Forest gardening

Forest gardening is a low-maintenance sustainable plant-based food production and agroforestry system based on woodland ecosystems, incorporating fruit and nut trees, shrubs, herbs, vines and perennial vegetables which have yields directly useful to humans. Making use of companion planting, these can be intermixed to grow in a succession of layers, to replicate a woodland habitat.

History

Forest gardens are probably the world's oldest form of land use and most resilient agroecosystem.^[1] They originated in prehistoric times along jungle-clad river banks and in the wet foothills of monsoon regions. In the gradual process of families improving their immediate environment, useful tree and vine species were identified, protected and improved whilst undesirable species were eliminated. Eventually superior foreign species were selected and incorporated into the gardens.^[2]

Forest gardens are still common in the tropics and known by various names such as: *home gardens* in Kerala in South India, Nepal, Zambia, Zimbabwe and Tanzania;



Robert Hart's forest garden in Shropshire, England.

Kandyan forest gardens in Sri Lanka;^[3] *huertos familiares*, the "family orchards" of Mexico; and *pekarangan*, the gardens of "complete design", in Java.^[4] These are also called agroforests and, where the wood components are short statured, the term shrub garden is employed. Forest gardens have been shown to be a significant source of income and food security for local populations.^[5]

In tropical climates

Forest gardens, or home gardens, are common in the tropics, using inter-cropping to cultivate trees, crops, and livestock on the same land. In Kerala in south India as well as in northeastern India, the home garden is the most common form of land use and is also found in Indonesia. One example combines coconut, black pepper, cocoa and pineapple. These gardens exemplify polyculture, and conserve much crop genetic diversity and heirloom plants that are not found in monocultures. Forest gardens have been loosely compared to the religious concept of the Garden of Eden.^[6]

Americas

The BBC's *Unnatural Histories* claimed that the Amazon rainforest, rather than being a pristine wilderness, has been shaped by man for at least 11,000 years through practices such as forest gardening and terra preta.^[7] Since the 1970s, numerous geoglyphs have also been discovered on deforested land in the Amazon rainforest, furthering the evidence about Pre-Columbian civilizations.^{[8][9]}

On the Yucatán Peninsula, much of the Maya food supply was grown in "orchard-gardens", known as *pet kot*.^[10] The system takes its name from the low wall of stones (*pet* meaning circular and *kot* wall of loose stones) that characteristically surrounds the gardens.^[11]

Africa

In many African countries, for example Zambia, Zimbabwe, Tanzania, gardens are widespread in rural, periurban and urban areas and they play an essential role in establishing food security. Most well known are the Chaga or Chagga gardens on the slopes of Mt. Kilimanjaro in Tanzania. These are an excellent example of an agroforestry system. In many countries, women are the main actors in home gardening and food is mainly produced for subsistence. In North-Africa, oasis layered gardening with palm trees, fruit trees and vegetables is a traditional type of forest garden.

India

Home gardens in Kerala are connected to 'Kaavu'. Some of the endangered species of wild plants, trees animals and plants can be seen in Home Gardens of Kerala. The main aim of preserving a Home Garden is to preserve ritualistic beliefs and cultural identity of joint families. Gradually, due to the origin of nuclear families and lifestyle related to the same, the Home Gardens underwent transformation to playgrounds. But still in Kerala, some families show ample importance to protect their Home Gardens. As pointed out, the preservation of home gardens in Kerala is strictly connected to family purposes. At the same time, home gardens are helpful to raise the water table of nearby ponds and wells.Unknowingly, some families in Kerala which preserve their home gardens preserve nature and ecological balance.

Kannur district in Kerala shows utmost interest in preserving forest gardens. Besides, the forest gardens in Kannur are preserved with due care because of the traditional way of worshiping nature as the embodiment of God. For instance, the 'Kaavus' or the local temples in Kannur possess the glory of preserved forests without human encroachment. Some of the most endangered species of wild life can be seen in Kaavus. For instance, the 'Parappool Kaavu' (Mele Kaavu and Thazhe Kaavu) and 'Kayyath Naagam' are important local temples in Taliparamba (Kannur District) with private forests/ forest gardens. The 'Parappool Kaavu' is situated at Parappool, 4-5 kilometers away from Taliparamba. The rich vegetation within the area of the Parappool Kaavu is still to be explored. On the other side, the Kayyath Naagam is closely connected to the Indian way of worshiping snakes. The vegetation preserved within the area of Land. The surrounding areas of Kayyam are full of paddy fields. The rich vegetation preserved within the area of Kayyath Naagam acts the role of a lung which purifies and recharges the air, water and the atmosphere. Normally, the believers are allowed to visit the temple not the preserved area. But, the believers are allowed to visit the preserved area on 'Aayilyam Naal' or a particular day in every year. Besides, the Kayyath Naagam authorities show keen interest to preserve the vegetation by not allowing the poachers to enter the preserved area.

Nepal

In Nepal, the Ghar Bagaincha, literally Home Garden, refers to the traditional land use system around a homestead, where several species of plants are grown and maintained by household members and their products are primarily intended for the family consumption (Shrestha et al., 2002). The term "home garden" is often considered synonymous to the kitchen garden. However, they differ in terms of function, size, diversity, composition and features (Sthapit et al., 2006). In Nepal, 72% of households have home gardens of an area 2-11% of the total land holdings (Gautam et al., 2004). Because of their small size, the government has never identified home gardens as an important unit of food production and it thereby remains neglected from research and development. However, at the household level the system is very important as it is the an important source of quality food and nutrition for the rural poor and, therefore, are important contributors to the household food security and livelihoods of farming communities in Nepal. They are typically cultivated with a mixture of annual and perennial plants that can be harvested on a daily or seasonal basis. Biodiversity that has an immediate value is maintained in home gardens as women and children have easy access to preferred food, and for this reason alone we should promote home gardens as a key element for a healthy way of life. Home gardens, with their intensive and multiple uses, provide a safety net for households when food is scarce. These gardens are not only important sources of food, fodder, fuel, medicines, spices, herbs, flowers, construction materials and income in many countries, they are also important for the in situ conservation of a wide range of unique genetic resources for food and agriculture (Subedi et al., 2004). Many uncultivated, as well as neglected and underutilised species could make an important contribution to the dietary diversity of local communities (Gautam et al., 2004).

In addition to supplementing diet in times of difficulty, home gardens promote whole-family and whole-community involvement in the process of providing food. Children, the elderly, and those caring for them can participate in this infield agriculture, incorporating it with other household tasks and scheduling. This tradition has existed in many cultures around the world for thousands of years.^{[12][13]}

In temperate climates

Robert Hart adapted forest gardening for temperate zones during the early 1960s. Hart began farming at Wenlock Edge in Shropshire with the intention of providing a healthy and therapeutic environment for himself and his brother Lacon.^[14] Starting as relatively conventional smallholders, Hart soon discovered that maintaining large annual vegetable beds, rearing livestock and taking care of an orchard were tasks beyond their strength. However, a small bed of perennial vegetables and herbs he planted was looking after itself with little intervention.

Following Hart's adoption of a raw vegan diet for health and personal reasons, he replaced his farm animals with plants. The three main

Robert Hart, forest gardening pioneer.

products from a forest garden are fruit, nuts and green leafy vegetables.^[15] He created a model forest garden from a 0.12 acre (500 m²) orchard on his farm and intended naming his gardening method *ecological horticulture* or *ecocultivation*.^[16] Hart later dropped these terms once he became aware that *agroforestry* and *forest gardens* were already being used to describe similar systems in other parts of the world.^[17] He was inspired by the forest farming methods of Toyohiko Kagawa and James Sholto Douglas, and the productivity of the Keralan home gardens as Hart explains:^[18]

From the agroforestry point of view, perhaps the world's most advanced country is the Indian state of Kerala, which boasts no fewer than three and a half million forest gardens...As an example of the extraordinary intensivity of cultivation of some forest gardens, one plot of only 0.12 hectares (0.3 acres) was found by a

study group to have twenty-three young coconut palms, twelve cloves, fifty-six bananas, and forty-nine pineapples, with thirty pepper vines trained up its trees. In addition, the small holder grew fodder for his house-cow.^[19]

Seven-layer system

Robert Hart pioneered a system based on the observation that the natural forest can be divided into distinct levels. He used intercropping to develop an existing small orchard of apples and pears into an edible polyculture landscape consisting of the following layers:

- 1. 'Canopy layer' consisting of the original mature fruit trees.
- 2. 'Low-tree layer' of smaller nut and fruit trees on dwarfing root stocks.
- 3. 'Shrub layer' of fruit bushes such as currants and berries.
- 4. 'Herbaceous layer' of perennial vegetables and herbs.
- 5. 'Ground cover layer' of edible plants that spread horizontally.
- 6. 'Rhizosphere' or 'underground' dimension of plants grown for their roots and tubers.
- 7. 'Vertical layer' of vines and climbers.

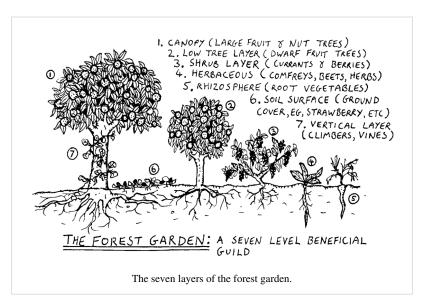
A key component of the seven-layer system was the plants he selected. Most of the traditional vegetable crops grown today, such as carrots, are sun loving plants not well selected for the more shady forest garden system. Hart favoured shade tolerant perennial vegetables.

Further development

The Agroforestry Research Trust (ART), managed by Martin Crawford, runs experimental forest gardening projects on a number of plots in Devon, United Kingdom.^[20] Crawford describes a forest garden as a low-maintenance way of sustainably producing food and other household products.^[21]

Ken Fern had the idea that for a successful temperate forest garden a wider range of edible shade tolerant plants would need to be used. To this end, Fern created the organisation Plants for a Future (PFAF) which compiled a plant database suitable for such a system. Fern used the term *woodland gardening*, rather than forest gardening, in his book *Plants for a Future*.^{[22][23]}

The Movement for Compassionate Living (MCL) promote forest gardening and other types of vegan organic gardening to meet society's needs for food and natural resources. Kathleen Jannaway, the founder of MCL, wrote a book outlining a sustainable vegan future called *Abundant Living in the Coming Age of the Tree* in 1991. In 2009, the MCL provided a grant of £1,000 to the Bangor Forest Garden project in Gwynedd, North West Wales.^[24]



Permaculture

Bill Mollison, who coined the term permaculture, visited Robert Hart at his forest garden in Wenlock Edge in October 1990.^[25] Hart's seven-layer system has since been adopted as a common permaculture design element.

Numerous permaculturists are proponents of forest gardens, or food forests, such as Graham Bell, Patrick Whitefield, Dave Jacke, Eric Toensmeier and Geoff Lawton. Bell started building his forest garden in 1991 and wrote the book *The Permaculture Garden* in 1995, Whitefield wrote the book *How to Make a Forest Garden* in 2002, Jacke and Toensmeier co-authored the two volume book set *Edible Forest Gardening* in 2005, and Lawton presented the film *Establishing a Food Forest* in 2008.^{[26][27][28]}

Projects

El Pilar on the Belize-Guatemala border features a forest garden to demonstrate traditional Maya agricultural practices.^{[29][30]} A further 1-acre model forest garden, called Känan K'aax (meaning well-tended garden in Mayan), is being funded by the National Geographic Society and developed at Santa Familia Primary School in Cayo.^[31]

In the United States the largest known food forest on public land is believed to be the 7-acre Beacon Food Forest in Seattle, WA.^[32] Other forest garden projects include those at the Central Rocky Mountain Permaculture Institute in Basalt, Colorado and Montview Neighborhood farm in Northampton, Massachusetts.^{[33][34]}

In Canada food forester Richard Walker has been developing and maintaining food forests in the province of British Columbia for over 30 years. He developed a 3-acre food forest that when at maturity provided raw materials for a nursery and herbalism business as well as food for his family.^[35]

In the United Kingdom, other than those run by the Agroforestry Research Trust (ART), there are numerous forest garden projects such as the Bangor Forest Garden in Gwynedd, North West Wales.^[36] Martin Crawford from ART administers the Forest Garden Network, an informal network of people and organisations around the world who are cultivating their own forest gardens.^{[37][38]}

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 - Also see Rob Hopkins (forward), Martin Crawford (2010). Creating a Forest Garden: Working with Nature to Grow Edible Crops, p.10 "Perhaps what Hart created was the closest to what we imagine the Garden of Eden as being."
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