

PROJECT COMPLETION REPORT

1. Title of the project: **Studies on distribution, behavioural ecology, habitat structure and conservation of newly discovered Arunachal macaque (*Macaca munzala*) in western Arunachal Pradesh, India**

2. Principal Investigator(s) and Co-Investigator(s):

Principal Investigator: Dr. Ashalata Devi

Assistant Professor, Dept. of Environmental Science
Tezpur University, Napaam, Sonitpur Assam-784028
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Co-Investigator(s):

i) **Dr. Awadhesh Kumar**

Associate Professor, Department of Forestry
NERIST (Deemed University),
Nirjuli, Itanagar, Arunachal Pradesh-791109
E.mail: tpileatus@gmail.com

ii) **Dr. A.K Gupta, IFS, M.Sc. PhD (Camb.)**

Addl. PCCF and Chief Wildlife Warden
Aranya Bhawan, Gorkha Basti
P.O. Kunjaban, Agartala-799006
E-mail: akphayri@gmail.com

3. Implementing Institution(s) and other collaborating Institution(s):

Tezpur University and NERIST (Deemed University)

4. Date of commencement:**04/02/2013**

5. Planned date of completion:**31/03/2016**

6. Actual date of completion:**31/03/2016**

7. Objectives as stated in the project proposal:

- i. To study the ecology and behavioural aspects such as time-budget activities, food preference and feeding habits, social organization and behaviour, and reproductive ecology of *Macaca munzala*.
- ii. To evaluate the habitat characteristic and structure of natural habitat of *M. munzala* in relation food species frequency, density, abundance, basal cover, importance value index, species diversity and similarity index along with soil profile and climatic condition.
- iii. To assess the natural regeneration status of most preferred seasonal food plants of *M. munzala* in relation to habitat conservation and management.

8. Salient findings and Achievements

The present study enumerates distribution and population status, behaviour ecology, foraging ecology, habitat characteristics and conservation issues of Arunachal macaque (*Macaca munzala*) in western Arunachal Pradesh.

The findings of the present study exhibited extended distribution of *Macaca munzala* in western Arunachal Pradesh, India. A total of 41 troops were recorded having 971 individuals. Population status was found to be increasing in Tawang district comparing to the earlier report (Kumar *et al.*, 2008), however the population status of *Macaca munzala* in West Kameng district is disturbing by receiving greater threat due to the hunting activity.

The present study recorded behavioural activity of three selected troops, namely, kang, Kharman and Muchut, which inhabited in varied forest type. No studies on behavioural ecology has been undertaken so far, the present research is the first attempt to report on behavioural ecology of this newly discovered macaque species, *Macaca munzala*. The study on behavioural ecology was carried out in mixed coniferous forest, broadleaf forest and degraded scrub forest. It was recorded that *M. munzala* spent highest time activity on foraging (32.33%) followed by resting and sitting (26.25%), moving (25.08%) and grooming and other interaction (16.33%). Seasonal changes greatly influence the activity pattern of *M. munzala*. Besides, it was also recorded that time activity budget, foraging activity and ranging behaviour differ with habitat characteristics as it was hypothesized in the study. The troop the reside in mixed coniferous forest has the higher time spent on foraging activity (34.54%) than troop reside in broadleaf forest (32.52%) and degraded scrub forest (29.89%). The present study revealed that altitudinal variation has influence in behaviour aspects of *M. munzala* and also the species has greater plasticity in the feeding habits. It was found that the species adopted the changing habitat matrix, although naturally regenerated food plants were the major source of their diet (87.41%), but acquiring food from the human habitation is also one of their food plant resource (9.28%). A total of 74 food plant species was recorded which was found to be higher than the earlier reports and seasonal variation in principal food plant species was also recorded similar to earlier reports (Kumar *et al.*, 2007 and Mendiratta *et al.*, 2009). A significant difference was recorded in used pattern of the food plant materials by the troops inhabited in higher altitude of mixed coniferous forest than the troops inhabited in lower altitude of broad leaf forest and degraded scrub forest. Among the tree species

Erythrina arborescens contributed highest in the diet of *M. munzala*'s troops inhabited in Broad leaf forest and Degraded scrub forest but *Leucoscepttrum canum* was found to be the highest contribution in the food resource for *M. Munzala*'s troop that reside in mixed coniferous forest of higher altitude.

The home range of *M. munzala* was found to be higher than the earlier study (Kumar *et al.*, 2007 and Mendiratta *et al.*, 2009) and there was variation in home range and habitat use pattern according to seasonal changes. The estimated mean home range of *M. munzala* was 129 ha. During monsoon season, home range was found to be the higher with 7 ha and the smallest home range was recorded during the winter season with 25 ha.

M. munzala was found to be tends more to be in mutual relationship with the other individual of the troop though troops having higher individuals (23.65). Mutual sitting and mutual grooming was recorded higher than the other social behaviour activity. Reproductive rate of the species could not be estimated but it was observed that successful copulation was throughout the year.

Distribution of *M. munzala* was recorded in the various forest type, i.e. subtropical forest in the lower altitude (1000-1600 m msl), broad leaf forest (>1600-2200 m msl) and mixed coniferous forest (>2200-3000 m msl). Mixed coniferous forest inhabited by *M. munzala* was dominated by tree species like *Quercus*, *Pinus* and *Alnus*; while broadleaf forest were dominated by *Magnolia*, *Quercus*, *Rhododendron*, *Schima* and *Alnus* species. Subtropical habited of *M. munzala* were dominated by *Terminalia* sps, *Altingia* sps, *Cinnamomum* sps etc. Degraded scrub forest was dominated by shrub species of *Elaeagnus pungens* along with co-dominant trees like *Erythrina* and *Alnus* species. The overall regeneration status of the preferred food plant tree species of *M. munzala* was found to be 'fair' during the period of study.

The macaque and human interaction was found unconstructive in Tawang district due to the intensive raiding behaviour of the species. While in West Kameng district, population status of *Macaca munzala* is largely threaten due to the hunting activity by the local inhabitants. Therefore, there is urgent needs of conservation and management of *M. munzala* in Arunachal Pradesh particularly in Tawang and West Kameng districts.

9. Conclusion

The present study reported population structure and extensive details of time activity budget and feeding behaviour of *M. munzala*. The extensive list of food resources of *M. munzala* has been recorded during the study. Observation and records on behavioural activities of this species in relation to the different habitat type will be of great help in the habitat management and formulation of conservation strategies of this endangered species. The finding of the present study will be of greater reference in further research on this species and holistically on ecological study on primates.

10. S&T benefits accrued:

i. List of Research publications

Bidyut Sarania, Ashalata Devi, Awadhesh Kumar, Kuladip Sarma and Atul Kumar Gupta. 2016. Predictive distribution modeling and population status of the endangered *Macaca munzala* in Arunachal Pradesh, India. American Journal of Primatology. 9999: 1-10. DOI 10.1002/ajp.22592.

ii. Manpower trained on the project

- a) Research Scientists or Research Associates: **One JRF**
- b) No. of Ph.D. produced: **01**
- c) Other Technical Personnel trained: **One Field Assistant**

Name and Signature



a. Ashalata Devi
(Principal Investigator)



b. Awadhesh Kumar
(Co-Investigator)



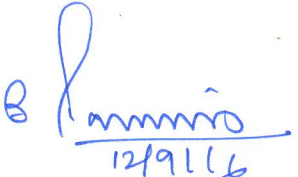
c. A. K. Gupta
(Co-Investigator)

UTILISATION CERTIFICATE
FOR THE FINANCIAL YEAR - (1st April, 2016 to 31st March 2017)

Certified that out of Rs. NIL of grants-in-aid sanctioned in favour of The Registrar, Tezpur University, Tezpur, Assam under this Ministry/ Department letter/ order No SR/SO/AS-77/2012 dated 17/05/2013 and Rs 2,07,796.00 on account of unspent balance of the previous year, a sum of Rs. 1,27,616.00 has been utilised for the purpose of research work for which it was sanctioned and that the balance of Rs. 80,180.00 remaining utilised at the end of the year has been surrendered to Government (vide Challan no _____ dated _____).


Signature of PI
Date


Signature of Registrar /
Date
Registrar
Tezpur University


Signature of Head Accounts
Date Officer/Date
Finance Officer
Tezpur University

(To be filled in by DST)

Certified that I have satisfied that the conditions on which the grants-in-aid was sanctioned have been fulfilled/ are being fulfilled and that I have exercised the following checks to see that the money was actually utilised for the purpose for which it was sanctioned:-

Kinds of checks exercised.

1.

Signature: _____


2.

Designation: _____ Date: _____

FINAL STATEMENT OF EXPENDITURE

1. Sanction Letter/ Order No and date of sanctioning the project: SR/SO/AS-77/2012 dated 11/01/2013
2. Total Project Cost: Rs. 23,98,000.00
(Sanctioned/ Revised Project Cost, if applicable)
3. Date of Commencement of Project: 04/02/2013
4. Date of Completion of Project: 31/03/2016
5. Grant received in each year (financial year):
 - a. 1st Year : Rs. 10,61,000.00 (Rs. 3,61,000 + Rs. 7,00,000)
 - b. 2nd Year: Rs. 6,50,000.00
 - c. 3rd Year: Rs. 4,00,000.00
 - d. Interest, if any: Rs. 21,276.00
 - e. Total (a+b+c+d): Rs. 21,32,276.00

P.T.O.


Finance Officer
Tezpur University

CONSOLIDATED FINAL STATEMENT OF EXPENDITURE

Annexure-XI contd...

(to be submitted financial yearwise ie 1st April 2013 to 31st March 2014; 1st April 2014 to 31st Mach of 2015; 1st April 2015 to 31st Mach 2016; 1st April 2016 to 30th June 2016)

Sr No (I)	Sanctioned Heads (II)	Funds Allocated (indicate sanctioned or revised) (III)	Expenditure Incurred				Total Expenditure (IV+V+VI+ Σ) (VII)	Balance as on date III - (VII) = (VIII)	Remarks (if any)
			1 st Year (1 st April 2013 to 31 st March 2014) (IV)	2 nd Year (1 st April 2014 to 31 st Mach of 2015) (V)	3 rd Year (1 st April 2015 to 31 st Mach 2016) (VI)	(1 st April 2016 to 30 th June 2016) (Σ)			
1.	Manpower costs	Rs. 8,40,000	Rs. 1,79,033	Rs. 1,66,194	Rs. 2,09,000	Nil	Rs. 5,54,227	Rs. 2,85,773	
2.	Consumables	Rs. 88,000	Rs. 48,298	Rs. 20,021	Rs. 19,769	Nil	Rs. 88,088	-Rs. 88	
3.	Travel	Rs. 4,20,000	Rs. 80,744	Rs. 1,98,553	Rs. 88,343	Nil	Rs. 3,67,640	Rs. 52,360	
4.	Contingencies	Rs. 3,40,000	Rs. 1,71,510	Rs. 94,233	Nil	Rs. 74,216	Rs. 3,39,959	Rs. 41	
5.	Others, if any	NII	Nil	Nil	NII	Nil	Nil	Nil	
6.	Equipment	Rs. 3,11,000	Rs. 3,09,159	NII	Nil	Nil	Rs. 3,09,159	Rs. 1,841	
7.	Overhead expenses	Rs. 3,99,000	Rs. 83,125	Rs. 1,73,373	Rs. 83,125	Rs. 53,400	Rs. 3,93,023	Rs. 59,77	
8.	Total	Rs. 23,98,000	Rs. 8,71,869	Rs. 6,52,374	Rs. 4,00,237	Rs. 1,27,616	Rs. 20,52,096	Rs. 3,45,904	

Amount to be refunded/ reimbursed (whichever is appropriate): Rs. 80,180/-

Name and Signature of Principal Investigator:
Date:

[Handwritten Signature]
22/9/16

Signature of Competent financial/ audit authority: _____
(with seal) Date: _____

**Finance Officer
Tezpur University**

* DOS – Date of Start of project

Note : (1) In Column (III) for 'funds allocated', the breakup of the total funds allocated for the entire duration of the project may be shown. The columns for 'expenditure incurred' should clearly indicate the breakup of expenditure financial year wise, including all commitments based on bills raised during the term, and salary arrears to project staff etc, if any, to be paid.

(2) Utilisation Certificate (Annxure- III) separately for each financial year ending on 31st March [in DST formats in one lot (in original or photocopy if sent earlier)] has to be enclosed.

N.B. For various Formats please see website www.serb.gov.in

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