

NMHS-FINAL TECHNICAL REPORT (FTR)

Demand-Driven Action Research Project Grant

NMHS Reference No:	NMHS/2015-16/SG05/05	Date of Submission:	2	0	1	2	2	0	1	9
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PROJECT TITLE (IN CAPITAL)**FISH FAUNAL DIVERSITY, HABITAT ECOLOGY AND THEIR CONSERVATION STRATEGIES OF THE KAMENG RIVER SYSTEM IN ARUNACHAL PRADESH****Project Duration: from (01.04.2016) to (31.07.2019).****Submitted to:**

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NMHS-Final Technical Report (FTR) *template*

Demand-Driven Action Research Project

DSL: Date of Sanction Letter

1	3	0	3	2	0	1	6
d	d	m	m	y	y	y	y

DPC: Date of Project Completion

3	1	0	7	2	0	1	9
d	d	m	m	y	y	y	y

Part A: Project Summary Report

1. Project Description

i.	Project Reference No.	NMHS/2015-16/SG05/05			
ii.	Type of Project	Small Grant	✓	Medium Grant	Large Grant
iii.	Project Title	FISH FAUNAL DIVERSITY, HABITAT ECOLOGY AND THEIR CONSERVATION STRATEGIES OF THE KAMENG RIVER SYSTEM IN ARUNACHAL PRADESH			
iv.	State under which Project is Sanctioned	ARUNACHAL PRADESH			
v.	Project Sites (IHR States covered) (Maps to be attached)	Morsing; Dirme; Phudung; Jigaon; Kafila; Banna; Dundri Jamiri; Seppa; Wallong; Bhalukpong; Tippi (Arunachal Pradesh)			
vi.	Scale of Project Operation	Local	Regional	✓	Pan-Himalayan

vii.	Total Budget/ Outlay of the Project	0.2466750 (in Cr)
viii.	Lead Agency	GAUHATI UNIVERSITY
	Principal Investigator (PI)	Prof. Dandadhar Sarma <i>Department of Zoology, Gauhati University, GNB Nagar, Jalukbari, Ghy-14</i>
	Co-Principal Investigator (Co-PI)	1. Prof. W. Viswanath, Professor (HAG) & Dean, School of Life Science, Canchipur-795003, Imphal, Manipur (India). 2. Sri Ratul Chandra Bharali, Asstt. Professor Department of Zoology, Udalguri College, BTAD, Assam. 3. Dr. Sarbojit Thaosen, Associate Professor, Haflong Govt. College, Haflong, Dima Hasao Assam – 788819
ix.	Project Implementing Partners	1. Sri Ratul Chandra Bharali, Asstt. Professor Department of Zoology, Udalguri College, BTAD, Assam. 2. Dr. Sarbojit Thaosen, Associate Professor, Haflong Govt. College, Haflong, Dima Hasao Assam – 788819
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2. Project Outcome

- 2.1. **Abstract** (not more than 500 words) [it should include background of the study, aim, objectives, methodology, approach, results, conclusion and recommendations).

Background: The Kameng River is one of the important north bank tributaries of the Brahmaputra River system in northeast India. Although survey on ichthyofauna of Arunachal Pradesh has been carried out by few workers but till date no information is available on the diversity of the Kameng River in particular, which is one of the major river system of the state.

Objectives/ Aim: **1.** To examine the fish fauna, their diversity patterns in the distribution of different fish biodiversity components of Kameng River and its tributaries in Arunachal Pradesh **2.** To analyze the habitat ecology, species diversity and possible influence on native fish fauna by exotic fish. **3.** Formulation of possible management strategy for the mitigation & conservation of existing fish diversity.

Methodologies: Collection of fishes is being done through fishing using gill net and electro fishing device at least 2 times in a season in each selected sampling site. Identification of Fishes was made following Jayaram 1981, 1999; Talwar and Jhingran 1991, Vishwanath (2014). The CPUE of gill was calculated for each sampling sites following Biswas (1993). All the physico-chemical parameters were analysed using method of APHA (2005). The diversity index of fish was calculated as per standard method (Shannon and Wiener 1963). Awareness meetings were organized using Participatory Rapid Appraisal tool such as Focus Group Discussion.

Approach: A total of 12 sampling sites were selected throughout the stretches of the River in Arunachal Pradesh on the basis of topography, altitudinal variation & tributaries. To examine fish faunal diversity of the river, experimental fishing was carried out twice in a season in all selected sampling site with the help of local villagers. The relative abundance of fish across different sites and distributional pattern of fish diversity in each sampling sites were also assessed seasonally.

Results: A total of 117 species under 8 orders and 23 families were recorded. Family Cyprinidae was found to be the most abundant, contributing 46 species, followed by Sisoridae with 13 species. 17 species were endemic to the region. All the studied physico-chemical parameters were estimated within permissible limit so far, except in some stretches of the sampling sites where anthropogenic activities have been observed.

Conclusion: The Kameng River still enjoying high fish faunal diversity and many species are yet to be discovered. The river support good habitat for the ichthyofaunal except in some of the places where there is significant anthropogenic activities. Local people need to aware about the conservation of the fishes and the habitat.

Recommendations: Frequent exploration has to be undertaken to explore the ichthyofaunal of the river. More awareness and training has to be conducted for the local people regarding the conservation of the river and their use in livelihood generation.

2.2. Objective-wise Major Achievements

S. No.	Objectives	Major achievements (in bullets points)
1	To examine the fish fauna, their diversity patterns of Kameng River and its tributaries in Arunachal Pradesh	<ul style="list-style-type: none"> • 117 species were recorded. • Lower reaches of the river has richer diversity. • 17 endemic species were identified
2	To analyse the state of habitat ecology, species diversity and possible influence on native fish fauna by exotic fish	<ul style="list-style-type: none"> • All the studied Physico-chemical parameters were estimated within permissible limit, except in some stretches of the sampling sites where anthropogenic activities has been observed • Relative abundance of Cyprinidae was estimated highest in all the sampling sites. Sisorids were the second most dominating family • No invasive species were recorded in the sampling sites. However, local people commented on the presence of some exotic species in the river.
3	Formulation of possible management strategy for the mitigation & conservation of existing fish diversity.	<ul style="list-style-type: none"> • 6 training programmes has been organised till date since the inception of the project for the local people to make them efficient in breeding the indigenous species independently. • 3 awareness meetings were organized using Participatory Rapid Appraisal (PRA) tool such as Focus Group Discussion (FGD), to educate the local people about their role in the conservation process of the fishes as well as the river.

2.3. Outputs in terms of Quantifiable Deliverables*

Sl. No.	Quantifiable Deliverables*	Monitoring Indicators*	Quantified Output/ Outcome achieved	Deviations, if any, and Reason thereof:
1.	Checklist and Monograph of existing fish fauna of the River along with its diversity, distributional pattern, habitat suitability and commercial value will be prepared.	Monograph on the existing fish fauna of the river covering its diversity, distribution, habitat suitability and commercial values (Nos. / species)	117 species has been reported during the period and a monograph of the existing fish fauna is prepared.	
2.	Complete database on habitat ecology of the fishes of the rivers and impact of invasive species and climate change etc. will be generated.	Assessment Reports on Impact of invasive species and climate change on the selected fauna (Nos./species).	No invasive/exotic species were encountered. However, local people commented on the presence of some exotic species in the river.	
3.	Development of indices for management of fish biodiversity and formulation of conservation strategy.	Indices for fish biodiversity conservation strategy (Nos.).	Diversity indices show the presence of the rich fish faunal composition of the river. The lower stretch of the river supports more species diversity. The probable factor may be the lower temperature of the water at higher altitude.	
4.	Awareness building through organization of workshops / seminars /meeting on sustainable	Awareness material / manual on the habitat ecology of the faunal diversity (Nos.).	6 training programmes has been organised for the local people to make them efficient in	

conservation of existing fish fauna of the River.	Training/ Workshops/ Meetings (Nos.) for awareness generation and sustainable conservation of faunal species.	breeding the indigenous species independently. 3 awareness meetings were organized using Participatory Rapid Appraisal (PRA) tool such as Focus Group Discussion (FGD), to educate the local people about their role in the conservation process of the fishes as well as the river.
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(*) As stated in the Sanction Letter issued by the NMHS-PMU.

2.4. Strategic Steps with respect to Outcomes (in bullets)

S. No.	Particulars	Number/ Brief Details	Remarks/ Enclosures
1.	New Methodology developed	Not Applicable	
2.	New Models/ Process/ Strategy developed	Not Applicable	
3.	New Species identified	3	1 accepted; 2 communicated
4.	New Database established	17	DNA sequences submitted to GenBank
5.	New Patent, if any		
	I. Filed (Indian/ International)	Not Applicable	
	II. Granted (Indian/ International)		
	III. Technology Transfer(if any)		
6.	Others (if any)	Breeding protocols of 2 species has already been developed.	

3. Technological Intervention

S. No.	Type of Intervention	Brief Narration on the interventions	Unit Details (No. of villagers benefited / Area Developed)
1.	Development and deployment of indigenous technology	Breeding protocol of indigenous species.	Local people from different villages participated in the training programme on breeding of the indigenous species of fishes.
2.	Diffusion of High-end Technology in the region	Not Applicable	
3.	Induction of New Technology in the region	Not Applicable	
4.	Publication of Technological / Process Manuals	Under process	
	Others (if any)		

4. New Data Generated over the Baseline Data

S. No.	New Data Details	Status of Existing Baseline	Additionality and Utilisation New data
1	117 species reported	No report on the detailed study of the river	Better understanding of the fish faunal composition of the river.
2	17 gene sequences of different species found in the river	3 sequences of the species were present in the GenBank	Help in the better identification, conservation and further studies on the species
3	No exotic/invasive species were reported, but local people affirms the presence of some exotic species such as <i>Cyprinus carpio</i>	No records are available on invasive species in the river	Helps in future assessment of the invasive species and also on its induction in the river system.

4	Suitable habitat with good water chemistry, except in some specific sites	No data on habitat characteristics of the river	Helps to compare and analyse the changes occurring in the river in near future
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5. Demonstrative Skill Development and Capacity Building/ Manpower Trained

S. No.	Type of Activities	Details with number	Activity Intended for	Participants/Trained			
				SC	ST	Woman	Total
1.	Workshops	6	Livelihood generation for the local people based on breeding of the indigenous species	0	145	66	145
2.	On Field Trainings	-	-	-	-	-	-
3.	Skill Development	-	-	-	-	-	-
4.	Academic Supports	-	-	-	-	-	-
	Others (if any)	-	-	-	-	-	-

6. Linkages with Regional & National Priorities (SDGs, INDC, etc)/ Collaborations

S. No.	Linkages /collaborations	Details	No. of Publications/ Events Held	Beneficiaries
1.	Sustainable Development Goal (SDG)	Not Applicable		
2.	Climate Change/INDC targets	Not Applicable		
3.	International Commitments	Not Applicable		
4.	Bilateral engagements	Not Applicable		
5.	National Policies	Not Applicable		
6.	Others collaborations	Not Applicable		

7. Project Stakeholders/ Beneficiaries and Impacts

S. No.	Stakeholders	Support Activities	Impacts
1.	Gram Panchayats	–	–
2.	Govt Departments (Agriculture/ Forest)	–	–
3.	Villagers	Training/workshop on the breeding of the fishes	Showed enthusiasm
4.	SC Community	–	–
5.	ST Community		
6.	Women Group		
	Others (if any)		

8. Financial Summary (Cumulative)

S. No.	Financial Position/Budget Head	Funds Received	Expenditure/ Utilized	% of Total cost
I.	Salaries/Manpower cost	720000.00	720000.00	100
II.	Travel	400000.00	400000.00	100
III.	Expendables & Consumables	300000.00	299814.00	99.9
IV.	Contingencies	100000.00	125000.00	125
V.	Activities & Other Project cost	100000.00	100000.00	100
VI.	Institutional Charges	259811.00	321750.00	123.8
VII.	Equipments	500000.00	499900.00	99.9
	Total	2379811.00	2466464.00	103.6
	Interest earned	3844.00		
	Grand Total	2383655.00		

* Please attach the consolidated and audited Utilization Certificate (UC) and Year wise Statement of Expenditure (SE) separately, *ref. Annexure I.*

9. Major Equipment/ Peripherals Procured under the Project (if any)**

S. No.	Name of Equipments	Cost (INR)	Utilisation of the Equipment after project
1.	Digital water & soil analyzing kit	85,000.00	Already in used for other exploration work of the department
2.	Digital movie cum still camera	75,000.00	Already in used for other research work of the department
3.	Electro-fishing device	2,99,900.00	Already in used for other exploration work of the department
4.	Rubber Boat	40,000.00	Already in used for other exploration work of the department

**Details should be provided in details (ref Annexure III &IV).

10. Quantification of Overall Project Progress

S. No.	Parameters	Total (Numeric)	Remarks/ Attachments/ Soft copies of documents
1.	IHR States Covered	1	
2.	Project Site/ Field Stations Developed	12	
3.	New Methods/ Modeling Developed	0	
4.	No. of Trainings arranged	6	
5.	No of beneficiaries attended trainings	145	
6.	Scientific Manpower Developed (Phd/M.Sc./JRF/SRF/ RA):	1	
7.	SC stakeholders benefited	0	
8.	ST stakeholders benefited	145	
9.	Women Empowered	66	
10.	No of Workshops Arranged along with level of participation	6 (20–30 participants in each workshops)	

11.	On field Demonstration Models initiated	0	
12.	Livelihood Options promoted	1	
13.	Technical/ Training Manuals prepared	1	
14.	Processing Units established	0	
15.	No of Species Collected	117	
16.	New Species identified	110	
17.	New Database generated (Types):	1	
	Others (if any)		

11. Knowledge Products and Publications:

S. No.	Publication/ Knowledge Products	Number		Total Impact Factor	Remarks/ Enclosures
		National	International		
1.	Journal Research Articles/ Special Issue:		2	1.8	
2.	Book Chapter(s)/ Books:	1			
3.	Technical Reports	-	-		
4.	Training Manual (Skill Development/ Capacity Building)	-	-		
5.	Papers presented in Conferences/Seminars	1	1		
6.	Policy Drafts/Papers	-	-		
7.	Others:	-	-		

* Please append the list of KPs/ publications (with impact factor and further details) with due Acknowledgement to NMHS.

12. Recommendation on Utility of Project Findings, Replicability and Exit Strategy

Particulars	Recommendations
Utility of the Project Findings	Assist in future assessment/development and conservation of the fish fauna and river. It also helps in value addition to the biodiversity hotspot.
Replicability of Project	Monitoring of the river after a period of 5 years will help in assessing the changes in the river and the ecosystem
Exit Strategy	This investigation will be helpful for restoration of habitat of Kameng River and conservation of Fish faunal diversity of the River. It will also serve as a base line data for other researchers and students in their future research, and environment activist in conserving ecosystem. Prospects of ecotourism may encourage and form a point for development by government, NGO's and planners.


(PROJECT PROPONENT/ COORDINATOR)

(Signed and Stamped)
Dr. Dandadhar Sarma
Professor
Department of Zoology
Gauhati University
Guwahati-781045


(HEAD OF THE INSTITUTION)

(Signed and Stamped)
পঞ্জীয়ক
গুৱাহাটী বিশ্ববিদ্যালয়, গুৱাহাটী-১৫
Registrar
Gauhati University, Guwahati-14

Place: Guwahati

Date: 23.12.19