

**Chapter 1 : Oluyede Clifford Ajayi | African Studies Centre Leiden**

*Oluyede Ajayi is an agricultural economist who joined the World Agroforestry Centre's Southern Africa regional programme in to support the economic assessments, evaluation of the impact of agroforestry technologies being.*

The importance of policy for agroforestry by Frank Place, Oluyede C. A high percentage of tree cover is found in nearly all continents of the world, highest being in Central America and southeast Asia. The FAO Forest Resources Assessment Report has integrated since the assessment of trees outside forests, which consist mainly in agroforestry systems as well as tree systems in urban areas. The evidence suggests that policy plays an important role in distinguishing countries and regions which have benefited greatly from agroforestry from those who have not. Three policy areas appear to be most important. The first concerns essential long term private property rights over land and trees. Where these have been absent or contested, tree planting and management by farmers has been limited. Second, policies related to tree germplasm multiplication and dissemination are important in facilitating expansion of agroforestry. Finally, the recognition of agroforestry as an attractive investment area within agricultural institutions and programmes is also important. Key policy-related constraints to agroforestry The adoption or lack of adoption of agroforestry is influenced by a variety of factors. Some have relatively little to do with policy -- including climate conditions e. However, a number of important factors are directly linked to policy. This is the first justification for why adoption of agroforestry is a policy issue. The second reason why the adoption of agroforestry is a policy issue is that agroforestry generates significant public environmental services such as watershed protection, biodiversity, and carbon sequestration for which market failures exist. The result is that without government involvement in providing greater incentives, the level of private investment in agroforestry will be less than socially optimal. In the following paragraphs, the key policy-related constraints to agroforestry adoption are discussed, in no particular order of importance. In some places, long term rights to land are insufficient to motivate long term investments such as agroforestry. Tree tenure Forest policies inhibit tree growing on farms by regulating harvesting, cutting or sale of tree products and certain tree species. Although sometimes well intentioned, such protective policies, when applied to agricultural landscapes, discourages farmers from planting and protecting new seedlings that emerge. Agroforestry tree germplasm systems The problems observed in the agroforestry tree germplasm sector are numerous: Seed collection, propagation and multiplication methods are also poorly known and farmers often have no other option but to protect or transplant trees which have germinated spontaneously. Subsidies or support for other land use practices There are many governments that have put in place price floors for food products, subsidies for specific inputs like fertilizer, or favorable credit terms for certain agricultural activities. These almost always exclude agroforestry and therefore discourage its practice. In the case of fertilizer, for example, such government policies induce higher use of fertilizer and less interest in using more sustainable practices like agroforestry. Extension systems Studies from several countries in Africa have shown that sustainable land management practices such as agroforestry are not sufficiently known by extension agents and much less likely to be disseminated to farmers e. This creates an information bias towards other types of practices. Agroforestry was first attached to the forestry sector but forest departments have historically had relatively few resources for programmes, been unfamiliar with agricultural practices, and often played a more policing than advisory role. Agriculture is the natural home for this farmer practice and there is a noticeable shift of agroforestry towards agriculture, especially as the soil fertility benefits of agroforestry have become more well known. Environmental services Agroforestry is increasingly being recognized as a key land use for the provision of environmental services, such as carbon sequestration Smith and Martino, watershed protection and biodiversity. These externalities are sometimes spatial such as the effects of agroforestry on watershed protection for downstream users, or temporal, such as the effects of agroforestry on long term soil health and land rehabilitation. These services, or positive externalities, are not rewarded by market mechanisms market failure and thus the supply of these benefits is less than socially

optimal levels. This is a justification for government involvement to establish or catalyze systems and mechanisms that can link consumers buyers of the environmental services with suppliers and to increase the efficiency of such markets e. Policy reforms that have been pro-agroforestry There have been some recent policy reforms that have directly targeted and benefited the expansion of agroforestry. A good number of these are related to revisions in forest policy or its implementation. The first example is the reforms which occurred in the form of re-interpretation and implementation of the Forest Code in Niger that helped to expand the practice of farmer managed natural regeneration to over 5 million hectares of land Garrity et al. The government of Indonesia has altered policies on property rights to grant communities long term rights to forest land in return for environmental stewardship of the land HKM programme and have also created a village forest concept Hutan Desa which would provide villages rights to benefits of carbon or other environmental services Pender et al. Guatemala recognized in the Forest Act in that procedures for timber harvesting in agroforestry systems should be simplified. Fifteen years later it is observed that farmers produce timber within their farms as another form of diversification of land use, and as another source of income Detlefsen and Scheelje, Some governments have gone as far as to adopt explicit agroforestry strategies or policies. In France, constraints against agroforestry were mainly economic and linked to taxations of tree products. As long agricultural as subsidies are linked to cultivated area, farmers showed no interest in growing trees in cropland, even if there is a recognized ecological advantage and if long term income can be expected from timber. And if the land is classified as forestry land, taxation is higher. In , the government of France passed an agroforestry policy whose main achievement was to establish agroforestry as a legal agricultural land use qualifying for EC agricultural subsidies in the framework of the common agricultural policy CAP. Farmers can receive investment support for the establishment of the agroforestry systems on agricultural lands. Without that, all other agricultural practices were favored APCA, Several countries or regions are developing or refreshing agroforestry strategies. Brazil had earlier developed an agroforestry strategy in and is currently embarking on a participatory process to refresh the policy. China and India have embarked on ambitious programmes to increase tree cover outside of forests Grain for Green and Greening India respectively , including some attention to smallholder agroforestry. This was in response to recognition of deforestation, the increase in agricultural land area, and the high motivation of farmers to plant trees. The government has also allocated several million dollars to assist farmers in regions where these targets are not already met. The Indian State of Chhattisgarh adopted an agroforestry policy in which goes as far as to include agroforestry products among several that it establishes a price floor and guaranteed market for, in order to ensure adequate production. A number of countries have advanced agroforestry in their programmatic development as a result of increased attention to climate change. In order to make agricultural production and income more resilient to climate change and variability, transformations in the management of natural resources e. The key role of agroforestry for climate-smart agriculture is now cited in key publications along with institutional and policy options available to promote the transition to climate-smart agriculture at the smallholder level e. In the agriculture and environment sectors, agroforestry is a priority action in many countries. Support for these processes has come partly from processes at global and regional levels. Similarly, African ministers of agriculture endorsed the wide scaling up of agroforestry to address climate change adaptation and mitigation objectives in agriculture in The Comprehensive African Agricultural Development Programme CAADP developed an agriculture climate change adaptation and mitigation framework which was endorsed by the same ministers in and which also highlights agroforestry. Conclusions and implications for advancing policy reforms at national level for agroforestry There are a number of important policy constraints that hinder wider adoption of agroforestry among smallholder farmers in developing countries, both at formulation and implementation levels. Yet, driven by rural development and environmental objectives, there is a greater policy recognition of the importance of agroforestry. Thus, there is strong reason to believe that a more concerted and collaborative supporting effort among such organizations would lead to even greater policy impacts. It is hoped that the production of the guidelines along with other efforts by countries and institutions

will catalyze an even wider partnership and movement towards removing policy barriers that have hitherto constrained agroforestry from reaching its full potential. Adoption of renewable soil fertility replenishment technologies in southern African region: Implications of local policies and institutions on the adoption of improved fallows in eastern Zambia Agroforestry systems 59 3: Etat des lieux en juin Constraints to Fertilizer Use in Nigeria: Agroforestry parklands in Sub-Saharan Africa. Journal of Agricultural Education and Extension 16 2: FAO, Rome, 41 p. Innovation in Natural Resource Management: Greenhouse-gas mitigation in agriculture. Philosophical Transactions of the Royal Society, B. Agroforestry and soil conservation needs of smallholders in southern Zambia, Agroforestry systems, United States Department of Agriculture, Washington, 35 p. Analysis of global extent and geographical patterns of agroforestry. Frank Place, Oluyede C.

**Chapter 2 : Oluyede Clifford Ajayi | IDEAS/RePEc**

*Oluyede C. Ajayi and Patrick Matakala Fifteen years of research and development work by the World Agroforestry Centre (ICRAF) and.*

The review revealed that local communities have comprehensive indigenous knowledge of termite ecology and taxonomy, and apply various indigenous control practices. Many communities also have elaborate knowledge of the nutritional and medicinal value of termites and mushrooms associated with termite nests. Children and women also widely consume termite mound soil for nutritional or other benefits encouraged by indigenous belief systems. In addition, subsistence farmers use termites as indicators of soil fertility, and use termite mound soil in low-risk farming strategies for crop production. In the past, chemical control of termites has been initiated without empirical data on the termite species, their damage threshold, and the social, ecological, or economic risks and trade-offs of the control. This review has provided new insights into the intimate nature of human–termite interactions in Africa and the risks of chemical control of termites to human welfare and the environment. There is no doubt that some species cause significant damage to crops, rangeland, trees, and structural timber. At the same time, they also play a beneficial role through promotion of essential ecological processes. The ongoing interest in sustainable agriculture and food security in Africa highlights the need for a more balanced approach to termite control and maintenance of their ecosystem services. To begin to address the mismatch between these two objectives, a holistic appraisal of the termite problem and opportunities for their sustainable management is needed. Sustainable termite management is defined here as one that ensures 1 control of the pest species without causing ecological damage and loss of the ecosystem services provided by termites, 2 conservation of the non-pest termite species, and 3 use of termites and associated resources without exhausting them. Management of risk and ensuring resilience are key concepts in sustainability, and these beg for a strategy that combines the skills and indigenous technical knowledge of farmers with modern scientific knowledge Sileshi et al. Termites are a large and diverse group of insects consisting of over species worldwide. With over species, Africa is by far the richest continent in termite diversity Eggleton This family consists of four subfamilies: Macrotermitinae, Nasutitermitinae, Termitinae, and Apictotermitinae. The reputation of termites as pests is also associated with the presence of termitaria in crop fields and near trees. Thus, most of the discussion in this paper focuses on the members of the Macrotermitinae. The main genera in the subfamily Macrotermitinae are *Odontotermes* 79 species , *Microtermes* 33 species , *Macrotermes* 21 species , *Ancistrotermes* nine species , *Allodotermes* seven species , and *Pseudacanthotermes* five species Pomeroy et al. The taxonomy of Macrotermitinae is notoriously difficult, and many species are not easy to identify with certainty Darlington et al. Unfortunately, current recommendations for termite control do not take into account this taxonomic difficulty. *Macrotermes*, *Odontotermes*, and *Microtermes* species tolerate semi-arid and even arid areas Eggleton In traditional agro-pastoral systems, when land productivity declines, the farmers shift to a new area. With the rapid increase in human population, the rate of conversion of natural habitat has increased and land degradation is taking place at a faster rate United Nations University UNU Most of these areas experience periodic droughts, and climate change has made them even more prone to frequent dry spells. Crops and trees are increasingly planted on marginal land, resulting in greater stress and vulnerability to termite attack Glover , Wood et al. As humans encroach into bushland, the conflict between humans and pest termites will increase. This translates to 1. From this viewpoint, termites are beneficial for the functioning of forest and savannah ecosystems. Termites also play a significant role in the availability of nutrients and water to crops and trees, and hence the productivity of agricultural ecosystems Black and Okwakol Throughout the semi-arid regions of West Africa, crop-growth variability related to termite activity has been used by subsistence farmers in low-risk farming strategies for crop production Mielke and Mielke , Brouwer et al. Therefore, agriculture holds the key to the management of termites and conservation of biodiversity as small-scale farmers are the ultimate managers and

stewards of the land Sileshi et al. Resource-poor farmers look for practices that best fit their biophysical, economic, and sociocultural conditions. Ethno-ecology or traditional ecological knowledge Berkes is particularly important for the formulation of sustainable termite management in Africa. Engagement of researchers with local communities may thus help researchers to link their efforts to the local environmental and cultural context. Toward that end, we undertook a comprehensive review of case studies on human-termite interactions from across Sub-Saharan Africa Fig. Finally, we describe the potential impacts of termite management practices on the ecosystem services that termite species provide in the agro-pastoral systems of Sub-Saharan Africa. Emphasis was placed on eastern and southern Africa because this is the geographic area where the Macrotermitinae, which are the most serious pests in agriculture and forestry, reach their highest densities Jones The bulk of the discussion is based on studies conducted in five districts of Malawi Sileshi et al. The specific sites Fig. Drought is defined as absence of rainfall over an extended period of time, usually a season or more, whereas dry spell is a period of abnormally dry weather conditions less severe than those of a drought. The data-collection methods employed in the specific study sites Fig. The farmers in Uganda gave information on 1 identity of the termite species, 2 abundance and distribution of termites, 3 termite damage to trees and crops, 4 relationship between termite damage and rainfall patterns, 5 priority termite species for control, 6 termites as a source of food, and 7 termite control practices. During community meetings and focus-group interviews in Malawi, Mozambique, and Zambia Nkunika , Sileshi et al. During group interviews in Kenya, farmers provided information on 1 local names and descriptions of termites, 2 soil and land-use preferences of termites, 3 cultivated and wild plants attacked by termites, 4 stage and condition of the plants when attacked, 5 termite-resistant or repellent plants, and 6 termite control practices Malaret and Ngoru Individual interviews designed to supplement results from community meetings were also conducted in eastern Zambia. In all study sites, the researchers made direct field observations, collected specimens to confirm termite identity or their damage, and obtained authoritative identification of the termite samples. For example, in Tororo district of Uganda, a total of 14 species were identified with distinct vernacular names Nyeko and Olubayo ; Table 1. For example, most farmers in Tororo district rated *Macrotermes bellicosus* and *M.* This is in agreement with scientific studies in Uganda Pomeroy Farmers in Machakos district of Kenya associated *Macrotermes* and *Odontotermes* with farmland more than bushland. They could also identify the humus feeders from those that attack crops or trees Malaret and Ngoru In Tororo district of Uganda, farmers identified eight pest species Table 1. However, they rated *M.* Although *Pseudacanthotermes springeri* was reported to damage some crops, farmers perceived it as a minor pest that does not merit control Nyeko and Olubayo Out of the six genera identified by farmers in southern Zambia, *M.* In eastern Zambia, farmers ascribed most of the crop damage to *M.* *Microtermes* species considered major pests in Africa Wood et al. This is probably because *Microtermes* species do not build termitaria. Damage to plants by *Microtermes*, *Allodotermes*, and *Ancistrotermes* spp. This probably makes these species less apparent to farmers. Farmers rated maize *Zea mays* L. In Machakos district of Kenya, farmers identified 24 species of trees and shrubs as resistant to termites Malaret and Ngoru Ugandan farmers identified *Eucalyptus* species and *Grevillea robusta* as particularly highly susceptible to *M.* The more serious damage on the exotic crops e. Indigenous African crops and trees are expected to be resistant to these termites with which they have co-evolved. Contrary to scientific reports that termites rarely attack vigorously growing plants Wood et al. This does not necessarily mean that farmers are incorrect in their assessment. Rather it indicates that there are areas where local knowledge differs from scientific studies. Most farmers in eastern Zambia believe that crops become susceptible to termite attack at maturity Table 3 , and this agrees with the literature Wood et al. According to these farmers, termite damage to crops and trees is more severe during dry spells or drought periods. Similarly, Ugandan and Kenyan farmers considered termite damage to be more severe in the dry months compared with the wet months Malaret and Ngoru , Nyeko and Olubayo Damage by termites is greater during dry periods or droughts than periods of regular rainfall Logan et al. The increases in termite damage could also be associated with climate change-induced drought. Farmers in Uganda and Zambia also

mentioned that termite problems are more serious now than in the past Sekamatte and Okwakol , Sileshi et al. In a recent survey of eastern Uganda, elders linked the increasing termite problem and low abundance of predatory ant species to aerial sprays intended to control tsetse flies *Glossina* sp. Termite damage on trees and crops could have increased as a result of the depletion of the usual termite food due to deforestation and overgrazing Tenywa Deforestation may also have resulted in loss of the natural enemies of termites such as the armadillo *Orycteropus afer* , pangolin *Manis* spp. Habitat loss has led to the disappearance of the armadillo in countries such as Ethiopia Jiru Continuous cultivation and overstocking reduce the diversity of termites Glover , Black and Okwakol , Eggleton et al. The alates, queen, and soldiers of some species in the subfamily Macrotermitinae are eaten across most of Africa. Local people easily tell the edible termites from those unsuitable for consumption Table 1. Out of the 14 species identified in Tororo district, only 10 were consumed. Some species were not eaten due to various reasons Nyeko and Olubayo Some communities also have an intimate knowledge of the association between termites and edible mushrooms Oso , Yongabi et al. The Macrotermitinae cultivate edible mushrooms in the genus *Termitomyces* in the termitaria. Each year, these fungi produce a crop of large mushrooms, which are highly prized by people as a delicacy. According to the Guinness Book of Records, T. Communities in Uganda and Nigeria associated specific mushrooms with certain termite species and identified each *Termitomyces* species by local name Oso , Nyeko and Olubayo Many communities in Africa have elaborate indigenous knowledge of the nutritional and medicinal values of these mushrooms Oso , Yongabi et al. Chemical analyses Kabasa et al. *Termitomyces* species are also used in the treatment of various diseases Kabasa et al. Termites also contribute to human nutrition and health through the deliberate ingestion of soil, a phenomenon called geophagy Hunter Geophagy has been practiced by humans since antiquity and on almost every continent Hunter , Rowland Termitaria are the major sources of the soil consumed by women and children in Kenya Geissler , Luoba et al. In many communities, geophagy is firmly grounded in indigenous belief systems Geissler , Knudsen In the cosmology of the Luo a tribe in eastern Kenya and Chagga a tribe in northern Tanzania , termitaria symbolize sexuality and the feminine power of procreation, thus ingesting soil is good for the blood and for fertility of the woman Geissler , Knudsen Similarly, in cosmology of the San people in southern Africa, termitaria symbolize a spirit world that has unparalleled transformative and generative powers Mguni Consumption of soil from termitaria is common among the nutritionally vulnerable populations, especially children and pregnant and lactating women Wiley and Katz

### Chapter 3 : [blog.quintoapp.com](http://blog.quintoapp.com) - Overstory # - Indigenous Fruit Tree Domestication

*BibTeX @MISC{Sileshi\_no, author = {Gudeta Sileshi and Festus K. Akinnifesi and Oluyede C. Ajayi and Frank Place and Gudeta Sileshi and Festus K. Akinnifesi and Oluyede C. Ajayi and Frank Place and Published World and Agroforestry Centre and World Agroforestry Centre and Layout Eric Omayo}, title = {No.*

### Chapter 4 : Resources | EverGreen Agriculture

*World Agroforestry Centre (ICRAF), Malawi The literature on farmers' choice of agricultural technologies is populated by studies that have focused almost exclusively on analysing contemporary observable variables but, little attention is paid to understanding the historical context and policy antecedents that may have influence farmers.*

### Chapter 5 : CiteSeerX " No. Nairobi: World Agroforestry Centre.

*Read publications, and contact [blog.quintoapp.com](http://blog.quintoapp.com) Ajayi on ResearchGate, the professional network for scientists. The World Agroforestry Centre (ICRAF) has a long history of agroforestry.*

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## Chapter 6 : [blog.quintoapp.com](http://blog.quintoapp.com) - Overstory # - The importance of policy for agroforestry

*Trends in average maize yield, production quantity and total harvested area in the various regions of Africa. Average yields for in each region were obtained from FAO ().*

## Chapter 7 : Oluyede Ajayi | Platform Database Oluyede Ajayi | Platform Database

*Written by Frank Place, Oluyede C. Ajayi, Emmanuel Torquebiau, Guillermo Detlefsen, Michelle Gauthier and G rard Buttoud. Posted in The Overstory eJournal There are many key policy-related constraints to agroforestry, such as agricultural subsidies that exclude agroforestry cropping systems.*

## Chapter 8 : AgroForestry - [blog.quintoapp.com](http://blog.quintoapp.com)

*World Agroforestry Centre (ICRAF), Chitedze Research Station, P. O. Box , Lilongwe 3, Malawi. Accepted 11 January, The graft success of seedlings depends on rootstock size and the skills of grafters.*