

**ECO-TOURISM AS AN ADAPTATION STRATEGY FOR CLIMATE CHANGE
IMPACTS IN AGRICULTURE SECTOR IN PALUGASWEWA CASCADE SYSTEM, SRI
LANKA**

By

G.P.W.S Anuradha

Table of Content

CONTENTS

Table of Content	2
List of Figures	3
Chapter 1.....	4
INTRODUCTION	4
1.1 Background	4
1.2 Problem identification and Justification.....	5
1.3 OBJECTIVES	10
1.3.1 General Objective	10
1.3.2 Specific Objectives	10
Chapter 2.....	11
LITERATURE REVIEW	11
2.1 The concept of ecotourism	11
2.1.1 World status of ecotourism with world heritage sites	12
2.1.2 Sri Lankan status of ecotourism	12
2.2 Climate change with food production	12
2.3 Local Traditional knowledge can be related to promote ecotourism practices within world heritage sites.....	13
2.4 Tank Cascade system	13
Chapter 3.....	15
METHODOLOGY	15
3.1.1 Introduction	15
3.1.2 Study Area	15
3.1.3 Study Population and Unit of Analysis	16
3.1.4 Sampling Method and Sample Size.....	16
3.1.5 Collection of Data.....	16
3.1.6 Household Survey.....	16
3.1.7 Key Personal Interview (KPI)	16
3.2 Data Analysis	16
3.2.1 Probit regression Model.....	17

Chapter 4.....	18
Chapter 5.....	19
REFERENCES	19

List of Figures

Figure 1 Temperature anomalies 2022.....	6
Figure 2 Annual greenhouse gas emission by sector from 1990 to 2014.....	7
Figure 3 AO elaboration based on data from Emergency Events Database 2009.....	8
Figure 4 Agriculture damage and loss across all sectors by type of hazards.....	9
Figure 5 Damage by agriculture sector, 2006–2016).....	10
Figure 6 Location of the study	15

CHAPTER 1

INTRODUCTION

1.1 Background

Sri Lanka is a developing country and mainly based with the agricultural economy (Robert Mendelsohn and Ariel Dinar, 1999) rice is the staple food as well, there are two growing seasons throughout the year as Yala (May – end of August) season and Maha season (September - March) (Department of Census and Statistics, 2023). Drought, water scarcity are the main challenges with yield reduction and income losses (Bandara, S., Ignaciuk, S., Hewage, A., Kwon, J., Munaweera, T., Scognamillo, A. & Sitko, N., 2021). Ancient Village tank cascade systems (VTCS) are identified as a timely solution for the climate change adverse effects within the dry zone, Sri Lanka. Thus, it is crucial to recognize the paths within the VTCS which can be led to minimize the climate change adverse effects (Galagedara, Lakshman & Mowjood, M.I.M & Vidanage, Shamen, 2018).

Minor tank-based farming system was traditionally consisted of three-major components.; In this connection, ‘gangoda’ (home garden), ‘chena’ (shifting cultivation) and ‘welyaya’ (lowland paddy cultivation). A well-managed home garden played a vital role within the village tank community by providing fruits and vegetables for household consumption and developing a pleasant cooler atmosphere. Chena cultivation receives a most outstanding place within the small tank based farming system than lowland paddy cultivation since it was the most stable and necessary portion of the household financial gain (Harischandra, 2018). Chena crops on the opposite hand act as an insurance against any failure within the lowland paddy crop whereas providing a considerable financial gain a vital supply of the family diet. Traditionally, inland fisheries and traditional crop varieties fulfilled the nutrition desires of those communities to fulfil food and nutrition security. Irrigation water was there throughout the year from the tank cascade system for the cultivation and livestock. In that time villagers have access to enough food, enough foods were available, they knew the how to use foods and their nutrition aspects, and foods were stable throughout the year. It has completed the four aspects of food security and it has ensured the nutrition security as well. (Harischandra, 2018)

Climate changes have negatively affected on agricultural practices and directly on the food production reducing the food availability, food accessibility and food stability. Recently projected drop in paddy yield is higher for the yala season low country and intermediate zones are up to 6.5% drop by 2030 because of climate change (WFP, 2018). Extreme weather events such as flood, landslides cause to damage the infrastructure facilities such as roads and ultimately it negatively affect to the physical food access. On this backdrop, the cascade system has the capability to fight against adverse climate changes such as drought and flood. Cascade system can absorb shocks of natural disasters to avoid flood by storing water and drought reduce by reducing water loss from tanks due to existence ecosystem (WFP, 2018).

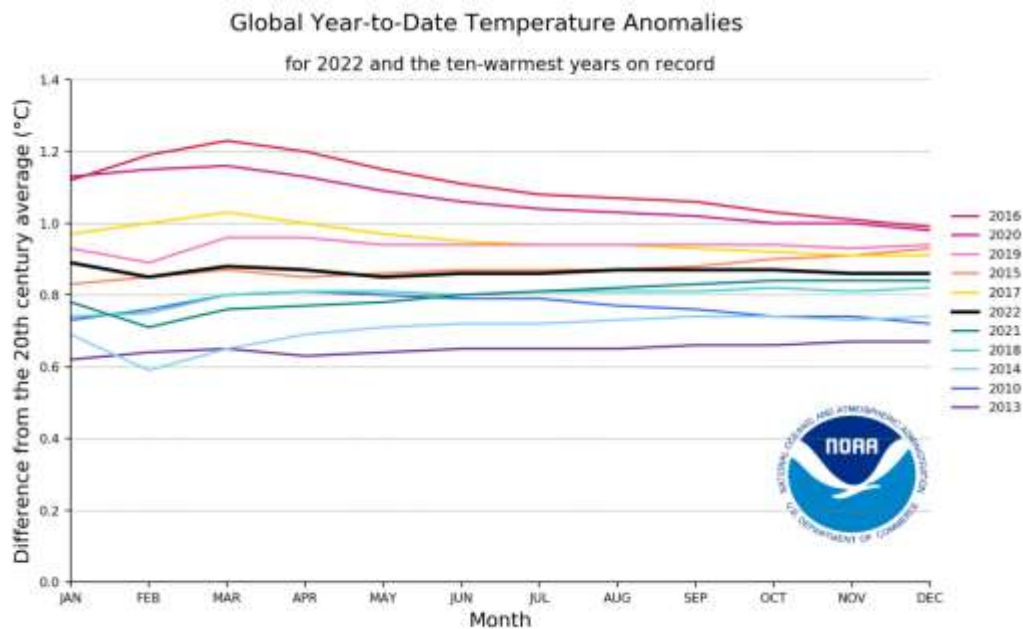
The CTVS (ellanga gammana) has been declared as a world Heritage Site by the Food and Agriculture Organization of the United Nations in 2018 (FAO, 2018). Eco tourism is recognized as an adaptation strategy to climate change since the ecotourism concept normally used to conserve protected areas / heritage sites by forest-based attraction, traditional local livelihood patterns (Agyeman and Yaw, 2019). The Cascaded Tank-Village Systems (CTVS) mainly found within the dry zone, Sri Lanka and based with a traditional agriculture system which has been recognized as a sustainable ecosystem (FAO, 2016). The Palugaswewa CTVS is based within the Palugaswewa Divisional Secretariat Division in the Anuradhapura District.

1.2 Problem identification and Justification

The 2030 agenda for Sustainable development goals leads to 17 sustainable goals agreed with all United Nations members in 2015 (SDGs; United Nations, 2015). Climate actions as 13th goal of the Sustainable Development Goals, it illustrates that temperature rise continuously and the year 2022 recorded as the 6th warmest year (Figure 1) with comparisons of global data from 1880 to 2022 (NOAA National Centers for Environmental Information, 2022). As Sustainable development goals report 2022, it forecasted the adverse weather conditions (with recent data) with climate change as follow.

1. Sea level rise by 30-60 cm by 2100
2. Drought estimated to displace 700 million people by 2023
3. Disasters will increase by 40% from 2015 to 2030

Furthermore, 2021 will become the largest CO₂ emission year with energy related CO₂ emissions as it is increased by 6% (SDGs; United Nations, 2022).



(Figure 1- Temperature anomalies (NOAA National Centres for Environmental Information, 2022)

Globally, climate change has become the main issue with agriculture production especially within the developing countries. Production would be reduced by climate change in several ways as; it leads to reduces crop development in several stages, less grain production in weight wise, increase the evapotranspiration (HOWARD BURDITT and Cline, 2008) and less production in livestock rearing and fisheries as well (FAO. 2018; 21) (figure 2), in other hand positively, carbon emissions can be help for the C₃ crop's (wheat, rice, soybeans) photosynthesis but not help with the C₄ crops (maize, sugar cane) (HOWARD BURDITT and Cline, 2008). With the rapid increasement of global population it is vital to address sustainable agriculture to feed increasing population especially within Sub-Saharan Africa and South Asia (NOAA National Centers for Environmental Information, 2022) and climate change hardly hits with rural livelihood's economy largely since rural livelihood economy mainly depends on the agriculture (FAO. 2018; 21) according to the Food and Agriculture Organization report 2018, globally, it has illustrated that drought is the main contributor for agriculture production lost as 83% and then volcanic eruption (30%), storm (23%), flood (17%), tsunami (11), earthquake (4%) (Figure4) with this extreme

events crop loss mentioned as 49% and livestock production loss illustrated as 36 % (figure 4). Furthermore, the agriculture sector is recognized as a main contributor for greenhouse gas emissions with available data from the mid-20th century (FAO. 2018; 21). Livestock production, rice cultivation, fertilizer, energy use is recognized as the main sources of agriculture greenhouse gas emissions (figure 2) and greenhouse gas emission was increased by 3% from 2012 to 2017 (FAO 2020). This emission is projected to increase by 27% from 2017 to 2050 (Searchinger et al. 2019).

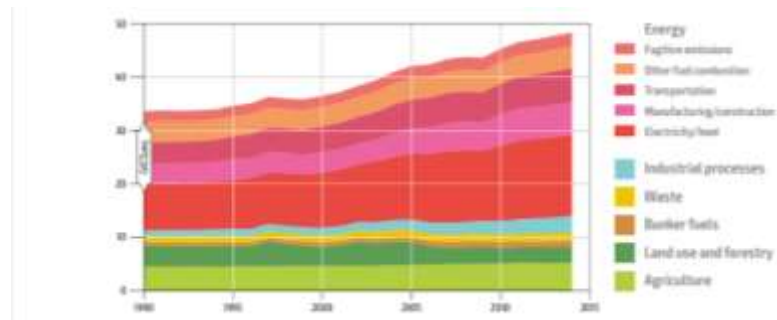


Figure 2- Annual greenhouse gas emission by sector from 1990 to 2014(WRI, 2014)

These extreme weather events caused by climate change directly led to economic loss worldwide, so early warning systems and climate change mitigations are vital to take in action as a priority. According to the World meteorological organization, 3454 disasters have been recorded from 1970 to 2019 and with that it has recorded 975 622 deaths and furthermore economic losses mentioned as US \$1.2 trillion. Globally this can be accounted as 31% of climate change disasters and 47% of deaths, 31% Of economic losses (World Meteorological Organization, 2021).

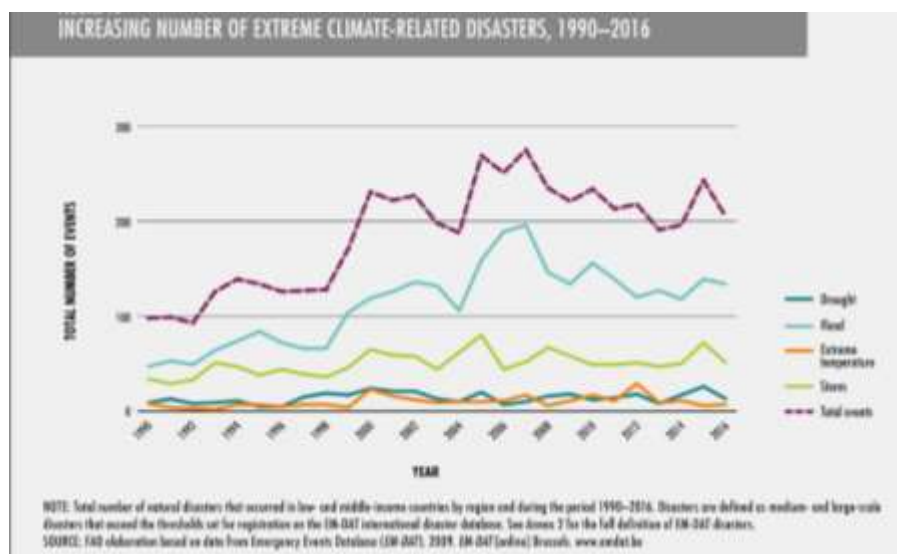
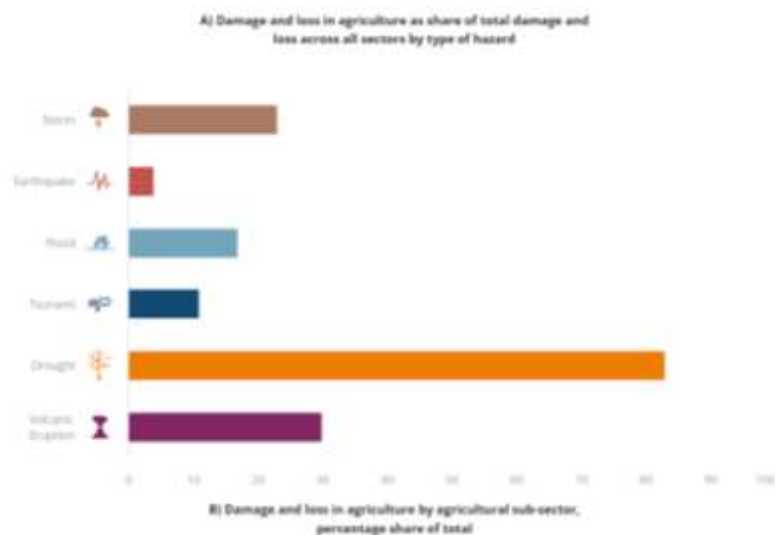
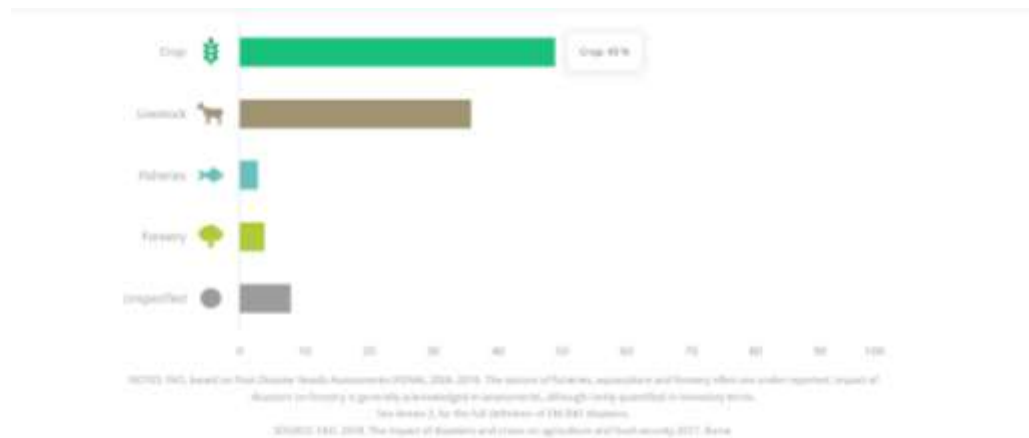


Figure 3 - AO elaboration based on data from Emergency Events Database (EM-DAT). 2009. EM-DAT [online] Brussels. www.emdat.be



(Figure 4 -Damage and loss in agriculture of total damage and loss across all sectors by type of hazards, 2006–2016) (FAO, 2018b)



(Figure 5 -Damage by agriculture sector, 2006–2016) (FAO, 2018b)

In Sri Lanka context, these climate variations accounted for 40% paddy yield reduction in 2017 due to the worst drought occurring in late 2016 as Sri Lanka ever experienced in this 20th century. Moreover, flood conditions are occurred in May 2017, and it caused to 229, 5560 people household food insecure (Coslet et al., 2017). So, it is vital to find mitigation plan to cope up with climate change. On one hand ecotourism is recognized as a tool to conserve natural and cultural heritage in a sustainable way (Santarém, Saarinen and Brito, 2020). Food and Agriculture Organization identified the most vulnerable group to the climate variations as small scales farmers (accounted for 2.5 billion in globally) especially who are within the natural resources / forest dependent rural communities (FAO, 2018b). Palugawewa tank cascade system which is located in Anuradhapura, Sri Lanka declared as a world agriculture heritage site and there is an opportunity to establish eco-tourism project to mitigate the climate change adverse effects and it will lead to enhance the community's economy as well. This cascade is in a highly environmentally important area in between two tourist hotspots of Habarana and Ritigala sanctuary mountain range. Therefore there is a potential to develop this cascade as an eco-tourism hotspot in line with climate smart agriculture programs, promotion of ecological agriculture practices, tradition practices of agriculture, aesthetic value, traditional fishing and agriculture practices, lifestyle of the local traditional villagers (FAO, 2016b). Moreover, there is a need to find out dying local traditional knowledge to reuse for the integration into Sri Lankan agriculture policies to cope up the extreme impacts due to the modern climate turbulences.

1.3 OBJECTIVES

1.3.1 General Objective

To assess the feasibility of eco-tourism as an adaptation strategy for the food production / agriculture sector in Plugaswewa Cascade, Anuradhapura

1.3.2 Specific Objectives

- 1) To examine the community preference towards the eco-tourism project within the Palugaswewa cascade system, Anuradhapura of Sri Lanka.
- 2) To assess the factors that determines the adoption of eco-tourism as a source of income diversification.
- 3) To identify the challenges, opportunities and policy gap when developing ecotourism operations in the agriculture sector in Palugaswewa tank cascade system, Anuradhapura, of Sri Lanka.
- 4) To propose set of recommendation to the development of resilient ecotourism practices in world heritage sites.

CHAPTER 2

LITERATURE REVIEW

2.1 The concept of ecotourism

According to the international ecotourism society, ecotourism defines as “Responsible travel to natural areas that conserves the environment, sustains the well-being of the local people and involves interpretation and education” with the specification that education is to staff and guests (TIES, 2015).

Principles of ecotourism –

1. Does not consume natural resources.
2. Develop a moral sense on ecosystem.
3. Possesses sustainable principles and ethics regarding the environment. (TIES, 2015)

Ecotourism aims to bring together sustainable travel, communities, and environmental protection. This means that the following ecotourism principles should be followed by individuals who implement, engage in, and market ecotourism activities:

1. Reduce the effects on the physical, society, behaviour, and psychology. Build environmental and cultural awareness, and respect.
2. Create satisfying experiences for guests and hosts alike.
3. Generate straight financial gains for conservation.
4. Create profits for the community's residents as well as for entrepreneurs.
5. Assist in increasing visitors' awareness of the political, environmental, and social climates of the host countries by providing them with unforgettable interpretive experiences.
6. Create, build, and run harmless infrastructures.
7. Recognize the rights and spiritual practises of the Indigenous People in your neighbourhood and collaborate with them to develop empowering programmes. (TIES, 2015)

2.1.1 World status of ecotourism with world heritage sites

World Heritage Sites offer more than just fantastic tourist attractions. Millions of people around the world benefit from World Heritage sites. The International Union for Conservation of Nature (IUCN), which serves as an advisor to the UNESCO World Heritage Committee and an evaluator of natural world heritage sites, states that natural world heritage sites protect exquisite landscapes, rare ecological processes, and important habitats for numerous iconic species. They also benefit economies, a stable environment, and people's well-being with traditional practices. About half of the natural places on the World Heritage List aid in preventing natural disasters like landslides and floods, and two-thirds are essential water sources. More than 90% of the listed natural areas generate income through tourism and recreation and jobs (Ecotourism world, 2020).

2.1.2 Sri Lankan status of ecotourism

Tourism is the third largest foreign exchange earner within the country and ranked 74th out of 141 countries in the travel and tourism competition 2021. Tourism is accounted for 12% of direct gross domestic production in the country and in 2018; on other hand tourism industry peaked with \$5.6 billion / 2.5 million tourism arrival. Although tourism is main revenue of the country, ecotourism practices in Sri Lanka have been less than 1% over the last decade (Central Bank of Sri Lanka, 2021).

2.2 Climate change with food production

Long-term changes in temperature and weather patterns are referred to as climate change. These changes could be caused by natural processes, such oscillations in the solar cycle. But since the 1800s, human activities—primarily the combustion of fossil fuels like coal, oil, and gas—have been the primary cause of climate change (United Nations, 2022).

Climate is a crucial factor when it comes to the production part of the agriculture. In South Asia, it is projected to decline the food production by 2050 as follows;

- Rice production will be declined by 49%
- Wheat production will be declined by 49%
- Maize production will be declined by 19% (Nelson et al. , 2009)

On the other end, Climate change has become one of the trending issues around the world, including Sri Lanka. According to the Department of Census and Statistics (2004), 71% of Sri Lanka's agricultural land holdings are smaller than one hectare, and 66% of cropland is rain-fed,

making it more subject to the effects of climate variability and extremes. The effects of the drought and delayed monsoon rains on the production of the two main crops, paddy and tea, in 2009 restrained the expansion of the agricultural sector (Central Bank of Sri Lanka, 2010). In Sri Lanka, there was 40% of paddy production decline due to the drought condition in 2016 and in 2017, 229,560 households were insecure because of the heavy rains, furthermore statically it is predicted 6.5% of yield reduction in 2030 (De Costa, 2008; Seo, Mendelsohn and Munasinghe, 2005; National Adaptation Plan, 2016; United Nations Development Programme UNDP, 2016). Rainfall is projected to increase by 48% for the Southwest Monsoon by 2050 affects the wetter southern part of the country (WHO, 2015) and further Rainfall is projected to decrease by 27–29% for the Northeast Monsoon by 2050 the wet zone is expected to become wetter and the dry zone drier with climate change (WHO, 2015).

2.3 Local Traditional knowledge can be related to promote ecotourism practices within world heritage sites.

Traditional knowledge is the mature, long –standing traditional practices, knowledge and wisdom of local communities and indigenous people of a region. Indigenous knowledge, Local knowledge, civilization knowledge are the terms which similar to traditional knowledge (Ranasinghe, 1948). Traditional knowledge always contributes to the sustainable development of a country or a region.

New investigations have proven that traditional farming practices are more vulnerable to climate change. If traditional farming is more adopted few seasons it could be tolerate drought conditions, reduce soil salinity, and improve soil P, K and matter and some physical properties. Traditional farming practices involved decreasing cost of production while labour and capital productivity increased.(Dharmasena, 2012)

Traditional knowledge is vanished in present society due to the nature of spreading through word by mouth from generation to generation. (Ranasinghe, 1948) could be conserve in several ways such as identification, documentation, research, preservation, protection, promotion, enhancement, transmission(by formal or non-formal education).(Silva, 2014)

2.4 Tank Cascade system

The Sri Lankan farming system, the “ellanga gammana” or Cascaded Tank-Village system within the Dry Zone was selected as a globally vital Agricultural Heritage System (GIAHS) by the Food

and Agriculture Organization of the United Nations (FAO, 2017). ‘A ‘cascade’ is a connected series of tanks organized within a micro-(or meso-) catment of the dry zone landscape, storing, conveying and utilizing water from an ephemeral rivulet’.(Madduma Bandara 1985)

The tank cascade system involved in three folds to enhance food and nutrition security as follow ;(1) Gangoda (2) Chena (3) Welyaya (Harischandra, 2018). The village tanks host a remarkable heritage of agro-biodiversity and wild diversity and represent a unique buffer against natural disasters and global climate change. the worldwide significance of this system is high thanks to the sensible answer it provides to soak up shocks of natural disasters like floods which may be controlled by storing water, and drought by reducing the water loss from tanks thanks to existence of the encompassing scheme. The Cascaded Tank-Village System conjointly contributes to economical water management with water from one tank flowing to a different, through a network of tanks and streams. (WFP, 2018)

CHAPTER 3

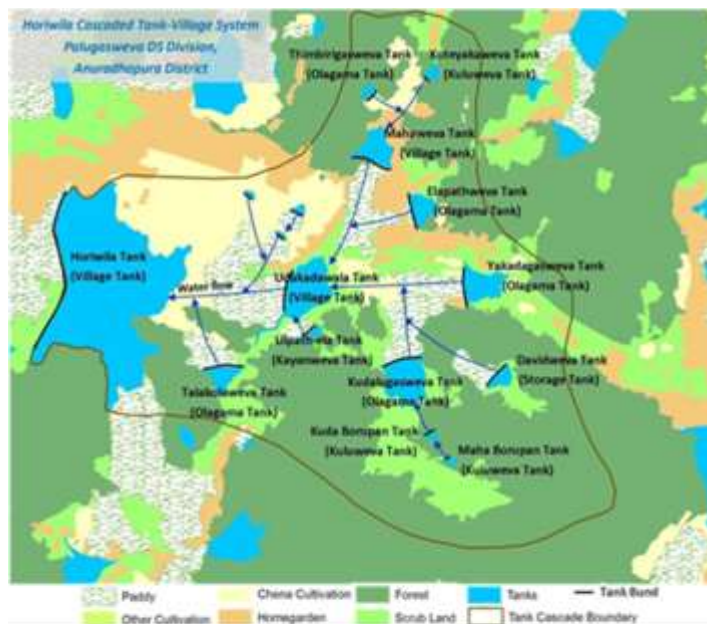
METHODOLOGY

3.1.1 Introduction

A sample of 120 farmers was randomly selected to conduct the study. The six tanks were randomly selected from the cascade based on three criteria as top middle and bottom of the cascade.

Data analysis was conducted with descriptive data analysis and multiple linear regression analysis.

Map of Palugaswewa cascade system



Palugaswewa cascade system

Figure 6: Location of the study

(Source: FAO, 2017)

3.1.2 Study Area

The *Palugaswewa* Divisional Secretariat area with 12 Cascaded Tank-Village Systems is located in the Anuradhapura District of Sri Lanka. The site falls within the agro-ecological zone DL1b, which is characterized by undulating terrain and bimodal rainfall pattern with 75 percent expectancy annual rainfall of about 900 mm. (FAO, 2018).

3.1.3 Study Population and Unit of Analysis

The population of the study comprised of households who were engaging in the farming practices based on the Palugaswewa tank cascade system. The unit of analysis was the individual farmers engage in the food production.

3.1.4 Sampling Method and Sample Size

Sampling is done by purposely within cascade from upper lower and middle part of the cascade as below, Purposely 20 households would be interviewed using a questionnaires from one village tank and totally 120 households would be interview to collect data.

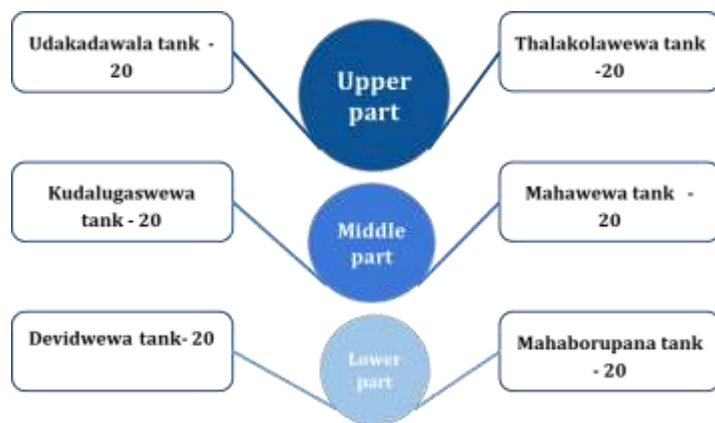


Figure 3.2: sampling method

3.1.5 Collection of Data

Primary data was mainly collected through a pre-tested structured questionnaire and four key personnel interviews were also employed.

3.1.6 Household Survey

Primary data is mainly collected through field survey. A pre-tested questionnaire is used as data collection tool.

3.1.7 Key Personal Interview (KPI)

Ten key personal interviews will be conducted 10 stake holders in the Palugaswewa tank cascade system to collect the information about the policy gap and preference towards the ecotourism practices.

3.2 Data Analysis

The study is carried out both qualitative and quantitative data.

- 1st objective ; To examine the community preference towards the eco-tourism project within the, Palugaswewa cascade system, Anuradhapura of Sri Lanka ; Descriptive statistics
- 2nd objective ; To assess the factors that determines the adoption of eco-tourism as a source of income diversification ; Probit regression will be used
- 3rd objective ; To find out the challenges, opportunities and policy gap when developing ecotourism operations in the agriculture sector in Palugaswewa tank cascade system; Key informant discussions - 10 stakeholders will be used to achieve objective
- 4th objective; to propose set of recommendation to the development of resilient ecotourism practices in world heritage sites

3.2.1 Probit regression Model

$\Pr (Y=1 | X) = \Phi(X_1 \beta_1 + X_2 \beta_2 + X_3 \beta_3 + X_4 \beta_4)$ Where;

Y - Probability of practicing eco-tourism

X1 - Land productivity

X3- Labour productivity

X4 - Profit from agriculture production/yield

CHAPTER 4

TIMELINE

Activity	Time Period 2023																															
	February				March				April				May				June				July				August				September			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Problem Identification																																
Review of literature and Development of conceptual framework																																
Development of Methodology and Data Collection method																																
Proposal Presentation/Pr oposal Report																																
Questionnaire preparation																																
Data collection																																
Data Analysis																																
Thesis preparation																																
Abstract submission																																
Final presentation and thesis submission																																

CHAPTER 5

REFERENCES

- Agyeman, Yaw. (2019). Ecotourism as an Adaptation Strategy for Mitigating Climate Change Impacts on Local Communities Around Protected Areas in Ghana. 10.1007/978-3-319-71025-9_159-1.
- Bandara, S., Ignaciuk, S., Hewage, A., Kwon, J., Munaweera, T., Scognamillo, A. & Sitko, N. (2021). The challenge of making climate adaptation profitable for farmers: evidence from Sri Lanka's rice sector. FAO Agricultural Development Economics Working Paper 21-01. Rome, FAO.<https://doi.org/10.4060/cb3384en>
- Coslet C, Goodbody S, Guccione C (2017) Special report: FAO/WFP crop and food security assessment mission to Sri Lanka. FAO and WFP, Rome, Italy
- Department of Census and Statistics (2023). Department of Census and Statistics. [online] www.statistics.gov.lk. Available at: <http://www.statistics.gov.lk/Agriculture/StaticInformation/rubpaddy>.
- FAO (2016). A PROPOSAL FOR DECLARATION AS A GIAHS THE CASCADED TANK-VILLAGE SYSTEM (CTVS) IN THE DRY ZONE OF SRI LANKA MINISTRY OF AGRICULTURE AND FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, SRI LANKA. [online] Available at: <https://www.fao.org/3/bp892e/bp892e.pdf> [Accessed 2 Mar. 2023].
- FAO (2016b). MINISTRY OF AGRICULTURE AND FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS THE CASCADED TANK-VILLAGE SYSTEM (CTVS) OF THE DRY ZONE OF SRI LANKA. [Online] Available at: <https://www.fao.org/3/bp893e/bp893e.pdf> [Accessed 4 Mar. 2023].
- FAO (2018). The future of food and agriculture – Alternative pathways to 2050. Summary version. Rome. 60 pp. Licence: CC BY-NC-SA 3.0 IGO.
- FAO (2018a). FAO in Sri Lanka | www.fao.org. Available at: <https://www.fao.org/srilanka/fao-in-sri-lanka/ru/> [Accessed 28 Feb. 2023].
- FAO (2018b). THE STATE OF BUILDING CLIMATE RESILIENCE FOR FOOD SECURITY AND NUTRITION. [online] Available at: <https://www.fao.org/3/I9553EN/i9553en.pdf#page=84> [Accessed 4 Mar. 2023].
- FAO (2020). “FAOSTAT: Data.” <http://www.fao.org/faostat/en/#data>.
- Galagedara, Lakshman & Mowjood, M.I.M & Vidanage, Shamen. (2018). Village tank cascade systems as an adaptation strategy for climate change and agricultural sustainability. 10.13140/RG.2.2.16662.98882.
- Harischandra, K. (2018). A holistic approach to ensure food security through cascade system development in the dry zone of Sri Lanka: a practice from Plan Sri Lanka. [online] AGRIS: International Information System for the Agricultural Science and Technology. Available at: <http://agris.fao.org/agris-search/search.do?recordID=QL2012002247> [Accessed 18 Jan. 2023].
- HOWARD BURDITT and Cline, W.R. (2008). Getting hotter. [online] Available at: <https://www.imf.org/external/pubs/ft/fandd/2008/03/pdf/cline.pdf>.

- Madduma Bandara C.M. (1985) Catchment Ecosystems and Village Tank Cascades in the Dry Zone of Sri Lanka: A Time-Tested System of Land and Water Management; in
- Strategies for River Basin Management (Eds. Lundqvist, J. et.al.) Linköping, Sweden.
- NOAA National Centers for Environmental Information, Monthly Global Climate Report (2022), published online January 2023, retrieved on March 3, 2023 from <https://www.ncei.noaa.gov/access/monitoring/monthly-report/global/202213>.
- Paul 2015, PB150529 Impact of Climate Change on Food Production.
- Santarém, F., Saarinen, J. and Brito, J.C. (2020). Desert Conservation and Management: Ecotourism. [online] ScienceDirect. Available at: <https://www.sciencedirect.com/science/article/pii/B9780124095489118275>.
- Saqib, S. e, Ahmad, M.M., Panezai, S. and Ali, U. (2016). Factors influencing farmers' adoption of agricultural credit as a risk management strategy: The case of Pakistan. International Journal of Disaster Risk Reduction, [online] 17(Volume 17), pp.67–76. doi:<https://doi.org/10.1016/j.ijdr.2016.03.008>.
- Searchinger, T., R. Waite, C. Hanson, and J. Ranganathan. (2019). Creating a Sustainable Food Future: A Menu of Solutions to Feed Nearly 10 Billion People by 2050. Final report. World Resources Report. Washington, DC: World Resources Institute. <https://www.wri.org/publication/creating-sustainable-food-future>.
- TIES (2015), TIES Announces Ecotourism Principles Revision, The International Ecotourism Society.
- United Nations (2015) Transforming our world: the 2030 Agenda for Sustainable Development. Available at: <https://sustainabledevelopment.un.org/post2015/transformingourworld> (accessed 10 January 2023).
- United Nations (2022). *The Sustainable Development Goals Report 2022*. [online] United Nations. Available at: <https://unstats.un.org/sdgs/report/2022/The-Sustainable-Development-Goals-Report-2022.pdf>.
- United Nations (2022). *What is Climate Change?* [Online] United Nations. Available at: <https://www.un.org/en/climatechange/what-is-climate-change>.
- Wfp.org. (2018). Sri Lanka: National Strategic Review of Food Security and Nutrition - Towards Zero Hunger | WFP | United Nations World Food Programme - Fighting Hunger Worldwide. [online] Available at: https://www.wfp.org/Sri_Lanka_Food_Security_Review [Accessed 18 Nov. 2018].
- World Meteorological Organization (2021). *Weather-related disasters increase over past 50 years, causing more damage but fewer deaths*. [online] World Meteorological Organization. Available at: <https://public.wmo.int/en/media/press-release/weather-related-disasters-increase-over-past-50-years-causing-more-damage-fewer>.
- World, E. (2020). *Make Your Travel More Sustainable by Visiting UNESCO World Heritage Sites*. [online] Ecotourism World. Available at: <https://ecotourism-world.com/make-your-travel-more-sustainable-by-visiting-unesco-world-heritage-sites/> [Accessed 17 Apr. 2023].
- WRI (2014). Climate Watch (CAIT): Country Greenhouse Gas Emissions Data. [online] World Resources Institute. Available at: <https://www.wri.org/data/climate-watch-cait-country-greenhouse-gas-emissions-data>.