

MINUTES OF THE NINTH MEETING OF STEERING COMMITTEE ON R&D SCHEME FOR CONSERVATION & DEVELOPMENT HELD ON 19TH JANUARY, 2021 AT MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE, INDIRA PARYAVARAN BHAWAN, NEW DELHI

The Ninth meeting of the Steering Committee on R&D Scheme for Conservation & Development was held on **19th January, 2021** under the chairmanship of AS(RA) to consider 2 projects received online under the R&D Scheme for Conservation & Development. Dr. Navroz kersi Dubah, Centre for Policy Research, New Delhi and Dr. K.R. Shanmugam, Madras School of Economics, Chennai could not attend the meeting due to prior engagements. The list of participants is at **Annexure-1**.

2. Confirmation of Minutes of 8th Meeting of the Steering Committee

The minutes of the Eighth Meeting of Steering Committee held on 2nd December, 2019 were circulated to the Committee members and were confirmed.

3. Consideration of Proposals

Ms. Rita Khanna, Advisor welcomed Shri Ravi Agrawal, Additional Secretary, MoEFCC and Chairman and the members of the Steering Committee for consideration of the 2 projects listed at **Annexure-2**. It was informed that those projects had been received on-line on the MIS-Portal under the new revamped Scheme on R&D for Conservation and Development. The projects were first considered in the meetings of Technical and Financial Appraisal Committee (TFAC) under the R&D Scheme on Conservation & Development and recommended for funding by the TFAC.

The projects were taken up for consideration.

1.0 PROJECT DETAILS: Project on **“NIR Light reflective Nano composite plastering mortar/coating towards climate change adaptation in buildings”**. Dr. K. Jeyasubramanian, Senior Professor, Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi- 626 005 (Tamil Nadu).

Co-PI: Mr.I.Baskar, Assistant Professor (Sr.Grade), Department of Civil Engineering, Mepco Schlenk Engineering College, Sivakasi - 626005

Duration of Study: 3 Years

Location of Study: Sivakasi, Virudhunagar, Tamil Nadu

Thematic Area: Climate Change: Vulnerability & Risk Assessment, Process, Mitigation and Adaptation

Objectives:

- Proposed project is mainly focusing to restrict the penetration of solar radiation towards the interior.
- The major hot region of the solar spectrum is Near Infra-red radiation, normally 50% reaching earth surface. (wavelength:1500 nm to 2500 nm).

- By impregnating NIR light reflective materials like fibres of palmyra and coconut leaves and the NIR light reflecting pigments like Fe₂O₃, ZrO₂ and Cr₂O₃, it is possible to prevent the entry of hot NIR light from the outdoor.
- This is to reduce the indoor air temperature and thereby maintaining the thermal comfort. All these facts attribute towards the reduction in power consumption and ultimately minimize the greenhouse gas emission. The correlation with the power consumption and the quantities of greenhouse gas emission can be computed using Autodesk Revit Architecture software.

It was stated that the project involves:

- Preparation of NIR light reflective additives using nano fibres obtained from the leaves of coconut and/or palmyra in combination with Fe₂O₃, ZrO₂ and Cr₂O₃ Nano particles.
- Characterization of Nano particles and Nano fibres using XRD, FTIR, SEM with EDAX, AFM, UV/Vis reflectivity, NIR reflectivity, etc.
- Preparation of plastering mortar and a paint coating using epoxy resin with and without nano additives will be obtained and characterized.
- NIR reflectivity of the plain and the NIR additives impregnated plastering mortar/coating will be evaluated using NIR spectrometer.
- Construction of a prototype home using bricks, the plastering process will be performed using mortars & roof coating containing NIR reflective additives.
- Evaluation and monitoring of the interior temperature of the constructed model exposed to daylight during peak hours.
- Preparation and characterization of Nano formulated paint using NIR light reflecting materials with other paint forming ingredients.
- Thermal insulation property of the model will be compared with a conventional structures.

Budget

Total Project Cost: Rs 44,91,210/-

The proposed cost of the project and year wise breakup of the cost:

Tenure	1st Year (in Rs.)	2nd Year (in Rs.)	3rd Year (in Rs.)	Total Budget (in Rs.)
3 years	31,27,080	6,43,080	7,21,050	44,91,210

The component wise breakup of cost:

COMPONENT	Year 1 (In Rs.)	Year 2 (In Rs.)	3rd Year (in Rs.)	Total Cost (In Rs.)
Salary	4,09,200	4,09,200	4,62,000	12,80,400
Equipment	22,00,000	0	0	22,00,000
Consumables	50,000	80,000	70,000	2,00,000
Travel Cost	30,000	40,000	55,000	1,25,000
Contingency	30,000	30,000	40,000	1,00,000
Institutional Charges	4,07,880	83,880	94,050	5,85,810
Any Other	0	0		0
Total Budget	31,27,080	6,43,080	7,21,050	44,91,210

Output Outcome

Expected Outputs:

1. NIR light reflecting additives impregnated plastering mortar/coating can be used as a thermal regulating plaster and as roof coatings in buildings. Owing to their high NIR light reflectivity, the interior temperature of the room becomes less in comparison with conventional building materials used.
2. PI and his team is expected to publish 2 to 3 research papers in international journals with high impact factor. An Indian/International patent is the ultimate aim of doing this project. After getting prior permission from MoEF, New Delhi, patents will be filed jointly with MoEF, New Delhi and Mepco Schlenk Engineering.

Expected Outcome:

- i. The optimized composition of NIR light reflecting additives consist of both fibres and Nano particles along with cement, sand as Plastering mortar – Can be used in construction industry.
- ii. NIR light reflecting additives optimized in this project are going to be used as pigment along with other conventional additives as Paint.
- iii. A new thermo regulating plaster mortar for building industry is possible. While using this as surface coverage material, we can reduce the power consumption in domestic and commercial building sectors.
- iv. New type of paint formulation is possible in which Nano fibres obtained from natural materials and NIR light reflecting metal oxides will be suspended along with binder, inner coat drier, outer coat driers, thinners, stabilizers, anti-settling agents, etc. Thus obtained paint can be designated as Cool paint having higher market potential. The will produce a Indian/International patent.
- v. The proposed thermo regulating plaster and paint coating might be able to reduce the indoor air temperature and eventually possible to reduce the Heating, Ventilating, and Air Conditioning (HVAC) load which in turn reduces the pay bills of the consumer and carbon foot print.

The proposal was taken up by the Technical and Financial Appraisal Committee (TFAC) in its 14th meeting held on 30th July, 2020 wherein it was recommended for consideration of Steering committee. The recommendations of the TFAC are quoted below:

"Committee noted that the product developed must meet the Energy Conservation Building Code (ECBC). The Committee observed that the PI should also assess and extrapolate the extent of reduction in room temperature and consequent reduction in HVAC load required, a cost-benefit analysis in terms of reduction in indoor room temperature and reduction of carbon foot print in terms of power consumption and energy savings and ultimately in minimising greenhouse gas emission and Carbon Footprint (CO₂). The PI should also focus on how the system developed can be used in Smart Cities. The Committee after deliberations recommended the project for funding subject to the inclusion of the above mentioned aspects. The Committee also agreed for procuring the NIR Spectrophotometer for an estimated cost of Rs 22 lakhs. The Committee also desired that PI may not only apply for patent for the technology and certification from the Central Building Research Institute."

Subsequently, the project has been taken up for consideration by Steering Committee in its 9th meeting held on 19th January, 2021 wherein PI gave the presentation and elaborated point wise on the recommendations given by the TFAC. It was noted that the budget for equipment submitted by the PI was on a very higher side thus the PI might explore the possibility of tying up with other premiere institutes like IIT, Chennai for using their equipment. The chairman of the

Committee noted that it would be prudent to leverage on the facilities available in various premier institutes rather than funding the projects with large proportion of amount for procurement of equipment by individual college.

In view of above observations, the Committee requested PI to collaborate with other institutes for use of their equipment or generate funds for this purpose from other sources. After deliberations, the Committee requested PI to revise the budget accordingly and resubmit the project for approval of the Ministry.

2.0 PROJECT DETAILS: Project on “**Microbial communities in changing climatic regime: Analysis of primary and secondary risk factors**” PI: Dr. Vartika Mathur, Assistant professor Animal-Plant Interactions lab, Department of Zoology, Sri Venkateswara College, University of Delhi, Delhi 110021

Co-PI: Dr. Pooja Gokhale Sinha, Assistant Professor, Department of Botany, Sri Venkateswara College, New Delhi

Duration of the study: 2 Years

Location of the Study: Delhi, New Delhi, Delhi Cantonment

Thematic Area: Climate Change: Vulnerability & Risk Assessment, Process, Mitigation and Adaptation

Objectives of the Project: Major Objective

- To study the impact of elevated CO₂ levels on rhizosphere and phyllosphere microbes associated with tomato plant as well as on soil and plant processes.
- Assessment of combined impact of high CO₂ and Polycyclic aromatic hydrocarbons degrading microbial communities at elevated CO₂

Detailed objectives Objective

- To examine the effects of elevated CO₂ on the richness, composition and structure of rhizosphere and phyllosphere bacteria and fungi.
- To study the impact of elevated CO₂ concentration on growth and development of tomato plants.
- To evaluate the impact of elevated CO₂ levels on plant primary (chlorophyll, carotenoids, total sugars, proteins) and secondary plant metabolites (phenols, tannins)

Objective II

- Identify PAH degrading soil microbes
- To examine the impact of elevated CO₂ on biodegradation of soil PAH.
- To study the effect of elevated CO₂ on resultant soil organic carbon

Credential of the Organisation : The Project is submitted by Dr. Vartika Mathur, Assistant professor Animal-Plant Interactions lab, Department of Zoology, Sri Venkateswara College, University of Delhi, Delhi 110021. The Institute is recognized by UGC accordingly, PI has submitted UGC Certificate

Budget

Total Project Cost: Rs.4973800

The proposed cost of the project and year wise breakup of the cost:

Tenure	1 st Year (In Rs.)	2 nd Year (In Rs.)	Total Budget (In Rs.)
2 Years	3644400	1329400	4973800

The component wise breakup of cost:

Component	Year 1 (In Rs.)	Year 2 (In Rs.)	Total cost (In Rs.)
Salary	456000	456000	912000
Equipment	2200000	0	2200000
Consumables	650000	550000	1200000
Travel cost	75000	75000	150000
Contingency	75000	75000	150000
Institutional Charges	188400	173400	361800
Any Other	0	0	0
Total Budget	3644400	1329400	4973800

Output Outcome

Expected Output of the project:

- The project will lead to determination of the effect of elevated CO₂ on rhizosphere and phyllosphere microbial populations, their diversity and growth dynamics.
- It will lead to creation of a database of microbial species found at high CO₂. This in turn may provide us valuable scientific information.

Expected Outcome of the Project:

- The project outcomes will result in capacity building of our institution in terms of Manpower and Equipment.
- Key findings from the project will facilitate scientists, policy makers and environmentalists in better management and conservation of soil in future climatic situations.
- Will contribute to existing Database on the thematic area as well.

The proposal was taken up by the Technical and Financial Appraisal Committee (TFAC) in its 18th meeting held on 19-20 December, 2020 wherein it was recommended for consideration of Steering committee. The recommendations of the TFAC are quoted below:

"After detailed deliberation, the committee recommended the project for funding subject to the following condition:

The study should also examine the impact on elevated temperature along with elevated CO₂."

Subsequently the project was taken up for consideration by Steering Committee in its 9th meeting held on 19th January, 2021 wherein PI gave the presentation and elaborated point wise on the recommendations given by the TFAC. It was noted that the budget for equipment submitted by the PI was on a very higher side thus the PI might explore the possibility of tying up with other premiere institutes of the country for using their equipment. The expert from WII advised the PI to consult with WII to explore the possibility for using their equipment. It was brought out that similar facility has been funded through NMHS. The same could be leveraged. The chairman of the Committee noted that it would be prudent to leverage on the facilities available in various premier institutes rather than funding the projects with large proportion of amount for procurement of equipment by individual college. It was also pointed out that the original proposal was for 2 years but the same has been revised to three years.

In view of above observations, the Committee requested PI to collaborate with other institutes for use of their equipment or generate funds for this purpose from other sources. After deliberations and in the light of observations of the expert from WII, who advised to consult with WII to explore the possibility for using their equipment, the Committee requested PI to revise the budget accordingly and resubmit the project for approval of the Ministry for two years.

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

ANNEXURE-1

LIST OF PARTICIPANTS OF NINTH MEETING OF STEERING COMMITTEE (SC) OF R&D SCHEME HELD ON 19.01.2021 IN MoEF&CC

1.	Shri Ravi Agrawal,	...	Chairperson Additional Secretary, MoEFCC
2.	Director (IFD) Nominated by AS&FA	...	Member
3.	Dr. P.K. Bahal, representing Chairman Central Pollution Control Board	...	Member
4.	Sh. V.B.Mathur, Chairperson, National Biodiversity Authority (NBA) ...		Member
5.	Sh. Kailash Chandra, Director, Zoological Survey of India	...	Member
6.	Sh. S.S. Dash representing Director, Botanical Survey of India	...	Member
7.	Sh., V.P. Uniyal, representing Wildlife Institute of India	...	Member
8.	Ms. Rita Khanna	...	Member-Secretary Advisor

MoEF&CC

4. Dr. Ashish Kumar, Joint Director, RE Division
5. Shri Abhijit Prasad, Under Secretary (RE)
6. Shri Pankaj Ahlawat, Assistant Section Officer, (RE)

PROJECT INVESTIGATORS (PIs)/Co-PIs

1. Dr. K. Jeyasubramanian, Senior Professor, Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi
2. Dr. Vartika Mathur, Assistant professor Animal-Plant Interactions lab, Department of Zoology, Sri Venkateswara College, University of Delhi, Delhi

**Projects considered in the 9th Meeting of Steering Committee on R&D Scheme,
MoEFCC held on 19th January 2021**

Projects to be considered:

S. No.	Project ID No.	Thematic Area	Title of the Project	Principal Investigator
1.	179/2020/RE	Climate Change: Vulnerability & Risk Assessment, Process, Mitigation and Adaptation	“NIR Light reflective Nano composite plastering mortar/coating towards climate change adaptation in buildings”.	Dr. K.Jeyasubramanian, Senior Professor, Department of Chemistry, Mepco Schlenk Engineering College, Sivakasi- 626005
2.	208/2020/RE	Climate Change: Vulnerability & Risk Assessment, Process, Mitigation and Adaptation	“Microbial communities in changing climatic regime: Analysis of primary and secondary risk factors”	Dr. Vartika Mathur, Assistant professor in Animal-Plant Interactions lab, Department of Zoology, Sri Venkateswara College, University of Delhi, Delhi 110021