



7 keys to farm planning

Creating a landscape that enhances food production and protects your resources is not difficult, but does require careful planning. Landscape architect Carl Pickens outlines seven key elements to practical, sustainable farms and gardens.

Harvesting rainwater, use of sustainable materials, herbal leys, productive shelterbelts, permaculture design, composting and worm farms, native plants, rain gardens - property development offers many opportunities to demonstrate sustainable practices, but where does one begin?

Work on your block can quickly become overwhelming, but appropriate design can help set the stage for realistic and practical land management. A well-designed property should demonstrate the right mix of vision and practicality to enable long term success and sustainability.

There are many considerations, so let's break it down and begin with the most precious resource.

1. Saving Rainwater

Diverting rainwater from roofs into tanks is a necessity for many people. Intercepting rainwater via formed swales helps establish tree belts by allowing water to settle and infiltrate. Diverting rainwater through vegetated roofs and into rain gardens offers opportunities to both celebrate water and irrigate plants. A strategically-placed rain chain can turn an unsightly downpipe into an elegant water feature, something monks in Japan have done for centuries.

Water storage can be limited at times of the year when it is most needed due to low summer rainfall patterns. A larger tank can solve this problem, as many people who have inadvertently put in small tanks will know.

Other storage options include bladders under the house, to save on space, or above ground tanks.

Unless sufficient head can be gained or the tank is raised (which can be unsightly), a pump will be needed. It is advisable to place pumps outside the tank, as it extends pump life and makes maintenance easier.

Range of companies are now producing slimline tanks for urban properties that range in capacity from 1000L upwards. 1000L will not go far - 3000L is the bare minimum (in my opinion), unless you are watering a tiny space.

Many urban councils encourage the use of rainwater storage for garden irrigation, providing certain criteria are met. Compliance requirements will differ from region to region.

Swales are a good tool on sloping sites in dry or semi-humid areas. Swales are cross flow dry channels or basins intended to totally intercept overland flow (rainwater), hold it for a few hours or days, and let it infiltrate, as groundwater recharges into

soils and tree root systems. Trees are an essential part of the swale system and required to reduce the risk of soil water-logging. They also overshadow and cool swale soils, reducing evaporation.

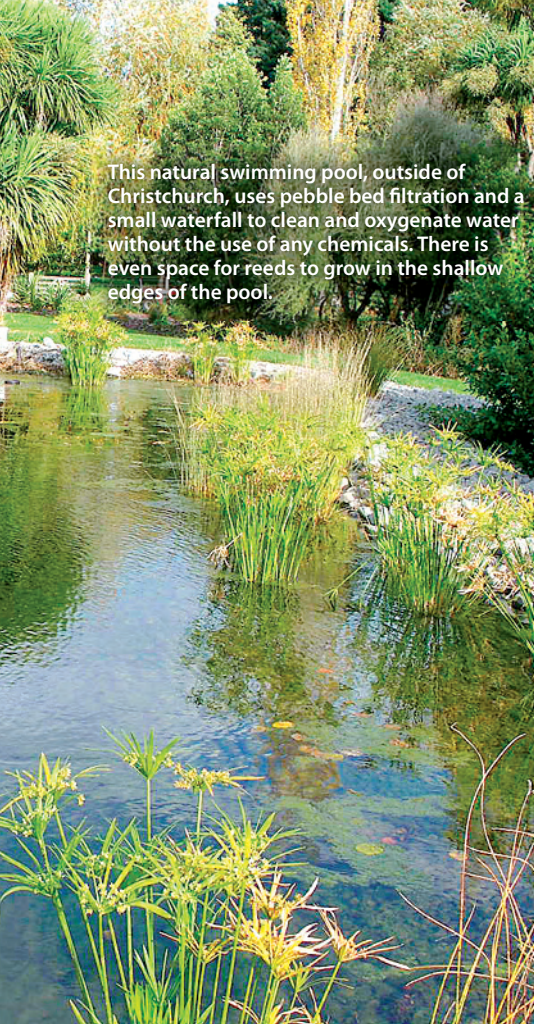
Swales are built on contour lines, with their width and depth altered according to the type of soil - wider and shallower swales are built on sandy soils, deeper and narrower swales on clay soils. Trees can be planted on the side slopes, with an approximate 3-4 year period before the swale base is overshadowed and humus starts to accumulate from fallen leaves. Tank water overflow and greywater can also be directed to swales, aiding in the establishment of tree belts that can provide food, fuel, and mulch.

2. Greywater

A regular supply of irrigation water can come from recycled greywater. While common on rural properties, greywater systems are rarer in cities due to establishment costs and regulatory hurdles.

The ease of establishment depends, at least initially, on whether it is classified as a discretionary or permitted activity by your local council.

Systems differ markedly in their filtration ability; some are rudimentary at best while others, such as the Biolytix



This natural swimming pool, outside of Christchurch, uses pebble bed filtration and a small waterfall to clean and oxygenate water without the use of any chemicals. There is even space for reeds to grow in the shallow edges of the pool.

system, use sophisticated filters to purify greywater to a high standard.

In Christchurch, with its relatively high water table, you are required to obtain:

- a discharge consent and a resource consent from Environment Canterbury;
- a building consent from Christchurch City Council for a drainage installation under Section 40 of the Building Act;
- may require a 'qualified person' to issue a design producer statement.

Greywater recycling involves delivering water, from showers, washing machines, and sinks, to the garden via tanks with in-built filters, and/or gravel filtration beds with grease traps. Gravel filtration beds can be planted with wetland-type species to remove excess nutrients. Water is eventually delivered to plants at least 100mm underground, where it is purified in the upper, most biologically active region of the soil.

The ideal place to deliver purified greywater is in areas of native plantings or orchards.

3. Use of Native Plants

Native plants evolved in New Zealand's unique climatic and ecological conditions, so are well adapted to grow here. This is not always the case for exotic plants

(though some flourish too well!).

Careful planning and eco-sourced plants offers the greatest chance of success, long term, with relatively low maintenance.

Decades of land clearance and human intervention has (for better or worse) altered soil structures and subsequent soil moisture patterns, including localised rainfall characteristics. Therefore a carefully considered approach is often required to re-establish areas of native bush on pastoral land. A successional approach is worth considering. Pioneer species planted at close intervals will shade out competing grasses at ground level after 2-4 years (depending on locality). Plants will benefit from heavy mulching and localised weed matting, and irrigation during the first 2-3 summers will aid establishment.

Existing gorse and even rank grasses can be a blessing in disguise. Soil is often much improved under established gorse (gorse is nitrogen-fixing), and natives can be planted into the gaps. Gorse will not tolerate the eventual shade.

Pioneering natives can also be planted into cleared gaps in rank grasses. With as little establishment effort as clearing gaps and a single water, plants can survive to eventually emerge above rank grasses and begin to shade them out.

Rank grasses have the advantage of being a deterrent to rabbits, which dislike moving through them, and they can help to retain soil moisture around plants by acting as a living mulch.

If main garden plantings are established with well-planned, low maintenance natives, areas close to the house can be more intensively managed and converted to vegetable gardens, home orchards, tunnel houses, or flower gardens.



Vegetable garden beds using untreated macrocarpa sides.

4. Shelterbelts

Mixed shelterbelts can provide coppicing timber, habitat for birds, fruit and nut trees, pollinator species, material for compost, shade and fodder for animals, as well as the benefits of shelter from prevailing winds and microclimate creation. Furthermore, shelterbelts can link across the land to provide corridors of movement for native birds, and a degree of protection for organic properties against spray drift.

John and Bunny Mortimer, in their book 'Trees for the New Zealand Countryside, A Planters Guide', provide some valuable recommendations:

"Practical experience has shown clearly that belts of medium porosity (40-60%) provide a much more even wind flow over a much wider area." This low permeability leads to eddying winds (turbulence) "at a factor of about five times the shelter height" on the leeward side.

Height is also important, as the distance to which shelter is effective against wind is largely dependent on the height and length of the shelterbelt.

"Generally, good wind shelter is provided for at 10 (times), with some effect up to 20 times, the shelter height on the leeward side and up to five times on the windward side," according to the Mortimer's.

Intensively-managed horticultural blocks will require shelterbelts at closer intervals, to mitigate the potentially destructive force of strong winds. In terms of length:

"A minimum length of 20-25 times the ultimate height of the shelterbelt is desirable, in order to maintain protection when the wind veers away from right angles to the belt, or when velocities

incorporate breathable vegetated green walls, use worm farms to recycle kitchen waste, and even create natural swimming pools, chlorine-free.

Hard landscaping typically involves highly extractive industries, so any measures that increase the sustainability of construction should be embraced.

7. Permaculture

Permaculture (permanent agriculture) is defined in co-creator Bill Mollison's book 'A Designers Manual' as:

"...the conscious design and maintenance of agriculturally-productive ecosystems, which have the diversity, stability, and resilience of natural ecosystems."

It is a way of working with nature, offering practical guidelines for creating a sustainable property.

Permaculture was originally developed as a response to declining soil fertility, biodiversity, and unsustainable land management practices, and has become increasingly popular as a design tool in urban environments.

Cuba, largely through necessity, has used permaculture techniques (amongst other tools), to transform its economy

into a predominantly self-reliant system, where agriculture has moved to the cities, and the country now has some 80% organically-managed agricultural lands.

Cuba's agricultural system is not perfect but it offers valuable lessons in a world where the future decline of oil reserves is inevitable, and a subsequent energy descent could see us having to radically modify our land management practices.

Zone and sector analysis are design tools in permaculture systems and are effective tools for energy conservation. Areas in the garden and on the farm are allocated, from Zones 1 through to Zones 4/5, with land uses assigned to each zone accordingly.

Zone 1 sees the placement of elements needing continual observation and frequent visits, such as herb gardens, seedlings and other propagation materials, and rainwater catchment tanks.

Zone 2 sees the placement of main crop vegetable beds, trellis and climbing structures, home orchards, and chicken runs.

Zone 3 sees the placement of commercial cropping, barns, large water storages, and windbreaks. Zone 4 contains forest or wilderness areas, and

One Earth Matters Landscape Architects



Based in Christchurch and run by Carl Pickens, a landscape architect with a background in organic horticulture, One Earth Matters is primarily concerned with providing effective design solutions, incorporating sustainable principles for rural and urban properties.

One Earth Matters will be exhibiting at the Ellerslie Flower Show 2009 in Hagley Park, Christchurch, from March 11-15.

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hardy or unpruned volunteer trees.

The rule is to develop the nearest area first and get it under control, before expanding the perimeter. There are now many examples of permaculture properties around the world, where people make a living from products derived from sustainable land management practices. ■

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