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# Homegardens of Monteverde: Exploring Changes in Home Crop Cultivation

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## **ABSTRACT**

Homegardens are model forms of sustainable land use in tropical agroforestry systems. Known as an assembly of varied crops and animals, these small homestead farms provide a cheap, nutritional source of food to the family while maintaining the biodiversity and productivity of the surrounding ecosystem. With the introduction of ecotourism into the Monteverde area, an economy traditionally based on agriculture shifted towards tourism services, thus changing the underlying dynamics of the community. Thirty families of the Monteverde area were interviewed and provided information relating to homegarden contents, family history, and lifestyle choices. This study shows that homegardens have declined significantly in diversity of both crops ( $F = 37.5210$ ,  $p = <.0001$ ) and livestock ( $F = 17.8885$ ,  $p = <.0001$ ), and that these changes are largely due to the urbanization and influx of tourism into the area. Changes in homegarden production, and also community structure, will have varying socioeconomic, cultural, and environmental impacts on the region.

## **RESUMEN**

El jardín de la casa es una forma sostenible de usar la tierra en sistemas tropicales. Una colección de plantas y animales, estas fincas pequeñas son una fuente de comida saludable para la familia. A la misma vez, ellos mantienen la biodiversidad y productividad del ambiente natural. Con la introducción del ecoturismo en el área de Monteverde, una economía basada tradicionalmente en la agricultura ha llegado a ser basado en los servicios turísticos, y por eso ha cambiado las dinámicas fundamentales de la comunidad. Treinta familias del área de Monteverde estuvieron entrevistadas, y ellas dieron información sobre los contenidos de los jardines, la historia de la familia, y del modo de vivir. Esta investigación muestra que los jardines han disminuido en diversidad de los cultivos ( $F = 37.5210$ ,  $p = <.0001$ ) y en animales ( $F = 17.8885$ ,  $p = <.0001$ ), y que la causa de estos cambios es la urbanización y la introducción de turismo en el área. Los cambios en los productos de los jardines, y también la estructura de la comunidad, van a tener impactos socioeconómicos, culturales, y ambientales importantes en la región.

## INTRODUCTION

In traditional land use systems of the tropics, house gardens have played an important cultural, socioeconomic, and environmental role. These backyard gardens are often a disorganized collection of crop species, fruit and timber trees, and livestock based around a central homestead (Kumar et al. 2004). The main use of the house garden is to supply the family with fresh, seasonal foods to supplement the diet (Torquebiau 1992).

Homegardens are valuable to family dietary and monetary health. In growing some foods that would normally be purchased in store, funds usually set aside for foodstuffs can be directed elsewhere. These crops are also generally more nutritious than those bought at a supermarket because of the organic way in which they are raised (Benbrook 2005). Since crops vary in availability season to season, the family is supplied with a more or less steady variety in foodstuffs from the garden. In addition to providing food stability for the family, these farmsteads can contribute to the local economy through crop exchange, local markets, and provide a source of cash income for the family (Christanty 1990). Extra produce from the garden can be sold to neighbors, in farmer markets, or through other sources.

Importantly, homegardens are also possible sources of ecosystem services. They are active in processes such as nutrient cycling via soil microbes (Isaac et al. 2001), erosion prevention (Torquebiau 1992), and habitat sources for native plant and animal species due to close mimicry of the natural ecosystem (Gliessman 1986). Important actors in nutrient cycling, like fungi, microbes, and earthworms are rich in diversity and abundance in the homegarden. Their presence contributes to the stability and sustainability of the garden and surrounding area by making nutrients readily available and maintaining the productivity of the system (Altieri 1987). Further, family gardens usually contain a wide variety of vegetable and fruit crops, useful tree species, decorative plants, and herbs, and therefore mimic the biodiversity of the surrounding area (CITATION?). In comparison to monoculture plantations, which experience pest outbreaks and create virtual deserts for native flora and fauna, the diversity of homegardens act as a pest biocontrol and also food and habitat sources for local fauna (Altieri 1987). Farmers also often make use of local crop varieties which helps to maintain the genetic diversity of the crop itself.

Homegardens are not only economically and ecologically sustainable, they also are a source of social interaction and help maintain cultural practices. In growing crops together, knowledge of food production and preparation is shared between generations. Communal activities such as garden maintenance and meal preparation create not only connections between family members, but also a general equality, especially between sexes (VanDusen 2000). Agricultural practices, as well as family recipes and traditions become well preserved.

Family gardens, or “kitchen gardens”, are common in the Monteverde area. Families grow a variety of crops to supplement the family diet. Traditionally, there has been a long list of foodstuffs cultivated in family farms (Griffith et al. 2000; VanDusen also). Vegetables like maiz, chayote, and carrots are common, as are beans, herbs, and fruits. Since many of the species cultivated are perennial or tree crops, they require less maintenance, and much of the tending work is distributed among different family members (VanDusen 2000). As the Monteverde area is composed largely of steep slopes,

experiences pest problems, and has no reliable market demand, it is unsuitable for large-scale farming (Griffith et al. 2000). Therefore, home gardens are mainly for family consumption only, and very few farms sell crops in local markets.

With the advent of a more industrial system of food production and cheap, imported foodstuffs, it has become easier to purchase processed foods and rely less upon local produce (Halwell 2004). Supermarkets provide these processed foodstuffs and also a wide variety of produce. Although supermarkets are convenient and predictable, the quality, sustainability, and sometimes price of food is often compromised (Halwell 2004). Within the Monteverde area, many households have started the slow switch from homemade foods to store-bought (Laracuente et al. 2008). This change in diet may be accompanied by a loss of traditional food cultivation and preparation knowledge. Additionally, there may have also been a loss of interest in farm maintenance and knowledge by younger generations. Crops once produced in family gardens may be replaced by purchased produce, and younger generations will no longer have the experience of cultivating and preparing traditional foods. All these events play a role in the loss of cultivation knowledge, and will be explored further in this paper.

This study aims to measure the changes in the crop content of Monteverde area homegardens over time. In addition to identifying which homestead crops and animals have been lost or gained, this project examines the reasons behind these changes. I ask: how has the advent of supermarkets and change in food availability affected local homegardens? To what extent have younger generations shifted away from the homestead lifestyle? Has the explosion in ecotourism in the area become a driving force behind the changes in occupation, and therefore crop cultivation? I also more generally document some of the differences between the local farmer's market and supermarket to provide more information on local food sources for families.

## **METHODS**

### **Study Site**

This study was conducted in two locations within the Monteverde area. Families were interviewed in both San Luis and in Cerro Plano. San Luis is a rural community located three kilometers from Monteverde. The area consists mainly of family farms, homesteads, and pasture. Cerro Plano is a more urban community placed between Monteverde and the town of Santa Elena. Cerro Plano contains neighborhoods, homesteads, and local businesses, most of which are directed towards the tourist market.

### **Data Collection**

To measure the change in homegarden contents over time, I conducted thirty interviews with local families. Fifteen families interviewed were from San Luis and 15 from Cerro Plano. In dividing the interviews between these locations, my goal was to compare the changes two types of communities: one rural and one urban. Each family provided information on family history (length of stay in area), occupation, family size, main food source, and home food production in terms of crops and livestock. Families were also asked on their opinions about their food source and the interest of young members in

learning about food production.

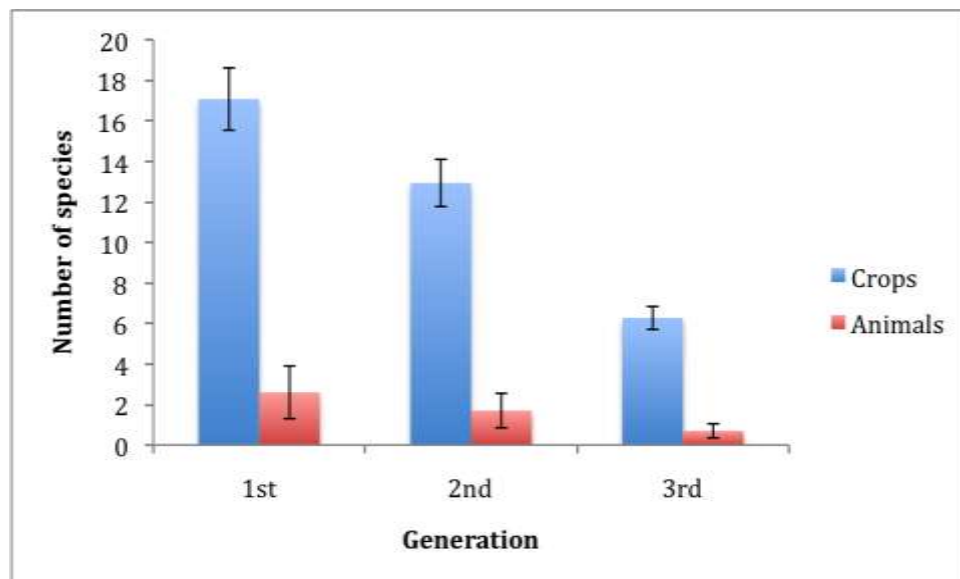
### Statistical Analyses

To compare crop and animal diversity loss in the Monteverde area across three generations, an ANOVA was used. A Tukey-Kramer HSD test was used to show where, generationally, crop diversity differed.

To compare crop diversity losses between San Luis and Cerro Plano across generations, a one-way analysis of variance (ANOVA) was used.

## RESULTS

A loss in overall crop diversity in the Monteverde area across all three generations was observed ( $F = 37.5210$ ,  $p < .0001$ , Fig. 1) and also for livestock ( $F = 17.8885$ ,  $p < .0001$ , Fig. 1). Numbers of common plant and animal species have declined from generation to generation. There now exist, on average, fewer species in present homegardens as compared to those from the first generation of the family.



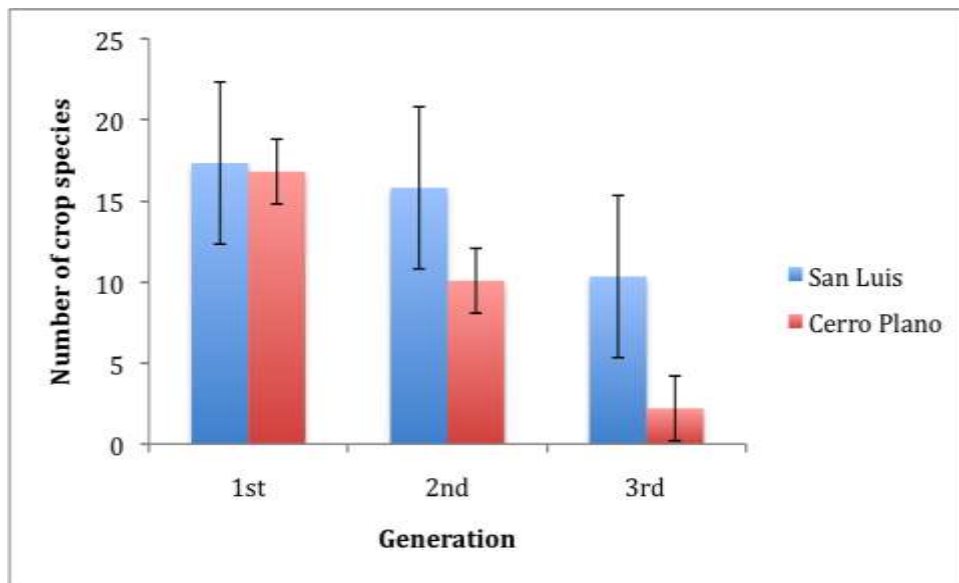
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FIGURE 1. Change in homegarden diversity in Monteverde. There was a loss in both crops and animals across all three generations. Blue bars represent the crop species found in homegardens, whereas red represent the animal species present. Each generation experiences sizeable drops in species numbers of both categories.

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There was a decrease in crop species number for Cerro Plano, when compared to San Luis for the second ( $F_2 = 9.9562$ ,  $p = .0038$ ,  $df = 28$ , Fig. 2) and third generations ( $F_3 = 31.4482$ ,  $p < .0001$ ,  $df = 28$ , Fig. 2), but not in the first generation ( $F_1 = .3216$ ,  $p = .5752$ ,  $df = 28$ , Fig. 2). Families in Cerro Plano have experienced a greater reduction in

the diversity of species found in homegardens. The majority of crops found in Cerro Plano homesteads were fruit trees, and rarely vegetable crops. Homesteads based in Cerro Plano were also in general observed to be smaller than those of San Luis.

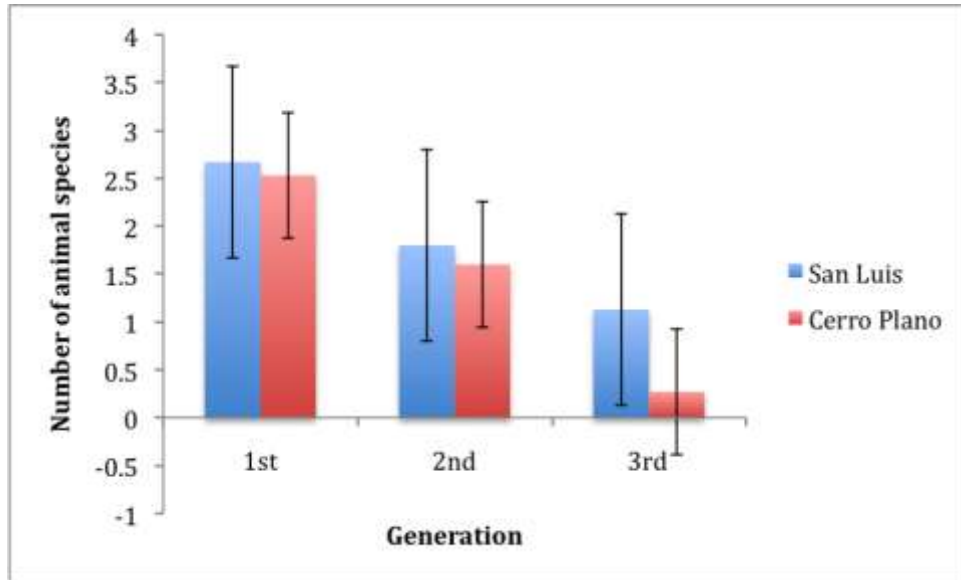


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FIGURE 2. Comparing change in crop diversity between San Luis and Cerro Plano. Though families in both areas initially produced similar numbers of crops, Cerro Plano families experienced a much greater drop in number of crops produced than those in San Luis in the second and third generations.

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There was no difference in livestock production between families in San Luis and Cerro Plano for the first ( $F_1 = .0909$ ,  $p = .7653$ ,  $df = 28$ , Fig. 3) and second generations ( $F_2 = .1400$ ,  $p = .7111$ ,  $df = 28$ , Fig. 3). Differences in livestock diversity were present, however, for the third generation ( $F_3 = 6.3946$ ,  $p = .0174$ ,  $df = 28$ , Fig. 3). Though both areas have reduced the number of animal species present in homegardens, families from Cerro Plano are now raising fewer species on average of animals than those in San Luis. Many San Luis families continue to raise smaller animals, like poultry, whereas animals are largely absent from Cerro Plano homesteads.

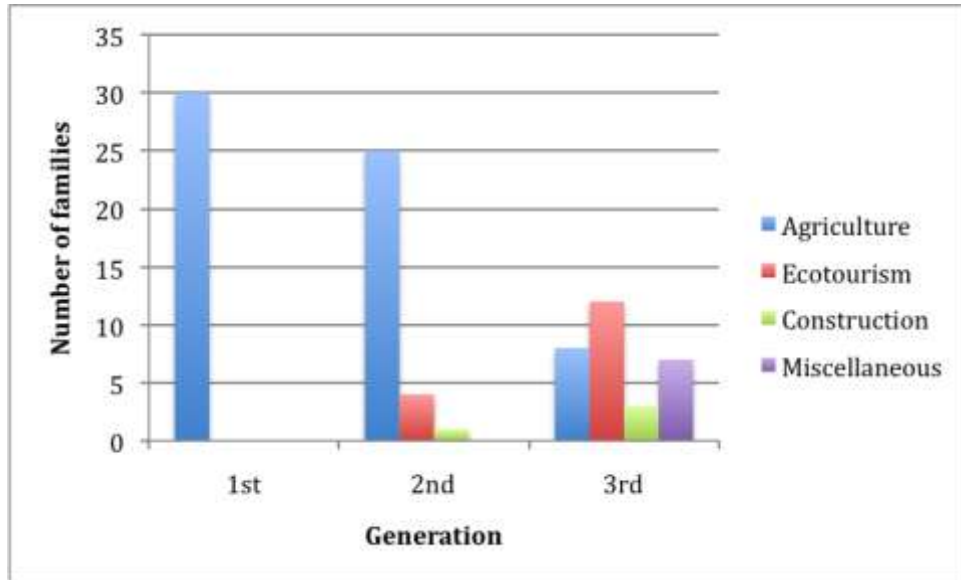


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FIGURE 3. Comparing change in livestock diversity between San Luis and Cerro Plano. Both areas experience losses in animal species numbers but differences between towns only become significant in the third generation.

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There also appears to be a large shift in occupations across generations in the Monteverde area (Fig. 4). Agricultural jobs have steadily declined, while occupations involved directly or indirectly in the ecotourism business have increased. The first generation of workers was largely farmers, many of which grew coffee or sugar cane for export. Second generation occupations were still mainly found within the agricultural sector, but families began to find other sources of income. Third generation occupations are much more diverse in nature, and often connected to the development of the town and local businesses. A much smaller percentage continue to work in farming, and most are from San Luis. Occupations common to the third and youngest generation were tour guides, construction workers, maids, and park maintenance personnel.



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FIGURE 4. Occupation change in the Monteverde area. Greatest losses occur in the agriculture sector. Jobs in the ecotourism business steadily increase across generations. The third generation shows the most diversity in occupations of all time periods.

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Family size has also declined over time (Fig. 5). Both families in Cerro Plano and San Luis areas are having fewer children in comparison to past generations. The largest decrease in family size occurred between the second and third generation.



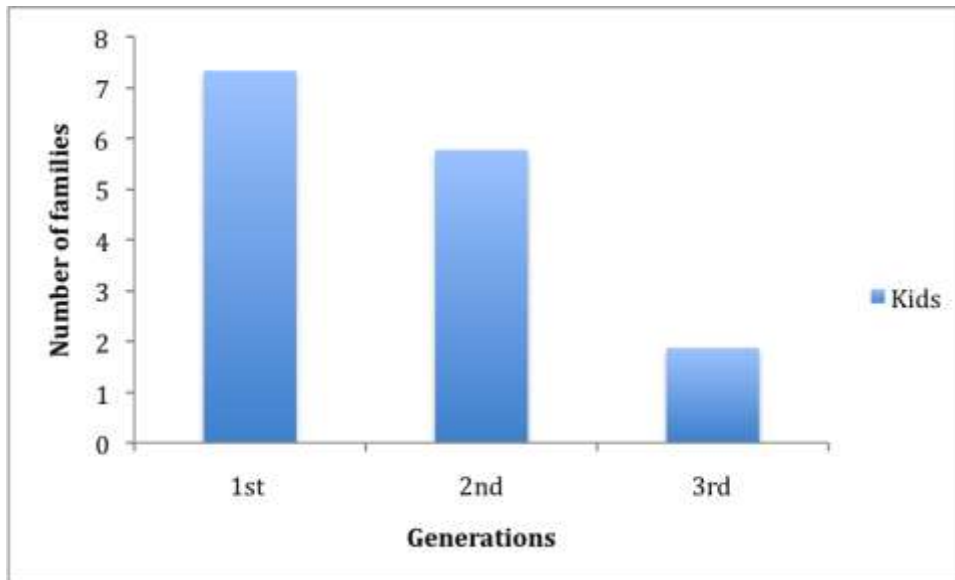


FIGURE 5. Average number of children per household across generations. The number of children per household has steadily declined. The greatest drop in number of children occurred between the second and third generations.

Families have also started to obtain the majority of their food from new sources. Supermarkets have grown in size and number in the area, providing more variety and predictability in food selection. Most families interviewed now obtain the vast majority of their food from large grocers. Of the thirty families interviewed, 80% obtain the majority of their food from the supermarket. This food source is very different as compared to first generation families, where nearly 100% of their food was produced at home or obtained by trade with neighbors. Furthermore, older generations produced more staple foods. Though some families exchange produce with neighbors, local markets and food commerce do not represent a large part of the family diet.

## DISCUSSION

Within the Monteverde area, there has been a loss in both crop and livestock diversity across generations. It is important to note that many of the crops lost over these generations were staple crops (beans and corn), which are the main source of for most families. Crops that needed less input (fruit trees, plaintains, etc.) generally persisted through time. Most losses in animal diversity occurred in large livestock like cows, horses, and pigs. Chickens require less space and maintenance, and therefore are still present in some households.

Differences in homegarden contents were most apparent in the Cerro Plano community. Cerro Plano is much more urbanized than San Luis, which has remained a largely rural area. This urbanization has caused homestead sizes to be smaller, and

therefore contain fewer crops and animals. This trend is common to other tropical homegardens, where crop species diversity increases with farm size (Kumar et al. 1994). With the huge development of the ecotourism businesses and all the changes that are associated with it (construction, maintenance, etc.), many farmers have changed professions, either within their lifetimes or across generations. Interviewees reported that their families earned a greater income with non-agricultural jobs than with farming-based professions. Families once focused in the agriculture sector have expanded to meet the demands of a changing community. This shift away from the farm is the driving force behind the loss in biodiversity of homegardens. Not only is the community becoming more urbanized to properly address needs of tourist, family energy is directed less in producing food than in earning an income in outside businesses.

Also co-occurring with urbanization and the development of ecotourism is the presence of new, convenient food sources like supermarkets and minimarts. Many families reported a reliance on stores for the majority of their food, causing homegardens to lose relevance. Supermarkets, in providing a variety of products year-round, become a stable and predictable source of food (Halwell 2004; Pollan 2006). Families are beginning to opt for predictability over quality when choosing where their food is coming from.

Family sizes are also smaller. This translates to fewer mouths to feed, and fewer family members to support. Homegardens begin lose their value as a food source when less and less food is needed to feed a family. Once homegardens lose their value, younger generations and children lose the context in which food is provided. If they are active in growing and cultivating foodstuffs, they have better knowledge of the importance of food and how to use it.

The significant loss of crop diversity in the Monteverde area may have important consequences for its families and environment. These consequences manifest themselves in terms of socioeconomic health of the family. Not only have some families lost a diversity of home produce, they have also lost a diversity in income (Torquebiau 1992). The reliance on one source of income to support the family could be detrimental if the source was lost and the extra cash that home crops once provided is no longer available (Torquebiau 1992). Since the extra crops sold once supported a local market, the loss of this stimulus could have shifted cash flow outside of the community. With less money circulating in the community, less is available to the families that live there. Nutritional security is also compromised (Kumar 2004). In obtaining the majority of their food from outside sources, the nutritional quality and method of production of food becomes unknown (Halwell 2004). Many interviewees that had large homegardens stated the importance of eating locally or from home. Some families were uneasy with some of their food purchases at the supermarket, and only bought food from outside sources when necessary. Produce purchased at the local grocery or supermarket could contain harmful chemicals or substances, especially considering many farms within the area are organic. With the loss of crop diversity, families may therefore put themselves at risk economically and nutritionally.

The decline in crop production has perhaps the most serious consequences in terms of culture loss. Many of the families interviewed reported that the children of the family were more focused on subjects taught in class and planned to enter occupations in which

there was a greater opportunity for increased income (like ecotourism services). Furthermore, many of the existing homegardens were largely attended to by the older generations. However, families largely reported that younger generations aided in meal preparation. Although they may be losing the knowledge of cultivating food, children continue to learn traditional meals and ways of using food. Shared meals may serve as a buffer against future food culture loss and the traditions associated with meal preparation.

It remains to be explored how the loss in homegardens and subsequent shift towards urbanization will affect the local environment. Certainly, a decline in homegardens should decrease the health of the soil, as fewer organisms involved in nutrient cycling (like earthworms, microbes, etc.) (Isaac et al. 2001). Genetic diversity of crops is also declining (Gliesmann 2000), and loss of crop varieties in homegardens is problematic. There could also be negative consequences for the surrounding flora and fauna that originally used the diversity of trees, shrubs, and flowers of the homegarden as important food sources or nesting sites (Kumar 2004). Further studies of soil analysis and biodiversity comparisons would contain insight as to how ecological mechanisms are affected by homegarden loss.

Homegardens have diminished in size and frequency in the Monteverde area. This phenomenon can be explained by increasing urbanization and occupation shift due to ecotourism, availability of convenient, processed foods by supermarkets, and in some part to smaller families that show less interest in maintaining the family garden. Other factors could also be influencing the crop and livestock diversity loss in homegardens, and should be explored further. Long-term cultural and ecological studies would reveal consequences of this shift from homegrown to store-bought.

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