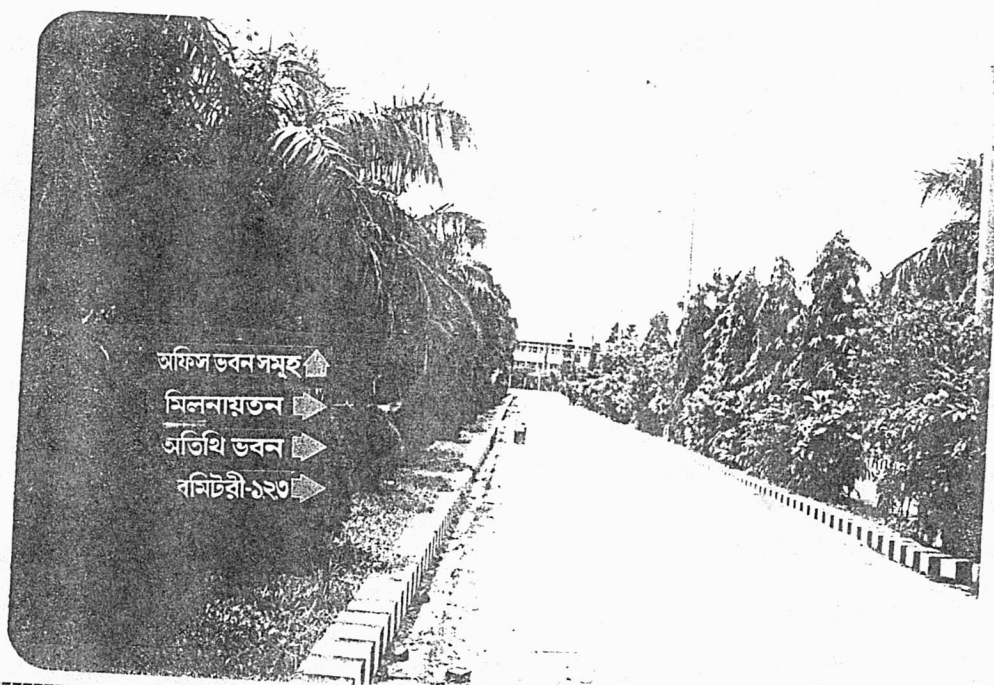


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Environment Development by Tree Plantation of the Training Institutes with special reference to BPATC

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Preface

Trees contribution in developing and in conserving a balance environment has been recognized as the single most important factor throughout the world. This is one of the most widely talked issue discussed by the ecologists to environmentalist and expert to decision makers. Their effort has not only aware the general people but also motivated them to participate the plantation programme and as such both local regional and national level initiative plantation programme has been undertaken on behalf of individual community, Government organization and NGO. But no single initiative has so far been taken by the training institution in Bangladesh.

Bangladesh Public Administration Training Centre (BPATC) as an apex training institution has since its inception in 1984 taken an intensive plantation programme in its campus in order to develop a sound environmental conditions as well to develop beautification of the centre. Over the years more than several thousands wood and non-wood products of trees have been planted in the campus and more will be planning in future. BPATC authority feels that there should be an evaluation report of the programme which would not only assess and measure the positive and negative aspects of the initiative but also help us to make further plan in future. Present study attempts to explore whether BPATC's plantation programme have further scope to improve the beautification of its campus and for developing her overall environment. It also attempts consider whether this type of initiative can be replicated in the similar types institutions and organisation in the country. Moreover, the programme would presumably render a demonstrative impact to the participants of different courses as well as the visitors to motivate and be interested to apply the programme after returning to their organisations.

In addition, the findings of the present study would serve as a reference material of our training programme on environmental management and sustainable development module and also serve as a basic document for further studies in future.

ACKNOWLEDGEMENT

This report is the first its kind written on the plantation programme of the centre as one of the approved research project. I express my deep sense of gratitude and indebted to A.Z.M. Shamsul Alam, former Rector, Bangladesh Public Administration Training Centre (BPATC), who initially directed me to hold a seminar on "Tree Plantation and Environmental Development" in mid 1995, and subsequently inspired me to undertake a research on Plantation programme of BPATC.

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I am also especially grateful to the officers and staff of the centre, who have taken the trouble to fillup the long questionnaire distributed to them and kindly made valuable comments and opinions. Their feed back not only generated very good idea about plantation programme of the centre but also help me in making suggestion and recommendations. Thanks are also due to the data collectors and tabulators who have taken the trouble to finish the unpleasant task.

Finally should be thanked Md. Helal Uddin, Steno-typist of the centre for sharing painful task of computer processing of the manuscript within a very limited period of time.

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Environment Development by Tree Plantation of the Training Institutes with special reference to BPATC

Introduction :

People throughout the world are increasingly recognizing the importance of tree plantation in improving human welfare. It not only provides aesthetic, social and economic benefit but also helps to maintain a balance environmental condition of local, regional and global natural systems.

2. Trees represent capital when converted to desirable forms and contribute to the economy by providing commercial products, as well as non-wood products. Trees also provide material for residential, agricultural, industrial and medicinal uses and important source of various kinds fruits food, fibre and energy for all of us.
3. Trees are also an integral component of the bio-sphere, helping to, stabilizing natural eco-systems and contribute to biological diversity and help maintain air water and soil quality of a given area. They influence bio-geochemical processes regulate run off and ground water, control soil, erosion influence local climate and reduce down stream sediment and flooding. As carbon sinks, trees sequester carbon dioxide from the atmosphere and reducing the green house effect.
4. Because of tropical climate and favourable location in South Asian Region, Bangladesh is traditionally known as lush green country for her richness and abundance of trees and forest from ancient period. The country has been blessed with the world largest mangrove forest of Sundarbon area and Sal forest belt of the Hilly areas and plain land. Over the past few decades, country's forest has been declined from about 15 percent of the total area to 5 percent. Out of a total area of 2 million hectares of forest land, less than half of this area is actually covered with trees. The estimated rate of deforestation is 8,000 hectares per year , which is one of the highest rate of deforestation in the tropical countries.(GOB).

Rationale of the study :

5. In recent years the people of Bangladesh are concerned about the rate at which forests/trees are being depleted. Deforestation is partly caused population pressure, greater demand for forest products and conversion to agricultural land. But fundamental cause of deforestation is the breakdown of the mechanisms that controlled people's access to and protection of the forest (World Bank, 1992).

6. The trees of Bangladesh have suffered the inevitable consequences of population, resulting in an ever increasing demand for cultivable land, wood and various forest products. The land has been brought under cultivation and put to other uses which in many cases proved to ecologically unsustainable. Desertification is evident in the north-west while fierce typhoons and tidal waves frequently batter open consulate lands and settlements or mainly because they are without protectively tree cover. People are facing a multiple of difficulties caused by nationwide deforestation when forests disappear, the associated fauna and flora also disappear. (

7. Deforestation and conversion of forest land to other uses has been the highest in the plain land of Sal-forest belt stretching from Dinajpur to Mymensingh, Tangail and Dhaka district. Within the 50 mile radius of Dhaka city forest lands are being rapidly converted to industrial sites, dairy and poultry farms and residential estate for urban elite of Dhaka (Chun K. Lai 1992).

8. The means at the disposal of the forest administration to address these problems are sadly inadequate the futile battle against the deforestation has continued for almost a century. Law enforcement even by arms did not eliminate the stealing of wood, resettlement of shifting cultivators did not stop enrichment, establishment of parks and reserves did not protect plants and animals, planting trees did not bring the lost single back and banning logging was found ineffective (World Bank : Policy Paper, 1995).

9. Besides, the forest department has attempted to counten this problem by imposing fines for illegal timber harvesting and by raising 1,72,000 hectares of plantations from 1973 to 1985,

an average of 14,000 hectares per year (UNDP 1992). A percentage of plantations raised in the hill forests and inland sal forest belt have poor survival rates, for example 220 hectares of plantations established during 1978-85 in Kachighata forest range of Kaliakoir Thana only 50 hectors remain (Shaheduzzaman 1992).

10. In the plain land, plantations programme have also suffered a number of limitation for various reasons. In general, their programme failed primarily for the selection of inappropriate species for inappropriate places, over reliance on a few exotic species such as Eucalyptus and Acacia. Inability of the forest department to protect new plantation and lack of local participation in plantation management.

11. As a result of these consequences an acute shortage of fuelwood and timber exists throughout the country. In 1990 the per capita annual consumption of fuelwood and timber was 2.7 and 0.3 cubic feet respectively (GOB : Task Force). These are not only lowest wood consumption rates in the world but also indicates most neglected sector in the country. It is estimated that by 2010, the available supplies in Bangladesh will meet only one-sixth and one-fourth of the projected demands for fuelwood and timber respectively (FAO 1989). Even the highly productive homestead forests which accounts for 82% of the country's total wood and bamboo supply were exploited to more than twice their sustainable yield (FAO 1990). Moreover, the huge gap between estimated supply and demand of fuelwood, timber and other forest products has resulted in over exploitation of forest resources, both in government controlled forests as well as in village homestead forests. The situation will continue to deteriorate as the wood supply-demand gap widens, as a result the deforestation process creates numerous adverse effects on environment and economy of the country. Recurrent droughts floods, cyclonic storms and other climatic hazards are believed to partially attributable to global deforestation.

Scope of the study :

12. In response to the environmental and economic threats posed by the alarming deforestation problem in country, the concern about the serious consequences of global and

national environmental degradation has been articulated by the press, international agencies and NGOs. Recurrent droughts, floods, cyclonic storms are other climatic hazardous has slowly convinced the government of Bangladesh to be proactive in protecting forest, trees and other national resources. This situation led the government to formulate the National Forest Policy for the first time in 1979, subsequently amended the policy in 1994, and the formation of separate Ministry of Environment and Forest in 1989 and declaration of 1990 as the Year of Environment and the decade of nineties to be the Decade of Environment.

13. In line with the preservation of global genetic diversity and environmental protection Bangladesh has signed several important international agreements. While, Bangladesh has a modest array of policies, plan and regulations to address major environmental topics in areas of forestry, fisheries, industries and water resources. Majority of regulations are generally weak and outdated. Mechanisms for enforcement of these regulations either do not exist or are simply ineffectual.

14. To strengthen the forest sector, Government of Bangladesh recently launched a Master Plan in collaboration with Asian Development Bank and United Nations Development Programme for over all improvement of forest and trees in the country. The Plan covers a period of twenty years from 1995 to 2015 and forges a long term strategy to guide broad-based development in Bangladesh. Three major group of programmes have been formulated in the plan to realize the vision (a) people-oriented programme (b) Production Directed Programmes and (c) Institutional Strengthening Programme.

15. In addition to the above initiative taken very recently, several other measures were undertaken to manage existing national forests and to expand forests and trees through reforestation and afforestation programme. Country-wide plantation programme, such as restoration of degraded forests and trees plantation outside forest areas have been operated. Amongst which community forestry, social forestry and agro-forestry practice are remarkable initiated by both government and non-government organizations. No single programme has so far been initiated by any training institute in the country.

16. Given this present situation, Bangladesh Public Administration Training Centre as an apex training institution of the country has undertaken a pioneer initiative in environmental development by tree plantation in its campus. This initiatives would not only maintain environment-friendly weather in the campus but also serves as a model for afforestation to other institutions of the country and also provide a demonstrative effect to the participating trainees of the centre.

Objectives of the study :

17. The main objective of the present study was to examine environment development by tree plantation of Training Institutes with special reference to BPATC. The nature of study is broadly exploratory with specific aim to identify the cause and effects environmental development of plantation specifically at the Bangladesh Public Administration Training Centre and other Training Institutes in general.

More specifically the study attempts to examine the following objectives :-

- (I) To under stand the role of trees in developing a friendly environment of a country.
- (II) To initiate tree plantation as a training institute in a most scientific way that would provide an integrated approach for environmental development and conservation.
- (III) To demonstrate the institutional effort by creating tree plantation model in the BPATC campus and recommend the most appropriate measures that suites the local environment.
- (IV) Present the clear options for benefit of tree plantation to the other training institutions for sustainable environmental development that can be replicated in a similar other areas of the country.

Methodology :

18. No single method is comprehensive enough to cover and highlight all the aspect of a given study within a limited period of time and as each and very method has its own strengths and weaknesses. The author of the present study therefore adapted a number of well established methods which were affordable and implementable within the specific period of time. However in undertaking the present study the following methods have been used :-

(a) **Primary Sources** : Several field visit of the study area were made to observe and comprehend the extent of the proposed issues of the study. Two sets of questionnaire have been used for collection of primary data, one set for local experts and professional of tree plantation and forest, the other for the selected staff and officers of BPATC associated in tree plantation (Please note the sample size of the study).

Besides, both formal and informal meeting and discussion with government officials, non-government personnel were held on several occasions and Ministry of Environment and Forest personnel involved in tree plantation programme were consulted.

(b) **Secondary Sources** : Moreover, secondary information and data collected from different sources, relevant documents and research reports available in the library consulted. Besides, in order to have the broad idea about the study as well as to formulate a conceptual framework of the present issue, relevant books, journals and articles available in the library have also been consulted, and as a reference some of them have been quoted in the present study.

Sample of the study :

19. BPATC has got 553 (Five hundred fifty three) personnel in four major categories e.g. class I, class II, class III and class IV. Stratified random sampling covering more than 50% percent of the total employee used in the present study. Out of these categories an attempt was made to ensure the greater number of representative character from class-I officers and officers

from Department of forest as well as Ministry of Environment and Forest included in the sample. This has also help to figure out the objectives of the study and also provide cross profile picture of the study.

Plan of Presentation :

20. The present study has been divided into ~~few~~ chapters. First chapter deals with the background of the study, e.g. objectives, scope, methodology and limitation of the study. Chapter II deals with the role of trees in developing environmental condition of a given region with particular reference to Bangladesh Public Administration Training Centre. Chapter III highlights the operational approaches of trees plantation followed by the comparative discussion of Indonesia and Malaysia case studies. Subsequently an attempt has been made, on the basis of this experience to suggest steps towards application of this silvicultural operation for BPATC possible application to the other training institutes in Bangladesh. ⁱⁿ ~~IV~~ an attempt has been made to provide comprehensive recommendations on the basis of the data and the information given by the respondents for expected tree plantation programme for BPATC and other training institutes for developing friendly environment and lesson for future design and implementation of this programme, ~~that~~ can be served as a potential references.

CHAPTER-II

Role of Trees in developing Environment

2.1 This chapter is directed towards identifying the role of trees in developing and maintaining healthy environmental condition of a country in general and Bangladesh Public Administration Training Centre (BPATC) in particular. In order to assess and findout the importance and role of trees following criteria has been employed. This criteria has been recommend by the experts and widely used in measuring the contribution of forest and trees in many studies of the tropical countries.

- (a) Economic contribution
- (b) Environmental contribution and
- (c) Aesthetic contribution.

2.2 Questionnaire was distributed amongst the faculty staff and professionals to provide their opinion on the role of trees in terms of the economic, environmental and aesthetic contribution. The chapter begins with a brief overview followed by the opinion given by the respondents.

2.3 Role of Trees in Economic Development

Human beings are depended on fbrests and trees for their survival and economic livelihood and quality of life for many centuries and this dependence remains equally applicable today and tomorrow. They are an integral part of the earth's life-support systems. Trees are highly diverse eco-systems, supporting millions of species and supplying wide range of resources. In addition, trees yield large quantities of forage, animal and plant food, medicines non-wood fibres and skins, essentials oils, guns, waxes, latex's and resign and many other non-timber commodities. The volume and value of these commodities is difficult to quantify, but they

provide substantial income and employment, and are important for the domestic economies of many communities and households.

2.4 Respondents were requested to mention the name of most important items of economic contribution that are commonly found in our society. This section tries to keep on record the diverse opinion given by the respondents. Some of the items have been rejected when it was found that those were not within scope of economic contribution and their weighted average do not carry the value of acceptance range.

2.5 The result of the opinions is being enumerated below in terms of the economic contribution in our society and the weighted average value.

- Creates opportunity to provide employment and livelihood.
- In construction of building and housing
- In making furniture
- In construction of road and bridges
- As a forage of animal
- In making medicine
- In making agricultural industry
- In making items of cottage industry.
- In running big industries
- As sunetuary of birds and insects
- Sources of income to many of us
- Reduces unemployment
- Raw materials for the industries
- Stops soil erosion and river bed sedimentation
- In making papers
- Are supporting to built kaitha house
- In making cigarettes and bidi
- As a slipper of rail road and bridge

- In making matches
- In making plywood
- In making vainer
- In making rubber.

2.6 To measure the intensity of this contribution in economic development in the present study four types scales e.g. (i) highest, (ii) moderate, (iii) low and (iv) not at all, have been used. Respondents asked to make their opinion on the items they considered important following scale mentioned above.

2.7 Table 1.1 below shows the respondents opinion on the intensity of tree's contribution in economic development. In this table only those items are shown whose weighted average considered as more than 60 percent of the total and the items have been classified into (i) wood product and (ii) non-wood product on the nature of the service given to our society. Only wood products contribution in economic development are shown in the table below :-

Table-1.1 : Wood product contribution in Economic Development

Trees provides	No.of respondents	High	Medium	Low
Food	120	80%	20%	
Fuel	107	85%	15%	
Fibre	165	63%	37	
Furniture	108	88%	22	
Fodder	105	53	47	
Shelter	107	62	38	
Timber	102	81	19	
Construction	105	54%	46%	
Agricultural	101	82%	18%	
Bridge/Culvert	107	50	50%	
Raw materials	91	54	26%	
Railway slipper	112	65	35	
Plywood	106	51	49	
Matches	111	67	43	

Source : Field Survey, 1996.

2.8 Table-1.1 represents the number of respondents of the item-wise intensity economic contribution. It shows that trees contribution in making the furniture has been rated 88% percent followed by fuel 85%, agricultural instrument 82% timber 81% percent and food 80% respectively of the wood product. Besides, wood products as a source of raw material for making various types cottage industries and household uses shown 74% percent railway slipper 65% matches 67% provide shelter 64% fibre 63% fodder, constructional material 54% and plywood 51% and bridge and culvert 50% respectively. While contribution of non-wood products in economic development is shown in the table 1.2.

Table-1.2 : Non-wood product contribution in economic development

Trees provides	No.of respondents	High	Medium	Low
Employment	121	87	13	
Medicine	103	85	15	
Source income	107	72	28	
Poverty alleviation	94	61	39	
Birds sanctuary	105	66	46	
Leaves	130	82	28	
Rubber	127	61	39	
Soil erosion	90	52	48	
Spices	93	56	44	
Fruits	118	88	22	
Vegetable	123	89	11	
Nut	96	51	49	
Jam/Jelly	81	48	42	
Bark	72	45	55	

Source : Field Survey, 1996.

2.9 The above shows that tree's contribution in providing non-wood products such as, vegetable has been 89% percent followed by fruit 88% employment 87% medicine 85% leaves for different uses 82% sources of income 72% birds and insect sanitary 66% and Rubber 67%

percent. Moreover, non-wood products also help and provide many other services amongst which poverty elevation, spices nuts, jam an jelly and bark were rated as important products that not only contributed economic development but also helps to the society in other ways.

2.10 From above analysis it appears that more 80 percent different wood-products produced from the forest and trees of Bangladesh is contributing economic development in various sects. Its gross contribution to economic product is about 10 billion, timber and fuelwood is account for almost half and the reminder representing the output of industrial forest products. On average wood-products industries in Bangladesh contributes about 2.3 percent to gross domestic products.

Environmental contribution :

2.11 Tree's contribution in developing environmental condition and in protecting ecosystem can not be measured in a single study. Following sections highlights only some of the major environmental aspects that would help us in making recommendation of the present study.

2.12 Trees are important environmental resources. They provide valuable environmental services, maintain local, regional and global natural system. Trees also protect soil loss and erosion especially in the areas of flood plain and heavy rainfall and retain moisture in soil, ensuring gradual supply of water to steams and rivers. Trees maintain the dynamic conditions necessary for their own continued existence and support other ecosystem for natural system.

2.13 The diverse specie of forest and trees access the farmland play an important role within ecosystem. For instance, no single species can create its own food from in organic material or completely decompose all its own wastes. Nor can any species maintain all the necessary characteristics of its habitual for its own persistence. Trees also play a vital role in the global carbon cycle. Trees and their soil contain about three time as much carbon as is currently held in the atmosphere. Trees absorb carbon dioxide from the atmosphere through photosynthesis and

release oxygen, whereas deforestation and subsequent deforestation of forest organic matter add carbon dioxide to the atmosphere.

2.14 Trees provide shelters of birds, bats, bees and other insect in the one hand and on the other trees depend on them for pollination of flowers and many kinds vertebrates for their distribution of seeds. Moreover, many trees, for example, depend also depend on a number of species of fungi to derive nutrients from soil. Free living soil bacteria fix nitrogen from the air, making available to trees. Small insects in the soil, such as earthworms, and termites not only modify the physical characteristics of the soil but also improve the growth of the trees.

2.15 In the following tables in attempt has been made to identify opinions of the respondents on the role of trees in environmental contribution. Table 2.1 shows the analysis of the respondents opinion.

Table-2.1 : Environmental contribution of Trees

Trees provides	No. of respondents	High	Medium	Low
Life cycle for all animals	105	58%	42%	
Absorb carbon dioxide	120	92%	8%	
Release Oxygen	120	92%	8%	
Retain soil water	107	88%	12%	
Increase fertility of soil	102	85%	15%	
Keeps temperature normal	97	81%	19%	
Bring rainfall	89	62%	38	
Protect flood	91	76%	24%	
Absorb dust and particle from smog	88	53%	47%	
Stabilize natural disaster	94	59%	41%	
Retain soil moisture	101	81%	19%	
Retain soil erosion	96	82%	18%	
Retard dessertification	115	88%	18%	
Provide Natural habitat	103	79%	21%	
Protect ecosystem	89	62%	38%	
Protect biodiversity	84	80%	20%	
Act as a Shelter	98	75%	25%	
Prevent drought	85	69%	51%	
Regulate and recharge the water of aquifers	81	51%	49%	
Increase the water absorption capacity	80	70%	30%	
Retain soil loss from rainfall	110	76%	24%	
Decrease Greenhouse effects	121	90%	10%	
Activate Photosynthesis Process	117	86%	14%	
Regulates Global Warming	118	89%	11%	
Unparalleled single most agents of environment	103	70%	30%	

Source : Field Survey, 1996.

2.16 The table 2.1 indicates that most of the respondents have not only reasonable idea about the items of environmental contribution of trees but also have individual feeling about the intensity of contribution. Absorption of carbon-dioxide and release of oxygen by the trees are being rated high-test 92% percent amongst the items identified followed by greenhouse-effect 90% Global Warming 89%, retard desertification and retain soil water 88% percent respectively. While, the commonly known photosynthesis process rated 86% percent, increase fertility of soil 85% soil erosion, 82% percent soil moist and keep the temperature normal 81% percent and protect bio-density 80% percent by most of the respondents.

2.17 Moreover, 79% percent of respondents rated that trees are providing natural hastily 76% percent flood protection, 75% percent stated trees act as shelter belt, 70% increase water absorption capacity and also considered trees as the unparallil single most potential agent of environment. While, 69% percent of respondents indicated that trees prevent drought, 62% percent protect ecosystem and occurs rainfall 59% stablize disaster, 58% percent life cycle for animals, 53% percent considered that trees absorb dust and particle fromsmog and 51% said regulate and recharge the water of underground acquires. The also indicates that some of the items can significantly contribute to both economic and environmental development.

Aesthetic contribution :

2.18 Trees aesthetic contribution have been recognized, since the beginning of civilization not only the by the Botanists, Zoologist and Ecologists but also by the different section of people ranging from an individual, Writer, Poet, Economist, Scientists, Doctors, Engineers and in some cases the Bureaucr. People from all walk of life in the past used to love the aesthetic beauty of the trees which attract them not only to visit the forest areas to enjoy the natural beauty but also make them romantic. In our culture, trees and forest play an important role in out, literature and religion and encourages naturalist to write many things on it and also offer material for scientic study. Over the years this phenomena, has been increased significantly and also given the due importance and recognition of aesthetic contribution both at Local, regional and national level. This recognition and importance results in creation of social forestry and ago-forestry in general

garden, nursery and parks in particular. Moreover, present widespread awareness and usefulness of the national beauty of the gardens and parks for recreation and in making films have gained recognition among policy planner and diction makers in recent years. Bangladesh Government has set-up arboriculture and selviculture responsible for making public gardens and parks throughout the country.

2.19 This section attempts to discuss the opinion given by the respondents on the aesthetic contribution of the trees. Table 2.2 highlights the opinion of the respondents below :-

Table-2.2 : Aesthetic contribution of trees

Trees provides	No. of respondents	High	Medium	Low
Increase the beauty of Environment	121	93%	07%	
Symbol of life	105	91%	9%	
Keeps mind fresh	107	80%	20%	
Symbol of Hope	96	74%	26%	
Symbol of peace	92	80%	20%	
Help to increase the creativity	90	77%	33%	
Encourage creativity	103	76%	34%	
Intimate friends	101	90%	10%	
Have unparallel contribution	100	97%	03%	
Attracts us	104	70%	30%	
Brings loveliness	106	82%	18%	

Source : Field Survey, 1996.

2.20 Table shows that 97% percent of respondents have expressed and recognized the unparallel aesthetic contribution of trees followed by 93% percent were agreed that trees increases the beauty of the environment 92% percent symbol of life and 91% percent as symbol of peace 90% rated trees as an intimate friend. While 82% percent stated that trees bring liveliness in the surrounding environment and 80% percent said that trees keep one's mind fresh

and 77% percent as help to increase the creativity, 74 percent as symbol of hope and 70 stated that it attract people at large.

2.21 On the basis of the respondents opinions given in the precedent sections all respondents were requested to make candid judgement on the BPATC's plantation programme as well as their assessment on the ways in the environmental development efforts that are being undertaken in the campus. In order to maintain and highlight the uniform sequence of the feed-back the following criteria used in the questionnaire. This would help us to understand the values of the centre's plantation programme and help to appraisal of forestry project, without which it is difficult to determine whether decision to increase or reduce forest area, or emphasis one particular species over other, are economically justified.

- a) Programme provides sufficient contribution
- b) Programme provides very good contribution
- c) Programme provides average contribution
- d) Programme provide no contribution.

2.22 Table 2.3 demonstrates respondents judgement and assessment of the plantation programme and its contribution in developing the campus environment.

Table-2.3 : Plantation programme and its contribution in developing environment

Criteria	No. of respondents	%
Sufficient	47	37.30
Good	58	46.03
Average	21	16.66
Not at all	-	-
Total	126	100.00

2.23 Table shows that 33.30 percent of respondents considered the BPATC's plantation programme and its contribution in developing the aesthetic beauty of the campus was sufficient. 54.03 percent indicated that the programme's considered it as average compared to the previous table 2.3 it shows that the BPATC's plantation programme not only contributing environmental development but also generating aesthetic beauty of the campus.

The Importance of Trees Valuation :

2.24 Valuation of trees contributing in developing and providing goods and services to the society not only help us in selection of appropriate species but also indicate us to reject and modification of the programme. In order to assess the priority to invest in conservation and development of environment, concern authority need to have a firm indication of what contribution these resources make to organisational economy. As McWeely emphasis that proper valuation of Trees contribution is only a fundamental steps because it informs the authority about how important biological diversity may be to national development objectives, it demonstrates how important an area is for the natural resources it contains, it reveals common interests in converging among various sectors and it facilitates comparison cost and benefit of different development proposals.

2.25 Moreover, proper trees valuation is essential to the appraisal of the programme and also important for policy analysis. Better forest and trees valuation can help planners to formulate effective policies, choose among project and allocate funds for trees plantation programme in the present but help us to figure out the issue. This aspect does not cover in the present study, but the opinions given by the respondent in the preceeding section enable the author to drawer as a recommendation about the importance of trees valuation in such study.

Plan of the Plantation Programme in the Centre :

2.26 A ship without radder can move towards any direction but it can hardly reaches its destination. This proverb is equally applicable in achieving goal of any programme. Given these

considerations, the present study also attempts highlights the planning aspects of the plantation programme of the centre and presents a series of successful models that have been applied in many parts of the country. This section summarizes the opinions of respondents about the type of plan require to formulate in order to carryout a successful plantation programme.

2.27 The table shows that 37.30 percent of respondents considered the present plantation programme and its contribution in developing the campus's environment was sufficient, 46.03 percent of respondents were of the opinion that the programme was moderate and only 16.66 percent considered the programme as average. The respondents were also requested to provide their views and suggestion for further improvement if they have only 32 respondents (%) have mentioned that there was further scope to improve the present programme.

2.28 Besides, the respondents also asked to mention extent of aesthetic contribution of BPATC's plantation programme Table 2.4 below shows their views of the respondents

Table-2.4 : Plantation Programme and its aesthetic contribution

Criteria	No. of respondents	%
Sufficient	42	33.30
Good	68	54.03
Average	16	13.57
Not at all	-	-
Total	126	100.00

about the planning programme of the centre followed by an overviews conventional and indigenous models of successful trees plantation programmes proposes a desired sequence of silvicultural plan and operations for enhancing environmental and aesthetic beauty of the centre.

2.29 Moreover, respondents were asked to make opinions as to whether BPATC should have any specific plantation programme of its own and what would be the basis of design to formulate a plan. Table 2.5 shows the opinions of the respondents about the plan of the plantation programme of the centre.

Table-2.5 : Duration of the Plantation Programme

Duration of plan	No. of respondents	%
Long-term	75	59.52
Short-term	34	26.98
Yearly plan	17	13.49
Total	126	100.00

Table-2.6 : Types of the Plantation Programme

Types of plan	No. of respondents	%
Row-wise	61	48.41
Rectangular	57	45.23
Other	08	06.34
Total	126	100.00

2.30 The above table 2.5 shows that in respect of duration of planning 59.52 percent of respondent considered that there should be a long-term plantation programme of 20 years to 25 years duration in the centre. 26.98 percent of respondents were of the opinion in favour short term plantation programme and its duration should be within 5 years, while only 13.49 percent preferred yearly plan.

2.31 The next table 2.6 shows opinion about the nature and of types plan where 48.41 percent of respondents considered that row-wise tree plantation should be given due importance and increase if the available space does not prevent to follow the above types, 45.23 percent favoured to go for rectangular type and only 6 percent of respondents did not mention any type to be followed while planning the plantation programme. Analysis of the above data reveals that BPATC should have a long-term comprehensive plantation programme with row-and rectangular types of trees.

Characteristics of Plantation Programme :

2.32 Experiences in the past have shown that a major cause of failure of many plantation programme in our country have been not only the failure to formulate appropriate plan properly but also lack of adequate character which represent basic factors of study area. Present section attempts to explore this issue by asking the respondents to make their own opinion about the characteristics major of plantation programme. Table 2.7 shows the opinion of the respondents.

Table-2.7 : Characteristics of Plantation programme

Types of character	No. of respondents	%
Nature of Location of the plot	115	91.26
Soil Texture	94	74.60
Type of area used for	108	85.71
Purpose of plantation	112	88.88
Types of roads	110	87.30
Availability of land	88	69.84
Types of nature of Trees	103	81.74
Protection SMP	80	63.49
Increase beautification	82	65.07

2.33 The above table shows that 91.26 percent of respondents indicated the nature of location of the plot as the main character of plantation programme, followed by 88.88 percent purpose of plantation, 87.30 percent types of roads and 85.71 percent the types of area used for. While 81.74 percent of respondents considered us types of nature of Trees, 69.84 percent on the basis of availability of land, 65.07 percent increase the beautification of land and 63.49 per as protection of suspended particulate matter (SPM).

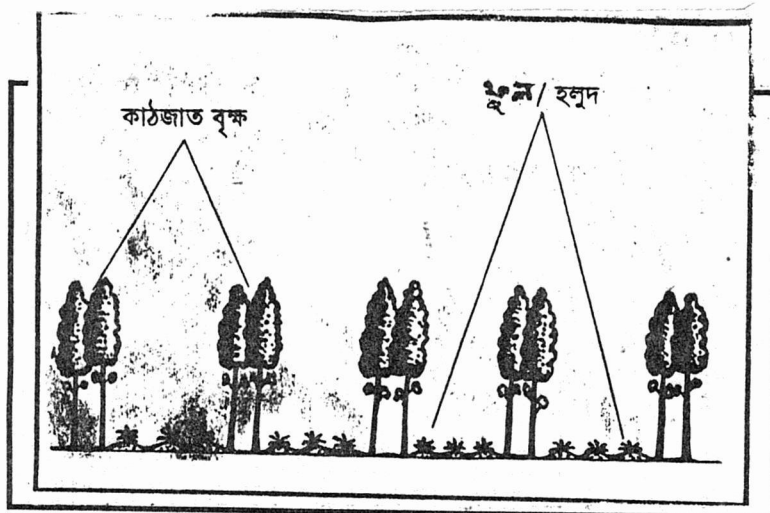
Module Tree Plantation :

2.34 A plan can not be considered comprehensive if it does not incorporate any recognised model for implementation of its both long and short-term programme. An attempt has been made in the present study to consider the issue and requested all the respondents to make their opinion on it. Ministry of Forest and Environment through its line agencies, has been over the years a successfully implemented a number of trees plantation models throughout the country. Whether any such model alone or in combination with more than one models can be incorporated in the BPATC's plantation programme has been considered. The present sections summarizes the respondents opinion about application of four models developed by the Department of Forest in the campus along with their positive and negative aspects.

2.35 A short introduction about the four models has given in the questionnaire so that each and every respondent have not only got the opportunity to familiar with them, but also provided the scope to make an unbiased opinion.

Model-I : Plantation & Agriculture :

2.36 This model is mainly applicable in the plain land where 4.5X4.5 feet East-west or North-south direction-wise two rows of wood species plantation can be grown. Thirty feet space is to be kept, vacant inside this row in order to planting of either fruit bearing or flower bearing non-wood trees. The model is shown belows :-

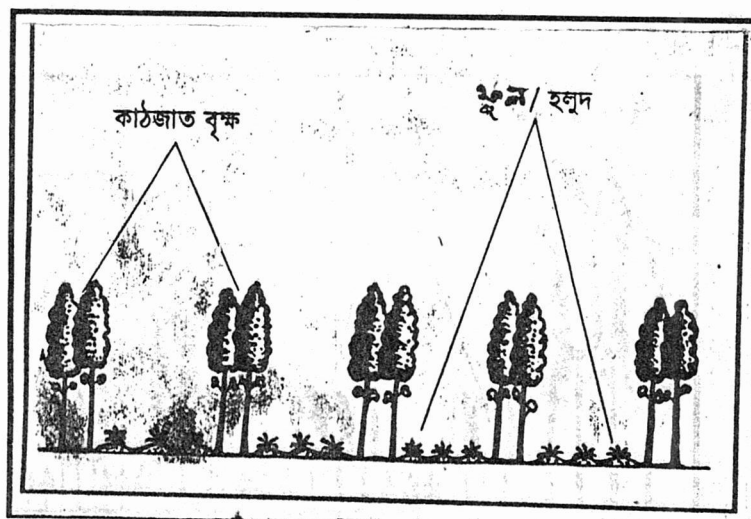


Model-I

2.37 Table-3.1 shows the opinion of the respondents. Overwhelming majority of the respondents 66 percent considered the model is most relevant and recommended it to implement in the campus. 23 percent of respondents considered the model is relevant and only 11 percent considered the model was not relevant.

Model-II : Tree Plantation and Fruit cultivation :

2.38 In this model, there is a provision of planting different types of wood and fruit bearing trees, wind brake in nature by 8X8 feet distances in seven rows around the campus. This model is given below :-

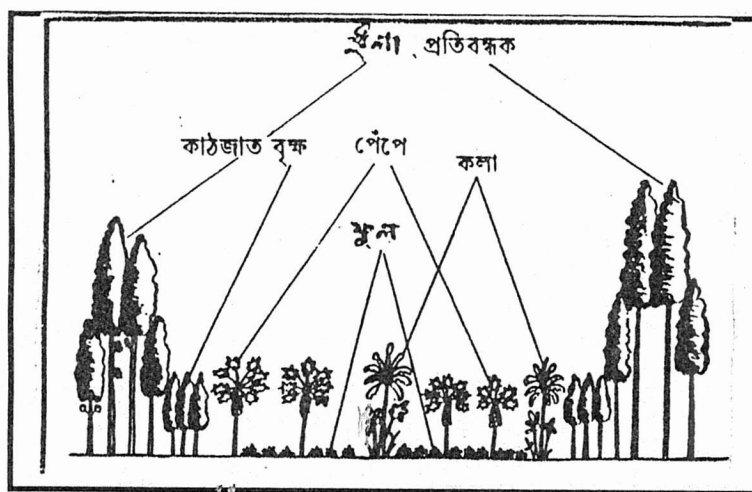


Model-2

2.39 Table-3.2 shows the opinion of the respondents about the model II. 51 percent made opinion in favour of this model and considered it as most relevant, 27 percent as relevant and 22 percent as no relevant for the campus.

Model-III : Tree Plantation, Agriculture and Fruit Cultivation :

2.40 In this model, there is a provision of planting wood species, fruit and vegetables in different parts of a single plot which is given below :-



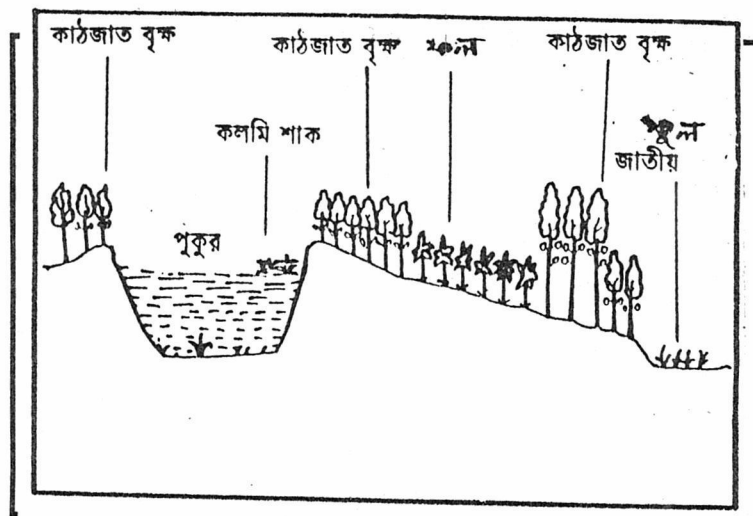
Model-3

2.41 Table 3 shows the opinion of the respondents. Over wheeling majority 82 percent of respondents considered this model as most relevant in the campus, only 16 percent considered it as relevant model far the campus. No opinion has been made against the application of this model.

Model -IV : Integrated Forest, Agriculture and Pisciculture :

2.42 This model has the wider the provision of planting various types of trees and crops and fishes in single areas where different ecosystem prevail. This type of integrated forest, agriculture

and pisciculture (DFAP) model is considered as one of best approach is a areas with diversive ecosystem. This can be seen below :-



Model-4

2.43 Table 3.1 represents the opinion of the respondents. 38 percent of respondents considered this model as most relevant, 24 percent as only relevant and 35 percent as not relevant in our campus. BPATC campus has the uniform ecosystem where this model would not be more appropriate as in case of the previous models. Nevertheless, there is a potential scope to utilize some of its features in combination with other models.

Table-3.1 : Comparative opinion about the application of different models

Name of the models	Most relevant	Relevant	No relevancy
1. Tree Plantation & Agriculture	46%	23%	31%
2. Tree Plantation & Fruit cultivation	51%	27%	22%
3. Tree Plantation Agriculture & Fruit cultivation	81%	19%	-
4. Integrated Forest, Agriculture & Pisciculture	38%	24%	38%

Source : Field Survey.

2.44 This table remonstrates that overwhelming majority, i.e. 81 percent of respondents favoured the Tree Plantation, Agriculture and Fruit cultivation model and considered it as a most relevant in the campus and 19 percent as relevant followed by model number two i.e. Tree Plantation and Fruit Cultivation in which 51% percent of respondents considered most relevant 27% percent as relevant and 22% as no relevancy. While 46% percent of respondents considered the first model as the most relevant and 23 percent as relevant and to 31 percent has no relevancy. Besides 38 percent of respondents considered the model number four as most relevant, 24% as relevant and 38% as not relevant.

Management Development Plantation Programme :

2.45 Each organization like directing, managing and administering its official matters, must formulate its own plantation policy, taking into account both local considerations and need to balance the values of trees for the future about the land use and management of plantation programme. In making the present management for sustainable use of trees a multi-sectoral approach is needed. In the following sections an attempt has been made to understand the present management.

2.46 A programme can not continue indefinitely without having commitment to the authority and systematic institutional management support. Present section attempts to analyse the respondents opinion about the centre's management effort, on order to operationalize the centre's plantation programme in more effectively, what are the steps are to be taken in future in order to modernize the centre's plantation effort. Respondents were requested to make their opinion about the programme covering wide range of issues. Overwhelming majority of the respondents i.e. 91% percent strongly endorsed their views that the plantation effort should not only be continuous programme but also motivation and involvement of all officers and staff should be ensured. This can possibly be done in the following ways :-

2.47 Respondents considered that in order to maintain the continuous intensive plantation programme in the campus following management steps are to be taken:-

- Provide training to the all officers/staffs working in BPATC
- Through arranging seminar/workshop
- Making attractive Poster and circulate widely
- Alternative leaflet and booklet with catchwords
- Arranging radio and Television programme
- Importance of trees are to be highlighted in the religious forum
- Usefulness of trees to presented through different cultural programme
- Observing Tree plantation weeks
- Arranging Tree plantation exhibition
- Usefulness of trees in our life is to be informed through mass media
- Making intensive visits to monitor the programme
- Observing Tree plantation programme through our participating trainees
- Providing incentive package for interested individual and group members
- Provision for awarding best workers in plantation programme
- Formulation appropriate policy and implementation strategies for plantation programme
- Preparing plantation calendar and make sure to implement it
- Assign and delegate the areas to the officers and staffs

- Distributing sampling of the trees to the employees
- Distributing tree plantation manuals among all.

Establishment of Nursery in the Centre :

2.48 Nursery is considered as the store-house of an organization for implementation of successful plantation programme. It can not only provide necessary sample of required species but also ensures the timely supply of sample throughout year. Considering the above fact, experts and policy planners strongly endorse the view that the organisation having plantation programme should have their own nursery. Present section attempts analyse the opinion of the respondents in establishing a own nursery for the centre. Table 4.1 represent the opinion of the respondents :-

Table-4.1 : Nursery in the centre

Variables	<u>The centre should have</u>		<u>Percent</u>	
	Yes	No	Yes	No
Establishment of Nursery	126	-	100%	-
Location of nursery within campus	110	16	87%	3%
Commercial nursery	33	93	26%	74%
Pilot nursery	21	105	16%	83%
Demonstrative nursery	107	19	84%	16%
Replicable to other institutions	116	10	92%	8%

Source : Field Survey.

2.49 The table 4.1 demonstrates the opinion about the nursery in the centre, 100 percent of respondents considered that the centre should have her own nursery and its location within the campus has been recommended by 87 percent. While 88 percent of respondent recommended that centre should have a demonstrative nursery, 16 percent in favour of pilot and 26 percent about commercial nursery. It is interesting to not here that 92% percent of respondents considered that this nursery can be treated as a model of its kind and can be replicable in other organisation of the country.

2.50 Apart from getting the above facilities the nursery should have the following services to render its centre and other organisations such as :-

- Tree plantation and nursery
- Brief resume of each and every species
- Criteria of selection of species on the basis of types of soil and weather
- Basic ideas of plantation about different types of species
- Knowledge of Treatment about the common diseases.

2.51 About all 100 percent respondents have expressed opinion that PATC's plantation programme can be replicated in the other training institutions as well as both public and NGO's office campuses. Respondents were also requested to make specific recommendations as to why this programme should be implemented elsewhere in the country. Table 4.2 gives an indication of recommendation of the respondents in terms of its implementation in the other organizations.

Table-4.2 : Reasons for Implementation outside BPATC

Reason for application	Number of Respondents	Percentage
This is one of the best model in the country	90	71%
Its standard and quality is one of the best in the country	85	67%
Operational procedures are very simple to follow	81	64%
No other comparable programme is found	87	69%
This plantation programme can easily be implemented	77	61%

Source : Field Survey

2.52 The table shows very positive and encouraging response from the respondents in terms of implementation of BPATC'S tree plantation programme in other training institutions and also public and NGO organisation. 71% percent of the respondents admitted that the BPATC's Tree plantation programme was one of the best model in the country. Sixty nine percent of the respondents considered that no other comparable programme like BPATC is found in the country. Sixty-seven percent feel that the standard and the quality of the centre's plantation model is not only one of the best but also to be replicated in the other parts of the country. Sixty-four percent of respondents expressed that there is no other plantation programme that can be followed in the other areas. While 61 percent of respondents considered that this plantation programme can easily be implemented in the other areas.

2.53 Analysis of this table lead to indicates that the plantation programe initiated by the Bangladesh Public Administration Training Centre (BPATC) as an apex training institution, has not only been unanimously appreciated by the respondents as a pioneer initiative in developing environmental conditions in the campus, but also, according to the opinions given by the respondents, serve as a demonstrative effect to the participating trainees of the centre. Moreover, this initiative would also maintain environment friendly weather in the campus and also serve as a model for plantation in other areas of the country.

CHAPTER-III

Operational Approaches of Tree Plantation and its application

3.1 As outlined in the previous chapter, a comprehensive plan of tree plantation programme with the utilization of effective indigenous model alone can provide a simple and effective method in achieving sustainable harvest of both timber and non-timber forest and trees products of a given region. This form of operational management has not only the added benefits of preserving balance environmental condition but also aesthetic value of the ecosystem, permitting the residents and the visitors to enjoy the national beauty and exploitation of diverse benefit. In the following sections an attempt has been made to identify the appropriate operational approaches of trees plantation programme and examine the possibility of introducing these approaches in the centre's plantation programme.

3.2 Professional foresters have been testing, developing and refining silvicultural techniques for managing tropical forests and trees for more than several decades. Given the appropriate site, species and planting some of these techniques have been quite successful. Unfortunately, almost all of these techniques designed mainly for the production of timber. Silvicultural systems for flower and fruit producing trees have received little attention. Over the years various communities in Bangladesh have started their own form of silviculture for developing environment and managing non-timber resources. Many of these systems are quite sophisticated and operations are being done by the trained personnel.

3.4 Within the present context, both conventional and indigenous forms of forest management can provide useful insight for appropriate silvicultural treatment of timber and non-timber trees. The purpose of this final chapter is to provide a brief review of the different silvicultural operations currently in use, to describe their application in the plantation programme of BPATC and other similar institutions and to assess their overall effectiveness in utilizing these approaches in our country.

3.5 The first section of this chapter focuses mainly on the components of silviculture of timber wood. Special attention is given to the individual operation that are most widely used to manipulate the floristic composition and structure of the trees. Selected examples of common silvicultural system are then presented to illustrate how different combination of these operations can be selected and scheduled to attain the maximum benefit.

3.6 The second section provides an overview of indigenous silvicultural management practices of non-timber trees. Third section attempt to integrate these two management practices in order to apply this approach in the plantation programme of Bangladesh Public Administration Training Centre (BPATC) and examine the possibility of its application in other training institutions. Conceptual discussion followed by analysis of the opinion of the respondents of the present study by proposing general sequence of silvicultural operations for developing balance growth and productivity.

Compnents of Silvicultural Operations :

3.7 Every silvicultural system is composed of individual operation that usually contribute to the overall management process of plantation. Although the details may very from system to system, the most common silvicultural operations applied in many tropical countries are as follows :-

- i) Harvesting
- ii) Refinement
- iii) Thinning
- iv) Liberation
- v) Selective Weeding
- vi) Diagnostic sampling and
- vii) Enrichment planting.

I) Harvesting :

3.8 Harvesting is the most fundamental and essential component of silvicultural operation in plantation management. While the primary purpose of this intervention is clearly the marchentable timber, tree felling can also play an important role in stimulating the regeneration and growth of certain species. It may be noted that detail information about the size, specific yield, controlled, selecting harvesting could be employed to replace those individuals that have passed their maximum productive value. The timber would have a high marginal value at this point and would probably be of better quality than if harvesting were delayed until the tree began to senesce and completely stop producing fruit and latex.

II) Refinement :

3.9 Given the high species-richness of most tropical forest and trees, the refinement operations are frequently used to simplify the flouristic composition of the stand. The goal refinement is to provide more utilization of site by desirable trees species. Frequent girdling, injection with arboricide or felling are used to remove the unwanted stems. This refinements operation frequently causes a favourable response in increasing the growth up to 50% percent and as such this practice has been applied for more than a centiny in Southeast Asia. The effectiveness of refinement however, is depend on the adequate supply of desirable saplings and poles to fill the "ecological void" created by treatment. If such advance regeneration does not exist, refinement can actually warsen the current situation.

III) Thinning :

3.10 Thinning involves the selective removal of stems of both timber and non-timber plants in order to favour the growth of the residual stand. This operation in frequently conducted in situations where there is an over abundance of tees are found but their normal growth is disturbed by the unesanting species. In making these stems, special care is taken to leave those trees with best form, most rapid growth and highest productivity.

IV) **Liberation :**

3.11 Liberation is used to promote the growth of valuable understory trees through the elimination of less desirable neighbouring competitors. It involves the selective treatment of individual trees and therefore is very dependable practice. A review of the existing literature suggest that this operation promotes significant increase in the growth and survive the target individual. Based on this findings, liberation would seen to be particularly promosing tool for the treatment non-timber forest resources.

V) **Selective Weeding :**

3.12 This operation decreases competition in the understory by removing the saplings, shrubs and seedlings of undesirable species. This operation is widely used in clearing and caring the non-wood timber trees plantation programme in our country. As emphasized by the Department of Forest in collaboration with Asian Development Bank and United Nations Development Programme (1995), selecting weeding offers the multiple benefits of creating reasonably uniform seedling distribution, ensuring a wide margin of the seedling mortality that will ultimately occur and providing considerable degree of choice in selection for individual for subsequent selvicultural activity.

VI) **Diagnostic Sapling :**

3.13 This operation technique provides the quantitative information on seedling abundance and survival, tree growth and available machantable volume required for prescribing or assessing the impact of every type of silvicultural operation. Inventories of trees are common examples of diagnostic sampling and the exact timing of this operations, is extremely variable, they are an inevitable component of every plantation Programme. Different sample designs and intensities are employed depending on the structure and composition of the local forest or trees which is found are of most common procedures in Southeast Asian management system.

VII) Enrichment Planting :

3.14 Many of the previous silvicultural operations discussed in the preceding sections are designed to procure and enhance natural regeneration of desirable species within the management area. In some environment, however, adequate regeneration may be lacking or be extremely difficult to establish even with intensive silvicultural treatment. In such cases, enrichment planting or “artificial regeneration” is frequently employed.

3.15 The intensity of this operation may range from a total dependence on artificial regeneration (as in plantation) to extensive planting within the areas regarded as unsuitable for natural regeneration operation to selective enrichment of isolated patches of plantation area to supplement existing populations of seedling and sapling. The later two types known as “extensive” and “intensive” enrichment planting respectively are the most relevant to the present discussion.

3.16 Extensive enrichment planting has been frequently employed in the tropical countries of India, Bangladesh and Srilanka. In this technique, planting lines are first started in the areas at a spacing of 10-20 metres. As much as possible the line should be oriented east-west to north-west to protect the suspended particulate matter and severe radiation. At the beginning of rainy season nursery-grown seedlings are then planted every 3-5 metres within the lines. the major constraints on this type of enrichment are relatively high cost and require frequent weeding and thinning of the planting stock. Given this limitation, extensive planting should only be applied in a larger-scale with caution should never be regarded as a best method of planting programme in our country.

3.17 While, intensive enrichment planting on the other hand, has met with greater success and is currently used Balda Garden and other areas in Bangladesh. The benefit of this operation is that planting is only those areas that not suitable, for example logging roads, skid trails and landings. Experience in different areas of Bangladesh, has shown that the survivorship of seedling transplantation is generally satisfactory (70-80 percent) although there is much

variability depending the species and site conditions. Seedling are easily raised in the nurseries mention in the earlier chapter at a modest cost and can easily be planted in the desired area with little difficulty (Manan 1992).

Application of Operational Components :

3.18 It appears from the above discussion that a successful plantation programme depends on the application of certain operation components. Once the benefits of individual operational components are known with sufficient precision, application of most appropriate component can be ensured. Moreover, application of such system require practical experience and in-depth understanding of the ecological, economic and administrative framework within which the system is to be applied. In the present study, an attempt has been made to explore the possibility of application of these operation components in the centre's plantation programme. Respondents were accordingly requested to make their opinion in this regard, they also requested to indicate whether the centre should follow any silvicultural system that has already been successfully applied in South Asian countries.

3.19 Table 4.1 shows the opinion of the respondents about application of operational components of the plantation programme in the centre.

Figure 4.1 Operational Components in the Plantation Programme

Components	No. of respondents	Percentage
Harvesting	120	95%
Refinement	91	72%
Thinning	107	84%
Liberation	85	67%
Selective Weeding	126	100%
Diagnostic Sampling	123	97%
Enrichment Planting	101	80%

Source : Field Survey.

3.20 The above table shows that there is a strong agreement in application of operational components in the center's tree plantation programme. Hundred percent of respondents considered selective weeding as one of most importance operational followed by 97 percent diagnostic sampling and 95 percent harvesting. While 84 percent considered thinning should continue as operational components, 80 percent as enrichment planting, 72 percent refinement and 67% percent on liberation components.

Development of Silvicultural System :

3.21 As it has been mentioned in the preceding sections of the chapter that this study would also focus a comparative study of plantation programmes in order to develop an appropriate system which can serve as a conceptual guide line for implementation of the centre's plantation programme.

3.22 Given this situation following discussion has been draw mainly from the Southeast Asian experience, assuming that the basic principle and operations outlined are equally applicable in Bangladesh context.

3.23 The silvicultural systems that have been developed over the years for tropical forest and trees can be divided mainly into two groups : (a) Polycyclic and (b) Monocyclic. Polycyclic systems are those in which commercial trees are harvested repeatedly in continual series of felling cycles. The length of this felling cycles is usually about half of the time required for a particular species to reach marchantable size. Mono-cyclic, on the otherhand, harvest all of marchantable volume in single felling operation, with the length of cycle being more or less equal to the rotation age of the species under exploitation. The difference between these two types of silviculture is that polycyclic system rely on existing crop of seedlings, saplings and poles in the forest or trees to produce harvestable crops for the next felling cycle. Mono-cyclic system ignore the accumulated growth of these smaller size classes and rely almost entirely on recruited seedlings to produce the next crop of trees. (Charles M. Peter 1992).

3.24 The Selective Felling System practiced in Indonesia is a useful example of a polycyclic silvicultural system. While the Malayan Uniform System and the Tropical Shelterwood System are both common examples of monocyclic systems.

Comparative Study :

(a) **Selective Felling System** : The Selective Felling System was first implemented in Indonesia in 1976. Initially, there was strong desire on the part of the government to increase the existing production of commercial timber from local forest. Second, there was growing appreciation of the important environmental benefit provided by intact forest (for example soil, water and biodiversity conservation) and to need to safeguard these functions whenever possible. Third, the management activities be extensive rather than intensive in nature and of relatively simple application.

3.25 The basic sequence of operations in the Indonesian Selective Felling System is listed in table 4.1. The system is composed of diagnostic sampling, harvesting, weeding and enrichment planting operations. Immediately after felling, weeding operations are initiated to enhance the growth of seedlings and saplings that have survived logging. Regeneration surveys are also conducted at this time, and any areas found to be deficient are enriched through planting. A second weeding is conducted few months later, and additional enrichment planting is employed as necessary to replenish existing seedling stocks. The continued growth of the harvestable volume for the next cutting cycle. The overall goal of the system is to produce a sustainable yield of timber and environment. (Jessup 1992).

3.26 Besides in Indonesia, this system has been applied with slight modification in a number of other countries including Nepal, Pakistan, Sri Lanka, India and Burma. In spite of some limitations, selection systems still represent the most cost-effective and efficient alternative for integrating sustained environment and plantation programme.

**Table-4.1 : Silvicultural operation and sequence of Application Indonesian
Selective Felling System**

Year	Months	Types of operation
F-2	Jan	- Pre-harvest sampling of regeneration - Harvest of Trees
F-1	As required	- Selection and marketing of harvest trees
F+0	As required	- Felling
F+0	Contineous	- Weeding and climbing cutting
F+0	As required	- Post harvest inventory - Enrichment planting (as required)
F+5	Contineous	- Weeding, enrichment planting, thinning of requirements

Note : All operations are referenced to the time of felling (F)

Source : Adapted from, Wadsworth 1992 and FAO 1993.

(b) **Malaysian Uniform System** : It is perhaps the most classic example of a monocyclic silvicultural system which include diagnosing sampling, harvesting, refinement, weeding and thinning. This system is based the presence of an adequate stocking of seedling regeneration that can respond favourably to the heavy canopy opening creating by logging. Logging is preceded by regeneration sampling and inventory and making of harvest trees, harvesting deffered if an insufficient seedling crop is encountered. Table 4.2 shows the operation and sequences of application in Malaysian Uniform System.

**Table-4.2 : Basic Silvicultural Operations and sequences of application in Malaysian
Uniform System**

Year	Months	Operation
F-1	Jan	- Pre-harvest sampling of regeneration - Harvest of Trees
F-	As required	- Felling, Poison girdling of uncouncted trees
F+3	Contineous	- Diagnostic sampling, - Weeding, cutting
F+5	As required	- Tending (as required)

Note : All operations are referenced to the time of felling (F)

Source : As above.

3.27 It may be mentioned here that the preceding discussion has been highlighted several consideration concerning the selvicultural treatment of tropical forest and tree plantation. The ultimate success of these techniques however, is largely dependent on the particular species and the site being managed. There is no single selvicultural system or package that can be blindly applied in every forest or tree plantation management.

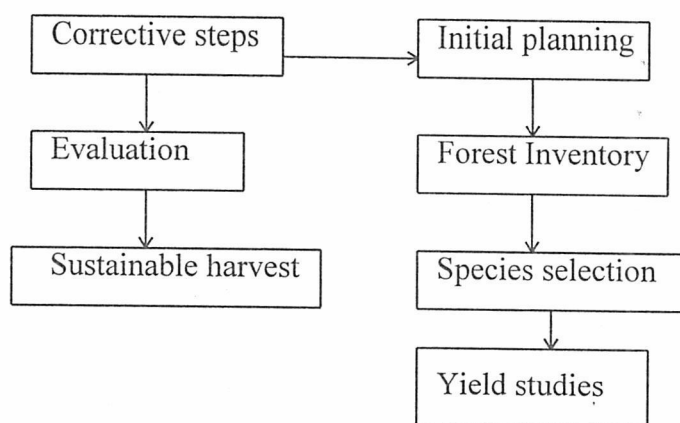
3.28 On the otherhand, most important features of both examples of forest and trees management is their inherent simplicity. Each form of system has minimum number of operations required to get job done.

Suggested Steps toward Application of Silvicultural Operations for BPATC :

3.29 A logical conclusion can be drawn from the preceding analysis that both conventional and indigenous silvicutlure practice have useful characteristics to offer in designing operational system for sustainable plantation management and environmental development. Ideally it appears

that such system would require minimum cost to apply and also provide other benefits. Based on these consideration a general framework for guiding the plantation programme in the centre is proposed in the figure 4.3.

Figure 4.3 : Framework for guiding plantation programme



3.30 It is important to emphasis at the outset, that sequence of operation in this figure does not represent an well established silviculture system. Rather it is a recommended series than can be used as a foundation for developing a functional and workable silviculture system. Moreover, the procedure attempt to indentify the most basic and simple combination of operations that can be applied to achieve the desire result. It is suggested however, that the scale of initial operations may be kept relatively small areas. Once a successful response has been observed, the treatments can then be safely applied on a larger scale.

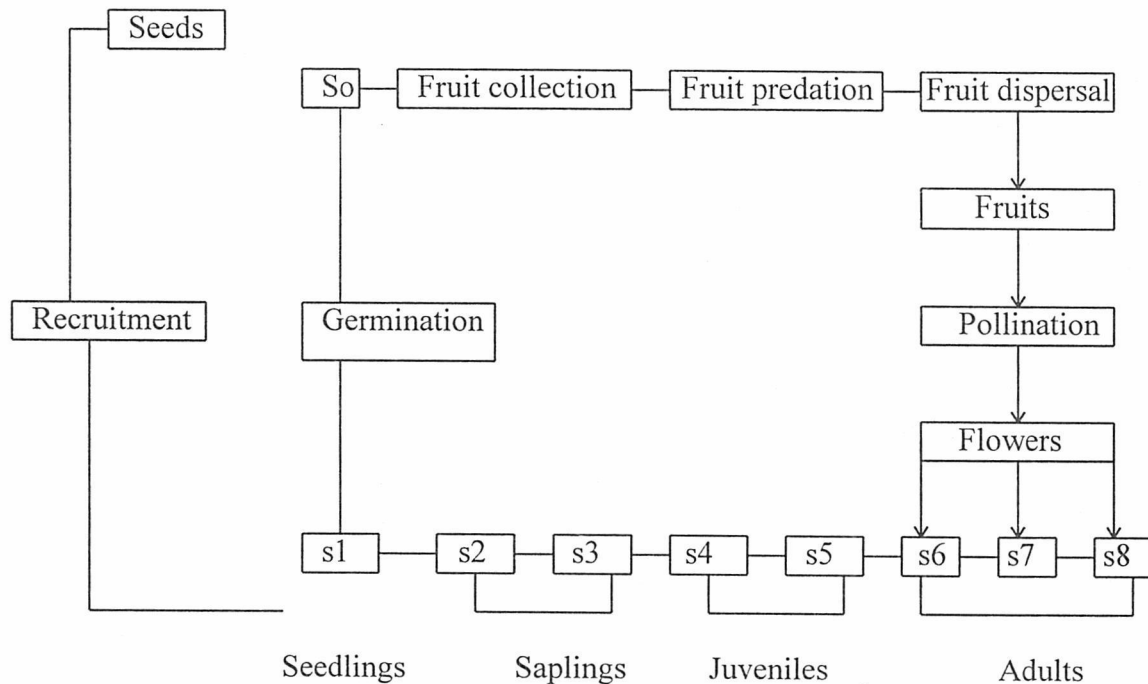
3.31 The procedure outlined in figure 4.3 is comprised of seven basic silvicultural operations e.g. (a) initial planning (b) forest inventory (c) species selection (d) yield studies (e) sustainable harvest (f) evaluation and (g) modification, having selective weeding, liberation thinning and enrichment planting components. Additional treatment may also required depending on the actual management objectives. In most situation, silvicultural treatment is required either to increase trees population and there productivity.

3.32 Given these management objectives, the first step is to make initial planning of the area to assess the size and distribution of common seedling population. If the initial planning appear sound inventory of trees of species should be began immediately in order to select the most appropriate species to the growth and survival of this regeneration. All shrubs, seedling and saplings of undesirable species should be removed during this operation. In all probability, the most intensive clean will be required directly under or quite near to the crowns of adult trees. This operation will be most effective if conducted several months prior to the normal fruiting season of the species in question.

3.33 As suggested earlier a systematic yield survey should be conducted when the particular species would attain sufficient maturity to provide maximum sustainable harvest. An additional care should be required to maintain this regeneration and to allow it to mature. Undesirable stems from both the middle and upper canopy should be removed during this operations and any new seedlings obtained through new treatment should later be selectively thinned.

3.34 In order to assess the effectiveness of this framework an evaluation to be done at the last phase of this procedure and the corrective measure would follow on the basis of recommendations given in the evaluation and appraisal study. The successful operation of this treatment will provide a very good plant population and maximum sustainable harvest. Generalized cycle diagram of a plant population is shown in the figure 4.4.

Figure 4.4 : Generalized Life Cycle Diagram of a Plant Population



3.35 At first glance, the sequence of operations described above may appear excessively complicated, tedious or even costly. It should be realized however, that not all of these steps will be required for many species. Given our current level of understanding about the ecology and management of non-timber trees, the critical point at this point is to figure out exactly which combination of treatment are most appropriate for different species. They can only be accomplished through a systematic, step-by-step assessment of cause and effect starting from the simple and then moving to the more complex. There is an urgent need to develop silvicultural systems for managing non-timber plantation project on a sustained yield basis. The overall strategy outlined above is perhaps the quirkiest, least expensive and most effective method of achieving this objectives.

CHAPTER-IV

Recommendations and Conclusion

4.1 The preceding four chapters have presented a large amount of information concerning the role of trees in developing environmental condition of a given region with special reference to Bangladesh Public Administration Training Centre (BPATC). Planning for sustainable management and the silvicultural treatment of centre's plantation programme. Following these information an attempt has been made to recommend key issues in formulating the ecological development and management of plantation programme. That can presumably be served as a potential reference for improving the centres tree plantation programme as well as the other organisation and training institutions. To make this recommendation more rational and accessible to the concern officer and BPATC authority, an outline of the major findings is presented below :-

- (i) Overwhelming major of the respondents strongly endorsed the view that centre's plantation programme should on the one hand, be strengthened and be continued process on the other.
- (ii) In planting the various species of trees environmental as well as aesthetic aspects are to be given more importance than that of its economic values.
- (iii) Both wood and non-wood types of trees are to be planted. Selection of both types of trees must be on the basis of location and purpose of plantation.
- (iv) A comprehensive master plan for plantation in the campus covering both short and long term is to be formulated in order to avoid wastage and duplication of work as well as to avoid the individual and group interest.
- (v) This comprehensive master plan should be approved by the Board of Governor of the center, which would on the one hand be considered by officers concerned as approved policy matter and the probability of major deviation from the original plan would minimize on the other. As

our experience in the past indicate that with the changes of the head of the authority of the center, the development policy of the plantation programme were seen as those that not only tried to restrict it but also deviated from the main plan.

(vi) Based on this consideration and researcher's personal observation, a general framework for guiding the plantation programme, as noted in the preceding chapter, should be strictly followed. Moreover, it is expected that models recommended by the respondents and the successful silvicultural practice discussed in the present study, that can latter be used as a foundation for developing plantation of trees and functional and cohesive selvicultural system in the centre.

(vii) Successful application of this framework should be based on the model most widely used and applicable to the centres physical conditions and configuration. Most notable feature of both the example of traditional plantation management however, is their inherent simplicity which has been successfully implemented by the department of forest in our country.

(viii) The location of the centre is apparently considered as one of the suitable area away from the hustle and bustle of the Dhaka mega-city, but, according to the opinion of the environmental experts, the location is not congenial for healthy living as the transmitting centre of Radio Bangladesh is located within the immediate vicinity of the centre and the Asian high-way has just touched the boundary wall of the centre. It is learnt from the different sources that the presence of high power radio transmitting station, exert negative influence on the human population particularly on the children and older people living for larger period of time. While the presence of highway can provide equal negative impact from the various types of traffic plying in the twenty-four hours on it. These traffic not only polluted the campus by leaving carbon monoxide, carbon dioxide and suspended particulate matter (SMP) but also creating uninterrupted noise pollution throughout the year.

(ix) In order to mitigate this situation, environmental experts and professional recommended that a shelter-belt is to be installed around the 54 acres of land by planting various types of trees having dust and sound absorbing capacity.

Lessons for the Future :

The brief assessment of centre's tree plantation programme and its management aspects presented above calls for an application of integrated plantation approach for successfully pursuing the path of sustainable development in the centre. Besides, to strengthening the forest and the tree plantation programme more intensive actions are to be taken throughout the country. Moreover, as a signatory of the various number of national and international protocols ranging from Human Habitation in 1972 to Agenda 21st in 1992. Bangladesh^{as} government in collaboration with UN system and NGO should undertake problem-oriented actions to develop the environmental conditions at local national and international level.

4.2 Actions needed at the local and national levels :

4.3 Each country must formulate its own forest policy, taking into account both local considerations and the need to balance the values of conserving forests for the future with current decisions about land use and management of forest ecosystems for multiple uses, including timber harvesting. In making the transition to sustainable use of forest resources, a multisectoral approach is needed. Development efforts and operations in other productive sectors, such as agriculture, energy, and industry, should promote forest conservation by minimizing destructive deforestation. An important first step will be for governments to change the existing incentives. This will involve :

- * the elimination of current policy distortions by correcting concession policy and royalty systems, removing explicit and implicit export subsidies on timber and other forest products, and revising incentives that encourage uncontrolled destruction of forests for expanding agriculture, and

- * the correction of market failures by defining property rights more clearly, and creating private incentives for planting trees, practicing preservation, and establishing sustainable management systems for timber production.

4.4 At the same time, governments will need to devise proper land use policies (including land tenure arrangements) that clearly spell out how forests are to be used. For example, different areas of an intact forest could be set aside for (1) conservation of biodiversity and environmental services, (2) production of timber and nonwood products, (3) conversion to sustainable agriculture, (4) restoration, and (5) multiple uses. Governments will also need to ensure that related sectors (such as agriculture, energy, transportation, and industry) pursue appropriate policies that take into account environmental consequences relating to forest ecosystems. In the case of agriculture, governments should take strong measures to accelerate production through intensified agriculture (i.e. improving production systems, land-use practices, technological packages, incentives, and markets). But clearly, governments will need to include the value of nonmarket forest functions into the cost-benefit analysis of development projects. They will also have to include the total values of forests and forest lands in national resource accounting systems.

Actions needed at the global level :

4.5 As individual countries take steps to improve the use of forest resources, the world community can-and must-help, as it carries the "burden of responsibility". In the 1990s, a number of important initiatives were launched - the Global Environment Facility, the Tropical Forestry Action Plan, debt-for-nature swaps, and the establishment of the International Tropical Forest Timber Organization. The international community needs to develop a global strategy for forest management supporting :

- * conservation of forests through sustainable management for multiple uses;
- * expansion of protected areas for the preservation of diverse forest ecosystems through global efforts;

- * augmentation of forest resources through planting trees to meet demand for forest products and to provide environmental services and ecosystem protection;
- * establishment of preconditions - including policy and institutional frameworks, research, and human capital development - for sustainable use of forest resources;
- * development of programs for intensifying agriculture and promoting rural development, especially in densely populated areas adjacent to forests; and
- * scientific research aimed at closing major gaps in our understanding of natural systems (such as forest ecosystem) and potential consequences of human interactions with forest ecosystems.

4.6 The international community also needs to increase funding markedly for the preservation of ecologically diverse forest ecosystems and reforestation, providing concessionary funding (in addition to contributing to the cost of preservation) where significant regional and global benefits are clear. As the rapid loss of natural forests, combined with other forms of environmental degradation, pushed the planet to the threshold of crisis, individual nations and the world community at large should-by sharing responsibility-accelerate the transition to the sustainable use of forest resources.

Trees must become part of our life :

4.7 The desire to promote healthy environment and protection of natural calamities/^{tree} must become part of the culture of everyone, not just professional and institutions, but employers, NGO and community organisations. This understanding is at the core of healthy environment.

A Final Word :

4.8 The initiative collectively described in the preceding paragraph as integrated conservation development project, with reference to BPATC plantation programme, in order to play significant role in developing and conserving environmental condition, decisive actions to need to be taken, jointly and separately by implementing organizations. Without deliberate concerted

effort by the interested organizations, replication and its success for development of environment will be bleak.

4.9 There are many examples coming from Western and eastern world who have not only contributed to their success in plantation programme but also earned their reputation in protecting healthy environment in a given region. We have learnt much since Stockholem to Rio about how to promote healthy environment but fail to build a success story that trees can not only provide life sustaining inputs but also protect as from diseases. We know that healthy area is a sustainable area. This leads to the conclusion that innovative well designed integrated environment development that constructively address the requirement of residents and participating officer's of the centre, are essential to the conservation of biodiversity and thus to sustainable development.

The End

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বাংলাদেশ লোক-প্রশাসন প্রশিক্ষণ কেন্দ্র
সাভার, ঢাকা

প্রশিক্ষণ প্রতিষ্ঠান সমূহে বৃক্ষ রোপনের মাধ্যমে পরিবেশ উন্নয়ন :
বিপিএটিসির উপর একটি ঘটনা সমীক্ষা

প্রশ্নমালা

[এই জরীপে সংগৃহীত তথ্যাবলী কেন্দ্রের একটি গবেষণা প্রকল্পে ব্যবহৃত হবে। প্রজন্য উত্তরদাতার নাম প্রকাশ করা হবে না এবং প্রদেয় তথ্যাবলী কেবলমাত্র এই গবেষণা প্রকল্পের মধ্যে সীমিত থাকবে]

প্রথম অংশ

- ১.০ উত্তর দাতার চিহ্ন :
- ১.১ উত্তর দাতার নাম (ঐচ্ছিক) :
- (ক) বয়স [] (খ) বিবাহিত [] (গ) অবিবাহিত []
- (ঘ) মহিলা [] (পুরুষ) [] (টিক চিনহ দিন)
- ১.২ শিক্ষাগত যোগ্যতা :
- ১.৩ বর্তমান পেশা :
- ১.৪ কেন্দ্রে কত দিন যাবৎ চাকরী করছেন : বৎসর মাস

দ্বিতীয় অংশ

- ২.০ উন্নয়নে গাছের ভূমিকা

দৈনন্দিন জীবনে গাছের প্রয়োজনীয়তা অপরিসীম ও বহুমুখী। গাছ আমাদের উন্নয়নে বহু বিধ অবদান রেখে থাকে। গাছের এই সামগ্রিক অবদানের প্রকৃতির (nature) উপর ভিত্তি করে নিম্নোক্ত প্রধান শ্রেণীতে ভাগ করা যায় :-

- (ক) অর্থনৈতিক অবদান []
- (খ) পরিবেশ উন্নয়নে অবদান []
- (গ) নান্দনিক অবদান []
- (ঘ) অন্য কোন অবদান অনুগ্রহ পূর্বক নাম লিখুন

২.১(ক) অর্থনৈতিক উন্নয়নে গাছের অবদান

গাছের অবদানের গভীরতা (intensity) পরিমাপের জন্য এই সমীক্ষায় চার প্রকার অর্থঃ সর্বোচ্চ (Highest) মধ্যম (Moderate), নিম্ন (Low) এবং শূন্য (Not at all) স্কেলে ভাগ করা হয়েছে। আপনি গাছের নিম্নোক্ত অবদান সমূহকে যে মানে (Scale) দেখছেন সেই মানের ঘরে টিক [] চিহ্ন দিন।

	সর্বোচ্চ	মধ্যম	নিম্ন	শূন্য
	৩	২	১	০
- কর্মসংস্থান ও জীবিকা অর্জনের সুযোগ সৃষ্টি করে	[]	[]	[]	[]
- রান্নায় ও ইট ভাটায় জ্বালানী হিসেবে ব্যবহৃত হয়	[]	[]	[]	[]
- নির্মাণ কাজে কাঠ ও খুঁটি হিসেবে	[]	[]	[]	[]
- খাদ্যের জন্য ফল/মূল হিসেবে	[]	[]	[]	[]
- গৃহ পালিত পশুর জন্য খাদ্য	[]	[]	[]	[]
- প্রয়োজনীয় ওষধী প্রস্তুত করে	[]	[]	[]	[]
- আসবাবপত্র তৈরিতে	[]	[]	[]	[]
- ঘরবাড়ী নির্মাণে	[]	[]	[]	[]
- সেতু নির্মাণে	[]	[]	[]	[]
- কৃষি যন্ত্রপাতি প্রস্তুত করতে	[]	[]	[]	[]
- কুটির শিল্পের বিভিন্ন পণ্য	[]	[]	[]	[]
- বহুৎ কারখানায়	[]	[]	[]	[]
- পশুপাখী সংরক্ষণে সহায়তা করে	[]	[]	[]	[]
- গাছ বিক্রির মাধ্যমে নগদ অর্থ উপার্জন	[]	[]	[]	[]
- আয়ের উৎস হিসেবে	[]	[]	[]	[]
- বেকারত্ব দূর করে	[]	[]	[]	[]
- শিল্পের কাঁচামাল সরবরাহ করে	[]	[]	[]	[]
- ভূমি ক্ষয় ও নদী ভরাট প্রতিরোধ করে	[]	[]	[]	[]
- অন্যান্য অবদান (যদি থাকে নাম উল্লেখ করুন অনুগ্রহ পূর্বক)।				
- কাগজ প্রস্তুত করতে	[]	[]	[]	[]

- পাখীর খাদ্য এবং আবাসস্থল হিসেবে	[]	[]	[]	[]
- গাছের পাতা গৃহ নির্মাণে ব্যবহৃত হয়	[]	[]	[]	[]
- বিড়ি/সিগারেট প্রস্তুত করতে	[]	[]	[]	[]
- রেলের স্লিপার হিসেবে	[]	[]	[]	[]
- দেয়াশলাই প্রস্তুত করতে	[]	[]	[]	[]
- প্লাইউড প্রস্তুত করতে	[]	[]	[]	[]
- ভিনিয়ার প্রস্তুত করতে	[]	[]	[]	[]
- রাবার প্রস্তুত করতে	[]	[]	[]	[]

২.২ পরিবেশ উন্নয়নে গাছের অবদান

আপনি যে সকল অবদানের সাথে একমত তার ডানে টিক [] চিহ্ন দিন।

	সর্বোচ্চ	মধ্যম	নিম্ন	শূন্য
	৩	২	১	০
- সকল প্রাণীকুলের জন্য "জীবন চক্র" গঠনে সহায়তা করে	[]	[]	[]	[]
- কার্বনডাই অক্সাইড শোষণ করে	[]	[]	[]	[]
- অক্সিজেন সৃষ্টি করে	[]	[]	[]	[]
- মাটির পানি শোষণ ক্ষমতা বাড়ায়	[]	[]	[]	[]
- বৃক্ষের পাতা মাটির উর্বরতা বৃদ্ধি করে	[]	[]	[]	[]
- জৈব সার চক্র বজায় রাখে	[]	[]	[]	[]
- তাপমাত্রা স্বাভাবিক রাখে	[]	[]	[]	[]
- বৃষ্টিপাত ঘটায়	[]	[]	[]	[]
- বন্যা প্রতিরোধ করে	[]	[]	[]	[]
- বৃক্ষের শিকড় সৃষ্টি 'নডিউল' বায়ুমন্ডল থেকে নাইট্রোজেন সংগ্রহ করে প্রাকৃতিক প্রক্রিয়ায় মাটির উর্বরতা বৃদ্ধি করে	[]	[]	[]	[]
- জ্বালানীর পরিত্যক্ত খোঁয়া পরিশোধন করে	[]	[]	[]	[]
- প্রাকৃতিক দুর্যোগ প্রতিহত করে	[]	[]	[]	[]
- মাটির আদ্রতা বৃদ্ধি করে	[]	[]	[]	[]

- মাটির ক্ষয়রোধ করে	[]	[]	[]	[]
- আবহাওয়ার তীব্রতা কমাতে হলে	[]	[]	[]	[]
- মরুময়তা প্রতিরোধ করে	[]	[]	[]	[]
- বাতাসের প্রবল চাপ প্রতিহত করে	[]	[]	[]	[]
- পশু পাখির সবাভাবিক আশ্রয়স্থল প্রদান করে	[]	[]	[]	[]
- নানা-জীব জন্তুর জীবন ধারণে অনুকূল পরিবেশ সৃষ্টি করে	[]	[]	[]	[]
- খরা প্রতিরোধ করে	[]	[]	[]	[]
- মাটির নীচের পানির স্তর সবাভাবিক রাখে	[]	[]	[]	[]
- মাটির পানি শোষণ ক্ষমতা বাড়ায়	[]	[]	[]	[]
- বৃষ্টির পানি সরণ হ্রাস করে	[]	[]	[]	[]
- পরিবেশ উন্নয়নে সর্বশ্রেষ্ঠ একক এজেন্ট হিসেবে কাজ করে	[]	[]	[]	[]
- গ্রীণ হাউজ প্রতিক্রিয়া সৃষ্টিতে বাধা প্রদান করে	[]	[]	[]	[]
- অন্যান্য	[]	[]	[]	[]

২.৩ গাছের নান্দনিক অবদান

	সর্বোচ্চ	মধ্যম	নিম্ন	শূন্য
	৩	২	১	০
- পরিবেশের সৌন্দর্য্য বৃদ্ধি করে	[]	[]	[]	[]
- বৃক্ষরাজী জীবনের প্রতীক	[]	[]	[]	[]
- পরিপাশবকে বৈচিত্র্যময় করে তোলে	[]	[]	[]	[]
- মনকে প্রফুল্ল করে	[]	[]	[]	[]
- গাছ জীবনের প্রতীক	[]	[]	[]	[]
- শান্তির প্রতীক	[]	[]	[]	[]
- আশার প্রতীক	[]	[]	[]	[]
- মানুষের সৃজন শীলতা বৃদ্ধিতে সহায়তা করে	[]	[]	[]	[]
- সৃষ্টি ধর্মী কাজে অনুপ্রেরণা জোগায়	[]	[]	[]	[]
- গাছ মানুষের শব্দশব্দ মিথ্র	[]	[]	[]	[]

- | | | | | |
|-----------------------------------|-----|-----|-----|-----|
| - গাছের একটি মোহনীয় অবদান রয়েছে | [] | [] | [] | [] |
| - গাছ আমাদের আকর্ষণ করে | [] | [] | [] | [] |
| - নয়নে শীতলতা আনায়ন করে | [] | [] | [] | [] |

তৃতীয় অংশ

৩.০ উপযুক্ত অবদান থেকে দেখা যাচ্ছে যে, আমাদের দৈনন্দিন জীবনে গাছের প্রয়োজনীয়তা অপরিসীম। একটি এলাকার সামগ্রিক উন্নয়নে গাছের বিকল্প নেই। বিপিএটিসি চত্বরে সৌন্দর্য বৃদ্ধি ও সামগ্রিক উন্নয়নের জন্য বৃক্ষ রোপণ কার্যক্রম শুরু হয়েছে। এই কার্যক্রমকে একটি অন্যান্য, অনুসরণীয় পর্যায়ে উন্নীত করতে আরো কি কি পদক্ষেপ গ্রহণ করা উচিত বলে আপনি মনে করেন। সমীক্ষার এই অংশে কেন্দ্রের চত্বরে যে ভাবে গাছ লাগানো হচ্ছে সে প্রসঙ্গে নিম্নোক্ত প্রশ্নের আলোকে মতামত দেয়ার জন্য অনুরোধ করা হচ্ছে :-

৩.১ বর্তমানে যেভাবে গাছ লাগানো হচ্ছে তা কেন্দ্রের পরিবেশ উন্নয়নে

- [] যথেষ্ট অবদান রাখবে,
- [] খুব ভাল অবদান রাখবে,
- [] মোটামুটি অবদান রাখবে,
- [] মোটেই অবদান রাখবে না,

উত্তর না হলে উন্নয়নের সবক্ষেত্রে আপনার পরামর্শ নিম্নে লিপিবদ্ধ করুন।

(ক)..... (খ) (গ)

৩.২ বর্তমানে যেভাবে গাছ লাগানো হচ্ছে তা কেন্দ্রের সৌন্দর্য বৃদ্ধির জন্য

- [] যথেষ্ট অবদান রাখবে
- [] খুব ভাল অবদান রাখবে
- [] মোটামুটি অবদান রাখবে
- [] মোটেই অবদান রাখবে না

উত্তর না হলে সৌন্দর্য বৃদ্ধির জন্য আপনার পরামর্শ নিম্নে লিপিবদ্ধ করুন।

(ক)

(খ)

(গ)

৩.৩ কেন্দ্রের কোন এলাকায় কি ধরনের গাছ লাগানো হবে তার একটি পরিকল্পনা থাকা উচিত হ্যাঁ [] না []

৩.৪ উত্তর হ্যাঁ হলে কোন জমির অবস্থান প্রকৃতির ভিত্তিতে কোথায় কোন গাছ লাগাতে হবে তার একটি নকশা প্রণয়ন করা উচিত। হ্যাঁ [] না []

(ক) সারিবদ্ধ বাগান হওয়া উচিত []

(খ) আয়ত বাগান হওয়া উচিত []

(গ) অন্যান্য [] নাম উল্লেখ করুন প্লিজ।

.....

৩.৫ এই পরিকল্পনাটি দীর্ঘ মেয়াদী (২০ থেকে ২৫ বৎসর) হওয়া উচিত হ্যাঁ [] না []

৩.৬ গাছ লাগানোর এই পরিকল্পনা যে সকল বৈশিষ্ট্যের ভিত্তিতে প্রণীত হওয়া উচিত :-

(ক) জমির অবস্থানের ভিত্তিতে []

(খ) মাটির প্রকৃতির ভিত্তিতে []

(গ) অফিস/ডরমিটরী/আবাসিক এলাকার ভিত্তিতে []

(ঘ) কোন উদ্দেশ্যে গাছ লাগানো হচ্ছে তার ভিত্তিতে []

(ঙ) রাস্তা ও বাউন্ডারী এলাকার ভিত্তিতে []

(চ) জমির প্রাপ্যতার ভিত্তিতে []

(ছ) গাছের প্রকৃতির ভিত্তিতে []

(জ) খেলা ও রাসায়নিক দ্রব্য এবং গ্রহণ করায়
ক্ষমতার আলোকে []

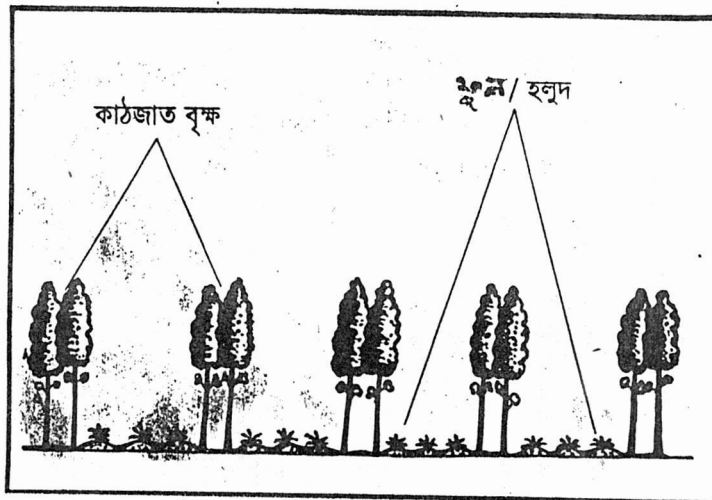
(ঝ) সৌন্দর্য্য বৃদ্ধির বিষয়ের আলোকে []

(এ৩) অন্যান্য বৈশিষ্ট্য (যদি থাকে নাম উল্লেখ করুন অনুগ্রহ পূর্বক)

৩.৭ বৃক্ষ রোপনের জন্য বাংলাদেশ বন অধিদপ্তর বিভিন্ন ধরনের মডেল পদ্ধতি প্রচলনের প্রচেষ্টা চালিয়েছেন। জানা গেছে এসব মডেল বিভিন্ন স্থানে সাফল্যের সাথে প্রয়োগ করা হচ্ছে। কেন্দ্রের চত্বরে এই সকল মডেলের যে কোন একটি অথবা এদের সমন্বয়ে একটি মডেল চালু করা যায় কিনা, এ ব্যাপারে নিম্নে মতামত দেয়ার জন্য অনুরোধ করা হলো।
(মডেলগুলো সম্পর্কে ধারণা লাভের জন্য প্রতিটি মডেলের চিত্র তুলে ধরা হলো)।

মডেল-১ : বৃক্ষ রোপন ও কৃষিজমি

৩.৮ এ মডেল সমতল জমির উপযোগী। এতে ৪.৫x৪.৫ ফুট পূর্ব-পশ্চিমে বা উত্তর দক্ষিণে লাইন বরাবর প্রতিসারিতে দুই সারি বন প্রজাতির চারা রোপন করা হয়। দুইটি সারির ৩০ ফুট মধ্যবর্তী জায়গায় ফুলের অথবা ফসলের জন্য রাখা হয়। নিম্নের চিত্রে এই মডেল দেখানো হলো :



নং নকশা

৩.৯

উপযুক্ত মডেলের চিত্রে দেখে আপনার এ সম্পর্কে একটি মৌলিক ধারণা হলো।
এই ধারণার প্রেক্ষিতে এই মডেলটি কেন্দ্রের চত্বরে বাস্তবায়নের সবক্ষে আপনার মতামত

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বিপক্ষে মতামত :

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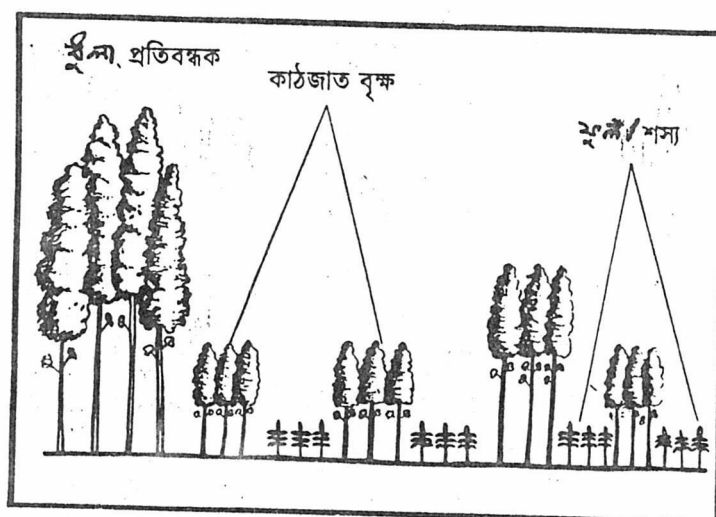
৪।

৫।

মডেল-২ : বৃক্ষ রোপন ও ফলের চাষ

৩.১০

এই মডেলে ৮ ফুট X ৮ ফুট দূরত্বে কেন্দ্র চত্বরের চারিদিকে বায়ু রোধক (Wind Brake) হিসেবে মোট সাতটি সারিতে নানা প্রকার পছন্দ সহ বৃক্ষ এবং ফল রোপন করা হয়। নিম্নের চিত্রে মডেলটি দেখানো হলো :



২নং নকশা

৩.১১

মডেলটি কেন্দ্রের চত্বরে বাস্তবায়নের সবক্ষে মতামত :

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বিপক্ষে মতামত :

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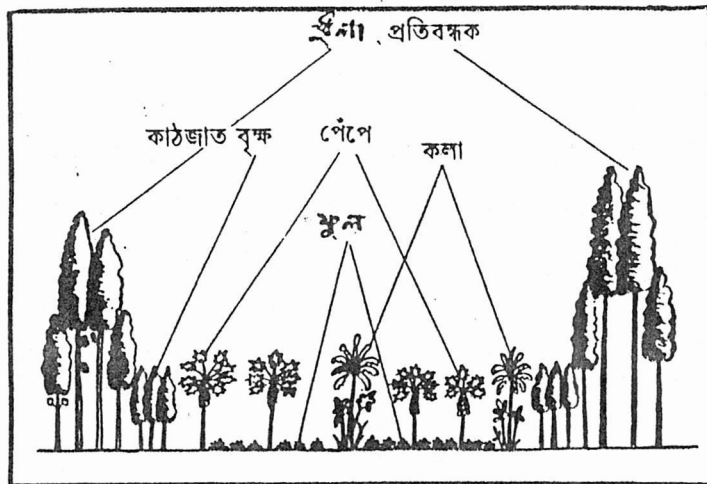
৪।

৫।

মডেল-৩ : বহু রোপন কৃষি কাজ ও ফলের চাষ

৩.১২

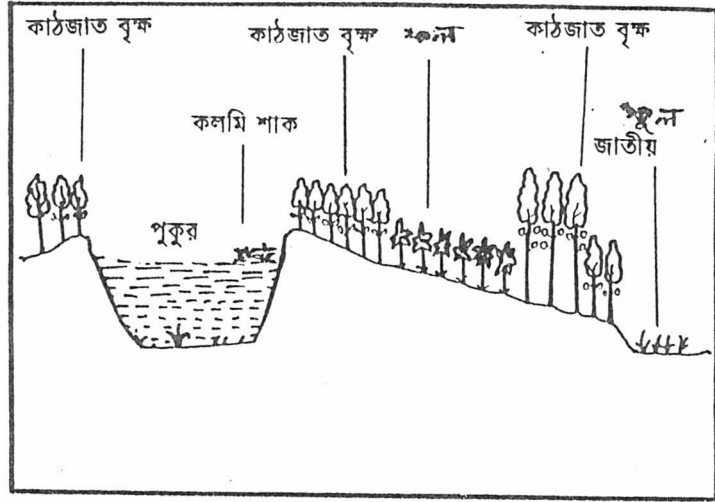
এই মডেলে একই প্লটে নির্ধারিত পৃথক পৃথক অংশে বন প্রজাতি, ফল প্রজাতি ও শাকসবজি চাষাবাদ করার ব্যবস্থা রয়েছে ।



নং নকশা

মডেল-৪ : সমন্বিত বৃক্ষ-কৃষি-ফল ও মৎস্য চাষ পদ্ধতি

৩.১৩ এই মডেলে সমতল জমিতে বৃক্ষ রোপন জমি, ফল ও পুকুর/লেকে মৎস্য চাষের ব্যবস্থা করা হয়। নিম্নের চিত্রে প্রস্তাবিত মডেলটি দেখানো হলো :



৪ নং নকশা

কেন্দ্রের চত্বরে সামগ্রিক ভূমি বিন্যাসের আংগিকে এই মডেল এর সদপক্ষে আপনার

মতামত :

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এই মডেলের বিপক্ষে আপনার মতামত :

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৫।

৪র্থ অংশ

বৃক্ষ রোপণ ও পরিচর্যাৰ জনগণকে উদ্বুদ্ধ ও সংগঠিতকৰণ

৪.০ কেন্দ্ৰৰ চত্বৰে নীৰিড ভাবে বৃক্ষ রোপনের কাৰ্যক্রমকে অব্যাহত রাখাৰ জন্য কি কি পদক্ষেপ গ্রহণ করা উচিত বলে আপনি মনে করেন ।

৪.১ (ক) বৃক্ষ রোপণ কাৰ্যক্রমকে একটি নিৰবচ্ছিন্ন কাৰ্যক্রমে পরিণত করতে হবে

হ্যাঁ [] না []

(খ) অন্যান্য সকল কর্মকর্তা/কর্মচারী নিৰ্বিশেষে উদ্বুদ্ধ করা দরকার

হ্যাঁ [] না []

(গ) কিতাবে উদ্বুদ্ধ করা সম্ভব বলে আপনি মনে করেন । নিম্নের বক্তব্যের

সাথে একমত হলে টিক [] চিহ্ন দিন ।

- প্রশিক্ষণের ব্যবস্থা করে []
- সেমিনার/ওয়ার্কশোপের মাধ্যমে []
- পোষ্টার ভিটকার লাগিয়ে []
- মনোমুগ্ধকর স্লেগান সম্বলিত বোর্ড স্থাপন করে []
- ভিডিও দর্শনের ব্যবস্থা করে []
- ধর্মীয় অনুষ্ঠানে গাছ লাগানো এবং পরিচর্যাৰ গুরুত্ব তুলে ধরে []
- বিভিন্ন ধরনের সাংস্কৃতিক কাৰ্যকলাপের মাধ্যমে []
- বৃক্ষ রোপণ সপ্তাহ পালন করে []
- বৃক্ষ মেলাৰ আয়োজন করে []
- বৃক্ষের উপকারিতা সম্পর্কে অবহিত করে []
- মাঠ পর্যায়ে পরিদর্শনের মাধ্যমে []
- বৃক্ষ প্রিয় ব্যক্তিত্বের পরামর্শ গ্রহণে []
- কেন্দ্ৰৰ প্রশিক্ষার্থীদের মাধ্যমে বৃক্ষ রোপণ কাৰ্যক্রম চালু করলে []
- কেন্দ্ৰ কতৃপক্ষ বৃক্ষ রোপণে উৎসাহদানের মাধ্যমে []
- যিনি গাছ ভাল বাসেন তাকে পুরস্কৃত করলে []
- কেন্দ্ৰ কতৃপক্ষ আইন প্রণয়ন করে []

- বৃক্ষ রোপণ কার্যক্রমের বাৎসরিক কর্মপরিকল্পনা প্রস্তুত করে []
- কর্মকর্তা/কর্মচারী নির্বিশেষে এলাকা চিহ্নিত করে দিলে []
- সকলের মধ্যে চারা বিতরণ করে []
- বৃক্ষ রোপণ পরিচর্যা ম্যানুয়েল সকলের মধ্যে বিতরণ করে []

৫.০ বৃক্ষ রোপণ কার্যক্রম অব্যাহত রাখার জন্য কেন্দ্রের একটি নিজস্ব নার্সারী বা বীজতলা খাঁকার ব্যাপারে আপনার মতামত ।

৫.১ ভাল বাগান সৃষ্টির জন্য কেন্দ্রের নিজস্ব নার্সারী খাঁকা প্রয়োজন ?
হ্যাঁ [] না []

৫.২ উত্তর হ্যাঁ হলে কেন্দ্রের কোথায় এই নার্সারী স্থাপিত হওয়া উচিত ?

৫.৩ এই নার্সারী কি শুধু কেন্দ্রের চাহিদা মেটানোর জন্য করা উচিত ?
হ্যাঁ [] না []

৫.৪ উত্তর না হলে এই নার্সারী বাণিজ্যিক হওয়া উচিত ? হ্যাঁ [] না []

৫.৫ বাণিজ্যিক হলে এই নার্সারী উন্নয়মানের বৃহাদাকার পাইলট নার্সারী হওয়া উচিত ? হ্যাঁ [] না []

৫.৬ কেন্দ্রের নার্সারিটি অনুরণীয় নার্সারী মডেল হওয়া উচিত ?
হ্যাঁ [] না []

৫.৭ নার্সারীতে শুধু গাছের চারা ছাড়াও আর কি সুযোগ থাকতে পারে যেমন :-

- বৃক্ষ রোপণ ও পরিচর্যা জানা যেতে পারে []
- নির্বাচিত বৃক্ষের সংক্ষিপ্ত পরিচয় পাওয়া যাবে []
- আবহাওয়া ও মাটির ভিত্তিতে বৃক্ষ নির্বাচন করা যাবে []
- কোথায় কি গাছ লাগাতে হবে সে সম্পর্কে ধারণা পাওয়া যাবে []
- গাছের রোগ বালাই প্রতিরোধ বিষয়ক তথ্য পাওয়া যাবে []

৬.০ পিএটিসি'র অনুরূপ বৃক্ষ রোপণ কার্যক্রম দেশের অপরাপর প্রশিক্ষণ প্রতিষ্ঠান ও সরকারী দপ্তর প্রাঙ্গণে বাস্তবায়ন হওয়া উচিত । হ্যাঁ [] না []

৬.১ উত্তর হ'ল হলে কেন এই কার্যক্রম অন্যত্র বাস্তবায়ন হওয়া উচিত । আপনার বক্তব্য
লিপিবদ্ধ করুন ।

- পিএটিসির বহু রোপণ কার্যক্রম সর্বোৎকৃষ্ট মডেল বলে []
- পিএটিসির বহু রোপণ কার্যক্রম অনসূরণীয় বলে []
- পিএটিসির বহু রোপণ কার্যক্রমের ন্যায় এমন কার্যক্রম কোথাও নেই বলে []
- দেশে অনসূরণীয় এমন কোন কার্যক্রম আর কোথাও নেই বলে []
- পিএটিসির বহু রোপণ মডেলটি সহজে বাস্তবায়ন যোগ্য বলে []

প্রশ্নপত্রটি উত্তর প্রদানে সহায়তা করার জন্য আন্তরিকভাবে ধন্যবাদ।