

The Edible Garden

Permaculture Design Project Report; Malvik, October 2017

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The Edible Garden is a long term ongoing evolving project in Malvik, Trøndelag some 17 km east of the city of Trondheim with a view over the Trondheimsfjord ($63^{\circ}26'25''\text{N}$, $10^{\circ}39'15''\text{E}$) at about 32m above sea level. When myself and my then wife and lifelong friend Eileen Stoupe were looking at a place to buy in 1984, the wish, as young vegetarians, was to be as self-sufficient as possible, and at that time this meant preferably flat land on which to grow traditional annual vegetables, as well as fruit and berries. We had rented a place nearby since autumn 1981 in the same climate zone. I was also very interested in birds and wild plants. The property we finally bought had a lot of trees in which the previous owners had set up around 25 nest boxes for birds. The house and garden were far from our perceived ideal as there was limited space suitable for growing traditional vegetables and the soil was shallow, but I had recently been introduced to the concept of raised bed gardening which could significantly improve the growing conditions (I had been a member of the UK based organic gardening organisation Henry Doubleday Research Association, HDRA since 1979). It was however a fantastic piece of land with a lot of interesting plants, notably Hazel, known to attract a good range of wild life, and Hepatica (blåveis), indicative of neutral to basic soil and an early spring was to be expected. It was also cyclable (17km) to my job in Trondheim and there was that view over the fjord too!

Looking back to the first years, I knew nothing of permaculture, but we nevertheless used most if not all the permaculture principles in designing the garden, house and our life at Malvikveien 418. This involved first observing, designing with due consideration to the different zones around the

house, utilising more or less only local sources of fertiliser, low tech solutions, hand power, organic methods and, for the annual crops, I practised rotation, used disease resistant varieties, composted, saved our own seed etc. I came across only a couple of other gardeners in the area who grew vegetables other than the ubiquitous potato. With no-one to ask, I therefore had to do a lot of experimentation:

Which varieties of traditional vegetables are best suited to my climate?

Could I grow vegetables on the north (very shady side) of the house which had relatively flat land?

How could I best utilise the cellar to store vegetables for winter and extend the season?

....and many other questions!

I was also inspired by the local group of the Trondheim Useful Plants Society (Nyttevekstforeningen) which started in 1981, from whom I learned about the cornucopia of delicious wild edible plants in the area around my house, some already in my garden. I also owned John Seymour's book "The self-sufficient gardener" which lead me to buy roots (thongs) of sea kale (*Crambe maritima*) in the UK, my first perennial vegetable, still going strong at about 34 years old, growing on a dedicated bed raised above the surrounding garden by the annual application of fresh seaweed! Travelling the world in my job as an oceanographer, I used the opportunities that arose to study foraging and vegetable gardening in other parts of the world and bought a number of books including Sturtevant's Edible Plants of the World, which describes around 3,000 edible plant species! We had two children and having less time for foraging, I moved a number of the local wild edible plants into my garden to be closer to the kitchen (unaware of the fact that indigenous peoples have always done this!). I also started sourcing many of Sturtevant's edible plants, mostly perennials and some of which I was already growing in my garden as ornamentals.

Over the years, it turned out that these perennial vegetables like sea kale, Hosta, day lily and udo often gave better yield than most of the traditional annual vegetables and through planting according to knowledge of what kind of conditions these perennials needed in the wild I unconsciously developed a garden that visitors nowadays recognise as a forest garden (again without having read of this form of gardening). Much of this is fully documented in my book Around the World in 80 plants, so I won't repeat this here!

Observations

I have made the following observations of the garden, many before we moved here, updated below with new knowledge:

- The name of the house, Bergstua, gives the first clue to the garden being situated on a rocky outcrop with thin soil. The typical depth of soil was no more than 15-20 cm at best apart from around the house walls where the rock had been blasted away to make room for the cold cellar under the house.
- The eastern half of the garden is on a steep slope, sloping towards the south east. This is one of the most favourable aspects in this area as far as warmth is concerned as there are not many south facing sites on the southern side of the fjord where the garden is located. Most properties are north facing for the view (housing development would have been very different if vegetable gardening and energy efficiency had been the main criteria!). The house itself and the western half of the garden is exposed to the predominantly westerly

and strongest winds from the west and north west and south east. Nowhere in the garden has a warm sunny aspect both due to the wind exposure and shade from the trees. The topography of the garden, the trees and presence of the house leads to many econiches. The area to the north side of the house is shady and cool, the south side warmer and more sunny, but still relatively shady with constant air circulation despite the construction of a wooden shelter wall to the southeast (I observed that average winds were strongest from this direction).

- Being so far north, there are several months in summer when it doesn't get properly dark and the sun circles the house, rising in the north north east and setting in the north north west in midsummer. The eastern part of the garden then gets sunlight for a long period in the morning.
- The natural vegetation in the garden indicated a good local climate with early spring (perhaps 4-6 weeks earlier than other properties in the hills around). A characteristic tree on these shallow soils is Hazel (*Coryllus avellana*) and local people told me that the nuts were traditionally harvested for Xmas! Other plants in the garden indicative of good growth conditions (productive, mineral rich soils) are *Hepatica nobilis* (Hepatica/blåveis), *Actaea spicata* (Baneberry/trollbær), *Convallaria majalis* (Lily of the valley/liljekonvall), *Polygonatum verticillatum* (Whorled solomon's seal/kranskonvall), *Polygonatum odoratum* (Angular solomon's seal /kantkonvall), *Clinopodium vulgare* (Wild basil/kransmynte) and *Pimpinella saxifraga* (Burnet saxifrage/gjeldkarve). Otherwise, there was in general a diverse local flora in the garden when we arrived and I counted 20 different wild and naturalised woody plants (trees and bushes). Hazel is also a valuable food source (nuts) for a number of bird species such as nuthatch (spettmeis), great spotted woodpecker (flaggspett) and Siberian nutcrackers (sibirsk nøttekråke) as well as red squirrels (ekorn).
- The property is located close to the fjord which never freezes in winter, the seawater reaching a low of about +6C. The heat from this large body of water and the prevailing south westerly winds deriving from the Atlantic results in a surprisingly mild winter climate for such a northerly and inland (from the outer coast) location. The year to year variation in the weather is large, some years there is hardly any frost at all, in other years it can freeze solid for 3 months as there is seldom long-term protective snow cover in winter. The freeze will often reach the bed rock so that all plant roots are frozen for a long time. The average temperature for the year in the garden is probably similar to Trondheim which is 4.8°C. The warmest month, on average, is July with an average temperature of 13°C and the coolest month is January, with an average temperature of -3°C. The highest recorded temperature in Trondheim is 31°C, which was recorded in July. The lowest recorded temperature is -26.1°C, recorded in January. Rainfall is fairly even throughout the year, ranging from 50-100mm on average, wettest in autumn. Malvik has a maritime climate, but is drier than the western coasts of Norway.
- The bedrock in the garden is mainly phyllite (<https://en.wikipedia.org/wiki/Phyllite> ; <http://geo.ngu.no/kart/minkommune/?kommunenr=1663>). It was formed 416-540 million years ago from layers of clay deposits later modified by temperature and pressure. Phyllite is fittingly from the Greek phyllon, meaning "leaf". This is a derivative of shale, and breaks up easily as it weathers, usually into sheets. I've noticed that the roots of large trees excavate over time into the rock making deeper mineral rich soil for themselves. In Norwegian Wikipedia, it mentions that land over phyllite provides fertile soils for plants, and areas with

phyllite are often cultivated in Norway. Parts of the wild part of the garden which are never fertilised have been scythed for over 30 years and produce just as luxuriant growth today despite the scythed material being removed 1-2 times a year and used in compost for the annual vegetables. The south west corner of the garden was on the edge of an old sand pit (sandstone occurs with phyllite in my area). One small area has a few bilberry (blåbær) plants, suggesting more acid conditions there. Another area had clearly been maintained as a small species rich wild meadow and I have maintained this area as an important area for wildlife. The pH in the cultivated parts of the garden is around 6.5.

- To the south of the garden was at that time the main road north from Trondheim (E6) and pollution from car exhaust, in particular lead, was a concern. In the 1990s, the E6 was moved to a new motorway further inland. Lead was phased out of petrol in the 1980s.

Borders

The natural physical borders of the garden are shown in Figure 2. However, with the house came also “*strandrett*”, the right to utilise the beach below the house, even though the house boundary doesn’t extend to the beach, and to have a small boat house. Most of the borders of the garden are planted with trees towards the main road in the south, a small tractor track and field to the east and the borders of three neighbouring gardens. These edges are nevertheless important for the overall biodiversity of the garden. The border to the west was, incidentally, planted in the 1980s as a kind of an instant ancient hedgerow, having read in a book about UK hedges that you can age a hedgerow by the number of species in it, as follows:

$$\text{Age} = (\text{no of species in a 30 yard stretch}) \times 110 + 30 \text{ years.}$$

I planted 31 species found in old hedges in the UK along a 35m length of border, immediately creating a close to 2,700 year old hedge! 😊

Other limitations to the development of the garden were of an economic character and a deep desire to manage and develop the garden with least impact on the planet. This involved using as far as possible only hand tools, scythe and hand lawnmower for cutting meadows and a small area of grass, bow saw and axe for felling and cutting firewood. As I had a full time job, development of the garden was a gradual one over many years and sourcing of plants and seed was done with minimal investment (mainly through trading).

Resources

As a result of our decision to use environmental friendly methods to develop the house and gardens (re-use and wearing out things coming before replacement) and the fact that I didn’t learn to drive until I was in my 30s, the focus was on using local resources from the start. I remember noticing older gardeners locally using seaweed as a fertiliser in their garden, in particular around berry bushes like redcurrant, a tradition that died out in the early 80s, but which I carried forward. Although, I did use some horse manure from a local farm for a few years in the 1980s, since then I’ve more or less only used seaweed as fertiliser in the garden. For the first 10 years or so, I even collected seaweed by wheelbarrow from the beach, but the walk became a bit too long when the local railway crossing was blocked for safety reasons. Since then I’ve used a car to move the

seaweed from the local beach to the garden each spring. Seaweed has mainly been used composted with other garden and kitchen garden waste and used 1-2 years after collection, apart from halophytes or salt tolerant plants like asparagus, beetroot family and seakale (*Crambe maritima*) which can be mulched directly with fresh material. A minor additional source of fertiliser / soil improvement over the last 15 years (until I took early retirement from my work as an ocean wave climatologist in Trondheim in April 2017) has been coffee grounds from the office coffee machine, cycling a large bag of grounds from the office to home (about 17 km) most of the year (the added weight helping to keep me in good shape and giving me more energy for me to garden as a by-product!).

Using my own humanure has also been important for me throughout my time here. I inherited with the house a traditional outside toilet, simply a bucket. I have composted the contents for a year before using mainly as mulch under fruit trees and berry bushes. The urine bucket has also been in use throughout and tipped on the compost heap as a kickstarter.

I've also collected tree leaves from the garden and in the past also from under large trees in the old Malvik railway station garden in the village. Leaves are first used as a protective winter mulch on the roots of less hardy plants in the garden and then used to make leaf compost (with, again, urine added to speed the decay process). I also collected bracken fern leaves in the past as winter frost protection from nearby woods. I use spruce tree branches harvested from the garden to hold leaves in place. Neighbours have also sometimes thrown sacks of leaves over the fence...

I inherited a large stinging nettle patch in the garden and have used the leaves to make nettle water for fertilising pot plants, sometimes also mixed with similarly nutrient rich comfrey (the non-spreading variety Bocking 14, sent to me by one of Norway's ecopioneers, Stein Jarving in the 1980s). Nettle is also a fantastic plant to have in a naturalistic living garden as larval food plant for a number of butterflies and moths, the seeds also being eaten by a number of finches (such as bullfinch) in winter and it's also one of the best spring vegetables amongst other uses.

For many years, I obtained all the firewood I needed for heating the house from thinning out and clearing areas of the garden for new planting of edible nut and fruit trees etc. Ashes from the fire are then spread back onto the land. Trees, in particular hazel coppice, are used to supply stakes and supports for climbing vegetables such as peas and runner beans as well as other tall "weak against wind" edibles such as broad beans, quinoa and a number of perennial vegetables.

Water is harvested from the house roofs and this has been the main source of water for at least house plants. Watering the garden is generally not needed, but mains water can be used when it occasionally becomes too dry.

Knowledge in the form of a good library, through membership in various organisations and networks with other gardeners is also a resource. Most of my gardening contacts locally were ornamental gardeners (hagelagene/ gardening clubs). Much of the knowledge I acquired in the early days (70s/80s) was inspired by the writings of Lawrence D Hills of the Henry Doubleday Research Association (HDRA), in particular his book *Fertility Gardening*, which listed many sources of useful organic materials from seaweed to wood ash to tree leaves to humanure! The Newsletter of the HDRA was also very important as was the writings of John Seymour. Also the book *Farmers of Forty Centuries* and a visit to China in the 1980s was inspirational! Later, understanding the enormous

diversity of the world's food plants (numbers of species and number of cultivars within each species) was a milestone (through the books *Sturtevant's Edible Plants of the World* and *Cornucopia II: A sourcebook of edible plants*).

Seed of my edible plants has also been a resource for me as over the last 25 years or so I've sourced most of the plants I've wanted to grow in my garden by trading with other gardeners around the world. In the start this was done by way of herb, vegetable and flower exchange clubs that operated by snail mail. So-called rock/alpine garden clubs are still important for me trying to source new perennials for my garden. I send in seed I want to donate and in return get to choose more varieties than members that do not donate seed...these societies produce seed lists of several thousand plants which are not only alpine (rock garden) plants but herbs and other larger perennials are also often offered. When the Internet arrived in the mid-90s, person to person trading became much easier. I would typically collect seed of 100-200 plants in my garden and publish my offerings on websites like GardenWeb (see, for example, <http://www.edimentals.com/blog/?p=524>). I was also at times a member of various Seed Saver Organisations, such as Seed Saver Exchange in the US that publishes a list of seed of around 13,000 vegetables each year its Yearbook, Heritage Seed Library in the UK and, since 2006 I've coordinated the Norwegian Seed Saver organisation KVANN (earlier Planteklubbene for Grønnsaker, Bær, Stauder, Georginer og Roser) working to conserve old varieties of Norwegian useful plants and also towards greater vegetable diversity (again we produce an annual yearbook and autumn catalogue with several hundred varieties of edible plants). I've also worked on a project for the Norwegian Genetic Resource Centre collecting, storing in the garden and distributing for safe keeping to members of KVANN and, recently, to various dedicated collections, such as the new Allium garden at the Ringve Botanical Garden in Trondheim where some 260 different onion species and varieties have been planted this autumn.

I've always used recycled packaging in the garden for sowing seed (yoghurt pots and milk cartons turned on their side) and for smaller plants, I also make plant labels from yoghurt pots and origami seed packets from computer paper from work printed on only one side. I have reused (recycled) plastic pots accumulated by other gardeners that would otherwise have been thrown out! Newspaper and cardboard mulch has been used to clear land.

Evaluation and Design

As far as possible within the limitations of a rather complicated garden, we used zoning in the evaluation stage when designing the garden and this had to a certain extent been used also by the previous owners. I created altogether 14 raised beds as described in the book "Raised Bed Gardening the Organic Way" by Pauline Pears (1983) mainly using the old technique of bastard digging to smother perennial weeds like ground elder (skvallerkål) that at one time covered most of the garden (I have more than enough to eat in other parts of the garden!). These beds were all about 1.2m wide, just wide enough that I could reach in to the centre of the beds without ever having to step on them. There were pathways between each bed, the soil from the pathways being dug out and added to the beds so that they had deep enough soil to grow long roots such as parsnips (raised beds did not at that time automatically have, e.g., wooden sides, they were just slightly raised (raised beds with wooden sides are not ideal to my mind in northern areas as they are colder in winter and cold weather as the soil doesn't insulate the sides). The pathways were filled in with first twigs, then stones from the beds themselves and elsewhere and finished with surplus fine quarry

waste (subbus) when we dug out the driveway to allow cars to drive up to the house (a process now reversed). There were originally 6 such beds in the south west part of the garden (the part of the garden that is flattest). Two of the beds were replaced by a greenhouse in the late 1990s, but it was destroyed in a major winter storm (Dagmar) on 26th December 2011. I decided not to reconstruct. I didn't want to use plastics (the previous greenhouse was a glass house) and a stronger house would have been ridiculously expensive. Therefore, the decision was made to concentrate on growing edible plants that were suited to my climate and long-term sustainable rather than struggling to grow what would be very expensive tomatoes, cucumbers etc. The remaining beds were built on the north side of the house, the other part of the garden that was relatively flat. These beds were also terraced to a certain extent using surplus timber from constructing the house that we inherited (we asked the owners not to clean out the outhouse when we took over as owners as we figured there would be a lot of things we would need and this proved true). This part of the garden originally had berry bushes and two large spruce trees which were removed. Growing vegetables in this rather shady part of the garden with little sun was a bit of an experiment, but to my surprise most vegetables grew pretty well here. In summer, being so far north, the sun literally circles the house, so that there is actually more light in this part of the garden than would have been the case further south.

The two areas with annual vegetables (the 14 raised beds) are closest to the kitchen as is a bed we called the herb bed in which we planted sun loving herbs such as oregano (various *Origanum vulgare* cultivars), lemon balm (*Melissa officinalis*), lavender (*Lavandula officinalis*), winter savory (*Satureja montana*), French, German and Russian tarragon (*Artemisia dracunculoides*), hyssop (*Hyssopus officinalis*), Sage (*Salvia officinalis*) etc. This is probably the sunniest bed in the garden with an *Amelanchier* hedge planted to its north between the grassier area next to the house and the raised beds in the south of the garden. I also use the lower balcony to the east of the house for some vegetables and herbs like lettuce, dill and coriander frequently needed in the kitchen in the summer.

I remember an old neighbour warning me that with so many trees close to the beds, in particular a beautiful large birch just to the south of vegetable Beds 1-6 (which are located in the southwestern part of the garden), the roots would invade and would suck most of the moisture and nutrients from my new vegetable patches... I listened and started making ditches around the edges of all the 14 beds so that the roots couldn't invade. When the driveway was dug (by hand of course), this was done right down to the bed rock cutting off any tree roots.... 25 years later, the tree roots from that side have started to invade the vegetable beds, so I am planning to dig a new trench along what was the driveway... A ditch was also dug along the northern edge of the raised beds to the north of the house, next to the adjacent Hazel/Aspen/Birch woodland to stop tree roots.

It was important not to remove the woodland adjacent to what was the main road north in the 1980s to reduce the drift of pollutants from car exhausts. This also reduces the noise in the garden, in particular in summer when the leaves are out. Incidentally, I remember reading advice from the HDRA in the early 1980s that growing with a lot of organic matter in the soil bound lead to the soil, so that one could grow vegetables even in inner city areas without fear of lead poisoning!

Zone 0 is the house and the full height cellar is an important part of the house for storing vegetables in winter. This was also an experiment. I discovered that plants such as leek, the cabbage family, swiss chard, chicory etc. did not survive outside or couldn't be dug due to heavy ground frost in

winter. I therefore built large wooden boxes filled with soil in the cellar. The aforementioned vegetables would be moved roots and all from the garden and replanted in the boxes. When the temperature decreased to a minimum of typically 2-4C in the cellar, these veggies happily go to sleep and don't need additional light. They stay green and I discovered I could then continue harvesting during the winter from a place easily accessible from the kitchen. This also applied to potatoes (traditionally stored in this type of cellar, a *potetkjeller*) and a range of other root crops like parsnip, carrot, Jerusalem artichokes, skirret, burdock, scorzonera (NB! By growing Japanese burdock as a vegetable, a new and unusual in my area bird species, goldfinch / stillits, started appearing in my garden, as did bird watchers, as the seed of various burdock species is their main food). The cellar contributes to the fact that I am able to be 100% self-sufficient in leafy vegetables, root vegetables and fruit, without using any additional heat or electricity, nor do I use a freezer, fermentation and I only dry fruit and wild fungi.

Fruit such as apples, cherries and plums are located further from the house as these are generally not harvested on a daily basis. They are mostly harvested late in the year and are then stored in the cellar or dried over a wood burning stove in the living room. Dried fruit is mainly used when fresh fruit such as apples from the cellar are over in late winter to summer, when fresh fruit once more becomes available. Some berries such as raspberries, blackberries, black raspberries, gooseberries, Worcesterberries and blackcurrants are needed on a daily basis in summer, harvested fresh for breakfast and hence some of these are located as close as possible to the house.

To the east of the house, the ground falls steeply and I spent a lot of time and energy terracing the part of the garden closest to the house. I now realise that much of this work was unnecessary as some of my most productive perennial vegetables like Udo (*Aralia cordata*) grow on the steepest slope together with fruit trees, berry bushes and other perennial vegetables (the roots of perennials bind the soil, stopping erosion).

Another "mistake" was that I ringbarked 2 birch trees near to the house in the garden. The idea was that this dead wood would provide food for birds such as woodpeckers in the garden. However, it introduced an aggressive form of honey fungus (*Armillaria* spp.) which over a period of many years systematically (spreading with roots) killed most of my fruit trees. However, this was also fortunate in that it gave me space to plant many new edible trees and shrubs including walnuts which I discovered do produce ripe nuts in my climate.

The Future

Over the past 10 years, Malvik's Edible Garden has become well known in permaculture circles through social media, my book and my talks, walks and courses around the world. I have arranged a springtime course in Malvik on 3 occasions in 2012, 2013 and 2016 based around my garden, combining garden and local foraging tours over a long weekend with a guest speaker. These have proven popular. I also regularly open the garden to groups and individuals on request. In the years to come, it is planned to maintain and develop the garden, reducing the number of species but increasing the yield, whilst maintaining a large diversity and the basis for continuing to make multiple species dishes and my record breaking salads that earned me the title of Extreme Salad Man. This is important in recognition that the garden is the most important reason for people to visit

and join courses here. I hope also to offer more plants for sale from the garden. The garden will hopefully also be accepted as a LAND centre.

It is planned to increase the number of courses, not only permaveggies, but also courses on fermentation and preservation of food, use of new wave vegetables in the kitchen etc.. I plan to continue to have Wwoofers and other helpers here on a regular basis, trading the learning experience from living here for help in and outside the house and gardens.

Space is limited in the garden for the many new projects and new vegetables that I wish to trial, in particular from the Far East (my main area of interest at the moment due to the large range of edible wild species in that region). I therefore intend to extend outwards also and collaborate with others around the country and abroad, in particular the Hurdal Ecovillage and Prestegårdshagen (the old rectory garden) where an experimental forest garden is planned in collaboration with Norwegian Seed Savers. I will continue my work on perennial onions (Allium) now that I've planted up an area to show off the diversity of Alliums at the botanical garden in Trondheim (Ringve). I am also collaborating with a new CSA scheme in Ranheim (Trondheim) where there will be space for planting perennial vegetables and for testing new nut and fruit trees. Finally, I hope also to continue collaborating with my friend and neighbour Per Frost in the new Malvikbakk Ecovillage project which is located nearby.

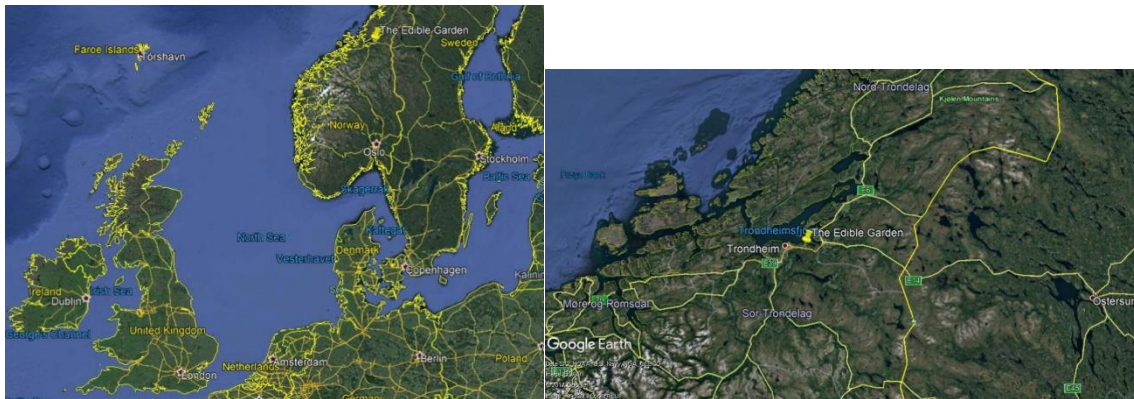


Figure 1 Geographic location of the garden



Figure 2 The garden boundaries

A GALLERY OF PICTURES FROM AN AROUND THE GARDEN TOUR IN 2009



