

# Forest gardening

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**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 build a woodland habitat.

Forest gardening is a prehistoric method of securing food in tropical areas. In the 1980s, Robert Hart coined the term "forest gardening" after adapting the principles and applying them to temperate climates.<sup>[1]</sup>

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Robert Hart's forest garden in Shropshire

## History

Forest gardens are probably the world's oldest form of land use and most resilient agroecosystem.<sup>[2][3]</sup> 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.<sup>[4]</sup>

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; *Kandyan forest gardens* in Sri Lanka;<sup>[5]</sup> *huertos familiares*, the "family orchards" of Mexico; and *pekarangan*, the gardens of "complete design", in Java.<sup>[6]</sup> 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.<sup>[7]</sup>

Robert Hart adapted forest gardening for the United Kingdom's temperate climate during the 1980s.<sup>[1]</sup> His theories were later developed by Martin Crawford from the Agroforestry Research Trust and various permaculturalists such as Graham Bell, Patrick Whitefield, Dave Jacke and Geoff Lawton.

## In tropical climates

Forest gardens, or home gardens, are common in the tropics, using intercropping 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.<sup>[8]</sup>

### Americas

The BBC's *Unnatural Histories* claimed that the Amazon rainforest, rather than being a pristine wilderness, has been shaped by humans for at least 11,000 years through practices such as forest gardening and *terra preta*.<sup>[9]</sup> This was also explored in the bestselling book *1491* by author Charles C. Mann. Since the 1970s, numerous geoglyphs have also been discovered on deforested land in the Amazon rainforest, furthering the evidence about Pre-Columbian civilizations.<sup>[10][11]</sup>

On the Yucatán Peninsula, much of the Maya food supply was grown in "orchard-gardens", known as *pet kot*.<sup>[12]</sup> 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.<sup>[13]</sup>

### Africa

In many African countries, for example Zambia, Zimbabwe, Ethiopia and 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.

### 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 they thereby remain neglected from research and development. However, at the household level the system is very important as it is 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. The gardens 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. 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.<sup>[14][15]</sup>

## In Mediterranean climates

The Mediterranean climate has long, hot, rainless summers and relatively short, cool, rainy winters (Köppen climate classification *Csa*).<sup>[16]</sup> Its climate conditions are highly variable within an area and modified locally by altitude, latitude, and the proximity to the Mediterranean.<sup>[16]</sup> In the 1950s the Forest Research Department of the Ministry of Agriculture founded a botanical forest garden in the Sharon region in Israel, the Ilanot Forest.<sup>[17]</sup> As the only one of its kind in Israel, it harbours more than 750 species of trees from locations all over the world, including the Japanese sago palm *cycas revoluta*, fig trees (*ficus glomerata*), stone pine trees (*pinus pinea*) that produce tasty pine nuts and adds to the biodiversity of Israel.

## In temperate climates

Robert Hart coined the term "forest gardening" during the 1980s. Hart began farming at Wenlock Edge in Shropshire with the intention of providing a healthy and therapeutic environment for himself and his brother Lacon.<sup>[18]</sup> 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 products from a forest garden are fruit, nuts and green leafy vegetables.<sup>[19]</sup> He created a model forest garden from a 0.12 acre (500 m<sup>2</sup>) orchard on his farm and intended naming his gardening method *ecological horticulture* or *ecocultivation*.<sup>[20]</sup> 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.<sup>[21]</sup> 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:<sup>[22]</sup>



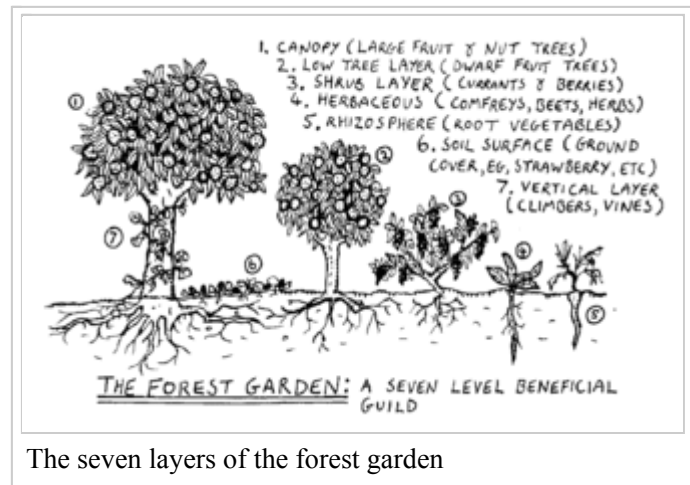
Robert Hart, forest gardening pioneer

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 intensity of cultivation of some forest gardens, one plot of only 0.12 hectares (0.30 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.<sup>[23]</sup>

## 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. 'Rhizosphere' or 'underground' dimension of plants grown for their roots and tubers.
6. 'Ground cover layer' of edible plants that spread horizontally.
7. 'Vertical layer' of vines and climbers.



The seven layers of the forest garden

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.<sup>[24]</sup> Crawford describes a forest garden as a low-maintenance way of sustainably producing food and other household products.<sup>[25]</sup>

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*.<sup>[26][27]</sup>

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.<sup>[28]</sup>

Kevin Bradley coined the phrase “Edible Forest” in the 1980s as the name of his nursery, garden, and orchard on 5 acres in the frigid zone 3 pine forests of northern Wisconsin. Among 3 options, he chose “Edible Forest” because it "evokes at once an ethereal, spiritual, and magical image", of Disney- like "Forest of No Return"; of the biblical "Garden of Eden". This image was perfectly in line with his ongoing experiment begun in 1985 in what he calls a closed loop human environment, combining multi-story tree and field crop "garden/orchards" for maximum beauty and use of space, someday to be very useful in an ever shrinking world. "The name, at the same time, with its irrational first impression (of course we can't eat a forest), forces the mind to think, if just a little bit, about its inference and thus sticks in our memories". It appeared from Bradley's research that the two words had, prior to the 80's, never been put together before as a noun phrase but which by today, after more than two decades of Bradley's "Edible Forest Nursery" and the 2005 text by Jacke and Toensmeier's- "Edible Forest Gardens", has grown into a movement and little "Edible Forests" all over the world.

In 2005, Dave Jacke and Eric Toensmeier's two-volume *Edible Forest Gardens* provided a deeply researched reference focused on North American forest gardening climates, habitats, and species. The book attempts to ground forest gardening deeply in ecological science. The Apios Institute (<http://apiosinstitute.org/>) wiki grew out of their work, and seeks to document and share the experience of people around the world working with the species in polycultures.

## Permaculture

Bill Mollison, who coined the term *permaculture*, visited Robert Hart at his forest garden in Wenlock Edge in October 1990.<sup>[29]</sup> Hart's seven-layer system has since been adopted as a common permaculture design element.

Numerous permaculturalists 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.<sup>[30][31][32]</sup>

Austrian Sepp Holzer practices "Holzer Permaculture" on his *Krameterhof* farm, at varying altitudes ranging from 1,100 to 1,500 metres above sea level. His designs create micro-climates with rocks, ponds and living wind barriers, enabling the cultivation of a variety of fruit trees, vegetables and flowers in a region that averages 4 °C, and with temperatures as low as -20 °C in the winter.

## Projects

El Pilar on the Belize-Guatemala border features a forest garden to demonstrate traditional Maya agricultural practices.<sup>[33][34]</sup> A further 1-acre model forest garden, called Kānan 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.<sup>[35]</sup>

In the United States the largest known food forest on public land is believed to be the 7-acre Beacon Food Forest in Seattle, Washington.<sup>[36]</sup> Other forest garden projects include those at the Central Rocky Mountain Permaculture Institute in Basalt, Colorado and Montview Neighborhood farm in Northampton, Massachusetts.<sup>[37][38]</sup>

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.<sup>[39]</sup> The Living Centre have developed various forest garden projects in Ontario.<sup>[40]</sup>

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.<sup>[41]</sup> 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.<sup>[42][43]</sup>

## See also

- Agroecology
- Analog forestry
- Climate-friendly gardening
- Deep ecology
- Forest farming
- Gardening
- Hügelkultur
- List of companion plants
- Mycoforestry
- Multiple cropping
- Natural farming
- Nutrient cycle
- Orchard
- Permaculture
- Polyculture
- Vegan organic gardening

## Notes

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  - Also see Rob Hopkins (foreword), 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."
  - Helmut Lieth (1989). *Tropical Rain Forest Ecosystems: Biogeographical and Ecological Studies*, p.611 "Important food plants, such as sago-producing palms, fruit-producing trees and medicinal plants were purposefully aggregated and tended in convenient places. Eventually, the forest garden, a kind of Garden of Eden, emerged. These jungle gardens on good soils of easy access required little maintenance and hardly any hard work."
  - Dave Jacke and Eric Toensmeier (2005). *Edible Forest Gardens - Volume One*, p.1
  - Robert Hart (1996a), p.80
  - Deborah d'Arms (2011). *Jardin D'Or: A Treatise on Forest Gardening, Recreating Sustainable Gardens of Eden*
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21. Hart, Robert A. de J. (1996a), pages 28 and 43
22. Hart, Robert A. de J. (1996a), p. 41
23. Hart, Robert A. de J. (1996a), pages 4–5
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37. "The Central Rocky Mountain Permaculture Institute".
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## External links

- Why Food Forests? (<http://permaculture.org.au/2011/10/21/why-food-forests/>), Permaculture Research Institute
- Plant an Edible Forest Garden (<http://www.motherearthnews.com/Homesteading-and-Self-Reliance/2007-08-01/Plant-Edible-Forest-Garden-Permaculture.aspx>), *Mother Earth News*
- The garden of the future? (<https://www.theguardian.com/environment/2007/dec/06/ethicaliving.conservation>), *The Guardian*
- Edible Forest Gardens: an Invitation to Adventure (<http://www.nofa.org/tnf/sp02/supplement/edible.php>), *The Natural Farmer*
- Forest gardens (<http://www.permaculture.org.uk/forestgardens>), Permaculture Association
- El Pilar Forest Garden Network (<http://www.mayaforestgardeners.org/>), information on traditional Maya forest gardening



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