

**Original Scientific paper**

10.7251/AGRENG2102068M

UDC 63(6-13)

**SOCIOECONOMIC STATUS AND AGROFORESTRY READINESS:  
A CASE STUDY OF SELECTED COMMUNITIES IN THE OR  
TAMBO DISTRICT, EASTERN CAPE IN SOUTH AFRICA**

Phokele MAPONYA<sup>1\*</sup>, Dean OELOFSE<sup>1</sup>, Casper MADAKADZE<sup>2</sup>,  
Nokwazi MBILI<sup>3</sup>, Zakheleni DUBE<sup>4</sup>, Thabo NKUNA<sup>1</sup>, Meshack  
MAKHWEDZHANA<sup>1</sup>, Takalani TAHULELA<sup>5</sup>, Kgosi MONGWAKETSI<sup>5</sup>

<sup>1</sup>Agri. Res. Council-Vegetable, Industrial and Medicinal Plants, Pretoria, South Africa

<sup>2</sup>University of Pretoria, Faculty of Agriculture and Natural Science, South Africa

<sup>3</sup>University of KwaZulu-Natal, College of Agriculture, Engineering and Science, South Africa

<sup>4</sup>University of Mpumalanga, Faculty of Agriculture and Natural Science, South Africa

<sup>5</sup>South Africa Forestry Company Limited (SAFCOL) Research, SAFCOL (Pty) LTD, Sabie, South Africa

\*Corresponding author: maponyap@arc.agric.za

**ABSTRACT**

This study pointed to the state of the community in terms of their socio-economic and agroforestry readiness in the OR Tambo District, which receives a median annual rainfall ranging between 800 and >1000 mm. In addition to favourable climatic conditions, the district has two plantations, namely the Mkambathi and Gqukunqa Forestry Enterprises, offering fertile ground to revive existing plantations, meaning that the community could immediately reap the benefits from the clear felling of the existing timber and agroforestry practices. Furthermore, the Agricultural Research Council conducted an assessment in collaboration with the Department of Agriculture, Land Reform and Rural Development aimed at identifying the community's socio-economic status. Fifty-six community members from five local municipalities were selected, using a purposive sampling technique, and assessed. Quantitative and qualitative research designs were employed, as a structured questionnaire in English was developed, focus group and stakeholder discussions were held, as well as field observations to elicit information for the study. Data were coded, captured, and analysed using the Software Package for Social Sciences. The decantal 1km X 1km approach was followed to determine the climatic conditions of the two plantations. Currently, profitable and suitable crops like dry beans, sugar beans and groundnuts were recommended to the stakeholders for agroforestry integration. The study recommended the establishment of agroforestry in the OR Tambo District as it satisfied the basic requirements for agroforestry readiness, i.e. good climatic conditions, land availability, availability of production inputs and the community's socio-economic status and involvement, towards food security.

**Keywords:** *Socio-Economic, Agroforestry, OR Tambo District, Eastern Cape Province, South Africa.*

## INTRODUCTION

According to Nair (1985), several criteria can be used to classify and group agroforestry systems (and practices). The following are the most commonly used criteria: the system's structure (composition and arrangement of components), its function, its socio-economic scale and level of management, and its ecological spread. According to Nair (1985) structurally, the system can be grouped as agrosilviculture (crops - including tree/shrub crops - and trees), silvopastoral (pasture/animals + trees), and agrosilvopastoral (crops + pasture/animals + trees). According to Maponya et al. (2019a; 2019b; 2021), agroforestry systems play a major role throughout human history in supporting livelihoods, assisting various communities to generate income, create job opportunities, as well as meeting food security and nutritional needs in the Limpopo Province. The researchers further indicated evidence of the importance of agroforestry systems (and timber-based mixed farming systems), especially silvipasture and agrosilvipasture, for supporting food production and income generation in the Limpopo Province. Some farmers in the Limpopo Province highlighted that they are generating income through renting of farms for grazing, selling trees to the communities to build shelters and kraals, medicinal purposes, fuelwood, etc.

Furthermore, South Africa is considered a semi-arid country vulnerable to water stress, particularly drought (Hassan, 2013). In the previous 7 years, South Africa has experienced the worst droughts in history, where some provinces were declared as disaster areas. The threshold for rain-fed agriculture is averaged at 250mm annually, and in terms of forestry, the rainfall needs to be higher than 750mm per annum to sustain commercial forestry. According to the ARC-SCW (2020), the OR Tambo District receives a median annual rainfall that ranges mostly between 800 and > 1000 mm. Climatically, the area is thus well suited to rain-fed arable agriculture where slopes and soils permit. A moderate summer peak in rainfall is evident. Summer rains start in September and the wettest months are November and December, and the driest months are May to August. In addition to good climatic conditions, the district has two plantations, namely, the Mkambathi and Gqukunqa Forestry Enterprises, which offers fertile ground to revive the existing plantations, meaning that the community could immediately reap the benefits from the clear felling of the existing timber and agroforestry practice.

Furthermore, the ARC conducted an assessment in collaboration with the Department of Agriculture, Land Reform and Rural Development (DALRRD) and the Department of Forestry, Fisheries and Environment (DFFE) aimed at identifying the community's socio-economic status and the rainfall conditions.

## MATERIALS AND METHODS

According to Backeberg and Sanewe (2010), participatory action research is the most appropriate research method, since people, especially farmers, benefit while the research is ongoing. A participatory action approach was also recommended by various researchers who emphasised that this approach is a good alternative to the traditional "transfer of technology" or "top-down approach" to agricultural research and extension. Coordinates were received from the DFFE to plot the climate maps. As indicated in Figure 1, two forestry enterprises participated in the study, namely, the Mkambathi and Gqukunqa Forestry Enterprises.

The Mkambathi forestry project is situated about 60km from Flagstaff and 290 kilometres from the SAPPI pulp mill at Mkomaas in KwaZulu-Natal. It is located in the Ingquza Hill Local Municipality in the OR Tambo District Municipality. The Mkambathi community already had a gum plantation which was established by the then Transkei Agriculture Corporation (TRACOR) in 1980, making it easy to rehabilitate the existing plantation because the community would immediately reap the benefits from the clear-felling of the existing timber and agroforestry. The project employs 127 people from the eight villages (ECRDA, 2020). A total of 668,8ha was planted with *Eucalyptus dunnii*, which is suitable for the pulp market (ECRDA, 2020). Gqukunqa is situated in Qumbu in the north of the Eastern Cape about 40km from Maclear on the R56 Maclear/Mount Fletcher road. The project lies 60km from the PG Bison board mill at Ugie. Its total area is 1,578ha in extent. It is located in the Mhlontlo Local Municipality in the OR Tambo District Municipality. The area planted is approximately 605ha, resulting in the creation of 211 jobs from 18 villages. The area was planted with *Eucalyptus nitens*, which is suitable for the pulp market and pole market (ECRDA, 2020).

Quantitative and qualitative research designs were employed, as a structured questionnaire written in English was developed to elicit information for the study. More so, the study incorporated group discussions, stakeholders' discussions, as well as field observations. As part of the standard protocol for conducting the study, meetings were held with all stakeholders namely: DALRRD, the DFFE and local community members. The goal of the meetings was intended to introduce and further explain the aims of the study.

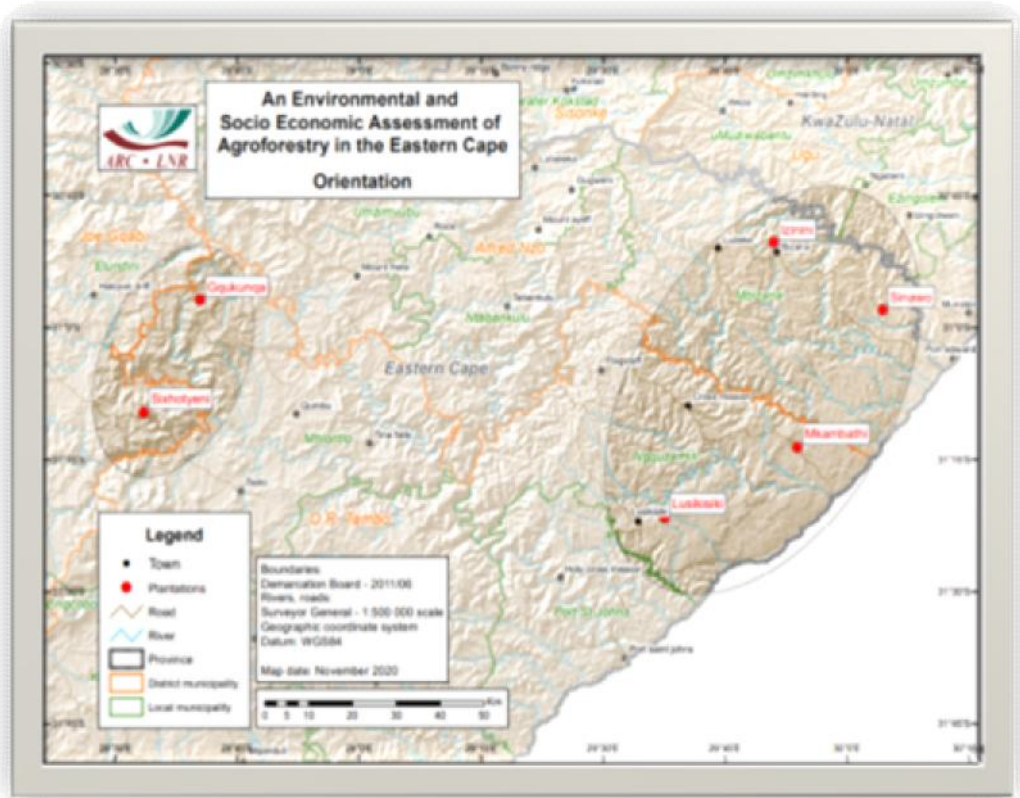


Figure 1: Agroforestry sites in the Eastern Cape, South Africa.  
Source: ARC-SCW (2020).

A purposive sampling technique was employed in selecting 56 community members, in order to cover their uniformity and homogenous characteristics, such as infrastructure requirements, skills availability, production challenges, agricultural training needs, amongst other factors. The following approach was used to determine the average monthly rainfall (Malherbe and Tackrah, 2003): Decadal (ten day period) 1km x1km surfaces were created from rainfall data (1920-1999) downloaded from the AgroMet databank at the Agricultural Research Council- Soil, Climate and Water (ARC-SCW) (South African Weather Service and SCW weather stations), with a recording period of 10 years or more. Regression analysis and spatial modelling were utilized taking into account topographic indices such as altitude, aspect, slope and distance to the sea during the development of the surface. The socio-economic data was captured and analysed with Statistical Package for Social Sciences (SPSS).

## RESULTS AND DISCUSSION

As indicated in Table 1, 56 community members from five local municipalities were assessed: King Sabata Dalindyebo (25%), Ngquza Hill (18%), Mhlontlo (16%), Nyandeni (25%) and Port St John (16%). The age distribution of the community members indicated that the majority (50%) fell within the age group of 46-60. Furthermore, as indicated in Table 1, the rest of the age categories were 18-35; 36-45 and >61, at 9%, 14% and 27%, respectively. In terms of education, 27% had incomplete primary education, 36% had completed primary education, 21% had incomplete secondary education, 5% had completed secondary education, and 9% had completed tertiary education, while 2% had incomplete tertiary education. The results in Table 1 further indicate that the gender composition consisted of 39% females and 61% males. As indicated in Table 1, all (100%) community members were farming full time and in terms of farming experience, about 45% of the community members had 1-5 years, 34% had 6-10 years, 20% had 11-20 years, and 2 % had >21 years of farming experience. Generally, OR Tambo community members had good farming experience, which makes them efficient in their decision-making processes and they are willing to take on the risks associated with the adoption of improved technologies, and they are ready for agroforestry integration.

Table 1 Distribution of community members according to their socio-economic characteristics

	<b>Number of Community Members</b>	<b>% Community Members Socio-Economic Characteristics</b>
<b><u>Local Municipalities</u></b>		
<u>King Sabata Dalindyebo</u>	14	25
<u>Ngquza Hill</u>	10	18
<u>Mhlontlo</u>	9	16
<u>Nyandeni</u>	14	25
<u>Port St John</u>	9	16
<u>Total</u>	56	100
<b><u>Gender</u></b>		
Female	22	39
Male	34	61
Total	56	100
<b><u>Age Categories</u></b>		
18 – 35	5	9
36 – 45	8	14
46 – 60	28	50
>61	15	27
Total	56	100
<b><u>Level of Education</u></b>		
Primary Education Incomplete	15	27
Primary Education Completed	20	36

Secondary Education Incomplete	12	21
Secondary Education Completed	3	5
Tertiary Education Incomplete	1	2
Tertiary Education Completed	5	9
Total	56	100
<b><u>Employment Status</u></b>		
Unemployed and community grower/farmer	56	100
Total	56	100
<b><u>Farming Experience</u></b>		
1 - 5	25	45
6 - 10	19	34
11 - 20	11	20
21>	1	2
Total	56	100



Figure 2. Community growers at the Gqukunqa Forestry Enterprise planting Eucalyptus trees and indicating their readiness for agroforestry integration.

In addition, timber-based mixed farming and agroforestry systems that have commercial timber species such as Eucalyptus as the woody component, are only suited in areas that receive sufficient rainfall to support the production of the trees (Maponya et al. 2021). In such areas, it is likely that there will be sufficient rainfall to support the other components of the system.

The rainfall maps were plotted during the 2020 planting season as follows: the average rainfall for September was fairly good (75-100mm) for most parts of the Eastern Cape Province agroforestry sites, as compared to the agricultural open field areas. The situation improves during October (101-150mm) with an increase in

rainfall in the areas in which the agroforestry sites are located. This situation is not surprising, as the DFFE had identified those sites as good for the establishment and expansion of agroforestry. The long-term increases in rainfall from November to December (see Figure 3) are experienced in the agroforestry sites. The agroforestry sites namely Mkambathi and Gqunqa Forestry Enterprises were experiencing increased rainfall at 125-175mm and 125-175mm, respectively.

In terms of future estimates, three rainfall maps that show the 33<sup>rd</sup> percentile, the median (50<sup>th</sup> percentile) and the 67<sup>th</sup> percentile were drawn. To explain what these maps depict, one can consider the 33<sup>rd</sup> percentile. *If there were 100 years of recorded data arranged in sequence from dry to wet, then the 33<sup>rd</sup> percentile would be the value of the 33<sup>rd</sup> year. In other words, the chances are good that this rainfall figure would be exceeded, or the chances are small that you will have less rain.* The model estimated annual rainfalls for the broad study area at 801- >1000mm for the 33<sup>rd</sup> percentile; 901- >1000 at the 50<sup>th</sup> percentile and >1000mm at the 67<sup>th</sup> percentile (see Figure 4). These agroforestry sites will allow for timber production and will thus support agroforestry / timber-based mixed farming systems.

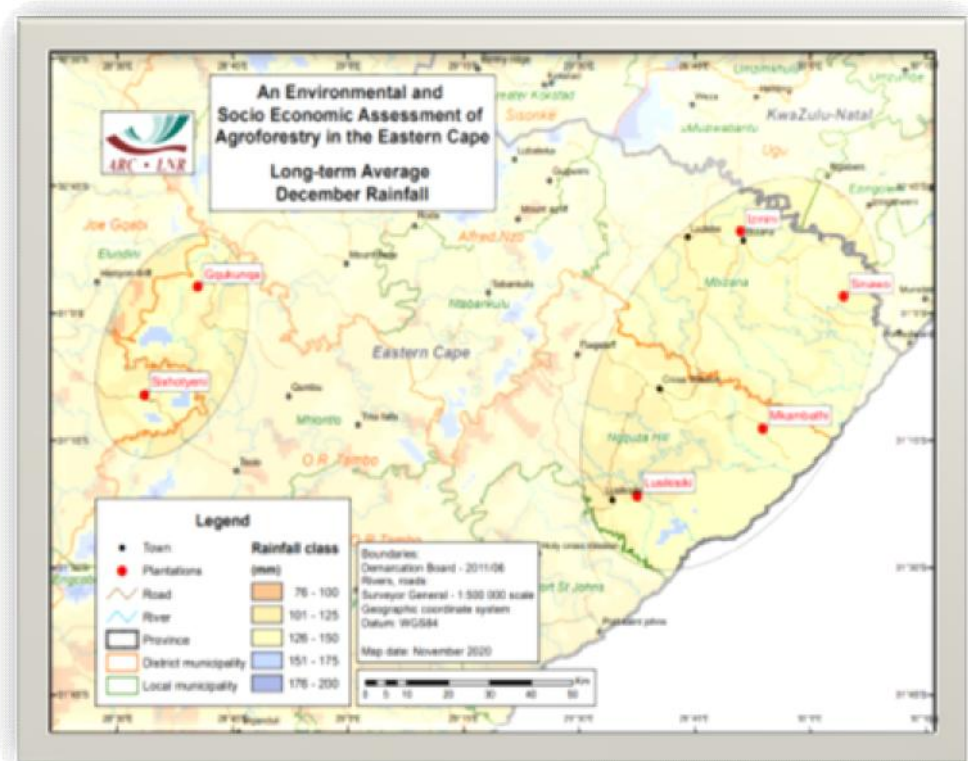


Figure 3. Eastern Cape Province long-term average December rainfall.  
Source: ARC-SCW (2020).

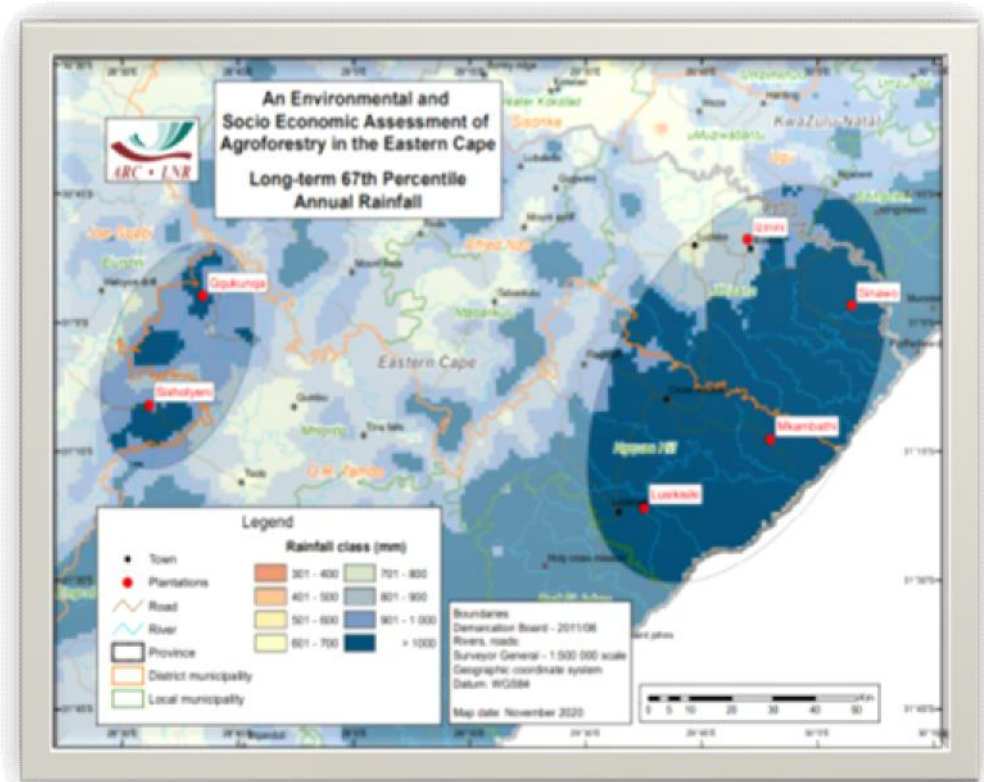


Figure 4. Eastern Cape Province long-term 67th percentile annual rainfall  
Source: ARC-SCW (2020).

## CONCLUSION

In conclusion, the most important socio economic factors associated with variation in levels of motivation to conserve trees on farms included gender, age, education level, experience and employment status to name a few. The research also indicated that communities have moved away from their villages to the study area in search of its good climate and land. Furthermore, the communities indicated that they are ready to practice agroforestry, as it will improve their livelihood through income generation, job creation and food security as seen in Limpopo and Mpumalanga Provinces. Hence, the research concluded that an agroforestry project will be more successful if the diversity of community socio-economic characteristics, climate and their perceptions are considered in its design. In addition, profitable and suitable crops like dry beans, sugar beans and groundnuts were recommended to the DFFE for agroforestry integration in the OR Tambo District and other agroforestry sites in the Eastern Cape Province. The research recommends that the establishment and expansion of agroforestry be carried out in the identified suitable areas and in line with the Department of Agriculture, Forestry and Fisheries Agroforestry 2017 Implementation Strategy, as these



satisfied the basic requirements for agroforestry readiness, i.e. good climatic conditions, land availability, production inputs availability and the communities' socio-economic issues and involvement, towards food security.

### **ACKNOWLEDGEMENTS**

The authors wish to acknowledge the following: Agricultural Research Council, South African Forestry Company Limited, Department of Forestry and Fisheries and Environment, Universities of Kwazulu Natal, Pretoria and Mpumalanga. A special thanks to Ms Marjan Van Der Walt (ARC-SCW) for her excellent and professional work in drawing the climate maps.

### **REFERENCES**

- Agricultural Research Council ISCW (ARC-ISCW). (2020). Report title. Published Report, Pretoria, South Africa.
- Backeberg GR and Sanewe AJ. (2010). Towards productive water use and household food security in South Africa. Paper presented at the 6th Asian Regional Conference of ICID, 10-16 October 2010, Indonesia.
- ECRDA (Eastern Cape Rural Development Agency). (2020). Forest Development. Published Report, Eastern Cape Province.
- Hassan R. (2013). Drought management strategies in South Africa and the potential for economic policy instruments. Book Chapter, DOI: 10.1007/978-94-007-6636-5-21
- Malherbe J. and Tackrah A. (2003). Long-term average ten daily 1km X 1km temperature, rainfall and evaporation grid surfaces modelled from weather station data with a long-term recording period. ARC-Institute for Soil, Climate and Water, Pretoria.
- Maponya P, Madakadze IC, Mbili N, Dube ZP, Nkuna T, Makhwedzhana M, Tahulela T and Mongwaketsi K. (2021). Potential constraint of rainwater availability on the establishment and expansion of agroforestry in the Mopani District, Limpopo Province in South Africa. *AGROFOR International Journal*, 6(1), 26 – 35.
- Maponya P, Venter SL, Du Plooy CP, Backeberg GR, Mpandeli SN and Nesamvuni E. (2019a). Research, extension services and training as key drivers to agroforestry adoption in the Limpopo Province, South Africa. 3rd World Irrigation Forum, International Commission on Irrigation and Drainage (ICID), 1-9 September 2019, Bali, Indonesia.
- Maponya P, Venter SL, Du Plooy CP, Backeberg GR, Mpandeli SN and Nesamvuni E. (2019b). Evaluation of the timber based mixed farming/agroforestry systems: A case of farmers in the Limpopo Province, South Africa. 4th World Congress on Agroforestry, 20-22 May 2019, Montpellier, France.
- Nair, PKR. (1985). Classification of agroforestry systems. *Agroforestry systems* (3), 97 – 128.