# A Community-Based Approach to Climate Change Mitigation and Adaptation Through Forest Restoration: A Case Study of Anambra State

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KEYWORDS

*Climate change,*
*indigenous people,*
*deforestation,*
*trees,*
*carbon*

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ABSTRACT

*Most developing countries including Nigeria are seriously affected by climate change. The role of indigenous peoples in protecting global forests and therefore regional and global climate stability has been widely recognized. The causes of deforestation in Anambra State are urbanization, land clearing for farming, bush burning for hunting, over-exploitation of medicinal plants, inadequate forest management techniques, highways and building construction. This paper suggests how indigenous communities in Anambra State can sustain their ability to use little available resources to respond to, withstand, adapt and mitigate the effects of climate change through forest restoration. There are 179 communities (Town Unions) spread throughout 21 local government districts in Anambra State. Anambra State Association of Town Unions (ASATU) where each community is represented has a women's wing that unites all the women in the State. It is intended that each community will contribute 1000 tree seedlings, for a total of 179000 tree seedlings. Each community's women shall be responsible for planting the trees in the designated locations. In the foreseeable future, the 179,000 trees planted will lower greenhouse gas emissions that worsen climate change. It would not only reduce the effects of heat waves, floods, and droughts brought on by climate change but would also have several positive economic and social effects. If 675 trees per acre would sequester around 20 tons of CO2 annually for 30 years, it implies that 179000 tree seedlings in Anambra State can sequester 5303.7 tons of CO2 in 30 years if planted*

**INTRODUCTION**

Climate change is an adverse environmental phenomenon that is causing enormous concern all over the world. Most developing countries including Nigeria are seriously affected by climate change. This has become a major topic of discussion in modern political and economic discourse (Ikeme, 2008; Ogbuabor and Egwuchukwu, 2017; Choko *et al.*, 2019). The effects of climate change vary geographically since some areas will be more adversely affected than others (IPCC, 2007; Wood *et al.*, 2014; Mulligan *et al.*, 2016; Mishrah *et al.*, 2017). Because of disparities in sensitivity and adaptive capability between different countries and areas, climate change has a profound influence on developing countries, especially the natural resources they possess and depend on (IPCC, 2007).

In Nigeria, the effects of climate change on human health may be direct or indirect, with the most vulnerable populations being children, pregnant women, the elderly, the impoverished, and those with disabilities and chronic illnesses (Hathaway and Maibach, 2018). The severity of the hazard arising from climate change, along with the community's susceptibility to it and its capability to tolerate it, all work together to define the impact of any particular shock at the community level (Alima Ogah ,2021). The main cause of climate change is the anthropogenic increase in greenhouse gas concentrations in the earth's atmosphere. Carbon dioxide ($CO_2$) is the principal greenhouse gas. Its concentration in the atmosphere is the result of a cycle between different carbon pools (Karsenty, *et al*; 2003). Forests are important carbon pools which continuously exchange $CO_2$ with the atmosphere, due to both natural processes and human action. Planting new forests, rehabilitating degraded forests and enriching existing forests contribute to mitigating climate change as these actions increase the rate and quantity of carbon sequestration in biomass.

Nations and communities must take precautions against and reduce the effects of climate change in order to deal with that threat. Communities in forest landscapes, in particular indigenous peoples, are considered to be among the groups most vulnerable to climate variability and change as they depend on climate-sensitive activities for their sustenance and livelihoods (IPCC, 2019). The pivotal

role of indigenous peoples in protecting global forests and lands, and therefore regional and global climate stability has been widely recognized (IPCC, 2019; Rainforest Foundation Norway, 2021; FAO and FILAC, 2021). It is essential to engage and partner with indigenous peoples to take climate and restoration action (Rainforest Foundation Norway, 2021). This paper suggests how indigenous communities in Anambra State can sustain their ability to use little available resources to respond to, withstand, adapt and mitigate the effects of climate change through forest and natural resources restoration.

**Role of Forest Ecosystem Restoration in Climate Change Management**

To alleviate the impact of climate change on the environment and livelihood sustainability in particular, strategic approach must be adopted. One of the approaches to climate change mitigation is the sustainable management of forest ecosystems (Oyewole *et al*; 2019). Forest resources have a significant role to play in achieving sustainable economic development and climate change mitigation.

Forests are a stabilizing force for the climate. They maintain ecosystem balance, are crucial to the carbon cycle, support human livelihoods, and provide goods and services that can promote sustainable economic growth. Aside from economic functions, the forest has been helpful in environmental sustainability in terms of erosion control, reduction of pollution, and provision of food and habitat for wildlife. In fact, forests are widely known as the world's largest repository of terrestrial biodiversity (Oyewole *et al*; 2019).

Stopping the loss and degradation of forest ecosystems and encouraging their restoration have the potential to account for more than one-third of the entire amount of climate change mitigation that experts estimate would be needed by 2030 to achieve the goals of the Paris Agreement (IUCN, 2021). Approximately 2.6 billion tonnes of carbon dioxide, one-third of the $CO_2$ released from burning fossil fuels, is absorbed by forests every year (IUCN, 2021)

In addition to providing food and timber, forests also protect biodiversity, manage water resources (due to their influence on the volume and distribution of rainfall, dynamics of water in the soil and the quantities of water discharged into the atmosphere in the form of vapour), and offer recreational opportunities (Schaphoff *et al*., 2016). According to IUCN (2021), globally, 1.6 billion people (nearly 25% of the world's population) rely on forests for their livelihoods, many of whom are the world's poorest. Hence, the need for forest restoration cannot be overemphasized.

**Forest situation in Anambra State**

Anambra State has the second smallest land area in Nigeria with a high human population and an alarming rate of deforestation and forest degradation because of human economic activities (Okereke *et al*; 2015). Anambra state is made up of five (5) forest zones which are also based on the five agricultural zones of the state (Ezike 2011). They include the Awka zone, Nnewi zone, Abagana zone, Otuocha zone, and Onitsha zone.

The natural vegetation in the greater part of Anambra State is tropical dry or deciduous forest, which, in its original form, comprised tall trees with thick under growth and numerous climbers (Nwosu 2003). The typical trees (silk cotton, Iroko and oil bean) are deciduous, shedding their leaves in the dry season. Only in the southern parts of the state, where the annual rain fall is higher and the dry season shorter, is the natural vegetation marginally the tropical rainforest type. Because of the high population density in the state, most of the forests have been cleared for settlement and cultivation. What exists now in many places is secondary re-growth, or a forest savannah mosaic, where the oil palm is predominant, together with selectively preserved economic trees. Relics of the original vegetation may, however, be found in some "juju" shrines or some inaccessible areas (Nwosu 2003).

The primary causes of deforestation in Anambra State are urbanization, land clearing for farming, bush burning for hunting, over-exploitation of medicinal plants, inadequate forest management techniques, highways and building construction. The land-clearing and post-clearing soil management practices in the state have an impact on the capacity of forests to store carbon. Deforestation in the state has resulted in the loss of soil nutrients, extinction of species with high economic or medicinal value, siltation of rivers, species extinction, decreased biological diversity, decreased ecosystem stability, decreased plant biomass, and disruption of the food chain, among other negative effects (Okereke *et al;* 2015). At this current rate of deforestation in the state, an untold hardship especially among the rural women who depend so much on the forest and its products is inevitable.

**Community-based strategy for climate change mitigation**

Forest and landscape restoration is a natural climate pathway with one of the highest mitigation potentials. Restoration through afforestation and reforestation could cost-effectively remove 0.9– 1.5 gigatonnes of carbon dioxide equivalent ($GtCO_2eq$) per year from the atmosphere between 2020 and 2050 (FAO, 2022). Forest and landscape restoration activities such as reforestation, afforestation and the integration of trees into other land use (e.g. agroforestry), can be relatively cost-effective mitigation options, especially when adapted to local socioecological contexts and considering local and distant trade-offs (Pörtner *et al.*, 2021).

In order to restore the status of Anambra forest, there is need to embrace and encourage an afforestation programme which involves the establishment of a forest or stand of trees in an area where there was no previous tree cover; Reforestation programme which

entails the reestablishment of forest cover, either naturally (by natural seeding, coppice, or root suckers) or artificially (by direct seeding or planting) and Agroforestry which is a sustainable land-use practice involving the deliberate combination of trees, agricultural crops and/or animals on the same land management unit. Planting of trees will improve resilience to climate variability and extreme conditions, and enhances diversity in terms of plant biodiversity and farm enterprise diversity.

Gender mainstreaming is a cross-cutting theme of scaling-up climate ambition on land use and agriculture. While women traditionally do the majority of agricultural and domestic work around the world, they are more likely to live in poverty because they lack the same access to financial and other resources, the capacity to buy land, and the authority to influence decision-making as men (Garrett, *et al*, 2022). However, in Anambra State, women are well-mainstreamed in a lot of activities which before now were not possible. For instance, some women are members of the Igwe Cabinet. In fact, in one of the towns, a woman is a Palace secretary. Hence, women shall be used to pilot the programme

**The Strategy**

There are 179 communities (Town Unions) spread throughout 21 local government districts in Anambra State. Each community has an Igwe and President General. The town unions have sufficient financial resources to address some issues in the localities. There is an association called Anambra State Association of Town Unions (ASATU) where each community is represented. This organization has a women's section that unites all of the women in Anambra State's communities. The tree planting will be coordinated by the women's wing.

It is intended that each community will contribute 1000 tree seedlings, for a total of 179000 tree seedlings. Each community's women are responsible for planting the trees in the designated locations, which may include their homes, communal woodlands, and along roadways as they deem fit. In the foreseeable future, the 179,000 trees planted in the state will lower greenhouse gas emissions that worsen climate change. It would not only have a significant positive influence on reducing the effects of heat waves, floods, and droughts brought on by climate change, but it would also have several positive economic and social effects.

Saving Nature (2023) states that offset estimates are based on 675 trees per acre, which sequester around 20 tons of CO2 annually for 30 years. This means that 179000 trees in Anambra State can sequester 5303.7 tons of CO2 in 30 years.

**CONCLUSION**

Environmental protection is not only the duty of the government but also of the governed. Climate change is a global problem and so all hands must be on deck to mitigate this problem. Hence community participation is crucial and would help immensely in ensuring grass root approach which would not only create awareness of forest restoration but would also create awareness in other environmental issues in the state.

**REFERENCES**

Alima Ogah (2021) Climate Change In Nigeria: Assessing Policy And Practice For Community Resilience, A thesis submitted in partial fulfilment of the requirement of Teesside University for the degree of Doctor of Philosophy, https://research.tees.ac.uk/en/studentTheses/climate-change-in-nigeria-assessing-policy-and-practice-for-commu retrieved on 6th Feb,2023

Choko, O. P., Olabisi, L.S., Onyeneke, R. U., Chiemela, S. N., Liverpool-Tasie, L. S. O., Rivers, L. (2019) 'A resilience approach to community-scale climate adaptation', *Sustainability*, 11, pp. 1-16.

Ezike E. S. (2011). A hand over note on the status of Anambra State Forest Reserves presented to the incoming director of forestry. Forestry Department, Anambra State Ministry of Agriculture. pp 1-23.

FAO and FILAC (Fund for the Development of Indigenous Peoples of Latin America). 2021. Forest Governance by Indigenous and Tribal People. An Opportunity for Action in Latin America and the Caribbean. Rome and La Paz. https:// doi.org/10.4060/cb2953en

Garrett, L., Lévite, H., Besacier, C., Alekseeva, N. and Duchelle, M. 2022. *The key role of forest and landscape restoration in climate action*. Rome, FAO. https://doi.org/10.4060/cc2510en

Hathaway, J. and Maibach E. W. (2018) 'Health implications of climate change: A review of the literature about the perception of the public and health professionals', *Current Environmental Health Reports*, 5, pp. 197-204.

Ikeme, J. (2008) 'Assessing the future of Nigeria's economy: Ignored threats from the global climate change debacle developing world-built environment research unit', De Montfort University, Leicester, UK.

IPCC (2007) 'Adaptation and mitigation options', In (book section): Summary for Policymakers. In: Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)). IPCC, Geneva, Switzerland. This version: IPCC website. Retrieved 02-08-2017.

IPCC. 2019. Summary for Policymakers. In: P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D.C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi and J. Malley, eds.Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security and greenhouse gas fluxes in terrestrial ecosystems. In press. www.ipcc.ch/site/assets/ uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf

IUCN (2021) Forest and climate change https://www.iucn.org/sites/default/files/2022-04/forests_and_climate_change_issues_brief_2021.pdf

Karsenty, A., Blanco,C., Dufour, T. (2003) Forest and Climate Change: Instruments related to the United Nations Framework Convention on Climate Change and their potential for sustainable forest management in Africa, Food and Agriculture Organization of the United Nations.

Mishrah, V., Mukherjee, S., Kumar, R., Stone, D.A. (2017) 'Heat wave exposure in India in current, 1.5 °C, and 2.0 °C worlds', *Environmental Research Letter*, 12, pp. 12-24.

Mulligan, M., Steele, W., Rickards, L., Fünfgeld, H. (2016) 'Keywords in planning: What do we mean by community resilience'? *International Planning Studies*, 21, pp. 348–361.

Nwosu M. C. (2003). Studies on the Physico-chemical Parameters and Plankton Abundance in Relation to fish Production of some lakes in Anambra State

Ogbuabor, J. E and Egwuchukwu, E.I. (2017) 'The impact of climate change on the Nigerian Economy', *International Journal of Energy Economics and Policy*, 7(2), pp. 217-223.

Okereke C. Nkumah; Mbaekwe E. I. and Nnabude P.C (2015) The ecological characterization of three forest types namely: Community Forest, Shrine Forest and Forest Reserves in three forest zones of Anambra State, https://phd dissertations.unizik.edu.ng/repos/81188378800_102297357288.pdf retrieved 14/2/23

Oyewole, S.O., Ishola, B.F and Aina-Oduntan, O.A. (2019) Maximizing the Role of African Forest for Climate Change Mitigation and Socioeconomic Development, World News of Natural Sciences WNOFNS 27, 11-21 EISSN 2543-5426

Parmesan, C., Pichs-Madruga, R., Roberts, D.C., Rogers, A.D., Díaz, S., Fischer, M., Hashimoto, S., Lavorel, S., Wu, N. and Ngo, H.T. 2021. Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change. Bonn, Germany, IPBES Secretariat. doi10.5281/zenodo.4659158.

Pörtner, H.O., Scholes, R.J., Agard, J., Archer, E., Arneth, A., Bai, X., Barnes, D., Burrows, M., Chan, L., Cheung, W.L., Diamond, S., Donatti, C., Duarte, C., Eisenhauer, N Foden, W., Gasalla, M. A., Handa, C., Hickler, T., Hoegh-Guldberg, O., Ichii, K., Jacob, U., Insarov, G., Kiessling, W., Leadley, P., Leemans, R., Levin, L., Lim, M., Maharaj, S., Managi, S., Marquet, P. A., McElwee, P., Midgley, G., Oberdorff, T., Obura, D., Osman, E., Pandit, R., Pascual, U., Pires, A. P. F., Popp, A., Reyes-García,V., Sankaran, M., Settele, J., Shin, Y. J., Sintayehu, D. W., Smith, P., Steiner, N., Strassburg, B., Sukumar, R., Trisos, C., Val, A.L., Wu, J., Aldrian, E., (2021) Scientific outcome of the IPBES-IPCC co-sponsored workshop on biodiversity and climate change. Bonn, Germany, IPBES Secretariat. doi10.5281/zenodo.4659158.

Rainforest Foundation Norway. 2021. Falling Short: Donor funding for Indigenous Peoples and local communities to secure tenure rights and manage forests in tropical countries 2011–2020. https://d5i6is0eze552.cloudfront. net/documents/Publikasjoner/Andre rapporter/RFN_Falling_short_2021. pdf?mtime=20210412123104

Schaphoff, S., Reyer, C. P. O., Schepaschenko, D., Gerten, D., and Shvidenko, A. (2016). Observed and projected climate change impacts on Russia's forests and its carbon balance. *For. Ecol. Manage.* 361, 432-444

Saving Nature (2023) Carbon Footprint Calculator https://savingnature.com/offset-your-carbon-footprint-carbon-calculator/

Wood, R. S., Hultquist, A., Romsdahl, R. J. (2014) 'An examination of local climate change policies in the great plains', *Review of Policy Research*, 31(6), pp. 529-554.

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