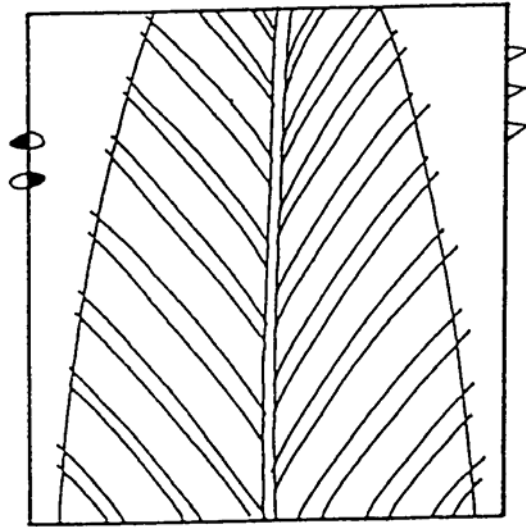


GARDENING WITH WATER



Waitakere City Council
Te Taiao o Waitakere

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This chapter is part of the Waitakere City Council's Sustainable Home Guidelines. The complete set can be obtained through most libraries or from the Waitakere City Council, Private Bag 93109, Henderson, Waitakere 0650, New Zealand, phone 09-839 0400, email: info@waitakere.govt.nz.

The guidelines are also available on the council's web site: <http://www.waitakere.govt.nz>



Water in the garden

The average Waitakere household of three pours 48,000 litres of water on the garden and lawn each year. This is about 10% of their total water use – less than most other parts of New Zealand – but most of it is used in the dry periods of the year when water is scarce. Our water supplies must be managed for those peak summer demand periods, so a reduction in water used on gardens will have a significant effect on the need to find new sources of water supply.

On the other hand too much water in our gardens can become a problem. In winter the soil becomes waterlogged and plants can rot and die. Many Waitakere residents spend time and money on drainage to reduce this problem.

When water soaks into the ground or filters through plants it is cleansed of sediment and pollutants. Urbanisation, however, increases the amount of impermeable surface across the city – surfaces that do not absorb water, such as concrete driveways, patios and roofs. Water that used to soak into the ground now runs rapidly off the surface and is diverted into stormwater drains. From there it flows into streams and harbours with its load of sediment and pollutants. Whatever we can do to reduce this runoff will improve the condition of our streams and harbours, and will help restore the underground water flows that keep our streams going in the summer.

Putting gardening into context

Roles of an eco garden or landscape

- Providing inspiration and relaxation – including beauty, utility, space, learning, and leisure
- Harvesting natural resources – vegetables/fruit, flowers, wood, and art
- Providing ecosystem services – soil moisture, compost, and treatment of waste
- Supporting biodiversity – fungi, bacteria, birds, insects and lizards
- Participation – doing, planning, and caring for nature

A garden can encourage nature not only in natural areas, but as an essential part of the human habitat. This brings emotional, physical, creative, economic, cultural and other benefits. Gardens can prevent damage to your living quarters from the elements, or at least mitigate it.

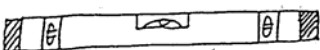
Observe the landscape of your neighbourhood. You should be able to see these three elements:

- Space dedicated to nature – for example bush, parks, streams, and wetlands
- Mixed-use spaces – for example gardens, hedgerows, street trees, sports fields, lawns, and horticultural space
- Green infrastructure – for example swales, rain gardens, roof gardens, retention ponds and artificial wetlands



Here are some ideas. The list is cumulative, not exhaustive. For each one you do or improve, the more likely you are making a significant contribution to the biodiversity, ecosystem services, health and enjoyment of your neighbourhood, yourself, your household, and your habitat.

- Your property is part of a wider environment. Wind, water, seeds, pests, pollution all cross boundaries. Your site and your management will affect and be affected by that environment, now and in the future.
- Natural areas all have systems (ecosystems) and thus a natural capacity to self-maintain. How much they can do this depends on how much they are disturbed, especially the soil and vegetation. Disturbance helps damaging plants to get established, and increases the likelihood of slips and erosion. Act so as to help the natural systems.
- Weeds are plants that are unwanted where they are growing. Environmental or invasive weeds pose the added threat of damaging natural areas and limiting the ability of our ecosystems and native species to survive.
- Restoration: help the recovery of an ecosystem that has been damaged, degraded or destroyed. Create passageways of cover or ecological corridors.
- Ecosystems provide services such as purification of air and water.
- Catchment: Look for the stream just downhill of you, and for the ridgelines that surround its valley – this is your catchment.
- Garden site vs. ecological site – know the difference.
- Your environment can provide economic resources such as food, social resources such as medicine, and cultural resources such as materials for art and spaces for inspiration.
- Biodiversity: species need niches to visit or survive in. Biodiversity is not only the powerhouse of healthy nature, but also provides the resources and the services that support healthy people, healthy economies, healthy societies, and healthy cultures.
- Permaculture.
- Pollution is generally not the presence of something ‘bad’, but the overpowering or degradation of the ecosystem services that would deal with it.
- Sustainability: If you require no more resources than your share of the planet can provide, create no more waste than your share of the planet can deal with, and coexist with other life forms in ways that maintain their biodiversity, then you are living a sustainable life.



Gardening when it's dry

In Waitakere a well-designed garden should not need much watering. This will save you water, money and time. The following sections offer some simple tips on how to manage your garden and lawns for dry periods, which plants can cope best, and how to manage an irrigation system (if you have to have one).

Choosing plants

By grouping your plants into those which require watering and those which don't, less water is wasted on plants that don't need watering. You can install separate irrigation systems for the different groups or simply use a watering can for the groups that need more regular watering.

Note the natural microclimates of your land over the year and plant accordingly. There will be areas that are naturally drier, such as steep slopes, areas with well draining soil, or areas exposed to dry summer winds. On the other hand, areas at the bottom of a slope, depressions, or poorly drained areas may be wet, especially in winter. If you use plants that naturally grow in these conditions, you will spend less time maintaining them.

You can also influence and change these local microclimates. Planting a shelter belt or trees to provide shade and wind protection, for example, can reduce evaporation and the need for irrigation.

Drought-resistant plants

Plants have developed many different strategies to cope with drought conditions. Some have long tap roots that can access deep groundwater, others have small leaves covered with fine silver hairs, or a waxy coating to reduce evaporation, or even no leaves at all, such as cacti and broom. Plants lose varying amounts of water to the air by transpiration – “sweating”. Plants with large leaves will generally lose more water than those with small leaves. Some plants become dormant over the dry period, or they can produce seeds and die at the start of the dry period, ensuring that the seeds are ready to germinate when rain returns.

Keep in mind that many drought-resistant species do not like being waterlogged in winter, which can be a problem in the wet climate of Waitakere. Native plants are generally better adapted to handle both drought and dampness. This applies especially to those marked with an asterisk (*) in the following table.

Plants that naturally grow in your area are totally adapted to the local conditions and should not need watering once they are established. Using native plants is the easiest way to achieve low maintenance, a water-efficient garden, and encourage native birds. The Waitakere City Council encourages residents to plant natives and has published a guide on revegetation. This booklet – *Native to the West: A Guide for Planting and Restoring the Nature of Waitakere City* – gives very detailed information on what suits your site and the diverse original plant communities and ecosystems in the city. It's available from the council.



Native drought-resistant plants

Larger Trees (8m+):

Pohutukawa (*Metrosideros excelsa*)¹
Kanuka (*Kunzea ericoides*)
Tawapou (*Planchonella costata*)
Karakā (*Corynocarpus laevigatus*)
Rewarewa (*Knightia excelsa*)
NZ Cedar, Kawaka (*Libocedrus plumosa*)
Horoeka/Lancewood (*Pseudopanax crassifolius*)
Toru (*Toronia toru*)
Puriri (*Vitex lucens*)
Towai (*Weinmannia silvicola*)¹
Totara (*Podocarpus totara*)
Hall's Totara (*Podocarpus cunninghamii*)

Small trees/large shrubs (2-7m):

West Coast Kowhai (*Sophora fulvida*)¹ and Kowhai (S. *Chathamica* and *S. microphylla*)
Whauwhaupaku/Fivefinger (*Pseudopanax arboreus*)
Houpara (*Pseudopanax lessonii*)
Tauhinu (*Cassinia leptophylla*)
Taupata (*Coprosma repens*)
Ake ake (*Dodonea viscosa*)
Tree Daises - Akepiro (*Olearia furfuracea*), Akiraho (*O. paniculata*),
Coastal Tree Daisy (*O. solandri*) and Tunguru (*O. albida*)
New Zealand Brooms
Rangiora (*Brachyglottis repanda*)
Shining karamu (*Coprosma lucida*)
Karamu (*Coprosma robusta*)
Kanono (*Coprosma grandifolia*)
Whau (*Entelia arborescens*)
Manuka (*Lepstospermum scoparium*)*
Mingimingi (*Leucopogon fasciculatus*)
Poataniwha (*Melicope simplex*)
Ngaio (*Myoporum laetum*)
Ti Kouka/Cabbage Tree (*Cordyline australis*)*
Pukapuka (*Griselinia lucida*)
Korokio (*Corokia*)
Karo (*Pittosporum crassifolium*)
Mapou (*Myrsine australis*)*
Kowhai-ngutu-kaka/Kakabeak (*Clianthus puniceus*)
Kumerahou/Golden Tainui (*Pomaderris kumerahou*)
Hebe stricta, macrocarpa and speciosa ¹

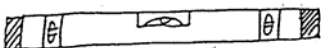
Shrubs and flax-like plants (<2m):

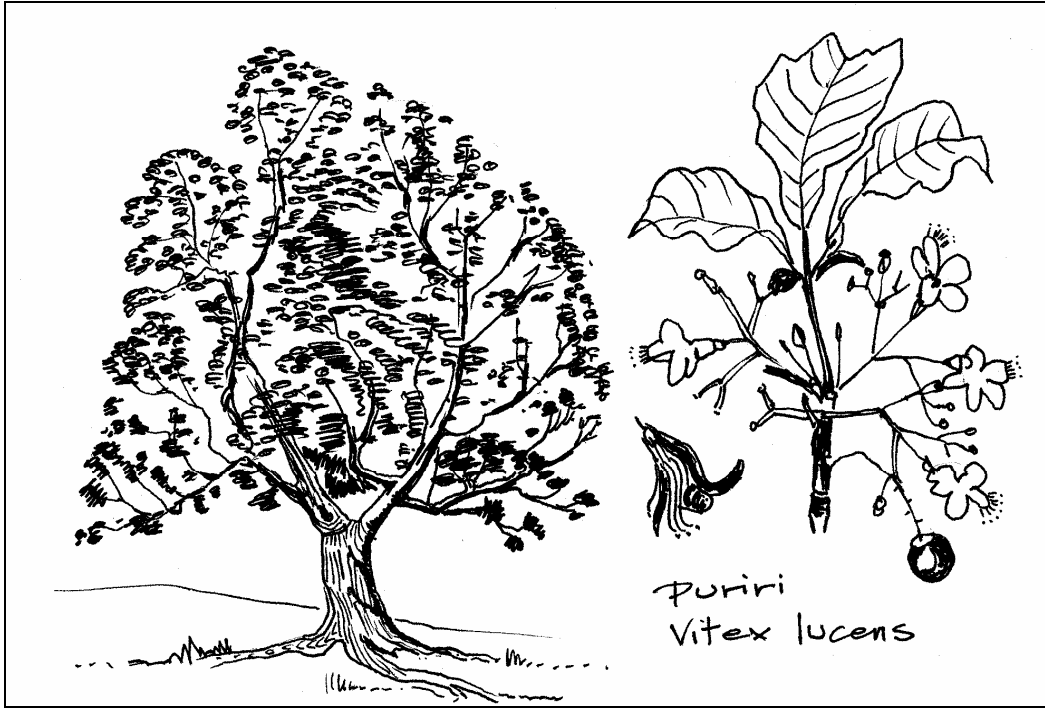
Flax (*Phormium spp.*)*
Tussock grasses
Stiff Stemmed Coprosma (*Coprosma crassifolia*)
(*Coprosma rhamnoides*)
Korokio (*Corokia cotoneaster*)
Koromiko (*Hebe macrocarpa*)
Mountain Flax* / Wharariki (*Phormium cookianum*)-note this is not the common flax harakeke
Toetoe (*Cortaderia fulvida, Cortaderia splendens*)*

Low Ground Plants:

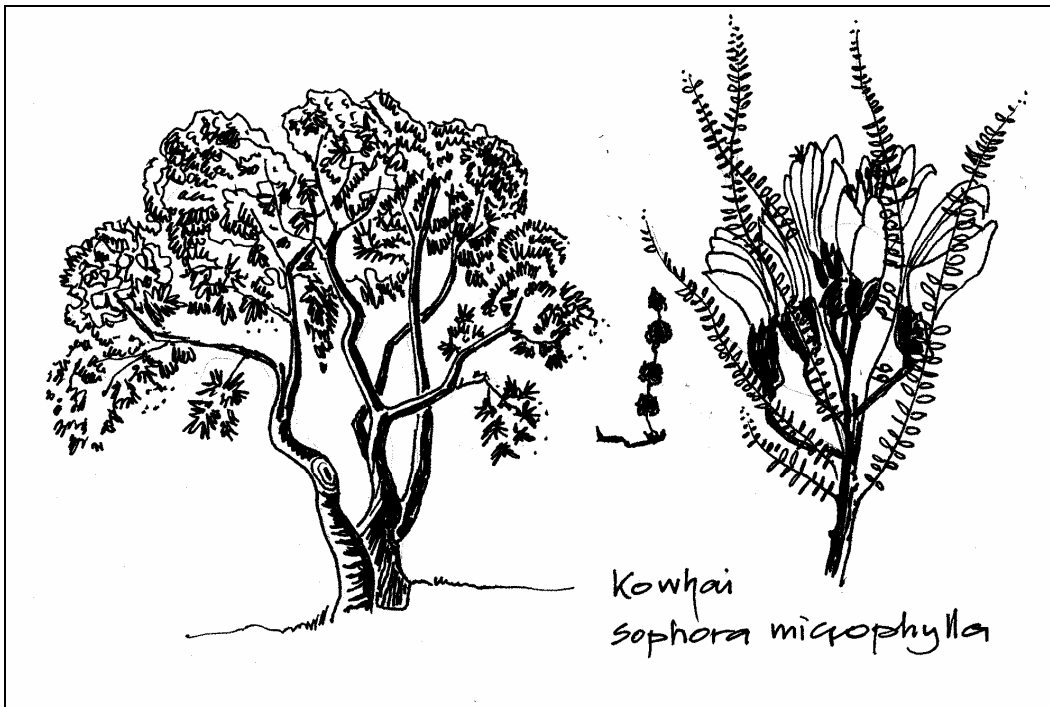
Waitakere rock daisy (*Celmisia major var. major*)
- this plant occurs only in Waitakere!
Coastal Astelia (*Astelia banksii*)
Dwarf Cabbage Tree / Ti rauriki (*Cordyline pumilio*)
Turutu / NZ blueberry (*Dianella nigra*)
New Zealand Spinach (*Tetragonia trigyna*)
Mercury Bay Weed (*Dichondra repens*)
NZ iceplant / horokaka (*Disphyma australe*)
West Coast Cliff Hebe (*Hebe obtusata*)¹
Patotara (*Leucopogon fraseri*)
Pohuehue (*Muehlenbeckia complexa*)

[¹These plants can cross with other varieties of the same species. Ultimately this could mean that they become extinct, because the genetic material is lost. Please do not plant related species in areas where they might cross with the naturally occurring variety.]

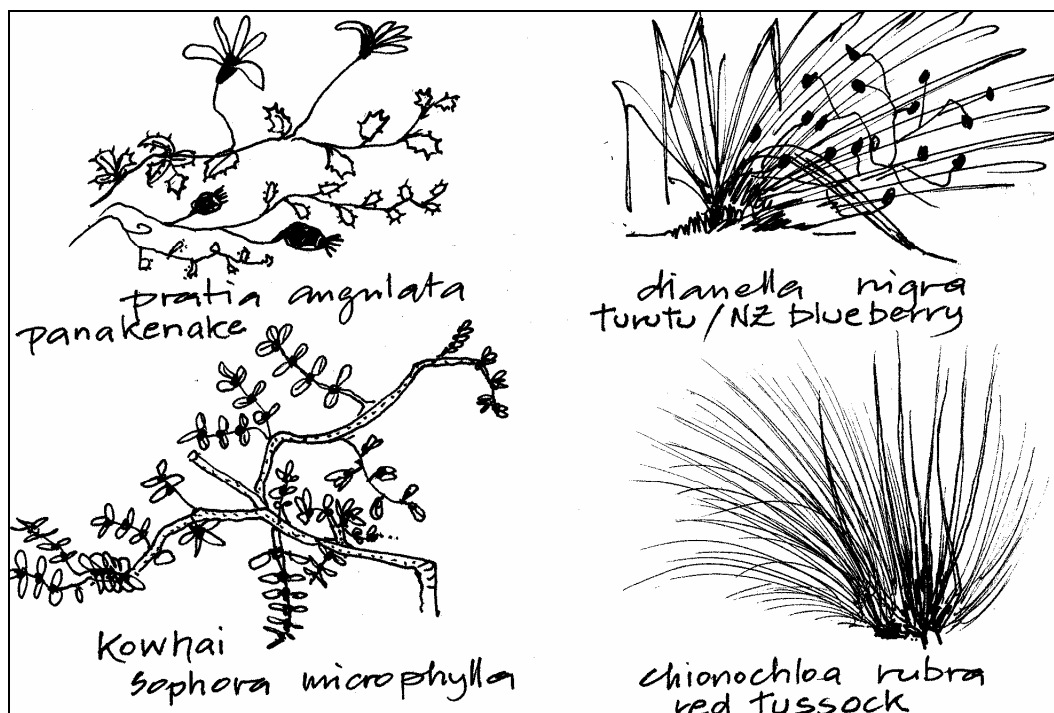




Puriri
Vitex lucens



Kowhai
Sophora microphylla



Exotic drought-resistant plants:

Flowers:

Ice Plants
Daisy, such as:
Argyranthemum frutescens,
Arctotis, *Brachyglottis*,
and *Euryops*.
Drosanthemum
Proteas
Lavenders
Most aromatic herbs
Stachys byzantina
Echium

Shrubs:

Crape Myrtle (*Lagerstoemia indica*)
Smoke Bush (*Cotinus americanus*)
Artemisia arborescens
Convolvulus cneorum
Euryops pectinatus
Grevillea
Callistemon
Cistus
Nerium oleander
Leucadendron
Leucospermum
Protea
Dryandra

Trees:

Vanilla Tree
Maytenus
Olives (*Olea europaea*), not
african type
Almond
Black locust
Burr oak
Carob
Cork Oak
Pomegranate
Fig
Holm oak
Pistachio

Palms:

Washingtonia
Brahea armata
Butia capitata
Jubaea chilensis

Winter Flowering Plants:

Pansies
Polyanthus
Primula malacoides
Primula obconica
Wallflowers
Iceland poppies
Nemesia

Succulents:

Yuccas
Aloe



Good management

Lawns

In Waitakere's climate, lawns should not require watering on most sites. If you have free-draining soils, such as are found in the volcanic areas, keep lawn areas to a minimum to reduce the need for irrigation, or accept periodic drought conditions without irrigation: your lawn will generally recover.

Don't cut your lawns too short, and cut them less often. Longer lawns take much longer to dry out and they have deeper roots (root depth is about the same as above-ground growth) so they take up any ground moisture better. Longer lawns are also healthier and stay weed-free. Lawns that are cut too short grow faster, so you end up mowing more often.

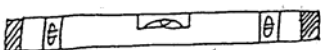
Grass varieties that need less water include red fescue, browntop, crested dogstail, droughtmaster and ryegrass.

Mulch

Mulching your plants (to about 100 mm deep) reduces the water that evaporates from bare soil by up to 70%. You can use untreated wood chips or shredded garden waste (avoid noxious weeds that can re-grow from small parts, or weeds that contain seeds). Mulch also gives nutrients to your soil and prevents weeds from germinating. Weeds compete with other plants for water, so try to control them. Bark mulch releases tannins which kill beneficial soil bacteria .

Soils

Add plenty of organic matter (compost) to your soil to increase water retention. Composting is also a good way to use the nutrients in your organic waste (food scraps, such as potato peelings, fruit, etc. – but not meat or fat). Composting uses natural processes to turn wastes into valuable fertiliser and it is easy to do it in your back yard. For information on composting contact your local community environment centre or your local or regional council or study the diagram on the following page. The best time of year to add compost and mulch is in autumn and winter.



1

egg shells
paper towels
peels
Cores

10e
kitchen scraps every day

2

Kitchen Scraps
Saw dust

layered
once a week

untreated saw dust

3

air tight lids
4 buckets of layered kitchen scraps

once a month

4

add water to each layer

Kitchen scraps
Sawdust & Soil
Weeds
Kitchen scraps
Sawdust
grass chippings
Bottom: Branches

twice a year

5

Compost heats up & reduces volume
weedseeds & pathogens are killed once compost is hot enough.

after one week

6

turn the compost pile

7

compost heats up again and cools down
reduced to 1/2 of volume

5-7 weeks

8

Compost is ready for garden: mulch & fork under.

6-8 weeks

Watering

Learn to tell when your garden needs water – many people over-water. It is okay for the top few centimetres of the soil to dry out – this will encourage your plants to develop deeper roots. Check with a trowel for moisture further down. Wilting leaves and retarded growth indicate that your plants need water.

When you do water your garden, do it in the morning or evening to minimise evaporation. Deep watering of the soil (a good soaking, less often) encourages roots to grow deeper and reduces evaporation. This is more effective than daily watering of the surface and foliage. Allow time for the water to soak into the ground; if it just runs off the surface you are wasting water. See also the following section on Irrigation Systems.

Use roof water to water your garden (see *Using Rainwater*). Or you can use the water from the rinse cycle of your washing machine or bath water to water established trees and non-food plants (but only if you are using eco-friendly, biodegradable detergents – no bleach!). If you have a septic tank on your property you can run the dripper line around water-loving plants or plant the disposal field with non-food crops to make use of the water and the nutrients.

Wind shelter and shade

If you shelter your plants from strong winds and sun, evaporation is reduced. Many plants benefit from being grown under trees that provide shelter from wind and sun. Grow shelterbelts, but make sure they won't throw unwanted shade on the house (see *Design for the Sun*). A shelterbelt that's 50% permeable is optimum and will give effective shelter for a downwind distance up to 10 times its height. A solid barrier such as a building or very dense vegetation will create turbulence downwind.

Irrigation systems

Before you install any system assess whether you need irrigation. Waitakere has a wet climate and most gardens can cope without irrigation.

In small gardens it probably makes most sense to use a watering can if extra water is needed during dry periods or while plants establish. This will be more convenient if you have several water sources (taps, ponds) around the garden where you can fill up your watering can.

For larger gardens and for people with less time, there is a wide range of irrigation systems available, some more water-efficient than others. Even though you can set irrigation systems to operate automatically with a timer, this doesn't always make sense. Often the garden ends up being irrigated when it has no need of extra moisture. Soil moisture sensors are available, which can be used to give the most efficient inputs of water. Plants don't like their foliage to be watered in the sun, and watering is best done in the evening, when there will be less evaporation.



Porous hose systems

These let water drip into the mulch layer or into the soil. Up to 70% of water is saved, because it is delivered under the mulch layer and less of it evaporates. The system can be used on mains pressure or low pressure, which makes it suitable for connection to rainwater tanks and gravity feeding (see *Using Rainwater*). Install porous hose only where the water is required, and use ordinary (non-leaking) hose to span the distances in between.

Drippers

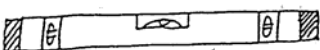
Drippers deliver the water directly to specific plants, making them a very efficient watering system. They also generally deliver water at a slow rate, allowing time for absorption into the soil.

Spray systems

These apply larger amounts of water above ground. This means that water can evaporate, but they are generally more efficient than sprinklers if they are used to deliver water to specific plants.

Sprinklers

A sprinkler is probably the least efficient way of watering the garden – it can use up to 800 litres an hour! A sprinkler with a high flow rate can result in runoff and wasting of water, because there is not enough time for the water to penetrate into the soil. The finer the spray the more water evaporates before it reaches the ground (wind shelter can reduce this). Timers can reduce the amount of water wasted because sprinklers are easily forgotten. Place a tin can on the lawn to measure how much water your sprinkler is sprinkling – a healthy lawn needs no more than 25mm a week.



Gardening with the rain

Water-loving plants

Plants absorb water through their roots, and later “sweat” it back into the air (transpiration). They act as a storage facility for water and reduce flooding while holding onto the moisture for longer. This is why dense forests are damp. Plants with large leaves lose more water into the air and are useful in boggy areas.

By planting the wetter areas of your section with water-tolerant species you can work with nature to make the most of your specific conditions. Plant instead of drain!

Native plants suitable for moist environments (ecologically suitable for Waitakere):

Native Grasses (*Carex flagellifera*, *Carex maorica*, *Carex virgata*, *Carex lessoniata*, *Carex secta*)

Toetoe (*Cortaderia fulvida*) - not the Argentinian pampas!

Hangehange (*Geniostoma rupestre*)

Flax (*Phormium tenax*) - food for birds

Panakenake (*Pratia angulata*) - attractive ground cover

Karamu (*Coprosma robusta*) - food for birds

Gahnia (*Gahnia xanthocarpa*)

Rushes (*Juncus gregiflorus*, *Juncus planifolius*)

Manuka (*Leptospermum scoparium*) - attractive flowers

NZ (native) Broom (*Carmichaelia aligera*) - attractive flowers

Swamp Coprosma (*Coprosma tenuicaulis*)

Kiekie (*Freycinetia banksii*)

Pukupuku (*Doodia media*) - fern

Turutu, NZ blueberry (*Dianella nigra*) - beautiful blue berries

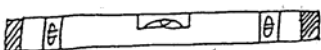
Cabbage Tree (*Cordyline australis*)

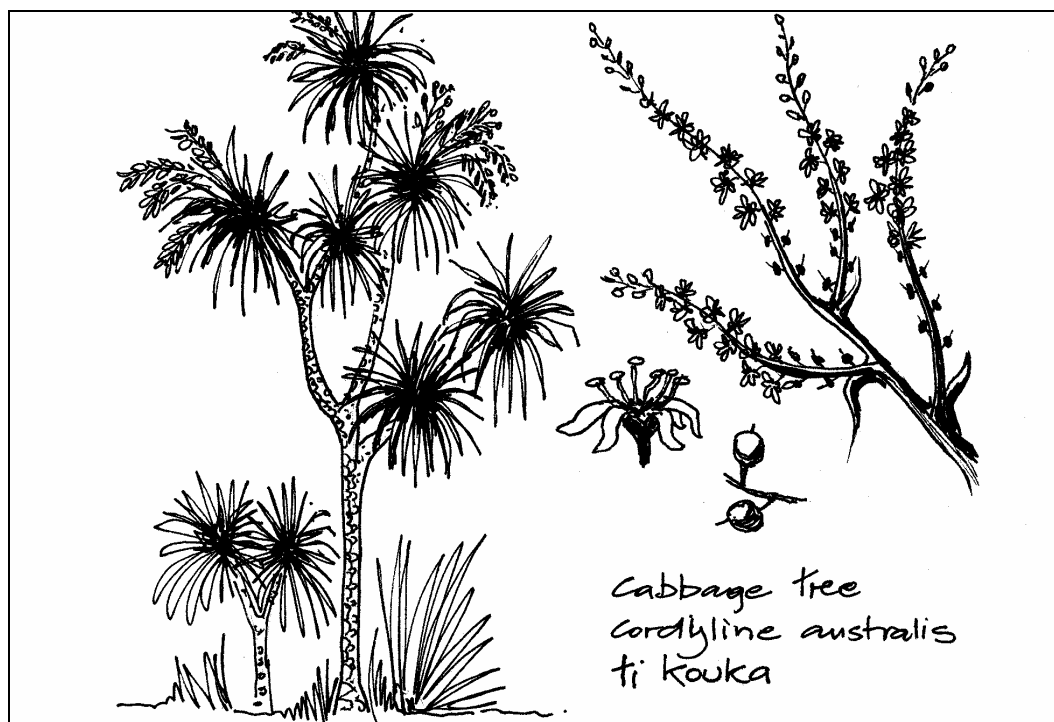
Nikau (*Rhopalostylis sapida*)

Pate (*Schefflera digitata*)

Kawakawa (*Macropiper excelsum*)

Lacebark (*Hoberia populnea*)





Streams and stream edges (the riparian area)

- Shade to keep/get water temperature below 19 degrees.
- Eradicate invasive species.
- Support nature to establish good habitat and natural function – for example plant healthy edge vegetation, intercept surface runoff.
- Have no pipes discharging directly into the stream.

Stormwater, groundwater and water use

Principle – The slower the speed of travel of rainwater to the local stream the better. This improves water quality and nourishes streams.

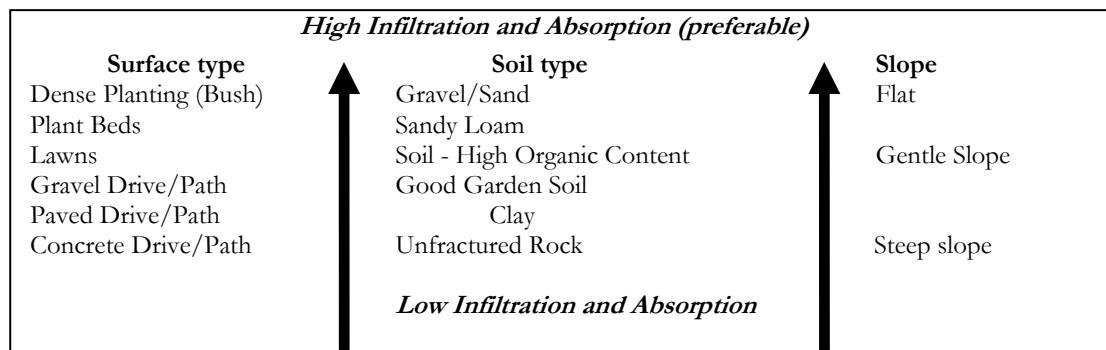
- Feed the groundwater and nourish a stream – allow flat/hollow spaces on lawns and paddocks, and floodplain areas beside streams, for water to collect or spread out harmlessly. This limits damaging flooding at wet times and nourishes streams in dry times by maintaining the stream flow from stored groundwater. It also allows time for ‘bioremediation’, the filtering and biological breakdown of pollutants.
- Encourage deep roots – work towards eliminating irrigation.
- Encourage soil water-holding capacity – keep the topsoil and let worms mix dead leaves and grass into the ground.
- Use rainwater tanks for the garden, even small ones.
- Use permeable paving.
- Group together plants of similar water demand.

- Cover the soil surface with leaf, grass, or wood mulch.
- Encourage organic material into the soil, as it helps retain moisture,
- Avoid irrigation where possible and when you do, irrigate deeply, use a timer, do it at still and cool times of the day (evening is best), use grey or non-potable water instead of potable water

Waterlogging and flooding tend to be more of a problem than droughts in Waitakere. The challenge is to work with nature to make the most of the water that naturally falls on your garden and to ensure that it will not kill your plants in winter.

Reducing runoff

You can reduce your runoff by increasing plant cover and reducing the amount of impermeable surface such as concrete. More water then soaks into the ground and is absorbed by the plants. Water is also cleansed when it is filtered by vegetation and soil.



Driveways

- Minimise the length and width of your driveways.
- Pave two tyre strips only, unless your driveway doubles as a play area for skateboarding, etc.
- Have a raingarden to take the runoff from the driveway.
- For permeable paving you can use permeable pavers (contact Council’s Ecowater Division for details, ph 839-0400). These systems need maintenance to keep the surface permeable, and must be installed according to the manufacturer’s instructions. They are unsuited to high-traffic or high-speed areas, or steep gradients. Permeable paving is still less permeable than planted areas.

Paths and walkways

There are many options for permeable paths, such as pebbles, stepping stones or bark. On steep slopes create meandering paths to divert the run-off into planted areas at the sides.



Increasing permeability and absorption

Intensely planted areas absorb a lot more water than a lawn area. You can increase the ability of your soil to soak up water (and not become muddy) by adding compost.

Reducing contamination

Heavy rain can flow over gardens and outdoor surfaces, picking up contaminants from a number of sources, a few of which are listed below. This then pollutes groundwater, local streams, and harbours.

Pesticides

Pesticides can be washed off plants and soil into waterways. You can avoid them by using plants which are naturally resistant to insect pests, or by techniques such as companion planting (consult an organic gardening book).

If you do use pesticides, use the less toxic ones – there are some naturally occurring pesticides available, such as pyrethrum. And follow the instructions: avoid spraying before rain or in the evening, and don't rinse the container on to the garden.

Fertilisers

Nutrients from excessive fertiliser use can cause algal blooms and oxygen deficiency in streams. Compost is generally safe, and natural fertilisers such as blood-and-bone are generally preferable to those made from fossil fuel. Use all fertilisers in moderate amounts and dilute. Native plants generally don't respond well to fertilisers.

Paints and household chemicals

Wash paint brushes in your laundry basin (water-based paints only), not outside. Some paint companies have good information about how to reduce contamination. If you wipe brushes and rollers on newspaper or old cloth first, less paint will go down the drain. Dispose of toxic chemicals and their containers carefully (call the local or regional council for advice) or better still, don't use them in the first place.

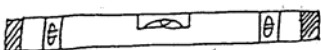
Cars

Cars pollute. Maintain your car and ensure it does not leak oil, brake fluids, fuel, etc. When working on your car avoid spilling any chemicals or oil, and dispose of chemicals carefully. If you do have a spill, soak it up with newspaper or sawdust and dispose of it through the rubbish – don't hose it away or let the rain wash it away! Don't leave old batteries and spare parts lying around outside where they will be exposed to rain.

Wash your car on the lawn – some of the pollutants will be absorbed by the plants and soil where they slowly break down – and you are watering the lawn at the same time! Some pollutants will take a long time to break down or not break down at all, such as lead. You should therefore avoid growing food in areas that might become contaminated from car runoff.

Swimming pools and chlorine

Chlorine is harmful, but some pools need it.



Step 1: Eliminate it by using salt water, or other tools such as an ozone system or a floating ioniser.

Step 2: Don't waste it: chlorine evaporates, so cover the pool and minimise aeration of the water in channels and waterfalls.

Step 3: Prevent contamination of waterways by letting waste pool water soak into the ground.

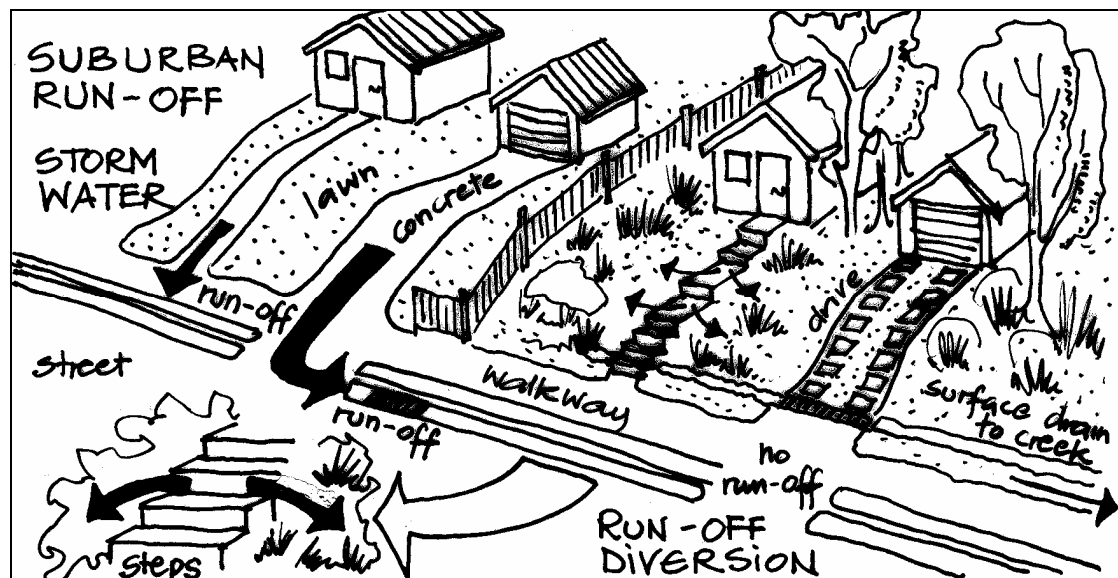
Soil erosion

Soil is perhaps our most undervalued resource – and silt is one of our city's biggest water pollutants. Most Waitakere properties have vulnerable clay soils. Conserve it and avoid washing it into waterways causing siltation, which can kill small organisms and plants.

Bare soil should be planted (even with a temporary crop of grass or lupin) or covered with mulch. Steep banks can be stabilised by intensive planting with species that have extensive root systems. If you can't avoid having soil exposed, divert water away from it and catch silt in a pond to settle, or a silt trap to filter (such as a hay bale, see *Site Earthworks*).

Harvesting water

Water that falls on your land can be harvested for irrigation or for water features.



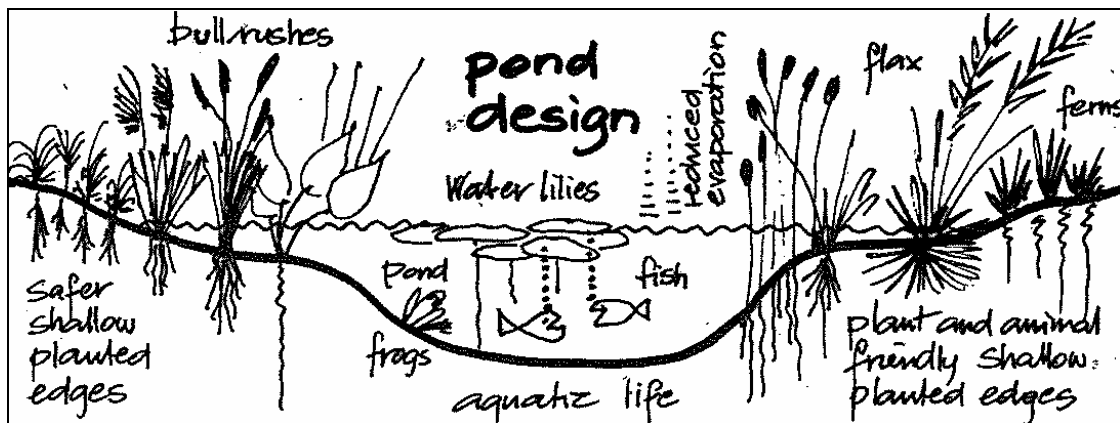
Consider safety issues when designing water features, because children can drown even in shallow water. Children's play areas and water features should always be separated by fences or densely planted areas. Gently sloping ponds, shallow at the edges and densely

planted, are safer. Kids might get muddy feet in boggy pond edges, but they are less likely to drown.

Diversion channels, dams and ponds

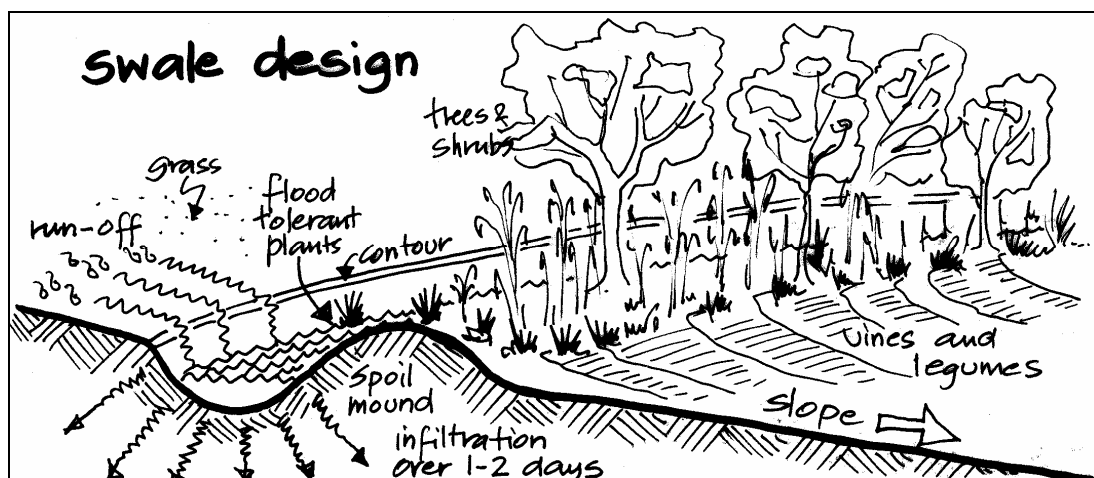
You can divert water to ponds along channels from areas where it is not needed. These features might be on a large scale on a farm, or quite small in a suburban backyard. Channels need to be fairly impermeable, perhaps with a clay base, if the aim is to collect the water rather than to make it soak into the ground. You can shape channels and plant them to appear like natural streams. This will encourage wildlife, prevent erosion and look more pleasant.

Ponds can be lined with plastic or clay. Other cheap options for small storage ponds are old bathtubs or laundry basins. Ponds should be planted to encourage wildlife, to avoid them becoming anaerobic and smelly, and to discourage mosquito breeding.

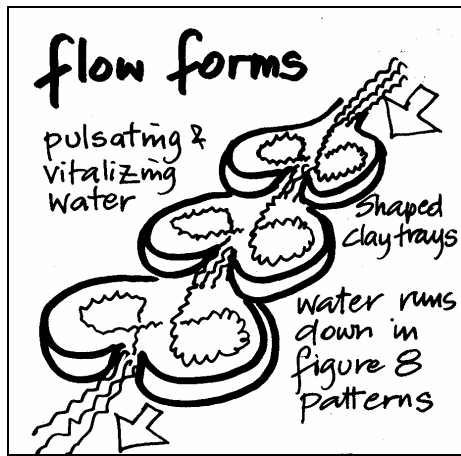


Swales

Swales are wide, gently sloping, vegetated channels. They capture the water and allow it to filter into the soil. Water-loving plants can be grown on the edge of the swale.



Flowforms



Flowforms are designed to replicate the natural flow patterns in streams, aerating and cleansing the water. The water flows in a figure-eight path, lengthening the time in which pollutants can be broken down by natural processes and oxygen can be taken up from the air. A natural stream, with its great variety of water conditions and plant life, is nevertheless preferable.

Further information

Advice at the Waitakere City Council:

Phone the call centre (09) 839 0400
Ask for: Green Network
 Eco Design Advisor
 Duty Planner

In print

Introduction to Permaculture, Bill Mollison, Tagari Publications, 1991.

Native to the West: A Guide for Planting and Restoring the Nature of Waitakere City, Waitakere City Council, 2005.

Waitakere Gardening Guide (pamphlet), Waitakere City Council, 1998.

Slip Sliding Away: Planting to Prevent Erosion (pamphlet), Waitakere City Council, 1998.

Invasive and Environmental Weeds of Waitakere, Waitakere City Council

On the web

<http://www.smarterhomes.org.nz> is a mine of up-to-date and independent information. Designed for the general public, it's easy to use, has case studies, and includes features such as Homesmarts, a calculator you can use to find information relevant to your needs or simply to run a home-health check.

If there are questions you can't find answers to on Smarterhomes, www.level.org.nz goes into more depth and is aimed at the design and building industries, with drawings and links to Building Code compliance documents.

Eco-building Products and Services Directory, Building Biology and Ecology Institute, phone Auckland (09) 376 6767, Wellington 0800 223 272. This is updated regularly and can be obtained from the website www.ecoprojects.co.nz.

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