

**UNVEILING ECOSYSTEM SERVICES POTENTIALS OF HOMESTEAD
AGROFORESTS OF NORTHERN BANGLADESH**

A THESIS

BY

MOST. AFROJA KHATUN MUNNI

STUDENT ID: 1701178

SESSION: JULY-DECEMBER, 2022

THESIS SEMESTER: JANUARY–JUNE, 2024

MASTERS OF SCIENCE (M.S.)

IN

AGROFORESTRY AND ENVIRONMENT



**DEPARTMENT OF AGROFORESTRY AND ENVIRONMENT
HAJEE MOHAMMAD DANESH SCIENCE AND TECHNOLOGY
UNIVERSITY, DINAJPUR-5200**

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**Submitted to the
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In partial fulfillment of the requirement for the degree of**

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JUNE 2024

DEDICATED
TO MY
BELOVED FAMILY AND
TEACHERS

DECLARATION

I hereby declare that the work presented in this thesis title “**Unveiling Ecosystem services Potentials of Homestead Agroforests of Northern Bangladesh**” has been carried out by myself and it has not been submitted for any previous degree. All questions have been distinguished by quotation marks and all sources of information specially acknowledged by references to the authors.

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UNVEILING ECOSYSTEM SERVICES POTENTIALS OF HOMESTEAD AGROFORESTS OF NORTHERN BANGLADESH

ABSTRACT

Homestead agroforests with diverse plants have the potential to generate ecosystem services. The aim of the study was to investigate the above-ground biomass (AGB), above-ground carbon (AGC), and soil organic carbon (SOC) and its driving factors. The study was conducted in the homestead forests of Panchagarh districts in Northern Bangladesh. A stratified sampling method was applied to collect socioeconomic information, vegetation and soil sample data. A total of 104 households were surveyed for data collection. The socioeconomic conditions of the homesteads were collected by semi-structured questionnaire; vegetation information and soil samples (0-30cm depth) were collected from a 20m × 20m quadrants laid in the homestead. The socioeconomic results revealed that the maximum number of respondents were middle- and old-age, with small families possessing secondary-level education. The respondents belong to the marginal farm size (43.4%) category of the low-income (59.6%) category. The maximum households had four decades of conventional and agroforestry farming experience. The mean AGB and AGC of the study area were 27 and 10.78Mgha⁻¹. The respondents mentioned that the percentage of provisioning, regulating, and cultural service supply was 34%, 36%, and 30%, respectively. The problem finding index (PFI) revealed that the major problems faced by the households were lack of training on managing homegardens (PFI-289.4) followed by the attack of insects, pest and diseases (PFI-282.7). In case of soil composition, SOC, SOM and TN were 2.19%, 3.78% and 0.28% while TP and TK were 89.80μg/g and 1.24 meq/100g of soil. AGC was positively correlated with tree height and DBH while negatively correlated with soil pH. Finally, it might be concluded that the homegarden agroforests have the potential to mitigate climate change effect by sequestering atmospheric carbon and supply ecosystem services for the communities around the World.

Keywords: Homegarden, agroforestry, ecosystem services, provisioning services, Carbon Sequestration

CONTENTS

CHAPTER	TITLE	PAGE NO.
	DICLARATION	i
	ACKNOWLEDGEMENTS	ii
	ABSTRACT	iii
	CONTENTS	iv-vi
	LIST OF TABLES	vii
	LIST OF FIGURES	viii
	LIST OF APPENDICES	ix
CHAPTER I	INTRODUCTION	1-3
CHAPTER II	REVIEW OF LITERATURE	4-12
2.1	Home garden Agroforestry in Bangladesh	4
2.2	Benefits of Home gardens Agroforestry	5
2.2.1	Economic benefits	5
2.2.2	Community benefits	6
2.2.3	Nutritional benefits	7
2.2.4	Homestead production system that produces provisioning services	7
2.2.5	Home garden for employment and economic security	8
2.2.6	Social benefits to the community	9
2.2.7	Home garden for soil productivity and improving environment	9
2.3	Carbon sequestrations and its regulators	9
2.4	Ecosystem services from home garden agroforestry	10
2.4.1	Provisioning services	11
2.4.2	Regulating services	11
2.5	Problems faced by the respondents for practicing homestead agroforestry	11
2.6	Probable solutions of problems faced by the respondents	11

CONTENTS (Contd.)

CHAPTER	TITLE	PAGE NO.
CHAPTER III	METHODOLOGY	13-18
3.1	Brief description of the study area	13
3.1.1	Location of the study area	13
3.1.2	Climatic scenario of the study area	14
3.2	Sampling strategy and data collection techniques	14
3.2.1	Sampling design	14
3.2.2	Data collection on diversity attributes of home garden	15
3.2.3	Soil sample collection and processing	15
3.2.4	Estimation of Aboveground Biomass (AGB) and aboveground carbon	15
3.4	Measurement of soil properties	16
3.4.1	Estimation of soil pH	16
3.4.2	Estimation of soil organic carbon and soil organic matter	16
3.4.4	Estimation of soil total nitrogen (TN)	17
3.4.5	Estimation of total phosphorus (TP)	17
3.4.6	Estimation of soil total Potassium (TK)	18
3.5	Statistical analysis	18
CHAPTER IV	RESULT AND DISCUSSION	19-28
4.1	Demographic characteristics of the respondents	19
4.1.1	Age	19
4.1.2	Family size	19
4.1.3	Education	19
4.1.4	Farm size	19
4.1.5	Family income	20
4.2	Farming experience	20
4.3	AGF farming Experience	21

CONTENTS (Contd.)

CHAPTER	TITLE	PAGE NO.
4.4	Valuation of ecosystem services derived from homestead forests	21
4.4.1	Provisioning services:	22
4.4.2	Regulating services	22
4.4.3	Cultural services	23
4.5	Problems faced by the respondents for practicing homestead agroforestry	23
4.6	Descriptive statistics showing tree structural, aboveground biomass and carbon sequestration	24
4.7	Descriptive statistics potential parameters regulating carbon stock	25
CHAPTER V	SUMMARY AND CONCLUSION	29-32
5.1	Summary	29
5.2	Conclusion	31
5.3	Recommendation	31
	REFERENCES	33-45
	APPENDICES	46-52

LIST OF TABLES

TABLE NO	TITLE	PAGE NO
4.1	Descriptive statistics showing the demographic characteristics of the respondents in the study area	20
4.2	Descriptive statistics showing the farm experience of the respondents in the study area.	21
4.3	Descriptive statistics showing the AGF farm experience of the respondents in the study area.	21
4.4	Showing the valuation of ecosystem services of the study area.	22
4.5	Problem finding index (PFI)	24
4.6	Descriptive statistics showing species Height, DBH, AGB and AGC composition of the study area	24
4.7	Descriptive statistics showing composition soil pH, SOC, SOM, TN, TP, TK of the study area-	25
4.8	Descriptive statistics showing correlations between the compositions of the study area-	27

LIST OF FIGURES

FIGURE NO	TITLE	PAGE NO
3.1	Map showing of Bangladesh and Boda Upazila of Panchagarh District	14
4.1	Valuation of Ecosystem services derived from homestead forests	23

LIST OF APPENDICES

APPENDICES NO	TITLE	PAGE NO
I	Problems faced by the respondents for practicing homestead agroforestry	46
II	Questionnaire for data collection	46
III	Some plates of experiments	52