



Green Gate Organic Farm

Introduction

The Green Gate Organic Farm is the farm operation part of the National Environment Centre (NEC), a vocational education facility part of TAFE NSW Riverina Institute in New South Wales, Australia. The NEC delivers nationally accredited Diplomas in Organic Farming, Urban Food Production, Permaculture, Conservation and Land Management and Sustainability. Starting in 2017 a Bachelor's Degree in Agroecology will be offered. These courses are delivered in two main ways. Firstly as an online course supported by a bio-regionally matched teacher/mentor, (the NEC has teachers based in all bioregions of Australia and in some other countries). Secondly the courses are also run on the Green Gate Organic Farm. Students become part of the management team of the farm and the learning is done in this context.

Green Gate Organic Farm is located on the eastern edge of the Murray Darling Basin in South Eastern Australia on the outskirts of Albury, a regional city of 60,000 people. The farm's total area is 200 hectares - about 20% of the average size of farms in the region, thus a small farm for this area. The climate although uncertain and changing is dominated by cool damp winters (the growing season) and hot and dry summers of varying length. In the cold season the minimum temperatures can get below 0 degrees Celsius and maximum temperatures in the summer can reach to about 45 degrees Celsius. The soils are ancient soils that are relatively infertile and difficult to manage.

The farm is certified organic and produces lamb, pasture raised pork, chickens and eggs, olive oil, honey, vegetables and herbs, grains and mushrooms. All this produce is sold directly to the people in the local community via an on-farm shop. The lamb, pork and olive oil are all processed off farm and then return to be sold. All the rest of the produce is processed on-farm including an on farm flour mill that allows our customers to process their own flour to their requirements.

Description of the Agroecology system

The farm was set up in the mid 1990's. In the process of planning a number of uncertainties were identified that would impact of the farm success, including climate change, the increasing scarcity of farm inputs, the inability for most farmers to receive a fair price for what they produce, and the uncertainty of local markets given that most people in community are fairly disconnected from their food production system. They purchase most of their food directly from a supermarket with no knowledge of the production system used. Agroecology was taken as the basis for a farm system to be developed to deal with these uncertainties.

The knowledge of the farm system has been developed by operating the farm as an action research project. Each year a new group of students, working with teachers, reflect on the farm system as it is, and then refine the plan or initiate a new pathway in the farm ecosystem. This process is standard practice for most farmers, but given that new ideas are constantly flowing, the farm's development and the growth of a deeper understanding of the agroecological system has been rapid.

The farm management approach has been to apply the understanding of the processes of ecosystems to the production of food for people; to see the farm as an ecosystem and work within that system. A set of farm rules were established to guide farm development and management, based on what our customers and potential customers would want from a food system (as outlined in appendix 1). This means that the farm becomes a connection tool to the local community and our customers.



The farm is a complex system of interrelated parts and it is best explained by using concepts of ecology to describe different parts of the farm.

Energy Flows in the food chain

A typical farm system has simple energy flows for example from the sun - to the grass - to the cow - to the supermarket. And farmers apply external energy to that system to make the energy flow along that pathway. In this case the farmer may apply energy to the system to make sure the sun's energy flows to the grass rather than to some weeds and so to the cow. In situations where there are abundant resources this energy is often oil, in low resource situations this energy is physical work by the farmer. In natural ecosystems there is no external energy applied, as the energy is partitioned as an internal process of the ecosystem. We have tried to design Green Gate Organic Farm so that energy flows by design rather than external application. For example the Green Gate farm system is designed so that pigs can harvest all their energy requirements from the farm rather than by inputting energy in the form of externally imported feed. This has the added benefit of significantly lowering the input costs into the farm system.

In variable climate ecosystems are adapted to variable water availability

Often in variable climates agriculture goes through boom and bust cycles based on single crops or production systems that cannot adapt to significant change. The approach on Green Gate Organic Farm is to ensure that whenever the rainfall occurs the most can be made of it. In grassland situations where water tends to run off the landscape rapidly, the farm has been designed to maximise water use and slow its movement where it falls across the landscape, allowing it to be stored in the soil. Our soil management has focused on increasing soil carbon significantly and therefore our landscape can hold a lot more water than it used to. Keyline pattern ploughing slows the water across the soil surface and allows penetration, swales slow down larger water volumes and concentrate water in growing areas, and leaky dams slow down water in the drainage lines.



Figure 1. Leaky dams

The timing of the rainfall is uncertain, therefore the farm system is designed to grow biomass (grass, weeds, trees insects etc.) whenever the rain falls. This biomass is then available for the farm system to convert into food for people. The farm's heap can convert the grass into meat, the pigs can convert the roots into pork, the chickens can convert the insects into eggs, biomass can be used as green manure for grain crops, logs can be harvested from the farm's trees to grow mushrooms on, some of the biomass can be harvested to create mulch and compost for vegetable growing, the flowers of the biomass provide nectar for our bees and so on.



Figure 2. Mobile chicken house and the guardian dog

In variable climates biodiversity increases farm system stability

In simple food production systems the boom and bust issues are increased because of the inability of the farm system to adapt to this uncertainty. In complex farm systems the boom and bust is levelled out. For example 2015 it was a bad year for Green Gate's wheat crops, but the farm still produced a



lot of food for people and an income for the owners because other parts of the system remained productive. It also means that the farmer can provide more valuable option for its customers because it can sell them a range of food.

Outcomes of the practices

Soils are the basis of terrestrial ecosystems and healthy and biodiverse soil ecosystem is critical to the development of healthy agroecosystems

The experience of Green Gate Organic Farm – as for agroecological farmers around the world- is that as the soil ecosystem becomes healthier farming becomes easier and easier. The challenge is how to manage a new system when the soil is unhealthy at the start. This was the case when Green Gate Organic Farm was developed. There are strategies that can be used to “trick” a soil ecosystem into acting like a healthy system until soil health can be restored, but this needs to be planned carefully. In the early history of Green Gate Organic Farm, the managers did not know these tricks and they encountered many problems, problems that now no longer exist.

Agroecologists are niche creators

One of the models in ecology is the “competitive exclusion principle”, only one organism can occupy a niche. On Green Gate Organic Farm there are areas that are more suitable for weeds than a crop, and in order for the crop to grow more external energy is thrown at it. A better approach is to set up the niche for the crop. For example, on Green Gate Organic Farm harvested logs that are not the right size for mushroom growing are used to develop a niche for another tree crop. The log placed in the correct place in the landscape will enable another tree to grow providing moisture, shelter, nutrients and a diverse soil ecosystem without having to manage weeds and pest etc.

Ecosystems reflect the landscape

Naturally plant communities reflect the landscape and subsequent soil patterns. The Green Gate Organic Farm is designed to match the landscape, this enables it to implement a lot of the system strategies already outlined. The farm becomes a complex farm landscape using less energy inputs.

Farmers are not separate entities from the farm, they are a significant part of a farm ecosystem

Industrial Agriculture sees the farmer as sitting outside the farm ecosystem controlling what goes on inside, just like a manager of a factory making computer screens. This is not how Agroecology works and is not the case at the Green Gate Organic Farm. The day to day management of the farm requires an intuitive understanding of the system and an ability to see the whole farm system from within. Sometimes it may take twice as long to do a job on the farm, taking time just to sit and listen and watch and feel to make sure the connections are strong.

Agroecosystems have emergent properties that cannot be foreseen

A monoculture crop is just a monoculture crop. An Agroecology system has emergent properties that come from complexity. The whole of the farm system is greater than the sum of the parts. The benefits for the local community from Green Gate Organic Farm don't only come from the fresh local food we grow. The farm is home to a range of endangered native species that are valued by the community. It provides a natural space with all the ecosystem services that these spaces provide in a semi urban setting. The farm also provides an opportunity for community members to develop social capital. The local land-care group uses the farm as a regular meeting site, as do the local seed savers network and others. Local schools use the farm as a way of integrating an



Figure 3. People connecting to the farm



understanding of the issues around food production into school activities, programs for troubled youth are run in the farm's complex landscape and the farm is visited by many individuals and groups over the year exploring different ways of thinking about food. This networking is critical in an industry that is not really supported in most of the support structures developed for food production in Australia.

Message from farmer to farmers

"Farming is the hardest job in the world and the easiest, it is the most complex job in the world and the simplest, sometimes it's the worst job in the world and sometimes the best, it is one of the most important jobs in the world and yet sometimes is not valued at all by the people that benefit from it.

Yet I love it.

This love comes from my deep personal connection to the land and the farm. Agroecology has deepened that connection and places significant value on it. But most of all it has made the hard job easier, has made the complexity easier to manage and more often it feels like the best job not the worst. And I know my customers value what I do because I see them every week when they buy food from our farm."

— Rob Fenton, Green Gate Organic Farm, TAFE NSW Riverina Institute