MINUTES OF THIRD MEETING OF TECHNICAL AND FINANCIAL APPRAISAL COMMITTEE (TFAC) OF THE R&D SCHEME FOR CONSERVATION & DEVELOPMENT OF THE MoEF&CC HELD ON 17th MAY 2019 AT INDIRA PARYAVARAN BHAWAN, MoEFCC, NEW DELHI

The third meeting of the Technical and Financial Appraisal Committee (TFAC) of the MoEFCC on the Scheme on R&D for Conservation & Development was held under the chairmanship of Prof C.R. Babu on 17th May, 2019 at MoEFCC in Narmada Conference Room, Ground Floor, Jal Wing, Indira Paryavaran Bhawan, New Delhi. Advisor (RE), MoEFCC, and Member-Secretary of the TFAC welcomed the Chairperson and members of the TFAC and special invitees for the meeting. List of participants is at Annexure-1. A total of 25 proposals received on-line under the new R&D Scheme on Conservation & Development and on-going projects under the Old R&D Scheme which ended on 31st March 2017 were considered. These are listed at Annexure-2.

I LIST OF R&D PROJECTS RECEIVED UNDER NEW R&D SCHEME

1. Reg. No. 43/2018/RE – “An Assessment of the Impact of Environmental Clearance Procedure on Air Quality based on Long Term Data of National Air Monitoring Program (NAMP) and the Continuous Ambient Air Quality Monitoring Station (CAQMS) of Kolkata”. PI: Prof. Ajanta Das, Computer Science & Engineering, University of Engineering and Management, Kolkata Co-PI: Details not provided

Objectives of the proposed project:

i) To study environmental clearance process implemented by WBPCB thoroughly to assess the overall environmental impact on Air Quality for a specific location, where Continuous Air Quality Monitoring Stations (CAQMS) are established.

ii) To study long term data of National Air Monitoring Program (NAMP) to enlist add-on conditions to Environmental Clearance of Projects with High Potential to impair Air Quality.

iii) The project will carry out the following research study: 1. General Environmental Clearance Process implemented by WBPCB, 2. Dataset or Parameters of Continuous Air Quality Monitoring Stations (CAQMS) for West Bengal and specifically Kolkata. Specific pollutants include Particulate Matter, Nitrogen Di Oxide and Sulphur Di Oxide. 3. Long Term Data of National Air Monitoring Program (NAMP) for West Bengal and specifically Kolkata

iv) The proposed Project will give the emphasis on analytics and knowledge discovery part by which it will be able to forecast the forthcoming pollution level.

v) The project will also review long term data from National Air Quality Monitoring Program (NAMP).

vi) In order to keep the forthcoming pollution level within standard limit, it will present some suggestive measure with respect to certain known upcoming events such as festivals or political gathering so that these upcoming events can be organized only on holidays, as air pollution increases on weekdays with more traffic.
**Expected Outputs of the Project:**

i. Paper Presentation in International Conference or Workshop  
ii. Research Paper Publication in International Conference  
iii. Research Paper Publication in International Journal

**Expected Outcome of the Project:**

i. To Predict Overall Environmental Impact on Air Quality  
ii. Development of Add-on Conditions to Environmental Clearance of Projects with High Potential to impair Air Quality

**Total cost of project:** Rs 6,84,750/-

**Cost Break-up of project** – Not provided

**Manpower Requirement:**
Research Fellows (JRF/SRF) 1  
Co-opt Dr. Sunirmal Khatua from Comp. Sc. Eng. University of Calcutta as Project Expert

**Equipment required (not available with Institution):**
Mobile Device 1  
Mini Mobile Device 1  
Backpack for mobile device 1

The PI made a presentation before the Committee.

It was informed that the proposed project is to study environmental clearance process implemented by WBPCB thoroughly to assess and predict the overall environmental impact of Air Quality for a specific location, where Continuous Air Quality Monitoring Station (CAQMS) established. This project will also review long term data from National Air Quality Monitoring Program (NAMP). It was informed that the data will be collected from Location wise Online Information Published by WBPCB from Monitoring Stations, Automatic Stations. The data collected from cities such as Asansol, Durgapur, Haldia, Howrah, Kolkata, Siliguri. The major pollutants to be studied will be Sulphur dioxide (SO₂), Nitrogen dioxide (NO₂), Suspended particulates smaller than 10 μm in aerodynamic diameter (PM₁₀), Suspended particulates smaller than 2.5 μm in aerodynamic diameter (PM₂.₅), Carbon monoxide (CO), Ozone (O₃), Ammonia (NH₃), Benzene (C₆H₆), Benzo Alpha Pyrene (BaP), Lead (Pb), Arsenic (As), Nickel (Ni). Location wise Air Quality in Howrah/Kolkata at Rajarhat, Dum Dum, Baruipur, Gariahat, Minto Park, Belur Math, Padmapukur, Padmapukar, Victoria, will be monitored. The major pollutants of the areas are PM10 PM2.5. The possible role of meteorological parameters in air pollution, Wind Speed, Wind Direction, Seasonal Data (Solar Radiation, Relative Humidity, Temperature, Fog events) in winter will also be studied. Fire (Corp burning, Biomass burning) etc. will also be assessed. It is also proposed to Study of General Environmental Clearance Process implemented by West Bengal Pollution Control Board (WBPCB) and also Study of Dataset or Parameters or Long-Term Data for West Bengal and specifically Kolkata which will be collected by Continuous Air Quality Monitoring Stations (CAQMS) and by National Air Monitoring Program (NAMP).
The Committee was of the view that the objectives of the study and the expected outcome are not clear. The project also appeared to be mainly desk job collecting secondary data. The study does not appear to bring out any new and innovative solution to the issue of air pollution in metro cities. Various types of models are already available for assessing air pollution. One of the major factors of air pollution in metro cities is due to vehicular emissions which are not covered under the EC process. As far as environmental clearance is concerned, the project proponent intends to collect baseline data as part of the Environmental Impact Assessment Study and the incremental increase of the proposed industrial operations to ambient air quality and thereupon an Environmental Management Plan will be prepared to mitigate the effects of the industrial operations on environment – in terms of impacts on air and water quality, land, biodiversity, etc.

The Committee desired to know the specific value addition to already existing data and methodology already available for assessing air pollution. The Committee desired that the PI rethink the entire study in terms of specific benefits that the study would bring to the aspect of EC process. The Committee suggested that the PI should prepare an integrated project for air pollution. It was also suggested that EIA report of ECs granted for industrial units including building and construction sector in the region may be consulted. Data available with organisations such as the West Bengal State Pollution Control Board (WBSPCB), India Meteorological Department (IMD), and CPCB may also be consulted. The Committee requested to suitably revise the project incorporating the suggestions as above and submit as a new project. The present project was not recommended for funding.


**Location of Project:** Informal E-waste recycling sites in the cities of Delhi (Seelampur, East Delhi), Ahmedabad and Kolkatta

**Project Duration:** 2 years 3 months

**Objectives of the Project:**

i) To identify the research trends on E-waste in Indian context through a detailed bibliometric analysis.

ii) To perform a detailed content analysis of the literature on E-waste and identify the gaps.

iii) To interact with the key stakeholders in the E-waste trade value chain in both formal and the informal E-waste recycling sector.

iv) To assess the challenges and opportunities associated with E-waste management in various Indian Cities in both the sectors.

v) To evaluate the potential of E-waste as urban mines and carry out an analysis from a resource conservation perspective.

vi) To evaluate the current status of the formal E-waste recycling initiatives in India.

vii) To compare and contrast e-waste management systems in cities and emerging cities.
**Expected Output of the Project:**

Appropriate policy instruments could be devised and management strategies could be formulated.

**Expected Outcome of the Project:**

i. In India, E-waste is both a challenge and an opportunity although it has a number of technological, economic, environmental and health connotations.

**Cost of project:** Rs 34,34,400/-

**Cost Break-up of project:**

<table>
<thead>
<tr>
<th>Tenure</th>
<th>1st Year (in Rs.)</th>
<th>2nd Year (in Rs.)</th>
<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years 3 months</td>
<td>19,42,200</td>
<td>14,92,200</td>
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<td>34,34,400</td>
</tr>
</tbody>
</table>

**The component-wise break-up of cost of the project is given below (in Rs.):**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Year 1 (in Rs.)</th>
<th>Year 2 (in Rs.)</th>
<th>Year 3 (in Rs.)</th>
<th>Total Cost (in Rs.)</th>
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<td><strong>Total Budget</strong></td>
<td><strong>19,42,200</strong></td>
<td><strong>14,92,200</strong></td>
<td><strong>0.00</strong></td>
<td><strong>34,34,400</strong></td>
</tr>
</tbody>
</table>

Manpower Requirement: Research Associate-1, Lab Assistant-1

Equipment required under the project: Not required

The PI made a presentation.

It was informed that the proposed project is to study Electronic waste (E-waste) or Waste Electrical and Electronic Equipment (WEEE) which signifies discarded appliances that utilize electricity for their functioning. Domestically produces 2 million tonnes of E-waste annually (ASSOCHAM 2018). Another 50,000 tonnes imported every year (The Indian government’s recent policy initiatives directed towards the development of an ‘information society’ or a ‘smart society’ with initiatives such as ‘Digital India’, ‘Make in India’ etc. will further boost electronics surge in the country and pose serious challenges to sustainable E-waste management initiatives. A joint report by United Nations Environment Programme (UNEP) and United Nations University (UNU) predicts. Indian E-waste management system is complex. It is mainly dominated by the informal sector. An estimated 95% – recycled in non-formal/informal sector, 5% – handled in the formal units, 75% E-waste stored due to uncertainty of how to manage it. E-waste is often viewed as a ‘commodity’ with intrinsic value. E-waste is a major source of income for urban poor, unemployed and low skilled
persons. E-waste is a complex stream of waste. It contains Hazardous chemicals – Harmful to human health and environment, Precious metals – ‘Urban Mines’ – Precious metals occur at concentrations more than tenfold higher in printed wiring boards than in mined minerals. E-waste in the informal sector is processed, mostly by using rudimentary techniques such as open burning, acid baths etc. and unskilled labours involving a number of women and children.

An empirical study will be carried out in India to evaluate the existing E-waste management structures, consumers’ disposal behaviour and associated awareness, present state of affairs at both the formal and informal sectors, the challenges and opportunities involve etc.. The key stakeholders in the E-waste trade value chain in both formal and the informal E-waste recycling sector will be first identified by reviewing the literature. Subsequently, different key stakeholders involved in both the sectors will be visited in studies areas.

Semi-structured interviews will be carried out with the stakeholders to assess the issues regarding the generation and management (including recycling) of E-waste in Indian cities. Questionnaires will be formed for different stakeholders as per the requirements. Finally, the potential for urban mines will be assessed based on field experience which will involve formulating an inventory of the valuable and precious metals recycled each day in a particular E-waste recycling site.

The Committee observed that CPCB and Ministry of Electronics & Information Technology (MEITY) are already working on this issue and a lot of data is already available in terms of E-waste generation through formal and informal routes. CPCB has already brought out Guidelines for dealing with E-waste. In 2016, the E-waste Rules were amended and CPCB has carried out nation-wide workshops across 71 cities to raise awareness on the matter of e-waste handling and disposal. In all major cities, there is a system for collecting old mobiles. An NGO- Chintan is working extensively on the issue of waste management especially by the informal sector. Thus, data is available and trends are known. The Committee desired to know whether PI has examined the information already available in the country. The Committee after deliberations desired that a more focussed project should be prepared and hence did not recommend the project for funding.


**Project Duration:** 2 years

**Location of Project:** Thiruvananthapuram, Kerala

**Objectives of the project:**

The main objective of the proposal is to develop low temperature plasma and microwave based recycling process for concentration of rare earths and precious metals from waste printed circuit boards and toxic emission analysis such as dioxin, furans, etc.
• Assessment of latest e-waste resources and identification of rare earths and precious metal presence
• Develop low temperature plasma and microwave based process to recover the metal values, glass fibre and activated char from wastes PCBs.
• Recovery and concentrating the rare earths (La, Nd, Sm, Ce, Pr) and key precious metals such as gold, silver, platinum, and palladium in treated PCBs.
• To develop a thermodynamic model for evaluating the feasibility of recovering valuable metals and flow sheet for mass and energy balance.
• Kinetic analysis for low temperature plasma and microwave pyrolysis process.
• Recycling of non-metallic materials such as polycarbonates and carbon from e-waste for their profitable utilization.
• In-depth analysis of dioxin and furans from these particulates/gaseous releases during pyrolysis and their precursors to develop optimal operating windows for reducing harmful emissions from a wide variety of waste PCBs

Expected Outputs of the Project:
• Assessment of latest e-waste resources in view of rare earth and precious metal presence.
• Establishing the process parameters for maximum recovery of rare earths and precious metals from e-waste.
• Analysis of dioxin and furans formation during the processing of e-waste.
• Development of thermodynamic model for feasibility of recovering the valuable metals from e-waste

Expected Outcome of the Project:

i. Scientifically, the research output from this proposal will provide a novel approach in which to questions related to recycling of complex e-waste for rare earth and precious metal recovery.

ii. The research will establish the technical know-how on how to reduce harmful emissions below environmentally safe limits, to maximise metal recovery.

Cost of Project: Rs 44.70 lakhs

Cost Break-up:

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<th>Tenure</th>
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<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs. lakhs)</th>
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<th>COMPONENT</th>
<th>Year 1 (in Rs.)</th>
<th>Year 2 (in Rs.)</th>
<th>Year 3 (in Rs.)</th>
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<td>Total Budget</td>
<td>33.81</td>
<td>10.81</td>
<td>0.00</td>
<td>44.62</td>
</tr>
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</table>
**Manpower Requirement**
Research Fellows (JRF/SRF) 1
Non Technical - 1 skilled

**Additional Equipment required (not available with Institution):**
Microwave kiln 1

Details of Co-PI of the project has not been provided. UGC/AITCE/Certificate of recognition is not attached- PI has merely stated that The National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram, is a constituent Laboratory of the Council of Scientific and Industrial Research (CSIR). Also, the Certificate that the work has not been undertaken and equipment being purchased under the project is not available in the Institute is not on the Letter Head of The National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram. A Private Company – M/s Earth Sense Recycle Private Ltd has expressed interest in the outcome of the project. As an end-user for the cutting edge technology being developed in this project, it has expressed interest for commercialization of the technology if found to be economically feasible and make it as industrial scale project.

PI made a presentation.

It was informed that E-waste is a growing polymetallic resource with valuable materials such as metallics, ceramics and polymers. One of the most hazardous components present as non-metallic materials in the PCB is the brominated flame retardants. However, if not treated well, these non-metallic materials produced some of the most hazardous and carcinogenic compounds such as dioxins and furans. Every e-waste consists of end of life printed circuit boards which is rich in base and precious metals. Processing of e-waste was handles by thermal processing, physical/mechanical processing and end process by hydrometallurgical treatment for pure metals. PI proposes to recover of rare precious metals which is considered to be more economic than mining from ores and in-depth analysis and characterization of dioxin and furans formed during processing of e-waste.

The Committee stated that the recovery of precious metal from e-waste is not new concept. DBT has sanctioned a large number of projects in the past but recovery of precious metal is still very low using microbial route. It was also informed that plasma technology is available and it cannot be used on a commercial scale. Thermodynamic model is not clear. During the process, the temperature increases upto 800°C, and there are chances of emission of Furans and Dioxins. The Committee desired that carcinogens such as Furans and Dioxins which will be emitted during process should be controlled. It was observed that PI has already done some work on Low Plasma Technology. The Committee was not clear about the Low Plasma Technology for recovery of precious metals. It was observed that there are the PI has submitted many objectives, which would be difficult to achieve in 2 years of project duration.

The Committee after discussions, decided that objectives be revised as given below:

i) Develop low temperature plasma and microwave based process to recover the metal value, glass fibre and activated charcoal from waste PCBs.

ii) Recovery and concentration of rare earth metals (La, Nd, Sm, Ce, Pr) and key precious metals such as gold, silver, platinum and palladium in treated PCBs.

iii) Recycling of non-metallic materials such as polycarbonates and carbon from e-waste for their profitable use.
iv) In-depth analysis of dioxins and furans from these particulates/gaseous releases and from liquid wastes during pyrolysis and their precursors to develop optimal operating windows for reducing harmful emissions from a wide variety of waste PCBs.

The Committee also suggested that Microwave kiln may be deleted. The Committee sought responses from PI on the points mentioned above before considering it further for funding.


**Expected Outputs of the Project:** A Comprehensive Report on environmental study of Damodar river water quality

**Expected Outcome of the Project:**

i. Present status of water quality of River Damodar

ii. Techno-environmental scenario of industries adopted for pollution control and its efficacy.

iii. Techno-environmental scenario of sewage waste generation by nearby towns and settlements.

iv. Suggestive measures for river rejuvenation

v. The study will be helpful in taking protectionary measures to clean the Damodar River

vi. Study will be the part of the NAMAMI GANGE as Damodar river is one of the tributary of lower Ganga.

**Cost of Project:** Rs 95,92,700/

<table>
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<th>COMPONENT</th>
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<td><strong>9592700</strong></td>
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**Additional Manpower Requirement:**

Research Associate (1)
Research Fellows (JRF/SRF) (2)
Project assistant Level-I (2)

**Additional Equipment required (not available with Institution):**

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<thead>
<tr>
<th>EQUIPMENT</th>
<th>No of Units</th>
</tr>
</thead>
<tbody>
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<td>Field kits</td>
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</tr>
<tr>
<td>Incubator</td>
<td>1</td>
</tr>
</tbody>
</table>
Autoclave | 1  
Muffle Furnace | 1  
Ice box | 10  
Deep Freezer | 1  
Merck-Millipore water purification unit | 2  
Ion Analyzer | 1  
Stereo Zoom Microscope with Photographic attachment | 1

Entertaking on equipment listed above as not available in the Central Institute of Mining & Fuel Research (CIMFR) has not been given by HOD, CIMFR. It has instead been self certified by the PI.

The PI made a presentation. It was informed that the proposed study would cover the stretch of 240 km of River Damodar flowing through the State Jharkhand. River Damodar river receives a number of tributaries from the southern and the northern slopes. Near Tenughat, the combined courses of the River Konar and River Bokaro meet the Damodar. The Damodar flows further east from Tenughat and before reaching Panchet, it receives a few other tributaries from the north and south. From north, Jamunia and Katri join the Damodar during flowing over the Jharia coalfield.

In several stretches, the river has become very shallow due to deposits of eroded soil, fly ash and coal fines. The region is richly endowed with mineral resources (coal, mica, bauxite activities comprising of about 310 coal mines, 180 non-coal mines, 80 urban centers and 80 other industrial centers). All these industrial operations draw water from the Damodar River and discharge their untreated effluents into the river. Industries like coal washeries, thermal power stations, steel plant, coke oven plants identified as major sources of pollution of river Damodar.

It was informed that the scope of work is Comparative assessment of water quality of Damodar River based on past studies (secondary data), time series analysis Physico-chemical analysis of water quality parameters, Bacteriological (MPN, faecal coliform and total coliforms) analysis, Heavy and trace metal analysis of water, sediments and biota, Qualitative and quantitative analysis of plankton and benthic biota and primary Productivity, Techno-environmental assessment of industries adopted for pollution control and its efficacy, Techno-environmental assessment of sewage waste generation by nearby towns and settlements being discharged into the river, Suggestive measures for river rejuvenation etc.

The entire stretch from its point at entry to its exit point in the State of Jharkhand would be studied for not only physico-chemical parameters of water quality but also the biological richness through a network of water quality monitoring stations. It will give recommendations on the specific interventions required by industry which lets industrial effluents into the river to improve the water quality. It was also informed that the JSPCB has a network of 21 stations already in the stretch and monitoring the water quality. Much of the poor quality of the river water is due to discharge of untreated sewage form the various municipalities, wastes from coal washeries and industries discharging effluents into the river. However the present study would be comprehensive collecting data not only on major physico-chemical parameters but also on biological parameters.
The Committee observed that JSPCB is already monitoring the Damodar river stretch flowing through Jharkhand at key locations. The Committee also noted that a number of such studies including a comprehensive Regional assessment of River Damodar by NEERI have been already undertaken and desired to know what action has been taken by the State Government to implement the recommendations/outcome of these studies. The Committee noted that much of the pollution problem of River Damodar is due to poor implementation of pollution control laws and poor compliance of consent and environmental clearance conditions by industrial units along the river. The matter of heavy metals from effluents from coal washeries can also be prevented through compliance of Environmental clearance conditions by treatment of effluents before discharging into the river. The Committee also stated that in regard to municipalities, the Ministry of Water Resources, Ganga Rejuvenation and River Development is implementing the National Mission on Clean Ganga (NMCG) for the cleaning and rejuvenation of River Ganga and its tributaries. The NMCG covers the entire aspect of status of water quality, action plan for cleaning, monitoring and rejuvenation of the River Ganga and its tributaries.

The Committee also desired to know the value addition that this proposed study would bring to improve the water quality of River Damodar. The Committee also observed that the cost of the proposed study appears to be very high. The equipment Ion Analyser costing Rs 28 lakhs of the total Rs 32,45,000 for cost of equipment is already available with CMFRI and must be deleted. The Committee was of the view that the PI must revise the proposal to cover the aspect of rejuvenation of River Damodar and submit the same to the Ministry of Water Resources, Ganga Rejuvenation and River Development for their consideration for funding. In view of the above, the proposal was not recommended for funding.

II CONSIDERATION OF ON-GOING R&D PROJECTS FUNDED UNDER OLD R&D SCHEME


The project was considered in the 4th meeting of Steering committee held on 09.10.2018.

Project Details: This ongoing project was started on 1st June, 2016 for a period of 3 years with a total cost of Rs. 63,90,920/-. The tenure of the project will be over in August 2019 when the first sanction was released. A total of Rs 28,47,520/- has been released so far out of approved project cost of Rs 63,90,920/-. UC, ES, GFR 12 A, Proforma for maintain assets and Progress report for FY 2017-18, etc have been received. PI has submitted 5 copies of Interim Progress report, Executive Summary, Undertaking of project completion, Bills/ invoices & photographs of equipment, proforma of maintaining assets and details of R&D work done in the meeting.

Objectives of the study:

- Bulk utilisation of red mud for making Advanced Ligno-Silico- Aluminous (LSA) Geopolymeric Materials.
- Characterization of Red Mud and Fly Ash.
- Development of Ligno-Silico (LS) alkaline activator utilizing agro waste i.e. rice husk
and alkaline chemicals.

- Characterization of the developed Ligno-Silico (LS) alkaline activator.
- Development Mix Design for Ligno-Silico- Aluminous (LSA) Geopolymeric Concrete,
- Development of Prefabricated Paver Blocks as construction material.

Red mud has a high content of FeO3 to the extent of 34% and has low Silica content. As a result, the strength of red mud as building and construction material is low. By mixing with flyash which has very high silica content, the strength of geo-polymer mortar in the red mud-flyash blend mix is increased. A 20% blend of red mud is good for use as making pre-fabricated materials and also for construction of pavement blocks/bricks. Replacement of cement with red mud-flyash mix, would reduce the CO2 emissions to an extent of 80%. The technology should be used within the premises of bauxite mines and the linked Alumina industrial projects and also used in pavement making within a radius of 5-10 km of production of red mud.

The Steering Committee had sought the following:

i) Exact data on reduction of carbon footprint by use of red mud-flyash mix material vis-a-vis other conventional materials.

ii) Details of physico-chemical properties of material produced by this technology vide use of conventional materials may also be furnished in a comparative table.

iii) The hazardous nature of the blend may be examined as Red mud has been classified as a hazardous substance and requires prior consent/authorisation from SPCBs.

These have been received from the PI vide letter dated 08.01.2019 and are given below:

(i) Data on reduction of carbon footprint by use of red mud-fly ash mix material via-a-vis other conventional materials may be furnished.

It was informed that the carbon dioxide emission reduction in Geopolymer Concrete as compared with cement concrete is 83%.

(ii) Details of physico-chemical properties of material produced by this technology vide use of conventional materials may also be furnished in a comparative table:

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Cement (As per IS 269 :2013)</th>
<th>Fly Ash</th>
<th>Red Mud</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fineness m²/kg min</td>
<td>225</td>
<td>320</td>
<td>250</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>3.15</td>
<td>2.21</td>
<td>3.2</td>
</tr>
</tbody>
</table>
Compressive Strength (MPa) of Cement Mortar compared with Advanced Red Mud - Fly Ash based Geopolymer Mortar

<table>
<thead>
<tr>
<th>Age in days</th>
<th>*Cement (OPC) Mortar</th>
<th>Advanced Red Mud -Fly Ash based Geopolymer Mortar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100%FA +0%R.M.</td>
<td>90%FA + 10%R.M.</td>
</tr>
<tr>
<td></td>
<td>90%FA + 20%R.M.</td>
<td>80%FA + 30%R.M.</td>
</tr>
<tr>
<td></td>
<td>70%FA + 40%R.M.</td>
<td>60%FA + 50%R.M.</td>
</tr>
<tr>
<td>3</td>
<td>40.36</td>
<td>43.92</td>
</tr>
<tr>
<td>7</td>
<td>51.42</td>
<td>47.45</td>
</tr>
<tr>
<td>28</td>
<td>59.40</td>
<td>58.27</td>
</tr>
</tbody>
</table>

Chemical Composition Comparison of Raw Materials i.e. Cement (OPC), Fly Ash and Red Mud

<table>
<thead>
<tr>
<th>Chemical Composition (%)</th>
<th>Cement (OPC)</th>
<th>Fly Ash</th>
<th>Red Mud</th>
</tr>
</thead>
<tbody>
<tr>
<td>SiO₂</td>
<td>21.25</td>
<td>62.12</td>
<td>8</td>
</tr>
<tr>
<td>Al₂O₃</td>
<td>4.33</td>
<td>21.30</td>
<td>25.9</td>
</tr>
<tr>
<td>Fe₂O₃</td>
<td>1.85</td>
<td>5.55</td>
<td>34</td>
</tr>
<tr>
<td>TiO₂</td>
<td>0.13</td>
<td>1.38</td>
<td>16</td>
</tr>
<tr>
<td>MgO</td>
<td>1.81</td>
<td>1.58</td>
<td>-</td>
</tr>
<tr>
<td>CaO</td>
<td>64.30</td>
<td>0.53</td>
<td>2.7</td>
</tr>
<tr>
<td>K₂O</td>
<td>0.71</td>
<td>4.24</td>
<td>-</td>
</tr>
<tr>
<td>Na₂O</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>V₂O₅</td>
<td>-</td>
<td>-</td>
<td>0.03</td>
</tr>
<tr>
<td>LOI</td>
<td>-</td>
<td>3.30</td>
<td>9</td>
</tr>
</tbody>
</table>

The hazardous nature of the blend may be examined as Red mud has been classified as a hazardous substance and requires prior consent/authorisation from SPCBs.

Red Mud has very less silica content and in combination of Red Mud + Flyash it is not defined as Hazardous under the Hazardous Waste Rules.

The PI made a presentation. It was stated that red mud-flyash mix generates 83% less carbon dioxide as compared with concrete blocks. The strength of Red Mud based Paver Bricks also had a high strength of M-40. Red Mud has very less silica content and in combination of Red Mud + Flyash it is not defined as Hazardous under the Hazardous Waste Rules. Leachability Studies (TCLP) indicated that the heavy metal concentrations of heavy metals such as Lead, Cadmium, Chromium and ferric oxide were below Detection Limits (BDL). The PI stated that the next phase of work involves use of Paver Blocks to make a stretch of 50-100 ft of road as a lab-land demonstration of the technology.

The PI stated that a total so Rs 10.95 lakhs have been utilised. The PI has also sought an extension of 7 months until 31.03.2020 without additional funds.

The Committee stated that the Ministry could fund as part of project fund, for the dissemination of this technology to all Government Departments in Centre and in States
and to various institutions such as CII, FICCI, Industry associations, etc. For this, the PI may make a 3-4 page Brochure with details of the environmental friendly aspect and cost effectiveness of the technology and its range of applications. The Committee also stated that PI may submit details of cost for bringing out this Brochure and printing for large scale dissemination.

The Committee recommended release of the next instalment of Rs 17 lakhs (including reimbursement of expenses incurred under the project by parent institution) subject to receipt of all requisite documents required for release and them being in order. The Committee also recommend the extension of the project tenure for 7 months until 31.03.2020 with no additional funds (except for Brochure and arrears for fellows) for completion of the work.


The proposal was considered in the first meeting of Steering Committee held on 09.06.2018.

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 SO2, NO2, CO, O3 on growth of different forest tree species.

ii) Influences of air pollution on CO2 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 had observed that the scope of work undertaken and methodology of the work carried out in not clear. The Committee had 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 Chhattisgarh which fall in the study area is important.

The Screening Committee had 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 an 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 had 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 had also sought details on the 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 had decided that the FTR be further considered after comments/inputs on the FTR received from experts in CPCB, IIT, Bombay, etc.

The Committee was informed that the complaint from the Research fellow is in regard to payment of arrears due to revised pay/emoluments. The Committee desired that the names of the fellows and the period for which the arrears need to be paid may be furnished to Ministry in a tabular form for processing for release. CPCB vide letter dated 03.05.2019 has provided comments, wherein a number of issues have been raised. The Committee, after deliberations, decided that the letter of CPCB may be forwarded to PI for his point-wise response which may be submitted as Additional Report to the FTR. The Committee decided that upon receipt of its clarifications as an Addendum Report to the FTR, the Ministry may consider release of Rs 5 lakhs balance (in addition to the Rs 2 lakhs unspent with PI) and then close the project.


The project was considered in the 4th Meeting of Steering Committee held on 28.09.2018.

Project Details: This ongoing project was started on 1st January, 2016 for a period of 3 years with a total cost of Rs. 71,78,000/-. The tenure of the project was over on 31st December, 2018. A total of Rs 47,14,160/- has been released so far out of approved project cost of Rs 71,78,000/-. PI submitted utilization certificate, GFR 19 during the meeting. Progress report, ES and GFR 12A for FY 2017-18 have also been received.

Objectives:

i) Synthesis of silica- and TiO2 nanoparticles and surface modification by siloxylation.

ii) Preparation of MCM-41 mesoporous silica nanosphere (MSN) nanoparticles.

iii) Preparation of pore- expanded MCM-41 MSN nanoparticles and surface modification.
iv) Preparation of macro cycle functionalized silica-and titanium dioxide nanoparticles by covalently conjugating macro cycles via the siloxane linkage.

v) Preparation of functionalized-dendritic wedges appended silica- and titanium dioxide nanoparticles by covalently conjugation the wedges via the siloxane linkage.

vi) Development of inorganic-organic hybrid nanomaterials by covalently conjugating macro cyclic ligands onto the interior walls of the MSN nanoparticles.

vii) Development inorganic–organic hybrid nanomaterials by covalently conjugating dendritic wedges onto the interior walls of the MSN nanoparticles.

viii) Quantification of the grafting agents onto the surface of the nanomaterials.

ix) Study of the morphology of the inorganic-organic hybrid nanomaterials.

x) Study the sorption behaviors of metal ions, inorganic anions, and organic matters by the inorganic-organic hybrid nanomaterial and their subsequent regeneration.

xi) Study of the disinfection of natural biological pathogens from water samples by the dendritic wedges appended TiO2 nanoparticles under UV/ Visible light irradiation.

xii) Development of Hybrid nanomaterial packed column reactor for the purification of water from natural aquifers.

xiii) Development of composite nanomaterial packed bed reactor for the purification of water from metal ions, organic impurities, and pathogens.

xiv) Development of hybrid nanomaterial packed column reactor for the purification of water from natural aquifers.

Outcome of the study:

i) Heavy metals such as Copper, Cadmium, Zinc, Nickel, and Iron ions were not detected after treatment of water sample from industrial estate using SiO2-L1 and Treatment of well water sample from tannery area and pond water using TiO2-L1.

ii) The NPs serve as fast and high-capacity adsorbents.

iii) These hybrid nano particles are well-dispersed in water, stable over a wide pH range, and expand the sorbent-based separation technology for the removal of waterborne contaminants.

iv) The sorption capacity of these hybrid materials can be exploited for the rapid and efficient removal of metal ions, organic matters, and biological pathogens from natural water.

v) The application potentials of nano particle-based adsorbents can be expanded by changing the ligands capable of binding with the waterborne contaminants.

The PI had informed that the product and technology developed under this project will be potentially useful, demand driven, and could be implemented by other agencies and users. These hybrid nanomaterials are nontoxic and environmentally friendly. These nanofilters are easily recycled after prolonged use without additional cost input and environmental pollution. Regarding cost-benefit analysis in terms of physical outputs and environmental benefits, the hybrid nano materials are expensive than the naturally occurring clay-based filters. These nano adsorbents are recyclable with 100% efficiency. In terms of long life and
the operational efficiency of these nano materials and the water purification process is economically viable. These hybrid nano adsorbents are nontoxic.

The Screening Committee had noted that the Column-type reactor assembly for water purification is to be developed and regeneration and recycling of used nano adsorbents is to be tested. The Committee after discussions was of the view that the project requires being completed to draw definitive conclusions on the efficacy of the new methodology for the synthesis and use of macrocycle and dendritic wedges functionalized silica- and TiO$_2$ nano particles and testing of the sorption behaviour of metal ions, inorganic anions, and organic matter by the nano filters.

In addition, Audit Party of the MoEFCC has made the following observations:

(1) No fund was released to the institute after release of the first instalment of Rs. 47.14 lakhs in November, 2015.

(2) Institute did not report any interest earned on the grant held with them and ‘NIL’ amount was shown against the same.

(3) In September, 2018, the Steering Committee, while reviewing the project asked the PI to complete the project with definitive conclusions and sought the details of the balance work to be completed along with time-frame.

(4) Though the institute stated (in March, 2019) that it advanced a total amount of Rs. 24.83 lakh for the project work during 2017-18 & 2018-19 in anticipation to the release of same from Ministry, it did not report and furnish the outcome and Final Technical Report/Project Completion Report after the expiry of the project duration in December 2018 till date (April, 2019).

Therefore, outcome/achievements/status related to ‘development of the affordable Hybrid nano-material based water filters’ under the project could not be ascertained.

The PI has submitted the Final Technical Report which was considered in the meeting. PI made presentation before committee. It was informed that PI has initiated development of a new methodology with Double column-type reactor for the synthesis of macrocycle and dendritic wedges with water purification assembly packed with composite nanoparticle column has been developed. The Nano adsorbents for water purification involves disinfection strategy of biological pathogens from water samples by the titania nanoparticles-based water filters. Analysis of water sample collected from Chennai urban areas, treatment of water sample from industrial estate pond water, bore well water using SiO$_2$ and TiO$_2$ was carried out. These hybrid NPs are well-dispersed in water, stable over a wide pH range, and expand the sorbent-based separation technology for the removal of waterborne contaminants. The sorption capacity of these hybrid materials can be exploited for the rapid and efficient removal of metal ions, organic matters, and biological pathogens from natural water. The NPs serve as fast and high-capacity adsorbents. The application potentials of NP-based adsorbents can be expanded by changing the ligands capable of binding with the waterborne contaminants. The operational parameters of the sorption behavior of metal ions, inorganic anions, and organic matter by the nanofilters are very simple. Recycling technology for the regeneration of the nanoadsorbents after prolonged use is developed.
Cost-benefit analysis in terms of physical outputs and environmental benefits (techno-commercial feasibility) has been carried out. It was observed that the hybrid nanomaterials are expensive than the naturally occurring clay-based filters. These nanoadsorbents are recyclable with 100% efficiency without additional cost and environmental pollution. In terms of long life and the operational efficiency, the water purification process is economically viable. The product and technology developed under this project is potentially useful, demand driven, and could be implemented by other agencies and users. The project is based on the application of nanoscience and technology with a promise of giving potable water. Other Beneficiaries are (Public Utility Services): Decentralized water treatments (package water treatment plants) and Point-of-entry (POE) and point-of-use (POU) water treatment units designed to process small amounts of water.

The Screening Committee had sought details of the following:

i) Balance work to be completed and time frame for completion.
ii) Comparative table of the techno-economic feasibility and efficacy and long-term sustainability of the technology be furnished in terms of all the physico-chemical parameters of water treatment as per ISI standards by conventional treatment vis-à-vis the present technology in the Final Technical Report at the stage of completion of the project.
iii) Cost effectiveness of the technology for achieving ISI Drinking Water standards vis-à-vis conventional technology.

The Committee noted that the details sought by the Screening Committee are still awaited. The Committee desired that point-wise response to comments of Steering Committee Meeting held in September 2018 is to be addressed in the FTR as an Addendum Report. The Committee desired that the PI submit the Final Technical Report, plus an Addendum Report with point-wise response to issues raised by Screening Committee as above, Consolidated UC and ES, Checklist for submission of all relevant documents duly filled in for release of balance funds.

8. F. No. 27-1/2015-RE – “Implications of land cover/land use and Climate Change on soil moisture variability in India”. PI: Dr.Vimal Mishra, Asst Prof, Civil Engineering, Gandhinagar, Gujarat.

Project was sanctioned on 14.08.2015 for a total amount of Rs 54,64,000/- and for a period of 2 years. One instalment was released for Rs 14, 53, 500/- Tenure got over on 13.08.2017. There was no communiqué from PI for nearly 2 years. Thereafter Ministry wrote to PI for status of project in 2017. PI did not submit the requisite documents including FTR, UC, ES etc. Now the report has been received which is to be considered by the Committee.

Objectives of the project:

i) To provide a platform to top quality scientists & engineers of India or of Indian origin desirous of working at the forefront of environmental sciences, engineering and technology with a focus on problem solving environmental research.
ii) To develop a community of researchers with diverse backgrounds, united by intellectual curiosity, top quality scholarship and drive to undertake research on important environmental challenges facing the country today.

iii) To find solutions, through scientific research, to the practical problems of environment and their application in field, leading to visible improvement in the environment of the country.

iv) To utilize and expand the resources available in the identified environmental schools/institutions of the country, to address complex environmental problems.

v) To undertake research in the thrust area (S) identified by the Management Committee in the host institution, while also strengthening connections across the other participating environmental schools.

The PI made a presentation of the FTR before the Committee. Forest cover in the country has reduced by 48% to 11% over India from 1770 to 2005. Moreover, cropland has increased by 17% to 24% in the last three century. It was informed that Deforestation impacted water and energy cycle as well as near-surface climate dynamics. Conversion of forest to cropland affects land surface temperature. Climate variability affects precipitation and temperature of the region at seasonal and annual scales. On the other hand, climate change may lead to a significant shift in the hydrologic cycle which in turn may affect partitioning and water and energy cycle variables. PI used reclassified globally reconstructed Land Use Land Cover (LULC) data and bias corrected Precipitation and Temperature data from BNU-ESM, CESM1-CAM5, GFDL-ESM2M, MPI-ESM-LR, and NorESM1-M. PI simulated evapo-transpiration (ET), total runoff (TR) and soil moisture (SM) using Variable Infiltration Capacity (VIC) model.

The study also performed one grid sensitivity analysis to study effect of LULC, Climate and it’s interaction on water budget. Estimated change in water budget using LULC and climate runs and calculated Standardized Soil moisture Index (SSI < -1.2) for severe drought. Evaluate the influence of the historic land cover change [1770-2005] on water budget. Estimate the influence of projected future climate change (reference LULC 2005 + Projected Future Climate and Estimate the influence of the projected climate change considering the historic land cover [2005 LULC + Future Climate, 1770 LULC + Future Climate. Sensitivity Analysis carried out. It was found that ET change is negative during forest to crop conversion under varying climate. TR and SM change are more under interaction condition than individual impact of LULC and climate.

The study found change in Water Budget under LULC: and evapo-transpiration (ET) decreases by 10% with deforestation in Gangetic plain from 1770 to 2005. Transpiration Rates (TR) (20%) and soil moisture (5%) increased under LULC change. ET increases during January to July (except February) and decreases during August to December. Whereas, TR and Soil Moisture (SM) decrease during monsoon season. The study found an increase in the drought frequency over the Gangetic plain and central India for LULC 2005. Drought frequencies are projected to decrease under LULC 2005 than LULC 1770 in peninsular India during near, mid and end period. However, drought frequencies are more for LULC (1770) than LULC (2005). These results indicate that droughts are also sensitive to LULC.

The conclusion drawn from this study is that forest has reduced from 48% to 11%, whereas, cropland has increased from 17% to 24% over the last three centuries. This has resulted in a decrease in evapo-transpiration (by 10%) and an increase in total runoff (by
20%) and soil moisture (by 5%) over Gangetic plain, Central and South India under LULC change, an impact on total runoff is more significant under climate change whereas soil moisture change is higher under LULC change, fewer drought frequencies and areal extent under current LULC (2005 year) than historical LULC (1770 year) and drought frequencies are projected to increase under a warming climate, LULC and climate change, both have consequential implication on agricultural drought in the projected future.

The Committee observed that PI has completed this project and submitted Final Technical Report (FTR) to Ministry. The Committee observed that it is good work and has been used by IMD in their forecasting. The FTR was accepted. The Committee recommended for the release of balance funds by the Ministry after receiving Checklist duly filled, Expenditure Statement, Consolidated Utilization Certificate etc.


The proposal was considered in the 3rd meeting of Steering Committee held on 30th August 2018.

Project Details: The project was started on 10th May, 2016 for a period of 3 years with a total cost of Rs. 53,52,680/-. The tenure of the project will be over in 9th May, 2019. A total of Rs 19,94,550/- has been released so far out of approved project cost of Rs 53,52,680/-. PI had been requested to make a brief presentation on the progress of the project before the Committee and for furnishing of documents. PI has attended the meeting and informed that he will submit audited Utilization Certificate, Expenditure Statement, GFR 12, GFR 19, DBT details, invoices, photographs of equipment and Annual Progress Report for the FY 2017-18.

Objectives:

i) The objective of the approved project is to gather current data on ecological parameters related to structure and functioning of vegetation and other habitat factors of Gir forest ecosystem and

ii) compare the same with baseline data and information, to gather current data on ecological parameters related to prey populations of Gir forest ecosystem and compare the same with baseline data and information,

iii) to investigate unstudied aspects of ecology of studied species and to gather ecological data on unstudied species of Gir forest ecosystem,

iv) to assess and quantify ecosystem services of Gir forest ecosystem,

v) to carry out overall analysis and synthesis of past and current information from ecosystem’s Perspective in order to extract ecological gradients, patterns and predict future trends.

The PI had earlier made a presentation before the Screening Committee in its 3rd meeting held on 30th August 2018 on the progress of the study. It was stated that Chital is the key prey species for lion and leopard, there has been moderate increase in population of Chital but its consumption has increased manifold, data for 5 such species have been collected which was not available till date/Species were not studied till date. PI acknowledged the cooperation of Government of Gujarat and Field Director, Gir National Park in execution of the project.
The PI had informed the Committee that the Gir National Park was extensively degraded during 70s due to ecosystem degradation. The Park covers a total area of 895 sq km. The Park harbours an average 60 lions/sq km as against 50-55/sq km during 1985-87. The total population of lions has been estimated as 700 in 2018 as against 250 in 1985-87. Similarly, there has been an increase in the prey population of Chital and Sambar Deer which form their prime diet estimated as 2.3/sq km.

**Work carried out so far:**

Of the total 895 sq km, the project has studies an area of 200 sq km so far. The balance area also requires to be studied. A total of 100 camera traps were set for 2 seasons (pre-monsoon and winter) each for 90 days. Camera trapping in western part of Gir from April, 2017 to June 2017 and November 2017 to March 2018. 420 vegetation plots have already been laid in whole Gir. Systematic sampling was followed using 2X2 km grid. Data were collected on tree layer, shrub layer, herb layer, seeding, sapling and indirect evidences in vegetation plots. Vegetation data computer feeding is on. 80 plots were chosen from different forest ranges of Gir to estimate densities of trees. 35 vehicle transects were run in whole Gir ranging from 13 to 30 kilometres. Data entry completed for analysis. Densities of Chital and Sambar were calculated using programme DISTANCE 7.2. Food plant species of chital assessed through direct sightings. A total of 200 km² area (50 sites) was covered with an effort of 2500 trap nights.

Data pertaining to status, distribution, activity pattern and habitat preference of large and small mammalian fauna has been collected. Scat collection for lion, leopard and small cats carried out in summer 2018.

**Work to be carried out yet:**

- Camera trapping in central and eastern part of Gir.
- Ungulates census in winters and summer season.
- Scat collection of lion and leopards for dietary studies
- vegetation sampling around camera traps for habitat use studies of large and small mammalian fauna
- Radio collaring of leopard to study their spatial ecology

The PI had informed the Screening Committee that the Park Authorities and the Government of Gujarat have given full cooperation in carrying out the study. PI had sought approval of use of funds available in the project for engaging a Project Assistant and for salary of a Field Assistant required in the project, since this a field-based study, and therefore services of a Field Assistant is required. This had been agreed to.

The Screening Committee after deliberations had desired with PI to complete the balance work, which includes the following:

i) Collection of data on types of food plants, which are key food species for the herbivores in the Gir NP.

ii) The use of GIS overlay maps of the vegetation (type and density), prey population and density and predator population and density for interpretation of the status of health of the Gir National park and prediction on the population dynamics of the predator-prey relationship require to be studied.
iii) Specific recommendations from the study whose implementation will ensure long-term survival of the Lions not only in the Gir National Park in the State of Gujarat but for the long-term survival of the species as a whole in our country

PI had informed the Screening Committee that this would be studied in the next phase of work.

Project tenure was over as on 09.05.2019. PI has submitted a Progress Report in January 2019 and has also sought two years extension for completion of project vie letter received on 17.01.2019. At the time of presentation to SC, PI had only asked for a Field Assistant and had not mentioned that an extension of project by two years would be necessary to complete the balance work.

The TFAC, after discussions, agreed for extension of the project until 31st March 2020. The PI was also requested to furnish all relevant documents, including details of engaging a Project Assistant, period and costs thereof for release of next instalment.

III CONSIDERATION OF REVISED PROPOSALS OF WII DEHRADUN UNDER NEW R&D SCHEME CONSIDERED IN 1st MEETING OF TFAC HELD ON 15.03.2019

10. Reg No 244/2018/RE – “Assessing fine scale distribution pattern, population and habitat status of Northern Swamp deer (Rucervus duvauceli duvauceli) across upper Gangetic Plains of North India”. PI: Dr.Samrat Mondol, Scientist D, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand), Co-PI: Dr. Bivash Pandav, Sc F, WII.

The Swamp Deer (Rucervus duvauceli duvauceli) is a much endangered species in the agriculture-forest landscape of the country and urgent measures are required for its conservation otherwise it is possible that we may lose the species altogether. Specific conservation plans are required to be prepared and implemented by the concerned States on priority.

Objectives of the project:

i. Assessing fine-scale distribution of swamp deer across its habitat in Uttarakhand and Uttarl Pradesh though intensive ecological surveys.

ii. Mapping the distribution of grassland patches with swamp deer evidences along upper Ganga and its tributaries, along with evaluation of extent of grassland usage by wildlife and identify suitable sites for grassland restoration.

iii. Understanding swamp deer movement patterns by radio collaring selected male and female animals in the Jhilmil Jheel Conservation Reserve and Banganga wetland area.

iv. Evaluating genetic composition of the northern swamp deer species using biological samples collected during field surveys.

v. Estimating genetic relatedness, population structure, dispersal direction and rates, and evaluating inbreeding status of existing swamp deer populations etc.
ORIGINAL APPLICATION

PI had stated that swamp deer are endangered with only 50-60 deer found in the natural habitats of Jhilim Jheel and Hastinapur WLS in the State of Uttar Pradesh and found only in grasslands and hence conservation of their habitats is critical to conserving its populations in the two habitats. The Committee had observed that the expected outcome of the study would lead to identifying critical grassland patches with a view to restoring their habitat delineate the boundary of their habitats for better conservation of the species. The Committee was informed that for reducing inbreeding, genetic study would be an important aspect of the study. The Committee had stated that the State Government should be consulted and their views/recommendation be attached with the project. The action plans formulated based on the studies in the project must be taken up with the concerned State Forest and Agriculture Department for implementation. The Committee after deliberations approved the project and requested the PI to reduce the cost by about 5-6 lakhs and resubmit the project with revised cost for funding.

REVISED APPLICATION

• With regard to attaching the view/recommendation of the State Government, we have now incorporated a number of study request letters from Uttar Pradesh and Uttarakhand State Forest Department to WII for swamp deer. We also submit the permission letter from Uttar Pradesh Forest Department for this study.
• As suggested by the committee, the total cost of the project has been reduced by Rs. 400000/- from the consumables head. The PI has stated that any further reduction will make it very difficult to conduct species identification work, which is mainly dependent on faecal pellet collection and genetic identification of those pellets.
• Researcher fellowship has been modified according to the latest enhancement order by the Government of India. The budget for JRF fellowship has increased from earlier Rs. 1085760/- to Rs. 1350240/-.
• The Expected Outputs and Outcome remain unchanged.
• Equipment and manpower requirement remain unchanged.

Project Duration: 2 Years 6 Months

Expected Outputs of the Project:

i) Fine-scale data of swamp deer occurrences.
ii) Detailed mapping and selection of critical habitats for restoration.
iii) Information on swamp deer behaviour and habitat use.
iv) Assessment of minimum number of individuals in each population, possible population structure, relatedness and inbreeding status.

Expected Outcome of the Project:

i. Major outcome will be the most detailed information on northern Swamp deer distribution, habitat use and threats.
ii. Another critical outcome is identification of critical grassland patches for restoration.
iii. The genetic data will be useful in selecting individuals from populations for reintroduction in suitable areas, whenever required

Cost of project: Rs 65,43,240/-
Cost Break-up of project:

<table>
<thead>
<tr>
<th>Tenure</th>
<th>1st Year (in Rs.)</th>
<th>2nd Year (in Rs.)</th>
<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 years 3 months</td>
<td>3546520</td>
<td>1620520</td>
<td>1376200</td>
<td>6543240</td>
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<tr>
<td>Revised proposal</td>
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The component-wise break-up of cost of the project is given below (in Rs.):

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Year 1 (In Rs.)</th>
<th>Year 2 (In Rs.)</th>
<th>Year 3 (In Rs.)</th>
<th>Total Cost (In Rs.)</th>
<th>Original Cost of project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary</td>
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<td>751200</td>
<td>2518240</td>
<td>22,53,760.00</td>
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<tr>
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<tr>
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<td>225000</td>
<td>925000</td>
<td>13,25,000.00</td>
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<td>400000</td>
<td>300000</td>
<td>1100000</td>
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</tr>
<tr>
<td>Contingency</td>
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<td>100000</td>
<td>500000</td>
<td>5,00,000.00</td>
</tr>
<tr>
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</tr>
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<td>0.00</td>
<td>800000</td>
<td>8,00,000 (satellite data acquisition)</td>
</tr>
<tr>
<td>Total Budget</td>
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<td>16,20,520</td>
<td>13,76,200</td>
<td>65,43,240</td>
<td>66,78,760</td>
</tr>
</tbody>
</table>

Manpower Requirement:

- Research Fellows (JRF/SRF) (1)
- Field assistants for surveys and biological sampling (2)
- Local manpower required during swamp deer collaring operations (20)

Additional Equipment Required:

- GPS radio collars (4)

The PI made presentation and informed that he revisions sought by the Committee have been incorporated:

i) Request letters from Uttar Pradesh and Uttarakhand State Forest Department to WII for study on swamp deer have been received. Permission letter from Uttar Pradesh Forest Department for this study was submitted.

ii) Total cost of the project has been reduced by Rs. 4,00,000/- from the consumables head. It was stated that any further reduction will make it very difficult to conduct species identification work, which is mainly dependent on fecal pellet collection and genetic identification of those pellets. Researcher fellowship increased from earlier Rs. 1085760/- to Rs. 1350240/- as per the latest enhancement order by the Government of India.
The Committee observed that Contingency of 2 lakhs, under ‘Any other’: Rs 8 lakhs, GPS Collar each for 3 years are not required and need to be deleted. Travel cost of Rs 11 lakhs is very high. The Committee desired that PI should provide the break up travel cost – in terms of number of trips, number of persons per trip, etc. It was observed that 70 people are to be hired by PI for entering the forest for luring animals. The Committee did not agree to this method of capture as the habitat of animals living in forest will be disturbed. It is also not a scientific technique and animal may die due to shock. Capture of deer should be done in a humane manner with minimum disturbance to the population and in a practical way such as using darts rather than involving force involving use of so many labour. The Committee did not agree to the presence of 70 people inside the dense forest. It was suggested that tranquillizer may be administered to capture animals for collaring.

The Committee noted that the Certificate of Undertaking that the study has not been undertaken before and the equipment is not available in Institution was not signed by Director, WII. The Committee directed PI to keep in touch with the DIG, Wildlife Division in the Ministry. The Committee decided that capture method should be humane and practical with minimum disturbance to wild animal habitats. The Committee decided that PI should suitably modify the project in the light of above comments and resubmit for further consideration.


**Project Duration: 3 years**

**Location of project**: Main study site in Manipur has been selected for this study. In addition to the Keibul Lamjao National Park, Manipur, Bangladesh bordering area in Tripura and Mizoram will also be sampled in detail. It is also proposed to compare the data with the hog deer populations of Corbett National Park, Uttarakhand, Dudhawa National Park, Uttar Pradesh, and Kaziranga National Park, Assam.

The objectives of the original and revised project are the same as given below:

Based on the research gaps identified in the recent publication (Gupta et al, 2018) entitled “Genetic analysis of endangered hog deer (Axis porcinus) reveals two distinct lineages from the Indian subcontinent”, the following objectives are set forth for this study:

1. To assess the genetic diversity of the hog deer populations in northeast India- Two subspecies of the hog deer have been reported from its range.

2. To estimate home range and movement of hog deer in Tripura, Mizoram and Manipur

   This objective will address the key questions – i) Whether KLN P in the Northeast is the only habitat of eastern hog deer (A. p. annamiticus), ii) Is there any population of A. p. Annamiticus remaining in the northeast.

3. Is there any suitable habitat and populations of hog deer left in Tripura and Mizoram
4. To assess the feasibility of the captive breeding programme of eastern hog deer (*A. p. annamiticus*)

5. Is there a need of captive breeding and reintroduction of *A. p. annamiticus* in the other areas of northeast

6. What would be the suitable site for captive breeding of *A.p. annamiticus*

**Cost of Project: Rs 63,49,240/-**

<table>
<thead>
<tr>
<th>Tenure</th>
<th>1st Year (in Rs.)</th>
<th>2nd Year (in Rs.)</th>
<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years under Revised project</td>
<td>32,54,520</td>
<td>16,69,520</td>
<td>14,25,200</td>
<td>63,49,240</td>
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</table>

**The component-wise break-up of cost of the project is given below (in Rs.):**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Year 1 (In Rs.)</th>
<th>Year 2 (In Rs.)</th>
<th>Year 3 (In Rs.)</th>
<th>Total Cost (In Rs.)</th>
<th>Original Cost under Old Scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salary</td>
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<td>719520</td>
<td>775200</td>
<td>2214240</td>
<td>3035520</td>
</tr>
<tr>
<td>Equipment</td>
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<td>1895000</td>
</tr>
<tr>
<td>Consumables DNA Analysis Rs 2,00,000/-</td>
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<td>400000</td>
<td>1500000</td>
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<td>60000</td>
<td>1100000</td>
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<tr>
<td>Travel Cost</td>
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<td>250000</td>
<td>150000</td>
<td>600000</td>
<td>600000</td>
</tr>
<tr>
<td>Contingency</td>
<td>100000</td>
<td>100000</td>
<td>100000</td>
<td>300000</td>
<td>300000</td>
</tr>
<tr>
<td>Institutional Charges</td>
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<td>1669520</td>
<td>1425200</td>
<td>6349240</td>
<td>75,30,520.00</td>
</tr>
</tbody>
</table>

**Expected Outputs of the Project (No change from that in original proposal)**

1. To assess the genetic diversity of the hog deer populations in northeast India.
2. To evaluate the extensive genetic variation among the different hog deer populations from northeast India.
3. To evaluate the home range and movement of hog deer in Tripura and Manipur to estimate the population size and movement of hog deer in its habitat.
4. Information would be available for the population size and movement of hog deer.
v. A comprehensive comparison in genome of *A. p. Annamiticus* and *A. p. porcinus* would be generated in this study that will be the key resource for the future conservation breeding program. This research project would also build genetic database for the conservation action plan.

**Expected Outcomes of the Project (No change from that in original proposal):**

i. The output of the project will address the objectives of the ministry in generating baseline information of threatened fauna. It will also address the NWAP objectives of status assessment of threatened species, conservation of threatened taxa, and identification of landscape level plan for *A. p. annamiticus*.

ii. By prioritising populations for conservation based on their genetic diversity, habitat specificity and vulnerability, the project outputs will help the MoEFCC objectives of identifying and safeguarding the genetically pure populations, and to protect their ecological functioning (NWAP chapters – 2, 3, 14)

iii. The output of conservation action plan involves assessing the abundance and distribution status of *A. p. annamiticus*, and its habitat relationships. This will add to the baseline information on other sympatric ungulate species, where very little information is known, especially from the northeastern region.

iv. By identifying climate refugias that harbour suitable habitats, critical for the persistence of the target species, we would be securing the future of the vulnerable populations and contributing to the MoEFCC objectives of being able to conserve natural habitats in the face of climate change (NWAP chapter- 6).

v. The output of the study will help MoEFCC to address the Aichi Targets 2011-20.

**Additional manpower Requirements:**

- Lab Assistant 1
- Research Fellows (JRF/SRF) 1
- Field Assistant 1

**Additional Equipment Reqd (not available in institution)**

<table>
<thead>
<tr>
<th>S.N</th>
<th>Name</th>
<th>No of Unit in Revised Application</th>
<th>No of Unit in Original Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drone Quadracopter and accessories</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Binoculars</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Spotting scope</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>GPS</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Compass</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Digital Camera</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Work Station Desktop</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Telemetry System</td>
<td>5</td>
<td>5</td>
</tr>
</tbody>
</table>
The Committee noted that the study with the aforesaid objectives has been already completed by the PI earlier and a Paper titled “Genetic Analysis of endangered hog deer (Axis porcinus) reveals two distinct lineages from the Indian Sub-continent” has been already published in Nature in its 6th July 2018 edition. In addition, several other studies on the same subject have been carried out. The earlier study of PI which has been published has studied the intra-species structure, differentiation and demographic history from three landscapes – i) Terai-Arc, ii) North-East and iii) Indo-Burma (Keibul Lamjao National Park (KLNP), Manipur) landscapes. Level of variation and divergence using mitogenome techniques have been carried out and the genetic diversity of the Hog Deer populations were studied. The study has concluded that the KLNP population is a probably a prime isolated and sustaining stock of A. P. anamiticus and should be managed as evolutionary significant units.

The Committee noted that although, this paper finds mention in the list of publications in the revised application, the PI has not specifically stated in the relevant section under Part A of the Application that the project has already been taken up and completed wherein this information should have been specifically mentioned. Instead, the PI under the relevant Section in Part A of the Application on whether the PI had undertaken/completed any projects, has stated as “Not Applicable”, which is incorrect. The Committee after deliberations decided not to recommend the project for funding.

12. Reg. No. 286/2018/RE - “Inventorisation and Assessment of RET Species in select Protected Areas and their Eco-sensitive Zones of India”. PI: Dr.K.Sivakumar, Scientist F, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand), Co-PI: Dr.Gautam Talukdar, Sc F, WII

**Duration of project:** 3 years

**Location of project:** The first phase of this study includes three study sites from three Biogeographic Zones (i.e. Coastal - Bhitarkanika National Park Himalaya - Nanda Devi National Park Western Ghats – Bandipur Tiger Reserve). Minimum three sites are required to be sampled to get the meaningful information so that it can be used for developing nationwide guidelines for preparation of management Plan of ESZs.

**Objectives of the project:**

1. Building the knowledge-base for existing RET species within select PAs and their ESZs of India from literature reviews and primary data collection at fields.
2. Inventory and assessment of distribution patterns of RET Species in select PAs and their ESZs.
3. Mapping of LULC of Eco-sensitive Zones and maintaining a geodatabase of select PAs and their ESZs. Mapping include the Invasive Alien Species (IAS) distribution inside ESZs.

**Expected Outputs of the Project:**

i. Data / Knowledge-base for RET species existing within select ESZs
ii. Geodatabase of select ESZs
iii. Technical report on inventory and assessment of RET species
iv. Modified MEE Framework for ESZ in India
v. Guidelines for Zonal Master Plan of ESZ
Outcomes of the Project:

i. Based on the data collected on status, habitat preference and prevalent threats of the RET species, recommendations for management and planning will flow into the ZMPs of ESZs.

Cost of Project: Rs 126.66 lakhs

The manpower and fieldwork implications for executing the project within 2.5 years is high due to the following - The project budget includes the hiring of manpower, procurement of equipment, base camp renting, and vehicle hiring charges for three separate teams for three zones but at the minimum cost.

<table>
<thead>
<tr>
<th>Tenure</th>
<th>1st Year (in Rs.)</th>
<th>2nd Year (in Rs.)</th>
<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs. lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
<td>63.16</td>
<td>37.66</td>
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<td>126.66</td>
</tr>
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</table>

The component-wise break-up of cost of the project is given below (in Rs lakhs.):

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Year 1 (In Rs.)</th>
<th>Year 2 (In Rs.)</th>
<th>Year 3 (In Rs.)</th>
<th>Total Cost (In Rs.)</th>
<th>Original Cost under Old Scheme</th>
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<tr>
<td>Salary</td>
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<td>31,00,000</td>
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<tr>
<td>Consumables</td>
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<td>1.50</td>
<td>4.50</td>
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</tr>
<tr>
<td>Total Budget</td>
<td>63.16</td>
<td>37.66</td>
<td>25.84</td>
<td>126.66</td>
<td>1,84,35,280</td>
</tr>
</tbody>
</table>

Manpower Requirements in Revised Proposal

Research Fellows (JRF/SRF) 4
Field Assistant 3

Additional Equipment Requirement

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Name</th>
<th>No of Unit (Old proposal)</th>
<th>In New Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Binocular</td>
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<td>3</td>
</tr>
<tr>
<td>2</td>
<td>GPS</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Range Finder</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Drone with accessories</td>
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<td>5</td>
<td>Computer</td>
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<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Camera Trap</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Revisions made in the Revised Application:

1) The project has been revised by selection of only 3PAS + their ESzs from three Biogeographic Zones (i.e. Coastal - Bhitarkanika National Park Himalaya - Nanda Devi
National Park Western Ghats – Bandipur Tiger Reserve) as against the 12 in the original application as given below:


2) Manpower sought under old project: Nil, whereas in the present proposal the PI has sought 4 Research Fellows (JRF/SRF) and 3 Field Assistant.

3) The number of equipment sought has also not been reduced although PAs have been reduced from 12 to 3.

4) Most importantly, the cost of the project has increased from Rs 126.66 lakhs to Rs 184.35 lakhs.

The PI had come for the meeting, but had left before making the presentation.

The Committee had the following observations/sought clarification on the following:

The Committee observed that there was no significant reduction in requirement of equipment and requirement of additional manpower as per details above although the number of PAs and their ESZs have been reduced from 12 to 3 and did not appear to be justified. The Committee was informed that provision of equipment for projects is being done by the Wildlife Division of the Ministry under the Centrally Sponsored Umbrella Scheme of Integrated Development of Wildlife Habitats (IDWH) and the PI may obtain the same as part of Annual Plan of Operation of the WII. The Committee did not agree to the provision of technical research fellows and desired that the PI should engage the staff of the State Forest Department and also build capacity of local persons. The Committee was of the view that the cost for travel appears to be high and sought details of number of trips, number of persons per trip, etc.

13. Reg. No. 254/2018/RE - “Engaging community in conservation of Covert Species in Meghalaya, Northeast India”. PI: Dr. Abhijit Das, Endangered Species Management Department, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand), Co-PI: Shri Salvador Lyngdoh, Scientist D, WII

Project Duration: 3 years

Location of Project: 5 (Reduced from 10) sacred groves in Meghalaya – Jowai (Jaintia Hills), Rangmaw (West Khasi Hills), Phapdem (Ri Bhoi), Damalgiri (West Garo Hills)

Objectives of the Project:

A. Ecological assessment of Amphibian, Birds and Mammalian assemblage in sacred groves of Meghalaya.
1. To determine species diversity and abundance of targeted taxa across different sacred groves of varying patch sizes.
2. To identify potential indicator species for long-term ecological monitoring of the habitat.
3. To develop a long-term monitoring and policy document towards conservation of Traditionally Conserved Areas (TCAs) of the state. Rationale Linnaean and Wallacean shortfalls are the serious impediments in conservation. Ecological information regarding diversity, abundance, community composition, and indicator taxa are lacking from sacred Groves of Meghalaya. This study aims to address two key deadlines in conservation biology that is a. Full Exploration of biological diversity by research in taxonomy, ecology, and behavior. Document the natural history of extant species by standardized survey techniques. The outcome of this objective will be relevant to the identification, characterization, and dissemination of scientific findings.

B. Engaging local communities for conservation benefits
1. To generate awareness among local communities, District council, forest department staff and students by popular talks, posters, and presentations
2. To conduct hands-on training workshops for identification, monitoring and behaviour studies Rationale. To garner public support is the cornerstone in conservation. This is possible if we can educate and aware local community about scientific findings. Many covert species in Sacred Groves are colourful, charismatic and harmless creature. Each species has its own call characteristics, reproductive behaviour, egg laying site, and microhabitat parameters. Frogs and Birds are thus quite a predictable creature to spot in the field. Their morphological diversity, cryptic or aposematic color, species-specific call and breeding requirements, techniques to find them in the field will be all interesting information for young local youths. This may add a whole new dimension in eco-development approach whereby local people can initiate tourism based on the covert creatures that are being conserved in TCAs.

C. Promoting “Sacred Wildlife Watch” using Birds and amphibians as model organisms
1. To generate wide publicity using social media and Institute website
2. Engaging trained “Wildlife Marshal” and project members for organizing the national event such as “Frog race” Bird Race and “Mammal watch”.
3. Documenting and disseminating ethno-zoological values involving target taxa Rationale Community support is the key to achieve long-term conservation benefits. Local communities will be interested to protect a system that offers sustainable livelihood opportunity. In this project, we plan to rope in local communities and Meghalaya Biodiversity board by involving them in our research activities, organizing training workshops and seminars. At the last phase of this study, we try to involve our trained community partners to learn and showcase native biodiversity by organizing “frog Race” and “Bird race” in the selected sacred groves. Since traditional mythological connections with sacred groves are hardly known, documenting such traditional beliefs or folklore will be will be a key contribution towards conserving “biodiversity values”.

Expected Outputs of the project:

i. Checklist, digital photo archive, natural history, breeding biology, Faunal apps with animal call
ii. Understanding patch size dynamics on vertebrate diversity and abundance
iii. Awareness by workshop, training, colour awareness materials
iv. Scientific reports, Collaborative Research papers on New description, redescription, diversity, abundance in peer reviewed journals
v. Awareness programme for students/villagers in various schools of the landscape for sustainable use of Natural resources, NRs conservation and management
vi. Illustrations and documentation of traditional linkages to sacred biodiversity
vii. Abundance, relative abundance of species encountered.
viii. Identification of indicator species (on health of the ecosystem)

**Expected Outcome of the project:**

i. Systematic documentation of selected vertebrate taxa for future conservation benefit
ii. Population level data for future conservation intervention
iii. Status and distribution of rare, threatened and endemic biodiversity in poorly known taxa such as amphibians
iv. Skill development in local youths for biodiversity documentation and monitoring
v. Involving community for long term conservation benefit
vi. Aiding documentation of People Biodiversity Register
vii. Systematic documentation of selected vertebrate taxa for future conservation benefit

**Cost of Project:** Rs 74,48,856/-

<table>
<thead>
<tr>
<th>Tenure</th>
<th>1st Year (in Rs.)</th>
<th>2nd Year (in Rs.)</th>
<th>3rd Year (in Rs.)</th>
<th>Total Budget (in Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 years</td>
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<td>19,55,800</td>
<td>19,41,000</td>
<td>74,48,856</td>
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</tbody>
</table>

**The component-wise break-up of cost of the project is given below (in Rs.):**

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>Year 1 (In Rs.)</th>
<th>Year 2 (In Rs.)</th>
<th>Year 3 (In Rs.)</th>
<th>Total Cost (In Rs.)</th>
<th>Original Cost under Old Scheme</th>
</tr>
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<tbody>
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<td>Salary</td>
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<td>922800</td>
<td>1038000</td>
<td>2883600</td>
<td>31,81,200.00</td>
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<td>450000</td>
<td>320000</td>
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<td>78000</td>
<td>78000</td>
<td>234000</td>
<td>2,34,000.00 + 5,00,000</td>
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</tbody>
</table>
Additional Manpower Requirements:

Research Fellows (JRF/SRF) (2)  
Adhoc labourer (2)

Reduced from original manpower requirement of 2 Research Fellows (JRF/SRF), 2 Research Assistants, 2 volunteers and 4 Field Assistants

Additional Equipment is the same as in original proposal (except for Deep Freezer):

<table>
<thead>
<tr>
<th>S. N.</th>
<th>Name</th>
<th>No. of Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Camera Traps</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>Call Recorder and Microphone</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Projector</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Deep Freezer</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Digital Compact Camera</td>
<td>5</td>
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<tr>
<td>6</td>
<td>Range Finder</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>Binocular</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Head Lamp</td>
<td>10</td>
</tr>
<tr>
<td>9</td>
<td>Torch</td>
<td>10</td>
</tr>
<tr>
<td>10</td>
<td>GPS</td>
<td>2</td>
</tr>
<tr>
<td>11</td>
<td>Laptop</td>
<td>1</td>
</tr>
</tbody>
</table>

The number and quantity of equipment has not decreased despite the reduction in locations from 10 to 5. Also, the same undertaking submitted with original applications has been attached.

PI made presentation before committee. The project was earlier considered in 1st TFAC meeting held on 15th March 2019 and committee sought clarification on following points:

Comments from the Committee in meeting held on 15th March 2019:

Extensive studies have been carried out on Sacred Groves in NE by Shillong University.

1. PI may select 5 Critical Sacred groves and locate them in a map.
2. Salaries, equipment's and consumable should be reduced
3. Recommendation/views of Forest Department should be taken
4. State Forest department and local forest officials should be engaged for capacity buildings.
5. Scientific studies in sacred groves of Meghalaya mainly involve floral and anthropological components.
Revisions made by the PI to the Application:

1) The Study sites have been reduced to five sacred groves - Jowai (Jaintia Hills), Rangmaw (West Khasi Hills), Phapdem (Ri Bhoi), Damalgiri (West Garo Hills). The same depicted on map as desired by committee.

2) Budget reduced from Rs 79,66,404 (Seventy nine lakh sixty six thousand four hundred four) to 74,48,856 (Seventy four lakhs forty eight thousand eight hundred fifty six only). Manpower budget is considerably reduced by omitting salary of two research assistance. So there is a decrease in Rs. 2,97,600 from the earlier budget. An amount of Rs 100000/- for two Deep fridge earlier budgeted are removed from the Budget.

3) Cost of Chemicals and glassware have been removed from cost of Consumables.

4) The Objectives of the Project as suggested by the Committee will involve Meghalaya District Council, State Forest Department and local level forest officials in the project implementation. Also capacity building of the State Forest dept and local communities will be involved as the project commences and until end of project. They will be trained in Wildlife identification, survey and monitoring techniques.

5) Endorsement from the State Forest Dept: Endorsement letter of the State Government by the office of Principal Conservator of Forest (Wildlife) and Chief Wildlife Warden, Shillong, received vide letter no. FWC/G/233/pt-1/22 dated 02 April/19 has been received.

6) Whether the study/similar studies have been carried out earlier: In this regard it was clarified that no studies hitherto conducted to understand the diversity, ecology and abundances of Reptiles, amphibians, Birds and small mammals of sacred groves of Meghalaya. Besides, no studies looked into involvement of community in the conservation of covert vertebrate diversity of sacred groves of Meghalaya. Scientific studies undertaken in sacred groves of Meghalaya mainly involve floral and anthropological components. Role of Sacred groves in conservation of floral Biodiversity was studied by Khan et al (2008), Traditional knowledge by (Jeeva et al 2006), impact of anthropogenic disturbance on plant diversity by Mishra et al (2004), Biodiversity values mainly from floral perspectives by Tiwari et al (1998) and tree diversity of Sanced groves by Upadhay et al (2003) and medicinal plants of sacred groves by Laloo et al (2006).Therefore, no studies hitherto conducted to understand the diversity, ecology and abundances of Reptiles, amphibians, Birds and small mammals of sacred groves of Meghalaya. Besides, no studies looked into involvement of community in the conservation of covert vertebrate diversity of sacred groves of Meghalaya. Thus the proposed project is the first of its kind to be implemented in the following five sacred groves of Meghalaya.

7) The PI informed that State Forest department and local forest officials would be engaged for capacity buildings which are incorporated in the revised proposal. PI propose to carry out following activities – i) Five training and awareness programs involving local villages, foresters and nearby schools and designing training manual; ii) Training ten community members and forest guards in basic species identification and wildlife monitoring, iii) Two pictorial field guides, iv) one comprehensive report, and v) at least five scientific peer reviewed publications from this project.
The Committee observed that PI reduced the number sacred groove from 5 out of 10 but still the budget has not been commensurately reduced i.e. to Rs 37,24,428 /-. In this regard, the Committee made the following observations:

i) King of Sacred groove in North Eastern state should be taken into confidence for carrying out this study. Committee suggested that the resources available with State Forest Department should be used.

ii) Camera Traps @ cost of 20,000 needs battery. Duracell batteries should be purchased in bulk then it would be cheap. Camera Trap will be provided by Wildlife Division of this Ministry. Compact camera to be given to community members of villages for taking picture of wild animal is not necessary as everyone has mobile handset.

iii) Base camp will be provided by Forest Dept. The forest department may be encouraged to be involved which would further minimise the budget of project.

iv) Travel cost should be reduced as the community will be involved in the project.

The Committee was informed that a project has been funded by MoEFCC under the All India Coordinated Project on Sacred Groves (No. 22/11/2011 –SG/RE) on Ecosystem Services Assessment of Meghalaya by Dr. S.K. Barik, Dept. of Botany, School of Life Sciences, North Eastern Hill University, Shillong for a total outlay of Rs 60,99,920 /-. The PI has not examined the proposal. The Committee after deliberations decided not to recommend the project for funding as major scope of the project has been already covered under this project funded by MoEFCC.

IV INTERNAL CONSIDERATION OF PROJECTS APPROVED/FUNDED UNDER OLD R&D SCHEME


Project Details: This project was started on 10th July, 2015 for a period of 3 years with a total cost of Rs. 24,17,100/-. Tenure of the project was over on 9th July, 2018. A total of Rs 12,90,870/- has been released so far out of approved project cost of Rs 24,17,100/-. The PI has refunded a DD of Rs. 12,63,894/- vide letter dated 24.04.2018 intimating that she is unable to execute the project and same has been deposited to Govt. Account. Final settlement is due.

The Audit Party of the MoEFCC has made the following observations:

(1) No funds were released for the project after first instalment of Rs. 12.91 lakhs in July, 2015.

(2) PI of the project did not initiate the project work and keeps on asking for re-appropriation of the approved/released budget even after expiry of more than two years.

(3) As per the UC submitted by the PI, a meagre expenditure of Rs. 0.41 lakh was incurred till closure of the project in April 2018. Further, the interest of Rs. 1.04 lakh earned till 2017-18 out of total interest of Rs. 1.18 lakh earned till April 2018 was transferred to the
institute’s revenue account in violation of the GFRs. However, the same got refunded to the ministry after persuasions in October, 2018.

Thus, the project which could result in development of technology to reclaim the re-mud dumping sites of alumina industry as abandoned without any initiation of project work.

The TFAC noted that action has been already been taken by Ministry in this regard and the observations of the Audit Party was noted.

15. (F.No. 19-342/2013-RE) “Utilization of Red Mud as Particulate filler in Polymer Composites”. PI: Prof. Alok Satapathy, Department of Mechanical Engineering, NIT, Rourkela

Project Details: The project has not started so far. PI has regretted to take up project. PI had intimated vide letter dt.10th January, 2016 that he is not proposing to take up the project. No Funds released so far.

The TFAC noted that no funds have been released and the project file may be closed as no action to be taken thereon.


Project Details: The project was not started so far. A sanction of Rs. 19,49,700/- dated 20.05.2016 has been issued but fund could not be released due to UC pending issue. There were 12 UCs pending with BHU of which 3 have been received. Hence PAO has not released the funds and project is yet to take off.

The TFAC noted that the matter of pending UCs has not been solved and decided that the project may be treated as a non-starter and closed.

17. F.No. 19-60/2013-RE - “Comparative Study of ESBL producing and PQMR E,coli and K.pneumoniae from purified tap water and unpurified samples of Yamuna.” PI: Prof. Arif Ali, Jamia Milia Islamia, New Delhi

Project Details: The project was approved by Apex committee in its 5th meeting held on 20.08.2014. First Instalment of Rs. 16,67,074/- was released on 29.10.2014 for FY 2014-15. The sanction order contained some errors. In Sept, 2016, PI came to know that fund was received by the University but PI could not launch the study as a result of the funds not being transferred. PI has requested to revalidate the whole amount for FY 2016-17 as the amount could not be utilised in FY 2015-16 as he was abroad. This Project has not started so far. Decision on re-validation was pending with Ministry.

The Audit Party of the MoEFCC has made the following observations:

(1) The project was approved after two years of submission of the proposal by the PI.
(2) PI did not utilize the funds during 2014-15 to 2017-18 and kept the funds parked since March 2015 while stating that the information related to receipt of funds would be known to him only in September 2016. However, the project work could not be initiated till October, 2018 for want of revalidation/re-approval.

(3) No interest earned/accrued on the released amount of Rs. 16.67 lakh was reported by the institute till date.

(4) Neither the project started even after the expiry of 54 months of sanctioning the project nor the funds were returned back to the Govt. account. Thus, the project only resulted in parking of Govt. funds since March, 2015 till date (April, 2019) even after the expiry of the sanctioned project duration in October, 2017.

The Committee, after discussions, decided that the project should not be taken up as the old scheme is over. The money released along with interest accrued from March 2015 till date should be recovered from the PI. Copy of the letter should be sent to Head of Department and Registrar and Vice-Chancellor with a condition that money should be refunded within two months time. A Statement of status of expenditure and Utilisation Certificate should also be furnished by the PI while returning the funds released.


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 Uttarakhand, to study the laws, rules, regulations on purchase of land and establishment of hotels/resort/ashrams/dharamshala in the state of Uttarakhand.

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 Uttarakhand.

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 Uttarakhand.

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

The Screening Committee after a brief presentation by the PI had decided that the report has to provide specific inputs on the objectives of the study as specified in the project. The Ministry, based on the Committee’s recommendations, had circulated the FTR to concerned Divisions of the Ministry and various organisations such as NDMA for their inputs/comments on the FTR. So far no response has been received.
The Audit Party of the MoEFCC has made the following observations:

(1) Proposal submitted in October, 2013 was considered, approved and sanctioned only by June, 2015 (i.e. after a delay of 20 months)

(2) Though the project duration was completed in June, 2016, the PI kept on submitting progress reports citing the date of completion as 31 December, 2017.

(3) The Final Technical Report (FTR) submitted the PI was circulated to the concerned divisions of the ministry besides NDMA and Govt. of Uttarakhand for their inputs/comments (in June 2018). However, the response/comments on the same were not found on record.

(4) In November, 2018, the Foundation was asked to register itself on the MoEFCC NGO Portal (moefngo.nic.in) for further release of fund. However, status of the same was not on record.

(5) The UC furnished for the period until June 2016 revealed an expenditure of Rs. 6.48 lakhs under the project. However, in September, 2017, it was claimed that an additional expenditure of Rs. 6.29 lakhs was incurred by the Foundation which needs to be checked with reference to the documentary evidence in support of such expenditure as the duration of project was already over and any such expenditure incurred after project duration on Salaries, Travel, institution charges in not allowable. Therefore, the same may be verified before any further release to the GEF.

The TFAC, after discussions, decided that the Ministry follow up with the institutions concerned from whom comments on the FTRs were sought and comments obtained. Thereafter, the balance amount, if utilised during project period could be reimbursed if the FTR meets the objectives of the study.

19. 14/25/2013-RE - “Study of Biodiversity of Udaipur Wetland of West Champaran and its water Quality with conservation being the objective”. PI: Shri R.N.Yadava, Dr.Ram Lakhan Singh Yadav College, Bettiah, West Champaran, Bihar

Project Details: The project was started on 13th February, 2014 for a period of 3 years with a total cost of Rs. 15,75,000/-. Tenure of the project was over on 12th February, 2017. A total of Rs 8,12,000/- has been released so far out of approved project cost of Rs 15,75,000/-. FTR & other documents are awaited. PI was invited to present the progress report before the PAC (EcRP) in the 15th meeting held on 29th February and 1st March, 2016 and in the 17th meeting held on 6th October, 2016, but PI has never attended the meeting of PAC (EcRP) for review of ongoing research project and has not sought more funds. Letters and Emails have been sent on 08.05.2015, 17.02.2016, 16.09.2016, 13.06.2017 and 02.11.2017, 03.11.2017, 28.02.2018 for ES & UC, Progress Report and other documents, but PI has not submitted so far.
The Audit Party of the MoEFCC has made the following observations:

PI never attended the monitoring meetings of Ministry’s Advisory Committee for Ecosystem Research Programme (EcRP) held in Feb/March and October 2016 for intimating the progress of project activities which continued during the entire tenure of the project duration. However, no stern action was taken by the project division against the PI/institution. After the release of the first instalment in February 2014, PI neither furnished any UC/SoE till date nor reported any progress of the project work even after 26 months of the expiry of the project duration of 3 years from the release.

The TFAC stated that a stern letter should be issued by Ministry to the PI with copy to HOD, Registrar and VC giving a time limit of two months for submission of FTR and other requisite document such as consolidated UC, ES, etc failing which action to blacklist the PI will be initiated by the Ministry. UGC, MoHRD and NITI Aayog may also be intimated in case of failure of PI to comply with furnishing of all the necessary documents and Reports and refund the balance unutilised funds.


The project as listed for consideration in the first Steering Committee meeting held on 18.06.2019. PI has informed that he will not be attending the meeting. The project is deferred for consideration in next meeting. The PI later informed that he will not attend the meeting.

The Audit Party has made the following observations:

(1) The cost of project which was recommended for approval with an outlay of Rs. 20.54 lakhs by the Programme Advisory Committee was revised to Rs. 16.17 lakhs while sanctioning could expend only Rs. 8 lakhs (49.47 percent of the project cost) till the completion of project tenure of one year.

(2) Scrutiny of the UC/SoE submitted by the PI for the period from April 2015 to December 2016 revealed that out of total sanctioned amount of Rs. 4.27 lakhs towards ‘Other project expenditure’ for the data collection, field surveys, creation and validation of CFR maps only an amount of Rs. 2.25 lakhs was released by the Ministry. However, the PI could utilize only Rs. 0.93 lakhs on this account during the entire duration of the project and diverted the balance amount of Rs. 1.32 lakhs towards salaries. This shows that the work undertaken in the project was without adequate surveys/data collection/creation and validation of CFR maps.

(3) The acceptance of Final Technical Report (FTR) which required consideration and approval of the Steering Committee could not be done as the PI did not present the same in June, 2018 meeting.

Thus, the financial as well as physical progress of the work under the project was weak and the FTR drafted by PI seems to be without adequate project work.
The TFAC noted that consideration of the FTR has not been done as PI has absented himself from the meeting. The TFAC decided that a stern letter of warning be issued to the PI to attend the next meeting being held in June 2019 to present the findings of the FTR failing which necessary action for recovery of funds released and/or blacklisting of the PI be initiated with copies to MoHRD, NITI Aayog, etc. The matter should also be brought to the Head of WWF, Delhi.

21. F.No.19-56/2014-RE – “Impact of anthropogenic activities on the benthic biodiversity alone the Tamil Nadu coast: Biotic indices approach.” Dr. P Murugesan, CAB in Marine Biology, Annamalai University, Parangipettai (Tamil Nadu)

Project Details: This project has not started so far. 1st sanction was issued on 17.05.2016 for FY 2016-17 but funds could not be released due to pending UCs of the institution. Letters were sent on 14.07.2016/29.08.2016/12.09.2016/04.09.2017 for wants of pending UCs. All pending UCs have been furnished now. However, decision needs to be taken whether the project should be at all taken up as the Scheme has ended as on 31st March 2017.

The TFAC noted that the project has not started and although sanction was issued, no funds were released. The TFAC decided that the Ministry may regret inability to consider the project as the old R&D Scheme was not in operation.

22. F.No.14/95/2013-RE – “Diversity and Ecological mapping on Lepidoptera (Insecta) of Shola Forests of Kerala.” Dr. R. Sheik Mohammed Shamsudeen, Department of Zoology, Sir Syed College, Kannur University, Taliparamba (Kerala)

Project Details: The project was started on 1st April, 2015 for a period of 3 years with a total cost of Rs. 20,55,900/-. Tenure of the project was over on 31st March, 2018. A total of Rs 10,84,800/- has been released so far out of approved project cost of Rs 20,55,900/-. The progress of the project was evaluated in the 17th meeting of the PAC (EcRP) held on 6th-7th October, 2016. Letters were sent on 25.11.2016/13.08.2017/03.11.2017/20.12.2017/02.02.2018/27.02.2018 for ES & UC, progress report, FTR and other documents but no response from PI so far.

The Audit Party of the MoEFCC has made the following observations:

1) PI did not even ask for release of the next instalment after getting the initial funding of Rs. 10.85 lakh in March-April 2015.

2) No SoEs/UCs were furnished after submission of the first UC for the year 2015-16 in August 2016.

3) Steering Committee on R&D Scheme, in September, 2018, also noted the non-responding of the PI after October, 2016 but did not recommend for short-closure/action taken on it. Instead, it only noted the non-furnishing of UCs, progress report, FTR etc. In the routine manner.

Thus, the status of the project was not ascertainable even after 13 months of expiry of the 3 year duration of the project.
The TFAC decided that a show-cause notice with stern warning be issued by Ministry seeking refund of amount released along with interest accrued until date within two months, failing which action will be initiated against the PI including blacklisting of the PI with copies to UGC, MoHRD, NITI Aayog, etc.

23. F.No.14/12/2012-RE – “In-vitro Multiplication and Eco-restoration of *Herbanaria panchganiensis*” – A Critically Endangered Orchid. PI: Dr. Nitin Dongarwal, Rashtra Tukadoji Mahraj Nagpur University, Nagpur, Maharashtra

**Project Details:** The project was started on 17th June, 2013 for a period of 3 years with a total cost of Rs. 21,12,500/-. Tenure of the project was over on 16th June, 2016. A total of Rs. 9,51,000/- has been released so far out of approved project cost of Rs 21,12,500/-. FTR & other documents are awaited. The progress of the project was evaluated in the 15th meeting of the PAC (EcRP) held on 29th February and 1st March, 2016. Letters were sent on 16.07.2015/17.02.2016/13.06.2017/07.11.2017/28.02.2018 for ES, UC, FTR and other documents, which are awaited.

**The Audit Party of the MoEFCC has made the following observations:**

1. No fund was issued to the institution after release of Rs. 9.51 lakh while sanctioning the project in June, 2013.

2. Though the Expert Group of Advisory Committee for Ecosystem Research Programme (EcRP) while approving the project recommended for providing funds towards institutional charges as per GOI norms, the same were allowed at the higher rate of 19.05 percent at Rs. 3.38 lakh instead of Rs. 1.77 lakhs @ of 10 percent, as allowed in other such projects). However, IFD wing of the ministry did not raise any issue on the same, as being done in all other cases scrutinised in audit.

3. The audited UC submitted for the period till March 2014 was incorrect and did not disclose any expenditure during the period. Despite that the balance unspent amount was reduced from Rs. 9.51 lakh to Rs. 4.77 lakh.

4. The monitoring and advisory committee of the ministry, in November, 2014 noted the inadequate frequency of observations by the PI to study sites and suggested for fortnightly visit of the sites. After presenting the progress in the next meeting held in FE-March, 2016, PI neither submitted the Final Technical Report (FTR) nor any UC/SoE for the fund released and utilized under the project despite giving several reminders from July 2015 to February, 2018. However, no action was suggested/taken by the Steering Committee of the Ministry on R&D Scheme while reviewing the projects in September, 2018.

Thus due to poor implementation and financial progress in the project, the status of the project was not ascertainable even after 34 months of the scheduled date of completion of the three year project in June, 2016.

The TFAC decided that a show-cause notice with stern warning be issued by Ministry seeking furnishing of the requisite documents and refund of the amount released along with interest accrued until date within two months, failing which action will be initiated against the PI including blacklisting of the PI with copies to UGC, MoHRD, NITI Aayog, etc. The PI
must also present himself for presentation before the next TFAC meeting being held in June 2019.


Project Details: This is an NGO. Proposal was submitted on 20.12.2012. Project cost was Rs. 25,56,000/- for 2 years. Apex committee approved in its 6th meeting held on 11.02.2015 for Rs. 24,06,000/-. This project has not started so far. No funds released so far.

The TFAC decided that the project is a non-starter and no funds have been released and should be closed with the approval of the Competent Authority.


Project Details: This XIth Plan project was started on 31st January, 2012 for a period of 3 years for a total cost of Rs. 31,17,190/-. The tenure of the project was over on 30th January, 2015. A total of Rs. 23,29,200/- has been released so far out of approved project cost of Rs.31,17,190/-. FTR was accepted by the PAC in 17th Meeting held on 06-07th October, 2016, however details of Outputs-Outcome of the project are not available in the minutes of meeting and basis on which FTR has been accepted. Executive summary, UC and other documents are still awaited.

This case was also listed for consideration in 2nd & 3rd Meeting of SC held on 18.07.2018 & 30.08.2018. PI had been again requested to make a brief presentation before the Committee on the Outputs-Outcome of the Project and for furnishing of documents for settling of accounts, however PI has not attended the meeting.

The TFAC decided that the PI may be asked to present the FTR to the TFAC and also furnish all relevant documents including consolidated UC, ES, etc and refund of balance unutilised amount in the Ministry account within two months failing which action may be initiated to blacklist the PI.

3.0 Any other matter with the permission of the Chair.

The meeting ended with a Vote of Thanks to the Chair.
### ANNEXURE-1

**LIST OF PARTICIPANTS OF THIRD MEETING OF TECHNICAL & FINANCIAL APPRAISAL COMMITTEE (TFAC) OF R&D SCHEME HELD ON 17.5.2019 IN MOEFCC**

1. Prof. C. R. Babu (Retd.), Prof Emeritus and former Pro-VC, University of Delhi  
   **Chairperson**

2. Shri K. Sravanthri Jeevan, Assistant Adviser (PHE), CPHEEO, Representing Dr. Ramakant, CPHEEO M/o Housing and Urban Affairs  
   **Member**

3. Dr. S.S. Samant, Scientist G, Scientist In-charge, HRC, Mohal-Kullu, H.P  
   **Member**

4. Dr. P. Madeswaran, Scientist G, Representing Director, National Centre for Coastal Research (NCCR), Pallikkaranai, Chennai  
   **Member**

5. Shri G. Rambabu, Scientist D, WM-1, Central Pollution Control Board, Delhi  
   **Member**

6. Dr. V.K. Soni, representing Director, India Meteorological Dept., M/o Earth Sciences, GoI  
   **Member**

7. Dr. T. Chandini, Advisor (RE), MoEFCC  
   **Member-Secretary**

**MOEFCC**

1. Shri S.P. Vashishth, DIG(WL)  
2. Dr. Tashi Wangdi, Director (RE)  
3. Dr. Rubab Jaffer, Joint Director (RE)  
5. Ms. Akanksha Sanchan, ASO (RE)  
6. Shri Goldee, Office Assistant

**LIST OF PROJECT INVESTIGATORS (PIs) PARTICIPATED IN 3RD TFAC MEETING**

1. Dr. Ajanta Das, Professor, Computer Science & Engineering University of Engineering and management, Kolkata  
2. Dr. Pardeep Singh, PGDAV College, University of Delhi, Delhi  
3. Dr. K Jayasankar, CSIR – National Institute for Interdisciplinary Science and Technology, Thiruvananthapuram  
4. Dr. K.K.K Singh, Chief Scientist, CIMFR, Dhanbad along with Co-PI Dr. R.K. Tiwary, Sr. Scientist CIMFR  
5. Dr. Manish Mudgal, CSIR – AMPRI, Bhopal and Shri Abhishek Bisarya  
6. Dr. S.S. Singh, Guru Ghasidas University, Chhattisgarh  
7. Dr. V. Alexander, Loyala College, Chennai
8. Dr. Vimal Mishra, Civil Engineering IIT, Gandhinagar, Gujarat
9. Dr. Jamal A Khan, Aligarh Muslim University, Aligarh
10. Dr. Samrat Mondol, Wildlife Institute of India, Chandrabani, Dehradun
11. Dr. Sandeep Kumar Gupta, Wildlife Institute of India, Chandrabani, Dehradun
12. Dr. Sutirtha Dutta, Wildlife Institute of India, Chandrabani, Dehradun
13. Dr. Abhijit Das, Wildlife Institute of India, Chandrabani, Dehradun
### Annexure-2

**I LIST OF PROJECTS RECEIVED UNDER NEW R&D SCHEME ON CONSERVATION & DEVELOPMENT**

<table>
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<th>S. N.</th>
<th>Registration No.</th>
<th>Title of Project</th>
<th>Thematic Area</th>
<th>Details of P.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>43/2018/RE</td>
<td>An Assessment of the Impact of Environmental Clearance Procedure on Air Quality based on Long Term Data of National Air Monitoring Program (NAMP) and the Continuous Ambient Air Quality Monitoring Station (CAQMS) of Kolkata</td>
<td>Air Pollution</td>
<td>Prof. Ajanta Das, Computer Science &amp; Engineering, University of Engineering and Management, Kolkata, Co-PI: Not provided.</td>
</tr>
<tr>
<td>2.</td>
<td>167/2018/RE</td>
<td>Formal vs. Informal E-waste Management System in India: A Study of Indian Cities</td>
<td>Pollution Prevention, Waste Minimisation, etc</td>
<td>Sh Pardeep Singh, Asst Prof., Dept of Environmental Studies, PGDAV College, University of Delhi, Nehru Nagar, Delhi, Co-PI: Not provided.</td>
</tr>
</tbody>
</table>
II CONSIDERATION OF ON-GOING R&D PROJECTS FUNDED UNDER OLD R&D SCHEME

<table>
<thead>
<tr>
<th>S. N.</th>
<th>File No.</th>
<th>Title of Project</th>
<th>Thematic Area</th>
<th>Details of P.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>19-339/2013-RE</td>
<td>Bulk Utilisation of Red Mud for making Advanced Ligno-Silico Aluminous (LSA) Geopolymeric Materials</td>
<td>Waste Minimisation</td>
<td>Dr.Manish Mudgal, Sr. Principal Scientist &amp; Section Head, Advanced Radiation Shielding and Cement Free Concrete Group CSIR-AMPRI, Bhopal</td>
</tr>
<tr>
<td>6.</td>
<td>19-99/2009-RE</td>
<td>Assessment of Air Pollutants and Its Impact on Tropical Forest of Northern Chhattisgarh</td>
<td>Air Pollution</td>
<td>Dr.S.S.Singh, Dean, School of Natural Resources, Dept of Forestry, Wildlife and Environmental Sciences, Guru Ghasidas University, Bilaspur, Chhattisgarh</td>
</tr>
<tr>
<td>7.</td>
<td>19-68/2012-RE</td>
<td>Development of Hybrid Nanomaterials- based Water Filters for Affordable Potable Water</td>
<td>Water Pollution</td>
<td>Dr.V.Alexander, Dept of Chemistry, Loyola College, Chennai</td>
</tr>
<tr>
<td>8.</td>
<td>27-1/2015-RE</td>
<td>Implications of land cover/land use and Climate Change on soil moisture variability in India</td>
<td>Climate Change</td>
<td>Dr.Vimal Mishra, Asst Prof, Civil Engineering, Gandhinagar, Gujarat</td>
</tr>
<tr>
<td>9.</td>
<td>14-246/2015-RE</td>
<td>Monitoring Structure, Functioning and Ecosystem Services of Dry Tropical Forest Ecosystem and Management of Ecosystem, prey Populations and predators</td>
<td>Wildlife Conservation</td>
<td>Dr. Jamal A Khan, Aligarh Muslim University, Aligarh</td>
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III CONSIDERATION OF REVISED PROPOSALS OF WII DEHRADUN UNDER NEW R&D SCHEME CONSIDERED IN 1st TFAC HELD ON 15.03.2019

<table>
<thead>
<tr>
<th>S. N.</th>
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<th>Details of P.I.</th>
</tr>
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<tbody>
<tr>
<td>10.</td>
<td>244/2018/RE</td>
<td>Assessing fine scale distribution pattern, population and habitat status of Northern Swamp deer (Rucervus dwauceli dwauceli) across upper Gangetic Plains of North India</td>
<td>Wildlife</td>
<td>Pl: Dr.Samrat Mondol, Scientist D, Wildlife Institute of India, PO Box 18, Chanderbani, Dehradun 248001 (Uttarakhand)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Co-PI: Dr. Bivash Pandav, Scientist F, WII</td>
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<tr>
<td>S. N.</td>
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<td>Thematic Area</td>
<td>Details of P.I.</td>
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<tr>
<td>11.</td>
<td>253/2018/RE</td>
<td>Status Survey and Genetic Study of Eastern Hog Deer (<em>Axis porcinus annamiticus</em>) populations in northeast India</td>
<td>Wildlife</td>
<td>PI: Dr. Sandeep Kumar Gupta, Scientist E, Wildlife Forensic Cell, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand) &lt;br&gt; Co-PI: Dr. S. A. Hussain, Scientist G, WII, Dehradun</td>
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<tr>
<td>12.</td>
<td>286/2018/RE</td>
<td>Inventorisation and Assessment of RET Species in select Protected Areas and their Eco-sensitive Zones of India</td>
<td>Wildlife</td>
<td>Dr. K. Sivakumar, Scientist F, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand) &lt;br&gt; Co-PI: Dr. Gautam Talukdar, Scientist E, WII, Dehradun</td>
</tr>
<tr>
<td>13.</td>
<td>254/2018/RE</td>
<td>Engaging community in conservation of Covert Species in Meghalaya, Northeast India.</td>
<td>Wildlife</td>
<td>Dr. Abhijit Das, Endangered Species Management Department, Wildlife Institute of India, PO Box 18, Chandrabani, Dehradun 248001 (Uttarakhand) &lt;br&gt; Co-PI: Shri Salvador Lyngdoh, Scientist D, WII, Dehradun</td>
</tr>
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</table>

IV INTERNAL CONSIDERATION OF PROJECTS APPROVED/FUNDED UNDER OLD R&D SCHEME

<table>
<thead>
<tr>
<th>S. N.</th>
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<th>Details of P.I.</th>
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<tbody>
<tr>
<td>14.</td>
<td>19-22/2014-RE</td>
<td>Bioremediation of Bauxite Residue (Red Mud) a waste product generated in Alumina Industry through Integrated Biosolid Microbe (IBM) combinations</td>
<td>Waste Minimisation</td>
<td>Dr. Kumud Dubey, Centre for Social Forestry and Eco-Rehabilitation, Allahabad</td>
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<tr>
<td>15.</td>
<td>24-38/2013-RE</td>
<td>Utilization of Red Mud as Particulate filler in Polymer Composites</td>
<td>Waste Minimisation</td>
<td>Prof. Alok Satapathy, Department of Mechanical Engineering, NIT, Rourkela (F.No. 19-342/2013-RE)</td>
</tr>
<tr>
<td>#</td>
<td>Date</td>
<td>Title</td>
<td>Category</td>
<td>Authors</td>
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<td>17</td>
<td>19-60/2013-RE</td>
<td>Comparative Study of ESBL producing and PQMR E.coli and K.pneumoniae from purified tap water and unpurified samples of Yamuna</td>
<td>Water Pollution</td>
<td>Prof. Arif Ali, Jamia Millia Islamia, New Delhi</td>
</tr>
<tr>
<td>18</td>
<td>24-06/2014-RE</td>
<td>Environmental Policy Perspective of Uttarakhand with special reference to Religious Tourism</td>
<td>Sustainable Development</td>
<td>Dr. R.K. Suri, Chairman of Trust, Global Development Foundation, 140, Rosewood Apartments, Sec-13, Dwarka, New Delhi</td>
</tr>
<tr>
<td>19</td>
<td>14/25/2013-RE</td>
<td>Study of Biodiversity of Udaipur Wetland of West Champaran and its water Quality with conservation being the objective</td>
<td>Biodiversity Conservation</td>
<td>Shri R.N.Yadava, Ram Lakhan Singh Yadav College, Bettiah, West Champaran, Bihar</td>
</tr>
<tr>
<td>21</td>
<td>19-56/2014-RE</td>
<td>Impact of anthropogenic activities on the benthic biodiversity alone the Tamil Nadu coast: Biotic indices approach</td>
<td>Biodiversity Conservation</td>
<td>Dr. P Murugesan, CAB in Marine Biology, Annamalai University, Parangipettai (Tamil Nadu)</td>
</tr>
<tr>
<td>22</td>
<td>14/95/2013-RE</td>
<td>Diversity and Ecological mapping on Lepidoptera (Insecta) of Shola Forests of Kerala</td>
<td>Biodiversity Conservation</td>
<td>Dr. R. Sheik Mohammed Shamsudeen, Department of Zoology, Sir Syed College, Kannur University, Taliparamba (Kerala)</td>
</tr>
<tr>
<td>No.</td>
<td>Date/Ref.</td>
<td>Title</td>
<td>Sponsor</td>
<td>Institution/Location</td>
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<td>23.</td>
<td>14/12/2012-RE</td>
<td>In-vitro Multiplication and Eco-restoration of <em>Herbanaria panchganiensis</em> – A Critically Endangered Orchid</td>
<td>Biodiversity Conservation</td>
<td>Dr. Nitin Dongarwal, Rashtra Tukadoji Mahraj Nagpur University, Nagpur, Maharashtra</td>
</tr>
<tr>
<td>25.</td>
<td>14/15/2010-ERS/RE</td>
<td>Studies on Ecology and Diversity of Nematodes of Pir Panjal Range in Jammu &amp; Kashmir”</td>
<td>Biodiversity Conservation</td>
<td>Dr. Dr. A.A. Shah, CBS School of Biosciences and Biotechnology, Baba Gulam Shah Badshah University, Rajouri, Jammu &amp; Kashmir.</td>
</tr>
</tbody>
</table>

3.0 Any other matter with the permission of the Chair.