



# The Quest for Afforestation Programmes in Response to Climate Changes in East Africa: A Scoping Review

Lucy Kithu

Masinde Muliro University of Science and Technology, Kenya

Email: [lucykithu@gmail.com](mailto:lucykithu@gmail.com)

**Abstract:** Climate change has disrupted the global economy albeit concerted efforts by world environmental concerns to manage the negative effects. Climate change management campaigns on both experimental and intervention scales are being realized in the developed nations as well as Africa and Kenya. African countries have always faced difficulties in implementing global strategies and climate change management campaigns are such strategies that remain largely difficult to implement more so in East Africa and Kenya. Specifically, the study set to explore the enablers of climate change management, evaluate the barriers to implementing the strategies, and examine the afforestation measures taken by Kenya in improving the implementation of climate change management strategies. The study methodology utilized a systematic analysis of peer-reviewed articles, PRISMASCR with a synthesis of both qualitative and quantitative presentations through a scoping review covering the years 2019 to 2022 which falls within the Sendai Framework 2015-2030. Climate change management strategy implementation successes varied from country to country depending on many factors while differing from urban centres compared to rural areas. Finally, the shortage of environmental specialists and adequate funding to involve local communities in such climate change management strategies contributed to the failure of these strategies. Cooperation amongst East African countries is key to the success of climate change management strategies with increased funding to increase local community involvement. Additionally, strategies to increase forest cover and retain the current forests must involve the local communities from inception to implementation.

**Keywords:** Sendai Framework, Afforestation, Climate Change, Community involvement, Kenya

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## 1. Introduction

Global climate change has forced communities and countries worldwide to suffer reduced economic activities due to the imbalance of carbon in the environment. With the fast spread of the carbon footprint resulting from increased modernity and human activities heavily reliant on fossil fuels, countries find themselves in a state of desperation in efforts to try to save the forest cover that is critical in slowing down climate change (Doelman et al., 2020). The developed world, through support and guidance by Sendai Framework 2015-2030 adopted at the Third. UN World Conference in Sendai, Japan, on March 18, 2015, has continued to make huge steps in producing strategic programs for combating the adverse climate changes with set targets for the year 2030 (Haghverdi & Kooch, 2020; Aitsi-Selmi et al.,

2015). Sendai Framework had the objective of having substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries globally. Referenced as Targets, the objectives of Sendai Framework include those to be reduced and those to be increased. The targets for substantially reducing include, global disaster mortality, number of affected people, GDP-related economic loss and damage to critical infrastructure as well as services disruption. The three targets for substantially increasing are; increase in number of countries with national as well as local DRR, international cooperation to developing countries and availability as well as access to early warning systems plus DRR information (Kelman, 2015; Pearson & Pelling, 2015). Specific countries in the West, including

the US and Canada and a few others globally have been implementing the recommended strategies with quick and efficient programmes, but the same cannot be said of the less developed countries, specifically Africa (Forster et al., 2021). The leading effective measure in most of the implementing countries specifically, the USA, Britain, France, Italy, Japan, China, and Germany, among other leading developed nations has been afforestation as well as maintenance of existing forest cover (Han & Keeffe, 2021; Forster et al., 2021).

However, the lack of advocacy by states to financially support afforestation programmes and rollout strategies for the same has remained a hindrance for most less developed regions of the world, especially Africa. Unlike in developed nations where afforestation continues to increase effectively, the African continent is still struggling with policies that make it difficult to fully implement afforestation programmes as a result of culture, politics, and lack of community involvement (Bustamante et al., 2019; Hazarika et al., 2021; Liu et al., 2022). The East African countries, including Kenya, Uganda, Tanzania, and Rwanda remained largely affected by the increasing climate change, yet they have also continued to fall behind in their implementation of climate change strategic initiatives. Generally, afforestation programmes in East Africa face challenges in terms of several factors but mainly cultural and economic (Kalele et al., 2021; Akanwa et al., 2019; Ngongolo et al., 2022). Meeting the Sendai Framework by 2030 for the 7 targets is a tough call for the East African states but efforts by individual countries with a need for collaboration, especially for cross-border forest zones are taking place although on sparse regularity (Makanji et al., 2019; Omona, 2022; Mswima et al., 2022). It is from this review that the current study set out with the research question: What are the key barriers and enablers of afforestation programmes within the East African countries especially Kenya?

## 2. Literature Review

The global efforts on afforestation have had obstacles in their implementation with the biggest one being food security, which requires utilization of the land thus cutting down or reducing the forest cover (Han & Keeffe, 2021). Regionally, the Sendai Framework for the East African states was pledged during the 2017 meeting in Mombasa, Kenya, with emphasis on collaborative measures that would help in mitigation. Kenya, Tanzania, and Uganda, in particular, have since implemented some afforestation programmes but on a smaller scale compared to the set goals of the Sendai Framework (Pello et al., 2021; Nthambi et al., 2021; Munyazikwiye & Michaelowa, 2022). Evidence from the UN indicates that whereas finances were available to some extent in most cases, it has proved problematic to smoothly commence the afforestation programmes while the people's culture and their agricultural activities remained yet another hindering factor (Ojuok, 2020).

Another key factor playing down efforts to accelerate the afforestation programmes as key in combating climate change was the colonial lineage across the East African states. Some countries appeared to receive favourable funding compared to their neighbours with different colonial powers thus impacting how effective the afforestation programmes could be implemented in the various East African nations (Twinomuhangi et al., 2022; Bamanyisa, 2019; Mfwango et al., 2022). Collaboration among the East African states also plays a role, especially when the countries engage in international agreements enabling them to seek common ground on matters of implementation and ratification of the global UN-led afforestation programmes (Malunguja et al., 2020; Taremwa et al., 2022; Owino et al., 2021). The effect of a good intergovernmental environment across the East African states can therefore not be ignored as it stands a chance of enhancing successful afforestation programmes to combat climate change.

Similarly, entering into environmental agreements with global partners like China and the European Union, as well as well-renowned countries of afforestation like Canada and the USA has given the East African countries opportunities to access funding channels for rolling out their afforestation programmes (Waaswa & Satognon, 2020; Hazarika et al., 2021). Such bilateral agreements however could be jeopardised by political links and a lack of structures in the member countries, thus slowing down the afforestation programmes.

## 3. Methodology

### 3.1 Protocol

The study used a scoping review approach for establishing related information on afforestation programmes in East Africa. A scoping review is a form of cognitive communication that uses process and repetition to identify and synthesize existing or new information on a topic. In particular, the study adopted the PRISMA-ScR guidelines in scoping review, which is simply a preferred reporting item for systematic reviews and meta-analysis (Lockwood et al., 2019) for presentation of findings. PRISMA which stands for Preferred Reporting Items for Systematic Reviews and Meta-Analyses is a methodological approach where, literature and findings from various articles related to the study topic are thoroughly studied to provide conclusive results on a study objective. PRISMA-ScR basically charts out how data from the included sources of evidence is filtered to make conclusions and recommendations for a study objective in this case afforestation programmes for mitigating climate changes.

## 3.2 Search Strategy

The study also utilized data from the specific databases in the environmental and climate change sphere together with peer-reviewed papers covering afforestation programmes globally, regionally, and the East African countries including National Centers for Environmental Information and Climate Change by World Bank among others. The study specifically looked out for strategies used, the uptake rates, rates of failure, and logistical challenges in the countries for afforestation programmes attempted. Trends were identified to show the afforestation success or failure as well as the real challenges causing that afforestation trend among the East African countries. Only articles written in English were considered for the study.

## 3.3 Study Selection and Eligibility Criteria

The population of the study comprised all studies of afforestation programmes within and related to East African countries through online access of the articles and data bases. The eligibility of the data was based on four criteria; first, the studies had to be on the topic of afforestation for climate change mitigation. Second, the study had to have been carried out in the last 5 years from the current review. Third, the focus had to be on East African countries or their global partners relating to East Africa. Fourth, the articles had to be from recognized academic databases for academic research as opposed to articles or commentaries in the news media. Data was screened for relevance of study objectives, specifically afforestation programme successes and failures highlighting the enablers as well as barriers in afforestation strategies across East Africa. The patterns of afforestation programme rollouts in the East African countries were then identified.

## 3.4 Data Charting

The study utilized the standard data extraction charting as designed by Green et al., (2006) and by later scholars including Sethi et al., (2020) and Bauer (2022). This PRISMA charting guideline was critical in the preparation of data for analysis. It also provided a chance for the study to identify what steps to undertake without skipping important criteria

## 3.5 Data Analysis

The data gathered from various sources was arranged into specific groups depending on their strength of being either barriers or enablers of afforestation. The country information was also key in helping to understand the key trends in afforestation programmes implementation. This therefore meant that there was classification of the data according to the country of application in East Africa.

## 3.6 Ethical Considerations

For this study to take place, permission of the university was sought commencing with departmental and faculty clearance for article writing. Additionally, all reference materials used in the study were acknowledged through citations and referencing.

# 4. Results and Discussion

## 4.1 Summary of Article Selection

The study commenced with a selection of the eligible articles for analysis, and this was achieved through the adoption of the PRISMA charting guide in which several articles were accessed and screened for the final selection as shown in Figure 1.

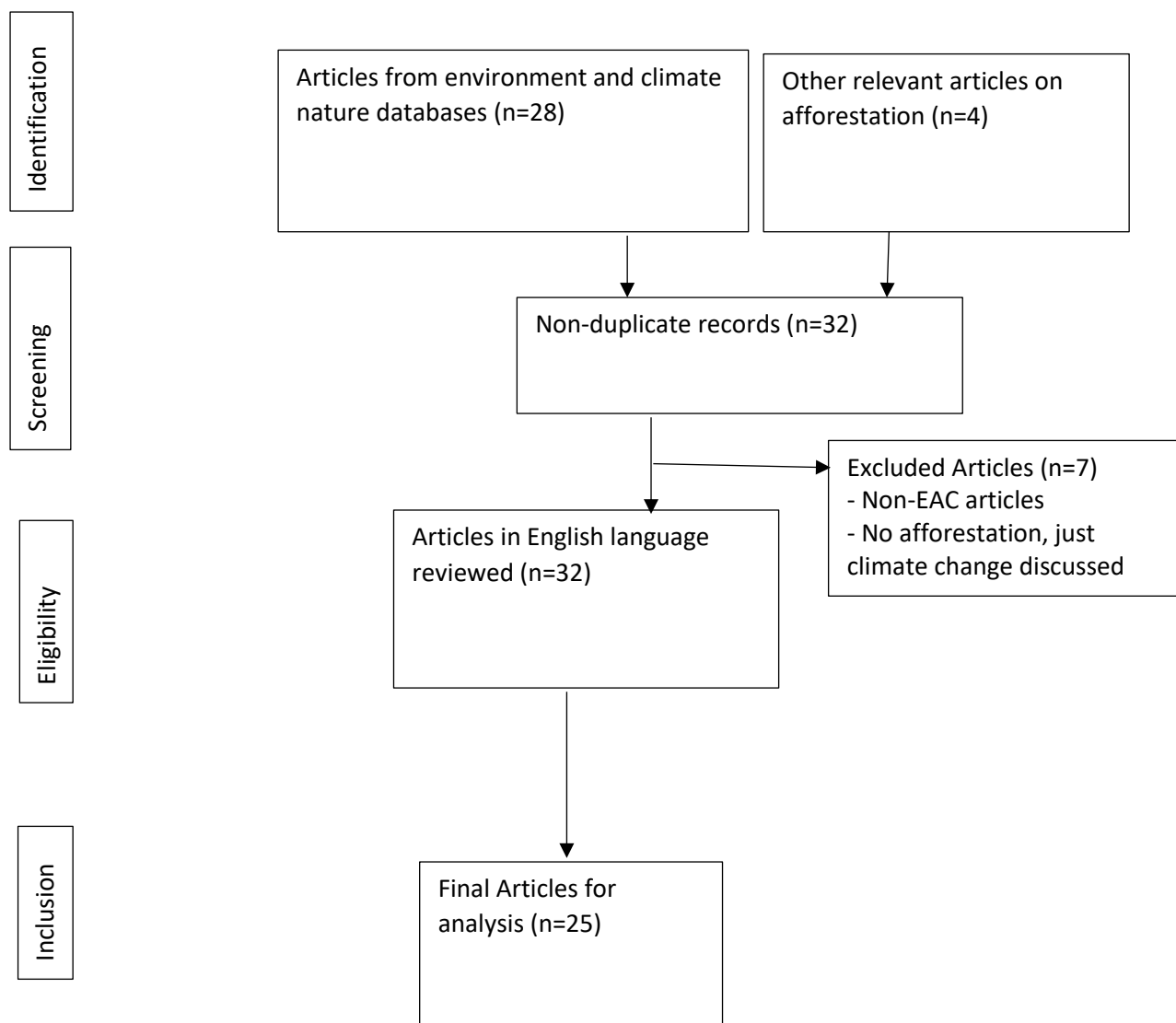


Figure 1: Adopted PRISMA Charting of Literature

## 4.2 Description of Article Categories

Out of 32 articles reviewed, a total of 25 articles were finally utilized that matched the study objective. There are 6 member states from the original 3 that form the East

African community including Kenya, Uganda, Tanzania, Rwanda, Burundi and South Sudan. The 25 articles were mainly from the EAC, 60%, EAC partners, 24%, and 16% from any other countries with a history of afforestation programmes from across the African continent and the rest of the world for example Canada, USA, China, and Germany.

**Table 1: Summary of Articles Reviewed**

S/No.	Origin	Frequency	Percentage (%)
1.	East African Countries	20	60
2.	EAC partners e.g. UN, USA, Canada, China etc.	3	24
3.	Others (non-partners)with afforestation programmes	2	16
	Total	25	100

Some of the studies were purely for qualitative understanding of the afforestation programmes in climate change mitigation (Doelman et al., 2020; Forster et al., 2021) and how the rest of the globe has reacted to global climate change. As the summary in Table 2 indicates, the majority of the studies were from Kenya

with 8, followed by Uganda with 4 and the least was 1 from Burundi, but this could be attributed to the screening which only considered English language articles yet Burundi is largely a French speaking country thus few English articles. Additionally, Table 3 provides a summary of data charting with comments.

**Table 2: Summary of Articles from EAC**

S/No.	EAC Member articles	Frequency	Percentage
1	Kenya	8	40
2	Uganda	4	20
3	Tanzania	3	15
4	Rwanda	2	10
5	Burundi	1	5
6	South Sudan	2	10
	Total	20	100

**Table 3: Data Charting Summary**

Summary of Key Findings/Evidences	Number of Supporting Sources	Proportion of Supporting Sources (%)	Study Designs Applied	Settings (countries or regions) Covered	Additional Comments
<b>Afforestation Program Barriers</b>					
Resistance from the community and cultural barriers	5	20	3	14	Communities like pastoralists are heavily dependent on forests yet not doing afforestation
State hesitancy in afforestation implementation	8	32	3	4	States not at ease with global climate initiatives
Low trust in afforestation success	3	12	4	2	Fueled by fear of losing livelihood sources
Politicization of afforestation programs	8	32	3	5	Old colonial divides mean communities separated yet sharing forested areas
Lack of community sensitization or climate change education	11	44	4	6	Community climate and environmental education scarce
Shortage of environmental or climate change specialists	14	56	3	8	The cost of training in environmental and climate matters high

<b>Summary of Key Findings/Evidences</b>	<b>Number of Supporting Sources</b>	<b>Proportion of Supporting Sources (%)</b>	<b>Study Designs Applied</b>	<b>Settings (countries or regions) Covered</b>	<b>Additional Comments</b>
Poor strategic planning by countries in approach to climate change and afforestation	12	48	3	4	States are not fast in the implementation of global climate change mitigation strategies
<b>Afforestation Program Enablers</b>					
Good support from the UN and other climate agencies	8	32	2	7	Evidence of UN support was visible
Well-coordinated efforts from EAC members	6	24	2	11	Kenya is at the forefront e.g. Mau and Imenti forests rehabilitation
Cross-border treaties within EAC states	4	16	3	6	East Africa has encouraged cross border movements
Governments engaging private practitioners for afforestation like ranches, private farms and relocations	7	28	2	7	Examples in Kenya include such private ranches as Sosyan and Lewa ranches
Relaxed forest restrictions to enable food sustainability with afforestation	4	16	3	4	Cropping systems enable farmers to carry out activities without interference with forests
Gender involvement as sensitization champions for afforestation	5	20	2	3	Very effective especially in rural areas where farming is key and women are involved
Ease of access to World Bank, UN grants, and foreign donors kick-starting afforestation programs	8	32	3	6	Groups and individuals equally have access to foreign funds in support of afforestation

**NB:** Since the sources overlap, the total percentages cannot be 100 on most or all columns.

## 4.3 Discussion

### 4.3.1 Barriers to afforestation programs

There were high incidences of resistance during the concerted efforts to implement or jump-start afforestation programs. There was resistance by the citizens of Kenya, Tanzania as well as Uganda with results showing that people were not willing to vacate or relocate from forested areas like Mau Forest and Mount Elgon Forest in Kenya (Makanji & Oeba, 2019; Omona, 2022). In both Tanzania and Kenya, high instances of hesitancy and low trust are witnessed as citizens fail to attend campaigns for afforestation. Even though reviews indicate that over 70% of the population in the EAC were willing to accommodate afforestation programs, the high level of hesitancy keeps pulling down the success rates of all efforts to implement afforestation strategies. It also became clear that in some countries like Kenya, Rwanda, and South Sudan, the afforestation programs meant to curb the spread of desertification were being politicized, for example the Kenyan evictees of Mau Forest believed it was done for political purposes as opposed to the obvious signs of drying rivers as a show for climate change (Ojuok, 2020; Pello et al., 2021). Lack of information on the population and more so the low numbers of environmental as well as afforestation specialists in the EAC countries as pointed out in various UN studies pose barriers to successful afforestation campaigns (Näschen et al., 2019; Mfwango et al., 2022).

The UN climate agencies aimed to achieve a 3% success rate in the afforestation efforts across the world, but the target is not on the right trend as per the estimated 2030 deadline. The estimated reduction of global temperature increases to an estimated 1.5 degrees Celsius to combat global warming was thought to be achievable through concerted afforestation programs (Haghverdi & Kooch, 2020). However, this is seemingly not achievable across the EAC region either due to long periods of political instability or simply poor economic status by most of the states, including Burundi and South Sudan, with the more stable ones like Kenya, Tanzania, and Uganda undergoing economic upheavals (Kalele et al., 2021; Nthambi et al., 2021; Akanwa et al., 2019).

More so, the study established that most countries were reacting too slowly to the increasing climate change or global warming effects either due to ignorance or simply failure to fully forecast the devastating effect of climate change. Across the EAC nations, populations near forests or even those heavily reliant on forests are very reluctant to observe afforestation measures which further makes it difficult to accept the recommendations for afforestation programs as directed by the authorities (Malunguja et al., 2020; Mswima & Kaswamila, 2022). Another challenge of afforestation appears to be the gender divide with many cultures across the EAC nations with indications showing almost 75% of women are

found in the rural villages where farming is the key activity yet men are the ones who are involved in the afforestation debates (Bamwesigye et al., 2020; Munyazikwiye & Michaelowa, 2022; Ntakirutimana & Vansarochana, 2020).

An interesting phenomenon proving to be a hindrance to the implementation of afforestation programs is the conflict between man and wildlife. Some of the activities meant to boost afforestation are largely in conflict with the freedom of movement for the wildlife for example, controlled grazing for improved soils means that wildlife has to be kept away from domestic animals and this involves removing some of the forest cover to achieve that objective, which is against the afforestation strategies (Taremwa et al., 2022; Bauer, 2022; Bustamante et al., 2019). Another notable challenge was the food insecurity in many parts of EAC nations. For example, reports in the Northern regions of Kenya indicate there was a widespread food shortage making it almost impossible to urge the residents to engage in afforestation programmes when access to food is of more priority to them (Owino et al., 2021; Nthambi et al., 2021).

Success rates were also noted in the main areas of most EAC with Kenya's Kakamega Forest, Imenti Forest, and Mount Elgon Forest cited as key rural areas that were now excelling in pursuit of afforestation programs aimed at increasing forest cover while maintaining the little that still exists (Pello et al., 2021; Makanji & Oeba, 2019; Owoade & Abolarin, 2024). However, poor infrastructure, including hospital facilities, the low network of roads, and poor communications have also contributed to the low implementation of afforestation strategies in the majority of rural areas (Ngongolo & Kilonzo, 2022; Giliba & Yengoh, 2020).

### 4.3.2 Enablers of Afforestation Programs

Even though the response by African states to climate change mitigation in general is slow, efforts are being made to improve the afforestation programs with the collaboration of global and regional partners (Bustamante et al., 2019; Hazarika et al., 2021). Existing peace treaties and good neighborliness has also contributed to the fairly good afforestation experienced in specific countries and regions for example the Mount Elgon Forest across Kenya and Uganda and the Mara-Serengeti Forest across the Kenya and Tanzania border (Twinomuhangi et al., 2022; Bamanyisa, 2019; Winowiecki et al., 2020; Kalilou, 2021). This implies that if well-coordinated, afforestation programmes could be a success in the EAC region. The enabling of both private and public players to get involved in the afforestation programs was the right step as many countries have adopted this private ranching approach (Forster et al., 2021; Han & Keeffe, 2021; Makanji & Oeba, 2019). Similarly, there was a gender-based role, especially in the rural areas where women, for example in Rwanda and Kenya, were involved in the sensitization

of forest preservation as well as education on sustainable food security without interference with the forest cover (Munyazikwiye & Michaelowa, 2022; Taremwa et al., 2022; Mswima & Kaswamila, 2022). This implies that the cultural backgrounds of individual EAC nations could be a key factor in afforestation, especially in the largely populated rural areas still having forest cover.

The emerging trends indicate that ties to the old colonial linkages enhanced the afforestation successes countries like Kenya, Rwanda, and Uganda have success rates linked to their colonial partners granting funds (Haghverdi & Kooch, 2020; Liu et al., 2022). So far, through such colonial linkages, the UN afforestation and climate change initiatives have been seen to grow over the last 5 years. Looking back at the fast spread of speeding global warming, it is commendable that the EAC nations have steadily maintained a check on the spread of desertification. It also emerged that EAC member countries keenly observe the afforestation successes while building on policies that are aimed at increasing forest cover. The private sector also features prominently in the records as their involvement in afforestation through ranches and conservatory approaches continues to complement government efforts to promote afforestation (Owino et al., 2021; Nthambi et al., 2021; Depicker et al., 2021).

## 5. Conclusion and Recommendations

### 5.1 Conclusion

It has emerged that the afforestation program is heavily influenced by various factors, including the hesitancy by citizens in the EAC nations to adhere to forest conservation and afforestation measures. However, people's cultural setup and location in a country have also had an effect with the urban dwellers readily enabling receiving products from the rural dwellers while not contributing to the sacrifices undertaken by the rural communities in the food production that affects forest cover. Unfortunately, the rural populations have limited options to earn their living as opposed to town dwellers who can do all their feeding on purchases. Efforts by UN climate agencies and afforestation advocates continue to be hampered by the poor infrastructure and low food security in the majority of rural areas thus making it difficult to pull away communities from forest lands.

### 5.2 Recommendations

Although scoping reviews are generally not recommended for policy designs, the study recommends the attainment of policy agreements that enable local populations, especially in the rural areas to be sensitized more on the need for afforestation programs to help improve the overall forest cover as an effort to reduce global warming. There is also a need for joint efforts in the afforestation programs specifically the involvement

of cross-cultural groups for example pastoralists living next to farmers sharing the same forest land have different views of the forest land and thus could be in conflict when it comes to forest conservation or afforestation programs. This could, for example, enable cross-border ethnic groups like Maasai across Kenya Tanzania border, and Karamojong across Kenya-Uganda borders to have a common approach to their forests and afforestation programs.

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