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ROLE OF FORESTRY EXTENSION IN PROMOTING SUSTAINABLE AFFORESTATION AS AN ON-FARM ECONOMIC ACTIVITY IN ZIMBABWE

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ABSTRACT

Despite a plethora of studies on afforestation, a close analysis of the focus of many studies conducted to date reveal the existence of a gap in knowledge on role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in developing countries, Zimbabwe being a case in point. Despite an absence of studies, evidence from studies conducted in elsewhere seem to pinpoint the significance of forestry extension services in enhancing afforestation adoption as an on-farm economic activity. Specifically, the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe remains a grey area, unexplored and under-theorised. Extant studies have mainly been biased towards afforestation as an alternative land use option models for afforestation and agronomy, and challenges in afforestation. These studies overlook the need to interrogate the role of forestry extension in promoting sustainable afforestation in developing countries. Therefore, this study using qualitative research methodology sought to explore the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe. Generally, study findings highlighted that forestry extension services in Zimbabwe are highly inadequate characterised by gross underfunding, limited manpower, limited skills amongst other challenges that impeded the execution of duties by extensionists. The result has been a limited contact between afforestors, potential afforestors and forestry extension service providers. All these have an impact on the overall contribution of afforestation on economic development, thus afforestation extension services should be upheld if afforestation is to be taken as a sustainable, alternative land-use option in the province. There is need to capacitate the Forestry Extension service unit (Forestry Commission and all those involved in forestry extension services) in order to optimise the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe. Generally, study findings highlighted that forestry extension

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services in Zimbabwe are highly inadequate characterised by gross underfunding, limited manpower, limited skills amongst other challenges that impeded the execution of duties by extensionists. The result has been a limited contact between afforestors, potential afforestors and forestry extension service providers. All these have an impact on the overall contribution of afforestation on economic development, thus afforestation extension services should be upheld if afforestation is to be taken as a sustainable, alternative land-use option in the province. There is need to capacitate the Forestry Extension service unit (Forestry Commission and all those involved in forestry extension services) in order to optimise the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

Key terms: Sustainable afforestation, forestry extension and economic activity

1. INTRODUCTION

The challenges of promoting sustainable afforestation have cast the limelight on the role of extension services. In light of the dynamic changes sweeping across the global afforestation environment, afforestation extension has been hailed as the missing piece of the jigsaw towards improving the rate of afforestation adoption (Mhaka et al., 2023; Kiuru, 2015; ILO, 2020). The role of extension services in promoting afforestation cannot be overemphasised (see Ofori et al., 2020; Lovell et al., 2017). However, despite this growing global focus on forestry extension (see Mohammed, 2009;Ullah et al., 2022; Arimi&Omoare, 2021), the essence of forestry extension in stimulating the adoption of sustainable afforestation as an on-farm economic activity has remained understudied and undertheorised (Muralikrishna&Manickam, 2017; Mohammed et al, 2019) and trivialised whilst it is trivialised in the Zimbabwean context. To date, a plethora of studies on afforestation have been done (Lovell et al., 2017; Tianet al., Sohngen, 2020; Dupraz et al., 2018), what is curious is that none of the studies has sought to interrogate the role of forestry extension in promoting sustainable afforestation in Zimbabwe. As a result, the paper interrogated both primary and secondary data to obtain insights on the relationship between forestry extension and sustainable afforestation.

2. BACKGROUND TO THE STUDY

The sustainability of plantation forestry has become an issue of wide interest and concern (Atel et al., 2012; Minang et al., 2018). Amidst the continued failure of agricultural production systems in meeting policy targets in developing countries, there has been a gradual paradigm shift towards afforestation. In recent years, a host of countries across the globe have actively sought to promote afforestation as an alternative land use for economic development through state policy and support (see Ryan, 2016; Lovell et al., 2017; Minang et al., 2018; Dupraz et al., 2019). The adoption of afforestation has rather been a slow process. Despite the snail-paced rate

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of adoption of this mode of land use, globally, there has been a gradual realization of the potential of afforestation as an alternative and sustainable land use option for economic development. As a result, a number of countries across the globe have actively sought to promote afforestation as an alternative land use for economic development(Tian et al., 2018; Dupraz et al., 2019).

Globally, there has been a growing appreciation of the potential of afforestation as an alternative and sustainable land use option for economic development (Minang et al., 2018; Dupraz et al., 2019). Afforestation is increasingly valued for its potential to enhance ecosystem services and is being actively promoted in many countries through state policy and support (Kanowski,2010). Forests cover 30 percent of all the land on earth and they contribute to the livelihoods of over a fifth of the world's population. Forests serve diverse ecological functions and provide numerous environmental and socio-economic benefits to society. When sustainably managed, forests can be a healthy, productive, 6 resilient and renewable ecosystem which can provide essential goods and services to people worldwide. An estimated 1.6 billion people i.e. 25 percent of the global population depend on forests for subsistence, livelihood, employment and income generation (UNFF, 2019). Forests have been identified as central in developing solutions to mitigating and adapting to climate change in the world (Brack, 2019). Together with sustainable agriculture, forests have a significant role in mitigating climate change. They can help the world meet at least a quarter of the Paris Agreement commitment to limit the global temperature rise to 1.5 o Celsius.

In time of crisis, forests act as safety nets as among the rural poor, the majority turn to forest products for their subsistence needs (Sacko, 2020). Forests provide economic and livelihood support for many people around the world, especially the rural poor, generating more than 86 million jobs. The forest sector employs not less than 54.2 million people in the world (ILO, 2020). About 31 percent of the world's population depends on wood-based energy for cooking, while up to 1 billion people feed on bush meat. There are more than 1.5 billion people, including women, children and other vulnerable groups, who depend on forests for food, nutritional diversity and income (FAO, 2018). In Africa, over two-thirds of the population rely on forests for their livelihoods, while fuelwood accounts for about 70 percent of primary energy source for households (Ebrahim and Weng, 2016). Forests are an integral part of this fabric and could claim to be the pillars of many African countries' economy (Amare &Darr, 2020). However, their capacity to provide these services and benefits to society on a sustained basis has been continuously threatened by the environmental crisis characterized by massive forest destruction and degradation.

In Africa, Ethiopia, Rwanda and Burundi have been the most affected as their forest resources have been almost totally depleted (FAO, 2015; Muralikrishna&Manickam, 2017). While global

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rates of deforestation have decreased in the recent past from a net annual forest area loss of 7.3 million ha in 2000 to 3.3 million ha in 2015, the decrease has not been even across regions (FAO, 2016). Deforestation rates in some regions, especially Africa and Latin America, are still alarmingly high. Many drivers of deforestation lie outside the forest sector and are rooted in wider social and economic issues, including challenges related to reducing poverty, urbanization, and policies that favour land uses which produce higher and more rapid financial returns, including energy, mining, transportation, and especially agriculture (Assmuth&Tahvonen, 2015; Tikkanen et al., 2012; Ryan et al., 2016).

The World Bank opined that deforestation can lead to a 15-20 per cent reduction in crop and livestock yields. About 50 million people (in Africa) face acute fuel wood scarcity and 5 million hectares of Africa's upland watersheds are deforested and in urgent need of rehabilitation (Kim et al., 2021). Soil erosion and disruption of stream flow are shortening the life of reservoirs. Such challenges presents both economic, social consequences for communities, hence the need for afforestation. However, despite the growing calls for afforestation as a panacea to community problems, many initiatives have failed. Several reasons for the failure have been advanced chief among them being the negative perception of farmers towards afforestation.

Efforts have been made globally to reverse the impacts of deforestation. One of the measures taken has been that of afforestation. Afforestation programmes have been initiated in several regions as alternative land use for economic development. However, despite this perceived value, in the context of overall forest cover, the conversion of land from agriculture to forest is unusual in the global context (Ryan, 2016).In most of the regions, current frameworks for afforestation management seem to have failed as output has fallen well short of policy targets (see Ryan, 2016; Dupraz et al., 2018). The success of existing institutions of management frameworks in afforestation have been widely questioned (see Ryan, 2016; Lovell et al., 2017; Tian et al., 2018; Dupraz et al., 2018).

Despite the lure of financial incentivisation from afforestation (see Hull et al., 2016; Minang et al., 2018), a lot of land globally remains either idle or underutilised. Similar to many countries, Zimbabwe has sought to increase forest cover for some time (Nyikadzino, 2016; Gwaze&Marunda, 2014). In Zimbabwe, many afforestation programmes initiated to address the problem of agriculturally unproductive land have stumbled along and eventually faded away (Nyikadzino, 2016). Generally, the decline in afforestation has consequences for downstream industries such as timber processing (Wilson, 2016; Ryan, 2016). As a result many afforestation initiatives in the World are failing to convince farmers to adopt afforestation (Dupraz et al., 2019) with low uptake of afforestation as an alternative land use for economic development (see Wilson, 2016; Lovell et al., 2017). Such a scenario poses a challenge for land use allocation and

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modelling land use change. As a result, afforestation uptake as an alternative land use land use for economic development remains low (Wilson, 2016; Dupraz, 2019).

However, growing pockets of research seem to be pointing towards extension services as the missing link in promoting sustainable afforestation in developing countries (see Muralikrishna&Manickam, 2017; Tikkanen, 2018). In most of the regions Zimbabwe included, current frameworks for afforestation management seem to have failed as output has fallen well short of policy targets (see Ryan, 2016; Dupraz et al., 2018). What remains worrying is that despite the failure of afforestation efforts in developing countries (see Beyene et al., 2019; Amare &Darr, 2020; Ofori et al., 2020), Zimbabwe included, little has been done to interrogate the role of forestry extension in promoting sustainable afforestation in Zimbabwe. Therefore, this study sought to explore the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

3. PROBLEM STATEMENT

Despite a plethora of studies on afforestation (see Romanova et al., 2022; Ullar et al., 2023; Lovell et al., 2017; Tian et al., 2018 Beyene et al., 2019; Amare &Darr, 2020; Ofori et al., 2020), a close analysis of the focus of many studies conducted to date reveal the existence of a gap in knowledge on role of forestry extension in promoting sustainable afforestation as an on-farm economic activityin developing countries, Zimbabwe being a case in point. Despite an absence of studies, evidence from studies conducted in elsewhere seem to pinpoint the significance of forestry extension services in enhancing afforestation adoption as an on-farm economic activity (see Beyene et al., 2019; Amare &Darr, 2020; Mohammed, 2009). Specifically, the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe remains a grey area, unexplored and under-theorised.Extant studies have mainly been biased towards afforestation as an alternative land use option (Ryan, 2016; Lovell et al., 2017; Tian et al., 2018; Dupraz et al., 2018); models for afforestation and agronomy (Luedeling, 2016; Ryan, 2016), and challenges in afforestation (Romanaova et al., 2022; Ofori et al., 2020; Wilson, 2016). These studies overlook the need to interrogate the role of forestry extension in promoting sustainable afforestation in developing countries. Without grounded knowledge on the role of forestry extension in promoting sustainable afforestation, the uptake of afforestation as an alternative land use for economic development will remain low. Of concern is that a lot of land globally will remain either idle or underutilised. Therefore, this study using qualitative research methodology sought to explore the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

4. Aim of the study

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To explore the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

5. LITERATURE REVIEW

This section reviews literature onforestry extension, sustainable afforestation as an on-farm economic activity and role of forestry extension in promoting afforestation. In order to bring about a universal understanding of the phenomenon under discussion, the following terms are conceptualized first:

5.1.1 Afforestation

Generally, scholars on afforestation seem to agree that afforestation refers to the effort/ or the process of establishing a forest especially on land not previously forested. Afforestation is defined by the UNFCCC (2020) as direct human induced conversion of non-forested land to forested land through planting or seeding. This definition lacks clinical precision, as the phenomenon of afforestation and reforestation are time bound (creating forests in less than 50 years where there were once forests is reforestation, creating forests after 50 years where there were once forests is afforestation). The UNFCCC definition is silent on time factor. Afforestation takes place on land that has not been covered by forest for at least 50 years (see Lubowski, Plantinga, &Stavins, 2006; Nielsen, Plantinga, &Alig, 2014; Tian, Sohngen, Baker, Ohrel, & Fawcett, 2018).

Aguilar et al (2000) posits that afforestation is the practice of converting non-forested land through planting, seeding, and/or the promotion of seed banks and sources and applies to areas that have not been forested for at least 50 years. It seems worthwhile at this point to take a position vis-a-vis the main concept of this study, that is, afforestation. To avoid confusion, or conceptual ambiguity therefore, in this study the term afforestation shall be construed to include reforestation. Put simply, in this study any creating of a forest where there is no forest will be viewed as afforestation. In this study, afforestation was perceived as the process of regenerating, rehabilitating and restoring the forest through tree planting.

5.1.3 Forestry extension

There is no single definition of extension which is universally accepted or which applicable to all situations (Tian et al., 2018). Furthermore, extension is a dynamic concept in the sense that the interpretation of it is always changing. Extension, therefore, is not a term which can be precisely defined, but one which describes a continual and changing process in rural areas. Generally, extension is an informal educational process directed toward the rural population. This process offers advice and information to help them solve their problems (FAO, 2015). In broad sense

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extension is an education process that informs, convinces and links people. It facilitates flows of information between farmers and other resource users, administration managers and leaders (Ageed et al., 2022; Perez-Silos et al., 2021). The term forestry extension is used to cover any situation in which local people are directly and willingly involved in forestry activities from which they will expect some recognizable benefits within reasonable period of time.This involves helping farmers to improve the productivity of their agriculture and also developing their abilities to direct their own future development. All stress that extension is a process which occurs over a period of time , and not a single, one-time activity. Where necessary this may include activities by industries or public organizations other than the forestry authority to promote forestry by individuals or by groups of people within limited area. It presupposes, however, that the participation arises from some perceived needs or opportunities which the people have recognized as being sufficiently important to devote part of their time, energy and resources to accomplish (FAO, 2019).

According to Mohammed (2009), extension should be regarded as a process of integrating indigenous and derived knowledge, attitudes and skills to determine what is needed, how it can be done, what local co-operation and resources can be mobilized and what additional assistance is available and may be necessary to overcome particular obstacles. The term"forestry extension" is used to cover any situation where people are directly involved in any forestry activity on their own land, or on land owned or controlled by the community or state, in which the people have a direct interest in the outcome, and from which they hope to derive some return in goods, cash, or other benefits, within a reasonable period of time. Where appropriate, this may include program undertaken by non-government organizations or industries to promote forestry by individuals or groups of people, to meet either community or industrial needs in the area (Romanova et al., 2022). The contents may, therefore, be adapted to cover activities referred to as social forestry, community forestry or by other similar terms, if these are considered to describe more accurately what is being practiced in a particular area (FAO, 2018). Extension is an on-going process of getting useful information to people (the communication dimension) and then in assisting those people to acquire the necessary, skills and attitude to utilize effectively this information or technology.

5.2. Objectives of forestry extension

Generally the goal of the extension process is to enable people to use the skills, knowledge, and information to improve their quality of life. The extension function can be used equally well by the private and public sector, although most general agricultural extension organizations are public sector institutions (Mohammed, 2019; Tefere&Nigussie, 2018). The purpose of extension is to facilitate learning and action among the numbers of farm families and communities, extension educators and administrators, and personnel of other services agencies and groups in

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order to promote agricultural production and improvements in the general quality in rural life (FAO, 2019).

Agricultural extension works to promote desired changes in geographical area overtime. It usually assumes a systematic nature to planning by objectives, specifying targeted client groups, delineating an interrelated set of roles and professional specializations, utilizing and methods to promote learning, identifying and mobilizing available resources, and a continuous upgrading of the competencies of extension personnel (Li et al., 2020; FAO, 2018). The main purpose of forestry extension is to help people to examine problems which are affecting their lives and to consider if they may be solved, or at least alleviated, by using forestry techniques within the range of their skills and financial resources. The views of the people should, in turn, be relayed to the officials who frame the laws and design the infrastructure of the region so that may promote policies which facilitate the achievement of the peoples objectives (Ryan, 2016.The emphasis must be on local people recognizing a need and deciding to do something about it, and definition of such a need and to indicate a variety of possible courses of action from which the local people can select the one most suited to their particular situation. The fundamental aim is not to provide an organization to do things for the people, however desirable these things may be, but to assist people to do things for themselves, to develop a genuinely critical view of their own situation and a realistic assessment of their ability to taking the necessary any defects.

5.2.1 Methods of forestry extension

The basic philosophy of forestry extension is to work with people, develop self-reliance, and establishing a local organization to promote development, definition of local problems and barriers to their solution, review of possible solution to identify problems, sources of information and support; selection of appropriate solution and definition of steps necessary to implement the program; development of program of activities with defined targets and responsibilities; leadership, sharing burdens and rewards, learning by evaluation (Mohammed, 2009; FAO, 2018). Methods of extension generally fall into three main categories individual method, group method and mass method. Irrespective of the extension message, the task of Forestry extension staff focuses on: provide people with an opportunity to learn, by methods, and in circumstances, appropriate to them; to stimulate in their clients mental and physical activity which leads to effective learning, and to achieve their objectives, forestry extension methods must meet these two major requirements (Duesberg et al., 2014).

People learn in different ways, some by listening, some by observing, and some through discussion. A person will, generally, learn more effectively by using a combination of two or more of these methods. Studies suggest that the more varied the methods of extension used in an area, the more people change their attitudes and practices (Wilson, 2015). Different extension

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methods have been found to be more effectives in different situations, and at different stages in the adoption process. All people do not learn, or change their practices, at the same speed. Some may be ready to adopt a new practice and need to know how to carry it out , while others are ,as yet ,scarcely aware that it exists or are just beginning to show an interest in it . For these reasons, the use of a variety of extension methods, suited to the needs of the people, and used either consecutively or in some cases simultaneously, is necessary to carry out an effective forestry extension program (Pennsylvania Farm Bureau, 2016).

5.2.1.1 Individual contacts

A most effective way of bringing about change is through individual contact in the home or in the work place, or in some cases through informal contact in markets or in public places. In this method the agent deals with farmers on one-to-one. Individual, face-to-face, contact has been found to be the most effective way of facilitating the learning process in an individual. Personal contacts have many important values such as (Hodgart, 2016):The personal influence of an extension agent is important securing cooperation and participation in extension activities and in the adoption of improved practices; People will listen to the advice and suggestions of extension staff whom they feel they know and like personally, and whose knowledge they respect; and, Immediate feedback is obtained on whether the message has been understood in the sense intended.

These factors pose considerable problems for extension organizations in developing countries. There are usually serious shortages of mature and experienced staff available for extension duties and the organizations have to rely mainly on young urban, recently qualified people who lack a depth of field experience and who find it difficult to establish the trust and mutual respect necessary between the extension staff and their clients (Chazdon et al., 2019). This may be a particularly serious problem in communities where there is more respect for age and wisdom than for formal education (FAO, 2019). Individual or face-to-face methods are probably the most universally used extension methods in both developed and developing countries. The extension agent meets the farmer at home or on the farm and discusses issues of mutual interest, giving to farmer both the information and advice. The atmosphere of the meeting is usually informal and relaxed, and the farmer is able to benefit from the agents individual attention. This individual contact between the extension agent and the farmer can take a number of forms (FAO, 1984):

5.2.1.1.1 Farm and home visit

The farm and home visit involve method meeting individually with farmer or farm worker at the farm or home. This technique is costly in terms of time spent and the number of clients contacted, which will necessarily be few. The extension worker should visit many different

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farms and homes, and care should be exercised to visit men and women farm managers as well as other members of the farm family (FAO, 2020). A farm and home visit serves a number of purposes (Song &Vernooy, 2013): to establish contact with men and women farmers and with others within the farm household; to learn what practices and problems exist on the farm and in the house, and provide information and assistance.

5.2.1.1.2 Office calls and inquiries

This method is concerned with personal visits made by clientele to the extension office, to seek information and assistance. To encourage office visits, extension workers should consider the following (FAO, 2014): Place the extension office in a convenient location; keep regular office hours so clients will know when the extension worker will be available; keep the office neat, orderly, and attractive; maintain an up-to-date bulletin board and have information materials readily available, make a special effort to put the visitor at ease, especially if the individual appears to be shy in the unfamiliar environment and a visit to the extension office is a statement of confidence in the extension worker and his or her advice, and should be handled carefully (FAO, 2020).

5.2.1.1.3. Informal contacts

Informal contacts are unstructured and/or planned meetings with clientele in an informal setting. Such meetings provide the extension worker with an opportunity to meet clientele in an informal situation, which facilitates the establishment of a personal bond, discussion, and the recommendation of solutions. Informal contacts can take place on the street, in the market place or at local celebrations. These meetings often take place by chance and are casual in nature. An effective extension worker is skilful in utilizing such informal teaching situations (Department of Education and Science, 2019).

5.2.1.1.4. Personal letters

Personal letters may be of limited importance in extension activities in some area at present, but their importance will increase as literacy become widespread. Letters are the main form of communication both within an extension organization and with other public organizations .All extension staff should try to acquire some skill in letter writing (FAO, 2014).

5.2.1.1 Telephone calls

Telephone calls are becoming increasingly popular in transacting business in developed societies and, if used properly, they can be very valuable in explaining a situation and obtaining advice or instructions over long distances within a very short time. Staff should be trained to make and to

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receive telephone calls effectively. It should, however, be emphasis in training that there is no permanent record of what was said during a telephone call and great care must be taken to ensure that all detailed instructions given during one are fully understood (FAO, 2014).

5.2.2 Group contacts

This method is designed to assist specific groups, such as farmers, producers or users of forest produce, women's or youth groups. Not only information be presented, or techniques demonstrated to several people, usually with a common interest, at one time, but discussions can be offered by the group and group questions from both sides can be asked and answered. This situation makes learning easier and may stimulate group members to take joint action on a problem (FAO, 2017). In this method the agent brings the farmers together in one farm or another in order to undertake his extension work (FAO, 2014). The method consists of a number of activities. They include such important extension activities as community meeting, method and result demonstrations, field days and tours. This process can assist people to reach a decision to take joint action on a problem. It is important to give special considerations in selecting or forming groups to promote extension activities (FAO, 2017).

The main features of the group methods are (Diem, 2017); Less expensive than individual methods, in terms of staff time and effort, to cover a given number of people; very effective, in that attitudes and decisions arrived at by group discussion usually carry more weight in a community than individual attitudes and discussion and are more likely to be widely adopt; and, they are able to assist the learning or change process of individual by the exchange of ideas and experiences between members of the group. Some of the disadvantages of group methods, however, are (Diem, 2019): - It may take along period of discussion for a group of people to arrive at decision on a matter; - One or two people with strongly-held divergent opinions may deflect the group from a wise decision; - Because of differences in conditions and interests of the group members, instruction in forestry practices cannot always be related to the particular problems of each members; and, - It is not always easy to get all the members of a group of people together at the same time for discussion or action. The advantages, however, of group methods out weight their limitations and they play a most important part in extension program. They usually lead to a much more rapid spread of information and change of attitudes than could be achieved by their spread from a few isolated persons enjoying individual contacts with extension staff (FAO, 2017). The group method takes different forms like; group meetings which is a useful educational form where the agent and farmers can come together, and ideas can be openly discussed and analyzed (FAO, 2015); purposes of group meeting which introduce and discuss new ideas or practices, create a favorable attitude towards forestry as a means of local community development.

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5.2.3 Mass contacts

As neither individual nor group methods can reach everyone who may want or need information on forestry extension matters, various methods of mass communication such as print, broadcast or audio-visual methods are employed to reach large numbers of people quickly and often at low cost. The information they convey must be, in most cases, generalized but it can play an important role in certain phases of an extension campaign. In this case contact is more tenuous. It is achieved mainly through the various means of mass communication such as printed matter, broadcasts or audio-visual presentations. The lack of direct contact makes it difficult to assess if the message has been properly received and understood by the audience and more difficult to modify to suit any particular groups of people or areas of the country (FAO, 2017).

Mass methods are used for a variety of reasons which include the following: - They help carry forestry information to many more people in a short period of time; - They help create general awareness and interest in a new topic or forestry activity; - They help form favorable attitudes amongst the general public towards forestry extension program; and, - They provide helpful repetition and reinforcement of extension messages to those already contacted personally through individual or group methods (FAO, 2017). Some of the positive features of mass media are (Journal of Development Studies, 2014); - They can increase the impact of extension staff in the field by the rapid spread of information, though they involve no personal contact; - Many more people can be influenced, over a given period of time, than by individual or group methods; and - News stories, repeating basically the same information on radio, TV and in press releases help the people to remember the message (FAO, 2017). Some of the less favorable aspect of mass media which must be taken into account in planning their use are (Oates et. al., 2016): - Comparatively few people in rural areas in developing countries have access to newspapers regularly; - The number of television sets in these areas is also limited by national coverage and cost; and, - The amount of detailed information, on which people can act, can be transmitted by mass media, is limited (FAO, 2017).

Some examples of mass media and the ways which they can be used most effectively include; circular letters, press, radio TV and others 2.4. Development of extension program In the initial stages, the need for a forestry extension program may not be properly recognized by the people concerned, though it may be recognized by foresters and other staff engaged in land use activities. For a program to succeed, however, it is necessary for the people themselves to recognize the need and to agree that something must be done to meet it. Therefore, needs or opportunities may have to be brought to their attention by some tactful comment and suggestions (FAO, 2016).

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5.3 State of afforestation in Zimbabwe

Zimbabwe has continued to experience forests lost as at unprecedented level (see Muralikrishna&Manickam, 2017; FAO, 2017).Forest area designated for production fell from 2,216,000 ha in 1990 to 1,406,000 ha in 2015 (FAO, 2017). Living forest biomass fell from 1483 million tonnes in 1990 to 941 million tonnes in 2015 and both public and private ownership of forests has been declining over time between 1990 and 2015 (FAO, 2015). The depletion rate translates to over 60 million trees a year against the current planned planting rate of only 15 million trees.

In response to the alarming forest depletion rate, the government has initiated a number of programmes in order to promote sustainable management of the forest resources. The Forestry Commission has been on a massive tree planting programme nation-wide since 1992. As from 2005 an average of 8.1 million trees were planted with a survival rate of about 65 to 70% (Nhekairo&Gumbie, 2013). This has been achieved through initiatives such as the national tree planting day, schools tree growing and tree care competitions and also at special commemoration such as International Forest Day, World Environment Day among others.

In order to consolidate these efforts, the Ministry of Environment embarked on a five-year National Tree Planting Programme in the year 2015 with a view to increasing the country's forest cover and reduce deforestation. This programme involved the planting of 75 million trees nationwide covering a total area of 45 740 hectares over five years (Government of Zimbabwe, 2016). This translates to an annual tree planting rate of 15-30 million trees covering 9 148 hectares yet falling short of the 60 million trees that are lost annually through deforestation. FAO (2015) statistics revealed that planted forest also declined from by 43.5% from 154,000 ha in 1990 to 87, 000 ha in 2015. Thus, one may conclude that such initiatives have failed as they have failed to achieve set policy targets. Depletion of forests in Zimbabwe is taking place at an alarming rate as the country lost 36.6% of its forest area between 1990 and 2015 (FAO, 2015). It is evident from the statistics presented above that tree-planting activities in Zimbabwe have been shrinking. Thus, from this evidence one may conclude that institutional and legal frameworks for sustainable forest management are weak.

In Zimbabwe, many afforestation programmes initiated to address the problem of agriculturally unproductive land have stumbled along and eventually faded away (Gwaze&Marunda, 2014; Marufu, 2014; Nyikadzino, 2016). Generally, the decline in afforestation has consequences for downstream industries such as timber processing (Beyene et al., 2019; Ofori et al., 2020). Though pockets of research are beginning to emerge, little has been done to interrogate the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

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7. RESEARCH METHODOLOGY

Qualitative research method was used to prosecute the study. Data collected from the primary sources were mainly in-depth interviews, oral tradition and key informants interviews (30 respondents). Content analysis was also used to aid data collection. Information obtained from both primary and secondary sources were used in the analysis and interpretations of study findings. The people targeted as key informants were purposively selected from of farmers, farm boards like Agritex, Ministry of Lands and Agriculture, EMA, Agricultural funding institutions egAgribank, Women's Bank, Agriculture training institutions egGwebi Agricultural College, Ministry of Local Governance, Rural District Councils, Chiefs, Headmen, Kraal heads, and other relevant bodies/individuals with relevant knowledge to the phenomenon under study. The study was conducted in Mashonaland West. A thematic approach was used to analyse the data collected. Observation was used to triangulate findings.

8. RESULTS: INTERPRETATION AND SYNTHESIS

This paper interrogated the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe. In order to have an appreciation of the centrality of forestry extension services in the promotion of sustainable afforestation growth, there was need to have a baseline of the state of afforestation.

8.1 State of Afforestation in Mashonaland West Province

In order to have an appreciation of the role of forestry extension services on the promotion of sustainable afforestation, it was imperative to isolate forestry extension-shaped factors that determine the state of afforestation. Generally, study findings point towards a limited number of farmers as being in afforestation.

8.1.1 Size of forests created so far

The size of created forests gives the bigger picture of how intense afforestation efforts in the province are. Evidence from research findings that the size of afforested areas, including reforestation are too little, if compared to the size of open or sparsely populated forests that need reclamation. Statistic provided by a forestry commission officer reveals that, deforestation activities grossly outweigh afforestation efforts. Study findings highlight that of those that have invested in afforestation, they have only done so on small portions of their farmland. The sentiments can be captured in the voices captured below:

> *I have dedicated thirty-hectares of my six hundred and fifty hectares a woodlot. The best I can do is to maintain the thirty hectares dedicated to date as a woodlot.* ***(Cotriana, an afforestor)***

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> *I grow tobacco and the regulator (Tobacco Industry & Marketing Board (TIMB), requires me to grow 0.3 hectares of eucalyptus for every hectare of tobacco I plant.Given that I plant twenty hectares of tobacco, annually, I would therefore need six hectares of my sixty-eight-hectare farm under eucalyptus. I only put two hectares under eucalyptus.* ***(Abielah an afforestor)***

From the sentiments above, one may conclude that afforestation constitute an insignificant part of land use considering the farm sizes. These findings are supported by the Ministry of Lands (2020) which provides the following statistics for the land under afforestation in the 7 Districts in Mashonaland West: MhondoroNgezi District: no afforestation against a total land area of 427 936.51 (Ha), Kariba District: 0.05% against a total land area of 823 092.37(Ha), Chegutu District: 0.04% against a total land area of 938 580.15 (Ha), Sanyati District: 0.19% against a total land area of 481 931.77 (Ha), Zvimba District: 0.10% against a total land area of 608 193.91 (Ha), Hurungwe District: 0.04% against a total land area of 1 983 580.15 (Ha) and Makonde District: 0.38% against a total land area of 875 678.06 (Ha). From these findings, it can be said that the size of the land under afforestation is very insignificant indicating limited investment.

Generally, it can be construed from the sentiments shared in the narratives above that the hectares under afforestation in Mashonaland West Province are almost insignificant when compared to total land are available. From these findings, it can be said that the size of the land under afforestation is very insignificant, hence the findings can be said to be in line with literature. Afforestation is being taken as a support venture not as the key land use amongst farming communities. Further to augment this, the researcher's experiences during data collection are also a clear indication of how little the land under afforestation is. The researcher had challenges establishing these afforestors in the province as they are so spaced because of their fewer numbers of-late.

8.1.2 Number of farmers who are into afforestation

Despite the growing significance of afforestation in the development discourse world-wide, its uptake by farmers as an economic activity of tremendous ecosystem value and services remains a peripheral consideration. The number of farmers who are into afforestation within the province was taken as a measure of how pronounced afforestation in Mashonaland-West is. Generally, evidence from the study demonstrates that the uptake of afforestation among farmers in the province remains generally low. The findings presented below illustrates that afforestation adoption remains alien to most of the farmers in the province. Such sentiments are demonstrated in the narratives presented below:

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> *Afforestation seems to be a preserve of large scale commercial farmers and schools, mainly in the rural Mashonaland- West who normally plant at least half a hectare of eucalyptus. A1 farmers are usually left out and most of them have the perception that, eucalyptus trees reduce soil fertility and provide too much shade that retards crop growth, hence can not grow such trees even for wind break around their small pieces of land.* ***(Deonnr, District Agritex Officer)***

Even the targeted number of farmers who are expected to be in afforestation by year 2030 remains low, indicating the limited involvement of farmers into afforestation:

> *Getting back to the farming community now, what I am only sure of is the fact that we have a target of reaching 15% of our farmers venturing into afforestation as a commercial venture by 2030. This is too high a bar though as we are currently having very few farmers onboard and the farming community perception towards commercial afforestation is still a cause of concern."* ***(Drueke, Planning and Monitoring Officer)***

Generally, sentiments shared from the narratives above illustrate that only a limited number of farmers are into afforestation. A possible explanation for the limited adoption of afforestation within the province might be the fact that the conversion of land from agriculture to forest remains unusual among landowners. Further, a close look at the findings also noted the existence of a number of challenges that militates against the adoption of afforestation. One of the major challenge faced in the promotion of afforestation as an alternative and sustainable land use option for economic development in Zimbabwe is inadequate knowledge of the potential economic gains that may accrue from afforestation initiatives. These findings share much in common with Beyene et al (2018) who opines that there is a general lack of economic knowledge in relation to the returns from afforestation and a lack of management expertise in relation to appropriate management (silviculture) of forests (also see Flemming et al., 2019; Jara-Rojas et al., 2020; Ryan, 2016). These barriers are further compounded by evidence to indicate that where opportunities afforded by forestry development exist, these are very often overlooked or dismissed by farmers due to attitudinal factors such as emotional attachment to the land or negative attitudes around the perception of failure in farming (Malone 2008). Forestry has traditionally not been seen as an integral part of traditional agriculture and most farmers consider forestry only as an alternative land-use for their worst land (NíDhubháin& Gardiner 1994). Thus, it can be construed from the study findings as well as from extant literature that forestry has traditionally not been seen as an integral part of traditional agriculture and most farmers consider forestry only as an alternative land-use for their worst land.

Further, other challenges that have been noted as being behind the limited number of farmers who are into afforestation are culturally based. Evidence from the study attribute some cases of

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poor uptake of afforestation as alternative land use to out-dated cultural values. Green (2009) opines that negative cultural attitudes towards forestry have also been widely reported in some countries. In a study conducted in Finland, Selby and Petajisto (1995) noted that there was a perception that converting land to forestry can sever the dynamic historical process involved in the creation of agricultural landscapes and thereby have a negative effect on local communities. Similarly, in the UK, Watkins et al. (1996) found that most farmers did not want woodland on their farmland, as they see their land as being exclusively a preserve for agricultural production. Forestry has traditionally not been seen as an integral part of traditional agriculture and most farmers consider forestry only as an alternative land-use for their worst land (NíDhubháin& Gardiner 1994).

In another study of six Latin American countries, that is, Argentina, Colombia, El Salvador, Honduras, Nicaragua and Peru, designed to assess the current status of forest tenure reforms, noted a historical and current bias towards promoting agriculture and cattle raising activities, leaving the sustainable use and conservation of forest as a secondary priority (see Warnholtz, Gerardo, Fernandez, Smyle and Springer, 2017). Noteworthy is that in the same study the authors observed that agricultural policies in the six countries continue to promote changes in land use from forests to agricultural or pasture, giving titles to individual landowners who can prove that they are and have been cultivating the land for crops for a long time. This scenario is obviously attitude based and clinging on historical circumstances.

8.1.3 Limited Level of Investment in Afforestation

The majority of potential afforestors develop cold feet over the time it takes to realize benefits from an afforestation initiative. Accounts presented below illustrate how farmers are reluctant to undertake long afforestation due to the long period taken to realize returns:

> *I could not put the greater portion of the farm into afforestation because in as much as I know the benefits of afforestation, it is still unclear whether the direct financial benefits of this woodlot are worth the initiative, given the above seven-year mark to harvesting* ***(Cotriana, an afforestor)***
>
> *I have not ventured into afforestation because, for me, five years needed to harvest these gum trees is equivalent to five cycles of maize, soyabeans and sorghum during summer cropping and five cycles of wheat during the winter cropping season.* ***(Zepn, Farmer).***
>
> *The problem with taking up afforestation as a business is that, looking at my age right now, I will not enjoy the proceeds. This is because afforestation is a venture that you can only take with the future generation in mind, not for your own sake.* ***(Fungie, Farmer).***

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A close analysis of the sentiments expressed above highlights an aversion to long term investments among local farmland owners. Such findings are also echoed in literature. Historically, reforestation has been a strong long-term investment for landowners. Depending on the environmental conditions, an afforestation project takes an average of 7-10 years before reaching maturity to offer meaningful returns to the farmer. Sustainable afforestation therefore implies a typical long-term investment in a forestry project. FAO (2018) highlighted that forestry projects require high rates of financing at the beginning, forests take some time to deliver revenues and benefits. Hence investors face high initial costs and delayed returns, which demands the availability of initial investment capital and the ability to wait for revenues (FAO, 2017). Such huge financial injections needed at the initial stages of afforestation projects act as hindrances, and further the uncertainty surrounding most farms discourage afforestors and potential afforestors from investing in afforestation.

Evidence from the study highlight that there has been limited investment into afforestation projects in Mashonaland West. Study findings highlight that of those that have invested in afforestation, they have only done so on small portions of their farmland. The sentiments can be captured in the voices captured below:

> *I have dedicated thirty-hectares of my six hundred and fifty hectares a woodlot. The best I can do is to maintain the thirty hectares dedicated to date as a woodlot.* ***(Cotriana, an afforestor)***

> *I grow tobacco and the regulator (Tobacco Industry & Marketing Board (TIMB), requires me to grow 0.3 hectares of eucalyptus for every hectare of tobacco I plant.Given that I plant twenty hectares of tobacco, annually, I would therefore need six hectares of my sixty-eight-hectare farm under eucalyptus. I only put two hectares under eucalyptus.* ***(Abielah an afforestor)***

From the sentiments above, one may conclude that afforestation constitute an insignificant part of land use considering the farm sizes. These findings are supported by the Ministry of Lands (2020) which provides the following statistics for the land under afforestation in the 7 Districts in Mashonaland West: MhondoroNgezi District: no afforestation against a total land area of 427 936.51 (Ha), Kariba District: 0.05% against a total land area of 823 092.37(Ha), Chegutu District: 0.04% against a total land area of 938 580.15 (Ha), Sanyati District: 0.19% against a total land area of 481 931.77 (Ha), Zvimba District: 0.10% against a total land area of 608 193.91 (Ha), Hurungwe District: 0.04% against a total land area of 1 983 580.15 (Ha) and Makonde District: 0.38% against a total land area of 875 678.06 (Ha). From these findings, it can be said that the size of the land under afforestation is very insignificant indicating limited investment.

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8.1.3 Limited knowledge about afforestation

As the farm afforestation decision essentially involves an inter-temporal land use change, farmers need comprehensive information on forest market returns under different environmental conditions and forest management regimes. Thus, knowledge about afforestation and its benefits can be said to be the bedrock informing decision on whether to invest or not in afforestation. Evidence from the study demonstrate that farmers are not well-informed about the dynamics of afforestation. Such sentiments are captured in the narratives presented below:

> *There is a gap, they are not informed. There are so many misconceptions especially with eucalyptus, where they are said to have high water usage, hence farmers are skeptical about adopting afforestation as an alternate land use* ***(Forestry extension officer)****.*

> *With the current economic arises people tend not to see the benefits of afforestation. They are mainly concerned of food provisions thus more inclined to cropping* ***(Wynot, Farmer).***

The narrative above illustrates that ignorance about afforestation and its related issues remains a challenge in the province. The generality of the study findings on afforestation challenges highlight poor education and training as one of the hindrances to the uptake of afforestation as an alternative and sustainable land use. The limited knowhow about the dynamics of afforestation also explains the general failure of most afforestation initiatives as well as the limited uptake of such projects. Education and training are used synonymously for the enlightenment of individuals about what should be known with regards to afforestation related issues. Most scholars in literature frameworks (see Lubowski, Plantinga, &Stavins, 2006; Nielsen, Plantinga, &Alig, 2014; Tian, Sohngen, Baker, Ohrel, & Fawcett, 2018) regard education and training as influential in facilitating effective afforestation strategies. They used terms such as `knowledge acquisition', `equipping with skills', `enlightening and provision with relevant information', `teaching', `learning', `programs' and `schooling' in most of their write up revealing underscoring the significance of education and training to uptake of afforestation as alternative land use. Thus, it can be construed from the study findings that there is absence knowledge among afforestors and potential afforestors on the significance of afforestation to economic development. As a result, there is limited adoption of afforestation initiatives. These barriers are further compounded by evidence to indicate that where opportunities afforded by forestry development exist, these are very often overlooked or dismissed by farmers due to attitudinal factors such as emotional attachment to the land or negative attitudes around the perception of failure in farming (Naggar et al., 2022). Forestry has traditionally not been seen as an integral part of traditional agriculture and most farmers consider forestry only as an alternative land-use for their worst land (Mahmood&Zubair, 2020).

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The limited knowhow about the dynamics of afforestation also explains the general failure of most afforestation initiatives as well as the limited uptake of such projects. Evidence from the synthesis of literature highlights that a number of afforestation initiatives have stumbled and faded away. In Zimbabwe, many afforestation programmes initiated to address the problem of agriculturally unproductive land have stumbled along and eventually faded away (CIFOR, 2014; Gwaze&Marunda, 2014; Marufu, 2014; Nyikadzino, 2016). As a result, afforestation has failed to proffer anticipated gains (see Wilson, 2016; Dupraz, 2019) resulting in subsequent low uptake of afforestation as an alternative land use for economic development (see Beyene et al., 2018; 2019; Ryan, 2016). As a result, afforestation continues to fail to deliver the anticipated gains (Nagar et al., 2022; Dupraz, 2019).

8.1.4 Inadequacy of afforestation extension services

Generally, study findings highlight the inadequacy of afforestation extension services in the province.Evidence from the study indicate that both farmers and forestry commission employees were not content with the level of support, given to afforestation by the government. Most farmers were of the view that, government and responsible arms of government did a lot of awareness campaigns on the importance of afforestation on media platform, yet when it comes to implementation, they are doing injustice. Such sentiments are illustrated in the narratives presented below:

> *Current extension services are not adequate because the limited numbers of extension officer on ground cannot bridge the gap in proper land use planning for instance forestry common has one officer in the whole district. The officer in some instance is not even mobile to visit farmers, teaching them on the practices in afforestation* ***(Fungie, Farmer).***

> *Basically, there are fewer extension officers for afforestation services as compared to agricultural extension services for crops and livestock. Government must surely do something.* ***(Contriana, Farmer/Afforestor).***

A close analysis of the sentiments expressed above highlights the inadequacy of extension services geared towards supporting afforestation initiatives in the province. Extension services provides a backbone to afforestation initiatives. In broad sense extension is an education process that informs, convinces and links people. It facilitates flows of information between farmers and other resource users, administration managers and leaders (Tafere&Nigusse, 2018; Ullar et al., 2021).

Extension officers who took part in the study also felt inadequate for the task assigned. Such sentiments can be captured in the voices presented below:

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The area I am supposed to service is too big. I have three districts to service but no vehicle to use when moving around farms. We all rely on one vehicle that is well serviced and services mainly the provincial office. That makes monitoring of woodlots very difficult. ***(Forestry extension officer)***

We cannot raise enough nursery for the farmers. ***(Forestry extension officer)***

The sentiments above show that, inadequate government support for afforestation is crippling the growth of afforestation as a sustainable farming venture like any other crops. This challenges have also been noted in extant literature. In another study conducted in Limpopo Province (South Africa) by Maponya, Venter, Du Plooy, Backeberg, Mpandeli and Nesamvuni, (2019) results also indicated that less than 45% of farmers received extension services, mainly through formal extension service. Bukomeko (2012) had similar findings of inadequate forestry extension services in lira district of Uganda. To further buttress the compounding issue of "the missing link", that is forestry extension services, FAO (2017) posits that the planting of trees is not fundamentally a forestry issue, it is a farm system and social issue and therefore there is a need for an `extension approach' which treats trees as one of many potential productive activities that must be incorporated into the farm system.

8.2 Forestry extension roles in promoting sustainable afforestation as an on-farm economic activity

The section below dissects the roles of forestry extension in promoting sustainable afforestation as an on-farm economic activity.

8.2.1 Education and training

According to the research findings, one of the roles forestry extension is to educate and empower afforestors. Evidence from the study illustrates education and training as another strategy and mechanism for developing best practices in the development of sustainable afforestation in Zimbabwe. In this study, education and training are viewed as means by extension officers of imparting knowledge and skills on sustainable afforestation business-related issues. The two terms are used interchangeably to inform people about what they should know about sustainable afforestation development. In most of their responses, stakeholders who participated in study used terms like knowledge acquisition, skill equipping, enlightening and providing relevant information, teaching, learning, programs, and schooling, revealing the importance of the strategy in providing basic information about effective ways to develop afforestation Zimbabwe. Narratives below are illustrative of respondents viewing forestry extension education and training as central to improving the adoption of afforestation as a sustainable land use option for economic development:

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> *There would just be education of people for instance one can be educated on afforestation as an alternative land use especially when they have underutilised land* ***(Forestry Extension Officer).***
>
> *There is need for vigorous reach out campaigns that seek to educate the farmer. Cost breakdown for plantations should be availed to farmers so that they make informed decisions. Education should be an on-going exercise with so many contact sessions and farm visits by forestry officers* ***(Afforestor).***
>
> *Education is critical because without education, people will view the laws as punitive and restrictive to their freedom a citizens thus they need to be informed on the reasons why they mustn't cut trees and at the same time plant more trees* ***(Farmer).***

It is evident from the sentiments shared above that most development efforts in afforestation plans are hampered by ignorance. As a result, stakeholders who partake in this study proposed that eradicating ignorance through related knowledge edifying programs is critical if the general public and responsible authorities are to comprehend and appreciate the significance of effectively developing afforestation ventures in Zimbabwe. These findings imply that imparting knowledge and skills is critical to the development of effective methods of developing afforestation as an as an alternative land use for development in Zimbabwe. These findings indicate that knowledge and skills are critical pillars of development effective strategies to develop sustainable afforestation in Zimbabwe.

The same sentiments are shared by the U.N. Food and Agriculture Organization (FAO) (2018) which states that worldwide there are deficiencies in the way that forest-related issues are taught, and environmental education is generally inadequate and insufficient. In the ever-changing world, education aims to satisfy the needs for information, professional knowledge and expertise for as many social groups as possible and as quickly as possible. The essence of education and training in promoting afforestation is also echoed by Ajulor (2018) who opined that only a well-educated and informed society is able to produce policy-makers who regard harmony between people and forests as a priority for sustainable development. The scholar went on to say that in this respect, best practices may be found in a number of countries that give high priority to their extension services, using them as tools to improve public relations in the forest sector. By prioritizing education and training in their forest policies, governments have seen great success with their forest reforms, according to a close study of the existing research. An excellent illustration of this is the experience of the Baltic nations (Latvia, Estonia). Large-scale training initiatives were put into place at the beginning of the 1990s, and it was via these initiatives that they were able to make the forest industry significantly more profitable by basing its operations on sustainable forest management principles. Institutional reforms in forest management are

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being followed by substantial training programmes. As a result of the study's findings, it is possible to draw the conclusion that, in all nations aiming to ensure sustainable forest management, great priority should be given to forest research, teaching, and training.

Thus, it can be said that one of the role that forestry extension services has to play is to educate and train afforestors on best practices in sustainable afforestation. On the significance of education and training Prayoo and Wongchantra (2016) posits that the importance of natural resources in all areas should be learned and understood of the effective quality management, planning, and conservation of natural resources and the environment along with environmental development, and all of these are great importance. Training is instrumental to the success of all human endeavours especially those that require skills acquisition for the attainment of set goals. An assessment of the training requirements of forestry and forest industry sectors and the capacity of training institutions to provide the service should thus provide a good basis for strengthening forestry education and training in Zimbabwe. The rapid technological changes in the forest sector in response to demands for sustainable forest management, more efficient utilisation of forest resources, higher quality standards and increased value addition, have in turn demanded additional skills from forestry and wood technology graduates. These emerging issues demand a new breed of foresters and wood scientists.

Evidence from the study demonstrates the need to strengthen and adapt the role of forestry extension in forest education to a changing context Forest education is the primary means of building the knowledge, skills and shared values that underpin sustainable forest management and the contributions of forests and trees to the achievement of environmental, social and economic development goals from local to global levels. Over the past several years however, various international fora have raised concerns that in many places forest-related education is insufficient, deteriorating or out-dated, leading in these places to a lack of awareness and understanding of sustainable afforestation and its contribution to economic development, and to forest graduates that are insufficiently prepared to meet the changing demands of the workplace. Forest education had been largely missing from the global forest policy agenda for nearly 20 years, marked by the limited efforts of the Food and Agriculture Organization of the United Nations (FAO) on the topic. Recently however, attention on forest education has picked up due to the activities of various research organizations and Non-Governmental Organizations (NGOs) and, notably, the inclusion of forest education on the agenda of the 14th session of the United Nations Forum on Forests held in May 2019. This signals a growing realization that forest education can and must be part of the solution to many pressing needs such as reducing the rate of deforestation and forest degradation, protecting ecosystems, enhancing livelihoods and safeguarding human health and well-being, conserving biodiversity, and mitigating and adapting to climate change.

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8.2.2 Forestry extension as a source of seedlings

The majority of respondents emphasized that Forestry Extension Service nurseries are the sources from which they obtained their seedlings for the afforestation program, while some mentioned private nurseries as sources for their seedlings. Farmers used to obtainseedlings of horticultural trees from private nurseries because such seedlings arenot available at Forestry Extension nurseries. Such sentiments are illustrated in the narratives demonstrated below:

> *We cannot raise enough nursery for the farmers. There is a nursery which is raising the stock of plant trees. There is a forestry promoter who assists the farmers. There are supposed to be 5 but at the moment Zvimba district has one. In fact, we do not have enough manpower at our offices to meet the demand. Of late we were subcontracting farmers to do so. We managed to enter into contracts with three different farmers, two of which have long withdrawn citing delays in payments as a challenge that affected his continued services.* ***(Forestry extension officer)***

Afforestation is a new venture in the agriculture spectrum in most regions hence, farmers expect to be in constant contact with their extension officers. In broad sense extension is an education process that informs, convinces and links people. It facilitates flows of information between farmers and other resource users, administration managers and leaders (Tafere&Nigusse, 2018; Ullar et al., 2021). The need for extension officers in afforestation has been noted in literature. In a study on role of forestry extension in promoting afforestation in Khartoum State, Mohammed (2001) found that 82% of his respondents stated that there were no extension visits to farmers. The extension personnel focused on agricultural issues on the expense of forest trees. In another study conducted in Limpopo Province (South Africa) by Maponya, Venter, Du Plooy, Backeberg, Mpandeli&Nesamvuni, (2019) results also indicated that less than 45% of farmers received extension services, mainly through formal extension service. Bukomeko (2012) had similar findings of inadequate forestry extension services in lira district of Uganda. To further buttress the compounding issue of “the missing link”, that is forestry extension services, FAO (2017) posits that the planting of trees is not fundamentally a forestry issue, it is a farm system and social issue and therefore there is a need for an `extension approach’ which treats trees as one of many potential productive activities that must be incorporated into the farm system. In Malawi, where a social forestry programme has been implemented over the past, five years, it has been agreed and accepted that, for the future development of forestry extension, forestry subject matter specialists will be fully integrated into the agricultural extension system. The integration and development of forestry extension within the agricultural service is now gaining wider acceptance and support. Forestry extension staff - will not generally be in contact with farmers but operate with and through agricultural extension staff. This intermediary role therefore, calls for quality rather than quantity of forestry staff and emphasises the need for

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suitably qualified foresters in the disciplines of agriculture, soil conservation, land management, farm systems and extension methodology.

This absence of support has incapacitated the Forestry Commission with one afforestor pointing out that:

> *We lack resources for raising adequate seedlings for giving tobacco farmers for free, further because of limited resources we cannot follow up on each and every farmer, monitoring the upkeep of their plantations. To that effect one would realize that after a year or two some of the plantations would have been destroyed by veld fires, due to lack of close monitoring* ***(Forestry commission officer).***

Maybe there is need to educate the government through its ministries that support agriculture such as the Ministry of Agriculture on the benefits of afforestation especially in arid and semi-arid areas. Ignorance might explain why the government chooses to support other agricultural ventures at the expense of others like afforestation. Thus, there is need for knowledge edifying programmes not only for the farmers but the government and other would be investors. However, evidence from studies show that there are now organizations that partner afforestors and provide all funding for a certain percentage to be paid during harvesting. However, the challenge has been that afforestors lack of information on existence of organizations to partner with in afforestation.

There is s general need to capacitate the Forestry Commission so that it can be able to execute its duties of promoting afforestation. The Commission is supposed to play a number of roles which include nursery provision, education and training, funding, information provision amongst others. In broad sense extension is an education process that informs, convinces and links people. It facilitates flows of information between farmers and other resource users, administration managers and leaders (Tafere&Nigusse, 2018; Ullar et al., 2021). Thus, it can be said that the influence of extension service officers on farmers to adopt afforestation is limited as they are undermanned. Thus, it can be said that generally, the Forestry Commission through its extension officers has failed to discharge its duties of influencing farmers to adopt afforestation. A number of farmers/afforestors who took part in the study pointed out the general lack of afforestation services. Such a concern can be captured in the voices presented below:

> *Yes afforestry commission and Agritex officers encourage people to plant trees. However at personal level they haven't visited me to engage me as an individual (Farmer/afforestor).*

> *No.-I am aware there is one extension officer from forestry commission. However she hardly comes. I remember seeing the officer around our area some years back, whether*

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their visits were affected by the pandemic or not, I am unsure, but by now they should have resumed to full swing. This all tells us that there is a resource challenge somewhere in the system. Obviously other forms of cropping are being –favoured when we look at the provision of extension services as compared to forestry growing (Farmer/Afforestor).

Forestry ex officers rarely visit farmers, neither do they conduct any contact activities for farmers. If they are doing anything, it could be on TV, radio, posters and social media. Busy farm life does not allow us extend access to all that. Further if you are to capture more farmers you need to be where they live (Farmer/Afforestor).

A close look at the sentiments expressed above illiustrate that afforestation extension services are highly inadequate in Mashonland West Province. Thus, one may conclude that the role of extension service officers in influencing farmers to adopt afforestation as an on-farm activity are very limited. Such inadequacys have been witnessed in a number of developing countries.In a study on role of forestry extension in promoting afforestation in Khartoum State, Mohammed (2001) found that 82% of his respondents stated that there were no extension visits to farmers. The extension personnel focused on agricultural issues on the expense of forest trees. In another study conducted in Limpopo Province (South Africa) by Maponya, Venter, Du Plooy, Backeberg, Mpandeli&Nesamvuni, (2019) results also indicated that less than 45% of farmers received extension services, mainly through formal extension service. Bukomeko (2012) had similar findings of inadequate forestry extension services in lira district of Uganda. Thus, it can be concluded that the study findings are in synchrony with literature.

Most afforestors and non-afforestors attested that the extension services for afforestation in Mashonaland West are generally poor. They rarely see, forestry extension officers at any occasion and the management of their tree plantations are their sole responsibility. From the service provider's perspective, the cause for the below expected standard service was incapacitation, where the commission does not have enough manpower resources to reach out to all farmers as maybe expected. Of note is the failure of the Forestry extension to be effective, because the Forestry Commission, being essentially a commercial concern, has very little to offer on forestry extension. Furthermore, Agritex has been unable to fulfil its role in developing forestry extension because of a lack of resources. These findings are in line with Nyikadzino (2023) who argues that forestry extension in Zimbabwe is still inadequate although the key to successful rural afforestation is a strong forestry extension service. Generally, stakeholders perceived the adequate forestry extension services as the difference maker in the drive to optimise the adoption of afforestation as a sustainable alternative land use option for economic development.

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A close look at the findings above highlights that adequate extension forestry services provide impetus to the adoption of afforestation as an on farm economic activity. Their role is important in that in the absence of extension services, expert advice to farmers on afforestation ceases resulting in some ventures collapsing. The concern on the management skill of farmers can be captured in one of the voices presented below:

> *The problem with most of our farmers is that they lack the skills to properly manage their woodlots in the early stages. the growth rate realised in the first two years, when trees will be developing a root system has an impact on the harvesting time. The management of the woodlot after a harvest also has a bearing on the shooting of the remaining stumps. management of such shoots as well should be properly done if the farmer needs to keep harvesting wood from the forest. However, in the case of our province, the few farmers who have harvested some of their trees so far, have suffered the challenge of not much shooting of stump. Once most of the stumps die after a harvest, it basically means a reduction in revenue on the next harvest, thus a clear sign of land underutilisation in Mashonaland west."* ***(Canie, District Forestry Officer)***

Thus, from the findings one may conclude that afforestation extension services are a must in the success of afforestation as an on farm economic activity. Such findings are in synchrony with FAO (2017). According to FAO (2017), the planting of trees is not fundamentally a forestry issue, it is a farm system and social issue and therefore there is a need for an `extension approach' which treats trees as one of many potential productive activities that must be incorporated into the farm system. These findings concur with Le et al. (2012) on whose study in Philippines noted that most smallholder woodlots produce merchantable volumes far less than their site potential, resulting in disillusionment of smallholders when there are no adequate expert advice services on the first years into afforestation. This is attributed to the fact that, these new afforestors may not understand the ways that trees are valued (that is, whether trees are sold simply by the number of logs, the diameter or length of each log, by the log volume or as partially sawn log flitches) or the effect of location on the log price they are likely to receive (for example, price at the stump, at the road side or at the mill door). All these have an impact on the overall contribution of afforestation on economic development in Mashonaland West, thus afforestation extension services should be upheld if afforestation is to be taken as a sustainable, alternative land-use option in the province.

8.3 DISCUSSION

Evidence from the study findings demonstrates that afforestation in Mashonaland and Zimbabwe in general remains low. The uptake of sustainable afforestation as an on-farm economic activity remains mired in a number of challenges, chief among them being limited forestry extension

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services. Despite the expected benefits gained from adoption of agro forestry models, some farmers misconceive the notion of agro forestry. Mohammed (2009) defined extension education as an applied science consisting of content derived from research, accumulated field experiences and relevant principles drawn from the behavioral science synthesized with useful technology into a body of philosophy, principles content and method focused on the problems of out of School education for adults and youth.Beyene et al. (2019)illustrates extension as an on-going process of getting useful information to people and assisting those people to acquire the necessary knowledge, skills attitudes to utilize effectively this information or technology. Generally the goal of the extension process is to enable people to use their skills, knowledge and information to improve their quality of life. In the study area the respondents revealed that there are considerable limited efforts being made by the extension unit in the study area to sensitize and mobilize farmers to participate in the afforestation program through adoption of agro forestry intervention. Farmers asserted that there are no forestry extension services. From the above finding it is clear that most of the extension messages are not tackling sensitive issues like changing attitudes of clients; motivate farmers to adopt different models of social forestry, and enlightenment about the role of trees. It seems that the central nursery is not functioning satisfactory. This agrees with Ullar et al. (2021) showing that the forestry extensionists spent the bulk of their time in and around their central nurseries, caring for seedlings and reception of requests for seedlings delivery instead of encouraging new comers to join the afforestation program. It worth mentioning that, extension process is supposed to offer advice and information to help afforestors to solve their problems. Extension deals with dissemination of information and transfer of technical know-how from experts to clients. Different methods are deployed to attain these objectives. In the study area the work of the extension unit is not satisfactorily to guarantee success of afforestation programs and this is mainly to the limited extensionists' visits to the study area. The majority of the interviewed sample asserted that the extension services are not encouraging to adopt agro forestry model. The efforts of the extension service focuses on distribution of seedlings with reasonable prices, but nodemonstration or transfer of technical know-how are introduced by the extensionists. This clearly reflects the importance of forestry extension to increase the awareness of trees among the farmers in the study area. In essence, extension agents should therefore discuss matters with the afforestors and potential afforestors; help them to gain a clear insight into their problems and also to decide how to overcome these problems.

Respondents were asked about the last extension visits to the study area, no oneof the respondents was able to remember the time of the visit and the issues discuss during the last visits. This reflects on the shortcomings of the forestry extension services. The improvement of extension services was cited by a number of respondents as vital in efforts to promote sustainable afforestation as an alternative land use for development in Mashonaland West. Generally,

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stakeholders perceived the adequate forestry extension services as the difference maker in the drive to optimise the adoption of afforestation as a sustainable alternative land use option for economic development. The voices presented below demonstrate the centrality of improved afforestation extension services:

> *…….but maybe for a start as we want to operationalize the government proposed tree planting models, we need more extension officers for education and enforcement to be successful. Thus we cannot rule out the need to recruit more extension officers* ***(Forestry extension officer).***
>
> *There is the issue of extension officers. We do not even know whether they are there or not. If we have possibly they are incapacitated to cover the areas allocated to them. So the focus will either be to capacitate them by providing transport or increasing the number of forestry officers so as to increase their visibility* ***(Farmer).***

A close look at the findings above highlights that adequate extension forestry services provide impetus to the adoption of afforestation as an on farm economic activity. Their role is important in that in the absence of extension services, expert advice to farmers on afforestation ceases resulting in some ventures collapsing. Thus, from the findings one may conclude that afforestation extension services are a must in the success of afforestation as an on farm economic activity. Such findings are in synchrony with FAO (2017). According to FAO (2017), the planting of trees is not fundamentally a forestry issue, it is a farm system and social issue and therefore there is a need for an `extension approach' which treats trees as one of many potential productive activities that must be incorporated into the farm system. These findings concur with Le et al. (2012) on whose study in Philippines noted that most smallholder woodlots produce merchantable volumes far less than their site potential, resulting in disillusionment of smallholders when there are no adequate expert advice services on the first years into afforestation. This is attributed to the fact that, these new afforestors may not understand the ways that trees are valued (that is, whether trees are sold simply by the number of logs, the diameter or length of each log, by the log volume or as partially sawn log flitches) or the effect of location on the log price they are likely to receive (for example, price at the stump, at the road side or at the mill door). All these have an impact on the overall contribution of afforestation on economic development, thus afforestation extension services should be upheld if afforestation is to be taken as a sustainable, alternative land-use option in the province.

9. CONCLUSION

The current study sought to interrogate the role of forestry extension in the promotion of sustainable afforestation as an on-farm economic activity in Zimbabwe. Generally, study

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findings highlighted that forestry extension services in Zimbabwe are highly inadequate characterised by gross underfunding, limited manpower, limited skills amongst other challenges that impeded the execution of duties by extensionists. The result has been a limited contact between afforestors, potential afforestors and forestry extension service providers. All these have an impact on the overall contribution of afforestation on economic development, thus afforestation extension services should be upheld if afforestation is to be taken as a sustainable, alternative land-use option in the province. There is need to capacitate the Forestry Extension service unit (Forestry Commission and all those involved in forestry extension services) in order to optimise the role of forestry extension in promoting sustainable afforestation as an on-farm economic activity in Zimbabwe.

10. AREAS FOR FURTHER RESEARCH

The current study shed light on the centrality of forestry extension in promoting sustainable afforestation adoption as an on-farm economic activity in Zimbabwe. However, the study illustrated a number of challenges that still impedes the forestry extension services from delivering their duties. Therefore, there is need for studies on mechanisms to improve the contribution of forestry extension to the adoption of sustainable afforestation as an on-farm economic activity in developing countries, Zimbabwe included.

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