

# *Eating Your Garden*

*Delicious Gardening with Wildlife  
in Mind*



*by  
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Eating Your Garden

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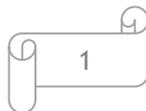
## INTRODUCTION

Some readers may be familiar with my little book on wildlife gardening *In Horto Feritas*. If not, you can download it for free at [https://bit.ly/Betts\\_downloads](https://bit.ly/Betts_downloads). *Eating Your Garden* is a light-hearted stroll through ideas for your garden to provide you with easy-to-grow food whilst boosting biodiversity and delivering wildlife benefits. I don't really do "tidy" in my garden for reasons of lack of time and laziness, but I don't have a guilty conscience about it because tidy gardening is usually bad for wildlife. Nature isn't tidy but that does not detract from its beauty. So discard your ideas about have to kill all the "weeds", remove the moss, shave the lawn to within an inch of its life, cut every dead stem and rake up all the leaves. Let the wildlife in to eat the pests and above all, enjoy the richness of nature whilst munching some of the great plants you can grow even if you have to share them with a few slugs or the occasional squirrel.

Safeguarding and enhancing our biodiversity have become critical so everything we can do to help in our day-to-day lives is important.

### **CAUTION**

This booklet is about growing food within your garden. *Eating Your Garden does not mean you can eat everything!* There are very many seriously poisonous plants both wild and in cultivation. Do NOT eat anything unless you are certain of its identification and that it won't harm or even kill you!



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## NOTES ON PRINCIPLES & METHODS

Many vegetables and fruits are easy and fun to grow, are attractive plants in their own right and produce healthy benefits for the human diet. Using nature to combat pests and diseases rather than “chemical” herbicides and pesticides that inevitably contain poisons also means eliminating the risks to human health and of killing unintended targets. In any case, there are fewer and fewer such products available as we discover their unwanted risks and legislation banning them comes into force.

Biodiversity and the “services” ecosystems provide ([see Appendix](#)) are essential to us all as modern research shows<sup>1</sup> and as I have written so many times. Indeed, as development and intensive agriculture reduce more of our semi-natural greenspace, gardens become ever more vital as a refuge for nature and wild species. That is all the more reason to avoid noxious chemicals and practices that cause them harm.

How you use your garden to grow things to eat is of course a personal choice: some prefer a traditional vegetable and fruit plot, perhaps with a fruit cage, and there is nothing wrong with that, especially if you suffer from an overabundance of grey squirrels as I do! In this booklet, though I am concentrating on mixing food and flowers, blurring the lines between utility and ornament which are, after all entirely artificial – and most vegetables and fruit bushes/trees are attractive in their own right. I also have a focus on wildlife, using it rather than abusing it and encouraging a garden ecology that works to the gardener’s benefit.

It is not difficult to have delicious fruit and vegetables almost all the year round from sowings and plantings around the garden or in containers and provide enough for bottling or freezing or just to give to friends. All it takes is a little thought, a bit of knowledge and a modicum of care as the seasons pass.

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<sup>1</sup> This is worth a read (also available to download) from the UN FAO web site: **Bélangier, J. & Pilling, D. (eds.) (2019).** *The State of the World’s Biodiversity for Food and Agriculture.* Food and Agriculture Organisation Commission on Genetic Resources for Food and Agriculture Assessments. Rome.

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Before we think about what to grow, it is worth considering measures to make your garden more suitable for successfully producing crops in patches here and there, and how to prepare the spaces to plant them. Since we want to encourage wildlife to help with pest control, as well as for its own sake to make the garden more of a refuge for threatened species and more interesting because of it, it is important to provide habitats for the wildlife we want.

We are not trying to eliminate all pests or weeds. Predator species need prey populations to survive. We are just trying to keep the pests in check. Log piles, compost heaps and leaves gathering on the ground make great habitats for beneficial invertebrates. Keep some native weeds, too (composites, now renamed **Asteraceae**, and umbellifers, now **Apiaceae**, are good), as these are natural foodplants for invertebrates. And please always have a nettle patch.

Beneficial garden wildlife can be broadly divided into those species that will eat or discourage the organisms that attack the fruit and vegetables you want to grow, those that will pollinate the crops' flowers and those which break down wastes, keep the soil healthy and help composting. It is a good idea to think of organisms that attack crops as food for predators rather than pests that must be killed by poison.

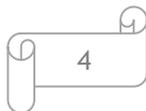
## Predators and controllers

Garden wildlife of great help in keeping down pests attacking your crops are many and varied, but here are some of my favourites:

- Hedgehog (*Erinaceus europaeus*). This much-loved mammal is sadly in decline in gardens, parasitic lungworms such as *Crenosoma striatum* and *Capillaria aerophila* are a serious problem, also poisoning from metaldehyde in slug pellets<sup>2</sup>, a chemical thankfully now being banned for garden use, is a serious problem. Hedgehogs Hoover up all kinds of creatures that eat our vegetables such as caterpillars and beetles. They do also eat slugs although not as many as some people think which, given the lungworm problem, is perhaps just as well.

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<sup>2</sup> A ferric phosphate replacement is available but there are concerns about toxicity to earthworms. Avoid.



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They will appreciate a snug, safe place to hibernate<sup>3</sup> – there are specially designed shelters on the market – and please try to keep your garden and surrounding areas permeable to hedgehogs (not onto roads!) because they travel far and wide when foraging. Watch out for hedgehogs that may be resting or hibernating in unlit bonfires, compost heaps or under sheds! Keep protective netting well off the ground (30cm or so) so hedgehogs don't get caught in it.

- Bats (*MICROCHIROPTERA*) – sixteen British species. Bats consume large numbers of nocturnal, crepuscular and auroral flying insects in summer, though they don't distinguish between those that are beneficial such as pollinator moths, and others that have designs on our crops. Bats are an important part of garden ecosystems, though, and their decline in recent years is to be regretted. The dramatic fall in invertebrate numbers we are seeing today will hit them hard. Put up bat boxes – there are many designs now available – and make the garden habitat rich so there is plenty of food for bats – a pond is great for attracting invertebrates and the bats will forage over it. They also have favourite “flyways” along hedges and tree belts.
- Common shrew (*Sorex araneus*). This little mammal has to consume two to three times its body weight every day and, as it is carnivorous, it helpfully eats slugs, snails, insects and other invertebrates that attack crops. They are happy in gardens free of over-tidiness but tend to be hunted by cats. They are very territorial, so you won't see them in large numbers.
- Song thrush (*Turdus philomelos*). One of the best predators of snails (don't forget to provide a stone to act as an anvil for them to use to crack open the snails) – a joy in the garden but they do eat berries and fruit so you may need to protect ripening crops. They like thick shrubs or hedges for nesting.
- Blue tit/great tit (*Cyanistes caeruleus/Parus major*). A pair of these tits these will eat a thousand caterpillars a day. They need nest sites and bird boxes for them are readily available which they will not fail to use. As with all resident garden birds, provide food at a bird table in harsh winter weather

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<sup>3</sup> I mention boxes of various kinds in this section. I provide more details in [In Horto Feritas](#).

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and drought – a bird bath of clean water is always appreciated for bathing and drinking.

- House sparrow (*Passer domesticus*). Sadly, this little finch has been in steep decline in recent years. You can still attract them to gardens, though. They are seed eaters but feed their young on aphids and caterpillars which they will readily seek on your vegetable and fruit plants. They tend to be colonial and you can buy sparrow “terraces” designed for them to nest in.
- Other birds. I have only mentioned one or two birds but there are dozens of species that appreciate gardens, and most are very beneficial as members of a healthy garden ecosystem. They also provide colour, song and endless interest. A garden rich in varied habitats, without herbicides and pesticides and with plenty of nest sites will encourage them and help your growing efforts.
- Slow-worm (*Anguis fragilis*). This lizard loves gardens and is a great predator of invertebrate pests. You can encourage them by providing shelter, hibernation sites (they burrow) and basking areas (a piece of tin or matting works well). Cats prey on them. Don't keep a cat and keep others' cats out (see below).
- Common frog (*Rana temporaria*). Frogs are great pest eaters – provide a pond<sup>4</sup> and they will be happy, and they will hunt prey in your garden, too.
- Common toad (*Bufo bufo*). Great pest predators, like frogs, but they are more terrestrial. They need a pond for breeding, though. No garden for wildlife should be without a pond which will also be a home for newts, another invertebrate-devouring crop-grower's friend.

Always take care when cutting long grass or shrubby areas as it is only too easy to kill or injure sheltering mammals, amphibians and reptiles.

- Common wasp (*Vespula vulgaris*). Because they sting, people have a thing about wasps, but they are not aggressive unless you provoke them or disturb their nest and they eat large

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<sup>4</sup> See Chapter 11 of [In Horto Feritas](#).

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numbers of crop pests. Please think twice before you kill wasps or destroy their nests.

- Ladybirds. Adults and larvae feed on aphids and other insects. They are very useful against greenfly on vegetables. The commonest species were the two-spot (*Adalia bipunctata*) and seven-spot (*Coccinella septempunctata*) but the invasive harlequin ladybird (*Harmonia axyridis*) is now very common, a species which unfortunately includes two-spots in its diet. Ladybirds are great survivors as they taste bitter and exude a pungent smelly liquid if attacked. They hibernate in cracks, crannies and leaf litter - so once more, don't be too tidy!
- Hoverflies (**Syrphidae**). The adults are good pollinators, but it is the larvae of some hoverfly species that attack aphids and other pests. If you have a flower-rich garden and don't use insecticides, you will have plenty of hoverflies.
- Anthocorid bugs (**Anthocoridae**). These hemipterans are natural predators of aphids, particularly on fruit trees, mites and other pests. In agriculture, some are available as biocontrol agents, but in gardens they should be plentiful as long as you have a wide range of habitats and don't use insecticides. Let them help you keep pests down.
- Lacewings (**Chrysopidae**). There are eighteen British species and they love eating aphids. You can buy them as a biological control but if you grow companion plants that attract them, you should have plenty in your garden. Leave a few dandelions (*Taraxacum s.l.*) and plant other members of the daisy family (**Asteraceae**) such as sunflowers and cosmos as well as umbellifers (**Apiaceae**) – parsley, dill, fennel, angelica, *etc.* Leave some hogweed *Heracleum sphondylium* in a wild part of the garden if you can as it is attractive to many predatory and pollinating insects.
- Ground beetles (**Carabidae**). There are hundreds of British species and thousands worldwide, many of which are carnivorous predators feeding on drop pests. You will have no shortage of them in a habitat-rich garden as long as, once again, you don't use insecticides.

### Helping the natural predators

If you find you have to give the natural predators a helping hand, there are non-invasive, non-toxic methods that are useful. A strong jet of water from a syringe or hose, especially aimed at the underside of the leaves, is a very good way of removing excessive greenfly, red

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spider mite and the like. Try not to keep the area too damp, though, as that encourages mildew and other undesirable fungi. Much more advice is available on the internet and there are several organic gardening societies you can join, probably with a branch near you.

Choose disease-resistant varieties to sow or plant; pull out and destroy badly diseased plants. You can also just plant several varieties as it is unlikely all will succumb to a disease or pest outbreak.

For small numbers of plants where natural predators have failed, you can squish. Make sure you know your target first, so you get the baddies and not those on your side. Squishing greenfly is effective but for anything like this I would wear gloves! Species like scale insects are more difficult to control by hand, but a bucket of soapy water and a sponge works well at cleaning them off. I have a problem every year with scale insects (tiny hemipterans bugs) on my *Citrus* plants that I put outside in summer which then develop sooty mould if I don't sponge off the scale. It is a little time-consuming, but you get much better with practice and it works! Don't worry about ants on the plants – they are just trying to protect the aphids which provide them with sweet honeydew, and you can leave some aphids for them.

It also helps to plant crops in small groups interspersed with “companions” that either attract unwanted invertebrates away from your crops or encourage predator species to the area or simply repel those pesky insects and bugs from the vicinity. Just mixing up plants into small stands helps deter pests as it disguises or hides your crops and makes harder for pests to find.

Growing nasturtiums (*Tropaeolum majus*) around cabbages, cauliflowers and broccoli has been found to reduce caterpillars on the cabbages. This is known as “sacrificial planting” (though I have to admit I like nasturtiums as a crop, too, for their peppery taste and use of their flowers in salads).

Marigolds (*Tagetes*) and **Asteraceae** relatives are very popular companion plants because they attract many beneficial predators such as hoverflies and ladybirds (and they pull in pollinators). You often see them planted with tomatoes.

To discourage pests such as carrot fly (*Chamaepsila rosae*), many gardeners have found that onions and their relatives, for example

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garlic and chives, planted among the carrots, will help repel them. Tansy (*Tanacetum vulgare*) and catmint (*Nepeta x faassenii*) are also popular pest repellants.

### Secondary metabolites

In general, remember that plants are extraordinary chemical factories, as well as producing from sunlight and soil all they need for primary growth, they manufacture an enormous array of “secondary metabolites”. These help to protect them from a range of environmental insults such as the cold, too much insolation, and especially attacks from grazing – not just the big herbivores, but particularly the tiny ones that we, too, want them to avoid. Plants from harsh climates with many herbivores itching to devour them, such as those from the Mediterranean, are rich in secondary metabolites. Many of these have strong tastes and scents that herbivores abhor but often we prize them. These plants can often prove to be good companions for your crops to help ward off pests, or delicious in their own right, such as rosemary (*Rosmarinus officinalis*), garden thyme (*Thymus vulgaris*), garden lavender (*Lavandula angustifolia*), sage (*Salvia officinalis*) and their relatives. Some plant oils are available commercially as invertebrate pest deterrents and can be effective as sprays that have no harmful effects on biodiversity.

### Biological control

Another way to support natural pest control by the wildlife of the garden is to supplement it by the introduction of target-specific invertebrate predators approved by the authorities for release. There are available on the market, for example, nematodes that despatch slugs and snails by releasing bacteria that kill the host, allowing the nematodes to feed on them (but see also the barrier methods below). There are nematodes that attack onion fly, cabbage white larvae and other pests, too. They do not harm vertebrates, but I prefer hedgehogs and thrushes to do the work. Sometimes native predators of pests such as lacewings and ladybirds can be purchased from specialist suppliers, but if you follow the advice in this booklet and [In Horto Feritas](#) (see Introduction), you should soon have plenty of populations of these in your garden.

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In greenhouses, the hymenopteran parasitoid<sup>5</sup> wasp *Encarsia formosa* is used successfully to control whitefly as are several predatory mites to control red spider mite. There are other parasitoids available, but I find they are best used in greenhouses.

## Traps and protection

There are various “no-kill” traps on the market for moles and small mammals but I would counsel against trapping mammals because of the stress it causes them, not uncommonly unintentionally lethal, but also because removing them to unfamiliar habitat is often a death sentence from starvation, accident or predation. For alien species like grey squirrels, it is illegal to release them anyway, even if you caught them in your garden. It is better to accept their presence in the garden ecosystem and discourage them by means of fencing, or electronic or other deterrents that will not hurt them.

Obviously, judicious use of netting or a fruit cage is a useful measure with mesh large enough to keep major frugivorous birds out, such as blackbirds, but let tits in. Against small invertebrate pests such as aphids and onion fly, the fleece you can acquire at horticultural outlets is effective but remember that it will exclude natural predators, too. Against slugs and snails, you can use crushed eggshells, wood ash, coffee grounds or similar materials thickly spread, which they cannot cross, or you can buy copper mats or tapes that they will not traverse. Straw around plants can also be helpful. Slug traps of beer that attract these gastropods to a liquid death are effective but keep them well off the ground to avoid non-target species such as beetles. Just putting out a few lettuce leaves as bait works well: check them regularly and dispose of the slugs you find (tweezers and salty water work well – any snails you might like to put out for the song thrushes). Don’t trap wasps and avoid indiscriminate sticky traps and similar that will kill beneficial species. For newly-planted and vulnerable small plants, cloches are useful or plastic half-bottles over individual transplants.

## A word about larger garden mammals

Some of these can drive gardeners to distraction, myself included! However, declaring war on them is counter-productive and rather

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<sup>5</sup> A parasitoid is an organism that lives on or within a host species that it ultimately kills after feeding on its tissues (*cf.* parasite which does not normally kill its host).

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hypocritical when you consider how we humans behave in our colonisation of the world!

- Grey squirrel (*Sciurus carolinensis*). If you live next to a wood, as I do, and are not in one of the few areas of the UK where they are absent, you will almost certainly have to interact with grey squirrels. An American introduction in the nineteenth century, this rodent is a charming and endearing mammal (I hear your sharp intake of breath) of great character and can become very tame. But, and it is a big but, ecological interactions with our native red squirrel have been a disaster for the latter. The grey squirrel is a voracious and clever omnivore that has no major predator to keep its numbers in check although pine martens (*Martes martes*) would likely do the trick and with luck might spread to become common again. Grey squirrels love juicy shoots, sweet bark, birds' eggs, nuts, bulbs, buds and just about anything they can get their agile paws around. They will bury their food for future use and have phenomenal memories. They will eat your vegetables, scump your fruit well before it is ripe and nick your nuts. If you have a squirrel problem, you will almost certainly need a wire cage around your fruit and vegetable areas to keep them out, or netting to cover vulnerable areas of bulbs. You can use fairly large mesh for exclusion cages, but it must be strong – plastic is hopeless as they can easily bite through it. You will need smaller mesh to cover bulbs to prevent digging. They don't like chili pepper, so try spraying with a chili extract<sup>6</sup> to keep them off, but you have to do it after every shower of rain and remember to wash the produce before you consume it!
- There is potential of control of grey squirrels by releasing a sterile gene or feeding them bait laced with a contraceptive which may eventually solve the problem, but re-establishing pine martens would be better. Personally, I hate trapping squirrels (see also above) and I won't shoot them as killing sentient animals sickens me these days.

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<sup>6</sup> Hot red pepper juice (capsaicin) mixed with water and a few drops of liquid soap as a wetting agent will work. Watch out for your eyes. It won't worry birds.

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- Rabbit (*Oryctolagus cuniculus*). Rabbits have become less prevalent since myxomatosis<sup>7</sup> was introduced, but some individuals are resistant, and populations recover until the next wave of the disease comes along. Unless you are in an area with plenty of rabbit predators (foxes, stoats, weasels, birds of prey), rabbits may well present a problem and there is no practical alternative other than fencing them out. When fencing, remember to bury the fence base and turn it outwards in an L to prevent digging underneath. The fence should be 1m tall at least, plus enough to bury and form the L. Chicken wire is good. Rabbit fences can be supplemented or perhaps replaced with electric wire deterrents, a two-wire mini version of electric stock fencing is available, but cost is a prohibitive factor for most of us. There are proprietary chemical spray deterrents, but they must be regularly replenished, and I have not found them very successful. Two of the more eclectic repellents are purported to be human urine and lion dung. Sound and water spray repellent devices are also available but habituation by the target species, rabbits or whatever, is a problem. Scarer devices can work for a while but again habituation is an issue and they must be regularly changed.
- Deer (**Cervidae**). Deer are browsers and will casually eat anything they fancy as they mooch about. The most likely ones coming into urban/suburban gardens today are Chinese muntjac (*Muntiacus reevesi*), although my mother used to have problems with fallow deer (*Dama dama*) eating the flowers of her tulips! Planting herbs which deer don't like such as mint amongst your crops may help. Fencing needs to be 1.5 to 1.8m high to stop deer as they are really good at jumping, although electric fencing can be effective. See under rabbits above for remarks about electronic and chemical repellents and scarers. Diesel-soaked cloth strips are a good repellent for deer but not pleasant in a crop area.
- Fox (*Vulpes vulpes*); badger (*Meles meles*). These mammals are now common in suburban and even urban areas. If you

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<sup>7</sup> This is a truly cruel and horrible disease that involves terrible suffering. If you find a sick rabbit, please despatch it humanely. A very sharp blow to the head with the back of a heavy spade from behind sufficient to break the skull and neck is instantly lethal (myxomatosis infected rabbits in the later stages of the disease will not run away from you if you approach from the rear) and then dispose of the body by deep (1m) burial or incineration.

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have rabbits, foxes are welcome. They are unlikely to harm your crops. Badgers might take sweet corn or other crops but seldom do in my experience, although they will feast on fallen fruit. Both these are fossorial species, so they love digging and that, especially by badgers, can be an issue. If it is, there is not much you can do – if it becomes a serious problem, please consult a qualified ecological scientist, one of the professional horticultural associations or Defra for advice so you do not inadvertently break the law. See under rabbits above for remarks about electronic and chemical repellents and scarers.

- Cats (*Felis catus*). For what I am about to say, *pace* cat lovers. Cats are a problem for wildlife, a serious predator of birds, pond fish, amphibians, reptiles and small mammals. You can fit them with an elastic-collar and bell on the basis that it will warn their prey but, frankly, it does not work. Of course functioning ecosystems need predators, but domestic cats are not ideal for that role which should be left to foxes, weasels, stoats, hopefully pine martens soon and avian raptors. Cats also make toilets in flower beds, creating the risk of a very unpleasant experience when weeding. My advice is: don't keep cats but if you really must, do not let them out at night.
- Dogs (*Canis* sp.). Dogs don't generally cause the multiple wildlife mortality associated with cats but unruly pet dogs and the larger breeds can be a problem if not well trained or when confined in small gardens. The big problem with dogs on every greenspace we manage is fouling. It is a criminal offence not to clear up after your dog. For goodness' sake everyone, put poop in a plastic bag and dispose of it properly. This does NOT mean hanging the bag in the nearest tree or slinging it into the hedge. Disgusting!
- Moles (*Talpa europaea*) and smaller mammals. Moles may be annoying on lawns, but owls and other raptors will take them, and they are good soil aerators. Spreading the molehills with a rake every time you see one is effective in keeping all but the shortest (and therefore wildlife unfriendly) lawns tidy, I find. They get in amongst the crops sometimes, but I have only ever found them to be a minor nuisance. There are deterrents on the market, although I have never found one that does more than move the moles elsewhere. Please don't trap them - it is horribly cruel. Voles and shrews do no harm and much good. Mice and rats have never been a serious

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problem with me. Populations will not explode if you don't allow bins to overflow, keep bird tables tidy and avoid leaving anything they like to eat accessible. Native raptors and other predators will keep mice and rats down. You do not need a cat!

Mammals they are not, but I should also mention pigeons here. These intelligent birds love young sprouting greens and, whilst farmers may appreciate their presence on graminaceous<sup>8</sup> (*i.e.* cereal) crops to encourage tillering<sup>9</sup> by their shoot-eating, pigeons make a nuisance of themselves in the garden. Scarers work reasonably well as long as you change them regularly to avoid the birds becoming habituated. There are many types available on the market, or you can devise your own with a little ingenuity. Alternatively, you can net crops while they are vulnerable.

### Pollinators

Pollination is an “ecosystem service” of primary importance to us as well as the health of the ecosystem.

This section is about plants that are not pollinated by the wind as, for example, most grasses and conifers are, or cleistogamous (having closed/self-fertile flowers) species such as observed in beans, peas and pansies<sup>10</sup>. Rather, I am considering here the great array of chasmogamous (open-flowered) plants that require an animal agent to transfer their pollen and ensure the mixing of their genes (“gene flow”). Whilst in the tropics and elsewhere, pollination is commonly by birds or even certain mammals and herpetofauna, in the UK it is almost exclusively the role of invertebrates. Without cross-pollination, relatively few plants produce seeds or fruit successfully, and we have probably all heard of the demand by fruit growers for beekeepers to take their hives to orchards to ensure maximum pollination and therefore greatest fruit yields.

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<sup>8</sup> Yes, I know I should now say “poaceous”.

<sup>9</sup> Poaceous plants, which include the cereals, have shoots which grow from the base rather than the tips. If a shoot is pecked off, it stimulates more shoots, known as tillers, bulking up the plant and generally making it more productive.

<sup>10</sup> Most cleistogamous plants also produce at least some chasmogamous flowers.

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Plants display marvellous and beautiful behaviour to attract pollinators – dazzling colours, heavenly scent (unless attracting blowflies as plants some do) and the sweetest nectar. Natural selection has produced extraordinarily-shaped flowers to attract pollinators, too, such as some orchids which mimic the sexual partner of the pollinator to fool it into mating with the flower and thus carry off its pollen to be transferred to another orchid of the same species during the next botanical copulation.

The general decline in macro-invertebrate populations is a major concern that means all of us should be doing our best to attract pollinators and provide habitat for them in which to reproduce as well as carry out their pollination function whilst foraging. Several countries, including the UK, have official pollinator strategies and various organisations, including the Royal Horticultural Society, now produce lists of plants that will attract pollinators to your garden.

It is true that many bee species are pollinators *par excellence*, collecting male pollen in large quantity to deposit it successfully on the female flowers' stigmata. But there are so many more pollinator taxa, some generalists and some specialists – it is too simple just to focus on bees, vitally important though they are. Many of the true flies or *DIPTERA* are excellent pollinators and some consider that hoverflies *Syrphidae* are second only to bees. Mosquitos are pollinators, too – only the females suck blood.

Those excellent predators of pests, the wasps (see above) and other hymenopterans, the ants, are also good pollinators, as are the *LEPIDOPTERA* (butterflies and moths) and many of the *COLEOPTERA* (beetles). Many flowers put on their best show at night with seductive scents and copious nectar to attract pollinating moths.

### Decomposers and Scavengers

Without the decomposition of dead matter and species that consume dead organisms, we would have no fertile soil and ecosystems would not function. Scavengers feed on dead animals (carrion): foxes, badgers, dogs, grey squirrels, mice, rats, crows, magpies and buzzards all scavenge. Invertebrate orders, especially *COLEOPTERA* and *DIPTERA*, contain many species that feed on dead animals – several silphid

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beetles (sexton beetles *Necrophorus* spp), calliphorid and sarcophagid flies (blow flies/flesh) are examples.

Catabolism, molecular breaking down of dead/waste biological material, is a complex process mediated by the decomposers of the ecosystem, mainly the fungi, micro-organisms (especially bacteria of which there may be several trillion in a few spadeful of soil plus the protozoa that feed on them) but also various larger detritus eaters. It is not an end but a biological circle, because the nutrients from waste and dead tissue are recycled and returned to the soil or other elements of the garden ecosystem and its web of food chains. Without the decomposers, ecosystems could not function so would collapse, nutrients would not cycle, and energy would not flow.

As well as the micro-organisms (within which I include fungi), some of the larger decomposers are macro-invertebrates and another reason not to use pesticides around the garden. Most larger detritivores are still tiny, though, and include the herbivorous springtails COLLEMBOLA which are generally <6mm long and have a furcula or springy tail for jumping that gives them their vernacular name. Then there are the mites of which there are tens of thousands of species amongst which the order *ORIBATIDA*, the oribatid mites, are considered as a very important component of soil-decomposing organisms. Their abundance and diversity in a habitat are a good indicator of the health of the soil.

Larger still are woodlice, flies, beetles and earthworms. Woodlice (*ONISCIDEA*) are crustaceans and there are several detritivorous species. Many beetles and flies consume wastes and dead material, especially as larvae, but earthworms *MEGADRILACEA* are some of the most important animals in breaking down organic matter in soils and compost, and recycling wastes as soil nutrients. We are all familiar with them, at least in general terms, and a high population is an indicator of good soil. They improve not just soil fertility but also its aeration and drainage. A common species is *Allolobophora chlorotica*, about 50mm long; a large species is *Lumbricus terrestris* which those of us doing biology will remember from the school laboratory and which can burrow to several metres below the soil surface. The latter can grow to 25cm long when extended.

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This is a very scant summary of a huge subject, but I hope it gives a flavour of the importance of decomposition and nutrient cycling and just a few of the organisms involved.

### Composting

Composting is a way to manage decomposition, harnessing the organisms involved and consequently both keeping the trophic cycle going as well as providing a fertile addition to flower and crop beds.

There is a large literature about composting which is readily accessible, and it is not my intention to cover the topic here. There are many composting aids on the market, such as tumblers, which make turning easier and can be good, especially for small quantities. Personally, I find it useful to have a three-sided brick bay with a concrete floor and slatted, removeable wooden plank front in which to put material for composting. This keeps it contained and gives easy access for turning and removal when ready to spread. Dividing the bay further into three parts allows heaps at different stages of rotting down to be maintained.

### Weeding

Do keep some native weeds as noted above but you will have to suppress weeds around your crops. If you keep fruit and vegetables interspersed with flower and shrub areas, weeding the small patches becomes easier – indeed I find weeding a relaxing and satisfying job: it gets you up close to your plantings and even lets you discover self-sown treasures now and then. Weed by hand when the soil is moist, using a hand fork to loosen stubborn roots taking care not to damage your crop or companion plants – if you do, water them back in and firm the disturbed soil. A hoe is a great friend of gardeners for weeding and often underrated. Hoe regularly in dry weather. It also turns up slugs and snails to the surface which birds and other predators will relish.

If you have problems getting down to ground level, use raise beds, pots, tubs and other containers for your crops. Most vegetables will grow in containers and there are now plenty of bountiful dwarf fruit trees available that are well-suited to container growing.

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Do use mulches to suppress weeds – compost, leaf mould, mats/collars specially made for individual plants or perhaps one of the new products such as processed straw. (I think this is sold as “strulch”, but I have not tried it.)

### Preparing the space

My experience is with the English Midlands on both acid clay and alkaline marl, and in France on dry limestone. I have never had easy soils but having a knowledge of botany and ecology has meant I have always found plants that the local conditions accommodate. Fruit and vegetables are mostly catholic in their requirements as long as they have reasonably well prepared soil and are not too dry or too wet for prolonged periods. However, it is pointless trying to grow bilberries or blueberries in limy soil or if you use hard tap water to irrigate them. (Grow them in pots and use rainwater.) Similarly, limy soils do suit broad beans, peas, spinach, onions/garlic and the cabbage family. It is easy to add lime (do it in autumn/winter) but not the reverse.

Wherever you are going to plant a crop, be it a single apple tree or a patch of radishes, it pays to prepare the ground well. Allow the plants space, check the soil is suitable (not full of a mass of roots for example), and that it is not in dense shade. If it is on a patio or in a rain shadow, remember you will have to water supplementally. Pots and containers generally need regular watering. This is not a gardening handbook, so I would advise you to read one of the many excellent amateur gardening guides to be found in any bookshop or on the internet if you have no knowledge of basic cultivation, but do be alert to how advice is rapidly changing as older pesticide and herbicide chemical-based intensive methods are changing to a more ecological science-driven approach that eschews poisons and methods in conflict with natural and semi-natural ecosystems in ignorance of [ecosystem services](#) (Appendix).

Over the years, many of which have left me without enough time for meticulous garden care, I have discovered the easiest crops to grow that largely look after themselves and are relatively trouble-free in my gardens which tend to be “on the wild side” shall we say. Below are some of my choices (alphabetical order with some relatives grouped). There are many, many others you can try!

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## WHAT TO GROW

### Easy greens, yellows and reds

Beans broad (*Vicia faba*), French (*Phaseolus vulgaris*). Both these are easy to grow from seed or transplants in small patches and the former are very hardy with attractive black and white flowers but watch out for aphids which love them. French beans are prolific fruiterers. The runner bean *Phaseolus coccineus* makes an attractive climber for the garden with its scarlet flowers (though some types are white). Pick the beans young to avoid stringiness unless you are saving seed for the following year. “Butler” is a beautiful variety for the garden with masses of red flowers and a good crop. Beans belong to the **Fabaceae** (formerly called the legumes) so fix nitrogen and will improve soil fertility.

Brassicas (**Brassicaceae**): cabbage, ornamental kale, sprouts, purple sprouting broccoli (all varieties of *Brassica oleracea*), cress (*Lepidium sativum*), mustard (*Brassica juncea*), rocket (*Eruca sativa*), etc. Of these, I find the easiest to grow are rocket, which grows quickly from sowings in a small, prepared patch and then will self-seed itself around the garden, and purple sprouting broccoli which can be purchased cheaply as small plants, but they do take quite a while to mature. Try “Red Arrow” which is very hardy and ready towards the end of February from previous year’s seed/transplants. Ornamental kale is fun and provides winter colour in the garden as well as being edible. Mustard and cress, of course, are great for sprouting on a moist flannel as all children know. Otherwise, I am not a great fan of growing brassicas - they are cheap in the market and plenty of organically grown ones are available in season. A few other brassicas come mixed in with young leaf salad seeds and these are worth growing.

Carrots (*Daucus carota* ssp. *sativus*). I wouldn’t bother unless you have deep, sandy soil when they are easy.

Courgette (zucchini), marrow, squash, pumpkin (*Cucurbita pepo* cultivars). These are great to grow in the garden if you have a patch where there was, say, an old compost or manure heap. There are dozens of varieties. Courgettes grow into full-sized marrows if you don’t pick them young. All are frost tender and need plenty of water

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and rich soil. Easy from seed or small transplants and in France we use the lovely, large male flowers to stuff with creamy cheese and other savouries to fry or bake.

Herbs. Many herbs will grow well around the garden. Most like plenty of sunshine as they mainly hail from warmer climes, and they often tolerate poor soil – so hot and dry for those in the list below unless I note otherwise. You can readily grow them in containers if you wish, I keep some by the kitchen door, so they are to hand when preparing food. The ones I like are:

- basil (*Ocimum basilicum*), familiar to everyone and related to mint; treat it as a half-hardy annual, great in pots in a sunny position; “British Basil” is a variety selected to do better in our climate;
- bay (*Laurus nobilis*) is a Mediterranean tree that can grow as tall as 18m but can be pruned to a bush or grown in a pot; great for flavouring pasta and casseroles;
- corn salad/lamb’s lettuce/mâche (*Valerianella locusta*) is increasingly popular in Britain and a very welcome green winter salad species in France where it also grows wild in places; “verte de Cambrai” is a flavourful variety, easy and convenient in raised beds;
- dill (*Anethum graveolens*) is an easy annual for a sunny position but it does like a rich soil; try the variety “tetra” which has been bred not to bolt too quickly;
- fennel (*Foeniculum vulgare*), large, well-known hardy perennial, easy in a hot, dry spot and there is a variety with bronze leaves that grows well in a pot with me;
- horseradish (*Armoracia rusticana*) is another very easy perennial to grow almost anywhere in the garden but it can be invasive, so I keep it in an out-of-the-way corner along a hedge;
- lavender (*Lavandula angustifolia*) – such a wonderful fragrance and used for flavouring and herbal tea as well as to prevent clothes moth in linen drawers; bees and many other invertebrates love it; easy in a warm sunny spot, drought tolerant and does not object to poor soil; I would not be without it but it is not very long-lived, flowering best when young – commercially the bushes are replaced every three years.

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- lemon balm (*Melissa officinalis*) is a very easy herbaceous perennial of the mint family, smelling wonderfully of lemons, which I have had for many years in a gravelly corner of my garden and it doesn't seem to mind any amount of neglect; also good in pots – the variety “citronella” is said to have the strongest lemon scent;
- mint (*Mentha* spp) –perennial herbs familiar to all of us with its many varieties and forms; very easy to grow in the ground or containers but you may find the latter preferable because it runs around the garden unless you sunk a root barrier around it – bees love it, too;
- oregano (*Origanum vulgare*) and its relative marjoram (*O. majorana*) are easy herbs in the garden or pots and the leaves dry well;
- parsley (*Petroselinum crispum*) is a hardy biennial forming a tap root in the second year when it flower; happy in pots and it seeds itself about if you grow it in a patch – indispensable; try the French type with flat leaves which is very flavoursome;
- rosemary (*Rosmarinus officinalis*<sup>11</sup>) is attractive, evergreen and drought tolerant and happy in any sunny well-drained spot or in containers; there are trailing varieties available which look good over walls/on rockeries;
- sage (*Salvia officinalis*) is another easy evergreen (well, ever-green really) happy in any sunny well-drained position or tubs; the more compact varieties make good ground cover, and all are loved by bees;
- tarragon (*Artemisia dracunculus* var. *sativa*). Insist on “French tarragon” as this has the best flavour and you'll need to buy plants as the flowers are sterile; a hardy perennial that does down in winter – I grow it successfully in pots;
- thyme (*Thymus vulgaris*) needs no introduction; there are dozens of varieties and it is worth buying in pots so you can check flavour/aroma; some creep and others are bushier.

There are many other culinary and various herbs - don't be afraid to try them.

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<sup>11</sup> Like many plants with a complex of secondary metabolites, rosemary can be toxic in very large amounts. As a concentrate (essential oil form) it should be avoided in pregnancy as it has been known to cause miscarriage.

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Jerusalem artichoke (*Helianthus tuberosus*) is a tall (to 3m) and beautiful sunflower relative that has few pests, delicious tubers and is easy to grow in a good soil; harvest the tubers regularly and replant (small tuber fragments will grow) but keep it contained unless you want nothing else in your garden;

Lettuce (*Lactuca sativa*) and salad leaves (various spp); I confess to finding lettuce difficult beyond the early leaf stage – they are easier in containers I find and it is worth having some from spaced sowings through the year even if they bolt as they are good sacrificial traps for slugs (see above; salad leaves are easy in small patches from seed but keep them weeded and be sure you can recognise the wanted leaves from the unwanted weedy infiltrators; you can buy seed mixes with many coloured leaves, ones that you can pick and pick for weeks, or hot spicy ones and the Japanese mixes are worth trying;

Nasturtium (*Nasturtium majus*), one of my favourites, a beautiful annual from the Andes for the flower garden in its own right with many varieties and easy from seed which you can collect to grow each year, an asset in anyone's garden and ideal for children to grow to help them get the gardening "bug" – it flowers profusely until the first frosts kill it, leaving the seed for you to collect; You can eat the peppery leaves (the name means nose-tweaker) and the flowers which make salads delightfully colourful;

Onions (*Allium* spp); I think the easiest to grow almost anywhere are bunching onions (*A. fistulosum*) & spring onions (various *Allium* spp & vars), chives (*A. schoenoprasum*), garlic chives (*A. tuberosum*), shallots (*A. cepa*)/sets;

Pea (*Pisum sativum*) – can be grown as a climber around the garden and they fix nitrogen so are good for soil fertility; I like the "mange tout" and "sugar snap" types; dwarf varieties are available;

Peppers (*Capsicum annuum*); the chilis are good but some are so hot they are only for masochists; sweet peppers are delicious roasted and in salads; many do best in pots on a sunny patio – try "Topepo Rosso";

Radish (*Raphanus raphanistrum* ssp. *sativus*) – a quick and easy crop from seed favoured by children that can be grown in almost any well-tilled small patch in the garden or a window box, and sown in succession for long availability; try the variety "sparkler";

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Rhubarb (*Rheum rhabarbarum*) (OK, we treat it as a dessert, but it isn't a fruit); very easy to grow and an attractive plant in its own right with colourful stems and big leaves, an early pudding for the table – rhubarb crumble is yummy – if you force it in the spring; discard the leaves and any frost-damaged stems as the oxalic acid in them is toxic, though you'd have to ingest a large quantity to kill you;

Spinach – I prefer the perpetual variety or spinach beet (*Beta vulgaris* var. *vulgaris*) which you can keep cutting for a long time and tends not to bolt; a sowing in June/July can be harvested into winter; Swiss chard is similar and also easy;

Watercress (*Nasturtium officinale*) is great if you have a slow-flowing, clean shady stream in your garden but you can also grow it on shady damp ground with some success; worth a try if you have the right conditions in your garden.

Of course, there are many others to try. I don't bother with potatoes but if you have an allotment or a separate vegetable patch, they are not too difficult. (Never eat the leaves or tubers that have gone green in the sun as they are poisonous.)

### Easy fruits

Apple (*Malus pumila*), our favourite fruit, a must to grace any garden; there are thousands of known varieties from which to choose in a myriad of shapes, colours and flavours – eaters, cookers, early, mid and late season, and dwarf ones for a large pot or patio tub; apples are generally unfussy and easy to grow but do be careful about cross-pollination needs as you'll need two compatible varieties with synchronous flowering (grouped lists are readily available on the internet); codling moth and a few other pests can be a nuisance but less so in a biodiverse garden with many predators (biological control with pheromone baits and trunk bands can be useful for serious problems);

Aronia (*Aronia melanocarpa*) is a shrub from the eastern USA that has black berries which contain very high levels of anti-oxidants/polyphenols. Raw, the berries are not very palatable but are good mixed in preserves, pies and added to muesli I find; easy to grow in

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the garden and prolific in fruit – I would not be without this shrub but whether it will help me live for ever is a moot point;

Blackberry (*Rubus fruticosus* agg.); wild blackberries are common in our hedgerows but I would keep them out of the garden as they are very invasive and hard to remove once established; the fruit is delicious so go for one of the cultivars for planting in the garden; try the thornless variety “Loch Ness”;

Cherries (*Prunus avium* cultivars) are more difficult I have found, although morello cherries are easy enough, even on a north wall. There are some sweet cherries now available for pot culture. I have not tried these, but they look interesting. You will need very good protection against birds!

Currants; black (*Ribes nigrum*) and red (*Ribes rubrum*) currants are very easy almost anywhere in the garden and we are all familiar with them in all sorts of dishes, preserves and juices – indispensable; gooseberries (*Ribes uva-crispa*) are easy too;

Damson/plum/mirabelle/wild plum (*Prunus* spp & vars); there are many types of plum that are delicious and easy in the garden or within garden hedges, and there are dwarf ones available for tub/patio culture; damsons are especially easy and I have old ones that, as they come to the end of their lives, happily sucker and form new small trees that fruit in a couple of years.

Elderberry (*Sambucus nigra*) is another very easy and productive shrub that is attractive, native to the UK and needs no introduction; be aware that this is a poisonous plant and berries should not be eaten before they are fully ripe when they are excellent for cooking as jams, sauces, jelly, chutney (& wine); the flowers are also used in cordials;

Goji (*Lycium barbarum*) or Duke of Argyll’s teaplant is a scrambling shrub (illustrated on [page 28](#) whose dried berries are familiar to most of us nowadays due to marketing as a health food (with little scientific evidence as far as I know); it is very easy to grow and has become naturalised in parts of the British Isles; the berries are best dried I find as they are a little bitter when fresh but that disappears on desiccation when they can be used rather like raisins (delicious in muesli); it is advisable to experiment with a few plants as some produce much larger berries than others;

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Nuts – almond (*Prunus dulcis*) a Mediterranean small tree for a south wall perhaps needs deep soil but is drought tolerant, lovely flowers; hazelnut/filbert/cob (*Corylus*) needs no introduction but choose a garden variety with large nuts and protect from squirrels; walnut (*Juglans regia*) large tree needing time and space, easy enough and prolific when mature – may be better to acquire a garden with one already;

Pear (*Pyrus communis* cultivated vars), well worthwhile; “conference” a late season reliably prolific, delicious and can set fruit without pollination; “concorde” is also excellent, more compact and fruits when young; I have an Asian “nashi” pear (*Pyrus pyrifolia*) that I grew from a pip from fruit bought in a market – it is amazingly prolific, reliable, no too big and attractive in flower, too;

Raspberry (*Rubus idaeus* and vars and other spp); usually easy to establish in good, well-drained soil but require support, attention to pruning the canes and care to avoid invasion of adjacent garden areas; flowers very attractive to bees; I grow the autumn fruiting Terri-Louise which flowers and fruits on the current season’s canes but there are many from which to choose;

Sloe (*Prunus spinosa*) – also called blackthorn and almost every native hedgerow has them, and the flowers are a harbinger of spring; a bit fiddly to pick but good in jams, pies and chutney – and of course sloe gin; keep them in your hedge as they sucker readily;

Strawberry (*Fragaria*); really needs no explanation but the cultivated crop ones need much weeding and protection of the fruit that I find a little tedious, although strawberry pots and hanging baskets can work well; I think the wild ones, or cultivars of them, have a superior taste, are easy to establish anywhere on a shady bank and are generally trouble-free with several varieties available in commerce, some as seed; viruses can reduce vigour of cultivars after a few years;

Tomato (*Solanum lycopersicum*); there are now many varieties for outdoor summer cropping that can be popped into a sunny spot in the garden, “outdoor girl” being a well-known one; some varieties such as “tumbling tom” work well in hanging baskets and there are many that can be grown in pots on a patio.

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## ABBREVIATIONS

<: less than

>: more than

agg.: aggregate.

cf.: *conferatur* (Latin, let it be compared).

etc.: *et cetera* (Latin, and other similar things).

i.e.: *id est* (Latin, that is).

s.l.: *sensu lato* (Latin, in the broad sense).

sp., spp: species, singular and plural respectively.

ssp.: subspecies (plural ssp)

var., vars: variety, varieties.



*Lycium barbarum*, goji or Duke of Argyll's teaplant in the author's garden. It is an easy scrambling shrub that has become popular in recent times for its purported health benefits. The fruits are best dried and used rather like raisins.

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## APPENDIX

### Ecosystem Services

In this paper I have tried to explain why biodiversity and ecosystems are so important to us, and how they are in peril from human activity. But what do ecosystems actually do for us in accountable terms? Most of you will have heard the phrase “ecosystem services” and that we all depend on ecosystems functioning properly to be able to go about our daily lives and, indeed, for our very survival. But what are these “services”?

I hope the text and tabulated list below will help anyone confused by “eco-speak” to understand why healthy ecosystems at local, regional, national, international and global levels are so vital to us – why we must nurture them, not take them for granted or impoverish them. The existence of these ecosystem services forms a strong utilitarian argument for conserving nature, in other words for the preservation of our “natural capital”.

Firstly, a definition: in a book bringing together papers about nature’s services in 1997, the editor, Gretchen Daily<sup>12</sup> noted that “*Ecosystem Services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life.*” These services maintain biodiversity and the production of ecosystem goods, which includes the basic materials that support human life. We, that is humans, are an integral part of ecosystems and interact strongly with them, sadly often to their detriment.

Depending on context, natural ecosystems can, as well as benefits, also produce effects that are undesirable or harmful to us such as diseases, species that become invasive or natural disasters of one kind or another (although it must be said that our disturbance of natural ecosystems usually makes these issues much worse). The complexity of ecosystems means that managing them is not at all easy and negative outcomes cannot always be foreseen. Moreover, “one person’s meat is another’s poison” and people’s cultural perceptions vary greatly and often violently, especially when it comes to religious or political dogma. Rather less controversially, but often of acute

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<sup>12</sup> Daily, G.C. (1997). *Nature’s Services – Societal Dependence on Natural Ecosystems*. Island Press, Washington DC, USA.

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local interest, where one person will want a flowery meadow, another will demand a football pitch. Although such a choice is ecologically a no-brainer, culturally choosing is more difficult and feelings run high. Finding the right balance is hard when space is as limited as it increasingly is.

In 2009 Roy Haines-Young and Marion Potschin of the University of Nottingham<sup>13</sup> found some evidence that suggests that biodiversity and ecosystem functioning are closely linked in a number of ways:

- There are effects of particular combinations of species on the way they use resources. These can increase average productivity and the rates nutrients are retained;
- The species composition of an ecosystem influences the vulnerability of ecological communities to invasion by alien species – under similar environmental conditions, this vulnerability tends to increase as the number of species decreases;
- Disturbed ecosystems can be stabilised if they contain species with traits that enable them to respond differently to environmental changes.

In other words, and perhaps unsurprisingly, there are advantages for biodiversity, and therefore for us, when an ecosystem and the ecological processes within it function optimally, and they can recover from disturbance.

In 2011, the UK published a National Ecosystem Assessment which concluded that Earth's ecosystems are important for human well-being and our economic prosperity, but that they are "*consistently undervalued in conventional economic analyses and decision-making*"<sup>14</sup>. This was an important piece of work that provided "*a comprehensive overview of the state of the natural environment in the UK and a new way of estimating our national wealth*". It demonstrated the under-valuing of our natural resources and how

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<sup>13</sup> Haines-Young, R. and Potschin, M. (2009). *Methodologies for defining and assessing ecosystem services*. Centre for Environmental Management, University of Nottingham, UK. This paper is a good source of background and references.

<sup>14</sup> An archived synthesis of this report can be found at <http://tinyurl.com/pehfym2> (but see *Ongoing and Further Work* below).

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*“valuing them properly will enable better decision making, more certain investment, new avenues to wealth creation and jobs, and greater human well-being in changing times ahead”.*

Although there are overlaps, the convention that I broadly use here is to group ecosystem services into four categories<sup>15</sup>:

1. **Provisioning.** These are the products obtained from ecosystems.
2. **Regulating.** These are benefits from the regulation of ecosystem processes.
3. **Cultural.** This is a difficult category for a scientist because of its subjectivity – though many are real, these services are hard to identify, qualify or quantify objectively, and not a few are not biological at all<sup>16</sup>. There are authors who include perceived religious and spiritual benefits here, too, which I have omitted in order to avoid the science: religion polemic.
4. **Supporting.** These are extended or indirect services needed in order to produce all other ecosystem services.

The Table below is an attempt to arrange a list of ecosystem services into the above four categories. It is indicative and not in any way exhaustive. A more detailed Table can be downloaded from the Common International Classification of Ecosystem Services site at <http://cices.eu/>.

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<sup>15</sup> This “functional grouping” is the most widely used although there are others. It is based on the work of De Groot, R.S., Wilson, M.A. and Boumans, R.M.J. (2002). A typology for the classification, description and valuation of ecosystem functions, goods and services. *Ecological Economics*, 41, 393-408.

<sup>16</sup> See also Fisher, B., Turner, R. K. and Morling, P. (2009). Defining and classifying ecosystem services for decision making. *Ecological Economics*, 68(3): 643-653 and Fisher, B., Turner, R.K., Zylstra, M., Brouwer, R., de Groot, R., Farber, S., Ferraro, P., Green, R., Hadley, D., Harlow, J., Jefferiss, P., Kirkby, C., Morling, P., Mowatt, S., Naidoo, R., Paavola, J., Strassburg, B., Yu, D. and Balmford, A. (2008). Ecosystem services and economic theory: Integration for policy-relevant research. *Ecological Applications*, 18(8): 2050-2067. For these authors, and I concur, ecosystem services should be fundamentally ecological in character: aesthetic, cultural and recreation outputs may be better thought of as benefits to which ecosystems contribute. It is a difficult topic, though, so I have listed some of the cultural benefits that are obviously directly ecosystem derived.

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FUNCTIONAL CATEGORY	ECOSYSTEM SERVICE
<b>PROVISIONING</b>	<p><b>Foodstuffs:</b> crops of all kinds, animals and their products (fish, shellfish, meat, dairy, honey, <i>etc.</i>), wild plants/berries, mushrooms &amp; fungi, algae/seaweed, fermentation supplies, <i>etc.</i></p> <p><b>Animal/pet feeds and grazing</b></p> <p><b>Water:</b> surface and ground waters for drinking; cleaning, cooling, paper making, <i>etc.</i></p> <p><b>Fibres:</b> (cotton, linen and many others)</p> <p><b>Fuels &amp; energy:</b> wood, energy crops, straw, utility animals, <i>etc.</i></p> <p><b>Oils, soaps, waxes, resins, <i>etc.</i></b></p> <p><b>Manure &amp; organic fertilizers</b> – also organic pesticides such as pyrethrin.</p> <p><b>Genetic and biochemical resources:</b> animal, plant and fungal DNA – many foods, food additives, varieties with disease resistance and novel crops rely on wild species’ genomic resources.</p> <p><b>Medicines and pharmaceuticals:</b> an almost endless array of secondary plant metabolites, for example, exists in nature.</p>
<b>REGULATING</b>	<p><b>Climate regulation:</b> greenhouse gas/carbon sequestration by terrestrial ecosystems, water columns &amp; sediments and their biota; transfer of carbon to oceans, <i>etc.</i>; moderating temperature, humidity, winds (<i>e.g.</i> storm attenuation by mangroves &amp; reefs), extreme weather and regional precipitation/temperature patterns.</p>

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	<p><b>Air quality:</b> maintaining rural &amp; urban air quality (e.g. through vegetation).</p> <p><b>Water regulation and purification:</b> maintenance of chemistry of fresh and salt waters favourable to biota; pollution removal, attenuation and buffering/flood control.</p> <p><b>Decomposition:</b> catabolic waste and related decay processes, nutrient recycling.</p> <p><b>Disease control:</b> negative feedback mechanisms, genetic variability, predator–prey relationships, biological control resources, habitat changes encouraging mosquitoes and other pathogenic vectors, <i>etc.</i></p> <p><b>Life cycle, gene pool maintenance:</b> pollination, seed dispersal, habitats for plant &amp; animal nurseries/reproduction (e.g. sea-grasses, reefs, woodland/ grassland, micro–macro-scale habitat heterogeneity) especially migratory species.</p>
<b>CULTURAL</b>	<p><b>Recreation, exercise, entertainment, <i>etc.</i>:</b> bird watching, nature photography &amp; film, painting &amp; drawing, walking, hiking, climbing, running/various outdoor sports, boating, leisure fishing, wildlife tourism, crafts, inputs to fashion, inspiration and cognitive development, <i>etc.</i></p> <p><b>Education:</b> field trips, nature study/biology, ecological research, pond dipping, biological recording, <i>etc.</i></p> <p><b>Heritage:</b> historical/bio-archaeology (amber, peat, caves, coprolites, fossils, pollen record, tree rings, <i>etc.</i>), patrimonial preservation for future generations.</p> <p><b>Aesthetic/symbolic:</b> motifs, symbols, ornaments and emblems (English rose, poppy, natural sculptures, <i>etc.</i>), enjoyment of nature/ species/</p>

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	wilderness – scenic drives, parks/reserves, etc., <i>genius loci</i> .
<b>SUPPORTING</b>	Overlap with Regulation & Maintenance above but considered here are on-going long-term processes such as photosynthesis/atmospheric oxygen production, ecological primary (plants) & secondary production, soil formation (pedogenesis) & erosion control, weathering processes, nitrogen fixation and other bio-geochemical processes, vegetative erosion suppression, nutrient cycling, water cycling, etc.



# *Eating Your Garden*

FOR YOUR NOTES



# Eating Your Garden

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