

WETLANDS IN NORTH BIHAR PROVIDE A BASIS TO ITS SUSTAINABLE DEVELOPMENT



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Abstract: North Bihar is known for its fine network of rivers emanating from the Himalayas and also for a large number of other natural and manmade water bodies. These wetlands compensate the loss of forests in the region which are now confined to less than 2% of the total land area. Thousands of ponds, tanks, *chours* (land depressions) and *moins* (ox-bow lakes) constitute the lifeline of the area by serving as the source of irrigation and pisciculture. Of late, the Government of Bihar has initiated steps to augment the aquatic productivity, both in the fields of aquaculture as well as organic farming. Attempts are being made to save the wetlands from dilapidation and human encroachments. Boost to aquaculture is aimed at ending the dependence on other states in the field of fish availability. *Clarias batrachus* has been declared as state fish with an eye on initiating its organized aquaculture. Water bodies in the region could also be harnessed for wild ornamental fishes. Last decade has also witnessed the setting up of a number of fish nurseries in private sector. The state Government is also contemplating to develop some wetland sites for augment fisheries as well as solar energy. A shell button industry in Mehsi (East Champaran) owes its existence to a large scale availability of *Parreysia* sp. in the Burhi Gandak river and other associated water bodies. A number of wetlands like Kabartal (Begusarai), Kusheshwarsthan (Darbhanga), Baraila (Vaishali), Saraiyaman (West Champaran), Gogabeel (Katihar) etc. are important birding sites. Some of these have been identified as potential “Ramsar sites” and have the potential of being developed as ecotourism sites. Steps have been taken to rescue the national aquatic animal “Dolphin” (*Platanista gangetica*) in the north Bihar water bodies. Wetlands in Mithila region of north Bihar are known for cultivation of Makhana (*Euryale ferox* Salisb.) that has been deciphered as a promising nutraceutical along with a number of other useful aquaphytes. There is a need to harness their capacity to tackle the problem of malnutrition as well as some life style diseases. Wetland plants like *Sesbania* spp. *Vetiveria zizanioides*, *Eichhornia crassipes* and some other aquatic species of invasive nature could be harnessed for their manifold qualities. The paper takes into account some important facets of north Bihar wetlands in relation to sustainable regional development.

Key words: Wetlands, North Bihar, Development, Mithila, Proposed Ramsar site, Makhana, Dolphine

INTRODUCTION

North Bihar is known for its fine network of rivers emanating from the Himalayas and also for a large number of other natural and manmade water bodies. These wetlands compensate the loss of forests in the region which are now confined to less than 2% of the total land area. Thousands of ponds, tanks, *chours* (land depressions) and *moins* (ox-bow lakes) constitute the lifeline of the area by serving as the source of irrigation and pisciculture. Kabartal (Begusarai), Kusheshwarsthan (Darbhanga), Gogabeel (Katihar),

Saraiyaman (West Champaran), Baraila (Vaishali) are some important wetlands in this region that perform the job of ground water recharge, irrigation and aquaculture and sustain the livelihood of human beings and other organisms to a considerable extent. Ghosh *et al.* (2004) have provided an account of spatio-temporal changes in wetlands of north Bihar.

MATERIALS AND METHODS

A survey was made on the water bodies in north Bihar and pattern of their utilization in terms of

plants and animals growing therein. Information gathered has been presented under the following themes:-

1. The state of Bihar is all set to usher in blue revolution as a component of rainbow revolution.
2. Mithila wetlands produce Makhana as a specialty of the area and other water crops.
3. Shell button industry in East Champaran – a unique endeavour in this area.
4. Potential Ramsar Sites of north Bihar as places of ecotourism.
5. Rivers in north Bihar provide ideal habitat to Gangetic Dolphin and a recent rescue operation in Mahananda river in north Bihar.

RESULTS AND DISCUSSION

North Bihar is known for its wetlands. Mithila area of the northern Bihar is famous for its ponds, fish varieties and Makhana (i.e. gorgan nut). The area does have its cultural moorings based around water bodies. The region fondly remembers its benevolent kings in the past who got excavated a number of big tanks called Rajokhari (i.e. royal tanks). An erstwhile royal village called Andharathari still boasts of an inner ring of 27 ponds arranged in the form of a ring (Fig. 1), most of them named after the Karnat dynasty kings of Mithila who ruled this area during 11th – 12th centuries A. D.

Besides the natural water bodies of varying sizes, the area does have a series of ponds/tanks located in different districts. Fig. 2 shows at least 7 important sites in north Bihar where wetlands and related activities are located. Wetlands in the region are a repository of aquatic biodiversity and provide a basis of sustainable livelihood to the associated populace.

A total number of 4,416 major and 17,582 small sized wetlands (measuring less than 2.25 ha) have been identified (National Wetland Atlas: Bihar prepared by ISRO and IESWM, 2010). The state does have 4.4% (measuring a total of 4,03,209 ha) of its geographical area under wetlands.

Natural water bodies dominate the wetlands in the state comprising about 92% of the total wetland extent, while manmade water bodies account for about 3.5% of the total wetland area.

Table 1 shows the district wise wetland areas in altogether 21 districts of north Bihar. The region has 2,69,418 ha area under wetlands, comprising an average of 4.96% of its total geographical area. It is apparent from the table that Katihar district has a maximum of 21,011 ha wetland area (10.30% of the geographical area of the district). Katihar is followed by West Champaran, Saran, Begusarai and Supaul districts respectively so far as the total wetland areas are concerned. Darbhanga district does have 8,709 ha wetland area comprising 3.48% of its total geographical area.

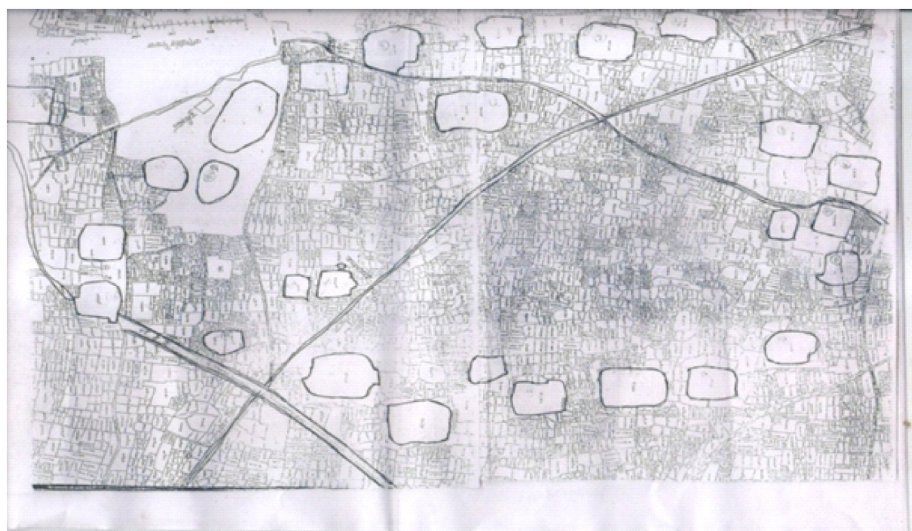


Fig. 1. A ring of 27 ponds in the Andharathari village of district Madhubani of north Bihar

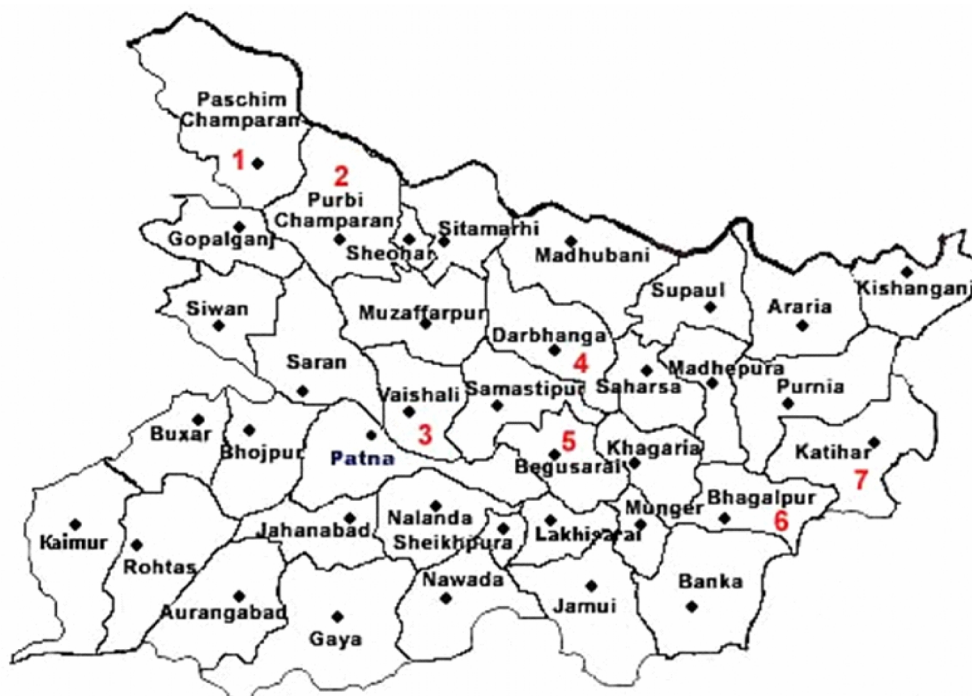


Fig. 2. District map of Bihar showing sites of important wetlands and related activities in North Bihar

Sl. No.	Districts	District geographical area (sq. km)	Wetland area (ha)	% of total wetland area in north Bihar	% of district geographical	Open Water (ha)	
						Post-monsoon	Pre-monsoon
1	West Champaram	4250	21697	8.36	5.11	11924	10118
2	East Champaran	4155	12477	4.81	3.00	8915	5119
3	Sheohar	443	1476	0.57	3.33	845	782
4	Sitamarhi	2628	2601	1.00	0.99	906	588
5	Madhubani	3478	8958	3.45	2.58	2411	2280
6	Supaul	2985	19285	7.43	6.46	9004	9021
7	Araria	2797	4157	1.60	1.49	2245	1930
8	Kishanganj	1939	10954	4.22	5.65	5542	4886
9	Purnea	3203	12401	4.78	3.87	5279	3365
10	Katihar	3010	31011	11.95	10.30	17135	14574
11	Madhepura	1797	3539	1.36	1.97	1589	967
12	Saharsa	1196	12086	4.66	10.11	7202	4125
13	Darbhanga	2502	8709	3.36	3.48	5171	2467
14	Muzaffarpur	3123	10490	4.04	3.36	6984	4048
15	Gopalganj	2003	7122	2.75	3.56	5128	3783
16	Siwan	2213	7105	2.74	3.21	4295	2117
17	Saran	2624	21170	8.16	8.07	12118	7950
18	Vaishali	1995	17148	6.61	8.60	11405	5970
19	Samastipur	2579	15022	5.79	5.82	10867	7133
20	Begusarai	1889	20365	7.85	10.78	10628	7703
21	Khagaria	1486	11645	4.49	7.84	9060	5807
Total		52295	259418	100.00	4.96	148653	104733

[Adapted from National Wetland Atlas: Bihar prepared by Indian Space Research Organisation (ISRO) and Institute of Environmental Studies and Wetland Management (IESWM) (2010)]

Bihar on way to Blue Revolution

The river basins in north Bihar are replete with a series of shallow water bodies, locally called *chaurs* spread over c 46000 ha. These biologically sensitive and fragile areas are repository of a variety of freshwater and ornamental fishes. These *chaurs* provide a basis to the capture fisheries with a production rate of 40-50 kg/ha/yr. Greater colonization of macrophytes and habitat destruction hinders the fisheries. Despite having a vast potential of fish production the state lags behind in meeting the total fish demand. As against an annual requirement of 5.80 lac metric tonnes the state produces only 4 lac metric tonnes. Similarly the state produces only 350 million fish seeds as against the demand of 800 million fish seeds. However certain managed pockets have shown high fish production to the tune of over 1000kg/ha/yr. The State Fisheries Policy envisages recognizing this unique property regime for co-operative management wherein crop cultivation is to be integrated with fisheries.

Fisheries sector plays a key role in food security and employment generation as significant proportion of population depends upon it for livelihood sustenance. It also generates precious revenue for the state.

All efforts are being made to make the state self-sufficient in fish production. Farmers are being sent to other states for training in fish production under scientific aquaculture. Incentives in the form of loan/subsidies and insurance facilities are being extended all with an intention to motivate them to augment aquatic productivity (Prabu 2013). With a view to augment the productivity of nutritionally more significant cat fishes, the State Government has recently declared Mangur (*Clarias batrachus*) as the state fish. Steps are on for farming *Pungasius* as well. The State Government has extended the facility of insurance of fish to the farmers.

Wetlands in the region could be harnessed for wild collection of ornamental fish (Singh et al., 2006) also. A large section of local population, specially those belonging to the economically weaker sections, feed upon the shell fishes to supplement their requirement of low cost

animal proteins. Prabhakar and Roy (2009) have provided a detailed account of the use of flesh of molluscs like *Pila*, *Bellamya*, *Lamellidens* and *Parreysia* by the aboriginals in the Kosi region for the cure of a number of ailments. They have also provided the details of the local use of *Paratelphusa* sp. and *Macrobrachium* sp.

Recent years have witnessed the springing up of a number of fisheries enterprises in north Bihar, some of which have been nationally acclaimed. These include:-

1. Sahazadapur in Sarairanjan block of Samastipur district where a 110 acre complex has been developed under an ecosystem approach for integrated wetland area management with fisheries, dairy, duckery and horticulture as components. 44 tanks here so far have been made operational over 75 acre areas (Prabu, 2012).
2. 211 acres wetland area in Jalalpur – Bangari village in Bhittha Panchayat of Pupari sub division of Sitamarhi district has been developed as another integrated project comprising the components of fishery including hatchery, dairy, horticulture, biogas and vermicompost. It is one of the unique project of its kind in the state showing an excellent approach towards natural resource utilization and mobilization (Prabu, 2013).
3. 83 acres land area in Darihara chaur in Laknaur C. D. block of Madhubani district near Jhanjharpur has been developed with fisheries, dairy and horticulture as components.
4. 40 acres in Gorla Kothi village in Chainpur block of Siwan district has come to light for development of a hatchery complex in private sector.
5. Daiya Kharwar village in Madhubani district has emerged a role model in the hatchery business (Prabu, 2009b; Kumari, 2012).

Mithila wetlands produce Makhana as a specialty of the area and other water crops

Wetlands in 8 to 10 districts of Darbhanga, Kosi and Purnea divisions in north Bihar are known

for the cultivation of gorgon/foxnut (*Euryale ferox* Salisb.) and several other water crops which are good source of nutrients (Jha, 1991a,b). Makhana is held as a promising nutraceutical on account of its good quality of starch and protein. Of late, it has been found effective in curing cardiac ailments (Das *et al.*, 2006). Makhana marketing network is paying dividend in the state of Bihar (Prabu, 2008).

Makhana system could be harnessed for integrated aquaculture with carp as well as air breathing catfishes (Jha *et al.*, 2006; Jha *et al.*, 2011). It is with a view to accord a national as well as global recognition to Makhana as a crop that ICAR set up a National Research Centre for Makhana at Darbhanga. The Centre has experimented with field based Makhana cultivation for improving cropping intensity of rice fields and has come out with improved techniques (Kumar *et al.*, 2001 a,b).

Water bodies in north Bihar remain infested with plants like *Vetiveria zizanioides*, *Eichhornia crassipes*, *Sesbania rostrata*, *Alternanthera* spp., *Typha* spp. etc. Local people have devised methods to utilize these invasive aquaphytes in their own way (Jha, 2005, 2012; Jha *et al.*, 2011a, b, 2012 a,c, 2013 a,b; Jha, 2012; Kumar 2012, Kumari, 2013 etc.).

Govt. of Bihar has initiated steps to persuade farmers in the state to opt for growing *Dhaincha* (another *Sesbania* sp.) to boost organic agriculture as a sequel to second green revolution. There is a need to utilize aquatic plants for their therapeutic properties. A good number of aquaphytes has been found to have the potential to cure life style complexities like diabetes and cardiovascular diseases (Jha *et al.*, 2012b).

Shell button industry in east Champaran

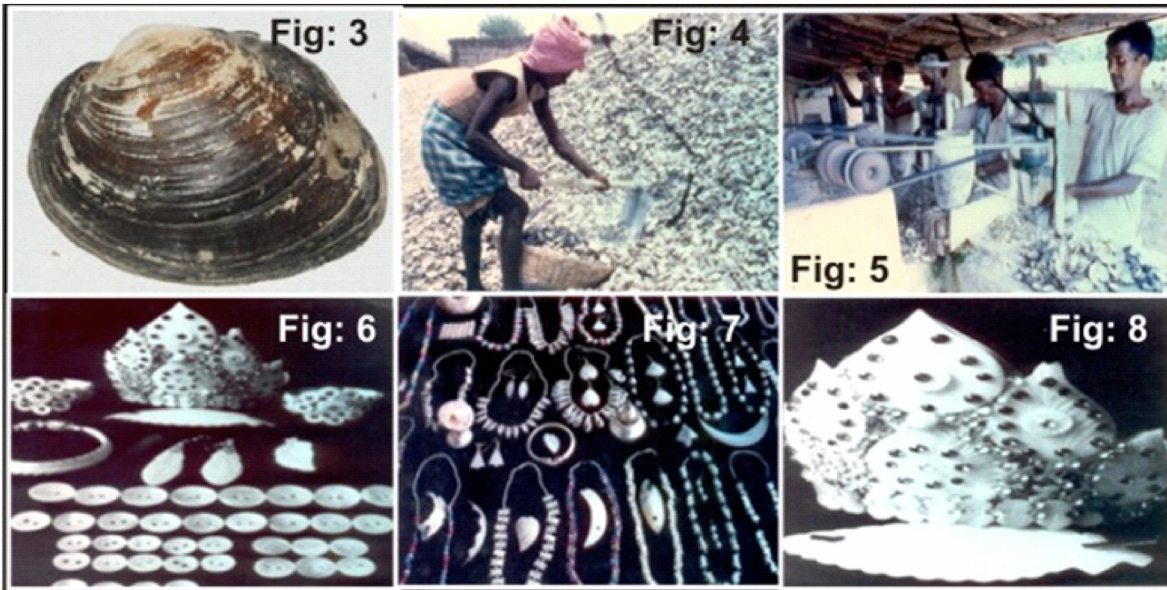
East Champaran district in northern Bihar is one of the largest districts in terms of wetland area (Kumar and Singh, 2013). It is known for its pearl button industry at Mehsi (Table 2), located 48 km east of Motihari, the district headquarter. Oyster shells of *Parreysia* sp. collected from the nearby Sikarahana river constitute the raw material for carving the natural button.

The century old industry owes its ingenuity to one of its inhabitants who set it up in 1905. Mehsi based Tirhut Moon Button Factory became the pioneer.

Mehsi buttons got a fillip during the 1st world war as Japanese buttons became scarce. Second World War put a check on the Japan make button

Table 2. Some Important Sites of North Bihar where Wetlands and Related Activities are Located

Sl. No	Sites	District	Coordinates		Recognition as
			North	East	
1	Saraiyaman	West Champaran	25° 11'	85° 31'	Tourist spot, Culture based capture fisheries site
2	Mehsi	East Champaran	26° 21'	85° 6'	Shell Button Factory
3	Baraila	Vaishali	26° 10'	85° 42'	Bird sanctuary/Potential Ramsar site
4	Kusheshwarsthan	Darbhanga	25° 49'	86° 18'	Bird sanctuary/Potential Ramsar site
5	Kabartal	Begusarai	25° 37'	86° 8'	Bird sanctuary/Potential Ramsar site and Tourist spot, Culture based capture fisheries site
6	Sultanganj – Kahalgaon	Bhagalpur	25° 17'	86° 55'	Dolphin sanctuary/Potential Ramsar site
7	Gogabeel	Katihar	25° 24'	87° 45'	Bird sanctuary/Potential Ramsar site



(Source: eastchampan.bih.nic.in/industries.htm)

Fig. 3 to 8. An account of the shell of *Parreysia* sp.

and demand for Mehshi button shot up in the Indian market and even outside.

North Bihar wetlands: Potential Ramsar Sites

Quite a good number of wetlands in north Bihar are sites to thousands of resident birds and are also thronged by a large number of migratory birds. Winter season witnesses the migration of alien birds in a huge number. It is on this account that these sites have been identified as Important Bird Areas (IBAs) and Potential Ramsar Sites (Table 2) by the BNHS-IBCN network (Islam and Rahmani 2008). A good number of these sites are religious shrines also and have the potential of being developed as places for eco-cum-religious tourism (Jha *et al.*, 2001).

North Bihar Wetlands – An ideal habitat for gangetic dolphins

Lotic system in north Bihar is known for sustaining a good population of Gangetic dolphin (*Platanista gangetica*, locally known as *Sonsi*) (Choudhary *et al.*, 2006). *Sonsi/Susu* is an indicator of the health of an aquatic system. Gangetic dolphins witnessed a major decline in its number in recent past in Ganga as well as in

its tributaries. It was mostly on account of their killing after entrapment in fishing nets. Dolphin oil is used as bait for luring some indigenous fishes like 'Bachwa' (*Eutropiichthys vacha*) and 'Gerua' (*Clupisoma gerua*). An alternative for Dolphin oil has been recently prepared in the form of oil from the scraps of other fishes (Gopal Sharma – personal communication). It is in the fitness of things that the 50km stretch of river Ganga from Sultanganj to Kahalgaon in Bhagalpur district of Bihar has been declared as "dolphin sanctuary". on 5th October, 2009 Dolphin was declared as the "National Aquatic Animal" in the meeting of National River Basin Authority held at New Delhi and as such this day is observed as National Aquatic Animal Day.

Aisa's first Dolphin Research Centre is likely to be set up soon at Patna University. Out of approximately 2500 Gangetic dolphins found in the Gangetic basin, 60% are exclusively located in the state of Bihar. Confluences of Ganga with (1) Saryu at Doriganj in Saran district, (2) Gandak at Hajipur-Sonepur in the Vaishali/Saran districts and (3) Kosi at Kursela in Kathihar districts are major points of concentration of this blind mammal that finds its way and prey in the rivers through echolocation.

A rare rescue operation of dolphins was witnessed in Kishanganj district of north Bihar on 9th March 2013. Two dolphins weighing 2.5cm & 2.52cm which were stuck in the river Donk near Baldiyaghat under Pothia block of the district were dropped in river Mahananda near Thakurganj. This operation was carried out by the Zoological Survey of India (Bihar and Jharkhand) in collaboration with the Forest Dept. of Bihar. Within 30 seconds the two female dolphins swam 200 yards away into the river as they got sufficient water and a fresh lease of life.

River Mahananda has its confluence with Ganga on its downstream and has been the habitat of dolphins. The two dolphins faced the danger of low water level in the river Donk. The Forest Dept. officials protected them by putting wide nets on the two ends where they were trapped and dropped sufficient amount of fish so that they could survive easily (Gopal Sharma, personal communication).

Govt. of Bihar is developing the river front of Ganga in Patna for boosting the tourism potential of the state. Ministry of Environment and Forests, Govt. of India has drawn a Conservation Action Plan for the Ganges River Dolphin (Sinha *et al.*, 2010).

The economy of the state very much depends on its water wealth, more so after the separation of the mineral rich Jharkhand from Bihar. It is under this dispensation that the state needs to undertake all possible efforts for proper and balanced utilization of its water bodies and sustainable development of its biotic resources.

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