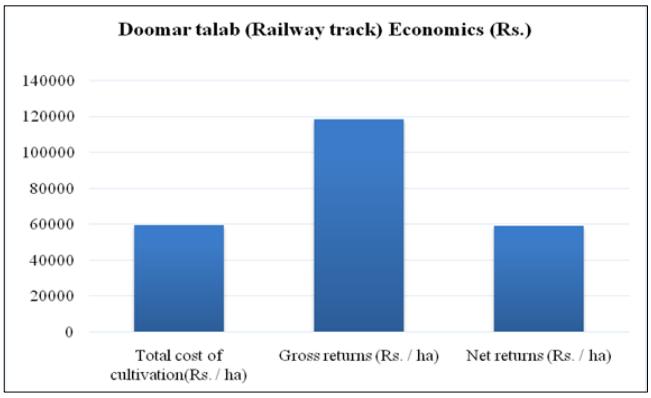

Fig 2: (b) Economics analysis of Doomar talab (Railway track)

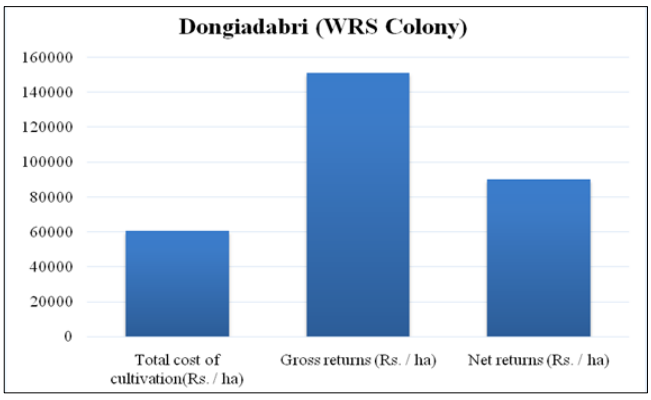

Fig 2: (c) Economics analysis of Dongia dabri (WRS Colony)

Conclusion

Primary productivity non-cultivated plant resources in the floodplains, was the dominant plants species Lotus, Karmatta Bhaji and Chunchuniya Bhaji wherever natural vegetable was present. And the highest Input: Output ratio (1: 99) was recorded in Doomar talab wetland followed by Mahant Talab and Dongia dabri (1: 2.48) was recorded. And the highest B:C ratio (1.99) was recorded in Doomar talab wetland followed by Mahant Talab and Dongia dabri (1.48) was recorded.

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