F. No. 4-1/2018-RE
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE
(RE Division)

Minutes of the First Meeting of Steering Committee on R&D Scheme to consider R&D projects of XIIth Five-Year Plan held on 7th June, 2018 at Indira Paryavaran Bhawan, New Delhi

1. The first meeting of the Steering Committee on R&D Scheme was held on 7th June 2018 to consider R&D projects of XIIth Five-Year Plan, at Indira Paryavaran Bhawan, Jor Bagh, New Delhi. The list of participants is at **Annexure-1**. Shri Navroz Dubashi, Member had informed of his inability to attend the meeting.

2. Shri A.K.Mehta, Additional Secretary, MoEFCC and Chairperson of the Committee welcomed all the members, Invitees, Project Investigators (PIs) and participants in the meeting. Dr.T.Chandini, Advisor informed the Committee that agenda includes review of Final Technical Reports of 18 R&D projects that were completed during the XIIth Five-Year Plan under the R&D Scheme which ended on 31st March 2017. The PIs were requested to briefly present the Final Technical Report in terms of broad objectives of the project and deliverables, the major findings/outputs and outcome thereof.

3. The Committee was informed that of the 18 projects listed at **Annexure-2,** PIs of 3 projects at S.Nos 1, 5, 8 had sought deferment, and 4 PIs at S.No. 3, 4, 6 and 17 had confirmed but have not come to the meeting and one PI at S.No. had informed that he will not be attending. The remaining 10 projects were taken up in the meeting.

4.0 The following projects were considered:

4.1 **Assessment of Anthropogenic pressure and its impact on Forest and Grassland Ecosystem of Dachigam National Park, J&K India (F.No.14/13/2013-ERS/RE) of Dr. AzraMusavi, Department of Economics, Aligarh Muslim University, Aligarh**

PI has vide e-mail sought deferment for consideration in next meeting.

4.2 **Study of population structure, Phenology and natural regeneration requirements of *Pterocarpus santalinus* – an endemic, endangered and exploited tree species of Southern Eastern Ghats by Dr. M. Sridhar Reddy, Dept. of Environmental Sciences, Yogi Venmana University, Kadapa, Andhra Pradesh** (F.No.14/63/2013-RE).

Project Details: The project was started on 19th November, 2014 for a period of 3 years for a total cost of Rs. 17,63,750/-. The tenure of the project was over on 18.11.2017 and the PI had sought extension which was granted upto 31.03.2018 with no additional cost. A total of Rs 14,49,402/- has been released so far in 3 instalments out of approved project cost of Rs 17,63,750/-. The PI has also submitted a Consolidated UC with other documents during the meeting. The PI has submitted the FTR and also refunded a DD for an unspent amount of Rs. 32,110/-.

Objectives: The objectives of the project at the time of approval were to investigate the future stability of Red Sanders *Pterocarpus santalinus* by (i) studying the population size

structure, (ii) to find out deviations between coppice and normal tree with respect to fruit set, (iii) to verify and study the 'suffrutex' stage of *Pterocarpus santalinus* by studying the peaks of recruitment of new individuals to the population structure, (iv) to verify and study either the good-good or lose-lose relationship that exists between *Cymbopogoncoloratus* grass and *Pterocarpus santalinus* etc.

PI made a presentation. The PI informed that the Red Sanders is a very threatened species and is the dominant tree species found only in Kadapa Hill Ranges, Kadapa district in Andhra Pradesh. Seeds are the main source of tree generation.

The major findings of the study are given below:

i) Controlled fires have helped in increase in productivity of more seedlings and regeneration.
ii) Grazing should be controlled as it destroys seedlings and fresh growth and regeneration.
iii) Poachers specifically target 51-70cm gbh girth stem trees. In terms of value, multiple stem species is not as valuable as single-stem trees and hence poaching of such trees is less.
iv) Loss of reproductively fit trees by selective logging should be controlled.
v) Seedling banks (suffrutex stage) – to overcome the harsh drought conditions and fire desirable.

The major findings of the study are that Red sanders can overcome fire but not microhabitat destruction and loss of reproductive trees due to selective logging. Conservator of Reserved Forests of Red Sanders must take focussed attention on these issues as Red Sanders is found only in Kadapa due to specific soil and other conditions. The data can be useful for NDF preparation - Endemic &CITES listed species.

The Committee desired to know whether seedlings of Red Sanders can be propagated outside Kadapah. The Committee after deliberations desired that ICFRE, FRI may also be consulted on the FTR for their comments/views and also sent to State Forest Department for implementation of recommendations/ findings. FTR can be finalised based on the response on comments sought above.

4.3 **Effect of plant invasion on biodiversity and forest regeneration in fragmented mountain ecosystems of Dr. Irfan Rashid, Department of Botany, University of Kashmir, Srinagar (F.No.14/79/2013-RE)**

The PI had confirmed of participation but has however not attended the meeting.

4.4 **Monitoring of biomass stocks and forest community structures in temperate zone of Western Himalaya of Dr. Rajesh Thadani, Centre for Ecology, Development & Research, Dehradun (F.No.14/81/2013-RE)**

The PI had confirmed of participation but has however not attended the meeting.

4.5 **Analysis of Socio-Economic and Conservation Benefits due to Community Forest Resource(CFR) Rights Implementation Across Selected Regions in Central and**

Eastern India (No.24-17/2014-RE) of Dr.Vishaish Uppal, WWF, Lodhi Estate, New Delhi

PI has informed that he will not be attending the meeting. The project is deferred for consideration in next meeting.

4.6 **Studies on Population structure, distribution pattern and regeneration potential of some lesser known commercially potent non-timber forest product yielding species in tropical west evergreen forests of Assam of Dr.Roshan Sarmah, Deptt. of Botany, Debraj Roy College, Assam** (14/20/2012-ERS/RE)

PI has vide e-mail sought deferment for consideration in next meeting.

4.7 **Fragmentation of humid subtropical broad-leaved forest and its impact on plant diversity and ecosystem function in Meghalaya, Northeast India by Dr. Krishna Upadhaya, Department of Basic Sciences and Social Sciences, North-East Hill University (NEHU), Shillong** (F.No.14/25/2011-ERS/RE)

Project Details: The project was started on 14th July, 2014 for a period of 3 years with a total cost of Rs. 35,57,500/-. Project tenure was over on 13th July, 2017. A total of Rs 25,27,250/- has been released so far in two instalments of the total approved project cost of Rs. 35,57,500/-. The PI has submitted FTR during the meeting. Consolidated UC along with supporting documents awaited.

Broad objectives of the Project:

To study the fragmentation pattern of humid subtropical broad-leaved forest in Meghalaya, and its possible causes and effects on:

i. Species diversity, forest microenvironment and regeneration of dominant tree species;
ii. Accumulation of C, N and P through litter, fine roots and soil microbial biomass and their turnover and
iii. N- and P- mineralization pattern in the forest fragments.

The study would generate scientific evidence on the impact of fragmentation on species diversity and ecosystem functioning.

The PI presented the major findings and outcome of the project:

- 1,42,328 fragmented patches distributed throughout the state.
- Fragments with size <0.5 sq km accounts to more than 99.7% of the total number of patches
- In terms of area it covers only 11%.
- Patches above 20 sq km accounts for 80% of the total forest cover.

From these studies, it was found that:

- The forests of Meghalaya are highly fragmented and majority of the fragments were in <0.5sq km area.
- The microclimatic parameters showed a marked variation among the studied fragments. The light intensity and air temperature was higher in the smaller patches and in the edge as compared to the larger fragments and interior micro-sites.

However, relative humidity was high in the forest interior and larger patches as compared to the edge and smaller fragments.

- The soil temperature was high in smaller and edge micro-sites whereas, the moisture content was higher in the interior and larger patches.
- Soil organic carbon, total kjeldhal nitrogen and available phosphorous were significantly higher in the larger patches.
- Species richness, density and basal area of woody species (≥5cm dbh) increased with the increase in fragment size. The shrubs richness decreased while herb species increased with the increase in fragment size. There were 179 species that were rare, endemic or threatened. In addition during the field survey a new species *Pyrenaria cherrapunjeana* Mir and many species were rediscovered after a lapse of >80years from the study area.
- The proportion of individuals in low diameter class (5-15cm) was high in all the stands but the contribution to basal area in case of large and very large and one of the very small fragment was by >65cm dbh class.
- Litter accumulation and input of nutrients (N and P) was high in the large fragment classes.
- Fine and coarse root mass increased with the increase in fragment size
- Decomposition of leaves did not show any significant variation among the fragment classes but the root decomposition was faster in the larger patches.
- Microbial biomass-carbon, -nitrogen and -phosphorous increased with the increase in fragment size.
- Nitrification and net Nitrogen and Phosphorous mineralization was higher in the larger fragment classes as compared to smaller patches.

The PI stated that the entire study was conducted within a radius of 8km and hence impact of other extraneous factors was reduced.

The overall outcome of the study:

i) Fragmentation of forests has adverse effects on ecosystem function. Grater the fragmentation, greater the adverse impacts.
ii) A number of new species of plants were found with the help of BSI during the course of the study.
iii) Soil litter nutrient which is very important for forest ecosystem function was more in bigger patches.
iv) Leaf litter decay and decomposition was more in bigger patches.
v) If a forest ecosystem is fragmented beyond a critical area of 20-30ha, it adversely affects the forest ecosystem in terms of the aforesaid ecosystem functions.

The Committee after deliberations desired that ICFRE, FRI may also be consulted on the FTR for their comments/views and also forwarded to State Forest Department for implementation of recommendations/ findings. The Committee desired that the study may be compared with other such studies. The Committee requested the PI to furnish a Consolidated UC along with supporting documents. FTR can be finalised based on the response on comments sought above.

4.8 **Ecological Studies on distribution patterns and food plant resources of butterflies along altitudinal gradients in Sub-alpine forests of Himachal Pradesh of Dr. Pawan Kumar, Himalayan Forest Research Institute (ICFRE), Conifer Campus, Panthaghati, Shimla (F.No.14/21/2012-ERS/RE)**

The PI vide e-mail sought deferment of consideration of his project in the next meeting of Steering Committee.

4.9 **Understanding the ecosystem service of pollination in a fragmented seasonal cloud forest in the Western Ghats of Maharashtra by Prof. Renee M. Borges, Centre for Ecological Science, Indian Institute of Science, Bangalore (F.No.14/127/2013-RE)**

Project Details: The Committee was noted that the project was started on 17th December, 2014 for a period of 3 years with a total cost of Rs. 33,84,000/-. Project tenure was over on 16th December, 2017. A total of Rs 22,18,522/- has been released so far out of approved project cost of Rs 33,84,000/-. The PI has submitted FTR vide letter dated 27.03.2018. FTR has been given in PDF, it is also required in Word Format.

Objectives of the Project are:

i) To study breeding systems of dominant trees, shrubs and lianas
ii) Investigation of the impact of forest fragmentation on natural pollination success,
iii) Investigation of basic biology and life history of pollinators, such as body size, nest size, sociality and nesting preferences etc.

The PI made a presentation. It was stated that the study area formed a part of Bhimashankar Wildlife Sanctuary, Northern Western Ghats, which is a protected area of 130.78 sq. km. The study area is at an altitude of 900 m above sea level and predominantly evergreen; however the forest type with stunted crest vegetation. The major pollinators studied were: Birds, Ants, Wasps, Butterflies, Flies and Bees

The major findings of the study are:

i) Bees were the most dominant pollinators.
ii) Wild, native bees are often better pollinators than honey bees. However, 'introduced' (not originally from the area) honey bees were dominant over native bees.
iii) In terms of different habitats visited such as dense forest, sparse forest and rocky outcrops, bees and flies, were most diverse in all habitats followed by butterflies. Many solitary wild bee species belonging to Apidae, Megachilidae and Halictidae found to be ground nesting and protection and conservation of these ground nests were important in order to conserve the pollinators from different habitats.
iv) A diversity of flies dominant in the WL Sanctuary.

Major Outcomes

i. Fragmentation impacts pollinator services and pollinator diversity.
ii. The natural diversity of wild bees are likely swamped by the domination of introduced domesticated bees by the honey industry
iii. Wild bees and flies are the forgotten pollinators and more attention needs to be paid to conserve them
iv. Maximum diversity in floral visitors seen at rocky outcrops.
v. Nesting sites of solitary ground nesting bees need urgent protection since these bees pollinate many plant species especially the floral carpets as found in the Kas plateau laterite heritage site in Maharashtra.

The Committee observed that the major part of the work on pollinators appears to have been done on bees. Since the pollinators are the live wires of production and productivity in

an area, the committee desired to have an explanation in considering the honey bees also as pollinators who can contribute in pollination. The Committee also observed that only few images downloaded from Google Earth have been provided in the Report for the entire study. Further, maps of the study area along with GIS mapping of distribution pattern of the various pollinators vis-a-vis the components of forest ecosystem which were pollinated may be furnished. The Committee in addition desired the following details:

(i) The extent of study area of the project of Bhimashankar WLS and details of patches studied in tabular form and on maps. Categorisation of sample size as "large" and "small" is not clear and exact area needs to be provided. How many such "large" and "small" areas were studied?
(ii) Maps of the study area along with GIS mapping of distribution pattern of the various pollinators vis-a-vis the components of forest ecosystem which were pollinated may be furnished.
(iii) The frequency of the surveys carried out (specific period of study Year/Month/Day) of all the patches in the study area.
(iv) To confirm whether only "4 trees and two shrubs" and '20 plants per "area' were selected for the study related to tree habitat. The sample size of the study appears to be very small to study the pollinators of Bhimashankar Wildlife Sanctuary of 130 sq km.
(v) Rationale for selection of only 6 species of trees of the WL Sanctuary.
(vi) Details of study with birds as pollinators.
(vii) Population survey and habitat survey of wild, native bees versus domesticated bees.
(viii) Details of how many plants (details) were pollinated by domesticated versus wild bees.
(ix) The basis on which it was concluded that the introduced domesticated bees by the honey industry are interfering with the pollination by native wild bees.
(x) The total amount of Rs 22,18,522/- so far released to the project appears to be on the higher side.

The Committee after deliberations decided to reconsider the project after receipt of the aforesaid information.

4.10 **Reproductive biology of Scleractinian corals in Andaman and Nicobar Islands by Dr. C. Raghunathan, ZSI, Andaman and Nicobar Regional Centre, Port Blair (F.No.14/16/2013-RE)**

Project Details: The project was started on 31st August, 2014 for a period of 3 years with a total cost of Rs. 44,45,000/-. Project tenure was over on 30th August, 2017. A total of Rs 33,36,250/- has been released so far out of approved project cost of Rs. 44,45,000/-. The PI has submitted FTR. Consolidated UC received from PI without seal.

Broad Objectives of the Project:
i) Studies of fecundity of scleractinian corals in selected families at different seasons.
ii) Studies on growth and regeneration of corals by sexual and asexual mode of reproduction.
iii) Studies on substrate specificity for the settlement of coral's planula larvae.
iv) Coral transplantation studies on selected species in permanent monitoring plots.
v) Ex-situ studies on coral lifecycle.

PI made a presentation. It was stated that corals are found in our country in - A&N Islands, Gulf of Mannar, Lakshadweep, Gulf of Kachchh. In A&N Islands, corals constitute 6% of the total continental shelf. It is the most diverse reef of the world consisting of fringing, patchy

and barrier reefs. Barrier reef of A&N Islands is about 320 km length with 4 m deep and occupies an area of 1021.46 $Km^{2.}$ As per data available, extensive bleaching of corals occurred in 2010 and 2016 due to change in ocean currents brining an increase in water temperature >28^{o}C and which lasts more than a month. As on 2017, only 34.94% were live corals. The study selected Scleractinian corals which form the coral reef in A&N Islands. Of the total ddescribed species of 1488 Scleractinian corals found globally, 588 species are found in A&N islands. Of these, a total of 321 species are tthreatened worldwide, of which 137 species are found in A&N Islands. Four locations viz., Pongibalu, Rifleman Island, Jolly Buoy Island and North Bay in South Andaman region were selected for the study. Four locations were studied - Pongibalu, Rifleman Island, Jolly Buoy Island and North Bay in South Andaman region. A total of 346 species were recorded from the four studied areas of which 128 species were encountered from North Bay while altogether 330 species recorded from rest of the locations. 11 species are corals are new records to India.

Major findings:

i) All corals regenerate, however the rate of regeneration differs from species to species.
ii) Increased sedimentation rates adversely affect coral regeneration.
iii) Coral plates helped in regeneration of corals rather than breaking of corals from living reefs for regeneration and damaging the reef.
iv) Maximum sediment was recorded during September 2016 at North Bay while minimum sedimentation was seen at Pongibalu during February 2017.

The major outcome of the study include:

i) Scleractinian corals are Schedule-I animal under IW(P) Act, 1972. The status of the scleractinian corals were also monitored during the project work.
ii) The data on the scleractinian corals obtained through the project can be utilized for the preparation of management action plan as well as enforcement of effective conservation.
iii) Training on the coral recruitment and transplantation study and survey and monitoring techniques of corals adopted for this study will be useful to enhance the reef areas wherever the status of coral is poor.
iv) New reef areas can be developed with the knowledge of reproductive biology and successful transplantation method.
v) Broken parts of the scleractinian corals can be used for the formation of coral garden in a new area.
vi) The studies on the growth and regeneration pattern of scleractinian corals will be a helpful to understand the general resilience biology of the corals which will be helpful to make conservatory measures against the nature and anthropogenic damages of live coral reef structures.

The Committee desired that the study findings may be given to the State Governments where coral reefs are found in our country for implementation of recommendations/ findings. The PI has agreed to submit Consolidated UC duly signed and with seal of the relevant authorities at the time of project study. In addition, supporting documents such as details of permanent equipment purchased under the project, invoices and photographs of permanent equipment transferred to parent institution after completion of study from the HOD to be furnished. FTR can be finalised based on response on the comments sought above.

4.11 **Foraging ecology and habitat use of wading birds and shorebirds in the mangrove ecosystem of the Andaman Islands by Dr. C. Sivaperuman, Zoological Survey of India, Andaman and Nicobar Regional Centre Haddo, Port Blair (F.No.14/226/2013-RE)**

Project Details: The Committee was noted that the project was started on 8th December, 2014 for a period of 3 years with a total cost of Rs. 21,42,000/-. Project tenure was over on 7th December, 2017. A total of Rs 13,22,703/- has been released so far out of approved project cost of Rs 21,42,000/-. The PI has submitted FTR. The PI has submitted the UC duly signed and Expenditure statement.

Broad Objectives of the project:

- To describe the avian community at the Mangrove ecosystem of Andaman Islands
- To investigate the relationship between the birds and their prey
- To provide knowledge about the intertidal of the mangrove ecosystem as a foraging habitat for the birds
- To evaluate the consumption of the birds in the intertidal of the mangrove ecosystem and its meaning for the avian and the benthic community

The PI made a presentation. It was stated that after the 2014 Tsunami, the number of wetlands have increased in Andaman from 284 in Year 2010 to 349 in Year 2017. The water level in most wetlands has increased. The study area was surveyed using Navy Helicopters.

Major Findings of the Study:

- The arrival and departure of resident and migratory birds were assessed for the period of three years. The result shows that, most of the migratory birds are arriving during the month of August/September and stay up to March/April in Andaman Islands.
- Of the recorded species, Common Redshank showed highest in dominance in south Andaman followed by Curlew Sandpiper, Lesser Sand Plover, Large Egret, Long-toed Stint, Eastern Cattle Egret, Wood Sandpiper Eurasian Whimbrel, Pacific Golden Plover and Little Egret.
- Among the location South Andaman and North Andaman showed high similarity, followed by South and Middle Andaman.
- Time activity pattern and foraging behavior of Median Egret, Andaman Little Green Heron, Eurasian Curlew and Common Redshank were studied

Major Recommendations and Outcome:

(A) For Conservation of Habitat

- Conservation of birds and tsunami inundated wetlands.
- All the development activities, which have a bearing on the wetland ecosystem should be regulated, screened, and monitored.
- Strict protection for birds in the wetlands should be enforced. Active patrolling should be carried out by involving the forest department in different locations of wetlands
- Specific projects and programme for the conservation of the wetland ecosystem of south Andaman should be initiated.
- Plans and proposals that concern the future of the wetland ecosystem of south Andaman should be evaluated in a holistic way.

- Warning boards showing details of punishment for poaching of birds and other animals should be displayed.
- Huge quantity of waste materials were dumped at Ograbraj, Stewartgunj areas. Waste materials deposited in the wetlands include hardened cement bags, polythene bags and floating materials. Efforts may be initiated to control the dumping of waste materials to this sites are there are the prominent site of migratory birds.
- Declaration of wetlands of south Andaman into community reserves in order to protect the migratory water birds.
- Deforestation of mangroves to be stopped and restoration of the same should be executed

(B) Research and Monitoring

- Annual water bird surveys should be undertaken in association with Zoological Survey of India, Port Blair.
- Research on migration strategies of water birds should be carried out.

(C) Education, Information and Awareness

- Awareness camps on the importance of migratory birds coming to the wetlands should be conducted. Local people near by the wetlands should be given preference for attending the Nature education camp
- Mass awareness should be created and an Interpretation Centre in South Andaman
- Information on the birds visiting the area can be displayed as lists and charts with photographs.
- A watch tower can be built for observing the birds with telescopes. By doing this people coming to the region can watch the birds without much disturbance to the birds.
- An information bulletin should be prepared on the wetlands of south Andaman and migratory birds coming to the locality.

The PI informed that the CS, Andaman Administration has been provided the Report with its findings and recommendations for implementation.

The Committee noted that the Study has brought forth important recommendations for the conservation of wetlands and birds of these wetlands in the Andaman Islands. The Committee suggested use of drones for surveys. The Committee desired that the study findings may be followed up with the Andaman Administration and also shared with other State Governments for implementation of recommendations/ findings for conservation of wetlands in their States. The PI was requested to forward the Consolidated UC duly signed and with seal of the relevant authorities at the time of project study. In addition, supporting documents such as details of permanent equipment purchased under the project, invoices and photographs of permanent equipment transferred to parent institution after completion of study from the HOD are also to be furnished. FTR can be finalised based on the response on comments sought above.

4.12 **Diversity and microhabitat utilization pattern of spiders in Satpuda landscape by Dr. Atul Keshavrao Bodhke, J.D. Patil Sangludkar Mahavidyalaya Daryapur, Maharashtra (F.No.14/122/2013-RE)**

Project Details: The project was started on 31st January, 2014 for a period of 3 years with a total cost of Rs. 24,17,500/-. Project tenure was over on 30th January, 2017. A total of Rs

16,76,910/- has been released so far out of approved project cost of Rs 24,17,500/-. The PI has submitted FTR.

Broad Objectives of the project:

i) To document a comprehensive inventory of spiders of Satpuda landscape.

ii) To study the diversity and distribution of spiders.

iii) To compare diversity and composition of spider assemblages in various habitats.

iv) To assess the microhabitat utilization pattern of spider in the landscape.

Major findings of the study:

- Distribution of spiders from Satpura Landscape was studied. This is the first scientific survey of spiders from this unique habitat. Almost all records of spiders will be first documentation for Satpura Landcsape. Some taxa that were recorded for the first time for India. (i) Invertebrates from this sanctuary as a whole are poorly surveyed and mostly neglected compared to previous studies.

- A total of 431 species belonging to 187 genera and 38 families comprising 62% of spider families were collected during entire project period.

- All specimens were identified at least to genus and species level, since species identification is required for most calculations.

- More than 57% spider families were recorded from Satpura Landscape during the period of 3 years.

- Three new family was recorded for the first time to Satpura Landscape, India Viz., Family – Anapidae, Synaphridae and Trachelidae.

- The spider fauna showed appreciable functional diversity in comparison to other similar investigation.

- The Satpuda landscape ecosystem offers enough vertical and horizontal complexity at the landscape level and presents subtle variation spatially and temporally to support an overall characteristic community structure worth to conserve and protect.

- Grassland development is very important as many spider species are found in the grasslands/terrain. Soil erosion due to anthropogenic pressures is one of the causes of degradation of ecosystem and this requires being controlled. Deforestation is another factor for reducing in spider populations. Seven new species were found during his studies which are first time discovery in the world.

The Committee desired that specimens of newly found species be also given to ZSI for their catalogue. The Committee noted that the ecosystems of these spiders of Satpuda Landscape require being conserved as the spiders perform various ecosystem services in maintaining ecological balance and control of insect populations. The study findings may be given to the relevant institutions and departments of State Government for implementation of recommendations/findings. In addition, the PI is requested to furnish to Ministry a Consolidated UC with supporting documents such as details of permanent equipment purchased under the project, invoices and photographs of permanent equipment

transferred to parent institution after completion of study from the HOD to be furnished. FTR can be finalised based on response on the comments sought above.

4.13 **Study of Bryophyte diversity in the Eastern Ghats by Dr. A. K. Asthana, NBRI, Lucknow (F.No.23/22/2012-RE)**

Project Details: The project was started on 1st November, 2013 for a period of 3 years with a total cost of Rs. 24,49,000/-. Project tenure was over on 31st October, 2016 and PI sought extension which was granted upto 30th April, 2017 with no additional cost. A total of Rs 21,97,480/- has been released so far out of approved project cost of Rs. 24,49,000/-. The PI has submitted FTR in PDF format. The same requires being e-mailed in Word format. The PI has also submitted a DD of unspent amount of Rs. 23,341/-.

Broad objectives of the project:

i) Survey, exploration and collection of Bryophytes (Liverworts, Mosses and Hornworts) from bryophyte rich localities of Eastern Ghats.

ii) Identification and documentation of taxa with illustration and photographs.

iii) Preparation of a consolidated and illustrated floristic account with distributional maps of Bryophytes of Eastern Ghats.

iv) Assessment of RET taxa in the Eastern Ghats and application of conservation measures (ex situ/ in situ).

v) A consolidated account of illustrated flora of Bryophytes (Liverworts, Mosses and Hornworts) of Eastern Ghats along with detailed morphotaxonomic characters, keys for identification and distributional maps will be available.

vi) Publications enumerating new records, new reports and taxonomic status of various bryophyte taxa will be done.

The PI presented the FTR. It was informed that survey of the 3 States of Tamil Nadu, Andhra Pradesh and Odisha which include the Eastern Ghats were studied in the Yeras 2014, 2015 and 2016 only respectively.

Major Findings of the Study:

- Survey, exploration and collection of Bryophytes (Liverworts and Mosses) from bryophyte rich localities/areas of Eastern Ghats in Tamil Nadu, Andhra Pradesh and Odisha States have been made (during the month of March).
- About 1085 specimens have been collected. Plants were processed for preservation and Deposited in Bryophyte Herbarium of CSIR-NBRI Herbarium, Lucknow (LWG).
- Identification of 156 species has been done so far, of which there are 29 families of mosses consisting 69 genera &109 species, liverworts consist of 24 genera & 46 species belonging to 16 families and there is single species of hornwort. Identification of the balance of 1085 specimens is required to be undertaken.
- Preparation of Floristic account with taxonomic descriptions, illustrations, Keys and distributional maps is near completion.
- Preparation of Illustrations of most of the species has been completed and preparation of consolidated account with distributional maps is near completion.

The Committee observed that the study has not been completed. Also survey has been restricted to month of March only and will not provide complete record of the entire bryophytes found in Eastern Ghats. The Committee further noted that the following scope of work has not been completed: i) Preparation of a consolidated and illustrated floristic account with distributional maps of Bryophytes of Eastern Ghats, ii) Assessment of RET taxa in the Eastern Ghats and application of conservation measures (ex situ/ in situ), iii) A consolidated account of illustrated flora of Bryophytes (Liverworts, Mosses and Hornworts) of Eastern Ghats along with detailed morphotaxonomic characters, keys for identification and distributional maps will be available, iv) Publications enumerating new records, new reports and taxonomic status of various bryophyte taxa will be done. The Committee also observed that the project tenure was over on 31st October, 2016 and PI was given an extension upto 30th April, 2017. Further, for the study completed so far, an amount of Rs 21 lakhs appears to be high. The PI sought an extension of 2 months with no additional costs for completion of points 2 to 7, which the Committee agreed to. FTR is required both in PDF and Word format. In addition, the PI was requested to furnish to Ministry a Consolidated UC with supporting documents such as details of permanent equipment purchased under the project, invoices of permanent equipment transferred and letter of HOD for transfer of equipment to parent institution after completion of study to be furnished. The project would be further considered thereafter.

4.14 **Studies on the bryoflora of Megamalai Hills in the Western Ghats by Dr. A. E. Dulip Daniels, Associate Professor of Botany, Scott Christian College, Nagercoil (F.No.23/28/2012-RE)**

Project Details: The project was started on 19th December, 2014 for a period of 3 years with a total cost of Rs. 28,95,000/-. Project tenure was over on 18th December, 2017. A total of Rs 21,41,200/- has been released so far out of approved project cost of Rs. 28,95,000/-. The PI has submitted FTR.

Objectives of the project as outlined by the Project Advisory Committee in its 2nd meeting held on 4-5th February 2013 are:

i) To explore the study area for understanding he diversity and status of bryophytes.
ii) To study the ecology and suggest conservation measures.
iii) To prepare a database on the bryophytes of Megamalai Hills.
iv) To prepare a comprehensive and well illustrated flora of the area.

The aforesaid project was approved with these objectives in the 1st Meeting of Apex Committee held on 25thMarch 2013. However, it has been noted that the PI has conducted a study on "Bryophyte diversity in the Eastern Ghats of Tamil Nadu" with the following objectives:

1. To study the bryophytic flora of the Eastern Ghats of Tamil Nadu.
2. To identify threatened bryophytes based on IUCN categories.
3. To study the ecology (habitats) and suggest conservation measures to selected species.

The Committee after detailed discussions with PI observed that the project with specific objectives approved by Ministry has not been undertaken. The Committee decided that a decision may be taken by Ministry in this regard before further consideration of the Project.

4.15 **Assessment of Air Pollutants and its impact on Tropical Forest of Northern Chhattisgarh by Dr S.S Singh, Project at Dept of Forestry, Wildlife & Environment Sciences, G.G.V., Bilaspur (19-99/2009-RE)**

Project Details: The project was started on 4th October, 2012 for a period of 3 years with a total cost of Rs. 57,19,550/- of which a total of Rs 36,03,750/- has been released. Of this, Rs. 22 lakhs approx is for equipment which includes - Portable Flu Gas Analyser, Plant Chlorophyll Meter, Multi-Gas Monitor, Weather Monitoring Station, Portable VOC Monitor, Multi-Sensor Quantum Light meter and Videocam and Ozone Portable analyser. The project was given an extension of one year which ended on 03.10.2016 and sought another extension upto 31st March 2017. The PI has now submitted FTR.

Objectives:

i) Air pollutants status in the Northern Chhattisgarh, impact of SO_2, CO_2, NO_2, CO, O_3 on growth of different forest tree species.
ii) Influences of air pollution on CO_2 assimilation (photosynthesis), transpiration, stomatal blockage and over all forest growth,
iii) Air pollutant influences on regeneration of forest tree species, status of lichens in the forest as a bio-indicator for air pollutants,
iv) Air pollutant influences on seasonal wood forming pattern in prominent tree species, fruiting, seeding and
v) Dispersal rate influences by air pollutants in tropical forests of Northern Chhattisgarh.

The Committee observed that the scope of work undertaken and methodology of the work carried out in not clear. The Committee also observed that Korba is a critically polluted area and there are many sources of air pollution in the area and hence the study of impacts of air pollution from these sources on the forests of Northern Chhatisgarh which fall in the study area is important.

The Committee sought clarification on the FTR on the following:

i) The FTR has not provided maps of the study area showing major sources of air pollution of the study area and the location of forest areas within the study area studied for impacts. Details on whether only impacts of gaseous emissions were studied and not particulates which is also n important air pollutant, if so reasons? Was CO_2 being considered as an air pollutant, if so reasons?
ii) Details of inventory of sources of pollution carried out in the study area may be provided.
iii) The Committee noted that a large number of air pollutant measuring equipment including weather monitoring station has been purchased under the Study. In this regard, whether the levels of emissions from the major sources of air pollution have been measured? Please provide details.
iv) Dispersion characteristics of the air pollutants – SO_2, NO_x, O_3, etc from major sources of air pollution in the study area on overlay maps in different seasons to the various forests in the study area.
v) Maps of study area with Isopleths of the concentrations of air pollutants in the study area and indicating dispersion characteristics of the pollutants in the period of study for various seasons.
vi) Details on why impacts of heavy metals were taken up under the study.

The Committee also sought details of status of release of fellowship grant on a complaint received in the Ministry from one of the Research Associates who was recruited under the

project. The Committee requested the PI for consideration of his project after comments/inputs on the FTR are obtained from experts in CPCB, IIT, Bombay, etc.

4.16 **Red mud as an adsorbent for removal for pollutants by Dr. G. V. Krishna Mohan, Department of Chemistry, Vaddeswaram, KL University, Guntur District, Andhra Pradesh** (F.No.19-16/2014-RE)

Project Details: The major objective of the project is to prepare Red mud as an adsorbent/ amendment for Removal of Pollutants especially organics. The study is to provide information in Red mud as an adsorbent/amendment for removal of pollutants. Date of start of project is 08.09.2015 and project duration is 2 Years. Total cost of approved project is Rs 17, 82, 270 of which Rs 13,73,610 has been released so far in two instalments. FTR is awaited along with Consolidated UC and other documents.

The Committee was informed that the PI has been contacted several times on letter, e-mail and telephonically to furnish the FTR and other documents. However, there has been no response.

4.17 **Systematic and life history strategies of Strepsipteran parasitoids (insects: Strepsiptera) with special emphasis on stylopisation of pests of rice Agro-ecosystem in West Bengal by Dr.Niladri Hazra, Associate Professor, Deptt. of Zoology, The University of Burdwan, P.O.Rajbati, Burdwan-713104 West Bengal** (F.No.14/13/2012-ERS/RE)

Project Details: The project was started on 18.01.2014. Total cost of the project is Rs 32, 03,751 of which a total amount of Rs 29,80,280 has been released n 3 instalments. Tenure of the project is over on 22.01.2017. FTR was submitted on 16.05.2017, along with UC and other supporting document, however details furnished are not correct, which has been communicated vide letters dated 06.02.2018 and 28.02.2018.

The PI was requested to present the FTR in the meeting, but has declined stating pre-occupation. The Committee decided to consider the project in the next meeting.

4.18 **Environmental Policy Perspective of Uttarakhand with Special Reference to Religious Tourism by Dr. R.K. Suri, Chairman of Trust, 140, Rosewood Apartments, Dwarka, New Delhi (24-6/2014/RE)**

Project Details: The project was started on 1st June, 2015 for a period of one year with a total cost of Rs. 11,77,830/-. The 1st instalment of Rs 6,00,000/- has been so far released. The PI has submitted FTR.

Objectives of the Project:

i) To study policy issues on environment management of religious tourist destinations in Uttrakhand, to study the laws, rules, regulations on purchase of land and establishment of hotels/resort/ashrams/dharamshala in the state of Uttrakhand.

ii) To analyse the gaps in legislation, policies rules, regulation and gaps in implantation of rules, to find the aetiology of disaster in Uttarakhand on accounts of lopsided development of Religious Tourist Destination in Uttrakhand.

iii) To study the disaster mitigation plan around tourist destination, to analyse the cases pending before National Green Tribunal on violation of environment in and around Religious Tourist destination in Uttrakhand.

iv) To prepare a policy documents on Environmental Management for Religious Tourism.

The Committee after a brief presentation by the PI decided that the report has to provide specific inputs on the objectives of the study as specified for the project. The Committee after deliberations decided that the FTR requires to be circulated to concerned Divisions of the Ministry and various organisations such as NDMA for their inputs/comments of the FTR.

The Committee ended the meeting with a Vote of Thanks to the Chair.

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ANNEXURE-1

LIST OF PARTICIPANTS OF THE FIRST MEETING OF STEERING COMMITTEE ON R&D SCHEME HELD ON 7th JUNE 2018

1.	Shri A. K. Mehta, Addl. Secretary, MoEFCC	-	Chairperson
2.	Dr.B.Meenakumari, Chairperson, National Biodiversity Authority (NBA), Chennai	-	Member
3.	Shri V.P.Yadav, Additional Director, representing Chairman, Central Pollution Control Board, New Delhi	-	Member
4.	Shri Sandeep Chauhan, Joint Director, Botanical Survey of India (BSI) representing Director, BSI	-	Member
5.	Shri A.K.Das, Deputy Secretary, IFD, MoEFCC representing AS&FA	-	Member
6.	Dr. T. Chandini, Advisor, MoEFCC	-	Member Secretary

Special Invitees

1. Dr.C.Palpandi representing Dr.Sujata Arora, Advisor (Biodiversity), MoEFCC
2. ....., AIGF representing IG (Forest Protection Division), MoEFCC
3. Shri Satyendra Kumar, Deputy Secretary (Control of Pollution), representing Joint Secretary, MoEFCC

MOEFCC (RE Division)

1. Dr. M. Salahuddin, Director, MoEFCC
2. Shri S. P. Singh, US, MoEFCC
3. Shri B. K. Haldar, SO, MoEFCC
4. Shri Chaitanya P. Sharma, RO, MoEFCC
5. Mrs. Akanksha Sachan, ASO, MoEFCC
6. Shri Sandeep Bharti, Project Assitant, MoEFCC

PROJECT INVESTIGATORS

1. Dr. M. Sridhar Reddy, Yogi Venmana University.
2. Dr. Krishna Upadhaya, NEHU, Shillong
3. Prof. Renee M. Borges, Indian Institute of Science, Banglore
4. Dr. C. Raghunathan, Zoological Survey of India
5. Dr. C. Sivaperuman, Zoological Survey of India
6. Dr. Atul Keshavrao Bodhke, J.D.Patil Sangludkar Mahavidyalaya, (MS)
7. Dr. A. K. Asthana, NBRI, Lucknow
8. Dr. A. E. Dulip Daniels, Scott Christian College, Nagercoil
9. Dr. S.S Singh, G.G.V., Bilaspur
10. Dr. R.K. Suri, Chairman of Trust, New Delhi

ANNEXURE-2

LIST OF PROJECTS CONSIDERED IN THE 1st MEETING OF STEERING COMMITTEE HELD ON 07.06.2018

S.N.	Title of Project	Thematic Area
1.	F.No.14/13/2013-ERS/RE Assessment of Anthropogenic pressure and its impact on Forest and Grassland Ecosystem of Dachigam National Park, J&K India	Forestry
2.	F.No.14/63/2013-RE Study of population structure, phenology and natural regeneration requirements of Pterocarpussantalinus – an endemic, endangered and exploited tree species of southern Eastern Ghats	Forestry
3.	F.No.14/79/2013-RE Effect of plant invasion on biodiversity and forest regeneration in fragmented mountain ecosystems	Forestry
4.	F.No.14/81/2013-RE Monitoring of biomass stocks and forest community structures in temperate zone of Western Himalaya	Forestry
5.	No.24-17/2014-RE Analysis of Socio-Economic and Conservation Benefits due to Community Forest Resource(CFR) Rights Implementation Across Selected Regions in Central and Eastern India"	Forestry
6	14/20/2012-ERS/RE Studies on Population structure, distribution pattern and regeneration potential of some lesser known commercially potent non-timber forest product yielding species in tropical west evergreen forests of Assam.	Forestry
7.	F.No.14/25/2011-ERS/RE Fragmentation of humid subtropical broad-leaved forest and its impact on plant diversity and ecosystem function in Meghalaya, Northeast India	Forestry
8.	F.No.14/21/2012-ERS/RE Ecological Studies on distribution patterns and food plant resources of butterflies along altitudinal gradients in Sub-alpine forests of Himachal Pradesh	Biodiversity
9.	F.No.14/127/2013-RE Understanding the ecosystem service of pollination in a fragmented seasonal cloud forest in the Western Ghats of Maharashtra	Biodiversity
10.	F.No.14/16/2013-RE Reproductive biology of Scleractinian corals in Andaman and Nicobar Islands	Biodiversity
11.	F.No.14/226/2013-RE Foraging ecology and habitat use of wading birds and shorebirds in the mangrove ecosystem of the Andaman islands	Biodiversity
12.	F.No.14/122/2013-RE Diversity and microhabitat utilization pattern of spiders in Satpuda landscape	Biodiversity
13.	F.No.23/22/2012-RE Study of Bryophyte diversity in the Eastern Ghats	Biodiversity

14.	F.No.23/28/2012-RE Studies on the Bryoflora of Megamalai Hills in the Western Ghats	Biodiversity
15	19-99/2009-RE Assessment of Air Pollutants and its impact on Tropical Forest of Northern Chhattisgarh	Pollution
16.	19-16/2014-RE Red mud as an adsorbent for removal for pollutants.	Pollution
17.	F.No.14/13/2012-ERS/RE Systematic and life history strategies of strepsipteran parasitoids (insects: Strepsiptera) with special emphasis on stylopisation of pests of rice Agro-ecosystem in West Bengal.	Agriculture
18.	24-6/2014/RE "Environmental Policy Perspective of Uttarakhand with Special Reference to Religious Tourism"	Sustainable Development