

Two Bid Tender Document

For

**PRINTING OF ICFRE ANNUAL REPORT 2020-21 (English and Hindi)
(No. 05/AR/PO/Admin/ICFRE/2021-22)**



**INDIAN COUNCIL OF FORESTRY RESEARCH AND EDUCATION
P. O. New Forest, Forest Research Institute
Dehradun-248-006 UTTARAKHAND**

Notice Inviting Tenders
(National Competitive Bidding)
(Indian Council of Forestry Research & Education)
Post- New Forest, Dehra Dun - 248006, Uttarakhand, India

Phone: 0135-2224869/0135-2750297
Website: [http:// icfre.gov.in](http://icfre.gov.in) Email: adg_admin@icfre.org

Tenders are invited from reputed firms having sufficient facilities for printing of ICFRE Annual Report 2020-21. The schedule of tender and the terms and conditions shall be as under:-

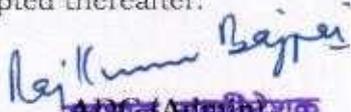
1. **Intent:** ICFRE invites tender for facilities for the printing of ICFRE Annual Report 2020-21 and online bids are invited on single stage two bid systems.

The details of the above items and other Terms and Conditions, etc. are available in the Tender Document. The tender forms and specifications are available at **CPPP** site <https://eprocure.gov.in/eprocure/app> and web site <http://www.icfre.gov.in>

2. Tender documents may be downloaded from ICFRE website <http://www.icfre.gov.in> (for reference only) and **CPPP** site <https://eprocure.gov.in/eprocure/app> as per the schedule as given in tender critical date sheet as under:-

Events	Date/Time	Venue
Date of publishing	05.08.2021 at 4.00 PM	ICFRE website and Central Public Procurement (CPP) Portal
Bid document download / Sale start date	05.08.2021 at 4.30 PM	CPP Portal
Bid submission Start date	06.08.2021 at 11.00 AM	CPP portal
Pre-bid Meeting/ Clarification	19.08.2021 at 3.00 PM	ICFRE Head Qtr, Dehradun
Bid submission End date	25.08.2021 at 4.10 PM	CPP portal
Opening date of Technical bids	26.08.2021 at 4.30 PM	Online

- The Tender may be either modified or cancelled in part or full, at the discretion of the Assistant Director General (Admin.), ICFRE, without assigning any reason thereof.
- The bidder shall submit all the documents required as per tender document at the time of submitting bid. No document shall be accepted thereafter.


Asstt. Director General
प्रशासनिक विदेशालय
Directorate of Administration
भा.वा.अ.सि.प./ICFRE

1. INSTRUCTIONS TO THE BIDDERS

Bids shall be submitted online only at CPPP website:
<https://eprocure.gov.in/eprocure/app>. Tenderers/Bidders are advised to follow the instructions provided in the "Instructions to the Tenderer/Bidder for the e-submission of the bids online through the Central Public Procurement Portal for e-Procurement at <https://eprocure.gov.in/eprocure/app>.

Not more than one tender shall be submitted by one tenderer/bidder. Under no circumstances, the father and his sons(s) or other close relations who have business relationship with one another (i.e. when one or more partner(s)/director(s) are common) be allowed to tender for the same contract as separate competitors. **A breach of this condition will render the tenders of both parties liable to rejection.**

Tenderer/bidder who has downloaded the tender from the <http://www.icfre.gov.in> and Central Public Procurement Portal (CPPP) website <https://eprocure.gov.in/eprocure/app>, **shall not temper/modify the tender form including downloaded price bid template in any manner.** In case, if the same is found to be tempered/modified in any manner, tender will be summarily rejected and EMD would be forfeited and tenderer/bidder will be liable to be banned from doing business with ICFRE in future.

Intending tenderers/bidders are advised to visit again the ICFRE website <http://www.icfre.gov.in> and CPPP website <https://eprocure.gov.in/eprocure/app> at least 3 days prior to the closing date of submission of tender for any corrigendum / addendum / amendment etc.

Bids will be opened as per date/time as mentioned in the **Tender crucial Date Sheet.**

- The complete tender in PDF format can be downloaded from the website <http://eprocure.gov.in> or www.icfre.gov.in. Following documents are required to be submitted along with bids:
- ❖ The scanned copy of the DD of the tender fee of (Rs. 1000/- + 18% GST) in the form of Demand Draft in favour of DDO, ICFRE Revenue Account A/c No. 496902010084490 payable at Dehradun payable at Dehradun from any Commercial/Recognized/ Nationalized Bank in India should be uploaded in **CPPP portal.**
- ❖ The scanned copy of the DD of Earnest Money Deposit (EMD) of Rs.30,000/- (Rupees Thirty thousand only) in the form of Demand Draft **With Minimum six Months Validity** in favour of ICFRE Security money/EMD Account A/c No. 496902010089917 payable at Dehradun from any Commercial/Recognized/ Nationalized Bank in India. Tenders submitted without EMD will be treated as invalid.
- ❖ The Bidders are required to submit Tender Fee, EMD. The scanned self certified copies of documents must be uploaded in CPP portal otherwise tender will be rejected.
- Tender Fee, EMD, Samples of papers to be used in text & cover and appropriately designed 10 coloured pages of the attached matter is essentially required to be submitted alongwith the above in hard copy on prescribed paper. (No deviation from the approved matter will be acceptable on or before the closing date. It is necessary to qualify).

2. SCOPE OF WORK

- a) **The designing, layout, planning and printing of the ICFRE Annual Report 2020-21 (both English and Hindi version) must be of superior quality. The rates for printing of cover pages and text pages should be quoted separately. The rates for printing Hindi and English version should be quoted separately.**
- b) The printed copies shall be delivered in three stages as mentioned below.

First phase - 40 copies of English version.

Second Phase - 100 copies each of English and Hindi version

Third Phase - Hindi and English versions 200 copies each

Amendment is possible in each stage. The printer must print the next step after all the modification are incorporated as per approved proof and technical specifications given below.

- i. Size - A 4
- ii. Approximately 200 pages of text and 4 pages of cover in multicolor system planning. Payment will be made on the basis of actual pages printed.
- iii. Text on imported Matt paper 130 GSM
- iv. Cover on imported Matt Paper 320 to 350 GSM
- v. Lamination on cover
- vi. Perfect binding with section sewing.
- c) **ICFRE reserves the right to print or not to print Hindi version in second phase of printing, therefore separate rates must be quoted (i.e. two BoQ). Clearly indicating with or without Hindi version of this stage.**
- d) Providing master CD (05 Nos.)/Pendrive of ICFRE Annual Report 2020-21 chapter-wise (English Version and Hindi Version each) in PDF/MS word for uploading on ICFRE website/portal and each file should have size less than 2 MB.
- e) **The printed items are required to be delivered in full within the stipulated time. Extension of time shall not be permitted.**

3. TIME SCHEDULE OF WORK

- a) The printer shall submit the press proof (after the proof reading by the printer) of the *Annual Report 2020-21* both in English and Hindi Version within 15 days of placement of confirmed order and provision of text material and photographs.
- b) The duly bound *Annual Report 2020-21* (English Version 40/100 copies) shall be delivered within 5 days of intimation of approval of press proof.
- c) The duly bound *Annual Report 2020-21* (after carrying out the necessary changes of English Version 200 copies and Hindi Version 200 copies) shall be delivered within 5 days of intimation of change

and final approval of the English version and approval of the press proof of the Hindi version.

- d) **Time is of essence in this contract. Therefore, no extension of time for whatsoever reason shall be permitted in the above schedule.**

4. TERMS AND CONDITIONS

Necessary proof for having the office/set-up in the Dehradun for last five year in the field of the printing will have to be submitted.

- a) In order to maintain consistency across the printing the job for the publication shall be considered as a single job and will not be allocated to different bidders.
- b) The tender for printing of publications is to be submitted in two parts viz. **'Technical Proposal'** and **'Financial Proposal'** in two bids.
- c) Only prices are to be quoted in digits and in words wherein the detailed specifications of the above printing are given. In case of a discrepancy in the two, that quoted in words will be taken as valid.
- d) The rates quoted are to be FOR ADG (Media & Extension), Indian Council of Forestry Research and Education, P.O. New Forest, Dehradun - 248 006.
- e) The Tender should be accompanied with a Bank Draft or FDR of a nationalized bank of Rs. 30,000/- payable to Account Officer, ICFRE, Dehradun as Earnest Money Deposit. Tenders submitted without Earnest Money Deposit will be treated as invalid
- f) The Tender should be accompanied with a Bank Draft or FDR of a nationalized bank of (Rs. 1000/- + 18% GST) in the form of Demand Draft in favour of Account Officer, ICFRE payable at Dehradun from any Commercial/ Recognized/ Nationalized Bank in India should be uploaded in CPPP portal.
- g) All pages of the tender document are to be signed and stamped by the tendering firm.
- h) Bidders must have their own infrastructure, which may be inspected by ICFRE for verification.
- i) Short-listing of a bidder do not confer any rights on any bidder, it only means that the offer made is under consideration.
- j) While submitting the bid, the bidder shall be deemed to have read, understood and accepted all the terms and conditions stated in this Tender Document.
- k) The bidder shall indicate the complete address of the firm / Office and work along with the name(s) of the contact person(s) and their Telephone / Fax / E-mails/Mobile Nos.(s) and other particulars as per the Pro forma at **Annexure - 1**.
- l) Conditional Tenders are liable to be rejected.
- m) The offers submitted by Fax/Email/offline shall not be considered. No correspondence will be entertained in this matter.

- n) In case of any dispute, the Director General, ICFRE shall decide the issue and his decision will be final and shall be the binding on the parties.
- o) No legal proceedings to enforce any claim and no suit arising out of this work contract shall be instituted except in a court of competent jurisdiction over Dehradun, Uttarakhand.
- p) The successful bidder shall furnish, a Performance Guarantee in favour of Account Officer, ICFRE, Dehradun, for an amount equivalent to 15% of the contract value. The performance Guarantee shall be in the form of B.G./Bank Draft issued by the Nationalized Bank. The Performance guarantee must be submitted along with the letter of acceptance within the stipulated time. The performance guarantee shall be released after ensuring the complete and satisfactory delivery of the printed material.
- q) EMD is liable to be forfeited, if wrong information is furnished as regards the qualifying, technical and financial proposals of the successful bidder fails to furnish the performance guarantee within the stipulated period, the EMD shall be liable to be forfeited.
- r) The Assistant Director General (Admin.), ICFRE, Dehradun, reserves the right without assigning any reasons thereof, to:
- i. Accept or reject whole or any part of an offer
 - ii. Reject any or all offers partly or wholly,
 - iii. Cancel or withdraw the Tender notice
 - iv. Accept or reject any deviations from these conditions
- s) Proof reading will be done by the bidder. Printer will be solely responsible for ensuring exactly same format of material provided by ICFRE which includes inter-alia names in italics, numerals, special characters, punctuation marks and words/phrases in Dev Nagri/Roman; proper placements of photographs /diagrams/table etc. in the first press proof as well as in subsequent press proof.
- t) The offer shall be valid for 12 months from the date of issue of work order.
- (i) Material for ICFRE Annual Report 2020-21 will be provided to the printer in hard copy as well as in soft copy by the Asstt. Director General (Media and Extension), ICFRE. However, contents in hard copy shall be treated as valid for all-purpose.
 - (ii) Proof reading will be done by the bidder. Asstt. Director General (Media & Extension), ICFRE will approve the proof.
 - (ii) The final print for both the first stage and the final shall be done only after approval of the final draft in Color copy.**
 - (iii) ICFRE reserves the right to carry out any number of corrections/modification/alterations in the material at any stage.
 - (iv) Printer will be responsible for any error/difference from the final proof. Errors once corrected will be not checked in later version and if cropped up it will be sole responsibility of the printer and subject to penalties.

- (v) Time wasted due to these typographical errors or omissions would be counted and no extension of time would be allowed on this pretext.
- (vii) The representative(s) of the Asstt. Director General (Media & Extn.), ICFRE shall be in constant touch with the bidder for finalizing the final drafts after very stages.
- u) All attachments should be neatly numbered and indexed. A serial numbered Index sheet showing the numbers given to the attachment and title should be enclosed.
- v) All certificates should be signed along with the seal/stamp on the letter head of the bidding firm/organization.
- w) Affidavit of partnership firm.
- x) Copy of Power of Attorney if any.
- y) Authorization of the bidder for signing the tender documents.

5. Submission of tender

The tender should be submitted in two parts, viz.,

- a. TECHNICAL BID.
b. FINANCIAL BID.

5.1 Technical Bid (as well as qualifying for technical evaluation)

The following documents are to be furnished by the Tenderer /Bidder along with **Technical Bid** as per the tender document:

S. No.	Particular	Max. Marks	Marks
1	Proof of having own establishment of offset/latest printing machine with modern infrastructure and other facilities.	05	
2	Proof of registration with Directorate of Industries from OEM or equivalent.	05	
3	Signed and scanned copy of GST clearance Certificate for last 3 financial years.	05	
4	Appropriately designed 10 coloured pages of the attached matter is essentially required to be presented alongwith the above in hard copy on prescribed paper on or before the closing date. No deviation from the approved matter will be acceptable. Submission of 10 designed pages as above is necessary to qualify.	40	
5	Turnover certificate of CA of Rs. 50,00,000.00, copy of Income Tax return filed/ copy of audited balance sheet filed with the income tax department for last three assessment year.	10	
6	Tender fee: The tender form downloaded from above websites must include Rs. 1000/- + GST by crossed Demand Draft in favour of Account Officer, ICFRE, Dehradun as tender fee along with the tenders (valid for at least six months) submitted and the scanned copy of the same should be uploaded in the Portal.	05	
7	Earnest Money Deposit equivalent of Rs. 30,000/-, in the form of DD/FDR/Bank Guarantee issued by any nationalised bank located at Dehradun, in favour of Account Officer, ICFRE Dehradun valid for at least six	05	

Rej Kumar Bajaj
सहायक महानिदेशक
Asstt. Director General
प्रशासनिक निदेशालय
Directorate of Administration
भा.व्य.अ.वि.न. /ICFRE

	months the scanned copy of the same should be uploaded in the Portal.		
8	The enclosed, Annexure 1 and 2 duly filled in must be submitted along with proposal.	10*	
9	The bidding firm must have undertaken work of similar magnitude during past three financial years. <u>Enclose Client List</u> alongwith work orders.	15**	

* 5 marks each ** 5 marks for each year

Note:

Sl. No. 4: Excellent work 95% Marks
 Very Good work 80% Marks
 Good work 65% Marks

Sl. No. 9: One mark for each order

5.2 FINANCIAL BID.

The financial proposal must be submitted in the format BoQ_1.xls along with this tender document at <https://eprocure.gov.in/epublish/app> separately as it is and quote their offer/rates in the permitted column and upload the same in the commercial bid. **Bidder shall not tamper/modify downloaded price bid template in any manner.** In case, if the same is found to be tempered/modified in any manner, tender will be completely rejected and EMD would be forfeited and tenderer is liable to be banned from doing business with Indian Council of Forestry Research & Education, Dehradun.

1. Administrative Charge/Service Charge will be inclusive of all taxes, fees, levies, etc. and any revision in the statutory taxes, fees, etc will be the responsibility of the Bidder and the same may be filled in the BoQ xls.

GST should be clearly mentioned in the online financial proposal. It will be paid as per govt. norms.

2. In case of any discrepancy/difference in the amounts indicated in figures and words the amount in words will prevail and will be considered.
3. The quoted rates shall remain firm throughout the tenure of the contract and no revision is permissible for any reason.

Authorized Signatory
 (Signature of the Authorized Person)

(i) Stage - 1 EVALUATION OF TECHNICAL PROPOSAL

Checking of qualifying documents and technical documents submitted along with the bid. This will be the first envelope, which shall be checked, and disqualification amongst these documents will lead to rejection of the proposal in Toto.

The technical evaluation criteria will include the firms **relevant experience, technical manpower (qualifications, availability and experience) and availability of necessary infrastructure machinery etc.** The technical

Raj Kumar Bajpai
 सहायक महानिदेशक
 Asstt. Director General
 प्रशासनिक विभाग
 Director's Office
 2024-25

evaluation also includes examination of the quality of samples submitted with the proposal. Evaluation will be carried out for total technical score (St) of 100 and scoring 70 points out of 100 will be the eligible criteria for financial evaluation.

(ii) Stage – 2 EVALUATION OF FINANCIAL PROPOSAL

The evaluation committee will determine if the financial proposals are complete and without computational errors. The lowest financial proposals (FM) (The currency is in Indian Rupees) will be given a financial score (Sf) of 100 points. The financial scores of other proposals will be computed as follows:

$Sf = 100 \times FM/F$ (Where F is amount of financial proposal, FM is lowest financial proposal).

(iii) Stage – 3 FINAL EVALUATION OF THE BID

Proposal will finally be ranked according to their combined technical (St) and financial (Sf) scores using the weights $S = St \times T\% + Sf \times F\%$.

The weight (T%) given to the Technical Proposal is 65%

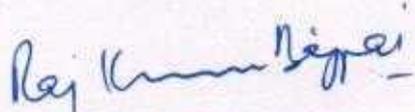
The weight (F%) given to the Financial Proposal is 35%

6. REGARDING CONTRACT

- a) If any part of the contract does not correspond or agree with any other part, or if any question arises as to the meaning of the terms of the contract or as to the performance of the work, Director General, ICFRE shall determine the matter and his decision shall be final and binding upon the parties hereto.
- b) The contract when executed by the parties hereto shall constitute the entire contract between the parties in connection with the works covered, and shall be binding upon the parties hereto or upon either of them unless the said modification shall be in writing and duly executed by ICFRE and the firm.
- c) The contract shall not be assigned or sublet in whole or in part by the firm without prior written consent of Assistant Director General (Admin), ICFRE. Any assignment or subletting of this contract by the firm without prior written consent of Assistant Director General (Admin.), ICFRE or any interest therein, or of any money due or to become due by reason of the terms hereof, shall be null and void.
- d) The Assistant Director General (Admin.) has the powers to cancel the contract at one-week notice, if the services of the contractor are found unsatisfactory or otherwise.
- e) The printed material under this contract shall not be deemed an asset in any form by the successful bidder.

7. PAYMENT TERMS

- a) **No claim on account of GST work contract tax or any other taxes and duties presently in force for the material used for execution of the work awarded under the contract, will be entertained and all such taxes and duties shall be borne by the Contractor himself.**


सहायक महानिदेशक
Asstt. Director General
प्रशासनिक निदेशालय
Directorate of Administration
आ.न.क.वि.व./ICFRE

- b) **The ICFRE shall deduct such taxes, duties and any other statutory levies imposed by the Government on such charges as may arise from the implementation of the contract.**
- c) The payment is subject to TDS as per Income Tax Rules / Laws.
- d) If the contractor violates any of these terms and conditions, the Performance Guarantee shall be liable for forfeiture, wholly or partly, as decided by Assistant Director General (Admin.) and the contract may be cancelled.
- e) The payment as per the contract shall only be released after the complete and satisfactory delivery of the printed material of all the stages as per clause 2 (b) of this tender document and on verification by the ADG(Media & Extension), ICFRE.

8. **PENALTY**

In case the bidder fails to execute the order of printing of ICFRE Annual Report within the stipulated schedule the performances guarantee shall be forfeited, and the work got done through some other printer. In case of any increase in the cost of printing of the Annual Report incurred by the ICFRE, the same shall be the liability of the bidder who failed to execute the order.

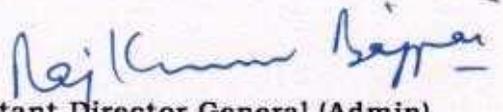
The printer has to furnish the corrected press proof each time within 02 days irrespective of the number of proofs. Delay in submission of the corrected press proof will attract a penalty of Rs 200.00 per day each time. Delay in submission of printed copies will attract a penalty of Rs. 500.00 per day. In addition, the printer may also be blacklisted for a period deemed suitable by ADG (Admin.) ICFRE, in case the delay goes beyond a week.

9. **ARBITRATION**

- (a) Except where otherwise provided in the contract all questions and disputes whatsoever in any way arising out of or relating to the contract or otherwise concerning the work or the execution or failure to execute the same whether arising during the progress of the warranty period or after the completion or abandonment thereof shall be referred to the sole arbitration of the person appointed by the Director General, Indian Council of Forestry Research and Education, (DG, ICFRE) Dehradun on this behalf at the time of dispute. There will be no objection to any such appointment that the arbitrator so appointed is an employee of ICFRE, or government servant or that he had to deal with the matters to which the contract relates or that in the course of his duties as employee of ICFRE, or government servant, he had expressed views on all or any of the matters in dispute of differences. The arbitrator to whom the matter is originally referred being transferred or vacating his office or being unable to act for any reason, shall be replaced by another person as decided by DG, ICFRE, to act as arbitrator in accordance with the terms of the contract. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor. It is also a term of this contract that no person other than a person appointed by the Director General, ICFRE should act as arbitrator and if for any reason, that is not possible, the matter is not to be referred to arbitration at all in all cases where the amount of the claim in dispute is Rs. 50,000/- and above, the arbitrator shall give reasons for the award.
- (b) Subject as aforesaid, the provisions of the Arbitration and Conciliation Act 1996 or any statutory modifications or re-enactment thereof and the rules

made there under and for the time being in force shall apply to the arbitration proceeding under this clause.

- (c) Services under the contract shall, notwithstanding the existence of any such dispute, question or controversy, continue during arbitration proceedings and no payment, due or payable by ICFRE or the firm shall be withheld on account of such proceedings unless such payments are the direct subject of the arbitration. Reference to arbitration shall be a condition precedent to any other action at law.


Assistant Director General (Admin)
Directorate of Administration
ICFRE, Dehradun

PARTICULARS OF THE FIRM

1. Name of the company : _____
2. Head / Regd. Office Address : _____
 a) Postal : _____
 b) Fax. No. : _____
 c) Telephone No.s (s) : _____
 d) E-mail Address : _____
 e) Website Address : _____
3. Former name of company (if any): _____
4. Dehradun Office Address : _____
 a) Postal : _____
 b) Fax. No. : _____
 c) Telephone No.s (s) : _____
 d) E-mail Address : _____
5. Type of Organization : Individual / Partnership / Incorporated
6. (i) Year of establishment: _____
 ii) Year in which printing:
 work started _____
7. Amount of EMD deposited
 a) Draft / Bank Guarantee No.: _____
 b) Bank Detail : _____
 c) Amount : _____
8. Period of validity of Tender: _____
9. Details of supporting : _____
 documents enclosed : _____
 : _____
10. Name and address of the : _____
 authorized signatory / : _____
 contact person for this Tender : _____
11. Whether letter of Authority for : _____
 attending bid opening
 enclosed with Tender ?

Raj Kumar Bajpai
 सहायक महादिदेशक
 Asstt. Director General
 प्रशासनिक विदेशालय
 Directorate of Administration
 भारत सरकार, नई दिल्ली

12. GST Certificate: _____
13. Whether the company has : _____
ISO Certification ?
If yes / whether document attached
in technical bid
14. Turn over of the firm : _____
15. Detailed qualification and experience : _____
of professional available for designing,
layout, planning of cover and text pages
of the report
16. Experience of the firm is undertaking : _____
works similar to printing of Annual
Report. Best sample whork needs to
be attached
17. Proof of the fact that firm own printing : _____
facility/have MOU for printing with
an established firm who own their
printing facility
18. Proof of solvency : _____
19. Time Schedule for accomplishment of Job: _____
20. Relevant additional information, if any,
(use extra sheet if necessary) : _____

Date :
Place :

**Signature of Bidder
Name
With Seal of the Firm**

Raj Kumar Bajpai
सहायक महाविदेशक
Asstt. Director General
प्रशासनिक विभाग
Directorate of Administration
सा.प्र.सं.सं.व./२०१६

**WORKS OF SIMILAR NATURE & MAGNITUDE
SUCCESSFULLY COMPLETED DURING LAST 3 YEARS**

Outline of recent experience on assignments of similar nature

Sl. No.	Description of Work	Cost of Assignment	Address of Organisation with Phone No. for which Assignment Done	Samples Attached Yes/No
1	2	3	4	5

**(Signature of Bidder)
With Seal of the Firm**


 सहायक महाविदेशक
 Assit. Director General
 प्रशासनिक विभाग
 Directorate of Administration
 भारत सरकार, दिल्ली

2.1 Ecosystem Conservation and Management

2.1.1.1 Projects under the Theme

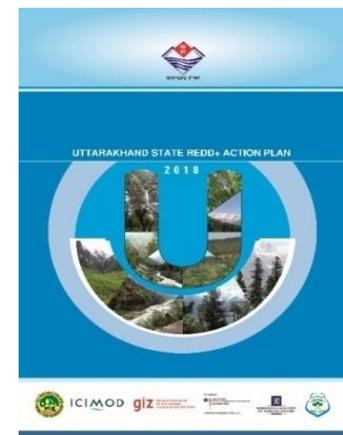
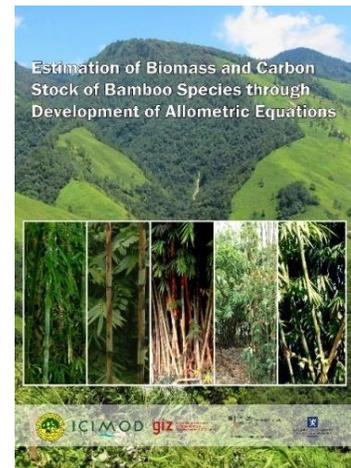
Projects	Completed Projects	Ongoing Projects	New Projects Initiated During the Year
Plan	11	17	04
Externally Aided	06	16	06

2.1.2 Climate Change

REDD+ Himalayas: Developing and Using Experience in Implementing REDD+ in the Himalayas

Following significant achievements have been made under the project on REDD+ Himalaya during the year:

- Biomass equations were developed for five common species of bamboo (*Melocanna baccifera*, *Dendrocalamus hamiltonii*, *Dendrocalamus longispathus*, *Schizostachyum dullooa* and *Bambusa tulda*) of Mizoram for estimation of biomass and carbon stocks. Biomass equations developed are $Y = -2.62 + 0.91 \cdot \text{DBH} + 0.25 \cdot \text{ht}$ (for *B. tulda*), $Y = 2.43 + 1.17 \cdot \text{DBH} - 0.70 \cdot \text{ht}$ (for *D. hamiltonii*), $Y = -3.53 + 0.71 \cdot \text{DBH} + 0.33 \cdot \text{ht}$ (for *D. longispathus*), $Y = -1.09 + 0.60 \cdot \text{DBH} + 0.07 \cdot \text{ht}$ (for *M. baccifera*) and $Y = -0.32 + 1/1.85 \cdot \text{DBH} + 1/6.46 \cdot \text{ht}$ (for *S. dullooa*). Published a report on biomass and carbon stocks of bamboo species which is also available on ICFRE website.
- **State REDD+ Action Plans (SRAPs) were prepared for Mizoram and Uttarakhand** through multi stakeholders' consultation workshops and expert consultation meetings. Through this process direct drivers of deforestation, forest degradation and barriers to enhancement of forests were identified and prioritized, and necessary intervention packages (sustainable land management and cropping pattern, adoption of horticulture crops, sustainable energy supply creating habitat mosaic for biodiversity conservation, livelihood improvement, forest fire control and management, market linkages for agriculture, and demonstrations of private plantation and agroforestry), strategies along with necessary activities for

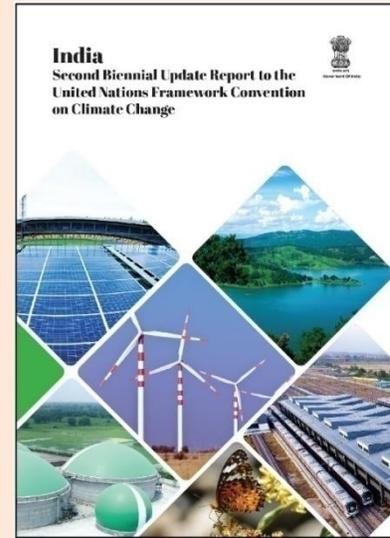


addressing the identified drivers have been prioritized. SRAP will be helpful in implementation of the National REDD+ Strategy in the states of Mizoram and Uttarakhand and also helpful in getting the carbon and non-carbon incentives under REDD+ mechanism. The SRAPs have been published and are available on ICFRE web site.

‘Preparation of Third National Communication and other new information to the UNFCCC Project’: A biennial update report on mitigation actions, constraints, gaps and related financial, technical and capacity needs to address climate change concerns in forest sector in India prepared and submitted to the National Communication Project Management Cell of Ministry of Environment, Forest and Climate Change, Government of India.

The report provides the updated information on mitigation actions including various afforestation/reforestation programmes, market mechanism in forestry sector and role of National Adaptation Fund for Climate Change in forestry sector. It also highlights the India’s submission of National Forest Reference Level to UNFCCC in compliance to decision related to REDD-plus and role of forestry sector in meeting targets of Nationally Determined Contribution (NDC).

Ministry of Environment, Forest and Climate Change, Government of India has incorporated the inputs of this report as chapters titled National Circumstances in Land Use and Forests, and Mitigation Actions in Forestry Sector of India Second Biennial for submission to UNFCCC.



Carbon sequestration and carbon dioxide emission from the soils under different forest covers in Uttarakhand (FRI)

Data on carbon dioxide emission from the soils under different forest covers in Uttarakhand were collected and average values of the collected data reveal higher CO₂ emissions in Sal Forest (3.49 $\mu\text{mol CO}_2\text{m}^{-2}\text{sec}^{-1}$) as compared to Chirpine Forest (3.20 $\mu\text{mol CO}_2\text{m}^{-2}\text{sec}^{-1}$). The higher values of carbon dioxide emission in Sal vegetation correspond to the higher soil temperature (20.10⁰C and soil moisture (29.27%). Soil temperature is the most important environmental factor controlling soil respiration rates because it affects the respiratory enzyme present in both root and soil microbial biomass. The temperature has a limiting effect on microbial populations at lower temperature than at higher temperature. Comparatively higher soil organic carbon was observed in Chirpine vegetation (100.11 t/ha) as compared to the Sal vegetation (75.68 t/ha). Promoting soil carbon sequestration is an effective strategy for reducing atmospheric CO₂ and improving soil quality.



CO₂ eflux measurement in sal forest, Dehradun

Climate change vegetation modeling (FRI)

The result of Lund Potsdam Jena (LPJ) and Joint UK Land Environment Simulator (JULES) for the multiple climate change scenarios of RCP2.6, RCP4.5 and RCP 8.5 for the short (2030), medium (2050) and long (2080) time period for the Indian Western Himalaya (IWH) region are similar to the result of Integrated Biosphere Simulator (IBIS). A framework for adaptation strategies focusing to IWH region is proposed for the mainstreaming adaptation in forest planning and management.

Impact of forest covers change on regulating stream flows of the Narmada River Basin using Macro scale Hydrological Model (TFRI)

Forest change dynamics of Narmada basin reveals that this basin has 36077.3, 35201.8 and 34905.4 km² in the years 1985, 1995, and 2005 respectively. The forest was Deciduous Broadleaf and Mixed forest. During 1985–1995, it lost 2.43% (875.58 sq. km of gross forest loss, i.e., sum of all forest area lost) of the forest area that existed in 1985 (36077.3 sq. km), and the rate decreased to 0.84% during 1995–2005 (296.36 sq. km gross loss of 35201.8 sq. km forest in 1995). These statistics does not include plantation and scrub areas.

Due to decreased forest area (876 sq. km) from 1985 to 1995, surface runoff increased in monsoon and post-monsoon season (June- Dec) by 103.2 MCM (Million cubic meter) and baseflow (groundwater contribution to stream) decreased by 2.5 MCM. Similarly, During the years 1995 to 2005, decreased in forest area (296 Sq km) increased surface runoff during monsoon and post-monsoon season (June- Dec) by 34.7 MCM (Million cubic meter) and baseflow (groundwater contribution to stream) decreased by 0.846 MCM.

Thus, forest cover acts a flow regulator which minimizes the peak flow in monsoon season and thereby increases the baseflow in lean season. This study has quantified the impact of forest cover change on stream flow. Decrease in forest cover had double losses; it increased surface flow during monsoon and thereby creating water scarcity in lean season in both the decades by decreasing the baseflow.

Impact of forest cover change on seasonal flow

Decade	Decadal Change in forest Area (km²)	Change in total runoff during June-Dec. in (Mm³)	Change in baseflow (groundwater contribution to stream) during Jan-May(Mm³)
1985 to 1995	876 (↓)	103.2 (↑)	-2.5 (↓)
1995 to 2005	296 (↓)	34.7 (↑)	-0.846 (↓)

Carbon Sequestration Potential of Existing Land-use Systems in Lahaul Valley, Himachal Pradesh (HFRI)

Study sites for different land use systems i.e. pure agriculture (Kuthbihal, Gushal & Tingrat), pastures (Tandi and Trilokinath), pure horticulture (Thalong Shakoli and Dalang), Agri-Horticulture (Goshal), deodar forest (Tindi), Juniper forest (Shakoli) were selected in the Lahaul valley. Field data on biomass, height, diameter etc. of some identified land use systems were recorded. The value of above and below ground biomass for



Deodar forest Tindi, Lahaul valley

pasture at Tandi was 1.73t/ha & 2.35t/ha respectively whereas, for pasture at Trilokinath the values were 1.37t/ha & 3.38t/ha respectively. The value of carbon stock for above & below ground components of the Alpine pasture at Tandi was 0.88 t C/ha and 1.13t C/ha whereas for alpine pasture located at Trilokinath values of above & below ground biomass carbon stock was 0.726 t C/ha & 1.656 t C/ha respectively. The soil carbon stock up to 30 cm depth was 52.44 t C/ha and 57.75 t C/ha for Tandi and Trilokinath pasture respectively. The values of biomass and biomass carbon stock for pure agriculture system at Kuthbihal was 13.51 t/ha and 6.372 t C/ha respectively. The soil carbon stock up to 30 cm depth for pure agriculture system was 95.75 t C/ha.



Horticulture system, Thalong, Lahaul valley



Grass land/Pasture of Tandi, Lahaul valley

2.1.3 Ecology & Environment

Assessment of Carbon stock and Carbon sequestration potential of major land use sectors in Nagaland and Upper Assam (RFRI)

As a part of the countrywide assessment of Carbon under Agriculture, Forestry and other land uses (AFOLU) by DST, the study was undertaken in Nagaland and Upper Assam. Among the various forest types assessed, Soil Organic Carbon (SOC) stock ranges from 35.8 t ha⁻¹ in Secondary moist bamboo brakes to 105.8 t ha⁻¹ in Naga hill wet temperate forest. In upper Assam SOC stock was found to range from 25.2 t ha⁻¹ in Grass land to 44.3 t ha⁻¹ in Assam Valley Tropical Wet Evergreen forest.



Terrace cultivation in Nagaland



Measurement of GBH of a shade tree in tea gardens of Upper Assam

Innovative technologies for climate change mitigation and biodiversity conservation with alternate livelihood opportunities for mountain communities in North Western Himachal Himalayas (HFRI)

Socio-economic surveys of the project areas of Shimla, Mandi and Kullu districts of Himachal Pradesh were conducted for collection of the baseline data. Seeds of fodder and other species were collected and raised in the nursery for species enrichment programme. Plantation of

Quercus leucotrichophora (Ban Oak) and *Taxus wallichiana* (Thuner) with active participation of oriented and trained community groups. Solar water heating systems (305 units) were installed in the project areas and initial data analysis showed saving of average 40% fuel wood with solar water heating system and mitigating around 2.5 MT carbon emission/panel/annum. Button mushroom cultivation emerged one of the most



Installation of solar water heating systems in project area Mandi (HP)



Community participation in plantation works at village dalair and jalair, kullu (HP)

successful activities for immediate cash returns for the organized women groups. One cultivation cycle at two sites concluded successfully with production of 2236.80 Kg mushroom of gross market value Rs. 290680/- providing benefit to 130 households in three months. Efficient use of fuel wood with solar water heating system is most popular and addressing availability of hot water in mountain and women drudgery reduction. Massive forest conservation and climate change mitigation expected with this intervention.

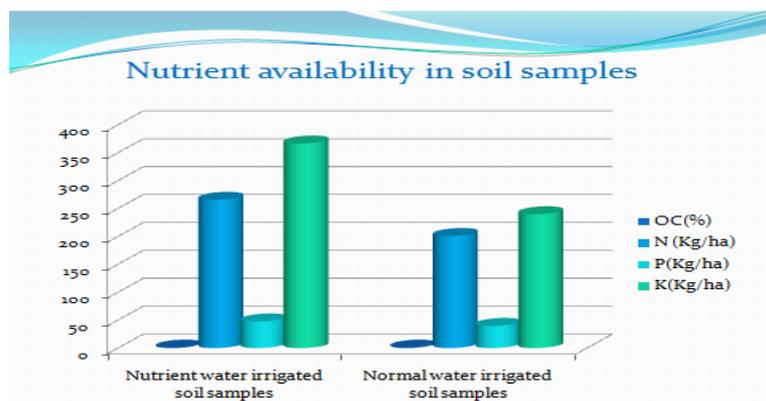
Impacts of nutrient loading from droppings of nesting migratory waterfowl in the wetland ecosystem of Nelapattu bird sanctuary, Andhra Pradesh (IFB)

Nelapattu Bird Sanctuary provides nesting as well as roosting grounds for a significant number of migratory waterfowl. The farmers used nutrient rich freshwater for irrigating their paddy fields. The sediment samples collected from three different locations were analyzed. The pond samples and nutrient water irrigated soil samples are comparatively having the same values of N (213.15 kg/ha), P (49 kg/ha), K (287.63 kg/ha) and O.C (1.4%). Whereas normal water irrigated soil samples slightly differed in N (184.5 kg/ha), P (47.62 kg/ha), K (253.72 kg/ha) and O.C (1.28) with the pond and nutrient water irrigated soil samples. During the winter season the water has slightly acidic (pH=6-6.5) and having high Orthophosphate (0.05-1.13 mg/L) due to high population of birds dropping their faecal matter in to the pond.

The water lettuce growing predominantly in this season due to excessive nutrient richness of the water. Wherever water lettuce was more, the algae was found to be less, so food for fish will be less and also other insects and zooplanktons, therefore the nesting birds get less food. The forest department is cleaning the water lettuce from time to time for this reason.



Birds in Nelapattu Sanctuary



Comparison of nutrients in sanctuary water with normal water

2.1.4 Biodiversity

Establishment of Bamboo Nursery at Rashtrapati Bhawan, New Delhi (FRI)

Forest Research Institute, Dehradun has established a Bamboo Nursery at the Rashtrapati Bhawan, New Delhi to generate awareness among the general public about the bamboo diversity and its uses. Personnel of Rashtrapati Bhawan were trained in FRI for the up keeping, enrichment and maintenance of the established bamboo nursery.

A total of 20 bamboo species [*Bambusa balcooa* Roxb., *Bambusa bambos* (L.) Voss., *Bambusa multiplex* (Lour.) Raeusch. ex Schult., *Bambusa nutans* (Munro) Kuntze, *Bambusa polymorpha* Munro, *Bambusa striata* Lodd. ex Lindl., *Bambusa tulda* Roxb., *Bambusa vulgaris* Schrad., *Bambusa wamin* E.G.Camus, *Dendrocalamus asper* (Schult.) Backe, *Dendrocalamus*

calostachyus (Kurz) Kurz, *Dendrocalamus giganteus* Munro,

Dendrocalamus hamiltonii Nees & Arn. ex Munro, *Dendrocalamus membranaceus* Munro, *Dendrocalamus somdevaii* H.B. Naithani, *Dendrocalamus strictus* (Roxb.) Nees, *Gigantochloa atroviolacea* Widjaja, *Guadua angustifolia* Kunth, *Phyllostachys aurea* Rivière & C. Rivière and *Pseudosasa japonica* (Steud.) Makino] were planted in the nursery. Bamboo Nursery was inaugurated by Hon'ble President of India Shri Ram Nath Kovind on 16 July 2018.



Bamboo nursery was inaugurated by Hon'ble President of India Shri. Ram Nath Kovind



View of Bamboo nursery at Rashtrapati Bhawan, New Delhi

Conservation and restoration strategies for traded trees of Eastern Ghats (IFGTB)

Successfully identified seed sources, collected fruits, standardized seed handling and nursery techniques for species such as *Aegle marmelos* (vilvam), *Albizia amara* (arappu), *Limonia acidissima* (vilam pazham), *Sapindus emarginatus* (poochakkai), *Santalum album* (santhanam, sandalwood), *Scheleichera oleosa* (poovam), *Strychnos nux-vomica* (yettikai), *Syzigium cumini* (naval), *Canarium strictum* (kungiliyam), *Givotia rottleriformis* (thalamaram), *Celastrus paniculata* (jyotishmati) and *Terminalia bellirica* (thandrikkai).

To understand the species distribution and reproductive status, a total of 60 survey plots were laid at Kolli hills, Pachamalai, Solaimathi and Pulianchulai at three different altitudes and enumerated the vegetation. It was found that a total of 291 species falling under 81 families were recorded in the four sites.

Enrichment planting of 12 species was successfully completed at Kolli hills, Pulianchulai, Pachamalai and Solaimathi in three different altitudinal ranges i.e., 901 m and above, 401-900 m and 201-400 m. Each seedling was tagged and planting was carried out with the support of TNFD in open forest areas. The GPS co-ordinates of the planting sites were recorded.



Enrichment planting at Kolli Hills

Biodiversity of Satpura agro-climatic region with special reference to dependencies of tribals (TFRI)

Total 92 insect species belonging to 35 families of the three orders Lepidoptera (19), Coleoptera (11) and Hymenoptera (05) were collected and identified. It was reported that ten species of insects viz. *Polistes carolina* (wasp), *Trombidium grandissimum* (bir bahuti), *Oeophylla smaragdina* (red ant), *Apis dorsata* (honey bee), *Hieroglyphs banian* (chidida), *Microtermes obesi* (termite), *Pachliopta aristolochiae* (common rose), *Bombyx mori* (kosa kida), *Sceliphron* spp. (mud wasp) are being utilized by traditional vaidraj of tribal pockets of Satpura plateau for the treatment of various diseases and also used as food by tribal people. Total 22 fungal species were collected. Out of this, *Termitomyces* sp., *Sparassis crispa*, *Pleurotus* sp., *Lentinus* sp, *Agaricus campestris* and *Volvariella volvacea* were edible. Data has been collected from collector, traders, and retailers for different available non-timber forest produces (NTFPs) from Betul and Chhindwara districts of Madhya Pradesh. The project will help generate data and status report on insect, edible fungi species diversity and NTFPs present in the Satpura plateau which will be helpful in conservation of biological diversity of the area.



Caterpillars of *Pachliopta aristolochiae*



Mylabris pustulata

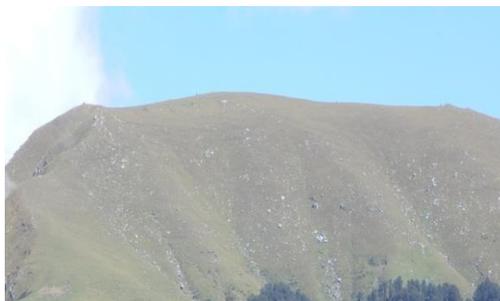


Trombidium grandissimum

Collection of edible insects by tribals for preparation of medicine and food

Ecological studies in alpine pastures of district Shimla, Himachal Pradesh (HFRI)

Ecological studies in alpine pastures Talra and Mural Danda of Shimla district were conducted during pre-monsoon, monsoon and winter seasons. Findings of the studies are tabulated below:



View of Alpine Pasture, Mural Danda



Allium humile



Fritillaria roylei

Talra Alpine Pasture				
Season	No. of species recorded	Dominant Species	Diversity Index	Biomass (t/Ha)
Pre-monsoon	40	<i>Trifolium repens</i>	3.14	AGB=2.37 BGB= 5.64
Monsoon	47	<i>Trifolium repens</i>	3.21	AGB= 2.93 BGB= 5.04
Winter	32	<i>Anaphalis triplinervis</i>	3.02	AGB= 1.41 BGB= 3.11

Mural Danda Alpine Pasture				
Season	No. of species recorded	Dominant Species	Diversity Index	Biomass (t/Ha)
Pre-monsoon	44	<i>Achillea millefolium</i>	3.46	AGB=2.96 BGB= 6.27
Monsoon	46	<i>Tanacetum dolichophyllum</i>	3.51	AGB= 3.86 BGB= 6.98
Winter	28	<i>Potentilla atosanguinea</i>	3.18	AGB= 1.46 BGB= 3.25

AGB= Above ground Biomass, BGB= Below ground Biomass

Assessment of vegetation in Kibber Wildlife Sanctuary, distt. Lahaul Spiti, Himachal Pradesh (HFRI)

Phytosociological data and soil samples were collected from selected sites at Badang, Langza, Komic Demul, Dhinam Gete, Chichham-1 & Chichham-2. A total of 52 plant species belonging to 22 families, 6 shrubs and 46 herbs were recorded from 4 sites.



Name of study site: Chichham-1



Name of study site: Gete-2

The study was carried out at three sites during this year i.e Dhinam, Chichham-1 and Gete. Total 35 plant species including 6 shrubs and 29 herbs were recorded from these sites. The above species play a vital role in fragile ecological habitat and water shed management. The detail is given below:-

Shrubs:

Caragana versicolor, *Ephedra* sp., *Ephedra gerardiana*, *Krascheninnikovia ceratoides*, *Lonicera spinosa*, *Potentilla arbuscula*.

Herbs:

Aconitum sp., *Aconogonum tortuosum*, *Allium carolinianum*, *Arnebia euchroma*, *Artemisia gmelinii*, *Astragalus* sp., *Astragalus rhizanthus*, *Bergenia stracheyi*, *Carex* sp., *Corydalis* sp., *Cousinia thomsonii*, *Dracocethalum heterophyllum*, *Gentiana* sp., *Geranium himalayense*,

Lindelofia stylosa, *Nepeta* sp., *Pedicularis* sp., *Plantago* sp., *Potentilla atrisanguinea*, *Potentilla biflora*, *Rheum speciforme*, *Rhodiola* sp., *Rhodiola tibetica*, *Saussurea* sp., *Saussurea taraxacifolia*, *Stipa* sp., *Taraxacum officinale*, *Thallictrum foetidum*, *Thermopsis inflata*.

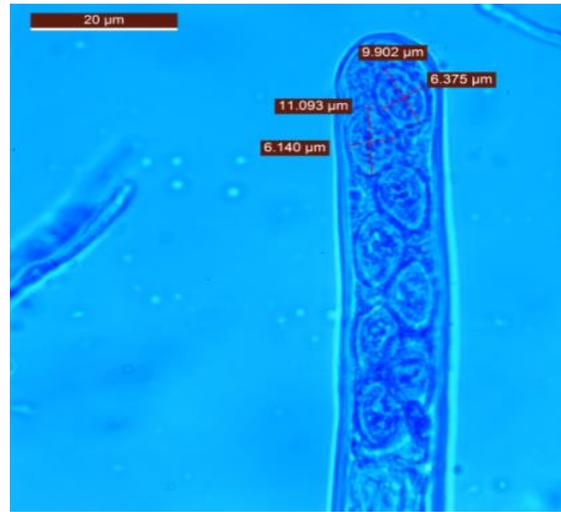
2.1.6 Tribals and Traditional Knowledge System

Exploration and utilization of wild mushroom diversity in Mizoram (RFRI)

247 species of mushroom were collected from the state of Mizoram, out of which, 77 species are reported as new records for Mizoram and 13 species (*Cookeina tricholoma*, *Galiella rufa*, *Helvella atra*, *Leotia lubrica*, *Conocybe apala*, *Calvatia booniana*, *Calbovista subsculpta*, *Thelephora anthocephala*, *Clavaria zollingeri*, *Inocybe lapponica*, *Laccaria vinaceoavellanea*, *Abortiporus biennis* and *Albatrellus confluen*) are reported as new records for India.



Cookeina tricholoma



Galiella rufa

Documentation of the Traditional Ecological Knowledge (TEK) and quantification of medicinal plants used by the Karbi tribe of Karbi Anglong hill district of Assam

Information on the application of Traditional Ecological Knowledge of the *Karbi* tribe has been documented. Medicinal folk healers were interviewed and information was recorded on various medicinal plants. The traditional pesticides (*Celosia argentea*, *Chromolaena odorata*, *Bambusa tulda*): fish poisons (*Polygonum glabrum*) ; household articles (*Bambusa tulda*, *B. nutans*, *Dendrocalamus hamiltonii*); vegetables (*Diplazium esculentum*, *Polygonum chinense*, *Zanthoxylum nitidum*, *Gnetum gnemon*, etc. were documented. The process of preparations of rice beer called *Hor-lang* was documented.

Various traditional practices of *Karbi* tribe has been documented including the-

Plants use as pest traps such as *Celosia argentea* L or ‘*Mer-aang*’ (*Karbi*), *Chromolaena odorata* (*Jarmani Bon*) (*Ass./Karbi*) – the whole weed is planted within the agricultural field, *Bambusa tulda* (*Jati bah*) – the leaves covered branches are struck in the field to trap insects.

Documentation of the *Karbi* community fishing festival i.e., *Okhi-Pru* have been done with various fish gears such as *Soklet* made of *Bambusa tulda* used to catch big to small fishes in deep water, *Tokprok* made of *Dendrocalamus hamiltonii* is used to strike fishes with the spikes in shallow water where, the narrow spikes strike medium to small size of fishes and big fishes are strike with the broad spokes. *Ok-keap-apot* made of *Bambusa tulda* which is similar to catapult, that strike fishes with the harpoon and also the fishing net. The above mentioned fish gears can be efficiently used (apart from the net) only when herbal poison is released in the water after threshing. A low-lying herb *Polygonum glabrum* or *Han-birik* (*Karbi*) and an unidentified liana namely, *Ru-Teng* (*Karbi*) are found in hills, are threshed and the juice is released in the water which make the fishes unconscious resulting into easy catching.

Documentation of local *Karbi* drink ‘*Hor-lang*’ is done, where the cooked rice is cooled by spreading over a mat for some days. After that a rice cake namely the ‘*Thap*’ is mixed with formerly cooked rice and kept aside in *Tebuk* or pot for five days in winter and three days in summer, fermented and mixed thoroughly with adequate amount of water and later, alcohol is distilled. The *Thap* is prepared altogether from twelve varieties of plants species. Notable of which are leaves of *Solanum melongena*, *Croton joufra*, bark of *Acacia pennata*, etc. Thus prepared liquor is kept in dry gourd shell ‘*Bongchin*’ use to store the *Hor*. It is used as beverage for daily and customary usage, seldom sold in small scale.

Various *Karbi* crafts have been documented such as ‘*Hagmar Jong*’ is a basket made of *Dendrocalamus hamiltonii* which is use for storing clothes, *Bai buk* or the garbage tray made of *Bambusa tulda* or *Bambusa balcooa*, brooms prepared from dried branches of *Sida acuta* and dustbin made of *Bambusa tulda*. *Jambili Athon* is one of the dignified cultural symbol, made up of ‘*Bengvoi*’ or *Wrightia coccinea* sims. A local bird known as *Vojaru* or Racked-tailed drongo is placed at central branch, is a symbol of wisdom, intellectuality, leadership. Another local bird named, *Vorale* i.e., Spangled Drongo is placed on other lateral branches are the followers.

The Medicinal plants used by the *Karbi* tribe have also been recorded for different utilization in treating numerous diseases as follows:

S. No	Disease	Plants Used	Method
1	Jaundice	<i>Achyranthes aspera</i>	Roots cut into pieces and worn around forehead till 4-5 days
2	Headache	<i>Cynodon dactylon</i>	Paste of the grass with few rice grain is applied over forehead – (3-4 days)
3	Glands on Body	<i>Datura stramonium</i>	2-3 leaves are grinded and applied over glands (2-3 times a day) until cured.
4	Any kind of disease	<i>Oryza sativa</i> + <i>Areca catechu</i> + <i>Piper nigrum</i> + <i>Ocimum</i> sp.	Bundled together and hanged from roof or any safe place for 1-2 weeks
5	Black fever (<i>Kala-azar</i>)	<i>Capsicum</i> spp. (Kon jolokia)	Paste of the roots of <i>Capsicum</i> spp. is placed on hands.
6	Dog bite	<i>Thubergia grandiflora</i>	3-4 leaves are grinded to paste – applied over the injury – 1-2 days
7	Cholera	Stem of <i>Jatropha gossypifolia</i> + <i>Phlogacanthus thyrsoiflorus</i> + Water	Stems of both are grated + mixed with water separately = drunk one after the other
8	Chronic Amoebic Dysentery	Stem of <i>Ricinus communis</i> + Water	Stem is grated + 1 tbsp water = drunk in empty stomach (1 TIME).
9	Vomiting	Stem of <i>Ricinus communis</i>	Stem is cut into pieces and worn as garland around neck until healed.
10	Extreme Vomiting	Stem of <i>Ricinus communis</i>	Direct stem is worn around the neck until healed.
11	Toothache	Garlic + <i>Sida rhombifolia</i> + <i>Musa paradisiaca</i>	Paste of 5 cloves (woman)/6 cloves (man) + Lower rotten stem of <i>Musa paradisiaca</i> + roots of <i>Sida rhombifolia</i> - applied to the area of pain.
12	Wounds	<i>Dendrocalamus hamiltoni</i>	Powder found in nodes is applied over fresh wound.



Household survey at Bokolia block



Interview of Medicinal Folk Healer at Howraghat block