East African Journal of Forestry & Agroforestry
eajfa.eanso.org
Volume 5, Issue 1, 2022
Print ISSN: 2707-4315 | Online ISSN: 2707-4323
Title DOI: https://doi.org/10.37284/2707-4323

EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County

Basil Okoth Kaudo[1], Antony Ondiwa Okundi[2], Patrick Mwenja[1], Everlyne Ikimat Ejore[1] & Jesse Owino[3]*

[1] Kenya Forestry Research Institute, P. O. Box 53-30500 Lodwar-Turkana, Kenya.
[2] Gazi University, P. O. Box 06500, Ankara, Turkey
[3] Kenya Forestry Research Institute, P. O. Box 382-20203 Londiani, Kenya.
[*] Author for Correspondence ORCID: https://orcid.org/0000-0002-7897-0766; email: kabasil81@gmail.com.

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Date Published:

28 December 2022

Keywords:

Tree planting, Household, Behaviour, Factors, Homabay County.

ABSTRACT

The ever-increasing impacts of climate change in sub-Saharan Africa have made many aware and struggle with livelihood options from nature, and the need for households and communities to plant trees can no longer be over-emphasised. Community tree planting is crucial for global environmental sustainability. The information that guided the public in selecting the tree they plant in their private spaces is important, especially to policymakers. This paper was aimed at analysing the factors that influence community tree planting behaviour. The study used a mixed-methods approach that involved both qualitative research using focus groups as well as quantitative research using questionnaires administered to the residents of the ten locations in Wangchieng ward: Homabay County in December 2021. A sample of 380 community households was selected, 38 in each location, through purposive sampling technique and mixed structured questionnaires delivered to them. The questionnaires assessed community attitudes and conservation involvement against the socioeconomic background, benefits, and costs of planting trees. Results showed that most residents of Wangchieng ward have positive attitudes towards tree planting. The data collected from the questionnaires showed that socioeconomic factors such as age, education levels and income were positively related to participation in community tree-planting programs among respondents. A stepwise binary logistics conducted ranked six variables as the major factors influencing household tree planting. The importance of trees was ranked at position one (most influential variable) with an odd ratio of 9.287, and at position six was education level with an odd ratio of 1.207. The full model containing all the variables was statistically significant at $\chi 2$ (10, N = 370) = 98.312, $p < .001$, clearly indicating that the model was able to distinguish respondents who have planted and those who have not planted trees in the last six months. Thus, it is recommended that household tree planting can significantly be enhanced by improving knowledge on the importance of trees, their various ecosystem goods and services, making

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

seedlings cheaply available for households as well as promoting households to do agroforestry in their farmers.

APA CITATION

Kaudo, B. O., Okundi, A. O., Mwenja, P., Ejore, E. I. & Owino, J. (2022). Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County *East African Journal of Forestry and Agroforestry*, *5*(1), 330-344. https://doi.org/10.37284/eajfa.5.1.1028

CHICAGO CITATION

Kaudo, Basil Okoth, Antony Ondiwa Okundi, Patrick Mwenja, Everlyne Ikimat Ejore and Jesse Owino. 2022. "Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County". *East African Journal of Forestry and Agroforestry* 5 (1), 330-344. https://doi.org/10.37284/eajfa.5.1.1028

HARVARD CITATION

Kaudo, B. O., Okundi, A. O., Mwenja, P., Ejore, E. I. & Owino, J. (2022), "Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County", *East African Journal of Forestry and Agroforestry*, 5(1), pp. 330-344. doi: 10.37284/eajfa.5.1.1028.

IEEE CITATION

B. O., Kaudo, A. O., Okundi, P., Mwenja, E. I., Ejore, & J., Owino, "Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County", *EAJFA*, vol. 5, no. 1, pp. 330-344, Dec. 2022.

MLA CITATION

Kaudo, Basil Okoth, Antony Ondiwa Okundi, Patrick Mwenja, Everlyne Ikimat Ejore & Jesse Owino. "Factors Influencing Household Tree Planting Behaviour. A Case Study of Wangchieng Ward, Homabay County". *East African Journal of Forestry and Agroforestry*, Vol. 5, no. 1, Dec. 2022, pp. 330-344, doi:10.37284/eajfa.5.1.1028

INTRODUCTION

Trees play a major role in soil protection and prevent flooding and erosion. Various tree species provide certain ecosystem goods and services that are very useful for human survival (Kampourakis, 2014). Trees create shade and shelter for both crops and livestock. With the growing dependencies on forest products, tree planting becomes a necessity to support the over-extraction in progress. According to Kampourakis (2014), poles from trees are used for building, fencing, and creating shelters. Moreover, charcoal burning is a major utility where trees are massively used. According to Oduor & Ogutu (2020), charcoal fuel is the most utilised source of energy in rural neighbourhoods. Services provided by trees can be grouped as regulatory services, such as climate regulation, soil formation, and nutrient and water cycling. Provisioning services, such as timber, firewood, fruits, and provision of pulp, as well as cultural services, such as aesthetic values (Kampourakis, 2014). Globally, 31% of the Earth's landmass is covered by trees (Saatchi et al., 2012). However, these figures have significantly come down due to over-extraction and incessant anthropogenic human activities in the forests causing deforestation and degradation of the forests. In Kenya, this translates to 12.3% tree cover (Atieno, 2022).

According to Meijer et al. (2015), heavy dependence on forest products, an increase in population, and deforestation has played a major role in tree cover reduction. Moreover, tropical deforestation and forest degradation occur due to direct and indirect drivers such as human-based activities or immediate activities that directly impact forest cover and loss of carbon (Ennos et al., 2019). Other direct drivers of deforestation include unsustainable agriculture, logging, livestock rearing, urban expansion, and mining. The current forest cover in Homabay county is 3.18% (Kenya News Agency, 2022). Homabay is ranked number 40 out of 47 counties on the Environmental Performance Index (NEMA, 2019). According to the Global Forest Watch report 2021, Homabay County had 50.2 Kha of natural forest in 2010. However, by 2020, 456ha of the natural forest had been lost, an equivalent of 27.0kt of carbon emissions. According to this report, over 66 kha of

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

humid forest has been lost in the last two decades. This contributes to about 3.6% of the total tree cover loss in the region. According to Sunil et al. (2016), indirect drivers of deforestation are such as corruption, population growth, land tenure uncertainties, and poor governance. These factors; both direct and indirect are often interlinked thus resulting in land cover and land use changes. In developing countries, demand for wood fuel and charcoal in particular is an important aspect in the survival of many households.

According to the literature review conducted, empirical evidence indicates that forest products for business provide an alternative source of livelihood to many people. Forest products such as charcoal and firewood offer more income and job opportunities to households as compared to other fuel alternatives such as electricity, gas, or dryland salinity (Oduor & Ogutu, 2020). In Tanzania, wood fuel is consumed by about 80% of the population (Oduor & Ogutu, 2020). According to Langat et al. (2016), firewood and charcoal are considered the two main sources of cooking fuel in most rural and urban settlements of Kenya. According to a report by Kagondu (2020), due to the economic impact of the coronavirus, most families have resorted to the use of wood fuel rather than cooking gas because it is cheaper. The report further indicates that about 7 million trees are cut every day for firewood, charcoal, and other purposes in Kenya. According to the MoE&F (2020), illegal human activities are solely to blame for the dwindling forest cover in Homabay County. Moreover, human encroachment into forests and replaced trees with crops are major attributes of deforestation.

According to the report, at least 120 families have settled in Gwassi forest, while 60 others have settled in Kodera Forest. This has significantly contributed to a reduction in forest areas and the destruction of trees in these areas. Conversely, planting trees on farms has been adopted by most communities in the rift valley of Kenya (Langat et al., 2016). Agroforestry is considered a major boost to incomes as well as the improvement of forest cover. As put by Wang (2022), with the shrinking arable land due to the effects of climate change, the adoption of agroforestry remains the only solution for farmers. Research has indicated the adoption of agroforestry, especially the planting of fruit trees on farms, as one sure way to increase land utilisation and improve performance. With the increasing global demand for tree-driven products, demands for tree-related products are overly stretched. Thus, the desire to plant more trees is of bigger essence. The objective of this paper is to establish the major factors affecting household tree planting behaviour in Wangchieng ward, to determine the motivation factors that promote household tree planting culture, and finally, to establish the feasible recommendations to adopt for successful tree planting culture in Wangchieng ward. The findings of this research are therefore geared towards informing both levels of the government, the National and the County government, and all the stakeholders involved on the best strategies towards encouraging tree planting among households in Kenya.

MATERIALS AND METHODS

The research was carried out between the 29th and 31st of December 2021. Three hundred eighty structured questionnaires were prepared addressing various aspects of the community. The questionnaires were distributed to 38 households in each of the 10 locations within the Wangchieng ward. The questions asked for the biographical information of the interviewees, their geographical location, educational levels, economic activities and their knowledge of trees and practices in tree planting. Data collection was conducted by ten local enumerators trained and recruited from each of the ten locations in the ward. Semi-structured questionnaires were used to conduct interviews and collect both qualitative and quantitative data within the households. Mobile platform-based GPS essentials were used to monitor data collection exercises and focus group discussions delivered to

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

identified community leaders and decision-makers. The sampling size was determined using Krejcie and Morgan Table 1970 to generate a suitable sample size (Bukhari, 2021). Purposive sampling was used to select relevant key informants for the survey. Both qualitative and quantitative data were collected and fed into Kobo Toolbox for analysis. Data analysis was conducted using SPSS version 25 and Microsoft Excel. Charts and graphs were used to describe the data.

The study was conducted in Wangchieng ward, Rachuonyo North sub-county division, in Homabay County. Homabay County lies between latitudes 0°.15S and 34^0E. The county is located in Southwestern Kenya along Lake Victoria, where it borders Kisumu and Siaya counties to the North, Kisii and Nyamira counties to the East, and Migori County to the South. The county covers an estimated area of 4,267.1 $km^{2,}$ constituting 2,696 km^2 of land area and of 1,227 km^2 of the water surface (CIDP, 2022). The county headquarters is in Homabay town, about 420 km from Nairobi. Homabay County has an inland equatorial type of climate. The climate is, however modified by the effects of altitude and nearness to the lake, which makes temperatures lower than in the equatorial climate. There are two rainy seasons, namely, the long rainy season from March to June and the short rainy season from August to November. The rainfall received in the long rainy season is 60 per cent reliable and ranges from 250 – 1000 mm, while 500 –700 mm is received in the short rainy season. The county receives an annual rainfall ranging from 700 to 800mm. Temperatures in the county range from 18.6°C to 17.1°C, with hot months being between December and March. February is usually the hottest month of the year. The temperatures are however lower in areas bordering Kisii and Nyamira highlands and higher in areas bordering the lake.

Wangchieng ward is an electoral ward found in Karachuonyo constituency, Homabay County. It is located at the coordinates of 0.38S, 34.72E and altitude: 1346.00m above sea level. The ward borders Central Kasipul and Kokwanyo/Kakelo to the North, West Nyakach to the west, and Kendu Bay Town to the East. According to KNBS (2019), the ward area is 95.40 square kilometres with a population of 33,336. This represents a population density of 349 people per square kilometre. Wangchieng ward comprises 10 locations; these include Kagwa, Kajiei, Kamser Seka, Kamwala, Karabondi, Kobala, Kobuya East, Kobuya West and Rakwaro Locations of Homabay County. The economy of the region is sustained by a diversity of economic activities in major market centres (Lida, Mawego, Kanu, Dan, Chuthber, Seka, Rambira, Apida, Kanyang'wena, Rakwaro, Kobala, Kobuya and Nyakwere market centres) and beaches (Seka, Achuodho, Rambira and Chuowe beaches). Wangchieng ward experiences hot and wet weather conditions. Due to its low-lying terrain, it experiences two major rainy seasons; in March-July and September –October. Most soils in Wangchieng ward are mixed up sandy and loamy. The major sources of income are fishing and agriculture. However, in the last 10 years, the 2-wheeled transport service industry ("bodaboda") and sand harvesting have grown in popularity among young people.

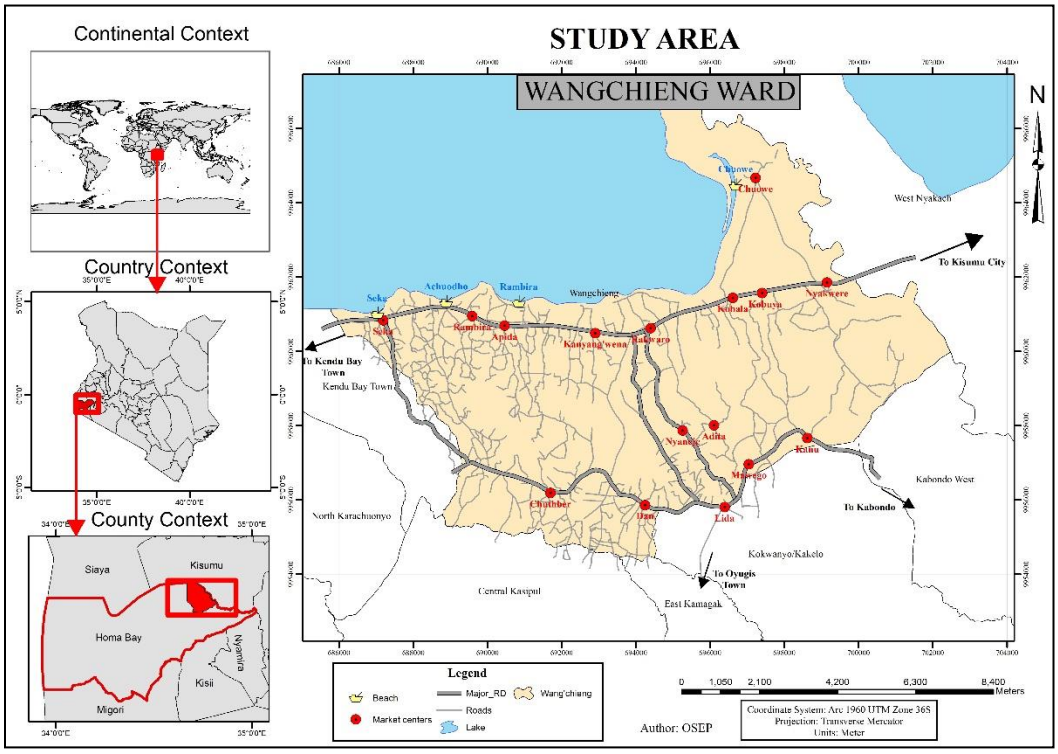
The region is home to a variety of natural vegetation with steep terrains typically covered with evergreen or semi-evergreen tree shrubs and grasses. The lowlands are primarily grassland with bushes and are frequently marshy and flood-prone. Reeds (*Phragmites sp.)*, hippo grass (*Vossia cuspidata*), Papyrus *Cyperus papyrus*, Common Cattail *Typha latifolia*, and Water Hyacinth *Eichhornia crassipes* are among the vegetation found on the lake's shore.

The majority of residents in Wangchieng ward rely on firewood and charcoal as primary sources of energy. The majority of these trees are cut from natural forests, with considerable land fragmentation areas visible as a result of intensive sand harvesting in the ward. Some of the common valuable local tree species in Wangchieng ward are

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Adugo *Acacia drepanolobium*, Alii *Acacia seyal*, Bondo *Euphorbia candelabrum*, Bongu *Ficus sur*, Chamama *Thevetia peruviana*, Chwaa *Tamarindus indica*, Dwele *Melia azedarach*, Jamna *Syzygium cumini*, Kang'o *Olea europaea*, Ober *Albizia coriaria*, Obudo *Cupressus lusitanica*, Powo *Grewia mollis*, Manera *Terminalia brownii*, Ochuoga *Carissa spinarum*, Odagwa *Ricinus communis*, Maua madongo *Tithonia diversifolia*, Madat *Vepris nobilis*, Ojuok *Euphorbia tirucalli*, Onunga *Morus alba*, Siangla *Rhus natalensis*, Pedo *Harrisonia abyssinica*, Roko *Erythrina excelsa*, and Siala *Markhamia lutea* among other several species.

Figure 1: Map of Wang'chieng Ward



Data Collection and Analysis

The factors influencing household tree-planting behaviour were investigated in this study. A data collecting approach was adopted in which 380 families in Wangchieng ward, Homabay County, were interviewed in December 2021 utilising a semi-structured questionnaire survey. The questionnaires gathered socioeconomic and demographic information about the study area. These data comprised household size, education level, income sources, per capita income, and so on. The data was collected using Kobo Toolbox, entered into the SPSS program version 25, cleaned, coded, and analysed. Cross tabulations were used to evaluate the many socioeconomic characteristics that influence tree planting behaviour. The associations between tree planting behaviour (dependent variable) and socioeconomic characteristics (independent variables) were identified using bivariate analysis (See *Appendix 5*). Factors found to be substantially linked with the dependent variable in the bivariate analysis ($p<0.05$) were examined as candidates in the stepwise binary logistics regression with independent variables. Further, to ascertain the extent of relationships between the variables, Principal Component Analysis (PCA) was done.

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Frequencies and percentages were also employed in the data description.

RESULTS AND DISCUSSION

Socio-Demographic Features of The Study Area

Male respondents made up 67.8% of all households surveyed, while female respondents made up 32.2%. Only 3.2% of those surveyed were unmarried, while 90.8% were married. The average household size was 5-8 people (55.2%), with the largest age group being 36-49 (37.8%); the average household income was 2000-4999 per month (67.2%), with just 1.4% earning more than 15000 per month **(**see *Appendix 1***).** Agriculture/fishing (91.9%) and sand harvesting/quarrying (2.4% of the families examined) were the two most common sources of income. Additionally, 26.2% had completed secondary school, while 25.9% had no formal education. A variety of factors were subjected to bivariate analysis to determine the extent to which they influenced tree planting behaviour (see *Appendix 5*). A stepwise binary logistics regression was used to rank them from most important to least important, as shown in *Appendix 6*. The importance of trees was ranked first (the most essential), followed by Ownership of a television, Rank 2: household strength, Rank 3: age, Rank 4: monthly income, Rank 5 and Rank 6: educational level (least significant). The entire model, which included all variables, was statistically significant at $\chi 2$ (10, N = 370) = 98.312, p < .001, clearly indicating that the model was able to distinguish respondents who have planted and those who have not planted trees in the last six months.

Importance of Trees

The importance tagged on the trees planted had a favourable and significant impact on the households' decision to plant trees. The varying importance of trees included knowledge about the various ecological services they are likely to benefit from the tree, such as beauty, food, shade, and climate modification. This variable was significant at a 0.000 level of significance (p<0.05). According to the stepwise binary logistic regression, each unit increase in household awareness about the importance of trees increased the chances of planting trees by 8.443 times (see *Appendix 6*).

The study acknowledges the Jones et al. (2013) study, which reported that 61% of respondents considered it crucial, and 32% thought it was somewhat important to have trees on the property where they planned to live. Furthermore, 59% of homeowners assigned personal attributes, symbolic or spiritual importance, and value to trees (Jones et al., 2013). According to this study, more individuals will plant more trees if they better grasp the benefits of doing so. *Grevillae robusta* and *Eucalyptus globulus* were the most planted in the recent six months, accounting for 25.4% and 7.3%, respectively. *Grevillae robusta* and *Eucalyptus globulus* are both typical construction tree timbers used in flooring, panelling, and cladding. They are also commonly utilised to establish woodlots for recreational and aesthetic purposes. This finding was consistent with the findings of Rigal et al. (2018) who discovered that local stakeholders regarded the trees supported by local governments as providing the best protection against weather hazards and the greatest economic advantages. During the focus group discussion, it became clear that the majority of the households were quite particular about the kind and species of trees they planted. This is significantly influenced by the species' specific ecosystem values and goods. Most households planted trees for aesthetic reasons (90.5%), whereas other factors such as food, medicinal benefit, and forage were insignificant in survey responses.

Education Level

Appendix 5 shows that the educational level variable was significant at 0.039 (p <0.05). A stepwise binary regression analysis ranked Education level at number 6 (least important determinant to tree

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

planting) with an odd ratio of 1.207. This infers that a unit increase in education level will enhance the chances of planting trees by 1.207 times. This data concurs with that conducted by Ashraf et al. (2015), which found that the educational level of the head of the family was weakly related to the adoption of tree-planting behaviour at only a 10% level of significance. According to the study, people with high education who elected to plant trees in their yards had more trees planted than those without a high education. This suggests that education level is an important factor in understanding tree planting behaviour. The results show that the socio-demographic features of the study area are important in determining tree planting behaviour. The more educated a person is, the more likely he or she is to plant trees.

Household Strength

Appendix 5 also shows that household strength is a crucial factor in household tree planting. Households who rely on crop production were found to be more likely (82.1%) to plant trees as compared to livestock keepers or apiculturists. These findings corroborated with those conducted by Gebreegziabher et al. (2020), which found that households with relatively more cattle were less likely to be involved in tree planting. According to this study, Household Strength was ranked at position three as a major determinant of tree planting (odd ratio 2.252). This is likely to be due to the role of village agroecology in promoting tree planting (Gebreegziabher et al., 2020). Cross tabulations on the effect of household strength on household tree planting were significant $p< 0.05$) (see *Appendix 6*).

Age

The age of the respondents was a major factor in household tree-planting behaviour. As indicated in *Appendix 6*, it was significant at $p<0.05$ and was ranked at position 3. According to this study, people between the age of 36-49 planted more trees (37%) as compared to those above 65 years (2%) (See *Appendix 4*). These findings were in accord with a study conducted by Tefera (2016), which indicated that the age of farmers was positive and linked to the adoption decision of farmers to plant eucalyptus trees. Further, other studies have also indicated that age affects the decision of the farmers to participate in on-farm tree planting (Alassaf et al., 2011). Our results were also consistent with studies by Khalwale et al. (2018) that indicated that the age of the farmers influences their knowledge and awareness of activities in the surrounding. Thus, most decisions to plant trees will ultimately be made by middle age to older people who understand how the environment has been partitioned. A study by Ashraf et al. (2015) argued that younger people are more inquisitive about adopting new technologies and planting trees. Moreover, middle-aged people are ready to take risks in disregarding the prevailing conditions.

Monthly Income

Monthly income is a major determinant of tree planting. According to this study, 86.0% of those earning 2000-4999 Kenya Shillings per month indicated to have planted 67.2% of the total trees planted in the last six months (see *Appendix 2*). This was the average income earned by the respondents (63.8%) (see *Appendix 1*). Stepwise binary regression ranked monthly income at position 5 as a major factor influencing tree planting within the households. The study found out a unit increase in the income of the respondents increased the odds of planting more trees by 1.552 times (see *Appendix 6*). This data was corroborated by that conducted by Alassaf et al. (2011), which indicated an increment in the income per capita significantly increased the odds of planting eucalyptus trees by a factor of 1.000. The study was also consistent with that conducted by Ashraf et al. (2015), which indicated area of the cropping land of the households, monthly income of the family, tree planting experience of the family, and cropping land with access to irrigation were the main determinants of the adoption of tree planting at 5% confidence

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

interval. The study further indicated the odd ratios for contribution for tree adoption were highest for monthly income (1.00), followed by irrigated land (0.99), tree planting exercise (0.63), and finally, agricultural land (0.57) (Ashraf et al., 2015).

Television Ownership

According to *Appendix 4***,** people with no television had planted more trees (81.5%) than those who were accessible to television (18.5%) in the last six months. This is explained by the demographics of people who own televisions and their clustering within the ward. According to *Appendix 1***,** only 27.6% of the respondents are connected to electricity, while 72.4% are not connected. According to this study, accessibility to television was ranked at number 2 as a major factor influencing household tree planting. A stepwise binary regression analysis indicated that a unit increase in the accessibility of television increased the odds of planting trees by 2.506 times. However, this would significantly be influenced by extraneous factors such as land tenure rights and the stability of an individual wherever he is living.

According to Faham et al. (2008), there was a positive and significant correlation ($p<0.01$) between using the level of mass communication media and the level of motivation towards the community's participation in tree planting. Most areas within Homabay county are rural, with only 18.4% of the households connected to main electricity (KNBS, 2019). Most people having electricity are those living along the major roads and those in the market centres or near public facilities and institutions like hospitals, schools, and chiefs' camps. According to this study, most people living in centres are people who have come to work and do not have the land and tree tenure rights to plant trees. Similarly, in some instances, young men and women have also rented rooms at the centres where they do business and partially live a better part of their lifetime before they fully settle themselves at their homes. They equally lack the rights to grow trees where they live albeit have access to electricity and knowledge on tree planting. This explains the negative relationship between television ownership and tree planting.

Principal Component Analysis (PCA) with varimax rotation was conducted to assess how all the variables were clustered. The Kaiser-Meyer-Olking (KMO) statistic for sampling adequacy was 0.750 (greater than 0.6), and Bartlett's test was significant at $p <0.05$ (see *Appendix 7*). Six components were rotated based on eigenvalues over 1 criterion and the scree plot. The first component accounted for 19.481% of the variance, while the sixth component accounted for 6.435% of the variance. *Appendix 8* displays the original variables and component loadings for the rotating components with loadings less than 0.5 omitted to improve clarity. Results thus suggest in keeping with zero-order correlations, marital status, household type, water scarcity, education level, and house occupants were not substantially related to the other variables and, therefore, should not be aggregated with others. However, other variables formed a coherent component (monthly income, main crops, do your own television? and livestock kept). Based on this analysis, factors influencing tree planting majorly revolve around the economic implications and embedded values associated with tree growth. Thus, lowering the cost implications and enhancing knowledge of tree planting will certainly increase the odds of tree planting.

Motivation Factors to Tree Planting

Appendix 3 shows that most respondents (40.8%) suggested that increasing the availability of water will significantly improve their capability for tree planting. Water is a major component of tree planting and development. While Homabay County is largely endowed with a freshwater lake, only 13.3% of the land is under irrigation (CIDP, 2022). Homabay County should start programs to facilitate water pumping in households to enhance agriculture-based livelihoods such as agroforestry.

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Another important factor is the availability of seedlings. While quite a number of the respondents indicated their capability to purchase seedlings, the lack of quality and availability of seedlings is often a challenge in most tree nurseries available. In contrast, 5.4% of the respondents indicated financial based support towards the acquisition of seedlings, watering and protection of the seedlings to significantly motivate them towards tree planting. However, 3.0% of the respondents indicated a lack of space to plant trees. People living in rentals were largely affected by this, and the aspect of tree tenure rights in rented households was largely to be blamed.

CONCLUSION AND RECOMMENDATIONS

Based on the research findings above, the major factors influencing tree planting behaviour in households are Education level, household strength, monthly income, the importance of trees, age, and finally household's accessibility to television. Looking at the correlation of the importance of trees to tree planting, it is important to improve access to extension officers and enhance community engagement through schools, local authorities, and business communities in tree planting. Additionally, while agroforestry is an intuitive concept in most rural livelihoods, its potential to address food security and climate change mitigation is often unappreciated. This paper therefore posits this concept as an integral policy implication in the development of forest and agricultural policies to help address Kenya's vision 2030 on forest cover targets and climate change mitigation. Further, it is important to create awareness and knowledge across all social demographics on tree planting with a keen emphasis on tree-growing techniques, soil water retention and ecosystem-based goods and services through regular environmental/agricultural campaigns on media or through various community seminars. To minimise the high cost incurred in the acquisition of seedlings, policies should be developed to support the establishment of locational/ward-based nurseries by the County governments to make available seedlings for planting in the counties and also to partner with various non-Governmental organisations to supplement their capacity on seedlings production. Key stakeholders and research institutions such as Kenya Forestry Research Institute can significantly support these initiatives through the provisioning of high-quality germplasm, training on nursery establishment, and species site matching to enhance the survivability of tree seedlings and developments in Kenya. Finally, with the growing climate change discourse globally, Homabay County should quickly strategise and set legal structures to receive climate financing, such as Financing Locally-Led Climate Action Program (FLLoCA) to help spur community efforts towards climate change mitigation and adaptation.

ACKNOWLEDGEMENT

The authors would like to thank The Organization for Sustainable Environmental Protection (OSEP-KENYA) for the support in data collection. They are also grateful to key informants, Willys Omulo of Aluora Makare CBO and Fredrick Were (Ward administrator) for their inputs in this research. Much appreciation also goes to Jackton, Henry Saoke, Belinda Atieno, Dickens Alal, Domnick Airo, Felix Mbura, Willis Jiei, George, Steve and Lovine Jiei for their invaluable assistance in data collection.

REFERENCES

Alassaf, A., Majdalwai, M., & Nawash, O. (2011). Factors affecting farmer's decision to continue farm activity in marginal areas of jordan. *African Journal of Agricultural Research*, *6*(12), 2755–2760. https://doi.org/10.5897/AJAR11.481

Ashraf, J., Pandey, R., de Jong, W., & Nagar, B. (2015). Factors Influencing Farmers' Decisions to Plant Trees on Their Farms in Uttar Pradesh, India. *Small-Scale Forestry*, *14*(3), 301–313. https://doi.org/10.1007/s11842-015-9289-7

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Atieno, S. (2022). *Kenya Achieves 10% National Tree Cover Target – Science Africa*. Science Africa. https://scienceafrica.co.ke/2022/05/24/kenya-achieves-10-national-tree-cover-target/

Bukhari, S. A. R. (2021). Sample Size Determination Using Krejcie and Morgan Table. *Kenya Projects Organization (KENPRO)*, *February*, 607–610. https://doi.org/10.13140/RG.2.2.11445.19687

CIDP. (2022). *Homabaycounty government second county integrated development plan 2018- 2022 (draft)*. *2022*.

Ennos, R., Cottrell, J., Hall, J., & O'Brien, D. (2019). Is the introduction of novel exotic forest tree species a rational response to rapid environmental change? – A British perspective. In *Forest Ecology and Management* (Vol. 432, pp. 718–728). Elsevier B.V. https://doi.org/10.1016/j.foreco.2018.10.018

Faham, E., Rezvanfar, A., & Shamekhi, T. (2008). Analysis of factors influencing motivation of villagers' participation in activities of social forestry (the case study of west Mazandaran). *American Journal of Agricultural and Biological Science*, *3*(2), 451–456. https://doi.org/10.3844/ajabssp.2008.451.456

Gebreegziabher, Z., Mekonnen, A., Kassie, M., & Köhlin, G. (2020). Household Tree Planting in Tigrai, Northern Ethiopia: Tree Species, Purposes, and Tenure Security. *Land Use Policy*, *96*(432). https://doi.org/10.1016/j.landusepol.2020.104635

Jones, R. E., Davis, K. L., & Bradford, J. (2013). The Value of Trees: Factors Influencing Homeowner Support for Protecting Local Urban Trees. *Environment and Behavior*, *45*(5), 650– 676. https://doi.org/10.1177/0013916512439409

Kagondu, N. (2020). *Coronavirus pandemic sparks surge in firewood use in rural Kenya | Reuters*. Thomson Reuters Foundation. https://www.reuters.com/article/us-kenya-health-forests-energy-feature-t-idUSKBN27R0XZ

Kampourakis, K. (2014). Charles Darwin and the Origin of Species . *Understanding Evolution*, 98–126. https://doi.org/10.1017/cbo9781139542357.006

Kenya News Agency. (2022). *Kenya surpasses 10% tree cover, assessment report 2021 says – Kenya News Agency*. https://www.kenyanews.go.ke/kenya-surpasses-10-tree-cover-assessment-report-2021-says/

Khalwale, T., Langat, D., Abuom, P., & Okoth, S. (2018). *Factors Influencing Adoption of on-Farm Tree Planting in*. *4*(3), 38–48.

KNBS. (2019). Kenya population and housing census volume 1: Population by County and sub-County. In *Kenya National Bureau of Statistics: Vol. I* (Issue November). https://www.knbs.or.ke/?wpdmpro=2019-kenya-population-and-housing-census-volume-i-population-by-county-and-sub-county

Langat, D. K., Maranga, E. K., Aboud, A. A., & Cheboiwo, J. K. (2016). Role of Forest Resources to Local Livelihoods: The Case of East Mau Forest Ecosystem, Kenya. *International Journal of Forestry Research*, *2016*. https://doi.org/10.1155/2016/4537354

Meijer, S. S., Catacutan, D., Sileshi, G. W., & Nieuwenhuis, M. (2015). Tree planting by smallholder farmers in Malawi: Using the theory of planned behaviour to examine the relationship between attitudes and behaviour. *Journal of Environmental Psychology*, *43*, 1–

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

12. https://doi.org/10.1016/J.JENVP.2015.05.008

MoE&F. (2020). *Republic of Kenya Ministry of Environment and Forestry The National Forest Reference Level for REDD+ Implementation*.

Nellie Oduor, E. K. and, & Ogutu, C. (2020). *Energy in Woody Biomas*. *September*, 8–11.

NEMA. (2019). *Environmental Performance Index (EPI): 2018 Homabay County*. www.nema.go.ke

Rigal, C., Vaast, P., & Xu, J. (2018). Using farmers' local knowledge of tree provision of ecosystem services to strengthen the emergence of coffee-agroforestry landscapes in southwest China. *PLoS ONE*, *13*(9), 1–18. https://doi.org/10.1371/journal.pone.0204046

Saatchi, S. S., Harris, N. L., Brown, S., Lefsky, M., Mitchard, E. T. A., Salas, W., Zutta, B. R., Buermann, W., Lewis, S. L., Hagen, S., Petrova, S., White, L., Silman, M., & Morel, A. (2012). Seeing Forests for the Trees and the Carbon: Mapping the World's Forests in Three Dimensions. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(24), 9899–9904. https://doi.org/10.1073/PNAS.1019576108

Sunil, C., Somashekar, R. K., & Nagaraja, B. C. (2016). Diversity and composition of riparian vegetation across forest and agroecosystem landscapes of river Cauvery, southern India. *Tropical Ecology*, *57*(2), 343–354.

Tefera, S. A. (2016). *Determinants of Farmers Decision Making for Plant Eucalyptus Trees in Market District, North Willow , Ethiopia*. *6*(13), 62–70.

Wang, A. (2022). Scaling Up. In *Forbes* (Vol. 205, Issue 3).

APPENDIX

Appendix 1: Socio-demographic profile of the respondents

Socio-demographic Attribute		**f**	**%**
Gender	Male	251	67.8
	Female	119	32.2
Marital status	Single	12	3.2
	married	336	90.8
	widowed	20	5.4
	Separated	2	0.5
Age	18-29	25	6.8
	30-35	112	30.4
	36-49	139	37.8
	50-59	61	16.6
	60-65	21	5.7
	Above 65	10	2.7
Household size	1-4	138	37.9
	5-8	201	55.2
	Above 9	25	6.9
Primary source of income	Agriculture /Fishing	340	91.9
	Sand harvesting/Quarrying	9	2.4
	Manufacturing	6	1.6
	Electricity, gas, water supply	2	0.5
	Construction	2	0.5

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Socio-demographic Attribute		f	%
	Wholesale/ retail trade	2	0.5
	Mechanic /Repair of vehicles or motorbikes	2	0.5
	Transport e.g., Boda boda	2	0.5
	Financial intermediation e.g., Banking	2	0.5
	Health and social work	1	3
	Students	1	0.3
	Barber	1	0.3
Monthly income	Less than 1999(Ksh)	12	3.2
	2000-4999	238	63.8
	5000-9999	81	21.9
	10000-14999	36	9.7
	Above 15000	5	1.4
Connection to electricity	Yes	95	27.6
	No	249	72.4
Level of education	No formal education	96	25.9
	Nursery school	22	5.9
	Lower primary	49	13.2
	Upper primary	75	20.3
	Secondary	97	26.2
	Certificate/vocational craft	10	2.7
	Diploma/higher national diploma	15	4.1
	College/university	6	1.6

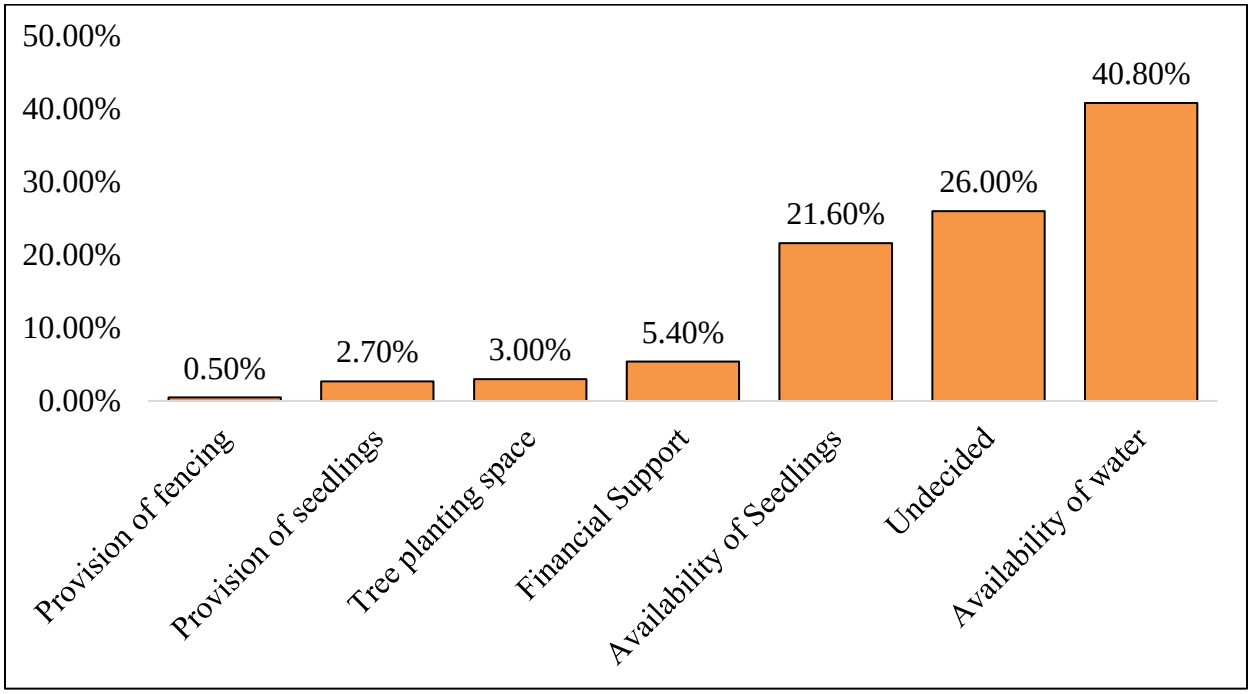
Appendix 2: Relationship between independent variables and tree planting frequency

Variables		Have you planted any tree in the last six months?	
		Yes	No
Gender	Male	81.3	18.7
	Female	82.4	17.6
Age	18-29	96.0	4.0
	30-35	90.2	9.8
	36-49	79.9	20.1
	50-59	72.1	27.9
	60-65	66.7	33.3
	Above 65	60.0	40.0
Education level	No formal schooling	85.4	14.6
	Nursery school	72.7	27.3
	Lower primary	79.6	20.4
	Upper primary	90.7	9.3
	secondary	81.4	18.6
	Certificate/vocational/craft	50.0	50.0
	Diploma/higher national diploma	73.3	26.7

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Variables		Have you planted any tree in the last six months?	
		Yes	No
	College/University	33.3	66.7
Marital status	single	91.7	8.3
	married	81.5	18.5
	widowed	80.0	20.0
	separated	50.0	50.0
Monthly income	Less than 1999	66.7	33.3
	2,000-4,999	86.0	14.0
	5,000-9,999	80.2	19.8
	10,000-14,999	63.9	36.1
	Over 15k	60.0	40.0
Farming activities	Crop production	84.2	15.8
	Livestock keeping	71.4	28.6
	Bee keeping	50.0	50.0
	poultry	33.3	66.7
	aquaculture	75.0	25.0
	others	70.3	29.7
House occupants	1-4	88.3	11.7
	5-8	78.1	21.9
	Above 9	88.0	12.0

Appendix 3: Motivation of tree planting in Wangchieng ward



Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Appendix 4: Relationship between certain socio-demographic factors to number of trees planted months

Parameter		No. of trees planted	Percentages
Age	18-29	24	8
	30-35	101	33.7
	36-49	111	37
	50-59	44	14.7
	60-65	14	4.7
	Above 65	6	2
Household strength	Livestock	46	15.2
	Crop production	248	82.1
	Apiculture	3	1
	Sand harvesting	4	1.3
	Others	1	0.3
Monthly income	Less than 1999 (Ksh)	8	2.6
	2000-4999	203	67.2
	5000-9999	65	21.5
	10000-14999	23	7.6
	Over 15000	3	1
Do you own television?	Yes	56	18.5
	No	246	81.5

Appendix 5: Factors affecting tree planting behaviour

Independent variables	B	SE	SIG	EXP(B)
Age	.455	.154	0.03**	1.577
Education level	.188	.091	.039**	1.207
Main crops	.086	.063	$.174^{NS}$	1.089
Livestock kept	-.008	.145	$.955^{NS}$	.992
Household strength	-.811	.301	.007**	.444
Monthly income	-.595	.257	.021**	.552
Do you own television?	-.920	.399	.021**	.399
Barriers to tree planting	.134	.114	$.241^{NS}$	1.143
Importance of trees	2.285	.481	.000**	9.827
Constant	-2.552	1.339	.057*	.078

*Model Chi square =98.312**, overall correct prediction is 86.1%; Cox and Snell R^2=0.234, Nagelkerke R^2 = 0.381, -2log likelihood =253.914**; Hosmer and Lemeshow Goodness-of-Fit Test = 6.558 (p = 0.585)*

*Note: *, and **indicate statistical significance at 0.1, and 0.05 respectively while NS =not significance.*

Article DOI: https://doi.org/10.37284/eajfa.5.1.1028

Appendix 6: Ranking of independent variables contribution to tree planting behaviour

Independent variables	B	SE	Sig	Exp(B)	Exp(B)adj	Ranking
Education level	0.188	0.091	.039**	1.207	1.207	6
Household strength	-0.811	0.301	0.007**	0.444	2.252	3
Monthly income	-0.595	0.257	0.021**	0.552	1.522	5
Importance of trees	2.285	0.481	.000**	9.287	9.287	1
Age	0.455	0.154	.03**	1.577	1.577	4
Do you own television?	-0.92	0.399	.021**	0.399	2.506	2

Note: Ranking with 1: highest, 4 smallest; if B > 0 then Exp(B)adjusted = Exp(B); and if B < 0, then Exp(B)adjusted = 1/Exp(B).

Appendix 7: KMO and Bartlett's tests

Kaiser Meyer Olkin measure of sampling adequacy		.750
Bartlett's test of Sphericity	Approx. Chi Square	744.299
	df	120
	sig	.000

Appendix 8: Factor Loadings from Principal Component Analysis with Varimax Rotation for a six-Factor component (N=380)

Component Loading							
Variables	**1**	**2**	**3**	**4**	**5**	**6**	**Communality**
Monthly Income	.753						.690
Main Crops	.753						.580
Do You Own Television?	-.730						.570
Livestock Kept	.610						.434
Importance Of Trees							.472
Farm Activities							.590
Income Source							.392
Marital Status		.651					.593
Household Type		.569					.489
Age							.521
Gender			-.588				.544
Water Scarce							.669
Barriers To Tree Planting							.598
Household Strength							.641
Education Level					.680		.690
House Occupants						-.598	.751
% Variance	19.481	9.224	7.851	7.467	6.855	6.435	
Eigenvalues	3.12	1.48	1.26	1.20	1.10	1.03	

