



# Small Indigenous Fishes to Boost Nutritional Security: A Case study in Deltaic Sunderbans



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# Introduction

- The mangroves ecosystem of Indian Sunderbans is a bio-diversity hotspot
- Mainstay of settlements, subsistence, prosperity and trade for millennia.
- Innumerable creeks, canals and tidal rivers, which separate the islands from each other and from the mainland.
- Securing livelihoods and managing malnutrition is a serious challenge



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- Sundarban as a biodiversity hotspot is rich in various flora and fauna including wide variety of small indigenous fish (SIF)
- Climate change and various anthropogenic reasons the small fish population is declining rapidly and some of the species are on the verge of extinction.
- Rural households are very much dependent on these fishes available in natural water bodies and ponds for livelihood and consumption.
- The declining trend of these fishes has affected their livelihood as well as food and nutritional security.



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# Broad Objective: Small Indigenous Fishes to Boost Nutritional Security



## Specific objectives:

- To study the nutritional scenario of Indian Sunderbans and to improve the nutrition of the selected population by introducing small indigenous fishes in regular dietary regimes
- To transform the selected village to 'Nutri-Smart village' by promoting conservation and culture of SIFs in the available water bodies



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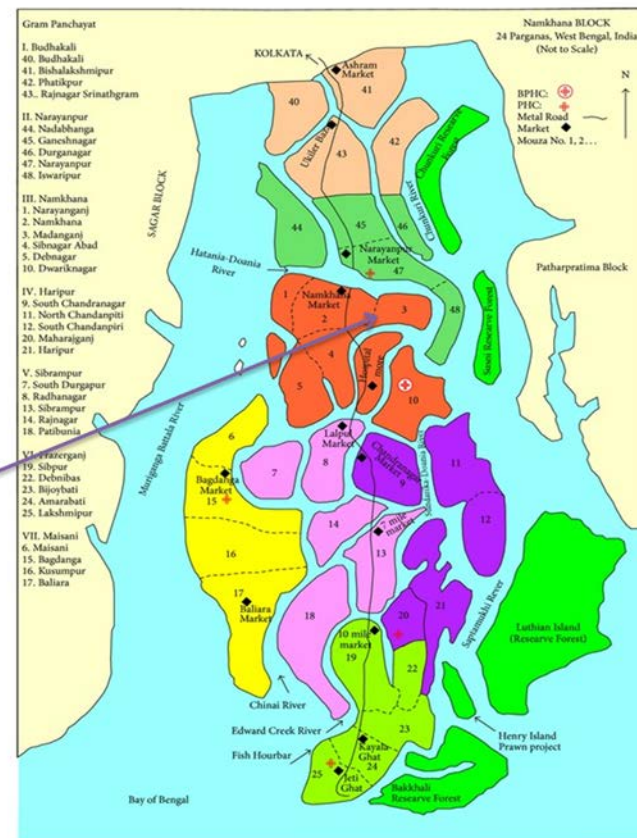


# Site selection



- The Madanganj Village of Namkhana Block, 24 Pargana (S) is on the bank of river Hatania and Doyania and Madanganj Village has a canal which is directly connected with the river and modulated by Sluice gate.
- This village is having approximately 700 households and nearly 2500 voters. For this study a total of 300 households were selected on the basis of 'Wealth Ranking' tool of PRA.

Madanganj Village



Namkhana Block of South 24 Parganas





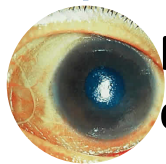
# To find out the nutritional scenario of the selected population



## Methodology



### Indirect



Morbidity data



Consumption data



### Direct



Anthropometry



Clinical and biochemical

Ref: Perk,2014 ; Gupta and Mahajan,2014



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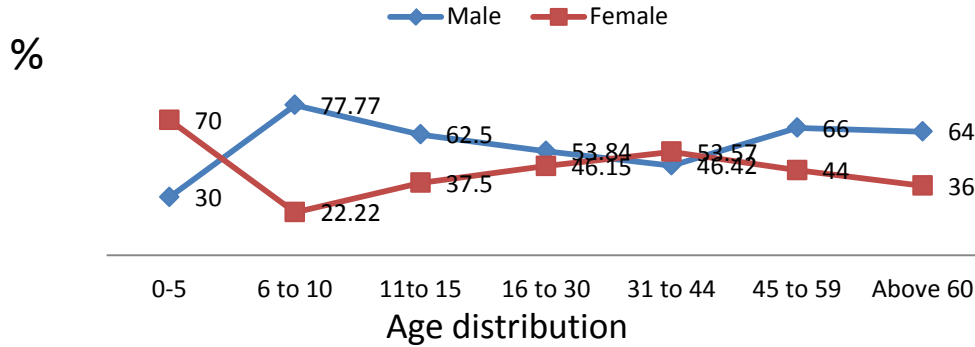




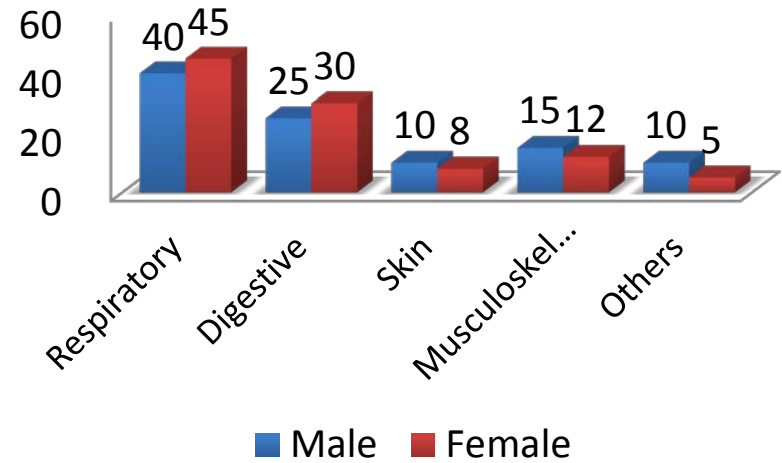
# Morbidity Pattern



### Age specific morbidity rate in Madanganj village of Namkhana : June to December ,2016(N=300 HH)



### Percentage distribution of morbidity pattern in Madanganj village, Namkhana(N=300HH)



### Age distribution



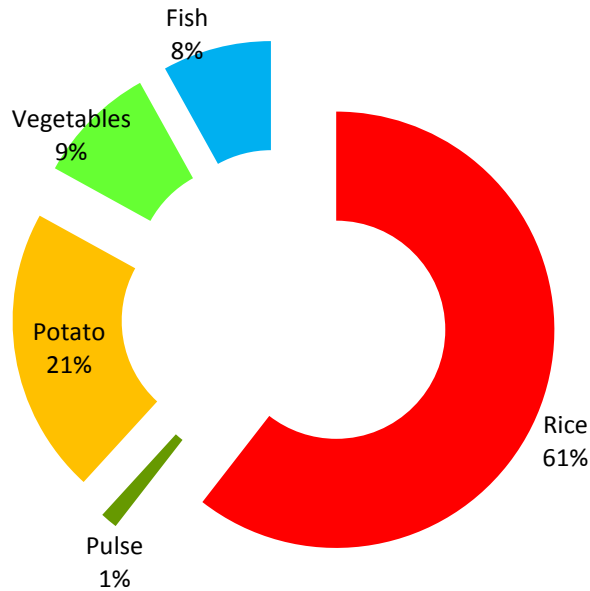


# Food Consumption Pattern



- Carbohydrate based diet, with rice and potato making up 82% of the diet

Percentage distribution of food items in daily meal



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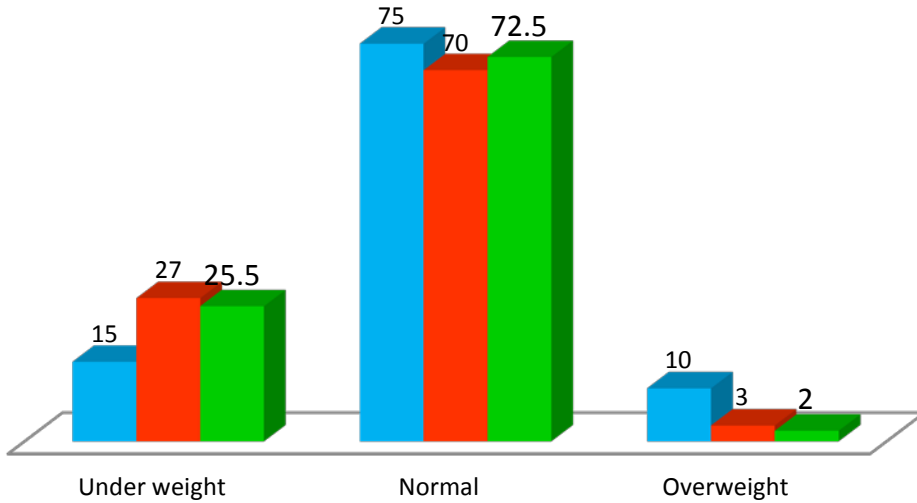




# Percentage distribution of Anthropometric measurement of the selected population (HH=300)

Avg family size: 4.3

■ Male ■ Female ■ Child



Classification	BMI (Kg/m <sup>2</sup> )	Male	Female	Children
Severe thinness	Less than 16.00	5%	3.3%	2%
Mild thinness	16.00-16.99	5%	6.6%	16.5%
Mild thinness	17.00-18.49	10%	16.3%	7%
<b>Normal Range</b>	<b>18.50-24.99</b>	<b>75%</b>	<b>70.1%</b>	<b>73%</b>
Overweight	>=25			
Pre-obese	25.00-29.99	10%	3.3%	1.5%

## Direct Method Anthropometry

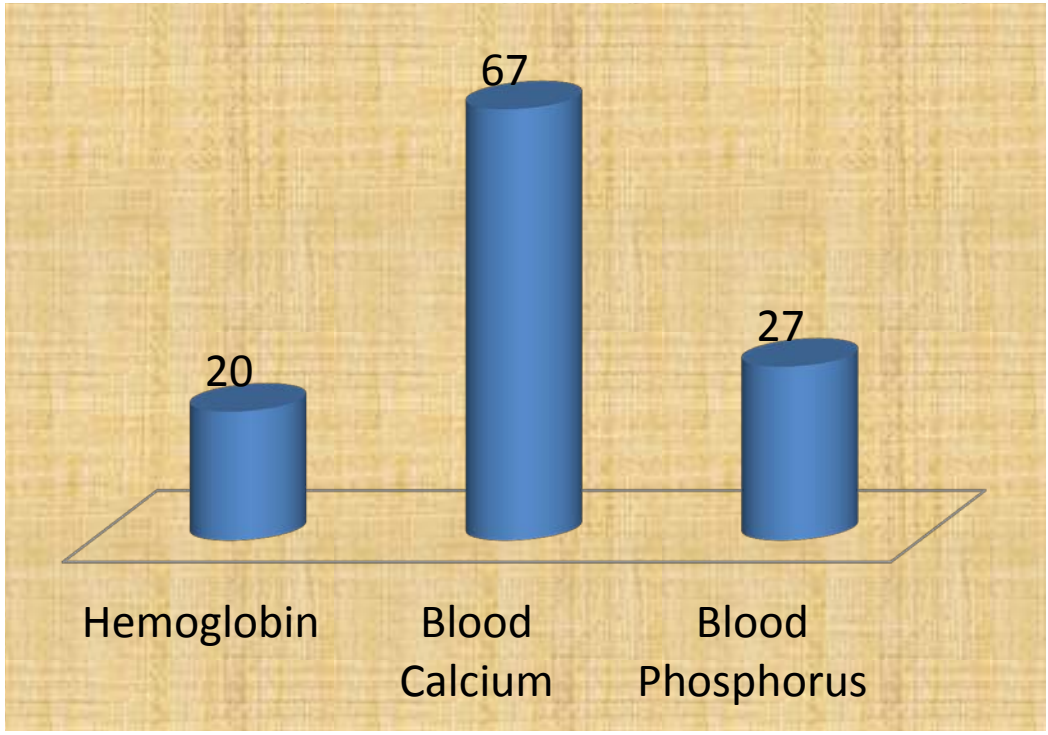




# Direct Method Biochemical



Percentage distribution of sampled women having deficiencies in Blood(N=30)

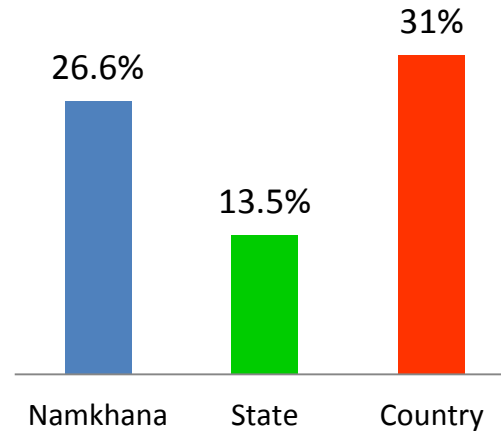


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# To improve the nutrition of the selected population by introducing small indigenous fishes in regular dietary regimes



Underweight



## Methodology

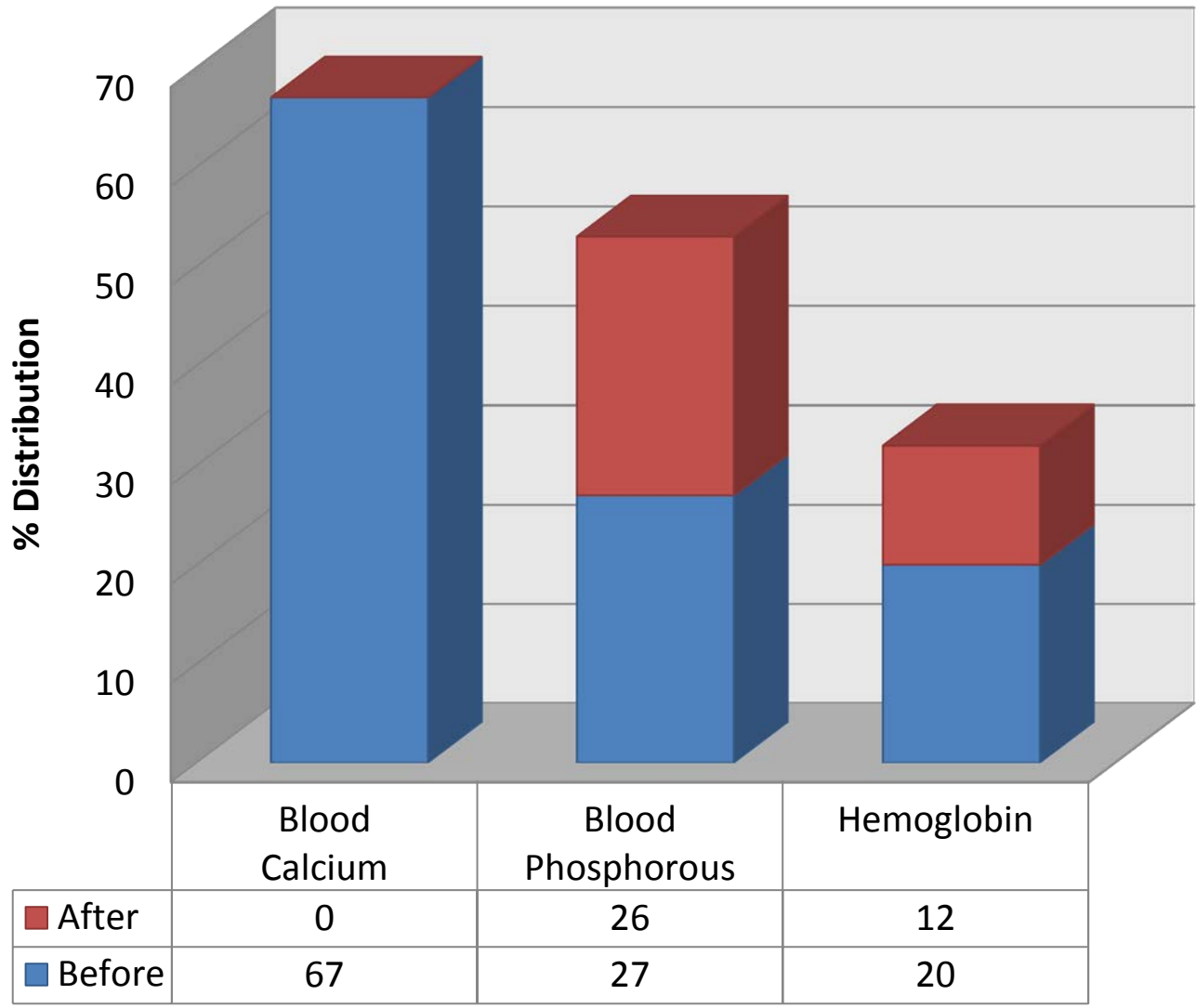
50gm SIF (*A. mola* and *P. sophore*)

Health check up and biochemical tests (Before trial)

Feeding trial for 30 days

Health check up and biochemical tests (After trial)





**Percentage distribution of the selected samples having deficiencies in certain blood parameters Before and after the trial(N=30)**



Paired t-test to compare sample mean(N=30)



Parameters before and after treatment	Paired Differences					t	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference			
				Lower	Upper		
Calcium(mg./dl.)	-1.16667	0.74664	0.13632	-1.44547	-.88787	8.558 <sup>-</sup>	0.000
Phosphorous(mg./dl.)	0.20000	0.88668	0.16189	-0.13109	.53109	1.235	0.227
Hemoglobin(gm%)	0.033	0.809	0.148	0.269	0.335	0.226	0.823



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To transform the selected villages to 'nutri-smart villages' by promoting conservation and culture of SIFs in the available water body in the locality

Methodology

Awareness generation

Technology Demonstration

Adult education



**Demonstration:** Amount of Money (Rs.) invested in 6 months in 0.1ha of pond and the return

Inputs	Demonstration Pond 1	Demonstration Pond 2	Demonstration Pond 4
Renovation of pond	1500	1500	1500
Lime	150	150	150
Cow dung	500	500	500
Feed	3600	1000	0
Seed cost	8736	1500	1500
<b>Total</b>	14486	4650	3650
<b>Stocking</b> (Ref. Kunda 2010)	<b>Mola 5.5kg</b> <b>Chela 7.5kg</b> <b>Stocking of carp Rohu 300,</b> <b>Katla 100, Mrigal 100, Grass</b> <b>carp 250</b>	Mola 5.5kg Chela 7.5 kg Punti 6kg	Mola 5.5kg Chela 7.5 kg Punti 6kg
<b>Total Production</b>	<b>Mola 30.5kg</b> <b>Chela 28.7</b> <b>Katla56.81; Rohu</b> <b>17.41kg;Mrigal 72.16Kg;</b> <b>Grass carp 170kg</b>	<b>Mola 27.8 kg</b> <b>Chela 25.1kg</b> <b>Puti 16.8 kg</b>	<b>Mola 26.8 kg</b> <b>Chela 26.1kg</b> <b>Puti 15.3 kg</b>
Fish sale	41226.6	10753	8950
profit	26740.6	6103	5300



Culture and conservation of the nutrient rich small indigenous fishes can fulfill the nutritional needs of the people of Sunderbans.



Seed bank



Demonstration pond



Seed bank





## Concept of 'seed bank' and 'seed chain'

- The community pond which is connected with a canal has been developed as conservation site through community participation. The SIFs seeds collected from the canals are conserving in that pond. This pond has been converted as 'seed bank' and which was inaugurated by Dr. Purnendu Biswas, Vice Chancellor, WBUAFS on 21<sup>st</sup> November, 2016 on the occasion of World Fisheries Day.
- Twenty beneficiaries were selected and seeds of SIFs were distributed to them to culture in their own ponds and each beneficiary will distribute small fish seed from their ponds to 10 people of that village and thus a 'Seed chain' will also develop. Thus way the whole Madanganj Village is approaching towards Nutri-smart Village.



# ROADMAP FOR NUTRISMART VILLAGE

Awareness about the nutritional value of small fishes

Capacity building of the target group

Sensitization of the target group for culture and conservation of small fishes

Scientific culture and conservation of small fishes

Production enhancement of SIFs

Improvement in household income through fish selling

Improved economic status

Increase in purchasing power of nutritional food

Increased availability of small fish

Consumption of optimum quantity of SIFs

Enhancement of nutritional status

Improvement of health and socio-economic status of people





# Thank u



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# Awareness camps and extension



17<sup>th</sup> May,16 at Community centre Madanganj



12<sup>th</sup> Fenruary,17 at ICDS, Madanganj



21<sup>st</sup> March,17 at Sub-health centre,Sivnagar Abad, Madanganj





## Samples Mean of the selected blood parameters(N=30)

Parameters	Before	After
Blood Calcium	7.48	8.56
Blood Phosphorous	2.73	2.86
Hemoglobin	12.20	12.33

## Biological references of the selected blood parameters

Parameters	Child	Male	female
Hb(gm%)	11.0-15.5	13.0-17.0	11.0-15.0
Calcium(mg./dl.)	8.4-10.4		
Phosphorous(mg./dl.)	4-6.5	2.5-5	





पोशकीय सुरक्षा एवं ग्रामीण विकास हेतु  
पत्तियों का पालन



Small indigenous fishes (SIFs)  
in nutritional security for rural community



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সুন্দরবনের মানুষের পুষ্টি সুরক্ষায়  
দেশীয় ছোটো মাছ



ভাৰুক্সনুপ-কেন্দ্ৰীয় অল্ৰদেশীয় মৎস গবেষণা সংস্থা  
ব্যারাকপুৰ, কোলকাতা - ৭০০ ১২০





# Output of the Project



Conference Presentation	Roy, A., Ghosh, A. and Bayen, S.(2016).Needs Assessments of the farmers: A tool to promote Farmer-Driven Extension in Inland Open water Management.Book of Abstracts: National seminar on Aquaculture Diversification: The way forward for blue revolution. pp. 128.
Conference Presentation	Roy, A., Ghosh, A. and Bayen, S., Dr. Md. Aftabuddin, Sinha, A. and Parida, P.(2016).Imperatives and strategies to improve nutritional status of women in Indian Sunderbans.Oral presentation in the 8th National Extension Education Congress-2017
Conference Presentation	Ghosh, A., Roy, A., Bayen, S., Md. Aftabuddin, Sinha, A., Parida, P., Das, B.K. (2017).Boosting up nutritional security in Sundarban through Small Indigenous Fishes: way forward.
Poster	Roy, A., Dr. Md. Aftabuddin, Ghosh, A. and Bayen, S.(2017). Approaching towards a nutri-smart village in Sundarbans. Published by ICAR-CIFRI.
Extension Pamphlet	Roy, A.,Dr. Md. Aftabuddin, Sinha, A., Parida, P., Ghosh, A. and Bayen, S.(2016).Small indigenous fishes(SIFs) in nutritional security for rural community. Published by ICAR-CIFRI.
Award	Best oral presentation award in 8 <sup>th</sup> National extension Congress at NAARM, Hyderabad

