Using Photovoice to Understand Change in Forest Homegardens: A Study in Kandy District, Sri Lanka

by

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ABSTRACT

USING PHOTOVOICE TO UNDERSTAND CHANGE IN FOREST HOMEGARDENS: A STUDY IN KANDY DISTRICT, SRI LANKA

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Homegardens are an ancient agroforestry practice that continues today to provide food and other resources, although they face immense socio-economic and environmental pressures. This study used the photovoice method to understand the local perspective of socio-ecological change in homegardens in Kandy, Sri Lanka. Photovoice is a method that invites participants to take photographs in response to the research topic. This method allowed the participants to teach and share their knowledge with each other, as well as others such as agricultural scientists, by disseminating the research through a local photography exhibit. The findings of this study suggest that rich knowledge can be revealed through photovoice, and this information helps draw attention to how homegardeners adapt to change in order to support their lives. This study concludes that local homegardeners have generations of experience adapting to changing socio-ecological conditions, yet their insights have seldom been included in research and policy development.
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CHAPTER ONE: INTRODUCTION TO THE STUDY

“For us, the homegarden and our life is not a separate thing. It is all connected. The homegarden is a part of our entire lives”

– Participant 19, During the Introductory Workshop

INTRODUCTION

Homegardens are diverse, smallholder agroforestry land-use systems that have endured the test of time. They have been practiced by rural communities over centuries and are considered one of the oldest agricultural systems after shifting cultivation (Kumar and Nair, 2006; Soemarwoto, 1987). Homegardens vary depending on their natural environment and the socio-economic and cultural context they adhere to. Despite this, they can be defined generally as a mixed forest-gardening system planted near the homestead with “intimate, multi-story combinations of various trees and crops, sometimes in association with domestic animals” (Kumar and Nair, 2004). Adding to this, other authors describe homegardens as systems that resemble the structure of a natural forest, with a diverse array of species that are needed to fulfill the social, economic, and cultural needs of the community (Mohri et al., 2013; Soemarwoto and Christanty, 1985). They are often a source of food, income, fuelwood, timber, fodder, and medicine for a household. Across the globe, homegardens offer a myriad of ecosystem services.

In Sri Lanka, 70% of the rural population owns a homegarden (FAO, 2009). These systems play a vital role in the country’s food security, climate change adaptation, and environmental landscape (Mattsson et al., 2018). The central highland districts of the country are occupied by Kandyan homegardens. What makes the Kandyan homegarden unique from others is its dense canopy, rich species diversity, and its deep embeddedness into the culture, knowledge, history, traditions, and livelihoods of people (Jacob and Alles, 1987; Pushpakumara et al., 2010). In fact, Kandyan homegardens date back at least 2000 years (Hochegger, 1998). The benefits of these land-use systems, as well as other homegardens in Sri Lanka, are widespread and well-known. This is due to the recent advancement in research that has highlighted the homegardens’ capacity to aid in food and nutritional security, as well as climate adaptation, among other services, that scale from local to national realms (Mattsson et al., 2018; Mohri et al., 2018).
BACKGROUND

Section one: Socio-ecological Change in Homegardens

Just because homegardens are considered sustainable, does not mean they are static systems. Homegardens are ever-changing and evolving over time. In more recent years, however, homegardens have undergone intense pressures from rural change and modernization (Landreth and Saito, 2014; Wiersum, 2006). Although research on dynamics in homegardens is limited, the overwhelming forces of these modern trends are very apparent. So much that authors like Kumar and Nair (2004) were compelled to raise the question, “are homegardens becoming extinct?” The greatest threats center around socioeconomic trends such as population growth, urbanization, and commercialization (Kumar and Nair, 2004). Nevertheless, environmental factors are also taking a toll on homegardens such as climate change and more extreme weather patterns (De Zoysa and Inoue, 2014; Mohri et al., 2018). It is important to note that these trends are not unique to Kandyan homegardens but are happening in tropical homegardens across the globe.

Scientists state that the sustainability of homegardens is driven by their rich plant diversity over generations (Abdoellah et al., 2006; Gajaseni and Gajaseni, 1999). However, urbanization and commercialization generally have a negative relationship with plant diversity. These trends are shifting both the structure and function of homegardens (Abdoellah et al., 2006; Wiersum, 2006). For example, urbanization is causing cities to encroach further into rural areas, and the population across the tropics continues to rise (Ricketts and Imhoff, 2003; Wiersum, 2006). In Kandyan homegardens, Mohri (2018) reports that over the last two decades homegardens have become considerably fragmented and there is less land available to grow. Generally, commercialization drives simplification of the garden, as farmers narrow their cultivations to suit market demands. In Java homegardens of Indonesia, Abdoellah et al. (2006) found that commercially-orientated gardens provided an increase in income, but an overall decrease in long-term benefits of the homegarden. Commercialization created more susceptibility to risks, food insecurity, and less social cohesion of the community (Abdoellah et al., 2006). However, contrary to most studies, Korale-Gedara et al., (2015) revealed that commercialization was not having a major impact on plant diversity in the context of Kandyan homegardens. Here, farmers are selling smaller quantities of numerous crops at various times throughout the year. Korale-gerdara et al. (2015) highlights, given the context,
commercialization does not necessarily have to be trade-off to plant diversity. Nevertheless, reports show that Kandyan homegardens are still experiencing considerable species-loss and endangerment (Kadupitiya et al., 2018; Landreth and Saito, 2014).

A few studies have revealed how homegardens are also impacted by environmental factors (Pushpakumara, 2012). Homegardens are facing more extreme and variable weather patterns, including floods and droughts. This was shown in Kandyan homegardens and across other contexts in South Asia (Landreth and Saito, 2014; Mohri et al., 2018; Weerahewa et al., 2012). A recent study by Landreth and Saito (2014) reported that the main drivers of change in Kandyan homegardens were water scarcity issues and an increase in wildlife destruction of crops. Farmers point to macaques, wild boars, and porcupines for destroying plants and forcing them to simplify their homegardens to animal-resilient species. Likewise, unpredictable rainfall and extreme weather patterns are driving simplification to drought-resilient species. The impacts of these adversities are leading to the abandonment of homegardens and paddy fields in the villages (Landreth and Saito 2014).

Abandonment of homegardens is further being perpetuated by a shortage of labour required to work in the garden (Kumar and Nair, 2006; Kuruppu et al., 2015). This is especially due to youth who tend to migrate to cities in search of better employment and education opportunities (Angel-Pérez and Mendoza, 2004). Effects of globalization and acculturation are also evident in homegardens. For example, people’s diets are changing, and they are becoming less dependent on traditional and cultural foods. Formal education is resulting in youth depreciating the traditional and agricultural knowledge of their heritage. Similarly, the practices and knowledge of medicinal plants in the homegarden are being overshadowed due to advances in scientific medicine. Ultimately, researchers note that homegardens are becoming less relevant to modern-day livelihoods (Koohafkan and Altieri, 2017; Kumar and Nair, 2006).

There is some debate among authors about whether changes in homegardens are generally positive or negative (Wiersum, 2006). Certainly, some modern developments have been beneficial to the growth and practice of homegardening such as new technology, improved plant varieties, and better agro-chemicals. This debate mostly resides in differing judgements and interpretations of what sustainability and the structure of homegardens should look like. For instance, authors that consider change as negative, have the perspective that the traditional homegarden systems are breaking down and need to be restored (Parikesit et al., 2005; Wiersum,
2006). On the other hand, other authors view change in homegardens as a process of rural transformation. They are focused on the economic benefits for farmers and integrating homegardens into a modern world (Peyre et al., 2006; Wiersum, 2006).

Regardless, it is difficult to predict the future of homegardens (Kumar and Nair, 2004). They are dynamic socio-ecological systems. Modern rural trends are prevalent and homegardens are changing, however, there is no concrete evidence that homegardens are going extinct (Kumar and Nair 2004). Homegardens are rooted and intertwined in the complexities of their socio-economic, environmental, and cultural conditions. Scientists point to the rich plant diversity of homegardens as the central reason for their sustainability over time, however, it must be recognized that this diversity is not a natural phenomenon, it is man-made. The efforts, knowledge, and practices of local people are the driving forces behind the sustainability of homegardens over generations (Koohafkan and Altieri, 2017; Kumar and Nair, 2006).

Section Two: Study Context

**Sri Lanka**

Sri Lanka is an island nation located in the Indian Ocean. Formerly known as Ceylon, the country changed its name to Sri Lanka in 1972 when it became a republic of the commonwealth. Sri Lanka was colonized by the British from 1815 until they gained independence in 1948. Since this time, the population has nearly tripled to its current estimate of 21.7 million people (World Bank, 2020). There are various ethno-linguistic groups in Sri Lanka, with the majority being Sinhalese and Tamil, however the country is also home to Indian Tamils, Malays, Burghers, and Chinese groups. Buddhism is the primary religion of the population (71%), and also plays a major role in the country’s heritage and history (UN-Secretary General, 2012). Sri Lanka has some history of ethnic and political tension, with the 26-year civil war between the government and the Liberation Tigers of Tamil Eeram ending recently in 2009. The UN reports that approximately 70,000 Tamil civilians lost their lives during this period (UN-Secretary General, 2012). The war also contributed to environmental degradation and heavy deforestation in the northeast districts. In the aftermath, Sri Lanka is working towards and making progress in restoration for both the economy and environment (World Bank, 2020).
Homegardens in Sri Lanka: The Context and Importance

Figure 1 Sri Lanka and the Kandy District

The Sri Lankan economy is founded on agriculture. During colonial rule, agriculture and homegardens across the country were disregarded as primitive, backward, and unproductive systems. In some cases, Pushpakumara (2012) notes that homegardens and various traditional practices were destroyed by colonizers during this time. However, homegardens remained resilient, and following independence they evolved to meet the present day needs of rural people. After independence, new species were introduced and the cultivations of the homegardens shifted to include more ornamental and vegetable crops (2012). Today, homegardens in Sri Lanka are recognized for their widespread benefits and their sustainability as a land-use system.
As the country works towards better food security and minimizing environmental concerns, the development of homegardens are viewed as an effective measure towards these goals (Galhena et al., 2013).

Homegardens play a significant role in not only the livelihoods of people, but the environmental landscape of the country as well. Homegardens cover about 14% of Sri Lanka according to the FAO (2009), however, recent data reported higher coverage of 22% (AgStat, 2018). Homegardens and are mostly found in rural areas, where the majority, 85%, of Sri Lanka’s population resides. Of these households, approximately 70% maintain a homegarden (FAO, 2009). Homegardens are generally owned by a family and passed down over generations. This has created rich local knowledge systems that are embedded into homegarden communities. The garden generally requires little labour which is mostly managed by the respective household; however, it depends on the season and types of species grown. In Kandy, additional labour is sometimes required (Perera and Rajapakse, 1991). There are a wide range of garden sizes, but typically they lie between 0.05 hectares to over 2.5 hectares (Pushpakumara et al., 2010). Homegardens across the country share similarities, however each individual homegarden is unique in its structure and composition (Jacob and Alles, 1987).

The social and environmental benefits stemming from homegardens are broad and immense. The descriptive details of these benefits are beyond the scope of this thesis, for more literature on this see Galhena et al., (2013), Mohri et al., (2018), Pushpakumara et al., (2010). In brief, homegardens in Sri Lanka offer significant potential for building forest cover and connectivity (Lindström et al., 2012). They play a vital role in wood supply of up to 42% for the country (Mohri et al., 2018). They provide a significant amount of carbon storage (Mattsson et al., 2013), reduce soil erosion, and are important for pollination, watershed management, pest control, nutrient cycling, animal habitat, and in situ conservation of biodiversity (Galhena et al., 2013; Pushpakumara et al., 2010). Homegardens contribute to food and nutritional security across urban and rural communities (Mattsson et al., 2018). They also are a source of income, preserve indigenous knowledge, improve gender equality, provide cultural services, and are attractions for ecotourism (Galhena et al., 2013; Pushpakumara, 2012).

**Kandyan Homegardens**

Differing from homegardens in the dry zone and coastal areas of the country, Kandyan homegardens tend to have a thick and closed canopy layer, structural complexity, and rich
biodiversity comparable to natural forests. For this reason, they are sometimes called Kandyan Forest Gardens (Perera and Rajapakse, 1991). They are predominantly situated in the Kandy district with a high population density, wet zone climatic conditions (annual rainfall >2200 mm), and they are characterized by the mountainous terrain and rolling slopes (elevation range of about 500-550m amsl). Average annual maximum, minimum, and mean temperatures are around 28°C, 20°C, and 24.5°C respectively. The topography of the selected villages is relatively flat. Major soil types in the regions are Low Humic Gley soil, Red Yellow Podzolic soil, Mountain Regosol soil, and Lithosol soils (Mapa et al. 1999; Agro-ecological Regions of Sri Lanka 2003). Kandyan homegardens are usually accompanied by other land-uses such as paddy field farming and tea plantations, while also next to natural forest. Together, the landscape surrounding homegardens forms a distinct mosaic (Pushpakumara et al. 2010). The homegarden is usually made up of tall timber trees in the top canopy layer, followed by fruit, ornamental, and/or spice trees in the layers below. Vines spread throughout the garden as well, such as pepper (*Piper nigrum*) that climb *Gliricidia* trees (*Gliricidia sepium*). In the lower strata, vegetables, tubers, and various medicinal plants cover the ground (See Figure 2). For a list of common species found in Kandyan Homegardens see Perera and Rajapakse (1991) and Kadupitiya et al., (2018). For a list of species that were identified and accounted for in this study, see Appendix I.

**Figure 2** A typical Kandyan Homegarden, key to image: a: road, b: ornamental and fruit trees, c: pathway, d: ornamental shrubs, e: cleared patch, f: house, g: vegetable plants and annual spices, h: shrubs, hedges and live fencing delineating front and side boundary, i: fruit trees, j: tall timber, coconut, and spice trees.

**Homegardens in Sri Lankan Policy**

As homegardens have been recognized for their substantial ecosystem services and benefits to the country, the Sri Lankan government has implemented a few initiatives to promote and sustain homegarding. In 2007, the “Api Wawamu Rata Nagumu” meaning “let us grow and uplift the nation” program was launched and included seed dispersal and agricultural training in villages for farmers. More recently, “Divi Neguma”, meaning “livelihood development” begun and aims to create 2.5 million homegardens in Sri Lanka. The goal is to increase vegetable production and intake to meet nutritional needs across the country. Other initiatives include the Food Production National Program, which incorporates homegardens as an aid to increase food security and income, and the UN-REDD initiative in Sri Lanka, where homegardens are recognized for their ability to adapt to climate change and to act as a buffer to forests (Landreth and Saito, 2014; Mattsson et al., 2018).

However, some initiatives have been criticized by authors. According to Landreth and Saito (2014), the “Api Wawamu Rata Nagumu” program did not meet local priorities in the homegarden villages. They report that despite the benefits of the initiative, many homegardens experienced an overall loss of ecosystem services during this time due to wild animal obstructions and extreme weather patterns, such as droughts. Due to these issues not being addressed, the overall program lacked effectiveness. It was also criticized as not “culturally suitable” since the distributed seeds did not meet local food preferences, and consequently, there was low uptake of the program (Landreth and Saito, 2014).

**PROBLEM STATEMENT**

In the wake of a global food crisis and a climate crisis on the rise, the world is searching for answers to better food production and more sustainable livelihoods (Koohafkan and Altieri, 2017). The homegarden concept and the desire to be self-sufficient and connected to food systems has resurfaced (Burgin, 2018; Koohafkan and Altieri, 2017; Kumar and Nair, 2004). As one example, ‘victory gardens’ have become part of discourse during the Covid-19 pandemic. Torquebiau (1992) refers to homegardens, as an “enigma of sustainability”. The longevity of homegardens as a reliable local strategy, proves the adaptability of the homegarden, making it an exceptional strategy for contemporary agricultural development (Koohafkan and Altieri, 2017; Kumar and Nair, 2006). Moreover, many authors in Sri Lanka reveal that homegardens offer a promising approach to achieving multiple Sustainable Development Goals (Mattsson et al.,
2018; Mbow et al., 2014; Weerahewa et al., 2012).

However, just because homegardens have existed over centuries, does not mean they have been resistant to change. Authors note that it is the local knowledge and practices of communities that have allowed homegardens to adapt over generations (Kumar and Nair, 2004; Mbow et al., 2014). Today, there is some question as to whether homegardens are on the verge of extinction (Kumar and Nair, 2004). Across the tropics, homegardens face many harsh constraints due to demographic pressures, land fragmentation, and trends in modernization such as commercially-orientated gardens (Abdoellah et al., 2006; Mohri et al., 2013; Wiersum, 2006). There is a lack of understanding on these dynamics, but even more-so, there is a lack of research from the local perspectives and their knowledge of change (Pushpakumara, 2012; Wiersum, 2006). This is critical, as local farmers are the foundation of homegardens’ existence and adaptability.

This thesis presents socio-ecological change in Kandyan homegardens from the lens of 24 local homegardener participants. This study is of exploratory nature, where the participants shared their lived experiences and knowledge of change in homegardens through photography and story-telling. This was done through a modified version of the ‘photovoice’ method. The following research questions were examined in this study:

1. Through the local perspective, how have Kandyan homegardens changed over time, both socially and environmentally?
2. What changes are considered beneficial and what changes are considered negative for their homegardens?
3. What issues do Kandyan homegarden owners face today?
4. How are these issues currently being addressed?
5. What would local caretakers like to teach others about their homegarden (for e.g. youth, agricultural extension workers, policymakers, researchers, and/or fellow homegardener, etc.)?

RESEARCH GOAL AND OBJECTIVES

The goal of this research is to explore the local experiences and perspectives of socio-ecological change in Kandyan Homegardens, to ultimately reveal and understand local knowledge that can contribute towards the sustainability of these systems for the future.
The following three objectives were developed to address the research goal:

1. To provide a visual analysis of local experiences and perspectives on how homegardens have changed over time.
2. To provide a visual analysis of the current situation and key issues homegardeners face today.
3. To create the opportunity for homegardeners to reflect, share, and teach their knowledge and experiences in Kandyan homegardens.

OVERVIEW OF THESIS

This dissertation is structured by five chapters. The first chapter defines the homegarden and introduces its relevance in Sri Lanka. It continues with a background review on socio-ecological change in homegardens, the study context, and a description of the Kandyan homegarden.

Chapter Two outlines the theories that form the framework for this study. It identifies the researcher’s standpoint in the study and defines the photovoice method. The chapter closes with an introduction to the stages of the photovoice project.

This thesis was prepared as two publishable research articles. The first article in Chapter 3 focuses on the objectives 1 and 2 and the first three research questions, which relate to analyzing the socio-ecological changes and issues in homegardens from a local, visual perspective. It presents findings through photographs and narratives of the changes and issues that participants are experiencing in their Kandyan homegardens. This paper also highlights the value of the photovoice method for agroforestry systems research.

The fourth chapter, or second journal article, focuses on the third objective of this research, and aims to answer the final research question. It examines local knowledge and presents findings on what the participants would like to teach others about their homegardens. This article argues the need for local knowledge and local voices to be effectively included in research and policy pertinent to homegardens.

Chapter Five of this dissertation provides a final summary for the research. It discusses the limitations and overall conclusions of the study. This chapter highlights the contributions of this research to the field of knowledge, as well as possible policy recommendations. It also
presents recommendations for future researchers who are interested in using the photovoice method, and for future studies on Kandyan homegardens.
CHAPTER TWO: THEORETICAL FRAMEWORK AND METHODOLOGY

THEORETICAL FRAMEWORK

Guided by the work of other scholars, this study views local knowledge not only as a resource, but as a growing body of knowledge that should be studied in action (Murdoch and Clark, 1994; Van Herzele and Van Woerkum, 2008). This study aims to not only reveal local knowledge, but to provide the opportunity for participants to reflect, produce, and teach their expertise. Thus, this research project is viewed as more than a method of collecting information; it is a learning process and a collaboration with Kandyan homegarderners to work towards environmental justice and knowledge equality.

Through this lens, this study evidently applies social learning theory, as the research is a process of learning through engagement and sharing knowledge with others. To promote and facilitate learning, this study is guided by two other key theoretical concepts. It leans on the work of visual sociology, as an enabler and process for sharing, especially as it applies to tacit and alternative forms of knowledge. Finally, this research is guided by participatory communication theory, as it is an opportunity to give marginalized peoples’ knowledge and voice agency and equity in research. It is the combination of these theories, and the relationships between them, that creates the theoretical framework for this study (Figure 3). These three theories are further explained below.

![Diagram of Theoretical Framework](image)

**Figure 3** Theoretical Framework. Source: Author
Social Learning Theory

Simply put, social learning theory is the concept that people learn through social engagements and are influenced by others. This happens through observing, interacting, or deliberating with other peoples’ perspectives, attitudes, behaviours, and experiences (Bandura, 1977). Drawing from Petheram et al., 2011 and Schusler et al., 2003, who discuss social learning within the context of natural resource management, this research adopts the idea that social learning is learning that happens when people share individual experiences and perspectives with each other and engage to form a collective understanding around a topic, such as homegardens. Through reflection and deliberation on their own experiences, and understanding others’ perspectives and experiences, learning opportunities are created. This can generate new knowledge, which in turn, can be used for collaborative action (Schusler et al., 2003). Social learning is understood as a natural phenomenon, but in research, it can be facilitated through specific methods to strengthen the occurrence and depth of learning (Leeuwis et al., 2004). In this study, the photovoice method, and its iterative sequence of steps were viewed as processes of social learning. Moreover, the ability to share and act out one’s knowledge was further enabled through the use of visual and participatory methods.

Triple Loop Learning

To understand the depth of reflection and learning by participants on their homegardens, this study was guided by a modified framework of triple loop learning. The theory was formed through the work of Argyris and Schön on organisational behaviour (1978), and has since been adapted to a range of different praxis. The first ‘single loop’ of learning involves changing of actions or behaviours to make improvements. The ‘double loop’ of learning goes beyond the single-loop by questioning assumptions and patterns. It is here that people become observers of themselves and challenge their underlying beliefs. Finally, the ‘triple-loop’ involves the questioning of one’s context and values, and creates a shift or reconstruction of one’s perspectives (Foldy and Douglas Creed, 1999). Groot and Maarleveld state that this process of learning can lead to “…a deeper understanding about how complex issues work and why. It improves people’s capacity to make sense of and adapt to an ever-changing world” (2000:4).
Participatory Communication Theory

The main idea of participatory communication theory is the need for ‘two-way’ dialogue between all relevant stakeholders in a project. It is a grass-roots, decolonizing approach to development that aims for equal and empowering participation. This theory surpasses the linear, top-down communication model which historically excluded marginalized communities (Tufte, 2017; Tufte and Mefalopulos, 2009). In a model of traditional linear communication institutions and researchers are positioned to be the message ‘senders’, and citizens to be the ‘audiences’ of information (Cornish and Dunn, 2009). Research that applies participatory communication theory is a collaborative process. This requires the researcher to not solely be responsible for producing and disseminating knowledge extracted from the study. Instead, the research participants are directly involved and take control over decision-making, data collection, and dissemination (Tufte, 2017). In this way, the use and process of participatory communication aims to close the gap between the researcher and the researched (Cornish and Dunn, 2009).

Tufte and Mefalopulos outline the 4 fundamental principles of participatory communication: dialogue, voice, liberating pedagogy, and action-reflection-action (2009). The principle of dialogue is defined as free and open discussion, meaning people who have traditionally been “denied their right to speak, must first reclaim this right” (2009). ‘Voice’ within participatory communication is about breaking down power relations and giving voice to marginalized groups. Tufte and Mefalopulos explain that this includes providing time and space for people to articulate their thoughts, define their own problems, discuss them, and form their own solutions (2009). The third principle is liberating pedagogy, which is derived from Paulo Freire’s critical pedagogy (1970). Here, the researcher becomes a facilitator of discussion among participants, and is not the one to offer solutions. This creates more space for open dialogue and co-production of knowledge. Lastly, ‘action-reflection-action’ involves the community building knowledge and reflecting on their own local issues, which they then take further action and raise awareness on the knowledge produced. Essential to success of these key principles is the formation of mutual trust and respect between the community and researchers (Tufte and Mefalopulos, 2009). Through a participatory process, the communities have a greater sense of ownership and commitment to problems and solutions identified.

Participatory communication theory is more interested in the process rather than the products of research. It is about the acts of participation, continuous dialogue, listening, co-
learning, and co-production of knowledge. Cornish and Dunn (2009) and Tufte (2017) state that participatory communication has the ability to reveal local knowledge, which is often overlooked or disregarded. It values non-textual forms of expression and views local expertise as a legitimate and important source of knowledge. In this study, the method of photovoice was used to facilitate participant-led research and knowledge transfer through visual tools.

**Visual Sociology**

Visual sociology is the idea that learning and knowledge construction can be acquired through visual forms (Rose, 2016). As Spencer (2011) states, “we are visual beings in a world which is a visual array of meaning”. It is grounded in the idea that significant information can come from analyzing different visual manifestations in a culture, society, or community (Banks, 2007). In research, visual sociologists recognize images as valid and important sources for studying social realities (Zuev and Krase, 2017). Emmison and Smith (2000) argue that images can be used to store, preserve, and represent information unlike any other data form. In this way, photographs should be seen as equivalent data sources to any traditional method of capturing information, such as interview responses or code-sheets. Visuals can also defy the barriers of language and connect understanding between the researcher and participants (Emmison and Smith, 2000).

An image itself does not stand alone as data but is dependent on sociological theory (Zuev and Krase, 2017). It is only through a theoretical framework that ‘content’ in the photograph can become ‘data’ for analysis (Emmison and Smith, 2000). How an image is interpreted, discussed, and expressed pertains to its sociocultural and socioenvironmental context. In this sense, how someone ‘sees’ an image is not merely biological, but is more-so a socially and culturally constructed process (Spencer, 2011). In this research, the participants’ photographs were not interpreted by the researcher, but only became sources of data through the narrative of the participant. The purpose of the photographs was to use the visual as a means of eliciting deeper reflection and knowledge, especially tacit knowledge that can be better expressed through visual outputs than written text (Thompson and Scoones, 1994). In this study, the ownership over data collection is more-so in the photographer’s (the participant’s) hands, and the researcher is a listener to the story that the photograph portrays (Wright et al., 2016).
METHODOLOGY

Researchers Positionality Statement

The research presented in this dissertation is not my own, but the product of a shared space between myself, the participants, and the research assistants at the University of Peradeniya. I feel very fortunate to have been a part of this study. The participants dedicated their time, work, and creativity. They produced the entirety of the data through their knowledge and experiences of homegardens. In this way, although I was the initiator and facilitator of this project, one of my main roles was to listen and learn. I sought to make this research as collaborative as possible, and to create a space for homegardeners to share their expertise, given the time and resources available. During the project, some participants thanked me for being “the messenger” of their knowledge. I felt honored to be given this title, and I did my best to navigate this role with care, reflexivity, and an open mindset.

In a study such as this, where I am presenting the stories and images of others, it is important to give readers a better sense of who I am and what I bring to this project. To start, I am an outsider to this research community. I am a Canadian-born person of Dutch descent who grew up in the Greater Toronto Area. Conducting this research was my first time travelling to Sri Lanka. My interest and pursuit towards studying Kandyan homegardens, and the local knowledge embedded in them, grew out of my past experiences and passions built over time.

Over the past 10 years, I tailored my education and work opportunities to better understand the complexities of rural poverty and social justice issues. While in school, I became interested in agroforestry systems as a holistic approach to building capacity for small-scale farmers. Agroforestry in relation to rural development blends my interests of social sciences and environmental sustainability. In 2016, I had the opportunity to work on an agroforestry project in rural Uganda over 7 months. It was here that I first gained research experience through interviewing small-scale farmers, and I became captivated with rural people’s connections to their environment and community. I learned that understanding these connections is the foundation for sustainable change.

Moreover, one of my most rewarding learning opportunities was working alongside my Ugandan co-workers and building relationships with people who did not share my language or culture. One of the ways we got to know each other was through sharing and taking photographs. I used my camera as a tool to develop trust by allowing my co-workers to take it home to their
families. Through this opportunity, as well as others back in Canada (such as facilitating a community mural with people in poverty), I experienced how visuals and art can form deep connections despite apparent differences. When I learned about the photovoice method in my graduate courses, I was immediately drawn to its visual and participatory approach to research.

As a non-Sri Lankan person and “outsider” to this research community, I put considerable effort into learning about the history, traditions, and culture of Sri Lanka prior to departure. Upon arrival, I spent time immersing myself as much as possible into Sri Lankan life through my host “family”, RA’s, and visits to homegarden villages. I relied on the “insider” status of my RA’s to gain legitimacy with the participants and foster relationships of trust during the study. Nevertheless, working on this project as an outsider was very challenging at times. Navigating the cultural and language barriers between myself, the participants, and the RA’s was one of my greatest hurdles. It was something I had to constantly work through and in general, it limited my ability to connect with people given the short time-frame of the project.

Throughout the study, I questioned whether or not it was appropriate for me to be the one conducting and presenting this research. As someone who has studied social justice issues, I recognize the fragility of development work that can be influenced through power inequalities, white privilege, and other similar factors. I came to learn that there are some positives to being an outsider, and in the context of this study, I was not taking this position from a local person. As a positive, I did not have any conflicts of interest and I had less preconceptions of what research on homegardens ‘should’ look like. Further, during my stay in Sri Lanka, many students expressed indifference in researching homegardens as they are so “familiar” and “typical” for them. As an outsider, I brought a lot of enthusiasm and curiosity to this study as homegardening is not a common practice in Canada.

I see this project as a meaningful learning opportunity in my life. There is no doubt that participatory and visual research, especially when conducted in another language, is a very time-consuming endeavour. It took considerable effort to translate the data, disseminate the results as a photography exhibit, and sort through one thousand photographs for analysis. Despite the challenges, this study was an extremely rewarding experience. By being welcomed into each participant’s homegarden, I felt that I gained an insider view into their life’s work and the generations of history and knowledge that comes with it. As this thesis will unfold, I was able to
share this knowledge through the participant’s photographs and stories, revealing their deep connection to their environment.

**Epistemology**

This section provides a foundation of the perspectives that frame this dissertation. The first is the theory of constructivism (Bodner, 1986). Constructivism is grounded in the idea that there is no objective form of knowledge or universal truth. Instead, each individual has their own sense of ‘reality’ and is unique in their understanding of the world (Burr, 1995; Creswell and Poth, 2017). Extending from this epistemological perspective is social constructivism. In a basic sense, this theory suggests that an individual’s knowledge of reality is continually constructed and reconstructed through social relationships and interactions with others, all of which hold their own personal assumptions and experiences of the world (Burr, 1995). Moon and Blackman (2014) state that, “how an individual engages with and understands their world is based on their cultural, historical, and social perspectives…” (p.117). Therefore, it is important to address how people construct meanings and realities in research, and consider the cultural, social, and environmental context of participants. It is also necessary to acknowledge that as an outsider relative to the community this research is situated in, I have a different constructed meaning of homegardens. Through a constructivist lens, and as a social scientist, I am more interested in understanding homegardens and the multiple experiences within them, rather than explaining what a homegarden is. For these reasons, this study used the method of photovoice, as it allows participants to voice their own knowledge and meanings of homegardens. This provides the researcher with the opportunity to then understand homegardens through another’s lens (Wang and Burris, 1997).

The second epistemological perspective that frames this research is reflexivity. There are many definitions of reflexivity, but they all encompass the idea of self-awareness, thoughtfulness, and consciousness of one’s actions and influences throughout the research project. In other words, Finlay (2002) defines reflexivity as the, “immediate, continuing, dynamic, and subjective self-awareness”. Reflexivity differentiates from reflection, as reflection is a removed thought process that looks back on an event after it has taken place. In contrast, reflexivity is the on-going, in-the-moment recognizing and evaluating of one’s actions and influence over the course of the research (Finlay, 2002). Through a social constructivist lens, a reflexive perspective acknowledges that the results of the study are influenced by the relationship
between the researcher and participants, as well as the context. Reflexivity acknowledges that it is critical to communicate the role of the researcher to readers, in order to more accurately understand the results of the study, as well as increase the transparency and integrity of the research (Finlay, 2002).

**Research Community Selection**

Kandy District, Sri Lanka was chosen for the research project as Kandyan homegardens have existed over centuries and are especially rich in biodiversity relative to other homegardens. Further, there is a gap in literature on local knowledge and perspectives of change in Kandyan homegardens (Landreth and Saito, 2014; Pushpakumara, 2012). The villages of Elladetta, Petiyagoda, and Lankatikalaka were chosen through guidance from staff members and research assistants at the University of Peradeniya. Elladetta and Petiyagoda are 2km apart, while Lankatikalaka is 5-7km north of these villages. The villages are approximately 15km from Kandy and rely on homegardening to various degrees for their livelihoods. The researcher relied on the insider status of the research assistants to gain legitimacy in the villages.

**Research Assistants**

Through guidance from staff members and faculty at the University of Peradeniya, two RA’s were employed by the researcher at the beginning of the photovoice project. The first was a male in his 30’s who had completed his doctoral degree and was working at the university. He had extensive experience conducting research and interviewing in rural communities in Sri Lanka. The second RA was a female who was finishing her last year of secondary school. Due to external factors, both RA’s were not entirely available over the course of the project, and thus three more RA’s were employed to fill these gaps. Of these three RA’s, two were males who had completed masters and/or doctorate degrees at the University of Peradeniya, and both had extensive experience with research in the agricultural field. The other RA was female and finishing her undergraduate degree in science.

Each RA received photovoice training and signed confidentiality agreements (Appendix VII) prior to starting work. The confidentiality agreement discussed the need to ensure the privacy of participants and all data collected. Each RA could speak Sinhala and English and provided translation throughout the project. Depending on their availability, the RA’s participated in the informational workshop, the semi-structured interviews, the group
discussions, the typing of photography captions, and/or the photography exhibit. The RA’s were essential to the success of the photovoice project, especially as the main researcher could not speak Sinhala. They also provided extensive guidance and support throughout the project, providing insights and context to rural life in Kandy district.

METHODS

Introduction

Before moving forward any further with this dissertation, it is important to define the method of photovoice, as it is a less-known research method and is key to the foundations and approach of this project. Therefore, in this section, we provide a brief overview and introduction of photovoice and its use in literature. We describe the underpinning theories that shape this method and discuss how photovoice was modified for this study. In an effort to avoid repetitiveness, please refer to the research articles presented in Chapter 3 and 4 for a more in-depth explanation of photovoice, including the benefits and limitations of this method.

Photovoice

Photovoice is a methodology that is exploratory and participatory in nature. As the name details, it is a method that combines both photography and voice as a way of collecting data in order to understand a phenomenon (Wang and Burris, 1997). The photovoice method is unique as participants are each given a camera and are in control of the data collection and analysis process. The participants take photographs in response to the research topic and share their meaning with the group. In this way, the participants define what is important to share in the study. Moreover, photovoice roots the data in the knowledge and lived experiences of participants (Harris, 2018). The researcher is able to see the world through the lens of the participant and understand the topic from their perspective (Nowell et al., 2006; Quigley et al., 2014; Wang and Burris, 1997). In this study, photovoice allowed the participants to share their knowledge and daily lived experiences of change in Kandyan homegardens.

Photovoice was developed by Wang and Burris in 1994. The method was shaped through three main theories. The first is Freire’s theory of critical consciousness (1970), where communities are engaged to critically discuss and reflect on structurally embedded issues that are central to their lives. The second is documentary photography, which is based on the principle that visual representation can enable a better understanding of people’s experiences, especially
those who may not have access to photography (Rose, 2016). The last is feminist theory, which
acknowledges marginalized populations that are often left out of research. This theory strives to
include, give-voice to, and empower them in the process, recognizing that they are the experts of
their own lived experiences (Castleden et al., 2008; Wang and Burris, 1997).

**Photovoice as Participatory Action Research**

Participatory Action Research (PAR) is a blend of 4 key components: participation, action, research, and the combination of these to create social change. It is considered a subcategory of ‘action research’, which is defined as collecting and analyzing data with the goal of taking action on the knowledge produced in order to reach transformative change (Macdonald, 2012). Adding ‘participatory’ to ‘action research’ further defines that this approach is meant to be conducted by, and ultimately for, the participants involved, (encompassing the principles from participatory communication theory) (Mackenzie et al., 2012). Liebenberg (2018) suggests that PAR is both a philosophy and methodology that underpins the photovoice method.

Photovoice as PAR is not research “on” a community, but rather “with” a community. This makes it a dynamic approach because it is situational and context-dependent. There is no “how-to” manual as every community is unique and in control of their own process (Elliott, 2011). PAR is a response to traditional, centralized methods that often continue colonial paradigms when conducted with marginalized peoples (Elliott, 2011). In totality, PAR is not necessarily a method to extract a large sum of information, but is more-so an approach that takes a stance on social inequality and is attentive to community needs (Elliott, 2011).

In photovoice, the “action” taken to create social change is when the research is shared with the local community and decision makers, through a photography exhibit or by the other means. Wang and Burris (1997) state that photovoice can give agency to often underrepresented peoples’ knowledge and bring their voices into the decision-making process. The exhibit is an opportunity to foster dialogue between the decision-makers and participants and can be an empowering process as the participants take action on their own local issues (Wang and Burris, 1997).

**Photovoice in Literature**

Research with photography has been conducted since the 1920’s (Gold, 2004). Yet, photovoice is a new approach as it uses principles of PAR, giving the participants the control in
taking the photographs that become the research data. Some authors note that visual and participatory research has been traditionally overlooked, and that there are lingering prejudices that this type of research is “watered down”, due to it being grounded in a participatory and flexible approach (Liebenberg, 2018; Nykiforuk et al., 2011). However, many studies with photovoice reveal that this is not the case, and interests in visual and participatory methods have surged over the last two decades (Petheram et al., 2011; Prosser and Loxley, 2008). Photovoice is understood as an effective and appropriate method for engaging marginalized populations (Castleden et al., 2008; Harris, 2018; Lemelin et al., 2015) and working towards sustainable community change (Beh et al., 2013; Harris, 2018; Lemelin et al., 2015; Quigley et al., 2014; Wang and Burris, 1997).

Photovoice originated in health studies, but today is found in a number of research fields and with a variety of populations (Carlson et al., 2006). It has recently emerged in socio-ecological and agricultural research and is building a reputation of being an advantageous method in this field. Some noteworthy studies include: Bennett and Dearden (2013) who used the photovoice method as part of a larger project on social and environmental changes in coastal communities of Thailand; Beh et al., (2013), examined the ability of photovoice to generate conservation knowledge among educators in rural Kenya; Lemenlin et al., (2015) used photovoice to explore socio-ecological effects from climate change with indigenous communities in Canada; and Berbés-Blázquez (2011), who aimed to understand the complexities between human well-being and ecosystem services in Costa Rica. However, to our knowledge and review of literature, as well as Scopus, this method has not been utilized with Kandyan homegardens in Sri Lanka.

**Photovoice in this Study**

Elliott (2011), Greenwood et al., (1993), and Lieenburg (2018) argue that researchers need to critically analyze their use of PAR and how ‘action’ and ‘change’ is defined in their results. For example, there are varying degrees of participation and action that can take place (Tufte and Mefalopulos, 2009). Simply intending to make research participatory or ‘empowering’, does not assure the process actually is. Many researchers make these claims when using PAR approaches but fail to critically evaluate their outcomes. One common example is defining dissemination, as ‘action’, when no real action was taken on the research results. Researchers should define how collaborative the method was from project design to
dissemination (Tufte and Mefalopulos, 2009). It is also crucial for researchers to take a reflexive approach to understanding their role in the study and the power dynamics at play (Finlay, 2002; Harley, 2012).

With this in mind, it is important to be transparent of the participatory nature and ‘action’ taken in this photovoice study at the outset. Through a critical lens, this study acknowledges that no final ‘action’ was taken as a result of the research. However, this project went beyond dissemination, as it mobilized the knowledge of homegardeners and stimulated dialogue between various stakeholders. For this reason, we define this study as more than participatory research and less than PAR, but somewhere in between, as we did not fully reach the ‘transformative action’ needed to create real social change (Tufte and Mefalopulos, 2009).

As photovoice is a flexible approach, this study modified the method to include interviews, (as suggested by Palibroda et al., 2009; Petheram et al., 2011). This allowed the researcher to build more rapport with each participant, and for the participants to discuss their photographs individually first.

METHODS: FIELDWORK
Research Design, Sampling, and Participants

The collaborative nature of the photovoice method was fundamental to the design of this project. Participatory research requires flexibility in order to better suit the needs of the group, and to be more legitimate in its cooperative nature. For this reason, this study utilized an exploratory and emergent approach. Morgan (2012) explains that emergent design involves, “procedures that can evolve over the course of a research project in response to what is learned in the earlier parts of the study” (p. 246).

The research design for this project, including the goal, objectives, research questions, and method, were defined in Canada prior to knowing exactly what community in Kandy the research would take place in, and prior to any data collection. In light of this process, and in an effort to be transparent, it is necessary to clarify that because the participants were not involved in the foundational research design, this study does not reach “empowerment participation” that can be achieved in PAR processes (see Tufte and Mefalopulos, 2009).

Prior to departure to Sri Lanka, the researcher collected as many used digital cameras as possible, and bought two new cameras, for a total of 9 cameras. The number of cameras obtained
played a part in deciding how many homegardeners could participate in the research, as each participant needed a camera for the photography aspect (see Stage 2 below). Upon arrival to Sri Lanka, the researcher worked with staff members and faculty at the University of Peradeniya to adjust the project according to their recommendations, given their cultural knowledge and experience working in homegarden communities. This included determining the sampling method, community location, and approximate number of participants, given the camera availability. The aim was to secure approximately 8 participants in each of the three villages, in order to rotate the use of cameras between villages and have a spare. Further, a small incentive or “gift” was added for the participants to receive at the end of the study (of Rs. 5000).

This research used a combination of snowball and purposive criterion sampling. Our initial contact was a staff member at the University of Peradeniya who lived in Elladetta village and therefore, was familiar with the community. This staff member handed out recruitment flyers (Appendix III) throughout each selected village, and also chose to participate in the research. Individuals were included based on their interest and commitment to the project. The criteria necessary to participate included; a) must own or be involved in a homegarden, b) must be physically able to take a photograph, and c) the group of participants must be representative of various ages and gender. A total of 24 participants were recruited for the research (see Table 1).

The unit of analysis for this study was initially an individual, however many participants completed the project with another family member or as a household. This is understandable as homegardening is often a family affair. Additionally, the novelty of using a camera was exciting for many, and other family members wanted to participate in the photograph-taking. In total, 14 participants completed the photovoice project individually, while 10 participants were joined by their spouse (both husbands and wives joined), or their child or grandparent, for the duration of the project. Table 1 describes the participants’ demographic data collected.

Prior to data collection, the researcher conducted a pre-test with another staff member at the University of Peradeniya. They were given the ‘Photovoice Question Guide’ (Appendix IV) and asked to respond to the questions through photography and narrative in their homegarden. Based on the experience of this pre-test, the photovoice questions were clarified and the semi-structured interview guide was further developed (Appendix IV).

In accordance with the emergent design approach of this research, the steps of the photovoice project were initially outlined by the researcher prior to data collection, but re-
defined and determined by the participants and researchers during implementation. The researcher kept a journal to record the photovoice process, the successes and challenges, as well as her relationships and interactions with the participants and RA’s. The goal of the journal was to create the habit of on-going reflection and self-awareness throughout the study. This allowed the researcher to continually critically assess her position in the project. The development and process of the photovoice stages are further described in the section below.

Table 1 Participant Data Chart

<table>
<thead>
<tr>
<th>Participant Number</th>
<th>Sex</th>
<th>Age</th>
<th>Level of Education</th>
<th>Employment Status</th>
<th>Marital Status</th>
<th># of children</th>
<th>Size of Homegarden (m²)</th>
<th>~Age of Homegarden (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>M</td>
<td>68</td>
<td>GCE A/L*</td>
<td>Retired</td>
<td>Married</td>
<td>4</td>
<td>3288</td>
<td>33</td>
</tr>
<tr>
<td>P2</td>
<td>F</td>
<td>70</td>
<td>GCE O/L*</td>
<td>N/A</td>
<td>Widow</td>
<td>2</td>
<td>1012</td>
<td>50</td>
</tr>
<tr>
<td>P3</td>
<td>M</td>
<td>71</td>
<td>University Degree</td>
<td>Retired</td>
<td>Married</td>
<td>3</td>
<td>1948</td>
<td>33</td>
</tr>
<tr>
<td>P4</td>
<td>F</td>
<td>58</td>
<td>GCE A/L</td>
<td>Working</td>
<td>Married</td>
<td>0</td>
<td>1543</td>
<td>40</td>
</tr>
<tr>
<td>P5</td>
<td>F</td>
<td>85</td>
<td>Elementary</td>
<td>Retired</td>
<td>Widow</td>
<td>1</td>
<td>911</td>
<td>150+</td>
</tr>
<tr>
<td>P6</td>
<td>M</td>
<td>75</td>
<td>Elementary</td>
<td>Retired</td>
<td>Single</td>
<td>0</td>
<td>1000</td>
<td>80</td>
</tr>
<tr>
<td>P7</td>
<td>M</td>
<td>56</td>
<td>GCE A/L</td>
<td>Working</td>
<td>Married</td>
<td>2</td>
<td>379</td>
<td>94</td>
</tr>
<tr>
<td>P8</td>
<td>M</td>
<td>42</td>
<td>University Degree</td>
<td>Retired</td>
<td>Single</td>
<td>0</td>
<td>1341</td>
<td>15</td>
</tr>
<tr>
<td>P9</td>
<td>M</td>
<td>72</td>
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**Stages of Photovoice**

**Stage 1: Introduction Workshop**

A workshop about the project goals and process of photovoice was conducted with each of the three villages. Prior to the workshops, the main researcher created a PowerPoint presentation to clearly introduce the method and intent of the research to the participants. A presentation on camera basics and photography ethics was also presented. These presentations were reviewed by the RA’s before they were shown to the groups. During the workshops, the presentations were given in English, and concurrently translated to Sinhala. Following the presentations, time was given for questions and concerns. The group then discussed the research questions that would guide the participants in the photography stage (*Stage 2*). The questions were:

1. How has your homegarden changed, both environmentally and/or socially?
2. What issues do you currently face in your homegarden, and how have you addressed these issues?
3. What would you like to teach others about your homegarden (for e.g. youth, researchers, extension workers, policymakers, each other, etc.)?

The participants were instructed that these questions were only a guide, and they were encouraged to explore and think about what they wanted to share as part of this research. It was also repeatedly stated that there was no such thing as ‘right’ or ‘wrong’ answers in this study. Further, the aesthetics of the images were irrelevant, as the research was focused more on the meaning behind them. Nonetheless, the participants were trained on how to take quality photographs as many had never used a digital camera before (see Figure 4). To aid in getting their messages across, the group discussed symbolism as a tool to convey deeper meanings or
concepts that may be difficult to photograph. The group also discussed ethics around privacy and were discouraged to take pictures of identifiable people, unless they felt it was absolutely necessary. In this case, they were instructed to receive signed consent from the identifiable person (see Appendix VI).

A key part of the workshop was laying the groundwork for the relationship between the researcher and participants. It was important for the researcher to communicate her role as a facilitator of the project and acknowledge the participants as the experts on homegardens. By stating this at the outset, and referring to the participants as co-researchers, the goal was to stimulate an open-learning and sharing environment, as well as minimize any power dynamics present. Since the workshops were the first meetings between the researcher and the participants, she also spent time introducing herself and having one-on-one conversations with each participant in an effort to build trust.

The participants received a photovoice package which contained information on the study, the consent form (Appendix V), a notebook, the Photovoice Question Guide (Appendix IV), as well as a camera with a charger and instructions. Information on the study and the consent form was reviewed as a group, and the participants took the form home to review individually and sign prior to their interview. All documents given to participants were translated and written in Sinhala.
**Stage 2: Photo-taking**

The participants were given approximately 2 weeks to take photographs in their homegardens. There were no limits to the number of photographs they could take. However, the participants were informed that there may not be time to discuss every image in their interview, as it is a time-consuming process.

**Stage 3: Interviews**

The interviews were semi-structured and conducted in the respective participant’s home. The participants spent the first few minutes reviewing all their images on the researcher’s laptop. Throughout the interview, they selected which images to discuss in the order of their choosing. After selection of a photograph, the researcher asked, “What does this photograph show?” and “Why did you take it?” The participant led the discussion throughout the interview, and everything was translated through an RA, as well as audio-recorded. If they needed more encouragement to speak, the researcher readily utilized questions found in the Interview Question Guide (Appendix IV). Many participants took detailed notes of each photograph to guide them in discussing what they wanted to share. They also prepared spices, fruits, and other items from their homegarden to show alongside their photographs (Figure 5a). Sometimes, upon the participants request, the researcher and participant would also walk through the homegarden (Figure 5b).

![Figure 5 Interviews, from left to right, a) participant prepared spices to discuss, and b) a walk-through the homegarden with participant](image)
At the end of each interview, the participant was advised to select up to 15 photographs to carry forward to the group discussions. They were encouraged to choose images they felt were the most important in regards to the research. To encourage the participant to make their own decisions, the participants did this on their own time. She later contacted each participant by telephone to note their selected images and printed them prior to the group discussions. Stages 1-3 were repeated with each village for a total of three rounds. After the interviews were completed in one village, the cameras were collected, and the introductory workshop was repeated with the next group.

**Stage 4: Group Discussions**

Utilizing group discussions enabled the participants to teach one another about their homegardens. It generated critical dialogue and awareness of the strengths and adversities faced in homegardens today. The participants shared knowledge and learned from each other’s experiences. They were informed that the intention of the group discussion was not to rank photographs or issues presented per se, but to consider, understand, and build knowledge around them.

Initially, the intent of the researcher was to conduct two group discussions, of 12 participants each, so that the participants could engage and learn from members of other villages. The first group discussion followed this plan and was held in Elladetta, with 4 participants from each village. Seated in a circle, each participant shared 2 photographs at a time. After they presented their image, the group would discuss the photo or raise a question to stimulate deeper thinking. The group then worked to categorize the images into themes. It was quickly realized that this was a lengthy process. The first group discussion lasted 4 hours, and the participants were not able to get through all the photographs they hoped to share. It also felt somewhat chaotic, as there were many people gathered in a small living room with little space to categorize the photographs, or view them in groups together. It was also difficult to facilitate the larger group through an interpreter.

Learning from this, the researcher and RA’s deliberated how to move forward. First, the researcher created a board that allowed the participants to display all their photographs in themes during the discussion (see Figure 6). Second, it was decided to continue with three smaller group discussions in each of the villages, instead of the one larger group of 12. The smaller, original groups of 8 participants allowed for a more efficient and intimate discussion, where the
participants also did not have to travel out of their village. The downfall was that this resulted in less dialogue with other homegardeners outside their immediate community. However, the participants that had already taken part in the first group discussion shared the ideas and themes that emerged with those who did not attend.

At the end of each discussion, the group decided on the most important photographs and messages to share for the photography exhibit. They also determined the logistics of the exhibit, such as who should be invited, and where and when it should take place.

**Stage 5: Writing Captions**

As the researcher prepared for the exhibit and created designs for display, the participants wrote captions for their photographs that were selected for the exhibit. These captions were collected and typed by a RA in Sinhala.
Stage 6: Photography Exhibit

The photographs were printed with their corresponding captions and displayed by theme (see Figure 7). The exhibit was held at the University of Peradeniya, in the lobby of the Department of Agriculture building. It was open to the public and advertised through flyers (Appendix VIII) posted and handed out to students, professors, as well as the Dean of the Agricultural Department. The exhibit was held on a weekday, as the participants wanted high student and professor traffic through the lobby. In order to remove possible barriers of access, a bus was rented to pick up the participants in their villages. The photovoice group celebrated afterwards with food at the university.

For some participants, attending the university was a novel event, and this is why it was chosen by the participants for the exhibit. The group also discussed hosting a second exhibit at a local temple, so that more community members and local agricultural extension officers could attend. Unfortunately, this was not possible due to time and money constraints at the end of the project. However, the group was left with all the materials needed to host a second exhibit if they chose to do so. At the end of the project, the participants received their monetary gift and kept all their own photograph copies taken as part of the research.

Data Analysis

Initial data analysis was performed by the participants through their categorization of photographs and identifying of emergent themes. Throughout the project, the researcher transcribed the interviews and group discussions on an on-going basis, however this process was not fully complete until 1.5 months following the photovoice project, as it required many hours
of careful listening and typing. The transcriptions from the interviews and group discussions, along with all the discussed photographs, and the researcher’s reflective journal were further analyzed in NVivo, a qualitative analysis software program. The participants’ identified themes were used as the foundational framework for open coding in NVivo. As the researcher reviewed and worked through the data, further parent and child nodes were created to subcategorize themes based on the objectives and conceptual framework of this study. Both thematic and interpretive analysis were employed to locate patterns and deepen understandings of the data. Throughout the analysis process, the researcher kept a journal and recorded her reflections of the data.

It is important to note that no photographs were interpreted by visual aspects alone, as that was not their purpose. The researcher analyzed the photographs through the narrative the participant attached to the image. Therefore, only the photographs selected for the interview, group discussions and/or exhibit were analyzed. The researcher was exceptionally familiar with these images and their intended messages, as many of them were discussed and examined in the interview, group discussions, and exhibit, and then further reviewed by the researcher during transcription and data analysis.

**Ethical Protocols and Considerations**

This research was designed to uphold voluntary consent, privacy, and to consider cultural sensitivities throughout the project. Sri Lanka does not have a research ethics board. However, this study received approval by the University of Guelph Ethics Board on December 10, 2018 (see Appendix IX for certification).

The principal ethical consideration was to ensure consent was given voluntarily and that participants understood and felt able to withdraw from the project at any time. This was highlighted during the recruitment stage and throughout the study. In the information workshop, the consent form was presented verbally to the group, and the participants took this form home to review it individually afterwards (Appendix V). The consent form informed the participants of any risks related to the project and details of what their participation entails, and their ability to withdraw at any time. The participants were reminded before their interview that sharing their photographs was completely voluntary. It was their choice which photographs to discuss and they could skip any questions from the researcher. Further, they decided which photographs to share with the group and at the exhibit.
One of the main risks associated with this project was that it was difficult to provide confidentiality within the group, as many participants knew each other. Another risk was that participants were informed on the responsibility that comes with holding a camera, and the need to respect the privacy and confidentiality of others. The researcher discussed photography ethics with the participants. They were also required to use the “Photograph Release Form” (Appendix VI) and obtain signatures if any of their photographs contained identifiable people, or property outside their own, otherwise it would not be used in this study.

To ensure the research considered cultural sensitivities, the complete research design and methods were shared and discussed with members at the University of Peradeniya, Sri Lanka. Further, all the RA’s were Sri Lankan, and most of the RA’s had experience conducting research in rural communities in Sri Lanka. They reviewed and translated all the materials that were given or presented to the participants during the study. A pre-test was also conducted with a staff member at the university prior to engaging with any participants.

SUMMARY

This chapter presented the overarching theoretical framework and methodology of the research project. It explained the photovoice method and provided an overview of the use of photovoice in literature, particularly as it pertains to agricultural research. The chapter outlines the stages of photovoice that took place during this research project and concludes with a discussion of the study’s ethical considerations. The following chapters present the two publishable journal articles based on the research findings.
CHAPTER THREE

Local Knowledge and Perspectives on Change in Homegardens: A Photovoice Study in Kandy District, Sri Lanka

ABSTRACT
Kandyan homegardens are traditional agroforestry systems that exist to support rural lives in Sri Lanka. They have sustained over generations of socio-ecological changes and are recognized today for their biodiversity conservation and ecosystem services. The key drivers of adaptation and conservation of homegardens are the local farmers who continuously manage them on a daily basis. However, local communities have seldom been included in research, especially not through participatory approaches. This study utilized a participatory and visual method called ‘photovoice’ to reveal the local perspectives and experiences of socio-ecological change from 24 participants in Kandyan homegardens. The results highlight visual documentation and narrative that display the farmer’s perspective of the current situation in Kandyan homegardens and the major challenges faced today. Priorities for future conservation include addressing wildlife obstructions, the lack of land to grow, and the lack of labour and interest in homegardening, especially from young generations. Our results indicate that the photovoice process allowed for rich, varied, and in-depth stories of the human-ecological relationship in homegardens to emerge. Photovoice, we conclude, is a robust method for research in agroforestry systems, that is well suited to complement GIS mapping and quantitative approaches.
INTRODUCTION

Kandyan homegardens are traditional agroforestry systems located in Sri Lanka’s Central Province. They can be defined as a multi-strata forest garden consisting of various tree and crop species, intermixed on a small plot of land, typically no larger than 1 hectare (Jacob and Alles 1987; Perera and Rajapakse 1991). Dating back over 2000 years, Kandyan homegardens have truly stood the test of time (Hochegger 1998). They developed as a local food system strategy and have evolved over time in response to socio-economic, ecological, and cultural needs (Soemarwoto and Christanty 1985). In the contemporary era, homegardens are known for their biodiversity and ecosystem services that spread from local to global scales. In a world that is searching for sustainable food production and climate smart agriculture, many argue that homegardens are just as relevant today as they were thousands of years ago (Kumar and Nair 2006; Pushpakumara 2012).

Nevertheless, Kandyan homegardens face intense and unprecedented pressures from agro-ecosystem and social change. This includes urbanization, population growth, commercialization, adaptation to climate change and seasonal variabilities of rainfall, which threaten the biodiversity of homegardens (Kumar and Nair 2004; Wiersum 2006; Mohri et al. 2013; Landreth and Saito 2014; Serrano-Ysunza et al. 2018). In recent literature, authors call for more inclusion of local communities as they are key stakeholders to building resiliency in homegardens (Landreth and Saito 2014; Mbow et al. 2014; Mattsson et al. 2018). In fact, local farmers have developed capacity to manage risk and to continually adapt homegardens over centuries to meet their needs. Researchers state that this human-ecological relationship is at the root of homegardens’ sustainability, yet it has often been overlooked (Kumar and Nair 2004; Koohafkan and Altieri 2017; Martin et al. 2019). By understanding the local perspectives and experiences of socio-ecological change, key insight into their willingness to adapt and priorities for future management can be revealed (Biggs et al. 2012).

This paper presents the results of a research project that utilized a participatory data-visualization method known as ‘photovoice’ (Wang and Burris 1997). Photovoice allows individuals to share their knowledge and perspectives through both photography and narrative. This method positions the participants as experts and is adept in capturing one’s relationship with their environment (Nykiforuk et al. 2011; Harris 2018). The photovoice methodology is further discussed in the third section of the paper. This research paper has two objectives; 1) to
document local farmers’ knowledge and lived experiences of socio-ecological change within Kandyan homegarden systems, and 2) to examine photovoice as a promising method for agroforestry systems research.

Understanding Homegardens: Relevant Literature and Conceptual Approach

Homegardens are found across the globe, but are typically more predominant in tropical regions (Kumar and Nair 2006). They developed to support rural livelihoods through household food security, provision of fuelwood, and keeping resources close to the homestead (Pushpakanamara 2012). Indeed, what separates a homegarden from other agroforestry practices is its direct connection to the home, and the multipurpose use of the garden to fulfill household needs. Each garden is built and managed in a way that reflects a household’s food and culinary preferences, spatial configuration and other context factors such as species selection for traditional medicines and aesthetics (Serrano-Ysunza et al. 2018). This personal relationship creates incredible diversity among homegardens, that even within a village no two homegardens are the same (Kumar and Nair 2006).

Today, modern socio-ecological trends are shifting the course of contemporary homegardening. Mohri et al (2018) reports that Kandyan homegardens have become substantially fragmented over the past two decades. Further, commercialization, wildlife obstructions, and water scarcity has driven homegarden simplification and abandonment (Wiersum 2006; Landreth and Saito 2014). This has led to at least 27 plant species becoming lost or threatened in recent times (Kadupitiya et al. 2018). Socio-ecological change in homegardens is highly complex and interrelated with rural livelihoods. As Kumar and Nair state, every homegarden and homegardener is different, and each may follow their own pathway to development and adaption to rural change (2004). This individuality makes it difficult to study homegardens as it can impede results.

In general, however, there is very limited research on the drivers of change in homegardens. Most research has centered around the biophysical and functional components, since the first Sri Lankan study reported in 1973 by McConnell and Dharmapala (Mattsson et al. 2018). More recently, studies have focused on the ecosystem services and the capacity of homegardens to manage climate change and food security challenges in Sri Lanka (Weerahewa et al. 2012; Galhena et al. 2013; Mattsson et al. 2013; De Zoysa and Inoue 2014; Williams et al. 2018). This has been beneficial in allowing the value of homegardens to be recognized at a
national and global level. In Sri Lanka, some homegarden development initiatives have been incorporated into national programmes. However, Landreth and Saito (2014) report that some programmes have not met communities’ priorities and are culturally unsuitable in the local context.

Creating an approach to understanding contemporary homegardens must therefore appreciate the dynamic nature of agroecosystems as well as the social and cultural aspects of this land-use. As homegardens are deeply embedded into rural livelihoods, authors argue that more research needs to include local stakeholders for homegarden development (Kumar and Nair 2004; Landreth and Saito 2014; Mbow et al. 2014; Mattsson et al. 2018). Photovoice is a method that produces rich data on communities’ knowledge and perspectives (Wang and Burris 1997). Through a participatory approach, this method drives co-production of knowledge and participant-driven data (Castleden et al. 2008). The use of a visual tool encourages deeper reflection of one’s environment and allows the researcher to better understand the participant’s experiences (Nowell et al. 2006; Petheram et al. 2011b). Photovoice is an approach that builds practical theory in the local context. This grounded and empirical knowledge can complement quantitative methods to produce a multi-disciplinary and comprehensive approach to homegarden research. After our review of Scopus, and extensive literature reviews (Hergenrather et al. 2009; Pushpakumara 2012; Mattsson et al. 2018), to our knowledge this is the first photovoice study in Kandyan homegardens.

METHODS

Photovoice

Photovoice was developed by Wang and Burris (1997), who summarize that it, “entrusts cameras to the hands of people to enable them to act as recorders, and potential catalysts for change, in their own communities” (p. 369). Wang and Burris (1997) derived photovoice from three underpinning theories: Freire’s concept of critical consciousness (1970) combined with feminist standpoint theory and applied through a documentary photography approach. In photovoice, individuals are free to identify and record the strengths and concerns in their environment, through the use of photography. The participants then “give voice” to their photographs through narrative and critical group dialogue. In the final stage of the method, the photovoice results are shared with the community and local decision-makers. This method has
the ability to capture the knowledge and perspectives of often underrepresented people, and uses their insight to inform local policy (Wang and Burris 1997).

The use of photographs is unique because they have the ability to mirror or depict the everyday realities of people’s lives (Wang and Burris 1997). In turn, researchers are able to gain more valuable insights into the participant’s perspective and knowledge in ways that words alone cannot (Quigley et al. 2014; Liebenberg 2018). By entrusting cameras into the hands of participants, photovoice allows the researcher to have access to an individual’s natural social and behavioural settings. It can reveal places, moments, and ideas that may not be available if the researcher was present. Here, the opportunity for new insights about the participants’ relationship with their environment can emerge that would likely not in other methods (Wang and Burris 1997; Harris 2018).

The success of photovoice lies in enabling participants to take control over the research process. The goal of the main researcher is to become merely a facilitator of the method, while the participants lead their own data collection and analysis (Castleden et al. 2008; Beh et al. 2013). In this way, they become co-researchers in the study. Through continuous reflective thinking, photovoice helps fuel critical consciousness of one’s environment (Carlson et al. 2006). Moreover, the individual concerns brought forward are further analyzed as a group and can create a sense of collective vision (Liebenberg 2018). It is only through a participatory method like photovoice, where participants learn from each other and can build capacity on local strengths and issues (Wang and Burris 1997; Petheram et al. 2011).

As photovoice is an exploratory approach with visual data, it can make it difficult to draw conclusions, especially if participants have a wide interpretation of the research (Nykiforuk et al. 2011; Sutton-Brown 2014; Harris 2018). This method also lacks transferability as the research is situated with often a limited timeframe and sample size. However, many authors argue that photovoice produces richer information in lieu of traditional interviews or surveys. Further, by sequencing photovoice with other methods, it can add depth to data (Nykiforuk et al. 2011; Harley 2012; Bennett and Dearden 2013).

**Site Selection and Sampling**

The site selection and sampling for this research was based on recommendations from staff members at the University of Peradeniya. The research was conducted in three
neighbouring villages, Elladetta (7.215443, 80.577747), Petiyagoda (7.217104, 80.584694), and Lankatikala village (7.233482, 80.568335), in the Kandy District, Sri Lanka (Figure 8). All three villages are located approximately 15km from Kandy city. These villages were chosen as study sites as they rely on homegardening, in varying degrees, for their livelihoods. We used a combination of purposive criterion and snowball sampling to recruit participants. Our initial contact was from the University of Peradeniya who was familiar with the villages. The criteria for participants included a) they must have or be involved in a homegarden, and b) they should be representative of various ages, genders, socio-economic groups, and are willing and interested to participate.

There was a total of 24 participants in the study, with 8 participants per village. The photovoice project took place from early December 2018 – March 2019. The participants ranged from 23-85 years old, with an average age of 56 years. There were 9 participants currently employed or in school, while the remaining 15 had retired or had never worked outside the home. This study had 8 male and 16 female participants. Their homegardens ranged from

![Figure 8 Map of Study Area, 1) Elladetta village, 2) Petiyagoda village, 3) Lankatikala village. Source: ArcGIS. Version 10.7.1 Redlands, CA: Environmental Systems Research Institute 2019](image-url)
approximately 379.4 m$^2$ to 6070 m$^2$ in size. The unit of analysis for this study was initially an individual, however 10 participants completed the project with another family member. This was understandable as homegardening is often a family affair. Moreover, no significant differences were found between the data of individuals and households.

**Photovoice Process**

When developing the photovoice method for this study, we used guidance from Palibroda 2009 and Jongeling et al., 2016. Figure 9 shows the complete steps taken in the photovoice project. We modified the original process to include individual interviews, as suggested by Castleden et al. 2008 and Jongeling et al. 2016. The interviews allowed the researcher to build

![Figure 9 Steps in Photovoice](image)

*Figure 9 Steps in Photovoice,
rapport with each participant, and for participants to formulate individual ideas on their photographs before sharing with the group. Throughout the entire project, an interpreter was present to translate between Sinhala and English.

The first step was an introductory workshop where the participants further learned about photovoice and the project intent. The participants received a few prompts to aid in their reflection around the theme of change in homegardens. The questions posed were 1) how has your homegarden changed, both socially and environmentally, over your lifetime? 2) What issues do you currently face in your homegarden? And 3) what would you like to teach others about your homegarden? Each participant then received a digital camera and basic photography training, as many had never used a camera before. Next, the participants were given two weeks to take photographs on their own time.

The fifth step of the project was a semi-structured interview with each individual. Their photographs were displayed on a laptop and the participant led the interview, as they chose what photographs to discuss. The interview allowed the participant to add narrative to their photographs and some follow-up questions were also asked if needed. Examples of questions that were regularly utilized include: Why do you think this issue began? How would you like to see this addressed? What do you predict for the future of your homegarden? The interviews took between 30 minutes to 4 hours in length. Afterwards, the participant selected their most important 10 photographs to share in the group discussions.

Sixth, each village participated in a group discussion. After critical dialogue through sharing their images, the participants identified and analyzed the major patterns that emerged and categorized (coded) the images into themes. There was also one combined group discussion (with 4 representatives from each village), which created the opportunity for participants to engage with individuals from other villages. At the end of each discussion, the details of the photography exhibition were deliberated, and the participants decided which photographs to share at the exhibition. The discussions lasted between 3 and 4 hours. Both the interviews and group discussions were audio-recorded and transcribed in the following weeks. Further analysis was completed in NVIVO software (a qualitative analysis program), however no photographs were analyzed that were not discussed by the participants, as the photographs are not meant to be interpreted by the researcher alone.
Finally, the participants wrote captions for each of their images in the exhibition. The photography exhibition was held at the University of Peradeniya and was open for anyone to attend, however, university faculty, staff, and students from the agricultural department, as well as family members, were specifically invited. The exhibition allowed the knowledge generated by the research to be shared with the community, where visitors engaged with participants and reflected on the results of the study. For many staff at the university, photovoice was also a new method and they were interested in learning the process. At the end of the project, the participants received a small honorarium of Rs. 5000 (about $36CAD) for their time spent on the photovoice project. All the materials needed to host a second exhibition were left with the participants, if they chose to do so.

RESULTS

Photovoice participants explored and presented a variety of social and environmental changes they have experienced in their homegardens. A complete list of these changes are recorded as trends in Table 2. The trends were further categorized as a positive change, a negative change, or both a positive and negative change to homegardens. Due to the exploratory nature of photovoice, many themes emerged as participants focused on different aspects of the homegarden. They discussed ‘change’ on a micro scale, such as the growth and development of their personal homegarden over time, and on a macro scale, such as land fragmentation in the village.

Through photovoice, the participants were able to share their experiences in their homegarden as a “story”. This created a natural flow of conversation during the interviews. They brought forward memories of the past and discussed present-day realities in their homegardens. The photographs provided visual representations of the challenges they were facing and gave the participants confidence that their message was understood by the researcher. Photovoice was also found to create a less intimidating environment and a more voluntary approach. Rather than being the “subjects” of the interview, the participants led the discussion, and the focus was on their photographs. The following results are presented below as favourable changes and modernization of the homegarden, and adverse changes to the homegarden, as described by the participants. Only photographs that were chosen by the participants to be displayed at the
photography exhibit are presented. For more photographic results and corresponding narratives from the study see Appendix II.

Table 2 Social and Environmental Changes in Kandyan Homegardens categorized as positive and negative trends, listed by the number of times mentioned (in paranthesis) during the research

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<th>Social Changes</th>
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<td>Growth and development of homegarden (90)</td>
<td>Infrastructure development (to house and village) (65)</td>
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<td>Improved or rare plant varieties (37)</td>
<td>Increase in income generation (54)</td>
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<td>Education development and access (4)</td>
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<td>Change in government regulations* (52)</td>
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<td>Technology development (29)</td>
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<td>Increasing wildlife disturbances (188)</td>
<td>Less labour and skill availability (71)</td>
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<td>More pests and diseases (41)</td>
<td>Land fragmentation (53)</td>
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<td>Soil erosion (35)</td>
<td>Loss of traditional knowledge (46)</td>
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<td>Decreasing resourcefulness and use of homegarden (33)</td>
<td>Land abandonment (41)</td>
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<td>Increasing pesticide usage (16)</td>
<td>Changing culture and attitudes towards agriculture (37)</td>
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<td>Increasing garbage (12)</td>
<td>Fluctuating market prices (15)</td>
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<td>More invasive plants or weeds (8)</td>
<td>Increase in imported foods (12)</td>
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<td>Climate change (4)</td>
<td>Increase in middlemen (3)</td>
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*mostly in reference to wild boar hunting prohibition and repeal, as well as imported goods

**Favourable Change and Modernization of the Homegarden**

Nearly 75% of participants chose to start their interview “story” with a photograph that displayed a positive change over their lifetime. Often it was a development to the homegarden that the participant had implemented themselves, such as various kinds of restructuring, adapting, or changing of cultivations within the garden. They shared images of the growth of their plants, the replacement of crops with new improved plant varieties, and their fruitful harvests (Figure 10b). These photographs were generally accompanied with a great sense of pride and a keen willingness to share. Many photographs emerged to celebrate what the homegarden is today and how it has brought value to their life (Figure 10a,b,c). For example, Participant 4 (P4) shared;
Earlier, our homegarden did not exist. I wanted to show both the garden and the house in this picture because from nothing we created all of this. We transformed our garden into tall, big trees and plants that are all useful for our life. We have created a good Kandyan homegarden system. I can get an income from every plant. It gives us everything we need – P4.

The participants were keen to share their daily work practices and teach other farmers the strategies they have used to improve their homegarden. Many photographs displayed how they have: increased income generation, enabled the growth of new plants, reduced competition of plants, managed shade, built a new house, and made the homegarden a “safer place” (for example, by managing mosquito breeding or using organic fertilizers).

Another common image that was shared at the beginning of interviews were infrastructure developments that participants have witnessed in their village (P1, P3, P4, P5, P6, P12, P20, P21). One participant began his interview sharing the significance of a new road. He stated;

My village is very ancient. 30 years ago, there was no roads here […] No electricity, no water, no telephone, no easy access to the town […] But in 1978 we got this road, and everything changed. It was a kind of turning point for us. We were able to develop our houses more and build. People started leaving the village to work in offices. Families began making more money, which meant they could also develop their homegarden - P6.

For many, the road in their village was a symbol of a new lifestyle that evidently shifted the course and function of homegardening to what it is today. It generated a series of changes such as electricity, new technologies, and more income through greater accessibility to job opportunities, cities, education, and markets. The participants reported that this greater accessibility meant farmers began spending less time in the village, and it allowed them to rely less on their homegarden for everyday needs. With better access to markets the homegarden generally became more about income generation rather than food sustenance, as one stated, “there’s a clear difference, … [before] this homegarden was only for our personal use, but now there is more of a trend to get an income” (P2, also P6, P7, P11, P20, P22). Showing the
economic value of the homegarden was a common photograph in the research shared by almost every participant. Specifically mentioned species as important sources of income were: vanilla (*Vanilla aromatica*), areca nut (*Areca catechu*) and coffee (*Coffea arabica*), and spice crops such as nutmeg (*Myristica fragrans*) (Figure 10c), pepper (*Piper nigrum*) (Figure 16b), and clove (*Syzygium aromaticum*), as well as ornamental species like anthurium (*Anthurium andraeanum*).

In this study, photovoice was adept at capturing nuance. There was a lot of ambivalence around the discussion of modernization affecting Kandyan homegardens. For instance, the participants were proud to share that their villages were developing. However, after further reflection and critical group dialogue many participants began describing how modern developments have also had negative consequences for homegardens (Figure 11). For example, after P5 shared Figure 11a, P19 further commented, “There is constant competition between agriculture and development and the case is that development is always put first, it overcomes agriculture […] So, we have to find a balance”.

This ambivalence of modernization manifested through comparing photographs of various modern practices in the homegarden versus traditional methods. The participants discussed old and new methods of cooking (from firewood to gas stoves, or mortar and pestles to electric blenders, etc.) as well as water collection (from well-water to the National Water Supply). For example, many participants showed photographs of shower heads and flush toilets to celebrate their access to the National Water Supply in the last decade. However, during the group discussions these images were contrasted with other participants’ photographs of traditional well-water systems and clay collection pots. This generated dialogue on the past and present use of water, and the changing relationship homegardens have with water-use. For example, with a photograph of an abandoned well (Figure 11b), P9 explained:

[…] water was the most important resource for our ancestors, but today wells are no longer being used. So, we need to protect that because water is the best resource that is available for planting and growing […] Our ancestors used to collect large amounts of rainwater, but now we don’t think this way anymore. We don’t have the same mentality towards water, and I think it’s costing us many environmental issues […] We need to protect it- P9.

When P9 originally shared this photograph in his interview, he gave only a simple description stating, “this is an abandoned well”. However, during the group dialogue he added more meaning to the image as he conversed with others about traditional water conservation methods. We found that the photovoice process allowed participants to continually reflect on
their photographs, to learn from each other, and to share knowledge through their images. In this way, as the photovoice process developed, the themes evolved much further as the participants added deep insight and narrative to their images.

For example, another ‘modernization’ discussed was the introduction of plastic materials. The participants described how many plastic items have replaced materials sourced from the homegarden (Figure 11c). Plastic was viewed as “convenient” but has caused an increase in garbage in the villages (Figure 11d), while the participants described materials made from the homegarden as “free and environmentally friendly” (P12, also P6, P10, P19, P24). With Figure 11c, one participant explained these concerns using the example of a plastic bag;

This picture shows a plastic bag that is used today, and a homemade item from the garden that was used like a bag in the older days. Before 1977, Sri Lanka had a closed economy […] but now we are getting cheap imports from other countries coming into our markets like these plastic bags. During this time, we didn’t realize the importance of the materials made from our own homegardens. There has been a change in culture, and it is not environmentally friendly. The question mark in the photograph is suggesting, ‘what will we choose to do next? Will we choose to use the resources from our own homegarden or plastic goods from the market?’ We are forgetting the importance of our homegardens […] Some of these materials are bound to
cultural practices […] We already had everything we need in the homegarden, but now our resources are being lost to plastic - P19.

Accompanying these conversations were evident feelings of nostalgia and remorse. The participants shared stories of how multi-functional species such as ‘kithul’ (Caryota urenaus), ‘tala’ (Corypha umbraculifera), and coconut (cocos nucifera) were once utilized for many everyday needs in the homegarden, however, plastic is replacing the materials made from these cultivations. They reflected on how modernization has substituted traditional knowledge, skills, and cultural and religious practices. They wanted to highlight that even though development has been “good”, it is shifting their relationship within the homegarden, as P19 continued, “we can’t just think we are moving forward […] We are leaving behind a lot of good things that our ancestors taught us”.

**Adverse Changes to the Homegarden**

During the research, there was more emphasis on socio-ecological changes that were described as ‘negative’ influences for homegardens, rather than ‘positive’. The photovoice process did not ask participants to prioritize issues per se, but to critically analyze their photographs and choose the most important messages to share as part of the research and

![Graph](image)

**Figure 12** The greatest threats for the future of Kandyan homegardens according to participants
photography exhibit. Nevertheless, three trends were clearly viewed by participants as the most threatening to Kandyan homegardens, as displayed in Figure 12. These trends are discussed below in order of significance, and this is followed by the remaining adverse changes brought forward in the research (as seen in Table 2).

The most heavily discussed issue during the research, mentioned by every participant, was the increasing wildlife attacks on homegardens and paddy fields. The participants shared photographs revealing the damage wildlife has caused (Figure 13a), or their protection mechanisms for plants in the homegarden, such as sheets of metal (Figure 13b). The wildlife associated with causing the greatest and most frequent damage to homegardens were wild boar and porcupines. As P10 summarized, “they come and rip up the roots and chew on the plants”. Some participants shared stories of their loss of entire cultivations due to wildlife (P1, P4, P16, P17, P22, P24), as P1 shared;

[…] I planted 1500 yam plants to put in my homegarden. But unfortunately one night I went to the temple for some meditation, and when I came back, I found that everything was damaged, all by wild boars. They are very destructive and can cause a lot of damage very quickly. It was a huge loss.

However, issues with macaques, rats, mice, and squirrels were also mentioned. According to this study, wildlife obstructions have drastically increased “over the last 10-15 years” (P1-P24), but even more so in the “last few years” (P1-P24). The participants explored how the wildlife issue, in particular wild boar, was attributed to many interrelating causes. Some reasons mentioned were the fast reproduction rate of wild boar, and the declining presence of their main predators (jackals) “because of all the use of pesticides” (P1, P5, P6, P12, P19, P24). Further, wildlife lacks habitat due to deforestation, as one stated, “they come to find food in the homegardens because they can no longer find it in the forest” (P9, also P3, P4, P20, P21, P24).

Figure 13 Photographs displaying effects from wildlife, from left to right: a) Coconut destroyed by porcupines - P3, b) Protecting coconut from wildlife - P4 c) ‘Aruaka’, a once popular but now rare tuber crop today because of wildlife – P16
Lastly, abandoned land areas in the village are turning into “overgrown jungle” which has created more suitable places for wildlife to invade closer to homegardens (P1, P3, P6-P9, P12-P17, P21, P24). The participants also mentioned the law prohibiting the hunting of wild boar, and how this likely increased the population. However, they were hopeful as this ban had just recently been repealed.

During the research, many participants discussed how homegarden cultivations have shifted from tuber and fruit crops to more animal-resilient species, often described as ornamental and spice crops (see Figure 13c). One stated, “we can’t cultivate anything anymore because of all this damage from animals” (P4, also P1, P16). Wildlife attacks have also caused a reduction of revenue from the homegarden and have made it more labour-intensive. The participants generally all agreed that “the struggle with wildlife is going to continue and it’s going to get worse”. Many expressed the need for more government action on this issue. Some participants were hopeful given the recent removal of the prohibition law for hunting wild boar. However, they felt that other solutions given by extension officers were not practical, such as P17 who stated:

The only solution they gave was to give electric shocks to the animals. But this electric device is really expensive, it’s like Rs.25000 [~$137 USD] who can afford that in the village? […] plus, we don’t want to harm the animals because many of us are Buddhist.

Overall, the participants were discouraged and felt that they could “not control this issue at all” (P15, also P9, P11, P19, P23).

The second major threat identified was the lack of labour and interest in homegardening. This issue was discussed by 17 participants during the research and highlighted as the “greatest risk” by 10. The lack of labour and interest in homegardening was at the center of many relating consequences for Kandyan homegardens. First, was the inability to cultivate or harvest crops that were labour-intensive or required a particular skill. During the research, this was specifically identified as clove (*Syzygium aromaticum*) (Figure 14a), fish-tail palm ‘kithul’ (*Caryota urens*), and paddy (*Oryza Sativa*). Some participants mentioned that these species have become “essentially useless in my homegarden” (P24, also P1, P9, P10, P12). The labour needed to harvest these species was described as difficult to find or too expensive to hire. The participants stated that these cultivations were not as economically viable anymore and felt they will be forgotten in homegardening, which would then cause a loss of traditional and cultural knowledge and products.
The second consequence of a lack of labour was related to the abandonment of land in the village, specifically paddy fields (Figure 14b). Nearly all the participants discussed a major change in the village landscape as abandoned land was turning into an “overgrown jungle”, as one participant further explained;

You can imagine that when you combine all these abandoned fields together, then I can’t cultivate my field alone even if I wanted to. Because combined, the rodents and wild boars and weeds start invading in the unmanaged land. So, it starts in one place and expands from one paddy field to the next and it becomes a community issue rather than just a one-person decision – P24.

Third, many participants expressed concern that the future of homegardening may be compromised. The young generation was seen as less willing to engage in agriculture, and some predicted that this would be the greatest threat to Kandyan homegardens (Figure 14c). As one participant stated;

My children’s attitude towards the homegarden is the biggest risk. Because for the wild animal issue, we can take precautions towards that, but for future generations, if they don’t want to work in agriculture then what do you do about that? There are a few reasons for this, one is the economy and the low income from agriculture, and the second is the common attitude towards agriculture, like being a farmer is inferior to something else - P22, (also P5, P8, P9, P10, P11, P19, P24).

Consistent with other themes that emerged, this topic evolved much further during the group discussions. The participants deliberated why this issue exists and suggested possible solutions such as: the need for incentives and agricultural subsidies, changing the discourse of agricultural work, and including homegardening in education paradigms.

The third greatest threat to Kandyan homegardens was viewed as the lack of land available to grow. Half of the participants highlighted this during the study, and five described it as the “greatest risk” to homegardens. The participants described a high population density in the

Figure 14 Photographs displaying labour issues from left to right: a) ‘Picking clove, a painful and difficult task’ - P13, b) ‘Abandoned paddy fields turning into jungle’- P9, c) ‘The young people don’t know how food comes to the plate, we have to involve and teach them about homegardening’ -P19.
villages with little space to expand (Figure 15a). Land fragmentation was deemed as changing what and how farmers can grow. A few participants noted a reduction of biodiversity, which is causing an increase in pest attacks and reduction of income, making homegardens “not a sustainable system” (P3, also P6, P19). During a group discussion, P6 further explained effects of fragmentation:

Kandyan homegardens are full of biodiversity […], it is almost like a forest with perfectly stratified layers. But today that is changing, it is becoming less and less like this. Today, I have a small and very simple garden […] there is less number of plants […] Before everywhere there were big trees and all were useful, but we had to cut them down because we used those timbers to build houses. Now the issue is limited land area, so instead of planting trees I have small plants like anthurium, where I can get about Rs.600 from one plant. So, with limited space this is the best thing for my homegarden.

Land availability was also connected to the on-going struggle of soil conservation (Figure 15b). As one participant highlighted, “We are constantly protecting the soil, if we lose it, we can’t bring it back” (P1). During the study, 13 participants highlighted this issue. Many reiterated P8 who said, “the lands in Kandy are all hillsides, so the biggest problem is erosion and the

![Figure 15 Photographs displaying land availability issues, from top left to right: a) ‘Tight living space, we don’t have the room to grow like we used to’ - P18, b) ‘With soil erosion, the land is even more limited’ - P14, c) ‘Bagging plants for maximum land-use’ - P6](image-url)
conservation of the soil and that gets more difficult over time”. A myriad of photographs displaying soil conservation strategies emerged, such as: terraces, “lock and spill” drains, composting, mounds, and self-made irrigation pipes. One of the most popular strategies to combat infertile soil and the lack of land to grow was through bagging of plants (Figure 15c).

In addition to these three “greatest risks” to homegardens, the participants presented many other adverse changes that were also a major part of the research and photography exhibit (as seen in Table 1, and examples in Figure 16). Many of these adversities were interrelated and further exacerbated the “greatest risks” to homegardens. Half of the participants presented a photograph of a pest or disease infected plant in their homegarden (Figure 16a). This was understood as an on-going issue, yet some noted that pests were becoming more frequent. Others discussed fluctuating market prices, an increase in middlemen, and an influx of imports that has decreased the value of homegarden cultivations (Figure 16b). As one participant explained:

A long time ago when the economy was more based on agriculture, farming was a total job to make income, but around the 1970’s we got new policies like free trade […] Now, we are not producing anything anymore, not even our own rice. We import everything. There is no clear policy for the farmers and the crops […] That’s on the bigger level. But what happens at the top affects the bottom level people, like us farmers - P8.

Discussants, primarily women, also identified the increase in chemical and pesticide usage in agriculture. They expressed anxiety towards market produce because they “do not know what kind of chemicals are in the food” (P20, also P5, P8, P18, P19, P22). In contrast, photographs of the homegarden harvest were described as “safe to eat” (P5, P7, P14, P20, P21, P22) (Figure 16c). The participants stressed the need to do organic farming, as some agro-chemicals were associated with kidney disease and harmful for their bee colonies.

Women in the study were also the main participants to discuss changes in community culture. They felt that their neighbourhood relationships were weakening, as people had become “more individual” (P4, also P2, P9, P24). The participants commented on fences that now border homegardens, where the village was once free to roam. They also discussed the reduction of the “Attham method” culture. One participant explained:

It’s a cooperative method. When one person needs help, we all go to that person’s land […] I think these types of values are disappearing from the culture. I suspect that it’s because people are chasing after money and have less time these days - P24, (P5, P6, P9, P19, P20).
Nevertheless, the participants proudly emphasized the sharing culture that is still very prevalent in their village communities (see Figure 16d).

**Underlying Themes**

Three underlying themes were identified through the photovoice process. First, changes in homegardens were described as complex, interrelated, and socio-ecological. The participants linked social changes to environmental impacts, and vice versa, where environmental changes were connected to shifts in the social realm. For example, the increase of wildlife obstructions was linked to shifting homegarden cultivations (see Figure 13c), the decrease of revenue, and loss of traditional and cultural knowledge. The group discussions allowed the participants to further analyze these issues and explore the interconnections.

Second, the homegarden was viewed as generally becoming less sustainable and less sufficient for the participants’ daily lives. The relationship between people and their
homegardens was changing and they felt less reliant on this land-use. This concept emerged through many photographs. Towards the end of the photovoice process, P19 decided to draw a picture that captured this sentiment, (seen in Figure 17a), he explained;

It’s a symbolic photograph. The outer most circle symbolizes complete self-sufficiency from the homegarden. It’s what the Kandyan homegarden system used to be like, as it provided everything that the household needs. But because of many affects like land fragmentation, attitude changes, environmental changes, and even developments, we have lost some traditions, and the self-sufficiency of the homegarden has reduced. You can see gaps in the circles of the drawing as you go in, the gaps represent what we have lost. So, self-sufficiency from the homegarden keeps reducing over time. We don’t use our homegarden like we used to […] Now, Kandyan homegardens are in some kind of danger, we are at the red circle - P19.

Third, the participants expressed a sense of hopelessness and worry towards the overwhelming adverse challenges to Kandyan homegardens. Approximately 71% of participants had a negative outlook for the future of their villages. They stated that homegardens will likely significantly decrease, become unprofitable, and/or be overtaken by housing and city developments. For example, one participant stated, “I think Kandyan homegardens will disappear from this world […] and that is a very bad thing” (P24). The other participants (21%) expressed hope for the future of their personal gardens because they had children who were interested in taking over, while the remaining 8% of participants were indecisive. Despite these mixed sentiments towards the future, the majority of discussions ended with messages of resiliency and adaption to change through local action. For example, with Figure 17b, one participant shared;

I am trying to show a symbol. These slippers represent the long journey that has been completed already by farmers in their homegardens, but now the slippers have hit a sort of obstacle [the staircase]. It has to overcome it to continue. So even though homegardening can

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Figure 17 Photographs displaying underlying themes, from left to right: a) Drawing of reducing self-sufficiency in the homegarden - P19, b) ‘Homegardens have come very far, but today we face obstacles, we have to keep working ’ – P6
be really harsh, still this pair of slippers moves forward as a farmer does through life. The
slippers know the hardships the farmer goes through, but it has to take the next step. We have
to somehow overcome the situation to make the homegarden a success – P6.

The participants were eager to teach one another ways to overcome issues. This
knowledge transfer was made easier during the research with the visual tool of photographs.
Overall, throughout the study, a sense of pride in owning and managing a homegarden was
evident in all the participants. They described the many ways that the homegarden has benefited
their livelihoods and many were hopeful their homegarden would be inherited by future
generations.

DISCUSSION

An important part of adapting and conserving Kandyan homegardens is to first
understand the diverse array of changes that homegardens are facing (Kumar and Nair 2006;
Pushpakumara 2012). Our study revealed both productive and viscous cycles of change, as well
as social and environmental changes, and the interplay between them. Photovoice was useful for
exploring these complexities through the lens of the farmer, and understanding the
interconnections of change within their livelihoods. As authors note, every homegarden and
homegarden dweller is unique (Kumar and Nair 2006), and each will adapt based on their
perceptions of socio-ecological change (Andrachuk and Armitage 2015). Therefore, our study
suggests that research on homegarden dynamics is not complete without the knowledge of local
communities who experience and adapt to change daily.

Our findings build on existing knowledge of socio-ecological change in Kandyan
homegardens, such as previous work from Mohri et al 2018, Weirsum 2006, and Landreth and
Saito 2014. However, the socio-ecological changes presented in our research are not new, as that
was not the focus of this study. Instead, through photovoice we; 1) took a participatory approach
to reveal the local perspectives and current experiences of change in Kandyan homegardens; 2)
presented the data through narrative and visual representations of change; and, 3) revealed how
this combination of a participatory and visual approach allows for new and deeper insights to
emerge that would likely not in other methods. The following discussion builds on these points
to demonstrate how photovoice can be advantageous in homegarden research.

First, photovoice is a participatory method that shifts the power from the researcher to the
participants (Castleden et al. 2008). In our study, this approach positioned the farmers as experts
on their lived experiences of change in homegardens. The researcher was then positioned as a
learner, and the participants led the process. This method created a voluntary approach for individuals to share their experiences in the homegarden. For example, rather than having to answer specific questions in an interview, the participants had weeks to reflect on what they wanted to share and were not limited on the number of photographs they could take. The participants also chose which images to discuss with the researcher, in the order of their liking. Our study found that this approach allowed interviews to be told as a “story” which is more congruent with traditional rural Sinhala culture (Hochegger 1998). Through a participatory approach, the group discussions allowed for co-production of knowledge. It ignited a sense of community and brought individual experiences together to form a collective experience in homegardens (Liebenberg 2018). One participant shared, “we should continue to learn from each other like this. When one of us has a problem in the homegarden, we should share what is happening, and teach each other our ideas” (P19). It is only through a community-embedded approach, like photovoice, where participant-driven data that is grounded in local knowledge can be created.

Second, the use of photographs prompted valuable learning and reflection on participants’ homegardens and livelihoods, in ways that words alone could not (Harper 2002). Throughout the photovoice process, Liebenberg (2018) suggests that individuals reflect on images multiple times throughout the study, which generates more critical thinking, (i.e. when they first take a photograph, when they choose to share that image, when they attach meaning to the image, and when the group responds, interprets, and discusses the image). In our study, photovoice allowed the participants to create awareness and re-examine their everyday environments and relationships with their homegarden. Many described that “they learned something from this research” (P23), and it made them “think about [their] homegardens in a new way” (P1). The combination of visuals and narrative also allowed the researcher to see homegardens through the lens of the participant. Moreover, it allows the researcher to accurately understand the essence of an issue (Nowell et al. 2006; Quigley et al. 2014). For example, we not only heard about the damage wildlife can cause, but also saw visuals of what that damage can look like in the homegardens (for e.g. see Figure 13b). In turn, the participants felt that their message was better conveyed. During the group discussions, the photographs provoked questions, emotions, and rich engagement. Finally, the use of images in this research offered an immediate and transferable way to disseminate the results within the community (Nykiforuk et
Rather than only an academic report, for example, the photography exhibition allowed the research to be understood by a wider audience (Wang and Burris 1997).

Third, this combination of a participatory and visual approach allowed new insights to emerge that would likely not surface in conventional methods, such as surveys or interviews (Harley 2012; Harris 2018). For instance, our findings report that as the photovoice process evolved, the participants were more reflective and added meaning to their photographs. As mentioned, when the participants shared their photographs as a group, it allowed them to learn from each other and widen their perspectives on issues. This process generated more in-depth narrative on the changes in homegardens and how they have impacted their livelihoods. One example was P19’s drawing near the end of the study in Figure 17a, where he highlighted the concept of reduced self-sufficiency from the homegarden. Photovoice allowed participants to reflect on how homegardens are deeply embedded into many aspects of their lives, from income generation and food sustenance to their health, history, culture, community, and social relationships. In this way, when the participants analyzed and connected their photographs, they revealed how one element of change could have ripple effects in homegarden systems. For example, this was discussed around the influx of plastic materials (Figure 11c,d). This trend was connected to the reduced utilization of certain species in homegardens, contributing to a loss of traditional knowledge and practices, and increased garbage in the villages. Photovoice is a useful method for unpacking these dynamics, and it allowed our findings to reveal rich insight into the human-ecological relationship in Kandyan homegardens.

Today, scholars are calling for a more comprehensive and collaborative approach to both homegarden research and agricultural development (Pushpakumara 2012; Landreth and Saito 2014; Steinke et al. 2019). The research available on Kandyan homegardens is generally limited and most studies are grounded in scientific methods and quantitative approaches (Mattsson et al. 2018). Yet, Kandyan homegardens are rooted in complex cultural and behavioural ambiguities, and this reality may skew the practical value of quantitative methods. Steinke et al states, “[c]omplementing quantitative approaches with participatory research may help cut through this complexity and link the analysis with reality on the ground” (2019). Our in-depth and varied findings from the local perspective suggest that there is a lot of potential for photovoice research to be sequenced with quantitative methods. Photovoice can build practical theory that is situated in the local context (Harris 2018). By combining the strengths of quantitative approaches and
GIS mapping with methods like photovoice, research on homegardens can provide a more holistic analysis. Photovoice can also be used as a form of triangulation for data (Bennett and Dearden 2013). However, it must be noted that photovoice does not only add rigour to the data, it adds rigour through the methodology itself. The process of participatory inclusion, building trust with communities, and the co-production of knowledge is powerful in shaping the results of research. Nevertheless, there are some important limitations to photovoice (see Wang and Burris 1997), particularly as it was used in this study. We had a low sample size of 24 participants and a relatively short project timeframe of 3 months. This is not representative of a Kandyan homegarden’s annual growing season, additionally, it would have been beneficial to establish more rapport as a group.

Authors agree that conserving homegardens for the future will need to be a combined effort from local communities to national governments (Landreth and Saito 2014; Mattsson et al. 2018). As Landreth and Saito report, some national homegarden initiatives in Sri Lanka have not met local needs and have therefore not been very effective (2014). In order to ensure more uptake and sustainability of programmes, researchers agree that policies for homegardens need to include local communities and be context specific (De Zoysa and Inoue 2014; Landreth and Saito 2014; Mbow et al. 2014). We agree with this view, yet call upon researchers to include farmers through participatory approaches. Our findings suggest that photovoice is a valuable tool to engage homegarden dwellers. Through visual documentation, it can reveal overlooked aspects of everyday life in the homegarden and transfer this knowledge to establish dialogue between homegarden communities and policy makers.

CONCLUSION

Kandyan homegardens have endured over centuries, and the main driver of their existence is the local farmers that manage them. Despite the pressures of agroecosystem change, homegardens continue to provide immense benefits and offer a promising approach to achieving multiple Sustainable Development Goals (Weerahewa et al. 2012; Mattsson et al. 2018). This remains possible from the daily practices and decisions of local homegarden communities.

This article presented empirical data from farmers in three Kandyan homegarden villages. Its findings are significant for homegarden research as we present visual documentation of socio-ecological change from the local perspective, and this has seldom been studied in Kandyan homegardens.
Photovoice is a promising method for researching local knowledge systems and human-ecological relationships within homegardens. Photovoice, we conclude, is a robust method for agroforestry systems research with potential to supplement conventional quantitative surveys and GIS mapping.

REFERENCES


Kumar BM, Nair PKR (2006) Tropical Homegardens: A Time-Tested Example of Sustainable Agroforestry


CHAPTER FOUR

Teaching One Another About Change in Homegardens: A Photovoice Study in Kandy District, Sri Lanka

ABSTRACT
Homegardens in Kandy District, Sri Lanka, as communities in both the social and ecological meaning of the term, are sources of rich, local knowledge. This knowledge has allowed Kandyan homegardens to endure over generations, where they are a community and household necessity, and are known for their extended ecosystem services. In spite of this, local homegardeners’ knowledge and voices are lacking in homegarden research and policy. This study used the ‘photovoice’ method to create a dialogue with 24 owners of homegardens in Kandy District, Sri Lanka. Most participants have been involved in this land-use for at least 3 generations. The photovoice process is iterative and based on three methods: first, acknowledge the participants as experts and ask them what they would like to teach others about their homegardens. Second, adapt and use a ‘triple-loop learning’ approach with a ‘photovoice’ process. Third, present the research to the community through a photography exhibition. The looped learning approach embedded in a participatory use of photography had two objectives: to reveal deep local knowledge and perspectives, and to provide the opportunity for farmers to produce and share their knowledge with each other, as well as others such as, researchers, community members, students and youth. The results find that homegardeners want to teach their local strategies for adaptability and resiliency to socio-ecological change. Through teaching they codify by verbally and visually explaining their tacit and local knowledge that is embedded in their own homegarden and the community. The benefits are scaling knowledge about the economic, cultural and ecological benefits of a homegarden. This article concludes that rich, local knowledge can be revealed and shared through the photovoice method, and this knowledge needs to be mobilized for future homegarden and agricultural development.
INTRODUCTION

Homegardens are known as one of the oldest and most dynamic land-use and agroforestry practices in the world (Kumar and Nair 2004). These systems were developed by rural communities in order to support their households. Homegardens are found across the globe but are predominant in tropical regions (Kumar and Nair 2006). Despite the longevity of homegardens as a land-use system, there is still no explicit universal definition as they vary depending on the context. In general terms, however, a homegarden can be defined as a multi-story garden of trees and crops planted around the homestead, sometimes including, but not requiring, proximity to larger livestock (Soemarwoto 1987). They are usually located on small plots of land and consist of various timber trees, fruits, vegetables, spices, as well as medicinal and ornamental plants in stratified layers (Pushpakumara et al. 2010). Homegardens can also be referred to as ‘backyard gardens’ (Galluzzi and Negri 2010), ‘forest gardens’ (Perera and Rajapakse 1991), ‘kitchen gardens’ (Ruiz-Ballesteros and Cáceres-Feria 2016), or their local name, as well as encompass concepts such as ‘victory gardens’ (Herrmann 2015) which has recently returned with the Covid-19 pandemic discourse.

The sustainability of homegardens is rooted in the capacity of local people to adapt their garden over generations to meet their needs (Soemarwoto 1987; Mohri et al. 2018). Today, homegardens are known for their rich biodiversity and ecosystem services that span from local to global scales. Due to climate change and environmental degradation, the importance of sustainable food production that is self-reliant at the household and community levels, has been at the forefront of international policy (FAO 2008; Pushpakumara et al. 2019). Homegardens have been regarded as a promising measure to counter these concerns; as recent studies have shown that homegardens support carbon sequestration, biodiversity and genetic conservation, and food security (Lindström et al. 2012; Weerahewa et al. 2012; Galhena et al. 2013; Mattsson et al. 2013, 2018; De Zoysa and Inoue 2014). What is often undervalued, however, is that these benefits derive from the daily local practices and tacit knowledge of homegarden caretakers (Kumar and Nair 2004). Researchers suggest that by combining tacit knowledge with new codified science and technology development, homegardening across the globe can aid in achieving multiple Sustainable Development Goals (Mbow et al. 2014, Senanyake 2006).

Despite the known benefits and time-tested credibility of local knowledge in homegarden communities, ruminating discourses continue to dismiss it as ‘backwards’, ‘primitive’, and
‘peasant behaviour’. The realm of academics and modern techniques remain superior over local knowledge (Doane 1999; Koohafkan and Altieri 2017). Consequently, rural peoples’ voices proceed to be largely excluded from research and policy (Lykes et al. 2003; Prins 2010).

This study sought to employ a research methodology that positions homegarden caretakers as experts. This is achieved through the participatory and visual method known as ‘photovoice’. Photovoice is a qualitative research method that uses photography and narrative to reveal participants’ knowledge and experiences of everyday life (Wang and Burris 1997). How this method was combined with a triple-loop learning approach is further discussed in the third section of this paper. This study used photovoice to generate critical dialogue and reflection on homegardens, with 24 Kandyan homegarden caretakers in Sri Lanka. The goal of this study was to reveal, produce, and share the knowledge of local caretakers. This article presents evidence in the form of images and stories collected through the photovoice method.

**Background: Local Knowledge in Homegardens**

Kandyan homegardens are socio-ecological systems that are deeply connected to the history, culture, traditions, food, health, economy, and livelihoods of Sri Lanka. The local knowledge embedded in these communities is inseparable and interconnected to each of these dimensions, making it highly complex (Thompson and Scoones 1994; Woodley 2005). Yanow (2004) defines local knowledge as the “… intimate familiarity with and understanding of the particulars of the local situation”. It is often tacit and combines the expertise, practices, beliefs, and skills of people who have extended interactions and experience in their context. This knowledge enables them to both benefit from and overcome challenges in their environment (Sithole 2007; Padmasiri 2018). In homegarden communities, local knowledge is often passed down from generation to generation. It can take years of practice and experience to accrue and is constantly evolving (Kumar and Nair 2004; Padmasiri 2018). Researchers note how homegardens are places of on-going innovation, where farmers continually refine trial and error experiments to adapt to changing conditions (Landon-Lane 2012). Their expertise includes the management and understanding of typically hundreds of plant species grown together in stratified layers (Pushpakumara et al. 2010; Koohafkan and Altieri 2017). This knowledge of plants expands to financial, social, and cultural capital, and is linked with understanding food, origins, medicine, religious practices, and gifts (Murrieta and WinklerPrins 2003). It can therefore be regarded that the knowledge of homegarden caretakers is rich, multi-dimensional,
and difficult for outsiders to fully grasp (Van Herzele and Van Woerkum 2008; Koohafkan and Altieri 2017).

As researchers become more intrigued with local knowledge, the reality is that it is quickly eroding from communities (Padmasiri 2018). Effects of modernization, globalization, and migration are resulting in people becoming less interested and dependent on homegardens (Siriginidi 2006). This is especially true for young people whose lifestyles and food preferences are changing. They tend to migrate to urban centers and learn less about agriculture (Angel-Pérez and Mendoza 2004). The rate of local knowledge being lost is defined as a global crisis (UNESCO 2017), as it is recognized as a critical component of future sustainable development (Senanayake 2006). In Sri Lanka, authors are calling for more research to include local communities (De Zoysa and Inoue 2014; Landreth and Saito 2014; Mbow et al. 2014). This inclusion can invite homegarden development policies to be enriched with local knowledge, allowing them to be more effective and suit the local context (Landreth and Saito 2014).

**RESEARCH APPROACH AND METHOD**

In this study, we are interested in revealing, sharing, and co-producing local knowledge with Kandyan homegarden farmers. To guide our work, we draw on the epistemology of constructivism (Bodner 1986), which is grounded in the idea that knowledge is built through experiences accumulated over life. Knowledge is shaped by one’s context and influenced through social interactions (Petheram et al. 2011a). Hence, each individual is unique in their understanding of the world. In this respect, we look to social learning theory, which at the basic level is the concept that people learn and are influenced by others. Through the reflection, engagement, and deliberation of one’s experiences, and understanding others’ perspectives and experiences, learning opportunities are created (Bandura 1977). In socio-ecological systems such as homegardens, there is a constant need to adapt to change and revise existing understandings (Biggs et al. 2012). Learning and local knowledge is therefore not static, it is always evolving and should be understood as a process rather than a resource (Thompson and Scoones 1994; Murdoch and Clark 1994; Van Herzele and Van Woerkum 2008; Jaffe 2017). Murdoch and Clark (1994) state that as a process, knowledge should therefore be studied “in action” and in everyday contexts as something to be produced.
To distinguish between the various depths of learning that took place in this study, this research looked to triple-loop learning theory (Argyris and Schön 1978). Triple-loop learning is the concept of three scales of learning that builds deeper reflections on a topic or issue, generating increasing degrees of action on what is learned (Argyris and Schön 1978; Groot and Maarleveld 2000). Briefly, the ‘single-loop’ of learning involves identifying and analyzing the ‘what’; for example, ‘what is the issue, and what can we change?’ Double-loop learning enables deeper critical thinking and awareness to build collective understanding. In this study, it involves more of the ‘how’ questions such as, ‘how did these issues arise?’ Finally, the triple loop of learning goes beyond the individual and collective understanding to think about the ‘big picture’. In this study, it involves further questions of ‘why’, for example, ‘why do we have homegardens?’ The triple-loop level questions the underlying principles and values. It involves ‘unlearning’ existing perspectives in order to reconstruct one’s understanding of their context (Argyris and Schön 1978; Foldy and Douglas Creed 1999; Eksvärd 2010).

![Diagram of learning loops](source: Eksvärd, K., 2010. Facilitating Systemic Research and Learning and the transition to agricultural sustainability. Journal of Agricultural Education and Extension 16, 265–280.)
Photovoice

Our research utilized a participatory and visual approach to strengthen the occurrence and depth of sharing local knowledge. As mentioned, local knowledge is complex and multi-dimensional. It is a blending of memory, practices, skills, tacit, and embodied ‘ways of knowing’. In this respect, local knowledge is difficult to elicit through formal research methods that are principally text-based (Beebeejaun et al., 2013; Thompson and Scoones, 1994). Even with participatory approaches that aim to be inclusive, Beebeejaun et al. (2013) argue that text-based research excludes people who are not academically or professionally orientated. These methods only re-establish power and knowledge inequalities between the participants and researchers (2013). Castledon et al. (2008), Harley (2012), and Harris (2018) argue that the incorporation of visual methods can overcome these challenges. Visual tools allow participants to better represent their perspectives and knowledge (Thompson and Scoones 1994). Harris (2018) and Nykiforuk et al. (2011) show that visual methods reveal deeper reflections and new insights that would likely not emerge through text. Visuals can provide a sense of common language and they are more accessible for people to understand (Van Herzele and Van Woerkum 2008). They allow participants to contribute in a practical way and engage effectively in research. In photovoice, it is this combination of participatory and visual techniques that suitably invites marginalized peoples to reveal and share their knowledge (Castleden et al. 2008; Petheram et al. 2011a).

Photovoice was developed by Wang and Burris in 1994. It utilizes both photography and narrative from the lens of participants to capture local experiences and knowledge of their surrounding environment. In this method, the participants are acknowledged as experts. They are given a camera to record their experiences and views on a certain topic. In this way, they become co-researchers by leading the data collection and analysis of their photographs. Wang and Burris (1997) describe three underpinning goals of photovoice, which in turn, echo the stages of the method: 1) for participants to individually reflect on the strengths and issues of their environment and record this through photography, 2) to share photographs as a group and generate critical dialogue around important issues, and 3) to influence decision-makers through presenting the photography research.

Photovoice is often used with marginalized communities as it both honours and elicits alternative ways of knowing (Liebenberg 2018). The photographs can ‘speak’ more than words
alone, and this helps the participant better explain their point of view (Harley 2012). During the group discussions, the images generate deep dialogue and engagement, creating rich data through the process (Petheram et al. 2011a; Liebenberg 2018). Photovoice also encourages on-going reflection, which allows the participants to build critical consciousness of their local environment. The participants then use this awareness to turn overlooked aspects of everyday life into political statements (Carlson et al. 2006). Through local dissemination of the research, photovoice brings the voices of underrepresented people into the conversation to create change in their communities (Castleden et al. 2008; Wang and Burris 1997). In this respect, the participants can build capacity on their local strengths and issues (Wang and Burris 1997).

**Research Context and Participants**

In Sri Lanka, approximately 70% of rural households have a homegarden (FAO 2009). These systems are a form of ancient and traditional land-use in the country. Kandyan homegardens are found in the wet zone of the country, predominantly in the Kandy District. They are known for their rich biodiversity that is exceptional over homegardens in the dry-zone of Sri Lanka, and others around the world (Pushpakumara et al. 2010; 2012). Kandyan homegardens are dense with multi-storied configurations of tree and crop species. They are home to diverse flora and fauna and are recognized for conserving at least 200 species in Sri Lanka (Jacob and Alles 1987; Martin et al. 2019).

Kandyan homegardens are often grown on hillsides of the rolling landscape of the area. The lowland valleys are usually occupied with paddy fields, while other nearby land-use systems consist of tea and rubber plantations as well as natural forest patches. This forms a kind of land mosaic that characterizes the rural areas of the Kandy District (Hochegger 1998). Kandyan homegardens are situated in a high population density of an average of 704 people per square kilometer, where the land is subject to intense fragmentation (IUCN 2007; Mohri et al. 2018). Over generations they have supported rural families with direct access and an annual supply of ecosystem services such as, fuelwood, fodder, timber, medicine, food, and nutritional security. In Sri Lanka, the homegarden is used for both home consumption needs and for income generation through selling produce in markets. Studies report that households receive 30-50% of their total income from the homegarden (Pushpakumara et al. 2010). They are known for the relatively little labour and inputs required, and in general, the labour is divided evenly among the male and female heads of the household.
Our research took place in the three villages of Elladetta (7.215443, 80.577747), Petiyagoda (7.217104, 80.584694), and Lankatikalaka (7.233482, 80.568335). These villages neighbour each other and are approximately 15km from Kandy City. We worked with 24 Kandyan homegarden caretakers, where 8 participants were recruited from each village. The participants were recruited through two key informants and included based on their willingness and ability to participate. There was a total of 16 females and 8 males. Half of the participants chose to partake in the photovoice process with their spouse or other family member as well. The participants represented a range of education levels from completion of primary education to university degrees, with the majority having completed secondary school level. The age range was between 23-85 years old, with the average age of 56 years. The project took place over 3 months from December 2018 – March 2019.

**Steps of Photovoice**

At the start of the project, the participants were engaged in a workshop on photovoice and the research objectives. The overall theme of the project was to explore socio-ecological changes in homegardens from the local perspective. The research question examined in this paper is; what do homegarden caretakers want to teach others about Kandyan homegarden (such as policymakers, extension workers, researchers, youth, and/or other farmers)? Each participant was given a digital camera to record their responses. The participants had approximately two weeks to take photographs on their own time.

This research modified the photovoice method to include interviews with each participant (as suggested by Palibroda et al., 2009; Petheram et al., 2011). The interviews allowed the participants to form their narratives for their photographs individually before presenting to the group. It also created an opportunity for the researcher to build more rapport with each participant. The interviews were between 30 minutes and 4 hours in length. The photographs were displayed on a laptop and the participants selected which images to discuss in the order of their choosing. The participant led the interview, however, to stimulate more conversing and reflection, the researcher asked prompting follow-up questions such as; ‘how did this issue evolve?’ Or ‘What do you think is an appropriate solution moving forward?’ The participants selected their top photographs to share in the group discussions and these were printed.

Four group discussions were conducted, with one in each village and one combined group discussion with 4 volunteer participants from each village. The participants shared their
photographs with each other and identified emerging themes. The images were then categorized into themes, and the participants selected the most important photographs and narratives to share at the photography exhibit. The group discussions were 3 to 4 hours in length.

The final stage of the photovoice project was the photography exhibit. This took place at the University of Peradeniya. The exhibit was open to the public, however, deans, professors, staff, and students from the agricultural department at the university were specifically invited to attend. The participants also invited their family members and neighbours. The exhibit stimulated dialogue between the homegarden caretakers and academic professionals and students at the university. It also allowed the knowledge from the research to be quickly disseminated and shared with the community, in an accessible and understandable way. At the end of the project, the participants received a small honorarium of 5000 Sri Lankan Rs. (~36CAD). The exhibit materials and photographs were left with the participants, as they discussed the idea of hosting another exhibit in the future.

Figure 19 Stages of the photovoice study
An interpreter was present during all the interviews, group discussions and the photography exhibit to translate from Sinhala to English. The interviews and group discussions were audio-recorded, transcribed, and further analyzed in NVivo, a qualitative analysis software. We focused on thematic coding based on the themes that participants identified during the study. Axial coding was included where a relationship would likely reveal, such as comparing data across gender and education levels.

RESULTS

Two underlying themes emerged in response to the research question, ‘what do you want to teach others about your homegarden (for e.g. policymakers, agricultural extension officers, researchers, youth, and/or other farmers)?’ The first theme centered around the participants teaching one another pathways to adapt and move forward in homegardening. This was shared through photographs of: a) local strategies to address current issues, and b) the need to recognize and utilize local knowledge. The second underlying theme centered around teaching others the strengths and benefits of having a homegarden.

The categorization of these themes parallels who the participants were addressing as their audience when answering the research question. For instance, the first theme was generally directed towards teaching fellow homegardeners, and the second theme was generally directed towards teaching non-homegardeners such as youth, researchers, and policymakers. The findings report no significant relationships in the information shared by participants of different education levels. This reveals that the local knowledge base of homegardeners is not necessarily relative to formal education. In presenting these results, we draw from the participants’ photographs and narratives included during the interviews, group discussions, and final exhibit.

“We can adapt”; Teaching One Another Pathways to Adapt and Move Forward

Section A: Strategies to Address Current Issues

Through the photovoice process, the participants became the problem identifiers and solution-givers in the research. The interviews played an integral role in allowing the participants to sort through and analyze all their photographs. It was the first stage of reflecting on the photographs they took, and it allowed them to further construct and share the meaning of each image. During the study, the participants identified various challenges that they faced in their homegardens. The most frequently discussed issues were wildlife obstructions, labour shortages,
land fragmentation, soil erosion, and pests and diseases. The participants wanted to share the various strategies they have acquired to manage these difficulties. Their intention of bringing these photographs forward was to teach fellow farmers their coping methods and useful practices in the homegarden. Thus, it was not until the group discussions that these photographs really “came to life”. The act of using the photograph to teach others in the group elicited more meaning and deeper reflections. A summary of this theme with photographic examples is found in Figure 20.

The most heavily discussed issue by every participant was the increasing trend of wildlife obstructions in the homegarden. This issue was largely related to damage from wild boar, porcupines, and macaques. It was described by participants as “one of the greatest threats” for the future of Kandyan homegardens. A myriad of techniques for protecting plants from wildlife emerged in the photographs. This included using iron plates, mesh, plastic, noisemakers, fences, cloth, among many other items, around the base of the plant or homegarden perimeter, (see in Figure 20a,b). For example, one participant explained his technique, “if you cover the base of the plant with bamboo, it’s difficult for porcupine claws to grab and chew it because bamboo is so silky […] This is kind of a local resource, so it’s cheap, and it works” (P3). The participants were proud to share their ideas with others, and in turn, appreciated listening and learning from fellow...
farmers. Many also suggested the need for more organized community effort and government intervention for long-term prevention of the wildlife problem. For example, all the participants stressed the importance of “clearing up overgrown abandoned areas of land in the village” as these areas provide spaces for wildlife to invade. Additionally, some suggested the possibility of “wildlife sanctuaries with electric-wire borders” to keep animals out of homegarden areas.

Throughout the study, land fragmentation was another major concern. With reduced space in the homegarden, the participants illustrated multiple ways they have adapted their land management and methods of growing. The most common technique, however, was planting in pots or polybags around the home where soil was unavailable in order to “maximize the land-use” (see Figure 21a). One participant described this;

People’s land is decreasing to sometimes only 10 perches from fragmentation. So that’s why we are now doing bagging of plants […] to maximize the growing opportunities of the homegarden […] I have a lot of bedrock and it’s a huge difficulty in my homegarden, but I can still use these areas by growing in bags. I can teach this technique to others. Some people have given up, but I want to talk about how we can use these areas - P6.

The key message underlying these strategies was, “efficient land-use”, with the hope that homegardens can continue to fulfill their needs. Some participants emphasized the necessity to “use all the space in the homegarden to be beneficial in some way” (P17) (Figure 21b). The participants discussed how land management is a key component of Kandyan homegardens. It is part of their knowledge that has been both passed down over generations and acquired through years of experience (for example see Figure 21c).

Many participants also spoke about soil erosion and presented numerous approaches to conserve and keep soil fertile. Some techniques mentioned were terraces, “lock and spill” drains (Figure 22a), self-made irrigation systems, levelling sloped land, planting China grass

Figure 21 Photographs displaying efficient land management strategies, from left to right, a) ‘planting in bags to maximize our growing opportunities’ – P17, b) ‘Even in limited spaces between the road and the paddy field, we are growing banana, we don’t have space, but still we are doing that! It shows that no matter how small, you can use the land in a fruitful way’ – P17, c) ‘I have managed my homegarden effectively with gliricidia, pepper, and coffee grown together. The coffee needs shade so I planted gliricidia trees then the pepper vines are guided up the gliricidia trunks’ – P1.
(Ophiopogon intermedius) (Figure 20e) or bamboo, planting in contour lines (Figure 22b), making organic compost and “vermiwash” fertilizer (Figure 20f), among others. The participants often emphasized strategies that served multiple benefits in the homegarden. For example, one participant shared his multi-purposeful soil management strategy with Figure 22b, he explained;

This is my areca nut [Areca catechu] cultivation. I planted it in contour lines because my land is quite steep. Since these plants have a fibrous root system and they have been planted with close spacing, they prevent soil erosion. I also didn’t use any chemical fertilizers, instead I put down organic matter like gliricidia [Gliricidia sepium] leaves […] I also chose a new variety of areca nut that comes to fruit-bearing stage after only 5 years, and this provides me with a good income for retirement, and at the same time, the erosion here significantly decreased after I started this. I want to share this picture in the exhibit because of all it’s benefits - P15.

Indeed, the use of a visual allowed the participants to not only better explain their strategy and articulate their knowledge, but to show it to others. During the interviews and group discussions, the participants felt their ideas were more understood by the researcher and other homegardeners, especially when the image had multiple messages. Moreover, some participants used the photographs as a visual tool to display step-by-step instructions for a technique. For example, one participant used a sequence of photographs to show the steps of making compost. She stated, “I want to give the message of using organic compost for the soil and to teach this process to others” (P24) (see Figure 20c).

The group discussions allowed for ample peer-to-peer learning as the participants listened to each other’s ideas and deliberated strategies. As the participants came from different education levels, types of employment, and various generations of homegardening, photovoice allowed

Figure 22 Soil management strategies, from left to right, a) ‘this drainage canal diverts water and allows me to redistribute eroded soil back into the homegarden … since I dug this drain I am getting good yields, and it’s possible for everyone to do’ – P9, b) ‘Areca Nut in contour lines for income and soil protection’ – P15.
them to learn from each other’s unique experiences and generational knowledge. Many photographs that participants brought forward displayed a blending of knowledges and experiences. For example, during a discussion of pests and diseases in the homegarden, one participant shared his story with Figure 23a;

These banana trees were affected by a disease. I learned from people at the agricultural department a way to bring it back to good health. First you remove the affected branches and burn them. Then you collect the ash created from this and pour it around the base of the plant. Scientifically, it changes the pH to get rid of the disease, but this is actually an indigenous method, and now my banana trees are recovering. I think other people can learn from this – P15.

Some participants brought forward photographs of pests or diseases in their homegarden with the “hope that other farmers will know a good solution” (P10), for example see Figure 23b. When P10 shared her issue (Figure 23b), the group responded with suggestions as some had dealt with the pest before. Thus, just as much as photovoice allowed the participants to teach others, it also provided an opportunity to learn. Some later commented that photovoice had been “useful for sharing knowledge with each other”. They encouraged the group to continue with this kind of farmer to farmer support and deliberation of their strategies.

**Section B: Recognizing and Utilizing Knowledge in Homegarden Communities**

Throughout the research, the participants continually reflected on the knowledge that is embedded in homegarden communities. For example, many discussed traditional practices and knowledge from past generations that they still use, or should be using, as a local strategy in homegardens, such as; traditional pest control methods (Figure 20d and 23a), land and soil

![Figure 23 Pest management strategies, from left to right, a) ‘My recovering banana plant’ - P15, b) ‘An infected Areca nut [...] the black ants make shelters out of the decaying leaves [...] I am hoping someone can help me find a solution’ – P10](image-url)
management techniques (Figure 21c and 22), cultural and religious practices (see Figure 27 and 28g,h), medicinal plant knowledge (see Figure 28d and 30c), and water conservation practices. Underpinning these discussions was a strong appreciation for local knowledge and knowledge passed down through generations. For example, with Figure 24a, one participant shared;

In the past, there were a lot of traditional practices around the use of water for homegardens. We carried the water using clay pots, and these pots actually absorbed bacteria in the water. We also had a ‘kamook’ tree planted close to the well. It is scientifically proven that these tree roots can absorb the containments in water. But now most of the wells are abandoned, the water can be heavily contaminated, you can’t even think of using it today because of all the harsh chemicals and pollution dumped into these waterways. People are mostly using tap water now and it is being treated with chemicals like chlorine. From media, I learned that even though the tap water is treated, still it is not as good as the well water once was – P5.

The participants wanted to remind and teach each other to recognize their traditional and local knowledge. Often accompanying these perspectives was the desire to teach others about the deep interconnectivity of their past livelihoods with nature. The participants felt they were losing this knowledge and mentality towards life. They felt the importance of homegardens was fading with modernization. For example, one participant stated;

The homegarden is full of resources, but we are not using these resources to their full potential anymore [...] The issue is that it has broken the cycle of how livelihoods and the homegarden connect, and how everything we used we recycled back into the environment – P19 (see Figure 24b).

Drawing from these reflections, P19 later continued, “we are leaving behind a lot of good things that our ancestors taught us [...] The challenges we face today are because we have forgotten our knowledge and practices from the past”. The participants discussed the need to teach the sustainable lifestyle of homegardens to future generations. However, they felt youth generally lacked interest in homegardening, and this worried them for the future. One participant reflected on the differences between her childhood and children today, she shared;

My childhood was very different from how my grandchildren are now living. In my days, as a family we would go to the garden to work together, but now children don’t even have a sense of what it is like and what their parents do in the land. They don’t see the value of agriculture [...] or have the same connection to nature as we did [...] In the past, we built up our senses to nature and walked through forests to get to school. We picked fruits and saw wild animals on the way. Today, children are so concentrated on their phone, they wouldn’t even notice an elephant [...] It is not their fault, it is also ours, we need to involve our children in the homegarden so they can see its value – P5.
The participants also expressed deep frustration over the lack of government action to promote and engage youth in agriculture. They felt the appropriate measures to tackle this issue was to first “create a good image of farming” (P23). As this participant continued, “People see being a farmer as inferior to something else. But with subsidies and new technologies, the government can make a positive impact and encourage youth […] They can change this trend” (P23, also P16, 19, P22). During a group discussion, another participant added the need to teach about homegardens in schools, he stated, “I went through all my children’s textbooks, but not one contains anything about homegardens […] Our knowledge also has to be passed down in a more formal way” (P19). The underlying message of these discussions was the need to recognize the knowledge already embedded in homegarden communities, and to teach the ways their knowledge is still relevant today. For example, P19 continued this message and stated, “of course, we have to move forward with technology and development, but we also have to think about it, can we combine development with the good from the past, to create a kind of harmony for the future?”

Throughout the research, as the participants deliberated strategies to adapt in the homegarden, shared collected experiences, and learned from each other, they reflected on their capacity as farmers. Several participants wanted to teach one another through the experiments

Figure 24 From left to right, a) the old method of collecting water – P5, b) The naturally made materials from the homegarden are environmentally friendly and bound to our culture, I want to compare this to the chair, where everything is made of plastic today. We are no longer using the resources our homegarden provides – P19.
they were conducting in their homegarden. They discussed how they can produce their own knowledge and learning opportunities, and this can then be shared with neighbours for the betterment of the village (see Figure 25 and 26). For example, with Figure 25a, one participant presented his experiment of propagating agarwood trees (*Aquilaria malaccensis*), he shared;

This photo has two meanings. The first one is about a layering technique of rooting branches, called ‘gudthi’. This technique allows me to propagate plants that are not starting from seeds. I want to share this knowledge with others. The second thing, is that people are complaining of the wildlife attacks or that they don’t have the proper propagation materials [etc..], but I want to say that there are so many techniques that we can test out, so why don’t we try these things? Nothing is impossible, if you really want to grow something, there is a way to do it. For example, of course plants are normally grown by seeds, but we can also use other methods. Even plants which cannot be propagated easily, can be propagated by changing the technique or learning a new method of growing. Similarly, whatever difficulty we face in the homegarden can be overcome by thinking about the situation differently - P6.

Experimentation was seen as a local action to adapt and build capacity on their local issues. In other cases, a few participants shared inventions they created to overcome challenges in the homegarden. For example, one farmer showcased his invention for moving young plants around the homegarden to ensure they receive adequate sunlight. As Kandyan homegardens are often dense with heavy shade, the participant stated, “I want to give the message about an issue which exists in the homegarden, and a way to mitigate it through your own will […] Like creating your own solutions to the limits of the system” (P13). The photovoice process allowed participants to share how they have adapted and overcome adversity to remain resilient in homegardens. However, not only was the key message of these photographs about adapting, it

![Figure 25](image)

**Figure 25** Photographs displaying experiments in the homegarden, from left to right, a) the ‘gudthi’ layering technique – P6, b) ‘Comparing organic and synthetic fertilizer […] organic compost has given good yields, so I want to transfer this knowledge to others, it shows that chemicals are not a must in the homegarden’ – P3.
was also about the need to acknowledge the skills and expertise embodied by farmers (see Figure 26a). As one participant affirmed, “there are people here with a lot of knowledge and skills in our own community” (P12).

The visual technique of symbolism was used by many participants during the research to reveal deeper concepts or perspectives. With Figure 26b, P19 used symbolism to illustrate the distinction between local knowledge and knowledge of government agricultural officers. He shared a message that homegarden caretakers are key sources of knowledge as they “know the existing situation in the village”. He continued;

This picture is a scarecrow or ‘pabaya’, which is dressed as a man in government. In Sri Lanka, a ‘pabaya’ is lazy or unintelligent [...] My point is that these agricultural officials are not coming here to homegardens anymore, they don’t leave their offices and so they don’t know what’s happening on the ground [...] They don’t ask us questions anymore and so the answers they are giving us are not practical [...] I think instead of always going to them, we need to find our own solutions as well. They may be more educated, but only in theory, [...] they don’t have the practical knowledge like we do – P19.

This evolved into a discussion around the need for more engagement and respectful dialogue between farmers and the agricultural department. They felt that there should be more investment in local leaders and communities through “subsidies, training, and scaling up local

Figure 26 From left to right, a) ‘I’ve learned many things from school, but my grandfather has a lot of knowledge about making compost. He’s been doing this for a long time and knows how to do it really well’ - P23, b) ‘A scarecrow dressed as a man in government’ – P19.
businesses” (P23). The participants also reflected on the value of sharing knowledge with each other. They commented on how homegardening is better as a community effort.

Many reminisced of their past “cooperative culture” and stressed the need for more dialogue within the community. Some participants reflected on these values and presented them as a way to move forward in homegardening, see Figure 27.

‘It gives us everything we need’; Teaching One Another the Strengths of Homegardens

The final theme that emerged was to celebrate and share the benefits of having a Kandyan homegarden. The participants wanted to teach others, specifically youth, researchers, and policymakers, why they have a homegarden and why they should be conserved for the future. The key benefits and strengths of homegardens that participants highlighted were: prosperous plants, income, food security and sovereignty, access to medicine, aesthetics, environmental stewardship, and the homegarden as a connection to knowledge, religion, history, and culture. A summary of this theme displayed through participants photographs is shown in Figure 28.
The participants were proud and eager to share these photographs throughout the research. Often accompanying these images was an articulation of the deep-rooted knowledge and work required to obtain the desired assets of the homegarden. For example, one participant began his interview with a drawing to explain the efficient configuration of a “typical Kandyan homegarden” (see in Appendix II). He highlighted the intimate interplay between the diversity of plants and layers. He stated;

In Kandyan homegardens, the goal is to have a mixed farming system with a lot of plant varieties. We use the whole land with an efficient stratification both horizontally and vertically. On the ground we grow vegetables, then low bushes, then there are fruit trees, and then tall plants like nutmeg and jack fruit trees. Whatever strata you are considering, you have something there for you. Even underground there is a calculated stratification with tuber crops and roots like ginger and turmeric. It is a really dense cultivation, but there are so many benefits. I want to show the biodiversity and use of space. The Kandy area is ideal for gardening. From our ancestry, good things were passed down to us from the previous generations, and we also will continue to grow and pass this on to the future generation – P19.

Indeed, all the participants spoke to the provisions of the homegarden. For many, this was presented through photographs of successful and abundant plants. One of the most popular subjects under this theme was a coconut tree (*Cocos nucifera*) (see Figure 28a, 29a), as one participant explained;

It is one of the biggest assets in our homegarden [...] you can use the whole tree. Every homegarden should have at least one because it has a lot of benefits [...] Coconut trees are

![Figure 28 Images displaying the strengths of homegardens, from top left to right, a) 'a coconut tree provides many benefits' – P1, b) 'nutmeg is our best source of income' – P9, c) 'jackfruit provides food security' – P18, d) 'a rare medicinal plant in my homegarden' – P2, e) 'the beauty of homegardens' – P4, f) 'we help to protect the trees and environment' – P20, g) 'Buddhism is a part of our homegarden lifestyle' – P11, h) 'betel leaf is a cultural plant that we grow and give to visitors’ – P1](image-url)
often called ‘kapruka’, which means a plant that gives whatever you wish […] It is important to Sri Lanka and should be conserved—P1.

The participants also discussed income generation from homegardens through diverse techniques and a variety of plant species. Nutmeg (Myristica fragrans) was frequently highlighted as a good income source and a future “investment strategy” for participants who were, or were soon to be, retired. However, the participants also mentioned many other species. Moreover, they wanted to teach others, especially youth and fellow farmers, that “homegardens can be sustainable sources of income in this area” (P7) (Figure 29b). For example, one participant commented:

I don’t get a lot of money from my job […] but, because of the additional income I can get from my homegarden, I don’t have to worry about that […] There is no fruit in my homegarden that I don’t receive an income from, butterfruit, coconut, nutmeg, jackfruit, […] everything – P4.

Drawing from these teachings, the participants also emphasized their access to and availability of food in their homegardens (Figure 29c). For example, in times where the market has been “unpredictable and fluctuating” some participants described that they “felt they survived” (P20, P21, P4) because of the food grown in their homegardens. In discussing food security, several participants specifically pointed out the significance of jackfruit trees (see Figure 28c). They insisted it should be in every Kandyan homegarden, as one explained, “one jackfruit can feed a whole family, so it provides options to ensure food security. In Sri Lanka, we call it ‘bakla’ meaning ‘the rice plant’, because it can be a staple food” (P18).

Many participants conveyed a deep gratification for growing their own food. Women, in particular, emphasized the fact that they are able to feed their family from the homegarden. Often

![Figure 29](image)

**Figure 29** Images displaying abundance and prosperity of the homegarden, from left to right, a) ‘I want to show all the layers of the coconut, each layer we can use differently, and some people do not know about all the benefits of coconut’ – P10, b) ‘Instead of buying or selling imports, we can get a good income from our own homegarden’ – P7, c) ‘I have 25 banana plants. Cultivating and eating from our own homegarden is really important to me and makes me proud. In the market we don’t know what kind of chemicals are in the food’ – P20
accompanying these remarks were concerns around the potential of harmful chemicals and pesticides in market foods (see Figure 29c and 30a). They explained that having a homegarden gives them more control over what they feed their family and, “the food from the homegarden is fresh and clean, without incorporating any chemicals, and we feel proud to get everything from our own hard work” (P7). One participant shared a drawing (Figure 30b) to teach that even a minimal or fragmented homegarden today, “can still provide at least one meal a week for a family” (P19).

Several participants also shared stories and knowledge with respect to medicinal plants. They expressed the need to conserve the practices and knowledge of medicinal plants for future generations. As one stated, “I have learned [about medicinal plants] through generations and communication with other people […] I want to teach my children and grandchildren about them too” (P21). One participant displayed Figure 30c and explained;

‘Thabu’ [costus speciousus] is really good for diabetes […] it decreases sugar in the blood […] Today, most people go to the pharmacy and get tablets, but I want to give a message to society through this photo and put this photo in the exhibition, because it’s an important herbal plant that people should know - P15.

Medicinal plants were often described as “rare in the village”, and the participants were proud to share them with neighbours, as one mentioned, “when people need [medicine], they come to me and I give generously” (P21). A few participants had a more distinct focus on medicinal plants throughout their interview. One reason for this, which became evident as they told their story, was that they had a family member who had been ill. The accessibility and availability of growing medicinal plants in their homegarden was viewed as incredibly useful to their livelihoods.

Figure 30 From left to right. a) ‘A spoiled pumpkin from the market only a few days ago. I don’t know how long it has been sitting on the shelf, it is not as fresh as our homegardens’ – P19. b) ‘Even the most minimal homegarden can still provide at least one meal a week for a family of 5 (260 meals per year)’ – P19. c) ‘Thabu’ a medicinal plant in my homegarden, it is good for diabetes’ – P15
Photographs of flowers, greenery, sunsets, and other aesthetically pleasing scenes in the homegarden also emerged in the study. However, during the interviews these photographs were often dismissed as they were considered irrelevant to the research. It was not until later that some participants recognized aesthetics as another “strength of the homegarden” and considered it as an additional reason to conserve the environment. The participants decided to include a few images displaying “beauty” in the photography exhibit to relay this message. For example, with Figure 31a, one participant shared:

An environment filled with lots of plants is a wonderful scene to be a part of. There is so much variety and so much life even on a small leaf. We should be protecting the diversity of the homegarden. If we remain curious to investigate and learn more about the homegarden, then we will become more willing to protect it and its beauty - P6.

As this theme developed through group dialogue, the participants reflected on the role they play as homegarden caretakers in environmental conservation. They built deeper narrative and added more meaning to their photographs. For example, with a photograph of trees in her homegarden, one participant initially described this as “beautiful”, then later added to her message during the group discussions, stating, “we need to protect the environment, and we can do this through protecting our homegardens” (P20). A few participants also reiterated the message of protecting the environment for the next generation (Figure 31b). With a photograph of a small Sesbania tree (*Sesbania grandiflora*), one participant explained, “I’m not sure if I will be here when this tree starts to bear fruit, but that’s the idea, it will be here for the next generation. This is a common thing in Sri Lanka, we believe the homegarden has provided for us and now we have to renew the resources for the next generation” (P21).
Lastly, the participants desired to teach and preserve the cultural, historical, and spiritual knowledge embedded in their homegarden villages. This was reflected through diverse photographs and narratives. For example, many discussed the homegarden community culture and values. They described close connections with their neighbours, and the notions of sharing resources and working cooperatively as central to their way of life. Some participants expressed concern that these principles were fading in their culture. They wanted to pass on these values to future generations and teach others what homegarden communities are like. For example, one participant shared:

Land is limited and there are lots of houses nearby, but we do not have to be divided by fences here. I want to share that message with the next generation, to be in good harmony with neighbours [...] Just like homegardens are full of diversity with plants and animals living together in harmony, people can learn from this. We should be in harmony as a village too - P2.

Sharing food, medicinal plants, and other resources with both neighbours and animals was frequently mentioned throughout the study. Some described it as, “the sharing culture in the village”, saying, “if someone needs something, we give it” (P21). A common photograph was of Betel leaf (*Piper betle*) where participants stated it, “represents a Sinhala tradition of giving. It is a sign of respect and gratitude and we often give it to visitors” (P1) (see Figure 28h). This participant continued, “we should protect and teach others these culturally important things in the homegarden” (P1). Another example is displayed in Figure 32a, of a Sri Lankan olive tree, this participant explained;

![Figure 32 Images displaying examples of culture and history within homegardens, from left to right, a) ‘Sri Lankan olive tree, a symbol of our sharing culture’ – P24, b) ‘an English sailor, Robert Knox, built this stair pathway in the 17th century as a prisoner of Kandyan King. I feel privileged to have this in my homegarden and I want to protect this historical monument and share the story with others’ – P1.](image)
This tree is like a symbol. Even though it has economic value, we don’t sell it, we choose to share the harvest with others in our community and with animals. It is in our blood to give from our homegardens – P24.

The historical significance of homegardens, and their existence over centuries, was also something participants wanted to teach others. A few participants shared historical accounts, ruins, or ancient agricultural tools found in their homegarden, (for example, see Figure 32b). They also wanted to share the interconnectivity of Buddhist practices and values that were integrated into Kandyan homegardens (see Figure 28g). One participant explained this;

A lot of concepts of Buddhism are tied into homegardening. From the first harvest, we always give an offering to Buddha […] It’s not only me, we go as a community to the temple. Homegardening is not only for consumption or to generate an income, there is also a responsibility related to Buddhism […] It’s important to understand that these cultural and religious practices are from a very long time ago in this area. Even the sacred tooth of Lord Buddha is held here in Kandy for centuries, so many of the people in the villages surrounding Kandy are involved in this. We still go to the temple of the tooth and give offerings, and these come from our homegarden - P19.

Throughout the study, the participants reflected on how the homegarden was integrated into their entire way of life. Agriculture was something “in their blood” (P20, P21). For example, one participant emphasized that they are “connected to the homegarden from birth”. He described this through a childhood lullaby that describes the mother working in the homegarden. He continued, “It’s a calming, relaxing lullaby, for both the mother and child. It’s a simple thing, but an important message to understand Kandyan homegardens, and their connection to our lives, from birth” (P19).

DISCUSSION

Our findings demonstrate that a visual and participatory approach elicits rich, local knowledge. Through photovoice, knowledge can then be shared, further produced, and mobilized. Our study achieved these goals by positioning homegardeners as experts on their lived experiences. As the knowledge-holders in the research, it created the opportunity for them to have a legitimate voice with the agency to teach others. Further, the use of a visual tool facilitated reflective insight, allowing the results of the study to move beyond a narrow discourse as the participants shared tacit, experiential, and other local ways of knowing. The social learning and iterative process of photovoice ensured that knowledge was co-created and further produced. Through these processes, we found that the participants deepened their understandings and perspectives of homegardens. They re-evaluated the role and importance of their knowledge
for future development. The following discussion builds on the implications of these objectives, where knowledge was shared, produced, and mobilized during the study.

As photovoice prompts on-going reflection and critical group dialogue (Wang and Burris 1997) our research found that the participants reached deeper levels of learning, that is ‘double’ or ‘triple-loop’ learning. This led them to investigate their underlying values of homegardening, and to re-examine their role as homegardeners. For example, the participants analyzed how the homegarden connects them to the past, to their belief system, knowledge system, and community relationships. Hence, they realized not only are they homegardeners, but they are also keepers of culture, traditions, history, and religion (see Figure 24, 27, 28, 32). As homegardeners, they contribute to their own alternative food system, alternative health system, and help to conserve the natural environment (Figure 28a-f, 29, 30, 31, 32a). It was clear that the homegarden connects to all aspects of their livelihoods. The participants revealed deeper levels of learning as the photovoice process developed, adding richer narrative to their images. For example, the original photographs of “beauty in the homegarden”, later shifted to messages of teaching others the homegardeners’ capacity to protect beauty, biodiversity, and the environment (see Figure 28e, f, and 31). In this way, the participants exhibited changing perceptions of the homegarden and their role within it.

Through the results, we see how homegardens form the foundation of the participants’ understanding of the world. As P19 stated, “we are connected to the homegarden from birth”, and others noted that it, “is in the heart of the people” (P8). However, they described many ways that their connection to the homegarden and local knowledge was fading. They felt the homegarden was becoming less relevant to their daily livelihoods, (see Figure 24). This theme is congruent with other homegarden and socio-ecological system studies (Pushpakumara 2012; Mohri et al. 2018; Padmasiri 2018). Koohafkan and Altieri (2017), argue that trends of modernization are separating people from their “roots”. In our study, the participants discussed how this has caused many to forget and neglect the local knowledge and benefits embedded in homegardens (Figure 24, 26). The participants wanted to teach others to reconnect with their environment, sources of food, medicine, and the other benefits of the homegarden. Authors note how this “connection” is the foundation for resilient food secure and sustainable systems (Koohafkan and Altieri 2017).
Local, tacit, and experiential ways of knowing can be difficult to recognize and elicit in research (Thompson and Scoones 1994; Van Herzele and Van Woerkum 2008). However, through the use of photovoice, the participants were able to express and share their knowledge. The participants demonstrated to others that their knowledge is relevant and useful for future development. For example, they discussed the complexity and long term understanding of land efficiency, plant stratification, resourcefulness, provision of food, community and religious practices, among many other ‘ways of knowing’. Authors state that these insights, such as the land management and rich biodiversity of homegardens, creates a system that requires minimal labour or agro-chemicals (Kumar and Nair 2004; Pushpakumara et al. 2010). Kandyan homegardens can also produce food year-round (Hochegger 1998). Considering there are global movements towards organic and environmentally conscious practices, this knowledge embedded in homegardens can serve as a resource and model for agricultural development (Kooohafkan and Altieri 2017). Moreover, our results highlight the need to recognize and empower the expertise of homegardener. Through photovoice, the participants taught each other a variety of strategies and experiments in the homegarden. They revealed how they are continually learning to resolve problems and adapt to change (see Figure 25, 26, 27). This kind of learning is what allows socio-ecological systems, like homegardens, to manage uncertainty, and this builds resiliency (Biggs et al. 2012; Padmasiri 2018).

At the end of the photovoice project, the research was presented at the University of Peradeniya in the form of a photography exhibit. This kind of project dissemination allowed the participants’ voices to speak for themselves through their own photographs and narratives, instead of being framed through the researcher (Lykes et al. 2003). Thus, the photography exhibit goes a step beyond project dissemination, as it is a form of local knowledge mobilization and transfer (Wang and Burriss 1997). The use of visuals allowed the results to be quickly disseminated and understood by a broad audience. The exhibit stimulated dialogue between a range of actors such as students, professors, community members, homegardeners, and the researchers. In this way, the exhibit created space for local knowledge to be valued, understood, and listened to in an academic environment that typically privileges scientific ways of knowing. Knowledge mobilization through photovoice can help bridge the divide between western and local epistemologies and build shared meanings of homegardens.

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It is also important to address the limitations of this study. Our project had a relatively short timeframe of 3 months. This is not representative of a Kandyan homegarden’s annual growing season. It also would have been beneficial to have less time constraints in order to hold a final group discussion after the photography exhibit. This final ‘reflection’ may have allowed the participants to complete another loop of learning that is possible to achieve through the photovoice method (Wang and Burris 1997; Petheram et al. 2011a). Finally, this study had a low sample size of 24 participants. However, this is above average for photovoice research (Hergenrather et al. 2009) and allowed exceptional rapport to be built as group.

Social learning processes enhanced by visual tools create pathways for tacit knowledge to be revealed and documented (Thompson and Scoones 1994; Van Herzele and Van Woerkum 2008). Through photovoice, this study captured a glimpse of the complexity and richness of knowledge in Kandyan homegarden communities. It demonstrates that when homegarderners are given the opportunity to teach others through methods like photovoice, deep local insight can be shared, produced, and mobilized. In this way, researchers can create space and pathways for local knowledge to be recognized and upheld for future agricultural development. Hochbaum et al., (1992) argue that “even the best and most proven theories are no substitute for practitioners’ training, experience, mastery of skills, knowledge, and inventiveness” (pg. 309). The revitalization and promotion of local knowledge is widely advocated by homegarden scholars as central to sustainable development. Learning from local experts and enriching their knowledge with codified science and research has the potential to optimize homegardens for better food security, environmental preservation, and sustainable agriculture for the future (Senanayake 2006; Mbow et al. 2014; Padmasiri 2018).

CONCLUSION

This study conducted a photovoice project with 24 Kandyan homegarden caretakers in Sri Lanka. Our research examined what homegarderners want to teach others, and aimed to share, produce, and mobilize the knowledge that was revealed. The results found that homegarderners wanted to teach one another strategies for adaptation in homegardens through local action and knowledge. The participants also shared the ecological, cultural, and social benefits of having a homegarden, and discussed the relevancy of their knowledge for agricultural development.

The photovoice method allowed for effective and inclusive participation and created the opportunity for rich learning and coproduction of knowledge. Future studies that build on this
research should consider long-term photovoice projects or collaborating with non-government organizations, in order to further act on the knowledge produced. Our research suggests that photovoice is an effective method for revealing and honouring local knowledge. This method produces community-embedded solutions which can be mobilized to create change in homegarden communities.

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CHAPTER FIVE: CONCLUSION

“This is the first photo I ever took with a camera, it’s a really nice memory for me. It shows a chili plant and it symbolizes all the things I receive from my homegarden. I have learned a lot from this project and our time together”

– P20, during a group discussion

FINAL SUMMARY

The work shared in this thesis reflects the outcomes of a participatory and visual project with 24 homegarden caretakers in Sri Lanka. We used the method of photovoice to reveal local knowledge and perspectives of socio-ecological change in Kandyan homegardens. This work contributed to the production of a photography exhibit. Here, the participants presented their expertise and insight, as well as their concerns and priorities for the future of this land-use to students and agricultural scientists. This project also contributed to the creation of two research manuscripts that reveal the major findings of this study. The first manuscript (Chapter 3) examines the local perspectives on socio-ecological change in homegardens, while the second manuscript (Chapter 4) reveals what Kandyan homegarden caretakers want to teach others.

In Chapter One, a brief introduction to the research is outlined. We provide an overview of the study context in Sri Lanka and the characteristics of Kandyan homegardens. We review the literature on socio-ecological change in homegardens, which demonstrates the need for inclusion of local caretakers in research and policy. This chapter closes with a description of the project objectives and the goal of the study.

Chapter Two provides a background on the overall framework for the research. We adopted social learning theory, broadly, as our main body of knowledge, along with visual sociology and participatory communication theory. The relationship between these theories is what guided our process and created a lens which informed how we understood the overall results. Following the theoretical framework is the research methodology. This work was guided
by constructivism and reflexivity. The project took an exploratory and emergent approach to the research design. We conclude with an overview of the stages of photovoice, which includes an informational and camera practice session, interviews, group discussions, and a photography exhibit.

Chapter Three presents the first half of the research results of the photovoice study. Here, we focused on the socio-ecological changes happening in Kandyan homegardens, from the perspective and knowledge of the homegarden caretakers. Through photovoice, our results provide visual documentation and stories of lived experiences of change in homegardens. The results were broad as participants highlighted a myriad of interrelating social and environmental changes. They described positive influences such as the growth and development of their garden, as well as infrastructure developments in the village that shifted the course of homegardening. Our results found that the greatest current challenges and risks for the future of homegardens were identified as wildlife obstructions, labour shortages and lack of interest in agriculture, and land fragmentation. This study also found that many participants were not hopeful for the existence of homegardens in the future. Photovoice is a robust method for understanding homegardens through the lens of the local participants. It places them in the driver’s seat of the research and roots the data in their knowledge. We concluded with a discussion on how the photovoice method can be advantageous for homegarden and agroforestry research.

Chapter Four presents the results that are pertinent to the last objective and research question, which is understanding what homegardeners want to teach others and creating the opportunity for them to share this knowledge. This objective was met through the use of photovoice and understanding the research as more than data collection, but as a learning process. We used the triple-loop learning framework to guide our understanding of deeper learning and found that participants added more meaning to their photographs as the photovoice process developed. Our results find that homegardeners wanted to teach one another about their local strategies for adaptation in the homegarden. They highlighted the need to recognize and uphold local knowledge in their villages. The participants also taught others the benefits of this land-use and the reasons homegardens should be conserved for the future. This study shows that deep local knowledge can be revealed with methods like photovoice. We discuss the deeper
learning and reflections that occurred and argue the need for local knowledge and voices to be included in homegarden research and policy.

Finally, this chapter summarizes the overall dissertation. It reviews the limitations of this study that should be considered when interpreting the results. It concludes with recommendations for future researchers interested in using the photovoice method, as well as for research and policy application for homegardens.

LIMITATIONS

A number of limitations should be considered when interpreting the results of this research project. While this study had an above average number of participants for a photovoice project (Hergenrather et al. 2009; Catalani and Minkler 2010), 24 participants is still a small sample size, and is in no way reflective of all Kandyan homegardeners. Further, the participants in this study all identified as Sinhalese and Buddhist. This is not representative of the various ethno-cultural or linguistic groups in the Kandy District. No participants identified as Tamil (the second most populous group in Sri Lankan), or Muslim, despite the fact that there was an Islamic community within the studied villages. Another important point to consider is that the research participants were, for the most part, familiar with each other with many being relatives. However, this is normal for Kandyan homegarden communities where the land is continually divided amongst the family over generations. Thus, the results and conclusions of this study are not generalizable and should not be considered representative of all Kandyan homegardeners.

As this study is part of a master’s degree, there were limited time and financial constraints which were especially difficult given the participatory nature of the project. It would have been valuable to have had more time to build rapport as a group and to have had richer participation during the design phase. This project does not reach “transformative participation” levels which can lead to “empowerment” of the participants (Tufte and Mefalopulos 2009). The results of the research were not acted on after being shared in the photography exhibit. It would have been beneficial to have facilitated a group dialogue between various stakeholders and the participants who attended, as well as feedback sessions on the process and outcomes of the project.

Further, the main researcher was Canadian and had a different cultural background and language than the participants. This should be considered as it may have affected the openness and quality of the data collected. As everything was translated to English, this may have reduced
the richness of responses. It also potentially limits how concepts and understandings within the homegarden were conveyed, as sometimes there were no equivalent English words. There were also a number of research assistants that conducted different parts of the study. This reduced the familiarity and relationship-building that could have been possible between the research assistants, the main researcher, and participants.

RECOMMENDATIONS

Socio-ecological change in Kandyan homegardens is an underexplored topic. As the findings from this research suggest, (among other studies such as Landreth and Saito, 2014, Mohri et al., 2018), socio-ecological changes influencing Kandyan homegardens are both broad and highly interconnected. In a system that is deeply embedded into rural lives, culture, and the environment, researchers cannot understand one dimension without taking into consideration the dynamic relationships that homegardens have with their surroundings. The multifaceted nature of homegardens means that more holistic approaches are needed to grasp the complexity of these systems and the interconnected challenges that they face today. Further, more nuanced research of these dimensions and the connections between homegardens and socio-ecological change needs to be explored. This can better inform policy applications and create possible synergies between homegarden, rural development, and environmental initiatives, allowing the potential for multiple goals to be pursued.

Although the findings from this study are not generalizable, they provide insight into future areas that can be examined. Our findings reveal that wildlife obstructions, lack of labour and interest in homegardening, and land fragmentation were among the greatest risks to Kandyan homegardens. These are vital areas that require more research and understanding in order to adapt for the future of homegardening. With the experience and knowledge of local caretakers, in-depth strategies can be created to address these priorities. As our findings report, homegardeners showed major concerns towards the lack of interest that younger generations have for homegardening and agriculture. This project only had one participant under the age of 30. There is limited data of youth perspectives on homegardens, and this information will be key to creating a sustainable future for this land-use. Likewise, this study was not designed to compare responses or perspectives on homegardens between males and females. As other studies reveal, women and men take equal part in the homegarden, but often have different roles
Jayawardena and Jayatilaka 1998; Howard 2006). Therefore, they may have different needs or priorities when adapting to socio-ecological change, which should be further examined.

There are limited Kandyan homegarden studies that aim to reveal local knowledge and perspectives, or that include local homegardeners in the research. Studies that aim to be participatory need to ensure the inclusion of communities is meaningful. Even though participatory approaches are more commonplace in research today, authors argue that a lot of research is impeded through power imbalances and the predominance of codified knowledge and western-based paradigms (Smith 2012; Beebeejaun et al. 2013). Therefore, it is important that collaboration with communities is meaningful and inclusive. Participatory action research (PAR) approaches can better create space for participants to effectively engage in the study, and they often resonate with local epistemologies. This study utilized photovoice and we recommend this method to appropriately collaborate with local homegardeners and reveal their insight and experiences through visual tools.

From our experience with the photovoice method, it is recommended to ensure the project has suitable time to follow up on the research and take action on what was learned. This method would be useful to apply over longer-term studies (such as 6 months +). Linking with a local organization or NGO may be more practical in allowing the expansion of the research over longer periods and to act on the knowledge produced in the study. Longer-term projects would also allow for research to be conducted in rounds, where the participants focus on one topic or question per round (see Beh et al., 2013). This would provide more opportunities for deeper learning and reflection and would create a narrower focus for group discussions. It also allows for more practice with photography as rural homegardeners and other marginalized communities may lack experience with a camera. Finally, in Kandyan homegarden research, year-long studies would capture data over the complete growing season. This type of information is needed in order to design and implement more research and policy that is responsive to and addresses the unique needs and priorities of homegarden communities in different contexts. Moreover, funding specific to PAR methods would be beneficial in supporting participant-led research that allows local knowledge to be included, mobilized, and acted on to create change and potentially empower marginalized communities.
CONCLUSION

Kandyan homegardens are deeply connected to the people, culture, and environment of Sri Lanka. When scholars and researchers understand homegardens from this view, as a highly integrated agro-ecosystem, then it becomes more than a scientific phenomenon. Homegardens are characterized and shaped by humans, and therefore they cannot be fully understood without the knowledge and perspectives of their caretakers. Through this outlook, the work of researchers can begin to harness the sustainability of homegardens and expand appreciation for the rich local knowledge at their core.

There is some question as to whether homegardens can continue to adapt to the unprecedented socio-ecological change of the modern world (Kumar and Nair 2004). This research acknowledges that local communities are the key drivers and knowledge-holders of adaptation in homegardens. The goal of this study was to understand socio-ecological change from the perspectives of local homegarden caretakers, and to then reveal and share their knowledge for the future sustainability of this land-use.

This goal was achieved through the PAR method of photovoice. Our study highlights how methods like photovoice can remove barriers that make it difficult to elicit local knowledge and capture its complex and tacit nature. Through the collaborative and visual process of photovoice, deep reflection and critical dialogue can be facilitated. Our findings suggest that local homegardeners have a lot to share and teach when given the platform to do so. Methods like photovoice provide this opportunity and allow for participants to engage and learn in a more concrete way. The findings of this project provide both visual documentation and narrative of lived experiences of change in Kandyan homegardens. The results show that local caretakers are concerned about the future of their homegardens. The challenges they face today are widespread and interrelated with many aspects of their lives. The participants identified their priorities and deliberated strategies for local action. They emphasized the benefits of homegardens for their community and beyond. In this way, the local caretakers illustrated both resiliency and a desire to sustain Kandyan homegardens for future generations. This study adds to the body of knowledge around change and dynamics in homegardens. It also contributes to the understanding of local expertise and perspectives in these communities. Moreover, this study paves a way for the use of photovoice in homegarden research, which has seldom been employed.
The project concluded with a photography exhibit that shared the knowledge and results of the study. This kind of innovative research dissemination, that is accessible to a wider audience outside academia, is critical for mobilizing local knowledge and building awareness for its use in homegarden policy. It can stimulate dialogue between various stakeholders, and therefore, lead to shared meanings of homegardens. There is immense value in creating spaces for local knowledge to be included and respected in research. In this study, photovoice provided the opportunity for participants to share, learn, and lead the process. By valuing local insight that has been built through generations of managing homegardens, research can better inform policy to build initiatives that are more effective and locally-relevant for homegarden communities.

This study is not arguing that local knowledge is a panacea to challenges faced in homegardens, nor is it advocating for it to replace scientific and codified knowledge. Instead, through guidance from other scholars, this study views local expertise as a complementary knowledge system to western science that has been vastly underutilized. Participant-led research, that appropriately engages with communities and reveals local ways of knowing, can contribute to larger policy frameworks needed to adapt to socio-ecological change, and support the resiliency and well-being of homegarden caretakers. Including local voices in research will be instrumental to constructing sustainable pathways for homegarden and agricultural development in Sri Lanka.
REFERENCES


104


https://doi.org/10.1080/00049182.2014.930003


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## APPENDIX I – LIST OF SPECIES IDENTIFIED IN HOMEGARDEN DURING STUDY

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artocarpus heterophyllus</td>
<td>Jak tree</td>
</tr>
<tr>
<td>Artocarpus altilis</td>
<td>Breadfruit</td>
</tr>
<tr>
<td>Mangifera indica</td>
<td>Mango</td>
</tr>
<tr>
<td>Caryota urens</td>
<td>Kithul fishtail palm</td>
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<tr>
<td>Terminalia catappa</td>
<td>Kottamba almond</td>
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<tr>
<td>Durio zibethinus</td>
<td>Durian</td>
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<tr>
<td>Areca catechu</td>
<td>Areca nut</td>
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<td>Naphelium lappaceum</td>
<td>Rambutan</td>
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<tr>
<td>Syzygium samaramgense</td>
<td>Jambu, apple</td>
</tr>
<tr>
<td>Bambusa vulgaris vittata</td>
<td>Yellow bamboo</td>
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<tr>
<td>Citrus grandis</td>
<td>Pomelo</td>
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<tr>
<td>Averrhoa bilimbi</td>
<td>Bilimbi</td>
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<tr>
<td>Cocos nucifera</td>
<td>Coconut</td>
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<tr>
<td>Myristica fragrans</td>
<td>Nutmeg</td>
</tr>
<tr>
<td>Tectona grandis</td>
<td>Teak</td>
</tr>
<tr>
<td>Saraca asoca</td>
<td>Asoka tree</td>
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<tr>
<td>Elaeocarpus serratus</td>
<td>Ceylon olive</td>
</tr>
<tr>
<td>Garcinia morella</td>
<td>Gamboge</td>
</tr>
<tr>
<td>Cinnamomum verum</td>
<td>Cinnamon</td>
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<tr>
<td>Gliicidia sepium</td>
<td>Glicicidia</td>
</tr>
<tr>
<td>Swietenia macrophylla</td>
<td>Mahogany</td>
</tr>
<tr>
<td>Averrhoa carambola</td>
<td>Starfruit</td>
</tr>
<tr>
<td>Carica papaya</td>
<td>Papaya</td>
</tr>
<tr>
<td>Garcinia mangostana</td>
<td>Mangosteen</td>
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<tr>
<td>Psidium guajava</td>
<td>Guava</td>
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<tr>
<td>Citrus sinensis</td>
<td>Sweet orange</td>
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<tr>
<td>Citrus auranteum</td>
<td>Sour orange</td>
</tr>
<tr>
<td>Piper betle</td>
<td>Betel</td>
</tr>
<tr>
<td>Passiflora edulis</td>
<td>Passionfruit</td>
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<td>Coccinea grandis</td>
<td>Iyv gourd</td>
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<td>Theobroma cacao</td>
<td>Cocoa</td>
</tr>
<tr>
<td>Citrus limon</td>
<td>Lemon</td>
</tr>
<tr>
<td>Vitex negundo</td>
<td>Nika</td>
</tr>
<tr>
<td>Coffea arabica</td>
<td>Coffee</td>
</tr>
<tr>
<td>Syzygium aromaticum</td>
<td>Clove</td>
</tr>
<tr>
<td>Persea gratissima</td>
<td>Avocado</td>
</tr>
<tr>
<td>Zingiber officinale</td>
<td>Ginger root</td>
</tr>
<tr>
<td>Curcuma longa</td>
<td>Turmeric root</td>
</tr>
<tr>
<td>Camellia sinensis</td>
<td>Tea</td>
</tr>
<tr>
<td>Piper nigrum</td>
<td>Pepper spice</td>
</tr>
<tr>
<td>Cymbopogon citratus</td>
<td>Lemon grass</td>
</tr>
<tr>
<td>Murraya koenigii</td>
<td>Curry leaf</td>
</tr>
<tr>
<td>Vanilla aromatica</td>
<td>Vanilla</td>
</tr>
<tr>
<td>Capsicum frutescens</td>
<td>Hot chili pepper</td>
</tr>
<tr>
<td>Anmona muricata</td>
<td>Soursop</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
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</thead>
<tbody>
<tr>
<td>Ananas comosus</td>
<td>Pineapple</td>
</tr>
<tr>
<td>Ixora coccinea</td>
<td>Jungle geranium</td>
</tr>
<tr>
<td>Ficus benjamina</td>
<td>Weeping fig</td>
</tr>
<tr>
<td>Anthurium andraeanum</td>
<td>Anthurium</td>
</tr>
<tr>
<td>Chrysoido carpus lutescens</td>
<td>Areca palm</td>
</tr>
<tr>
<td>Asplenium nidus</td>
<td>Birdnest fern</td>
</tr>
<tr>
<td>Cinnum asiaticum</td>
<td>Spider lily</td>
</tr>
<tr>
<td>Jasminum pubescens</td>
<td>Indian jasmine</td>
</tr>
<tr>
<td>Jasminum rex</td>
<td>Royal jasmine</td>
</tr>
<tr>
<td>Cyanometra caulifera</td>
<td>Namnam</td>
</tr>
<tr>
<td>Ixora aurora</td>
<td>Jungle gernnium</td>
</tr>
<tr>
<td>Hibiscus rosasinensis</td>
<td>Shoe flower</td>
</tr>
<tr>
<td>Tabernaemontana coronaria</td>
<td>Crepe jasmine</td>
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<tr>
<td>Aloe vera</td>
<td>Aloe</td>
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<tr>
<td>Licuala grandis</td>
<td>Ruffled fan palm</td>
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<tr>
<td>Dracaena marginata tricolour</td>
<td>Madagascar dragon tree</td>
</tr>
<tr>
<td>Calatheca ornata</td>
<td>Prayer plant</td>
</tr>
<tr>
<td>Calatheca zebrina</td>
<td>Zebra plant</td>
</tr>
<tr>
<td>Codiaeum variegatum</td>
<td>Croton</td>
</tr>
<tr>
<td>Anthurium hookeri</td>
<td>Birdnest anthurium</td>
</tr>
<tr>
<td>Polypodium aureum</td>
<td>Cabbage palm fern</td>
</tr>
<tr>
<td>Aglaonema costatum</td>
<td>Chinese evergreen</td>
</tr>
<tr>
<td>Chamadorea elegans</td>
<td>Lady palm</td>
</tr>
<tr>
<td>Jacobinia coccinea</td>
<td>Cardinal’s guard</td>
</tr>
<tr>
<td>Homalomena rubra</td>
<td>Emerald gem</td>
</tr>
<tr>
<td>Torenia asiatica</td>
<td>Asiatic wishbone</td>
</tr>
<tr>
<td>Fittonia verschaffeltii</td>
<td>Nerve plant</td>
</tr>
<tr>
<td>Alternanthera amoena</td>
<td>Calico plant</td>
</tr>
<tr>
<td>Neomarica northiana</td>
<td>Walking iris</td>
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<tr>
<td>Clerodendrum paniculatum</td>
<td>Pagoda flower</td>
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<tr>
<td>Eranthemum nervosum</td>
<td>Blue eranthemum</td>
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<tr>
<td>Centella asiatica</td>
<td>Gotukola</td>
</tr>
<tr>
<td>Punica granatum</td>
<td>Pomegranate</td>
</tr>
<tr>
<td>Quisqualis indica</td>
<td>Rangoon creeper</td>
</tr>
<tr>
<td>Pandanous amarillifolius</td>
<td>Pandan</td>
</tr>
<tr>
<td>Languas speciosa</td>
<td>Shell flower</td>
</tr>
<tr>
<td>Clerodendrum wallichii</td>
<td>Bridal veil</td>
</tr>
<tr>
<td>Pyllocactus crenatus</td>
<td>Night flower cactus</td>
</tr>
<tr>
<td>Spathoglottis plicata</td>
<td>Ground orchid</td>
</tr>
<tr>
<td>Eucharis grandiflora</td>
<td>Eucharis lily</td>
</tr>
<tr>
<td>Ophiopogon intermedius</td>
<td>China grass</td>
</tr>
<tr>
<td>Nyctanthes arbor-tristis</td>
<td>Night flowering jasmine</td>
</tr>
</tbody>
</table>
APPENDIX II – SUPPLEMENTARY PHOTOVOICE FINDINGS

Extra photographs and narratives that were included in the photography exhibit. This is not a complete sum of the of the findings, but presents supplementary results of the study.

Positive Change: Growth, Restructuring, and/or land management of Homegarden

This picture shows the removal of Mahogany trees in my homegarden. We have already removed 40 trees. These trees have served their purpose, but now we decided to remove them because Mahogany has taken up a lot of space, now we can grow more nutmeg, and other spices and fruits instead that will give us a better income throughout the year – P3

Multi-coloured anthurium are nice in the homegarden to create beauty. The white colour is more of a rare variety. They can be kept for a long time. Organic compost helps with this process. In a sunny location, with intense light, the plant grows well, and you can germinate it through seeds. There’s potential to get good income from anthurium, the price for selling is high. These anthurium were placed against a wall that is used to protect my homegarden. It makes the boundary more beautiful – P15.

22 years ago, we changed our land from a tea cultivation to a homegarden with a variety of plants. Tea was difficult to manage. We put in a pepper plantation and we have a really good harvest now [...]. We wanted to show this picture as it’s been a kind of blessing to us. We are so happy to see this harvest, it gives us a good income - P2.

Cordyline Plant [...] This can be grown in a limited space to get a good additional income. Here it is shown next to banana trees. It shows that I am using all the space in my homegarden to be productive. I sell the cordyline plants for income, and the banana is healthy for children, there is no chemicals – P22.

The thing is, our homegarden was destroyed when our mother died 7 months ago, and our brother died shortly after. We had to remove all the trees because when you have a funeral, many people are coming to the house. We had to cut the trees to make huts for people to stay. But we are planning to return the homegarden to how it was before. In this picture, we are protecting our plants from too much sun - P17.
Planting in polybags to utilize space around the house and maximize the land-use. Even with small land area, the homegarden can provide – P6, P19

We have a lot of coconut trees, so we lift the fallen leaves to stop water pooling, and places for mosquitoes to breed. I see this as a positive change in my homegarden. It’s something I learned from educational campaigns, it makes the homegarden a better and safer place – P3

We planted 10 nutmeg plants 1 year ago. It’s a good plant for when we reach our pension life. When we get old ... then we can still get a good income from nutmeg. Even for the future generations it’s good. We think of planting this as an investment for our future and for our children. Even when you can’t do anything else, you can still rent out this plant - P22 (also P1, P11).

[description in text of Chapter 4] A drawing of a typical Kandyan homegarden, showing how homegardens efficiently use vertical and horizontal space – P19

Improved variety of Areca Nut, I can get a harvest after 5 years – P3

description this is an improved variety of a coconut tree (called CR165), we can take the harvest in a short amount of time. This is from the coconut research institution. It’s not as tall as normal coconut trees, you can pluck the coconuts by hand, from just standing on the ground, it’s good for our older age – P24
## Infrastructure and Technology Developments

<table>
<thead>
<tr>
<th>Image</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Image" /></td>
<td>We built this path to our house a few years ago. We did it as a village. It has made our lives so much easier because we can now access our home by tuktuk. Earlier, we had a funeral here, and it was very difficult without this path – P20</td>
</tr>
<tr>
<td><img src="image2.jpg" alt="Image" /></td>
<td>To think of this road, it's a huge change. The old paths were slippery, and it was really muddy, so walking to school, if we fell down, we were all covered in mud. So, the road is like a dream...One time when I was younger, my brother got sick, and we had to put him on a chair and carry him all the way to town. Now we can take a vehicle to our home. We feel really proud to have this kind of road... Our daily lives are much easier... all our problems have decreased - P4</td>
</tr>
<tr>
<td><img src="image3.jpg" alt="Image" /></td>
<td>Old paths that we used before the road – P5</td>
</tr>
<tr>
<td><img src="image4.jpg" alt="Image" /></td>
<td>Earlier, we had to put in a lot of effort ... but now it’s much easier with these machines and stoves. With the introduction of liquid gas tanks and cookers, firewood usage has also decreased. It is good because it saves plants and forests which might have been cut down for firewood. Especially now as land fragmentation and reduction of vegetation has made it difficult to collect firewood - P5</td>
</tr>
<tr>
<td><img src="image5.jpg" alt="Image" /></td>
<td>Improvements to education from technology, such as the access to laptops, and better, reliable light for studying compared to previous times. I think before it was very difficult that way, with no reliable light. We didn’t even have a proper window for light like we do today - P6.</td>
</tr>
<tr>
<td><img src="image6.jpg" alt="Image" /></td>
<td>Developments that make our lives easier – P6</td>
</tr>
</tbody>
</table>
Income Generation, Prosperous, Abundant crops/harvests, Food Security

I have cultivated plants according to the changing market, for example this chili plant, it will rise up to about 1000rs/kg in some parts of the year - P23

Oranges, they have grown a lot and now we get a good harvest, but I have noticed some negative effects because our bee colonies have reduced – P9

Cardamom, it has brought us good income over the years – P21

the harvest of a rare and nutritious banana variety called ‘lavender’ - P16

I had a really good harvest of clove this year and made really good money. So that’s why I took this picture, for the 3rd question [about teaching others], as important plants for income. A slow-growing plant, but it lasts a long time - P15.

We planted 10 nutmeg plants 1 year ago. It’s a good plant for when we reach our pension life. When we get old and it’s difficult to work, we can still get a good income from nutmeg. Even for the future generations it’s good. So it’s like an investment for our future and for our children – P22

We get a really good income from Areca Nut, we can dry it and sell it later when the price increases in the market -P10 (many others)

Clove harvest – P11

Vanilla, a really good income source – P7

My future income […] I want to sell succulents and other small flowers for income – P6

we can learn from nurseries and how they grow plants. I can sell a lot of my ornamental crops here, it is good income – P22
we do all the processes to prepare coffee beans for selling, and we get a good income from this – P4 (P10, P3)

This is lemon, the cost of this is really high sometimes in the market. In the past when we were struggling financially, we felt lucky to have it in our homegarden, because we never had to buy – P21

Coconut harvest – P20

Harvest of soursop, a nutritious fruit in my homegarden – P15

‘Sera’ and ‘Rampe’ two plants that everyone should have in the homegarden – P12, (P3, P21, P23)

Jak fruit, I want to show the growth. Jak fruit is also good for food security in the village – P10

This is a Nutmeg and a Coconut tree. We sell the nutmeg and get income from this, and the coconut tree, this is mainly for our own consumption. There has been some time in Sri Lanka when the price of the coconut was really high. During that hard time, we felt we survived because we grew our own coconut – P21

Papaya from homegardens are the tastiest. These are not modified varieties, it is all natural. This variety is pink papaya. I have these kinds of fruits in to give completely fresh fruits to my children. There are no chemicals – P14

Our homegarden and paddy field provide everything we need to feed our family of 5. It makes me really proud, especially because I do most of the work here while my husband is at his job. It’s really satisfying to grow your own food, and to know it is organic – P20
Positive Developments with Negative Consequences (Loss of resourcefulness and use of the homegarden, loss of traditional knowledge)

This is a ‘Thala’ palm tree, there used to be impressive use of this tree. We would write carvings and make books from the bark, people made sleeping mats, baskets, and hats by weaving the leaves of the tree. Now, we are not doing this anymore. Most of the useful things that the tree provides can now be made out of plastic. Of course, we should move forward with technology and development, but the thing is, we valued this palm tree a lot because it was used for so many purposes [...] In my homegarden, I have protected this tree because I want my children to know about it - P12.

Old materials that were made in the homegarden are being replaced by plastic goods. Although plastic is convenient, we have lost a lot of knowledge and we are not using the resources our homegarden provides for us anymore – P19

These pictures have a deeper meaning. The mortar and pestle was used to chop the paddy plants and take out the rice. As a result, a lot of plant waste material is created in the process, but people found use for this waste like feeding animals. The mortar and pestle was also used to make medicines, and pound leaves [...] people even use it like a step ladder... and so this item actually has multiple other purposes [...] But now people just use a blender. Similarly, people now use a gas stove, but before the ash we got from cooking with firewood we used for pest control methods [...] New technologies have broken our knowledge and system of recycling in the homegarden – P19

Many people use gas stoves for cooking now, but I want future generations to also think about the option of firewood. It can help save money and clean up debris in the homegarden – P10

You can see that there are two ends with -9 and +9. In Sri Lanka, 9 is a bad number. Since it’s a circle, it’s showing that the positive side is connected to the negative. The point is, even though we think some of these new things are positive, still it has negative effects. We can’t just think we are moving forward [...] we have lost a lot of the good things from the past. All the challenges we face today are because we have forgotten our knowledge and practices from the past [...] - P19

Women are also leaving the home now, but you can’t blame them because both husband and wife are needed to make a steady income these days. But overall, there’s less time to spend in the homegarden, and this makes it not as successful as it was before – P5
This is an issue, you can see that these plants were cut off short here. This is because on top electric wires were strung over. So, I want to talk about the constant competition between agriculture and development. Electricity is something that is essential, and it’s necessary. But yet, agriculture is necessary because we need it for food. But the case is that development is always put first, and sometimes, it overcomes agriculture...So, they are constantly competing with each other, and we will have to find a balance – P17

We used this material for writing, it’s over 100 years old, from our great grandfather. It contains really important ayurvedic writings and descriptions. Earlier we didn’t have internet and computers and other ways to document this, so this was used to save the important writings and knowledge for future generations. We still look at this and use the ayurvedic medicine practices. The intention of our grandfather who wrote this was to keep all this information and to document his knowledge for the next generation- P12

This is a shower head, and I want to use it as a symbol to show how the environmental water system in Sri Lanka has broken down. There were a lot of cultivation methods based around using wells. With the NWS, the natural recycling system is ruined. I think that this is one reason that the canals are drying out in this area. There used to be running water here, there were even little fish and it was a small ecosystem on its own, but now it looks like this […] In some ways the NWS is easier for us, but […] there are major changes in how we consume our water, and with our attitudes towards water as well. Because in the older days, people were always more concerned about recycling and saving water - P19.

These are old agricultural tools. I want future generations to remember the historical importance of homegardening. It’s been here for hundreds of years and there is a lot of history here – P9

I’m really proud that we still get water from the well, most people have the National Water Supply. But well water is tastier and this has provided us with water for many generations – P24

In the villages people used to have many buffalos, much more than today. We used to care for them, and they were really good to have for both the benefits of the home and the land. But now today, most of the people are neglecting and forgetting the value of having a buffalo. They have almost been removed from the entire system of homegardening[…]Buffaloes were a huge resource to the village, and we are suffering from this loss - P19
**Soil Management Strategies**

We prepare our own organic manure and compost [...] My grandfather has a lot of knowledge about making compost [...] - P23

We’re very concerned about the soil. My land is located on top of bedrock. So, I always want to protect the soil. If I lose the soil, I can’t bring it back. I protect my soil with coffee trees, and I have a lot. They have a deep developed root system that holds the soil – P1.

This drainage system is to prevent soil erosion. When water comes down it is instead diverted back into the homegarden. Same with soil. It lands in the drainage system and once a year, I redistribute it back into the garden, so it’s not being lost from the land. It’s important to have good soil erosion prevention, because Kandy is a very slope-y area. Today, everyone is complaining that the soil is eroding, and it is not as good as before, but since I dug up this drainage system, I’m getting good yields, and it’s possible for everyone to do - P9 (P1, P8, P15).

This shows what we have done to protect our soil from the rain and wildlife. The grass on the other side of the fence was planted to protect the soil. When wild boars come, they dig around and can cause a lot of damage to the soil, so the soil gets drained out and erodes much faster. The grass we planted prevents the soil drainage and erosion from animals and the fence also helps keep the animals out - P13.

Self-made irrigation system to protect my homegarden during the dry spells – P1

The soil erodes a lot here during the rainy season, so we planted bamboo to stop it. It’s a permanent solution, because bamboo is really hardy and good for the soil – P14.
Wildlife Damage and Strategies for Protection

I add noisemakers to this fence to scare off wild boar – P22

Damage to the trunk from porcupine – P21

I consider it a good income source as turmeric has a high market price. The main reason I grow it is to sell it. I grind the turmeric tubers and sell it powdered. It was popular because it was home-made and in demand. But now all the porcupine damage has really discouraged me to grow turmeric. I can’t even sell it anymore because of the porcupines – P4.

Earlier in this homegarden there was a lot of plants that we could consume and eat, but nowadays it’s not like that anymore... we just can’t grow these kind of food crops like before because of the animals – P24

People are abandoning the land because they don’t have enough labour to work it, which is an issue with managing the lands, and so they try to abandon the land... When we abandon the land, it starts to become like a mini forest and these porcupines and wild boars, they can easily hide there – P1

I want to stress that this is a national issue, this wild boar problem. The government, they allow us to kill them now, but we don’t want to do that. People here don’t like that because we are Buddhist. The best solution is to clear up these overgrown forested areas that have invaded the villages, because the wild boar like to hide in the bushes of the jungles. If we can clear up these areas, then it won’t be suitable for them to live there anymore. This picture is only a temporary solution – P14

Recently the damage from wild boars has increased a lot, so this is the measure we have taken from the start. When using the iron plates or barrels the wild boars arrive to it, and it makes a loud sound and they get scared and run. Usually the measure is to use a fence, but that method is not always effective because it doesn’t make a sound, and animals can sometimes just go through it. So, I think this method is effective and easy. Like you don’t have to buy anything special, these things we can find anywhere and use them – P9, P15, P4

Wild boars are very destructive, they can cause a lot of damage very quickly. I have experienced huge losses from them. So, my strategy was to put a mesh fence around the homegarden to protect it from the wild boars. The fence won’t wear down and it can be used for about 10 years in good shape. But again, porcupines, they are not like the wild boar, they try to dig and go under these mesh sheets. So now I’m thinking about another solution, to put a small concrete wall under and with mesh, like a basement. That is the permanent solution – P1
Other Pests, Diseases, and Weeds

There is a reduction of biodiversity, and more pest attacks, meaning the revenue that we can get from the homegarden is reducing [...] I had about 35 coconut trees but many of them have been affected by the coconut weevil. I have lost a lot of income from this. If we are not getting a good income from the homegarden, then it is not a sustainable system. …we have to think about these aspects – P3

This tree is decaying. The outer bark layer of the tree from the bottom to the top is being destroyed by termites. This tree may eventually fall down. One way I have learned to stop this is by removing the bark that is affected and adding engine oil to kill the termites – P15

(Left) This banana Plant breaks at the middle of the trunk when it comes up to the fruiting stage. A problem that is new for us and we are working to find a solution – P23.

(right) This cocoa tree has a disease – P7

This is a parasitic plant (pilala). In the photo, it is anchored on a mango tree. It is like a vine type of plant, and these spread by bird’s feces and the seeds grow into vines. It is distributed everywhere. These parasitic plants absorb nutrients and water from the host plant and make it weak, and this becomes a problem. I want to use this photo to teach others about this problem. I think that knowledge should be passed to the younger generations – P15.

Snails are a major pest for me – P16
These weeds take over space where useful crops should grow. I believe they have come with the introduction of our village road, they were brought here. It’s not a huge issue, because it can be managed, but a recent issue because of the road – P24.

There are so many wild dogs. They come into the homegarden and urinate over all the plants, it is an issue – P9

This plant was destroyed by caterpillars. But my mother taught me a traditional pest control technique, putting ash on the leaves. And this has helped save the cabbage So, this is knowledge that’s been passed down for generations – P22
Other Negative Environmental Changes

<table>
<thead>
<tr>
<th>Photo 1</th>
<th>Photo 2</th>
<th>Photo 3</th>
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<tbody>
<tr>
<td>There is a brass kind of factory nearby and all the waste that comes from the factory is coming into my water and canal. And because this canal is going into my paddy field and close to the homegarden, it’s dying, I can’t use this water anymore - P22.</td>
<td>Natural water-ways have been destroyed. The population is so dense and the environmental pollution is increased from people and industries disposing waste. So, we cannot expect to get any clean water anymore like we used to - P5</td>
<td>Garbage is increasing. Some people bury, and some people burn their waste. Both are not ideal for the environment, but this is the only way to deal with garbage in the village. People need to be more educated on how to deal with waste. Some people who are richer are less likely to care, they just throw it on the road because they are less affected - P3</td>
</tr>
</tbody>
</table>

Other Negative Social Changes

<table>
<thead>
<tr>
<th>Photo 4</th>
<th>Photo 5</th>
<th>Photo 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homegardens used to be much more spacious than they are today. Children had more room to play, explore, and run around their homegarden. But times are changing, and behaviours and social interactions of people are different. Children today spend a lot more time inside [...] they also have less room to play because of all the housing developments – P5</td>
<td>Our relationships with our neighbours have reduced a lot. Earlier, we would talk with everyone and eat meals together around the village. Although it was really underdeveloped at that time, it was nice to feel like we were all living together. Even when we needed water, we would all get together and go the well... Once that water was done, we would have to go back and collect again. We were more like a community, but now it has become more individual - P4</td>
<td>There is no available labour for picking clove and it is a issue, and even if we do find some, the wages are really high. We can actually lose money if we hire labour. So, it’s a really difficult cultivation now...I think clove cultivations will eventually be lost because of this. But still, this year I was able to get a good income from clove – P15, (P11, P21, P1, P10)</td>
</tr>
</tbody>
</table>
[Before] we could obtain our entire income from our houses. We didn’t have to go to the shops for anything, because we had everything in our homegarden. We have rice as well from our village, because there is lots of paddy fields and all. So people didn’t really leave the village. Now the land area is covered more with houses, so we can’t grow as much or have the space for cultivations – P6.

People are restricted for growing paddy because of one major issue. And that is because of labour. It’s becoming very expensive in Sri Lanka. Previously, you could go into the village and find many people willing to work in the fields, but now people are migrating into the towns. The young generation is moving towards the more technical and service sector. They are not concerned about farming anymore – P9.

I want to highlight an issue. To get the harvest from the ‘kithul’ [fishtail palm] tree, you need specific skilled labour to do these extraction processes. These days I have so many flowers, but I can’t find people to cut and harvest the syrup. Before, the fishtail palm tree was completely utilized for many things, like making jaggery, trickle, ‘torti’ (alcohol)[…] Now, ‘kithul’ is not being used as it was before.

This is largely due to the government policies that started to control the production of making ‘torti’ (alcohol). It greatly affected the use of the tree in the homegarden as a source of income… It’s become like useless in my homegarden – P24.

The price of all the spices have gone down. Earlier the prices were very high[...] But now with the outside competition and all these regulations from the government, it’s really reduced for us- P1.

The market is now fluctuating very much. It’s hard to predict the prices and the changes. In the good older days, the market had steadier prices and prediction was much easier. But nowadays we can’t predict. It’s ok if you are buying, but if you are selling then you could get a really low price – P23.

Today, I am growing things like anthurium. The garden is becoming more simple, there is less diversity and less number of plants. We don’t have the space to grow like we used to. So, with limited space, this is the best thing for my homegarden Here, I also want to show how I am protecting my Anthurium from wildlife – P6.
Utilizing Local knowledge and Experience in the Homegarden

This is a man in our village. He is a creative person who has invented many types of equipment required in the homegarden. Since he is also local, he understands the existing situation and problems we go through. There is a high possibility of his products to fit our needs, rather than products found in the market. Sometimes his inventions are more useful to us than buying things of the same purpose in the city. It shows that we have talent and skills here. I think that these types of people need to be encouraged, trained, and subsidized to scale up their business. Because they also experience the problems we face and know what is needed, I think they are the ones that can help with homegardens… I want to show that there are people here with a lot of knowledge and skills in our own community – P19

All the work in the homegarden we do ourselves. It makes me really proud. We have a lot of experience – P4

Originally this wheel only had 3 holes, but my friend modified it and put several other holes in to make his work easier. That was his own creativity. The deeper meaning is that if he was able to think differently and make his life easier, than so can we, in our homegardens. We can also think differently to make our lives more efficient or profitable. It’s about thinking outside the box and making something better out of what we already have. For example, there can be new technologies to make things easier. Developing technology also has to be applied to agriculture…. Why are waiting around and using the same things or techniques. We can grow different plants, and use different materials that make our lives easier, so why aren’t we adapting and doing that? – P19

This is my mother, she is 90 years old, but she is still collecting clove. I thought this was important to show, because even at an old age, we can still work and be a part of the homegarden – P11

We have a lot of medicinal plant knowledge. Even now we teach it to our grandchildren, we show them different plants and explain how to use them. When people in this area have a health issue, they usually come and ask us [because] we know a lot about the medicinal uses of many plants. But many people don’t know these kind of things, so they may think a medicinal plant is useless and cut it down, but if we see this happening, we stop them and share with them the different uses of these plants - P12.

Managing shade in the homegarden [...] we developed this simple invention to move our plants around the homegarden to ensure they get enough sunlight when they are young [...] – P19

Our bee colonies have been affected and reduced by chemicals like pesticides [...] but we receive income from honey, and it is very nutritious [...] I want to share this with others and teach how to do it – P9
Beauty in the Homegarden

This flower shows a part of our culture because it looks like a traditional Kandyan dancer – P10

To show the beauty of the homegarden – P17

We really need to think about it, it’s not just about seeing things in nature, we should really be appreciating the beauty of the homegardens we see and have, and we should really believe that they are beautiful, otherwise we will not protect them as they should be - P2.

Other Examples of Culture, Beliefs, History, Traditions in Homegardens

Buddhism is built into how we homegarden [...] -P5

Mentally, Buddhism, is really important for my life. It gives me a calm mind in the homegarden and when I do work. I want to pass that on to my children - P11 (also from P5, P7, P9).

“A mother goes to the homegarden to bring leafy vegetables to eat”. This is a childhood lullaby [...] it shows how we are connected to the homegarden from birth [...] we should treat our homegarden like it is our mother, [...] When we give it what it needs, then we will also get what we need from the homegarden [...] – P19.
I planted this by myself, right now it is a small little plant, but it will grow into a big tree. I’m not sure if I will be here when the tree starts to bear fruit, but that’s the idea, that it will be here for the next generation. This is a common thing in Sri Lanka, where we have the idea that we eat and consume, but we believe that we have to leave something for the next generation, passing things down and renewing the resources - P21

This is the boundary of my land. And to mark the boundary, I have only one pole shown here. Normally people put up a fence or wall to separate their land, but I don’t want that separation. It’s about always having connection and friendship with the neighbours. Land is limited, and there are lots of houses nearby, but we are not divided by fences. And I want to share that message with the next generation, to be in good harmony with neighbours, in both the times of ‘dukkha’ (worry or stress) and ‘sukha’ (happiness) people should be together - P2

I want to talk about unity. Normally a squirrel and bird would not eat together, but here in this photograph they are. I think we can use this as an example for people. If animals can eat peacefully together, then humans with conflict can build community too. We shouldn’t care about race and nationality, but should be in harmony - P2

I planted betel leaf close by, this is cultural, and normally if a villager comes to us, to visit my land or house, then we can offer these things to them. It’s a Sinhala tradition of giving. It’s also used for types of offerings. So that’s why I’m showing this. I want to show the culture. That we should protect things that are culturally important. I think it’s relevant to the 3rd question [about teaching others] - P1, (P12, P24)

Our village of Eladetta, gained recognition after finding some historically important artefacts that prove Robert Knox lived in this area in the 17th century. He was a prisoner here. He built a pathway down to the paddy fields. This photograph shows evidence of his presence – P2
APPENDIX III – RECRUITMENT HANDOUT (SINHALA VERSION)

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කොලාපයේ රාජීයාවේ මහා ආවර්ධනය පුරාණ පිළිතුලියක් ඉදිරිපස පැතිරිනි මෙන් මෙරටියෙන් සහ මෙන් මෙරටියෙන් විශේෂ කලාපයේ විශේෂ කලාපයේගේ

කොකුදා අර්යන්තරයේ (Photo Voice)

කොකුදා අර්යන්තරයේ

විශේෂ කලාපයේ ඉදිරිපස 18 වසරියේ පසුව පමණක් දෙවැනිවරය ඉඩු පහළ?

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රේල්න් deHaan (ප්‍රශ්නයේ සනායක)

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APPENDIX IV – PHOTOVoice QUESTION GUIDE AND INTERVIEW QUESTION GUIDE

Photovoice Question Guide

1. How has your homegarden changed over time? Think about environmental changes and social changes.

2. What issues are you currently facing in your homegarden? How have you coped with this issue?

3. What would you like to teach others about your homegarden? (For example, what would you like to teach future generations, researchers, agricultural extension workers, or policymakers)?

Semi-Structured Interview Question Guide

1. Can you explain what is shown in this photograph?

2. Why did you take this photograph?
   a. Why is it important to you?

3. Why have you made this change?

4. What caused this change to your homegarden?
   a. Are you addressing an issue?
   b. Where does this issue come from?
   c. How long have you been dealing with this issue?

5. What did your homegarden used to be like 20 years ago? 50 years ago?

6. What do you predict or expect for the future of your homegarden?

7. What do you perceive as the biggest risk to your homegarden?

8. What would you share with future generations about your homegarden?

9. Which photographs are the most important to you to share in the research?

10. Why are these photographs more important?
APPENDIX V – CONSENT LETTER FOR PARTICIPANTS

INFORMATION AND CONSENT LETTER

You are invited to participate in the research project conducted by the University of Guelph with the University of Peradeniya, ‘Local Knowledge and Perspectives on Conserving Homegardens, in the Kandy District, Sri Lanka, Using the Photovoice Method’. The purpose of this letter, along with the Photovoice Information Meeting, is to provide you with the information you require to make an informed decision about participating in this research project.

Purpose of the Study
The purpose of this research is to gather local knowledge and perspectives on conserving Kandyan homegardens. It aims to reveal participants’ lived experiences and stories of homegardens throughout their lifetime. This may include perspectives on the issues you have faced, strategies to cope with those issues, and perspectives for the future of homegardens.

Procedures
This research project will use the method of photovoice. If you choose to voluntarily participate in this study, you will become a ‘co-researcher’ in collecting data. There are multiple phases in this project, it will involve:
- Learning to use a camera and photography ethics in an Information Meeting
- Next is responding to those questions through taking photographs, on your own time.
- With on-going consent, you will explain your photographs in an interview with the researcher. This will be audio-recorded and located at your home.
- From there, you can choose photographs to bring to a group discussion. This will be audio-recorded and located in your community.
- Finally, you can write descriptions and/or titles for your photographs, and the project results may be shared with others in the form of a community photography exhibit or photo-booklet.

Project Timeline
This project will last over 7-10 weeks, ending between February 15\textsuperscript{th}-30\textsuperscript{th}, 2019. As a participant, you will spend between 0-3 hours per week on this research. For a maximum of 6-10 hours total of your time.

\textit{Breakdown of timeline:}

<table>
<thead>
<tr>
<th>Week 1:</th>
<th>Information Meeting</th>
<th>2-3 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 1-2:</td>
<td>Taking Your Photographs</td>
<td>This will be done on your own time, over the span of 2 weeks</td>
</tr>
<tr>
<td>Week 2:</td>
<td>Interview</td>
<td>~1-2 hours</td>
</tr>
<tr>
<td>Week 5:</td>
<td>Discussion Groups</td>
<td>2-3 hours each</td>
</tr>
<tr>
<td>Week 7:</td>
<td>Distribution of project results</td>
<td>Date/method will be determined by group</td>
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</table>

Voluntary Participation and On-Going Consent
Your participation in this project is completely voluntary. You do not have to answer every question in the interview or discussion group, and you can choose which photographs to share. You may withdraw until the conclusion of the research project in September 2019. You may withdraw for any reason, and without any prejudice or consequences. If you choose to withdraw from the study, your data will be removed and destroyed. Please note that once you have participated in the discussion group, your data from this cannot be removed as it is a group-recording. To withdraw from the project, please notify the
Student Investigator, Rachel DeHaan, in person or by contacting her through the details below. If you withdraw, you can still receive the final thesis paper by e-mailing the Student or Principal Investigator. On-going consent will be ensured throughout the project. At any time, you can withdraw throughout the research process. Before the discussion group, you will choose photographs to bring, and this choice along with your attendance will be taken as consent through an action. You will also choose whether or not you want to participate in the project distribution, and if so, which photographs you want to include.

**Shared-Ownership of Photographs**

The photographs you take as part of this research project will operate under a shared-ownership agreement between yourself, and the researchers. This agreement is made by signing this form. Under a shared-ownership, you own all the photographs you take as part of this research, and can retain a printed copy of your photographs indefinitely after the interview. This will be a maximum of 30 photographs. It is completely voluntary which photographs to discuss during the interview, and which photographs you would like to bring to a group discussion or share in distribution. The researcher will only use the photographs that you give consent to use as part of the research. As previously stated, this will be the photographs discussed in an interview, discussion group, and/or shared at a community event. You may withdraw a photograph at any time before September 2019, unless it is used in the discussion group, as this data cannot be removed. The researcher will only use the photographs for the project and final research dissertation. Please be assured the researcher will NEVER use your photographs for any other purpose unless given prior informed consent.

**Confidentiality**

Any direct identifiers will be removed from photographs and audio-recordings. However, if a face is shown in a photograph, please be aware that this will not provide privacy or confidentiality. Other community members may be able to identify a participant through the content in the photograph or the description written about it. For example, this may be an identifiable homegarden, an identifiable person, or notable photograph description. All photographs used in the final thesis paper will be kept confidential through a pseudonym. You will choose whether or not you want your name attached to your photographs for any other sharing distribution of the project. The interview and discussion group will be audio-recorded and transcribed. As a discussion group involves a group discussion it is impossible to provide complete confidentiality, but guidelines will be presented to the group to ensure that it is a safe space for open discussion. If you would like to review these guidelines, please refer to the “Discussion Group Guide”.

The confidentiality of all the data will be protected by ensuring that it is stored in an encrypted computer. Any printed photographs will be kept in a locked cabinet. Only the Student and Principal Investigators, stated below, will have access to this information. All data will be shredded or destroyed at the conclusion of the broader research project in September 2019.

*Every effort will be made to make sure that all data and photographs are held securely. We will never share your personal information with anyone else.*

**Potential Risks**

There are some potential risks involved if you choose to participate in this study. They are all minimal, and likely less than those dealt with in every day life. It is possible that talking about issues with your homegarden may induce feelings of stress or frustration. You may also feel emotions, such as, worry or judgement when sharing your photographs with others. This will be minimized by assuring a safe space for discussion, and by allowing you to choose which photographs you want to share. Finally, as a co-researcher with a camera, you may be perceived by other community members as having increased
power and ability to take photographs of others or others’ property. However, you are not permitted to take photographs of identifiable people or others’ property without their permission and signed consent through the ‘Photo Release Form’. In addition, this research is focused on your personal homegarden, therefore, photographs outside your homegarden are not encouraged. Any photograph of an identifiable person or private property without a signed “Photo Release Form” will not be used in any part of the study.

Potential Benefits and Importance

-To Academia and/or Society
This research is important because too often the voices and knowledge of rural people is overlooked. In Sri Lanka, homegardens have been recognized as extremely valuable to the environment, yet in many previous initiatives, there has been little input from actual homegarden farmers. In this research study, the input and knowledge of local farmers is valued. The results of the research will be accessible and stay within the community. This may be through a photography book of the research findings or a community event. This will allow the community and/or the University of Peradeniya to build upon the research findings in the future. It is valuable to share in your experiences and knowledge on homegardens to generate critical conversation on the issues and strengths in your community. These research findings may guide future conservation initiatives for homegardens in the Kandy District.

-To Participants
There are little explicit benefits to participants in this study. However, as a participant, you can learn a new skill in how to use a digital camera. You can also learn to share your knowledge, experiences, and perspectives on your homegarden, through a photographic method. You will be viewed as an expert on your own lived experiences in your homegarden. In group discussions and project distribution with others, you may learn from other homegarden farmers and build relationships with peers. You may be able to learn how others are coping with issues in their homegarden, and apply similar strategies to your own, if relevant.

Compensation
You will receive a small gift or monetary gift as a thankyou for participating in this study. This will be decided by the group and will equal approximately 5000/= per participant. In addition, as a participant and a co-researcher in this study, you will be able to keep the photographs you take as part of this research. This will be a maximum of 30 photographs. If you withdraw from the project before its completion, you will not receive this compensation as there are limited funds, and participants are needed for the entire duration. Snacks and tea will also be provided throughout group discussions.

Distribution of Results
It is anticipated that the results of this study will be shared with others in the following ways: directly to the participants, a community event such as a photography exhibit or a community photo-book, and a thesis dissertation. Depending on what the group decides, the results may be presented in a community event or community photo-book by mid-February 2019. The thesis will be completed by September 2019.

Ethics and Contact Information
You do not waive any legal rights by agreeing to take part in this study. This project has been reviewed by the Research Ethics Board for compliance with federal guidelines for research involving human participants. If you have questions regarding your rights and welfare as a research participant in this study (REB# 18-11-004), please contact:
If you have any questions or concerns about the research please feel free to contact the student investigator, Rachel deHaan or supervisor, Dr. Helen Hambly Odame.

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hambly@uoguelph.ca

Name of Participant: ____________________  
Signature: ______________________________

Date: ____________________
APPENDIX VI – RESEARCH ASSISTANT CONTRACT

CONFIDENTIALITY AGREEMENT

For the Project: Understanding Local Knowledge on Conserving Homegardens: A Study in Kandy District, Sri Lanka, Using the Photovoice Method

REB# 18-11-004

Between the Student Investigator and the Principal Investigator,

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AND

the Transcriber, Translator, and/or Research Assistant.

I ____________________________ (please print name) understand that in the course of providing the above named services I will have access to project information/data which must be kept confidential, including but not limited to personal, and at times sensitive, study data revealed by or relating to human subjects, including, anonymized, de-identified, or identified data. I also understand that any information disclosed to me about the project, or any human subject’s role in the project is also considered project information/data that must be kept confidential.

I agree to:

• hold and maintain in strictest confidence all Project information/data that is shared with or is received by me;
• not discuss or share in any form or format any project information/data with anyone other than individuals approved in writing by the student investigator and/or Principal Investigator;
• not work with the Project information/data in a physical area/location that may compromise the security of the Project information/data;
• keep all Project information/data in any form or format in my possession secure from access by third parties by both physical security measures (Project information/data in tangible form kept in a safe and secure location under lock and key) and electronic information security measures (Project information/data in electronic form stored on a password protected, encrypted computer and hard drive);
• not make copies of any Project information/data in any form or format unless specifically requested to do so by the student or principal investigator;
• securely and permanently delete or destroy or return to the student and/or Principal Investigator, as directed by the student and/or Principal Investigator, all Project information/data (including any back-up records, copies), in any form or format (e.g. disks, tapes, portable storage media, transcripts), once I have completed the Services;
• notify the Student and/or Principal Investigator immediately if any unexpected or adverse events occur in my performance of the Services that constitute a breach of this confidentiality agreement such as any unauthorized access to Project information/data or any loss or theft of any Project information/data; and,
• not discuss the Project information/data with others during or after the Project is complete, or during or after I have finished the Services.

I am aware that any disclosure of Project information/data in violation of this agreement will constitute a serious breach of ethical standards and may result in the disclosure of identifiable information about human subjects that is harmful, and I pledge not to do so.

SIGNED AS AN AGREEMENT:

Name (print): ____________________________________________
Signature: ________________________________________________
Date: ____________________________________________________

PRINCIPAL INVESTIGATOR

Name (print): ____________________________________________
Signature: ________________________________________________
Date: ____________________________________________________

STUDENT INVESTIGATOR ACKNOWLEDGMENT:

Name (print): ____________________________________________
Signature: ________________________________________________
Date: ____________________________________________________
APPENDIX VII – PHOTOGRAPH PERMISSION SLIP RELEASE FORM

Photograph Media Release form

This form must be used when taking photographs of any identifiable person or another person’s property

Name of Participant/Photographer: ________________________________

Photograph File Number: ___________________.jpg (i.e. ‘001.jpg’, ‘002.jpg’)

With this form, I grant the above photographer the permission to share these photograph(s) with the Project researchers, Rachel deHaan and Helen Hambly, to use in the research project stated above. After the completion of the project, the photograph(s) will be kept indefinitely by the participant photographer and they have ownership over the image(s).

Please indicate below (by initialing) what uses of the photograph(s) you consent to. You are under no obligation - what uses you consent to is completely up to you. Your name will not be included in any uses of the photograph. Information on this form will be kept confidential.

1. The photograph can be used, on the behalf of the photographer named above, in the Photovoice Project, stated above. This includes in the research thesis paper and potential presentations that will be seen by other researchers and/or the public. If yes: _____

2. The Photograph can be used, exhibited and/or displayed in a community event, such as a photography exhibition or community photobook. If yes: _____

I have read this form and have given my consent to the use of the photograph as indicated above. I acknowledge and agree that: (a) While my name will not be included, there is no assurance or guarantee that myself/or my property will not be identifiable; and, (b) I will not have the opportunity to inspect or approve in any media in which the photograph appears unless specific arrangements are negotiated with the Student or Principal Investigator prior to disclosure.

Name of Person in Photograph (Print) ________________________________

Parent/Guardian Name of Person in Photograph (if under 18) ________________________________

____________________________________________________  ______________________
Signature of Person in Photograph  Date
A Picture of Change:

The Issues and Strengths of Kandyan Homegardens Over Time.

Will They be Conserved for the Future?

A “Photo-Voice” Research Project with Local Homegarden Owners.
Presented as a Photograph Display on:

Friday, February 15th, 2019
Faculty of Agriculture, Main Building,
Open between 12:00-3:00pm

Feedback and Comments Welcome
APPENDIX IX–ETHICS APPROVAL CERTIFICATE

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<td>Delegated</td>
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<tr>
<td>PRINCIPAL INVESTIGATOR:</td>
<td>Hambly Odame, Helen (<a href="mailto:hambly@uoguelph.ca">hambly@uoguelph.ca</a>)</td>
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<tr>
<td>DEPARTMENT:</td>
<td>School of Environmental Design &amp; Rural Development</td>
</tr>
<tr>
<td>SPONSOR(S):</td>
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<tr>
<td>TITLE OF PROJECT:</td>
<td>Local Knowledge and Perspectives on Conserving Forest</td>
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<td>Homegardens: A Study in Halioluwa, Kandy District, Sri</td>
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<td>Lanka, Using the Photovoice Method</td>
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CHANGES:

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<th>Date</th>
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<td>Annual Renewal</td>
<td>November 26, 2019</td>
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The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human participants in the above-named research project and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that researchers:
- Adhere to the protocol as last reviewed and approved by the REB.
- Receive approval from the REB for any modifications before they can be implemented.
- Report any change in the source of funding.
- Report unexpected events or incidental findings to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants, and the continuation of the protocol.
- Are responsible for ascertaining and complying with all applicable legal and regulatory requirements with respect to consent and the protection of privacy of participants in the jurisdiction of the research project.

The Principal Investigator must:
- Ensure that the ethical guidelines and approvals of facilities or institutions involved in the research are obtained and filed with the REB prior to the initiation of any research protocols.
- Submit an Annual Renewal to the REB upon completion of the project. If the research is a multi-year project, a status report must be submitted annually prior to the expiry date. Failure to submit an annual status report will lead to your study being suspended and potentially terminated.

The approval for this protocol terminates on the EXPIRY DATE, or the term of your appointment or employment at the University of Guelph whichever comes first.

Signature:

Date: November 26, 2019

Stephen P. Lewis
Chair, Research Ethics Board-General