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Inside the canopy in 2013. Photo: Kamal Melvani

# Watershed rehabilitation with forest gardens in Moneragala District, Sri Lanka

*Kamal Melvani, Jerry Moles and Yvonne Everett*

*"All stakeholders in the landscape mosaic of a watershed must participate in and gain from land rehabilitation if it is to succeed."*

## Introduction

Forests in mountainous watersheds provide valuable ecosystem services, including sustaining water flows. Moss and leaf litter, for example, store precipitation like sponges and gradually release it into streams. This ensures dry season flow in rivers and provides a lifeline to people when there is no rainfall. Riparian forest vegetation is especially important, because tree roots bind soil on stream banks, prevent erosion and reduce sediment flow and nutrient loss into streams while also filtering water. Shade cast by forest canopies lowers stream water temperature and enhances water quality.

Forest destruction results in the loss of these ecosystem services, impoverishing inhabitants and diminishing watershed sustainability. Conversely, establishing forest gardens (FGs) in watershed rehabilitation restores ecosystem services, provides livelihood benefits to communities, and improves watershed sustainability. Having restored Sri Lankan watersheds for over 30 years, the Neo Synthesis Research Centre (NSRC) tested the practice of forest gardens with 52 farmers at Maragalakanda, Sri Lanka for four years, from 1999 to 2004. This article describes how rehabilitation in the landholding of one farmer (referred to here by the pseudonym *Rani*) increased household livelihood security, reversed forest loss, and sustained watershed health. Evaluations undertaken from 2012 to 2016 assessed changes that were then occurring in Rani's landholding, and their implications for practitioners and planners.

## Context

Located in southeast Sri Lanka, Maragalakanda (a mountain in Moneragala District) receives 1,750–2,500 mm of rainfall annually in two separate monsoon seasons. It is the watershed of the Maragala Oya (see Figure 1) a river that feeds the Kumbukkan Oya. Maragalakanda has eight vegetation types: semi-evergreen, tropical wet evergreen, riverine and secondary forests, rubber plantations, grasslands, savannah and *chena* (traditional swidden agriculture with land rotation and extended fallow). The area is rich in biodiversity, encompassing 427 floral and 353 faunal species (IUCN 2018).

Watershed degradation first occurred here when forestland was cleared for plantations (tea, sugarcane, rubber) and continues through modern *chena* cultivation (non-traditional swidden agriculture without land rotation or extended fallow, referred to from now on as *chena*). With declining fertility, land is abandoned and returns to secondary forest. Estate Tamil communities who live in the upper watershed generate meagre incomes through *chena* cultivation (vegetables, sesame, finger millet, pumpkins, groundnut, bananas) or as labourers. They do not own land, and with little access to adequate housing, health facilities, potable water or sanitation, are impoverished. Sinhala farmers who reside in downstream areas do own land, but also clear forestland for *chena* cultivation. Unsustainable land management and high poverty rates, along with high biodiversity values and hydrological significance, made the Maragala Oya watershed an ideal choice for land rehabilitation.

Rehabilitation followed a successional process, using regenerative agriculture, analog forestry and conservation forestry. Regenerative agriculture promoted the cultivation of diverse annual and semi-perennial crops using biological inputs. Analog forestry established a tree-dominated ecosystem that was similar in structure and ecological function to the closest natural forest. These practices economically empowered rural communities through the use of marketable native and exotic crop species in landscape designs (Senanayake and Jack 1998). In parallel, conservation forestry, undertaken in buffer and riparian zones, sought to restore

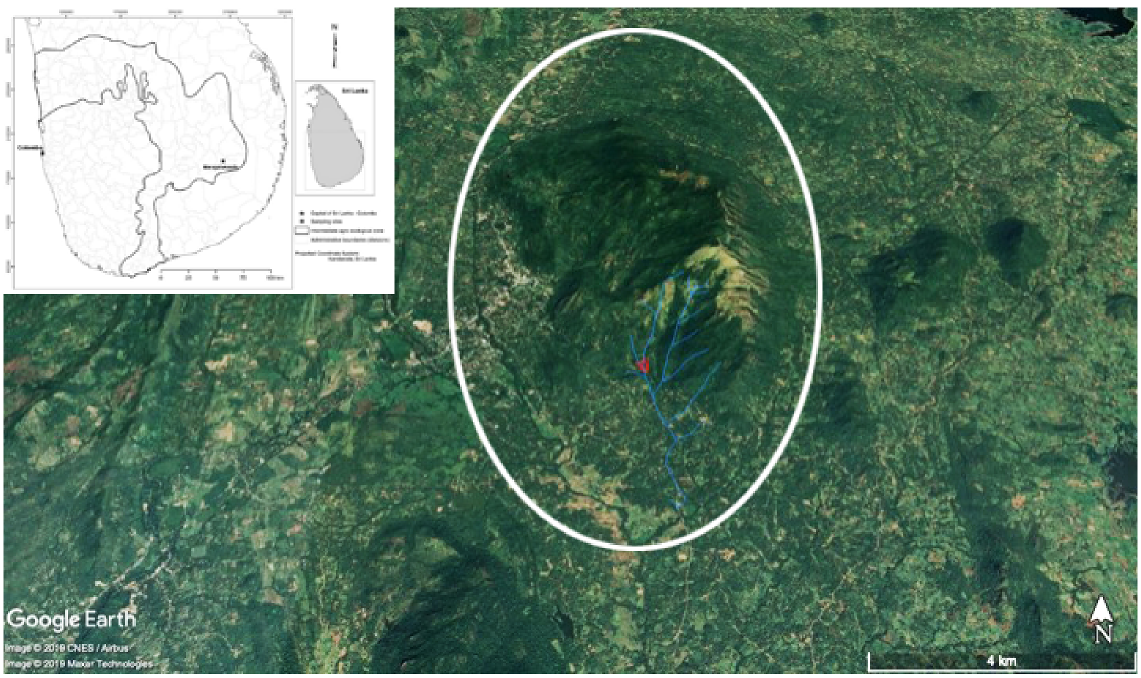


**Figure 1. A 3D Google Earth image of Maragalakanda (white oval); the mountain rises from the lowland peneplain. Maragala Oya is in blue, and the project location is in red.**

stream ecosystems while recreating habitat for faunal biodiversity using only native forest species. Once tree canopy was restored, these degraded areas would begin to conserve water and function like water towers.

Before rehabilitation began, preliminary discussions were held to identify households' issues, and how they would benefit from adopting forest gardens. Low and inconsistent on-farm income from *chena* cultivation, which in 2000 was USD 95, was their biggest problem. This allowed only one of Rani's five children to attend school, limited food purchases (cooking oil, sugar, and animal protein), and compelled household members to labour on other people's lands. The situation was acute in the dry season, when food stocks had been consumed, income from the past year's *chena* cultivation expended, and stream water was neither potable nor sufficient for cultivation.

Desperate and uncertain of how to resolve the situation, Rani's household welcomed the prospect of consistent income, food, medicine, firewood and timber from a forest garden. They decided to allocate the largest portion of their landholding to tree-dominated agriculture and the balance to cash crop and *chena* cultivation; cash income was essential to satisfy their immediate needs.

A base map (Figure 2) was drawn in 1999 that showed land use, topography, existing vegetation, wind, and water flows in Rani's 3.2-hectare landholding. Located at 216 masl, the landholding was part of a landscape mosaic comprised of undisturbed and disturbed natural forest remnants, feeder streams of the Maragala Oya, another farmer's (Raja's) landholding, an Estate Tamil village, and paddy fields. Land was sloping (~30%), rocky and eroded. Sparse vegetation provided minimal habitat for animals, birds and other pollinators. There was no water source except three dead gullies (i.e., gullies where the streams had dried up), which — along with open, hot and dry conditions — engendered unfavourable growing conditions.

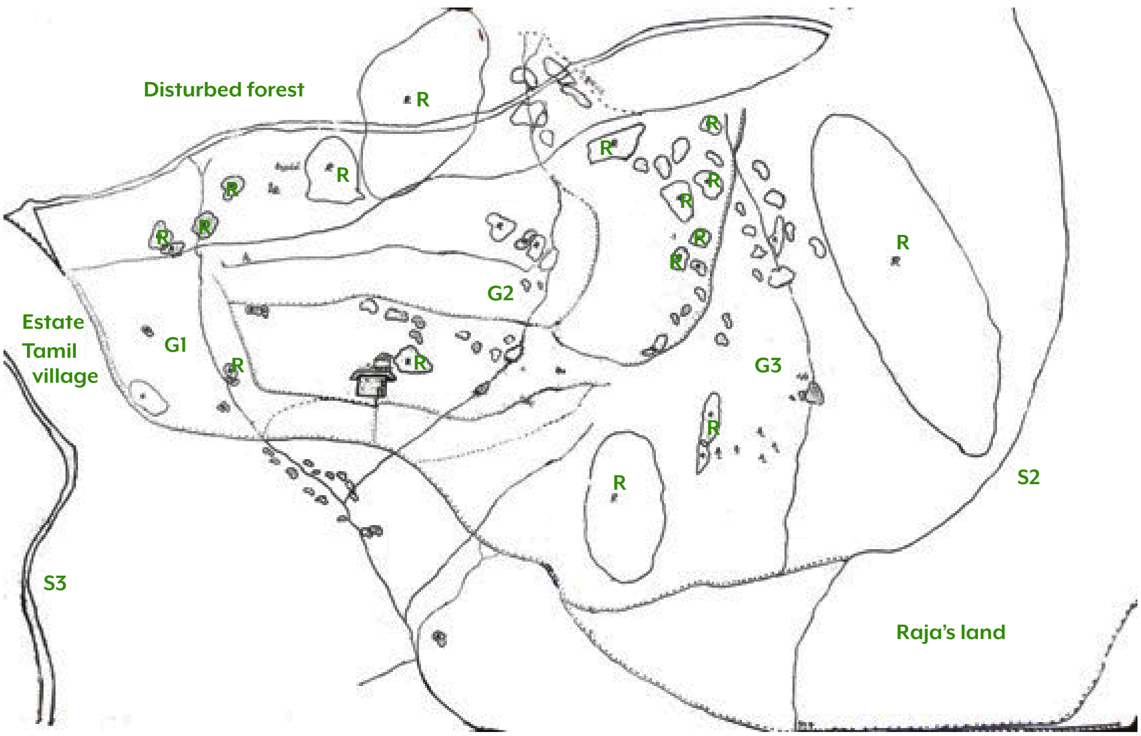


**Figure 2. Base map of Rani's landholding on Maragalakanda in 1999**
R: very rocky; G1, G2 and G3: dead gullies; S2, S3: major streams

The proposed forest gardens were modelled on the forest above Rani's landholding. Vegetation mapping (Küchler and Zonneveld 1988; Senanayake 1989) of this forest revealed that it mainly comprised broad-leaved and evergreen trees and shrubs across four strata (ground, low, mid and upper), as well as other growth forms, including forbs, climbers, grasses and lichens. A low density of species, 6–25% canopy closure, and the presence of exotic species signified that the forest was disturbed. This data provided context for the landscape design of the forest gardens.

The landscape design also considered topography, water, and wind flows. Drawn in accordance with household aspirations, it divided Rani's landholding into several land uses, including forest gardens, paddy fields, *chena* and cash crop areas, and a buffer zone between the disturbed natural forest and the landholding (Figure 3). Riparian vegetation was designed around ponds established in gullies. Forest garden vegetation mimicked the vegetation structure of the adjacent forest and aimed to provide the same ecological functions and services by using both crop and non-crop species.

Table 1 lists 175 species established in the forest gardens according to their height class and stratum. They provide a wide range of ecosystem services.

- 96 species (55%) provide food and medicine;
- 29 species (17%) provide riparian buffer and water filtration;
- 20 species (11%) provide shade and cover rocks;
- 10 species (6%) are ornamental;
- 9 species (5%) provide timber and firewood;
- 6 species (3%) provide biopesticides; and
- 5 species (3%) provide green manure.

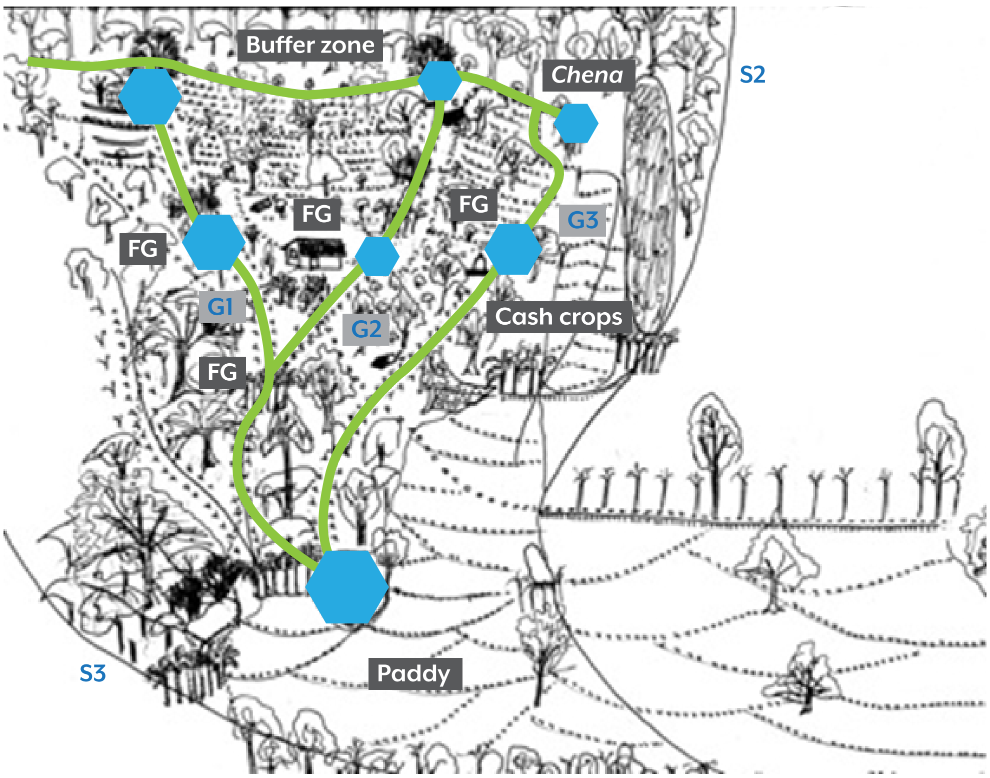


**Figure 3. Landscape design of Rani's landholding. The green line indicates proposed riparian vegetation; the blue polygons are holding ponds.**
FG: Forest Garden; G1, G2 and G3: dead gullies; S2 and S3: major streams

**Table 1. Species established in forest gardens by stratum, height class and ecosystem services**

| **Stratum** | **Upper** | **Mid** | **Low or understorey** | **Forest floor or ground** | **Other growth forms across all height classes** |
|---|---|---|---|---|---|
| **Height class** | **> 20 m** | **2–20 m** | **0.5–2 m** | **0.1–0.5 m** | |
| Food and medicine | *Vateria acuminata* | Avocado, Bengal quince, breadfruit, brindleberry, cashew, Ceylon almond, Ceylon cherry, Ceylon date, Ceylon olive, cloves, cocoa, curry leaf, ice cream bean, Indian gooseberry, jak, King coconut, *Madhuca longifolia*, Malay apple, *Mangifera zeylanica*, mango, mangosteen, pebble tamarind, rambutan, sapodilla, soursop, tamarind, *Terminalia bellerica, Terminalia chebula*, woodapple | Banana, bilimbing, cardamom, cinnamon, coffee, custard apple, drumstick, guava, jam fruit, lemon, lime, mandarin, orange, papaw, pomegranate, pomelo, *Sesbania grandiflora*, starfruit, *Wrightia antidysenterica* | *Alternanthera sessilis, Amaranthus* spp., aubergine, bird chillie, bitter gourd, black gram, bottle gourd, bush bean, *Canna indica, Capsicum chillie*, cassava, *Cassia auriculata*, Cowpea, ginger, horse gram, *Lasia spinosa*, leafy cabbage, long bean, melon, okra, pineapple, pumpkin, purple yam, radish, red chillie, ridge gourd, snake gourd, squash, taro, tomato, *Trianthema portulacastrum*, turmeric, winged bean | **Palms:** *Caryota urens*, coconut **Climbers:** Ceylon spinach, *Cardiospermum halicacabum*, *gotukola*, kan kong, passionfruit, black pepper, *Piper betel, Piper longum, Salacia chinensis*, sweet potato **Grasses and tuft plants:** Lemongrass, *Pandanus amaryllifolius* |
| Riparian buffer and water filtration | *Calophyllum* sp., *Horsfieldia eriya, Madhuca longifolia, Mangifera zeylanica, Terminalia arjuna* | *Garcinia terpnophylla, Mesua nagarissum, Mimusops elengi, Myristica dactyloides, Nauclea orientalis, Pongamia pinnata* | *Alpinia calcarata, Alpinia nigra, Alpinia zerumbet, Clerodendron* sp., *Clerodendrum chinense, Dillenia retusa, Pagiantha dichotoma, Strobilanthes asperrima* | *Aponogeton crispus, Acorus calamus, Costus speciosus, Jussueia repens, Lagenendra* sp., *Nymphaea nouchali, Spathyphyllum pattini* | **Palms:** arecanut **Grasses and tuft plants:** *Pandanus kaiida*, yellow bamboo |
| Shade and covering rocks | *Alstonia scholaris, Ficus racemosa, Samanea saman* | *Adenanthera pavonina, Bridelia retusa, Dimocarpus longans, Ficus bengalensis, Mallotus phillipensis, Sterculia foetida,Syzygium assimile, Tetrameles nudiflora, Trema orientale* | *Ficus hispida* | *Munronia pumila* | **Palms:** *Calamus rotang* **Climbers:** *Anamirta cocculus, Pothos scandens* **Succulents:** *Aloe vera, Kalanchoe pinnata, Sansevieria zeylanica* |
| Ornamental | *Delonix regia* | *Cassia spectabilis, Lagerstroemia speciosa, Spathodea campanulata, Tabebuia rosea* | *Caesalpinia pulcherrima, Heliconia* spp., *Tecoma stans* | *Anthurium* spp. | **Epiphytes**: *Orchid* spp. |

**Table 1, continued**

| Stratum | Upper | Mid | Low or understorey | Forest floor or ground | Other growth forms across all height classes |
|---|---|---|---|---|---|
| **Height class** | **> 20 m** | **2–20 m** | **0.5–2 m** | **0.1–0.5 m** | |
| Timber and firewood | *Antiaris toxicaria, Berrya cordifolia, Melia dubia, Michelea champaca* | *Chloroxylon swietenia, Chukrasia tabularis, Diospyros ebeneum, Filicium decipiens, Vitex altissima* | | | |
| Biopesticide | Neem | | *Vitex negundo* | *Andrographis paniculata*, marigold, *Sida spinosa* | **Grasses and tuft plants:** *Vetiver zianoides* |
| Green manure | | *Ceiba pentandra* | *Cassia alata, Erythrina lithosperma, Gliricidia sepium, Pavetta indica* | | |

The majority (52%) of all crops grown in forest gardens were trees. Shrubs, forbs, climbers, herbs, grasses, tuft plants, epiphytes, and other growth forms, including succulents and palms, made up the balance. High floral diversity with varying reproductive phenologies allowed household members to harvest crops in the short and long term. The household was food secure because they had continuous access to food and income throughout the year, and for many years. This tree-dominated, highly agrobiodiverse landscape design also reduced the risk from stressors (e.g., climate variability, animal pests) and lessened livelihood vulnerability. Short-term, annual (vegetables, leafy vegetables) and semi-perennial (root vegetables such as turmeric) crops satisfied immediate needs for food, Ayurvedic medicine, and income.

Crops were cultivated across central open areas in raised beds (see Figure 4), using soil excavated from contour drains dug to prevent erosion and increase water infiltration. Since there was no water source, water from a wetland above the landholding was diverted through a canal and distributed along the same flow pathways as the dead gullies and into a series of holding ponds. These gley-lined ponds increased water-holding capacity in the landholding and allowed Rani to breed native freshwater fish. In time, pond water would percolate into the groundwater table and recharge dormant aquifers. An irrigation line was also installed from the upper reaches of the watershed to supply stream water for household needs. Planted in between short-term crops were small and large trees — fruit, nut, spice, timber, and firewood species for harvest in the long term. Once these perennial crops started to mature and semi-shade conditions had set in, annual crops were phased out and replaced with shade-loving crops (e.g., black pepper). Riparian species were densely planted to mitigate soil erosion, increase shade to reduce soil moisture evaporation, build root mass to increase infiltration and recharge dormant groundwater aquifers, and recreate habitat for biodiversity.

## Ecosystem services

Over half of all species provided food, medicine, timber, firewood, ornament and biopesticides and were either used for household consumption or sold to generate income. While 96 species across all strata provided food and medicine, nine species confined to mid and upper strata were harvested for timber and firewood. Several plants had multiple values; e.g., jak provides food, timber and fodder while actively increasing soil organic matter owing to its voluminous leaf litter. While *Gliricidia* and coconut were used for firewood and harvested after a few years, timber harvests occurred in the long term. Some timber classified as super luxury (*Diospyros ebeneum*), luxury (*Berrya cordifolia, Chloroxylon swietenia*), Special Class Upper (*Chukrasia tabularis*) and Class 11 (*Melia dubia*) generated massive returns when sold, and were valuable biological assets of high Net Realizable Value (Melvani et al. 2020b). Several flowering trees, shrubs and annuals (e.g., *Anthurium* spp.) were ornamental, and beautified the homestead. Rani deliberately cultivated select annuals (e.g., *Andrographis paniculata*, marigold, *Sida spinosa*), and trees (e.g., *Vitex negundo*, neem) to make biopesticides.

**Left: The Gully 1 area when restoration began in 1999; project staff and Rani's family planted Gliricidia sepium as a nurse crop. Right: The Gully 1 area in 2012, after riparian vegetation was established. Photos: Kamal Melvani**

Species in forest gardens also contributed regulatory ecosystem services. Of these, 29 native forest species were planted in riparian areas to reduce erosion, stabilize streambanks, and regulate flows of surface and ground water through increased shade and infiltration. Trees (e.g., *Mangifera zeylanica*), palms (e.g., *Caryota urens*), shrubs (e.g., *Strobilanthes asperrima*) and grasses (yellow bamboo) were established along dead gullies (see photos above) and around ponds, while others (e.g., *Terminalia arjuna, Alpinia calcarata, Pandanus kaiida, Costus speciosus*) and water plants (e.g., *Nymphaea nouchali, Lasia spinosa*) filtered pond water. The use of native forest species in the buffer zone extended the range of the disturbed forest and created a biodiversity corridor between natural and disturbed forests (see photo, below). The microclimate in the landholding was regulated by shade created by 20 species of fast-growing trees (*Erythrina lithosperma, Vitex negundo, Gliricidia sepium*), palms (arecanut), climbers *(Pothos scandens)* and succulents (e.g., *Aloe vera*) planted around and between rocks.


**Rani's forest gardens provides a biodiversity corridor between disturbed and undisturbed forest in the landscape mosaic of Maragalakanda, Moneragala, Sri Lanka. Photo: Kamal Melvani**

Almost all floral species contributed leaf litter to soils. Leguminous (*Gliricidia sepium, Cassia alata*) and non-leguminous trees (*Ceiba pentandra*), shrubs (*Pavetta indica*) and grasses (lemongrass, *Vetiver zizanoides*) were grown as hedgerows on contours for soil conservation or used as green manure to make compost and liquid fertilizer, which are essential to regenerative agriculture. All these species supported the cycling of nutrients (e.g., carbon, nitrogen, phosphorous), and increased the soil fertility, productivity and profitability of FGs. The establishment of diverse floral species at different strata in FGs recreated biodiversity habitat, especially for pollinators and predators of insect pests.

Although traditional methods of pest management were used, habitat was also created for predators of rice pests by planting live fences of *Gliricidia sepium* and *Pavetta indica* on the bunds of paddy fields. Trees, including *Madhuca longifolia*, *Pagiantha dichotoma* and *Dillenia retusa*, were planted around the threshing floor, and arecanut palms along boundaries. The upper section of Rani's land was used to cultivate vegetables in *chenas*, while purple yam (*Dioscorea alata*) was grown as a cash crop in the lower section. Rani had two oxen that were used to plow the paddy fields.

## Monitoring and evaluation

Project impacts were assessed in different ways and at various times. During the project's lifespan, planting records were monitored by mapping trees, shrubs and other vegetation planted annually (Figure 4 shows the area after the project ended). Also assessed were changes in shade, leaf litter, soil organic matter, and biodiversity: surface (butterflies, birds, mammals, ants, snails, reptiles, amphibians), soil (earthworms) and aquatic (fish). Results from these rapid assessments indicated that Rani's landholding was increasing in ecological maturity. Concurrent livelihood changes were also evident. Annual income increased from USD 95 in 2000 to USD 280 by 2004.


**Figure 4. Map of Rani's landholding in 2004, after project activities ceased. Although trees and shrubs dominate the forest gardens, annual and semi perennial crops are cultivated in raised beds along contours. Dense planting of native trees is evident alongside gullies G1–3, in which holding ponds store water.**

Two long-term evaluations of rehabilitation were undertaken after the project ended. The first assessed biodiversity changes after analog forestry at project closure in 2004 using bird species richness, diversity and community composition (Gunasekera 2004). Birds were selected as indicators of habitat quality, and Rani's forest gardens and adjacent forest remnants compared. Results revealed that bird species richness in Rani's FGs was nearly the same as that in the forest plots surveyed. The mean number of non-forest bird species in Rani's FGs was higher than the mean number of specialist forest bird species, however, signifying that habitats in these four-year-old FGs were not as ecologically mature as in the forest remnants.

The second evaluation was a doctoral study (Melvani 2019) that focused on why and how farmers valued forest gardens in 85 landholdings in 2012–2016. Maragalakanda was one among nine locations sampled, and Rani's landholding one of the sampling sites. By 2013, vegetation in Rani's landholding had matured into distinctive land-use areas, including four forest gardens, paddy fields, *chena* and cash crop plots (Figure 5). Canopy closure in FGs 1, 2 and 3 had increased, whereas FG 4 had open conditions because trees had been harvested for timber. In contrast, the previously open and very rocky *chena* cultivation area had greater vegetation and canopy closure. The cash crop area, however, still maintained semi-open conditions.

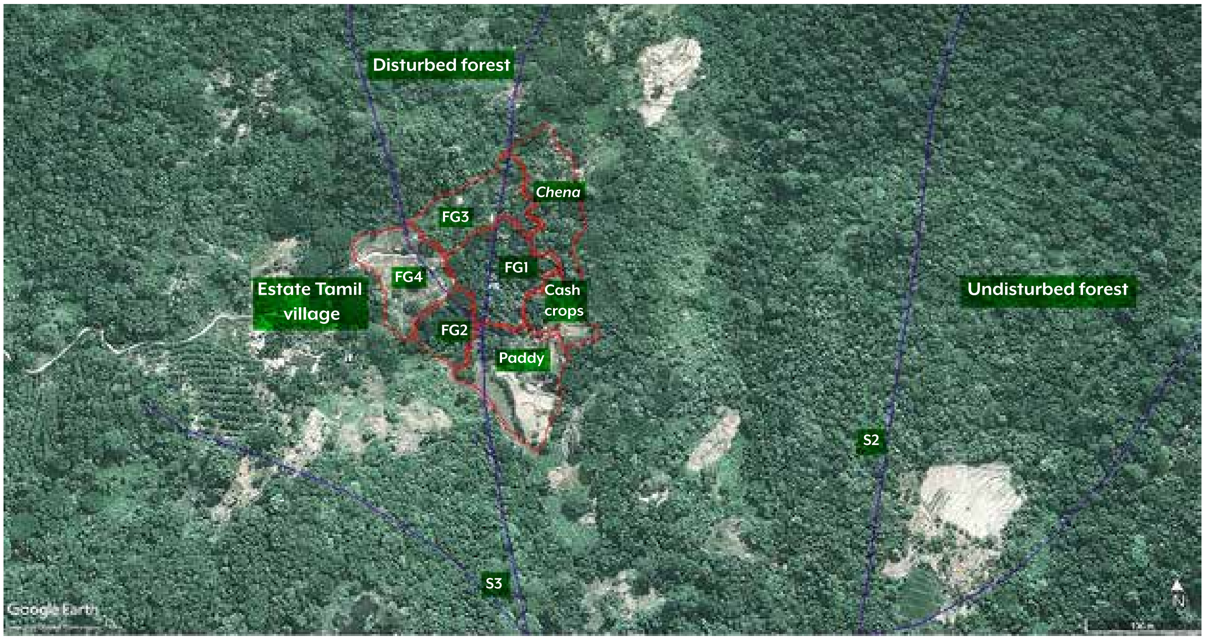


**Figure 5. Google Earth image of Rani's landholding in September 2012, 13 years after rehabilitation in 1999. Shown are forest gardens, *chena* and cash crop plots, paddy fields, feeder streams of the Maragala Oya (in blue), and disturbed and undisturbed natural forests.**

Although Rani cultivated a range of crops across her landholding, crop diversity was higher in forest gardens than in all other land uses. Most crops provided food and Ayurvedic medicine, while others provided firewood and timber (Melvani et al. 2020a). By 2013, more than half of Rani's landholding was under FG land use and had become a biodiversity corridor between the undisturbed forest and adjacent disturbed forest (see photo, page 24). More birds frequented the landholding. Rani confirmed, "I hear birds singing and realise that the value of my land has increased" (Melvani et al. 2022:8). Leaf litter increased in this tree-dominated environment that enhanced soil moisture retention, fertility and productivity. Consequently, by 2013, total income increased to USD 32,241, of which, almost 80% (USD 25,642) was from Rani's FGs. This massive income was generated from a) the sale of timber harvested from existing trees in FG4 (USD 22,918), and b) the value of household consumption and sale of pepper, coconut, fruits and vegetables (USD 2,724) obtained from FGs 1–3.

Over 60% of the total value of food and firewood consumed by Rani's household was grown in FGs. Moreover, average FG profit (USD 24,413) in Rani's landholding was higher than that of FGs in all other farmers' landholdings sampled at Maragalakanda.

In addition, with increased tree maturity over time, the estimated Net Realizable Value of potential timber and firewood stocks (biological assets) in Rani's landholding had grown to USD 3,308 by 2016. Having amassed considerable wealth, Rani educated all her five children, bought land and vehicles for them, and did not clear forests for livelihoods anymore. Despite these gains, Rani's livelihood was stressed by new challenges, including increasing rainfall variability, animal pests and the rising cost of purchases (e.g., fuel, electricity).

In 2014, Maragalakanda farmers acknowledged that deep-rooted trees increased infiltration, which, with the presence of holding ponds, recharged groundwater and facilitated aquifer recharge of dead streams in gullies (Oakes and Penna 2014).


**Figure 6. Google Earth image of Rani's landholding in September 2023, 24 years after rehabilitation started in 1999. The image also shows expansion of the Estate Tamil village into the disturbed forest above Rani's landholding.**

By 2023, a Google Earth image (Figure 6) demonstrated that further changes had occurred in Rani's landholding. While canopy closure increased in FGs 1, 2 and 4, *chena* and cash crop plot areas, FG3 now experienced open conditions because many trees had been harvested. Other dramatic changes included the shrinking area of disturbed forest owing to the upward expansion of the Estate Tamil village.

## Conclusions

Watershed rehabilitation with forest gardens reversed forest loss, restored ecosystem services, increased livelihood security, and obliterated poverty in Rani's household. While all these gains improved watershed health and sustainability, there remain serious issues to consider. Here are some recommendations.

All stakeholders in the landscape mosaic of a watershed must participate in and gain from land rehabilitation if it is to succeed. Practitioners must however recognize that farming households can and will make changes in the landscape design of their landholdings depending on their short- and long-term needs, and when adapting to stress. This may result in dramatic changes to their landholdings and livelihoods, but is how stakeholders choose to do it. The changes that occurred over time in FGs 3 and 4 in Rani's landholding are a good example of this.

Policymakers and planners of landscape-level watershed restoration must also consider population growth as a critical factor in the sustainability of outcomes. At Maragalakanda in 2023, the emergence of new generations of people in the upper watershed resulted in more forests being cleared and increasing fragmentation. Planners must therefore allocate new lands for expanding watershed populations while strictly implementing laws that prevent forest destruction.

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## References

Gunasekera DN. 2004. *Assessing the biodiversity goals of Analog Forestry using bird species richness, diversity and community composition*. Imperial College London.

IUCN Sri Lanka. 2018. *IUCN 30 Years in Sri Lanka*. Colombo, Sri Lanka: IUCN, pp. 88.

Küchler AW and Zonneveld IS. eds. 1988. *Vegetation Mapping*. Handbook of Vegetation Science series Vol. 10. Kluwers Academic Publishers. https://link.springer.com/book/10.1007/978-94-009-3083-4.

Melvani K. 2019. Valuing forest gardens in Sri Lanka. Doctoral dissertation, Charles Darwin University.

Melvani K, Bristow M, Moles J, Crase B and Kaestli M. 2020a. Multiple livelihood strategies and high floristic diversity increase the adaptive capacity and resilience of Sri Lankan farming enterprises. *Science of The Total Environment* 1–14:139120. https://doi.org/10.1016/j.scitotenv.2020.139120.

Melvani K, t.L. Myers B, Palaniandavan N, Kaestli M, Bristow M, Crase B, Moles J, Williams R and Abeygunawardena P. 2020b. Forest gardens increase the financial viability of farming enterprises in Sri Lanka. *Agroforestry Systems* 1–20. https://doi.org/10.1007/s10457-020-00564-9.

Melvani K, t.L. Myers B, Stacey N, Bristow M, Crase B and Moles J. 2022. Farmers' values for land, trees and biodiversity underlie agricultural sustainability. *Land Use Policy* 117: 105688. https://doi.org/10.1016/j.landusepol.2021.105688.

Oakes S and Penna I. 2014. *Rediscovering the country: A journey into landscape restoration.* SheOakes Films. https://vimeo.com/99883046.

Senanayake FR. 1989. The Tropical Forest Register. In: Jayal ND. ed. *Deforestation, Drought, and Desertification: Perceptions on a Growing Ecological Crisis*. New Delhi: INTACH, pp. 134–140.

Senanayake FR and Jack J. 1998. *Analogue Forestry: An introduction*. Department of Geography and Environmental Science, Monash University. https://research.monash.edu/en/publications/analogue-forestry-an-introduction.

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