Evaluation of Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

2013 – 14 to 2015 – 16

DRAFT REPORT

EXECUTIVE SUMMARY

The Evaluation of Compensatory Afforestation Fund Management and Planning Authority (CAMPA) for the years 2013 - 14, 2014 -15 and 2015 – 16 was assigned to TERI in August 2019 by Karnataka Evaluation Authority (KEA) at the behest of the Karnataka Forest Department (KFD), Government of Karnataka. The study was a summative evaluation wherein the scheme was evaluated post implementation to understand the overall effectiveness of the program/ scheme in terms of the objectives set out. The purpose was to assess the overall impact of the scheme, while also studying the effectiveness of the process/ delivery mechanism followed and to make suitable recommendations thereof to enhance the effectiveness and impact. Multi-dimensional approach including scientific, interactive/ consultative, objective-oriented, analytical, practical and participatory approach using appropriate methods were followed to gather qualitative and quantitative data. The primary data on plantations was gathered using the web based android application developed by Karnataka Forest Department.

During the period of evaluation Rs. 20,194.00 lakhs was the financial target of which Rs. 16,715 lakhs has been expended, i.e. 83% achievement. In terms of physical plantation activities (raising, maintenance and advance works), 109,783.34 ha was the achievement against the target of 110,473.52 (99%). During the evaluation study, 597 plantations works were carried out, of which 61 plantations were sampled across nine forest circles covering a gross area of plantation of 1070 ha (average of 17.54 ha/ plantation) and net area of plantation of 1006 ha (average of 16.49 ha/ plantation).

During the period of evaluation, advance works were taken up in 9459.04 ha (96% achievement), plantations were raised in 9992.82 ha (102% achievement) and maintenance works were carried out in 58,956.90 ha (99% achievement).

Scrutiny of the planning process revealed delay in approving APOs and sanctioning of estimates, where nearly 60% were approved after September. The plantation journals were updated in 89% plantations.

Soil moisture conservation works were implemented in 51% of plantations sampled, with an average expenditure of 7%, indicating that this activity was not given due priority. Monitoring visits by supervisory officers were seen in 46% of the plantations sampled. Joint Forest Management Committees (JFMCs) were involved in some of the planting and maintenance activities in two cases, indicating much scope for the participation of the community. Majority of the plantations sampled (57%) followed the ANR-I (B) model as denoted in the respective plantation journals, followed by ER Model – III in 20% of plantations and AR Model II (A) was followed in 15% of plantations.

About 90 species of plants were noticed during the study of which Honge was the most frequently occurring species followed by Nerale, Tapsi, Nelli, Honne, Mathi etc. all of which are native species and known for their NTFP value. It is noteworthy to mention here that the department was making an earnest attempt to encourage mixed plantations of native species which will enhance the biodiversity value of the forests and its intangible benefits to the environment.

Out of plantations sampled, 51% had boundary protection measures, only 28% of them were in good condition indicating that majority of the protection measures were becoming ineffective within 3-6 years after establishment/ installation.

The overall survival observed was 61%, ranging from 92% in Hassan circle to 31% in Kodagu circle. Out of the plantations sampled, 33% plantations were damaged by grazing, wildlife and fire which maybe the cause of low survival rate. NTFP Model-III showed highest percentage of survival (80%) mainly due to trench and mound method of planting, which was effective in soil moisture conservation and hence the better survival rate. Only one plantation of AR Model II (C) was sampled which indicated survival of 25% perhaps due to steep terrain, pit planting, lack of SMC measures, breached boundary protection and damage due to wildlife. Mathi *(Terminalia alata)* recorded the highest percentage of survival 77%, followed by Nandi *(Legarstroemia lanceolata)* and Tapsi *(Holoptelia integrifolia)* 76% each, Honne *(Pterocarpus marsupium)* 75%. The least survival was seen in Dhoopa *(Vateria indica)* at 42 per cent.

Of the 1834 other works carried out during the period of evaluation, a total of 180 works were sampled across 14 circles. Various types of other works such as boundary consolidation,

soil moisture conservation works, wildlife protection works, infrastructure, etc. were evaluated. Approved APOs were present in 82% of the other works sampled, however, the date of approval revealed that 45% of the works were sanctioned between January and March, indicating delay in sanctioning process. Scrutiny of field note books and completion certificates showed that check measurement with date in the field note books were not available in 29% of works and 80% of works did not have completion certificates at the time of field visit.

Protected areas were managed in accordance with the approved management plans to ensure protection of forests and wildlife. Solar fencing and elephant proof trenches were installed in appropriate locations to mitigate human animal conflict. However, much work needs to be done to reduce further conflicts. Habitat improvement works were also being undertaken. Wildlife protection and forest conservation measures such as anti-poaching camps (APCs) and fire protection camps were established.

It was observed that in majority of the cases, the waterholes and other soil conservation works were filled with silt from adjoining areas since desilting was usually carried out once in 4-5 years, hence sufficient water could not be stored for longer period. It was understood that anti-poaching camps were located in vantage points, had adequate staff, but need modern communication devices, arms and ammunition and higher capacity battery back-up for effective functioning.

Infrastructure works of the KFD serves various purposes such as office and residential quarters for staff, training facilities, forest rest houses, eco-tourism etc. All the works sampled were in functional condition at the time of visit and serving the intended purpose. It was learnt that the green building code was not followed in the planning and design phase, which offer the scope to make the buildings green and sustainable.

Efforts were made to improve the mobility of the field staff through induction of vehicles. In this regard, a total of Rs. 588.76 lakhs was expended against a target of Rs. 681.80 (86% achievement). However, it was observed that only 50% of the amount allocated for purchase of two-wheelers for Deputy Range Forest Officers was spent. The reasons for underutilisation of funds were not forthcoming.

As per the data provided by the Working plan wing, 12,85,139 ha (40%) of the forest area in the State was yet to be surveyed and demarcated. The Training activities of Karnataka Forest Department were carried out through a well-established network of Training centres located across the state. Training wing of the department was well equipped with state of the art equipment and technology to impart induction and on-the-job training. Comprehensive training needs assessment, a crucial step in human resource development, does not seem to be a systemic process of the training wing.

At the time of study the research wing was not being utilised to its optimum potential. There was much scope to provide comprehensive support to the functioning and execution of planting related activities of the KFD.

It was observed that the ICT wing has put in tremendous efforts to digitize and automate data and processes, which is one of the kinds in the country, by using modern technologies including GIS. The ICT wing has supported the functioning of KFD in multiple ways. Various android applications developed were helpful in ease of functioning, providing fire alerts, simplifying processes, monitoring work of the staff, etc. The website had a user friendly interface and was organized in an accessible manner. However, it was observed that the recruiting a senior, User interface and User experience Engineer may help in increasing the usability and efficiency of the functioning of IT wing.

To reduce the dependency of forest fringe communities on firewood, energy saving devices were distributed to benefit over 2920 people. During the period of study an amount of Rs. 148.44 lakhs were expended out of Rs. 222.5 lakhs (66%).The LPG stoves and cylinders distributed to individual beneficiaries were used regularly by the recipients and they articulated various benefits of the same. In case of solar lanterns, only 49% of the beneficiaries were using it regularly. There were no systems in place for repair and maintenance of the lanterns which has led to disuse of the device in some cases. Under community benefits, two solar fencing works, one each in Bengaluru and Chikkamagaluru circle and one cattle proof trench work in Hassan circle were evaluated. Focus group discussion revealed that these works were effective in the initial period for about 2-3 years subsequently, their effectiveness reduced due to lack of maintenance.

The department has to develop comprehensive definitions, benchmarks and rating indices to determine the success and performance of plantations. Five year plan mode could be adopted while planning new plantations with decentralised planning at circle level with approval of annual plan of operations well in advance. Timely approval of estimates coupled with regular monitoring by senior officers will go a long way in raising quality nurseries and plantations. The cost norms of the present plantation models are to be re-worked by involving the representatives from the field in order to fine tune the models and adopting the same. The present practice of augmenting mixed native species in degraded natural forests should be encouraged in all future afforestation activities of the department in order to increase the biodiversity value and the ecological services potential of the forests.

There should be a regular provision for desilting and maintaining of waterholes/ tanks/ percolation ponds. The anti-poaching camps should be located in vantage points with adequate manpower, basic facilities, well equipped with modern arms and ammunition and night vision binoculars. In addition, mapping of the requirements of new APCs will enhance effective protection. Regular maintenance of EPTs, CPTs, solar fencing, ensuring water resources within forests, eviction of encroachments and ensuring adequate staff at wildlife ranges will help in reducing the incidences of human animal conflict. The funds allocated for the mobility of the field staff, purchase of arms and ammunition and communication devices should be utilised in total for the purpose.

Forestry operations, soil moisture conservation works, benefits to community and individuals can be dovetailed and converged with other ongoing government schemes/ programmes such as MGNREGS, Watershed Development Programmes, Krishi Bhagya, Ujwala etc. Participatory need assessment has to be done prior to distributing individual / community benefits, along with proper documentation of the same.

The functioning of the research wing can further be strengthened with adequate funding and recruitment of qualified manpower and have regular interactions with other wings of the department to support them appropriately. A systematic training need assessment of the serving officers and incorporating more practical aspects in trainings, will enhance the knowledge and skill of staff through concerted human resource development. Proper transfer policies should be developed to retain the trained specialist personnel in appropriate wings at least for three years tenure after completion of training.

Brainstorming on further possibilities for process automation, making software/ application more user friendly with appropriate field level testing along with the developers, making the content on website more comprehensive especially for the general public will further enhance the effectiveness of the ICT wing.

EVALUATION OF NATIONAL AFFORESTATION PROGRAMME (NAP)

2013-14 to 2016-17

DRAFT REPORT

EXECUTIVE SUMMARY

The Evaluation of National Afforestation Programme (NAP) for the period 2013-14 to 2016-17 was assigned to TERI in August 2019by Karnataka Evaluation Authority (KEA) at the behest of the Karnataka Forest Department (KFD), Government of Karnataka. The study was a summative evaluation wherein the scheme was evaluated post implementation to understand the overall effectiveness of the program/ scheme in terms of the objectives set out. The purpose was to assess the overall impact of the scheme, while also studying the effectiveness of the process/ delivery mechanism followed and to make suitable recommendations thereof to enhance the effectiveness and impact. Multi-dimensional approach including scientific, interactive/ consultative, objective-oriented, analytical, practical and participatory approach using appropriate methods were followed to gather qualitative and quantitative data. The primary data on plantations was gathered using the web based and android application developed by Karnataka Forest Department.

The physical target of plantation activities (raising, maintenance and advance works) was 59,759 ha against which the achievement was 61, 044 ha, 102% achievement. The overall financial target was Rs. 5785.32 lakhs against which the achievement was Rs. 4,920.82 lakhs, i.e. 85% achievement. During the period of evaluation, 559 plantations works were carried out, of which 61 plantations across were sampled nine forest circles, covering a gross area of plantation of 1254 ha (average of 20.55 ha/ plantation) and net area of plantation of 1205 ha (average of 19.75 ha/ plantation). The planning process revealed that there was inordinate delay in approving APOs and sanctioning of estimates, wherein 84% were sanctioned after September. The plantation journals were updated in 62% plantations.

During the study period under the scheme, 61,044 ha of low density forests were augmented with 7,987 ha of advance works (13%), 9,460 ha of planting (16%) and 43, 597 ha of maintenance of previous years plantations (71%). The different models adopted for the augmentation were: 42% of the area was planted with Assisted natural regeneration (ANR) followed by 32% Artificial regeneration (AR), 2% Silvipasture, 6% bamboo, 7% cane and 11% Non-timber forest produce (NTFP). These afforestation works were in tandem with the activities intended to be carried out to obtain the output mentioned in the log frame of the scheme.

Out of 61 plantations sampled, 33% had boundary protection measure, which was also supported by the fact that on an average only 3% of the total cost was expended on boundary protection structures. Among the existing boundary structures, 68% were breached indicating that majority of the protection measures become ineffective within 3-6 years after establishment/ installation.

Details of SMC works carried out under the budget component of Other Activities were not made available. However, among the plantations sampled, 33% had SMC structures with an average expenditure of 2% of the total cost, despite the fact that most models had a budgetary allocation of 14-25%. Among the plantations sampled, 19 (31%) plantations were inspected by a senior officer as recorded in the respective plantation journal.

The overall average survival of the plantations sampled was found to be 55% and 32% seedlings in sample plots were in good condition. Highest survival was found in ANR I (B) 66% and least survival of 15% was found in NTFP Model- III plantations. Amongst the circles, with respect to survival rate, Bengaluru recorded highest (95%), while it was lowest (23%) in Ballari as nearly 81% plantations were damaged due to grazing and fire incidents. Glyrecedia (*Glyrecedia spp*) indicated highest survival at 78%, while Dhoopa (*Vateria indica*) recorded the least at 39%.

Entry Point Activities which were useful for the community at large were undertaken under this scheme without a systematic need assessment; however in some locations village level meetings were conducted. In some cases, activities to promote participation of the communities such as regular meetings with Joint Forest Management Committee (JFMC), involving them in fire management, providing funds for income generation activities were carried out. JFMCs were involved in some planting and maintenance activities in 41% of the cases. It may be inferred that the aim of the project to develop the forest resources through participatory approach has taken a back seat due to inadequate social mobilization.

This scheme has particularly contributed to promote NTFP species such as Nelli, Hunase, Antuwala, Ramapatre, Neem, Dalchini, Honge etc. in various plantations raised. However, efforts for value addition and institutional linkages for marketing products of forest based

micro enterprises have not been done., The interaction with the field officers and JFMCs indicated that more priority should be given to awareness, training and linkage with other institutions as specified in the log frame.

The overall project activities and outputs of NAP have been evolved on a larger perspective to accommodate the entire country. However, some of the activities that were not suitable for Karnataka have not been taken up. Five year plan mode could be adopted while planning new plantations with decentralised planning at circle level with approval of annual plan of operations well in advance. Timely approval of estimates coupled with regular monitoring by senior officers will help greatly in raising quality nurseries and plantations. The concept of augmenting mixed native species in degraded natural forests should be encouraged in all future afforestation activities of the department in order to increase the biodiversity value and the ecological services potential of the forests. Forestry operations, soil moisture conservation works, benefits to community and individuals can be dovetailed and converged with other ongoing government schemes/ programmes such as MGNREGS, Watershed Development Programmes, Krishi Bhagya, Ujwala etc.

Social mobilisation, revitalization and/ or promotion of JFMCs, training needs assessment, livelihood mapping and marketing linkages are crucial steps in this scheme to ensure participation of the communities (especially forest dependent communities) in developing the forest resources as envisaged. Hence, primary focus must be laid on strengthening this aspect in the delivery of the scheme with appropriate support of NGOs, social scientists, extension experts etc.

EVALUATION OF NATIONAL BAMBOO MISSION (NBM)

2013-14 to 2016-17

DRAFT REPORT

EXECUTIVE SUMMARY

The Evaluation of National Bamboo Mission for the period 2013-14 to 2016-17 was assigned to The Energy and Resources Institute (TERI) in August 2019 by Karnataka Evaluation Authority (KEA) on behest of Karnataka Forest Department (KFD). The study was a summative evaluation wherein the scheme was evaluated post implementation to understand the overall effectiveness of the program/ scheme in terms of the objectives set out. The purpose was to assess the overall impact of the scheme, while also studying the effectiveness of the process/ delivery mechanism followed and to make suitable recommendations thereof to enhance the effectiveness and impact. Multi-dimensional approach including scientific, interactive/ consultative, objective-oriented, analytical, practical and participatory approach using appropriate methods were followed to gather qualitative and quantitative data. The primary data on plantations was gathered using the web based and android application developed by Karnataka Forest Department.

The overall physical (plantation activities of raising, maintenance and advance works) and financial achievement against the targets of the mission during the evaluation period was 91% and 77% respectively. The overall average achievement of physical activities is 56%, which was affected by less progress in some components. During the evaluation period, among the 248 plantation works carried out, 26 plantations were sampled across seven forest circles covering a gross area of plantation of 449 ha (average of 17.26 ha/ plantation) and net area of plantation of 426 ha (average of 16.38 ha/ plantation). The planning process revealed that there was delay in approving Annual Plan of Operation (APOs) and sanctioning of estimates (71% APOs were sanctioned after planting season, .i.e. after September and 81% estimates were sanctioned after September). The plantation journals were available in 77% plantations at the time of visit, of which only 62% had complete details, indicating that there was scope for improving monitoring process.

. Monitoring visits by supervisory officers were made only in 38% of the plantations, denoting inadequate monitoring. Joint Forest Management Committee (JFMC) were involved in raising plantations in 31% of the cases, indicating low participation of the community. Bamboo augmentation was carried out as per the cost norms and number of years of maintenance given in the Govt. of India guidelines.

Out of 26 plantations, 62% had boundary protection measure, mostly barbed wire with wooden posts, of which 56% were breached. Seventy-seven percent of plantations were provided with watch and ward. NBM guidelines stipulate two years of maintenance, among the plantations sampled, 23% were maintained as per guidelines.

The overall survival of the plantations was found to be 39% and 25% seedlings in sample plots were in good condition, while 41% were satisfactory. Highest survival of 90% was found in one plantation in Chikkamagaluru T range, Chikkamagaluru division and circle. Amongst the circles Hassan circle recorded 93% survival, while Ballari recorded the lowest 17% survival. *Dendrocalamus strictus* indicated 62% followed by *Bambusa arundinasia* with 39% survival rate. Department may examine introduction of species like *D. tulda* or other species depending upon industrial demand.

The study found that activities were taken up to partially address the objectives on increasing the coverage of area under bamboo in potential areas and promotion, development and dissemination of technologies, while there were no significant efforts to address the remaining four objectives.

The mission objectives were developed for the entire country while strategy, activities and components should be specific to State and agro climatic zones within the State. A comprehensive understanding of the bamboo sector in Karnataka is required to arrive at a suitable strategy by involving all the stakeholders, so that it is regionally appropriate, need-based and resource efficient. This issue requires attention in future to select appropriate sites as well as species like *Dendrocalamus hamiltonii, Dendrocalamus stocksii* that are useful for artisans, besides, enhancing the area under bamboo cultivation in forest and non-forest areas to meet the market demand.

In addition to producing raw material, bamboo artisans are to be provided with additional training, storage facilities and assistance for marketing. There is a need to develop a comprehensive database of the stakeholders, including the artisans in JFMCs and build a network for the development of the sector. Consistent efforts are needed to expose the artisans to different bamboo growing states within the country, new technologies to help in drudgery reduction, improving quality of the finished products and modern technologies developed by various research institutions. Specific skill development training based on market demand could be imparted to interested youth and enable them to take up self-

employment. Other government schemes such as ATMA, Skill development, SCP/TSP could be leveraged/ converged to have better extension and outreach under the mission.

EVALUATION OF THIRTEENTH FINANCE COMMISSION (TFC)

2013-14 AND 2014-15

DRAFT REPORT

JANUARY 2021

EXECUTIVE SUMMARY

The Evaluation of Thirteenth Finance Commission for the period 2013-14 to 2014-15 was assigned to TERI in August 2019 by Karnataka Evaluation Authority (KEA) at the behest of Karnataka Forest Department (KFD), Government of Karnataka.The study is a summative evaluation wherein the scheme was evaluated post implementation to understand the overall effectiveness of the program/ scheme in terms of the objectives set out. The purpose was to assess the overall impact of the scheme, while also studying the effectiveness of the process/ delivery mechanism followed and to make suitable recommendations thereof to enhance the effectiveness and impact. Multi-dimensional approach including scientific, interactive/ consultative, objective-oriented, analytical, practical and participatory approach using appropriate methods were followed to gather qualitative and quantitative data. The primary data on plantations was gathered using the web based and android application developed by Karnataka Forest Department.

During the period of evaluation Rs.11020.76 lakhs was the financial target of which Rs. 10950.71 lakhs was expended, i.e. 99% achievement. In terms of plantation activities (raising, maintenance and advance works), 47,539.31 ha was the target against which the achievement was 61,388.61 ha (129%). During the evaluation period 1168 plantations works were carried out, of which 116 plantations were sampled across thirteen forest circles, covering a gross area of plantation of 1641 ha (average of 14.14 ha/ plantation) and net area of plantation of 1533 ha (average of 13.22 ha/ plantation).

During the period of study, an area of 1804 ha of new plantations were raised, exceeding the target (160%), besides, road side plantations of 42 km. This was in addition to maintenance of 38,850 ha old plantations and carrying out preliminary works of 4455 ha of next year’s plantation as an auxiliary to increase forest cover.

Scrutiny of the planning process revealed that there was delay in approving APOs and sanctioning of estimates, where 67% were sanctioned after September. The plantation journals were updated in 88% plantations.

Soil moisture conservation works were implemented in 24% of plantations sampled, with an average expenditure of 2%, indicating that this activity was not given due priority. Monitoring visits by supervisory officers were made in 53% of the sampled plantations. Joint Forest Management Committees (JFMCs) were involved in some of the planting and maintenance activities in 2% of the cases, indicating greater scope for the participation of the community. Majority of the plantations sampled (42%) followed the ANR-I (B) model as denoted in respective plantation journals. About 110 species of plants were noticed during the study. It is noteworthy to mention here that the department is making an earnest attempt to encourage mixed plantations of native species which will enhance the biodiversity value of the forest and its intangible benefits to the environment.

Out of 116 plantations sampled, 57% had boundary protection measure, of which 77% structures were breached, indicating that majority of the protection measures were becoming ineffective within 3-6 years after establishment/ installation.

The overall survival observed was 59%, ranging from 97% in Hassan circle to 26% in Mysuru circle. Out of the sampled plantations, 28% plantations were damaged by grazing, wildlife and fire which was the main cause of low survival rate. Roadside planting model-VII showed the highest percentage of survival (79%) while least survival was recorded in NTFP model III. There was an increase in survival percentage as the number of years of maintenance increases as evidenced in this study. Eucalyptus *(Eucalyptus spp)* recorded the highest percentage of survival 98%, whereas least survival of 40% was recorded in Nerale *(Syzygium sp.).*

During the period of evaluation, 1558 other works were carried out, of which 154 works were sampled. The works evaluated included boundary consolidation, buildings, formation of roads, soil and moisture conservation works, wildlife protection works, working plan works and research works. Check measurement with date in the field note books were not available in 26% of samples while 55% samples did not have completion certificates, indicating scope for improvement in record keeping.

As per the data provided by the Working plan wing, 12,85,139 ha (40%) of the total forest area in the State was yet to be surveyed and demarcated. The training activities of KFD were

carried out through a well-established network of Training centres located across the State. Training wing of the department was well equipped with state of the art equipment and technology to impart induction and on-the-job trainings. Comprehensive training needs assessment, a crucial step in human resource development, did not seem to be a systematic process of the training wing.

At the time of study the research wing was not being utilised to its optimum potential. There is much scope to provide comprehensive support to the functioning and execution of planting related activities of the KFD.

Infrastructure works of the KFD serves various purposes such as office and residential quarters for staff, training facilities, forest rest houses, eco-tourism and nursery sheds. All the works sampled were in functional condition at the time of visit and serving the intended purpose. It was learnt that there is scope to adopt the the green building code in the planning and design phase, which offer the possibility to make the buildings green and sustainable.

Efforts have been made to improve the mobility of the field staff through the induction of vehicles by utilising 71% of the allocated funds. The reasons for underutilisation of funds were not forthcoming.

It was observed that the Information and Communications Technology (ICT) wing has put in tremendous efforts to digitize and automate data and processes, which is one of the kinds in the country, by using modern technologies including GIS. The ICT wing has supported the functioning of KFD in multiple ways. The various android applications developed have been helpful in ease of functioning, providing fire alerts, simplifying processes, monitoring work of the staff and so on. The website had a user friendly interface and is organized in an accessible manner. However, it was observed that the presence of a senior, experienced IT Developer would be helpful in blending the user requirements, technical architecture and development process.

Protected areas were managed in accordance with the approved management plans to ensure protection of forests and wildlife. Solar fencing, Elephant Proof Trenches (EPT) and railway barricades were installed in appropriate locations to mitigate human animal conflict.

However, much work needs to be done to reduce further conflicts. Habitat improvement works were also being undertaken. Wildlife protection and forest conservation measures such as anti-poaching camps (APCs) and fire protection camps were established.

It was observed that in majority of the cases, the waterholes were filled with silt from adjoining areas since desilting was usually carried out once in 4-5 years, hence sufficient water could not be stored for longer period. With the limited prescribed sample size, it was understood that anti-poaching camps were located in vantage points, have adequate staff, but need modern communication devices, night vision binoculars, arms and ammunition and higher capacity battery back-up for effective functioning.

To reduce the dependency of forest fringe communities on firewood, energy saving devices and public awareness programmes on the importance of forests were conducted to benefit over 600 people during the period of evaluation. The LPG stoves and cylinders distributed to individual beneficiaries were used regularly by 96% of the beneficiaries and they appreciated the utility of the same. In case of solar lanterns, only 50% of the beneficiaries were using it regularly, since inadequate repair and maintenance mechanisms led to disuse. The community benefits have not served the purpose since it was not given after due consultation with the community and there was no proper mechanism for repair and maintenance.

Five-year plan mode could be adopted while planning new plantations with decentralised planning at circle level with approval of annual plans of operation well in advance. Timely approval of estimates coupled with regular monitoring by senior officers will help greatly in raising quality nurseries and plantations. The cost norms of the present plantation models are to be re-worked by involving the representatives from the field in order to fine tune the models and adopting the same.The present practice of augmenting mixed native species in degraded natural forests should be encouraged in all future afforestation activities of the department in order to increase the biodiversity value and the ecological services potential of the forests.

The functioning of the research wing can further be strengthened with adequate funding and recruitment of qualified manpower and by regular interactions with other wings of the department to support them appropriately. A systematic training need assessment, incorporating more practical aspects in trainings, will enhance the knowledge and skill of

staff through concerted human resource development. Proper transfer policies should be developed to retain the trained specialist personnel in appropriate wings at least for three years tenure after completion of training.

Brainstorming on further possibilities for process automation, making software/ application more user friendly with appropriate field level testing along with the developers, making the content on website more comprehensive, especially for the general public will further enhance the effectiveness of the ICT wing.

There should be a regular provision for desilting and maintenance of waterholes/ tanks/ percolation ponds. In addition, mapping of the requirements of new APCs will enhance effective protection. Regular maintenance of EPTs, Cattle Proof Trenches (CPTs), solar fencing, ensuring water resources within forests, eviction of encroachments and ensuring adequate staff at wildlife ranges will help in reducing the incidences of human animal conflict.

Forestry operations, soil moisture conservation works, benefits to community and individuals can be dovetailed and converged with other ongoing government schemes/ programmes such as MGNREGS, Watershed Development Programmes, Krishi Bhagya, Ujwala and other related programmes. Participatory need assessment has to be done prior to distributing individual / community benefits, along with proper documentation of the same.