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Aims and Scope

The Journal provides rapid publication of researches throughout the tropics aimed at increasing and sustaining production and management of wood and non-wood resources of tropical forest ecosystem. The scope also covers detailed studies on ecosystem dynamics, environmental conservation and management. Emphasis will be on papers presenting original research. Occasional review papers drawing together past and current literature are also published.

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PROSPECT OF PARTICIPATORY URBAN FORESTRY DEVELOPMENT IN IBADAN METROPOLIS, OYO STATE, NIGERIA

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ABSTRACT

This study investigated the potential participation of Ibadan residents in the development of urban forestry initiative for environmental rehabilitation of the metropolis. Data were obtained from multi stage randomly sampled 397 residents within the five local government areas (LGAs) in Ibadan metropolis. The result revealed that 49% of the respondents claimed to have trees planted around their residences. Out of this, 83% believed that these trees provide shade for them for recreation, protect their houses from environmental hazards as well as beautify their living environment. It was also discovered that though 84% of the respondents had interest in planting trees, only 78% expressed their willingness to participate in the reforestation of Ibadan metropolis. Furthermore, it was found that such willingness to participate depended significantly on respondents employment status, prior knowledge of existence of Ibadan urban forest reserve, educational level ($p < 0.01$), and period of residence in the metropolis ($p < 0.05$). Though several independent variables were not significant in explaining the willingness to participate, the multi-variate logistic regression has a significant likelihood ratio of 24.46 ($p < 0.05$) and the student's t-test indicates that only two socio-economic variables – age and prior knowledge of existence of the Ibadan urban forest reserves had significant influence ($p < 0.05$) on the dichotomous willingness to participate in Ibadan urban forestry initiative. The study also identified prospects for both interactive and material participation in this development initiative, whereby 64% of the respondents were willing to pay and participate in some other ways in the programme, while 77% were also willing to join an environmental non-governmental organization that would spearhead this urban reforestation initiative. The results of this study show that urban forestry could be used as development interventions to improve the socio-economic wellbeing of the urban poor, and significantly contribute to cost effectiveness, increased coverage and sustainability of environmental conservation programmes.

INTRODUCTION

Urban forestry is the planned, systematic and integrated approach to the management of the entire urban tree resource (Johnston and Rushton, 1998), for their contribution to the physiological, sociological and economic wellbeing of urban society (Grey and Deneke, 1978). Urban forestry deals with all trees and related greens in and around places where people live. These include woodlands, groups of trees, and individual trees on streets, in yards, school gardens, parks, cemeteries, vacant lots on utility right of ways, vines, ground cover grasses, and a variety of wild plants, animals and micro-organisms. Urban forest also encompasses a number of forest environs such as green belts, reserved lands, industrial and commercial green zones (Joshi, 1999).

The urban forest has distinctive characteristics of having high density of fauna (people), and limited growing spaces for trees. Being a mixture of naturally occurring and planted trees in specific locations, their creation and preservation require active planning and management by diverse group of owners, managers and stakeholders. This imperatively calls for a planned, integrated and systematic approach.

The deplorable state of urban environment in many parts of Nigeria where most open spaces or green areas are being taken up by development of concrete structures, calls for an urgent need to develop parks, gardens, avenues and other forms of urban forest to mitigate environmental hazards. Incidentally, the relics of urban forest in our cities are under heavy pressure of urbanization sprawl and also of meeting the specific needs like fuel wood, poles, light construction materials of the increasing urban populations. To make the situation worse, governments that hold these (urban) forests in trust for the society have in some instances been involved in the degradation of these forests (Ajewole, 2000). It then becomes very imperative to investigate the potential of the public to participate in the rehabilitation of the generally degraded urban forests and in the development of urban greening programmes, for overall improvement in their living environment.

Development of participatory urban forestry, which is the active involvement of urban residents in the care and development of publicly owned trees, departs considerably from traditional methods of forests management. It focuses on people and the way they relate to trees, rather than on the trees themselves (Johnston, 1988). For instance, whereas accrual of tangible benefits in terms of employment, fodder and fuel are likely to be prominent incentives for people to create and protect communal plantations in the rural areas, the contrary is the case in participatory urban forestry where ecological, aesthetic as well as a sense of pride in participation, become powerful propellants to participate in urban forestry initiatives. Participatory urban forestry development has some socio-psychological benefits to urban residents, and can play a crucial role in improving urban living conditions. As a personal imprint on the landscape, trees can strengthen a sense of territoriality and promote social identity. Planting and caring for trees can be a form of recreation; it arouses feelings of pride and self-esteem, and assists in relieving the stress of an urban existence. Moreover, personal contacts with trees enhance the appreciation of their aesthetic qualities to a far greater extent than is normally obtained through casual observations (Lewis, 1976). By caring for their own trees in both physical and emotional sense, urban residents develop a positive attitude and behaviour towards other trees. Their increased awareness and appreciation do encourage a sense of responsibility for trees that motivates a concern for care and protection. Hence participatory urban forestry helps urban residents to generate a mutually beneficial relationship between themselves and trees. The more they care for trees, the more trees are valued and protected as an important element in urban landscape and as element in urban asset (Johnston 1985).

Furthermore, the value of participatory urban forestry is not limited to the benefits that are directly related to trees, it also has a value of a community activity per se. It can represent a first step in bringing people to work together to improve their environment. It can give depressed communities the confidence to feel that they can actually effect some sort of change in their conditions. It can also build self reliance and self esteem within the community because it helps people to help themselves. Programmes of public involvement can also promote sense of ownership and pride towards trees, thereby reducing tree mortality (Sommer *et al.*, 1994).

THE STUDY AREA

Ibadan, the capital of Oyo State, is in the southwestern part of Nigeria. The metropolis, which according to world Bank (1992) has one of the smallest open spaces -1.38%-among Nigerian major cities, consists of five Local Government Areas, namely, Ibadan North, Ibadan North-West, Ibadan North-East, Ibadan South-West and Ibadan South-East. Ibadan is located on longitude $3^{\circ}54'E$ and latitude $7^{\circ}23'N$, with total land area of 130km^2 . It is 750m above sea level (asl) and has two distinct seasons; the rainy season being from March to October, while the dry season runs through November to February. Ibadan metropolis recorded a population figure of 1,228,663 in the 1991 National Population Census.

Ibadan metropolis originally had four forest reserves, namely Oke-Aremo, Ogunpa Dam, Eleyele and Alalubosa reserves, which served various needs of the people and provided watershed protection for Ogunpa dam, Alalubosa Lake and Eleyele dam.

However, Alalubosa Forest Reserve was destroyed and converted to residential quarters and "Alésinloye" market in the early 1990s, while the remaining three reserves are currently under various degrees of degradation. As a result of the sloppy topography of these reserves, environmental hazards such as siltation of lakes and ponds, large scale erosion and massive flooding have been partly traced to the destruction of these urban forest reserves (Oguntala, 1993).

Oke Aremo and Ogunpa dam Forest Reserves are grouped together under one working plan by the Oyo State Forestry Department. They are located on a range of hills running north-south through the middle of the town. Oke Aremo is situated on Aremo hill while Ogunpa is on the top of the eastern slopes of the Tank hill. These two hills are divided by a gap made by the Ogunpa stream. Ogunpa dam forest reserve with an area of 81.27ha was constituted in 1931 to protect the reservoir catchment area of Ogunpa dam. It was declared a game reserve in 1952. While Oke-Aremo Forest Reserve was constituted in 1935 over an area of 57.67ha to serve as a source of fuelwood and poles for the inhabitants of Ibadan (Alison, 1956). Similarly Eleyele Forest Reserve was constituted in 1956, over an area of 326.2ha, situated at about 4.6km from the centre of the city in the North-west of Ibadan, it occupies the land bordering the Ibadan major reservoir, thereby protecting the Eleyele dam, as well as providing fuelwood and building poles for Ibadan

amb, 1941). Similarly, Alalubosa forest reserve, which was situated adjacent to the town in the western outskirts of Ibadan, was constituted in 1916 over an area of 1000 ha to protect the water catchment area of Alalubosa Lake, which formed the former railway trestle. It was considered for amenity value in 1929 (William, 1932), and eventually became a resort for public holidays, especially on Easter Mondays.

Substantial portions of these urban reserves have given way to urbanization. Apart from the forests, what is left of Ogunpa dam and Oke Aremo are just small relics of degraded forests. Also not less than 80% of Eleyele Forest Reserve has been decreserved and deforested.

COLLECTION AND ANALYSIS

Sampling Procedure

Used in this study were obtained in June 1999 from a questionnaire survey of 450 respondents in Ibadan metropolis. Multi-stage random sampling was adopted to collect the primary data. Hence the metropolis was stratified into two zones: zone I comprised the respondents that lived within 1km radius of adjoining areas surrounding the urban forest reserves, while zone II comprises inhabitants living outside 1km radius of the adjoining areas surrounding the urban forest reserves, but within the five local government areas that make up the metropolis.

Zone I was further stratified into 4 cells, each comprising residents living within 1km radius of areas surrounding each of the four studied urban forest reserves, namely Ogunpa dam, Eleyele and Alalubosa sites. While zone II was further stratified to 5 cells, each cell comprising the residents living outside 1km radius of the adjoining areas surrounding the urban forest reserves, but within each of the 5 local government areas that constitute the metropolis, namely, Ibadan North-West, Ibadan North-East, Ibadan North, Ibadan South-West and Ibadan South-East. Names of major streets in each of the 9 cells were collected from the local planning authority. Using a table of random numbers, 2 streets were picked from each of the 9 cells.

Through purposive sampling, 25 respondents were surveyed from each of the 2 selected streets of the 9 cells. This gave rise to 200 respondents from the forests neighbourhood and 200 from non-neighbourhood zones respectively.

Analytical Techniques

The data were subjected to descriptive statistics, as well as chi square and logit analysis.

The Models .

Logit Model Specification

Non - Linear Maximum Likelihood Estimation regression model was employed to find the relationship between the dichotomous willingness to participate in the development of urban forestry initiative (dependent variable) and the socioeconomic characteristics (independent variables) of the respondents.

The logistic regression equation was specified in general form as:

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + E_i \dots \text{eqn. (1)}$$

Where

β_0 = constant

$\beta_1 \dots \beta_k$ = estimated regression coefficients

$X_1 \dots X_k$ = independent variables

E_i = error or random disturbance term

$$Z = \log \left[\frac{\text{probability of willingness to participate in badan urban forestry initiative}}{\text{probability of not willing to participate in badan urban forestry initiative}} \right]$$

$$Z = \ln \left(\frac{P_i}{1 - P_i} \right) \dots \text{eqn. (2)}$$

Where

$$P_i = \frac{n_i}{N_i} \dots \text{eqn. (3)}$$

\ln = natural logarithm

P_i = estimated probability of an individual willing to participate in urban forestry initiative.

$1 - P_i$ = estimated probability of an individual not willing to participate in urban forestry initiative.

n_i = no. of individuals willing to participate in urban forestry initiative.

N_i = No. of sampled individuals.

Once the logistic equation was estimated, predicted probability was determined using the equation:

$$P_b = \frac{1}{1 + e^{-z}} \dots \text{eqn (4)}$$

where P_b = Probability of a yes response

Z = logit prediction of a yes or no response

e = exponential

Model Specification

are model for a $r \times c$ contingency table is specified as:

$$\chi^2 = \frac{G_{ij} - S_i T_j}{S_i T_j} \text{ with } (r-1)(c-1) \text{ degree of freedom}$$

ated chi-square value

1 of all the observations

ividual observations in i th row and j th column

1 individual observations in i th row

1 of individual observations in j th column

umber of rows

umber of columns

AND DISCUSSION

of trees in living environment

f (49.3%) of the respondents claimed to have trees planted around their residences. as this might be, a cursory look at the study area revealed a very low tree density, and account for the low green physiognomic appearance of the metropolis. Be that as it of the respondents reported that these trees provide shade for them for recreation and climatic element like sun, 32% believed that the trees serve to protect their houses nmental hazards like windstorm, 17% said that the trees provide fruits/nut, while 13% at they serve as ornamentals to beautify the environment (Table 1). The trend of the orts the a-priori position that the primary importance of urban trees is environmental n. This is observed from the 83% of the respondents who claimed to be enjoying /ironmental benefits like recreation, protection from environmental hazards and on of environments.

VALUES OF TREES AROUND RESIDENCE

Ornamentals	Recreation	Fruits/nuts	Environmental Protection	Total
52	151	86	126	397
13	38	17	32	100

to Participate in Urban Forestry Initiative

vered that 84% of the respondents had interest in planting trees, while 78% expressed nness to participate in Ibadan urban forestry initiative. Interest in planting of trees in uld be regarded to include: the individual's interest to plant trees on his own and esidence as well as the individual's interest to join other people to collectively plant their neighbourhood or in the city in general. Hence the 7% difference could be taken of those individuals who only have interest in planting trees on their own and around f residence.

Further investigation considered the proportional variation of respondents' willingness to participate in Ibadan urban forestry initiative within each socio-economic variable and the possible significant dependence of such willingness on any of these socio-economic characteristics: gender, employment status, marital status, town of origin, awareness of existence of Ibadan urban forest reserves, residence proximity to forest reserves, income level, educational level, age and period of residence in the metropolis (Figures 1 – 10). The chi-square test of independence revealed that respondents' willingness to participate in Ibadan urban forestry initiative did not significantly depend on gender, marital status, town of origin, income level, residence proximity to forest reserves and age ($p > 0.05$).

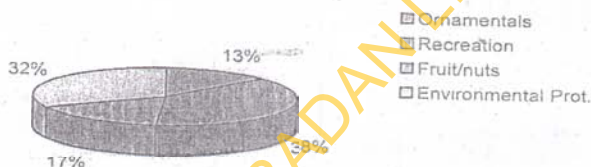


Fig. 1: Values of Tree Around Residence

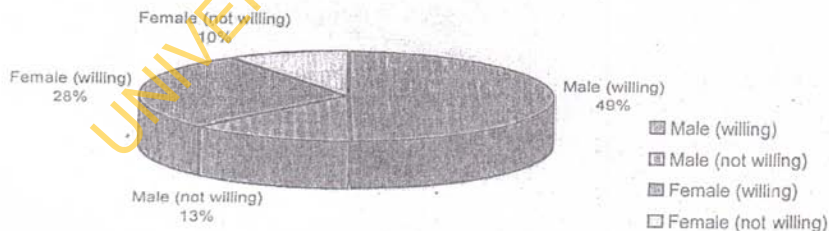


Fig. 2: Willingness to participate in urban forestry initiative according to gender

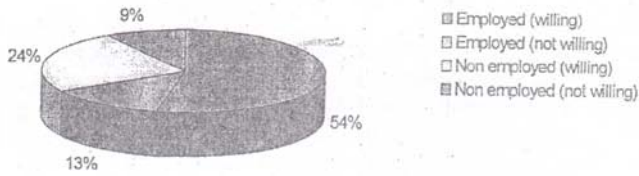


Fig. 3: Willingness to Participate in urban forestry initiative according to employment status

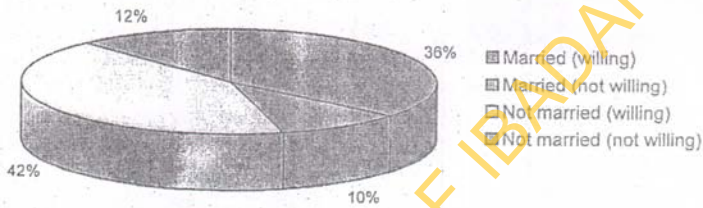


Fig. 4: Willingness to Participate in urban forestry initiative according to marital status

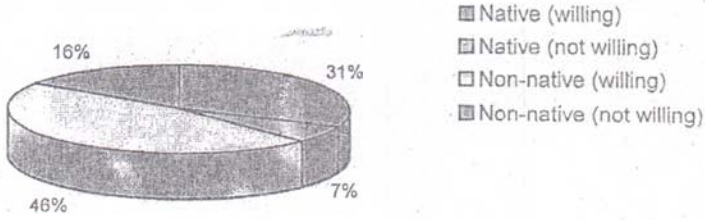


Fig. 5: Willingness to Participate in urban forestry initiative according to town of origin

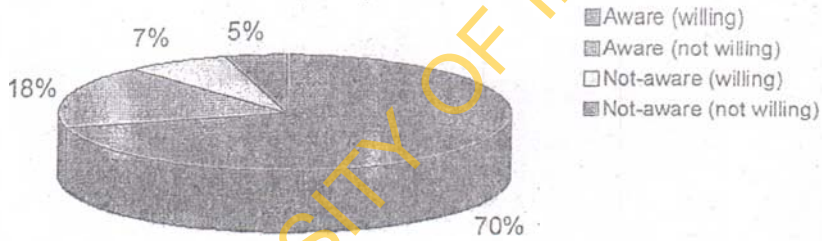


Fig. 6: Willingness to participate in urban forestry initiatives according to respondents' awareness of existence of forest reserves

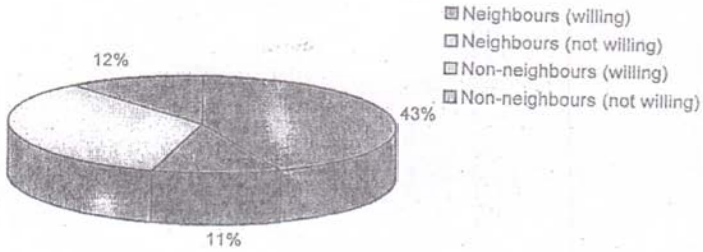


Fig. 7: Willingness to participate in urban forestry initiatives according to respondents' residence proximity to forest reserves

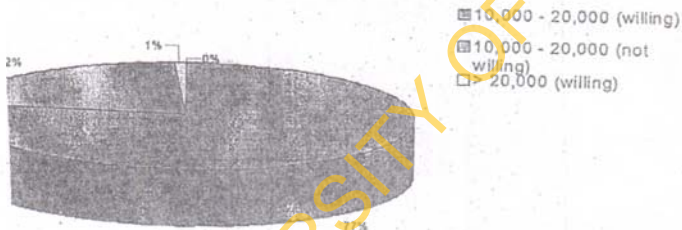


Fig. 8: Willingness to participate in urban forestry initiatives according to respondents' income level

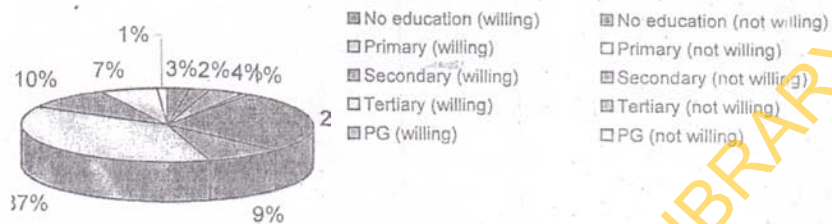


Fig. 9: Willingness to participate in urban forestry initiatives according to respondents' educational level

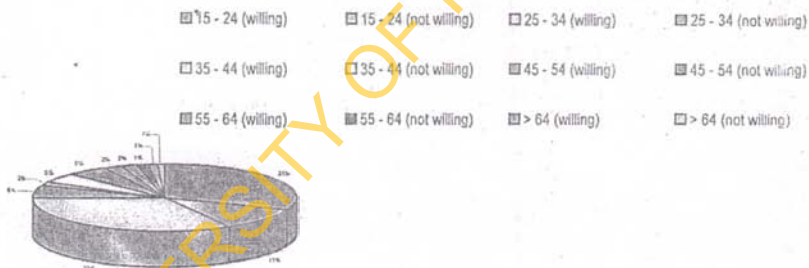


Fig. 10: Willingness to participate in urban forestry initiatives according to respondents' age group

: SUMMARY OF RESULTS OF HYPOTHESES

omnic	Calculated χ^2	Degrees of freedom	Tabulated χ^2
nt	1.3053	1	P = 0.05 (3.841)
tus	49.5438**	1	P = 0.01 (6.635)
igin	0.0374	1	
	3.1920	1	
	8.3548**	1	
	1.5768	1	
	1.3516	1	
l level	19.5083**	4	P = 0.05 (9.488)
	8.7012	5	P = 0.01 (13.277)
	11.3282*	5	P = 0.05 (11.07)

ance of the above results lies greatly in the percentage (84%) of the respondents that t in tree planting and those (78%) that expressed their willingness to participate in n of Ibadan metropolis. It was discovered that many of those who expressed interest ing did not know how to go about getting the right tree seedlings, while some believed dlings might not be easily affordable. Many of these people need to be encouraged ves such as free or heavily subsidised tree seedlings. This will greatly increase the in many residential environments. The result also showed that willingness to n this reforestation project cut across almost all the socio-economic strata, considering rcentage of respondents that were willing to participate within each of the socio- asses.

ariate Logit Analysis

gression model treated the log of the yes/no responses to the willingness to participate ban forestry initiatives as the dependent variable, and all the socio-economic factors s the independent variables.

several independent variables were not significant in explaining the willingness to able 3), the logit model have a log likelihood ratio of - 220.286 and chi-square value icating a significant relationship between independent and dependent variables he student's t-tests indicate that only two independent variables were significant and illingness to participate in urban forestry initiatives. Age was found to be significant id had a positive influence on willingness to participate. This connotes that older ore willing to participate in the reforestation program. Also prior knowledge of orest reserves in Ibadan, was significant ($p < 0.05$), and had a negative influence on participate. Furthermore, the non-significant variables-gender, employment status,

income, marriage, period of residence, environmental awareness and proximity of respondents' residence to forest reserves had negative influence on willingness to participate, while educational level and town of origin of respondents had positive influence on willingness in urban forestry initiatives.

TABLE 3: SUMMARY OF THE LOGIT REGRESSION MODEL

Socioeconomic class	Mean	Coefficient	Standard error	Calculated T-value
Constant	-	-0.4671	1.2265	0.3808
Gender	0.6247	-0.3573	0.3672	0.9730
Age	31.0105	0.0643	0.0255	2.5415*
Employment	0.6650	-0.3793	0.6185	0.6133
Income	4598.21	-0.00003	0.000048	0.625
Marriage	0.4596	0.7235	0.5258	1.376
Educational level	2.5445	0.00685	0.2384	0.0287
Town of origin	0.4207	0.2591	0.1457	1.7783
Period of Residence	20.0849	-0.2567	0.1654	1.5520
Prior Knowledge	0.8864	-1.2532	0.4952	2.5386*
Environmental awareness	1.3980	-0.1621	0.1644	0.9860
Proximity to forest reserve	0.5416	-0.4191	0.3849	1.0889

Log likelihood = -220.286

Chi-square (11 d.f); 24.46*

* significant at $p < 0.05$.

TABLE 4: WILLINGNESS TO PARTICIPATE AND PAY FOR URBAN FORESTRY INITIATIVES

		Willingness to pay		Total	
		Yes	No		
Willingness to participate	Yes	Freq.	255	55	310
		%	64	14	78
	No.	Freq.	33	54	87
		%	8	14	22
	Total	Freq.	288	109	397
		%	72	28	100

Predicted Probability of a "Yes" Response

The predicted probability of the average respondent giving a "Yes" response or in other words, willing to participate in Ibadan urban forestry initiatives, is estimated in two steps. The logistic Z value is found by summing the products of the independent variables coefficients and mean values, including the constant as described in equation (1). The logistic value is then converted to

and probability with equation (4). The logistic Z value is -5.3477, and the predicted probability of an average respondent willing to participate in Ibadan urban forestry initiative is 0.98. This implies that it is almost certain that an average respondent and by implication an Ibadan resident will be willing to participate in the development of urban forestry in the metropolis.

Participatory Model

There are basically four categories of participatory models. Process participation is the planning process where the public is involved in the process of decision making. Cognitive participation is a passive role whereby one identifies oneself with the concept, idea or task but not necessarily participating in it physically. Interactive participation is an educational role that involves motivating, organizing, guiding and preparing people for a particular task. Material participation is the implementation role in which the public actually contributes time, money, and other resources necessary for implementing the programme.

The findings of the study reveals that there is a great prospect for both interactive and material participation in the development of urban forestry initiatives in Ibadan metropolis. Majority of respondents (64%) were willing both to pay and participate in some other ways in the urban forestry projects. Meanwhile 8% were willing to contribute their finances alone into the project, 14% are willing to participate only in some other ways except money. However, 14% are not willing to pay or participate at all. Some of those that were willing to participate expressed a preference to be involved physically in planting, offer advice and intellectual support. It was observed that 77% were willing to join a prospective environmental non-governmental organization that would spear head this reforestation initiative. This is a good indication of great recruitment of volunteers for this development initiative.

CONCLUSION

Urban forestry initiatives must seek the involvement of various public, private, and community entities, as well as concerned and informed individuals in their planning and implementation. This will ensure that such programmes are realistic and adequately balance the interests of the people in the entire community, and go a long way in balancing conflicting interests. Initiatives involving poor urban dwellers may be much more difficult to develop. The greater the potential for urban forestry for production of wood and non-wood products, however, the greater the potential and the need for active participation of local people in implementation. Urban forestry initiative can be used as development interventions to improve the socio-economic wellbeing of the urban poor, as well as general living conditions of the urban

area. Urban forestry, albeit, implies planting of a few trees here and there; a small woodlot, roadside or at the periphery of the urban area, trees along the roads or streets etc. Yet,

the sum of these small scale activities by numerous tree planters can significantly contribute to cost effectiveness, increased coverage and sustainability of environmental conservation programmes.

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