03  From the Project Officer
Introducing the project and the people involved

2014
04  Weather Trends and Forecasting
Our first event was held at Inverloch

2015
SUMMER SERIES
06  Vegetable growing in a changing climate
08  Building a wicking bed
10  Vegetable growing in a changing climate
12  Water wise horticulture - two farm visit workshops
14  Healthy Soils - let’s get down and dirty!
16  Climate Change Cafe - talking about mental health and risk over dinner.
18  Biosecurity Workshop
19  improve the drought resistance of your farm

2016
24  Resilience through diversity
held at Bimbadeen with Rob Fenton
26  Agridiversity - forum held at Leongatha
28  Shade and Shelter - Two on-farm workshops held in partnership with Landcare
30  Financial Literacy
32  Video Case studies - six video case studies
34  Reel farming - two movies, six screenings
From the Project Officer

The Agricultural Climate Resilience project developed from South Gippsland and Bass Coast Shire Councils work with local producers since 2009, culminating in the Southern Gippsland Foodmap www.southerngippslandfoodmap.com.au. The three year project was funded by the Victorian Government with further support from the South Gippsland and Bass Coast Shire Councils. A range of local organisations are partnering with the project.

During the first year, I was employed to deliver the project program. The first task was to establish a steering committee of locally skilled and knowledgeable people to provide guidance on the topics of information that will be useful to food producers in adapting to a changed climate. Meeting twice a year, the committee determined the focus of the next six months of the project.

A major focus of the project is ‘mentoring’; helping farmers to gain skills to deal with the threats (and opportunities) that climate change might throw up utilising peers’ experiences. A number of mentoring models including forums, discussion groups, farm walks and demonstrations helped connect food producers with practical solutions to challenges of climate change.

The steering committee and I worked together to develop a program of informative events that started farmers on a journey to develop their resilience. We also aimed to put together a collection of information, links and case studies to inform and inspire as a legacy of the project, of which this publication forms an import part. If you are reading an electronic copy, click on the links to explore the resources.

A print copy of this document can be obtained from either of the Shire Councils. Contact Skye or Roslyn using the details in the information box (right).

For all of you that have attended events, provided feedback, shared your stories and let us on to your farms, thank you. This project could not have achieved what it did without the goodwill of all involved who were passionate about working together to find a way to cope with an increasingly erratic climate.

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To adapt you must understand what you are adapting to

The Weather Trends and Forecasting Forum was the first event organised by the project, held at the Inverloch Hub on Friday 31st October, 2013.

Farmers from around the district listened in rapt attention to Jane as she explained her career to date (with the announcement of a new television role, which we later found out was at Channel Seven) and how she forecasts the weather. Noting that dewpoint, highs, lows and troughs drove precipitation Jane spent an hour showing the audience the satellite and online data that informs a weather forecast. Admitting that a low pressure trough got her excited, and that ridges blocked tropical moisture, Jane increased the understanding of the attendees as to the drivers of the weather. A dynamic and animated speaker, Jane concluded her talk by taking questions from the floor.

After a short break for photos and refreshments, the Forum heard from

WEATHER TRENDS AND FORECASTING

The Weather Trends and Forecasting Forum featuring Jane Bunn and Graeme Anderson was enthusiastically received by the 55 people attending.
“Winter is the time to evaluate both your footy team’s finals chances and the type of Spring we are going to have”

the next speaker, Graeme Anderson. Graeme is a very experienced presenter at farmer forums outlining the drivers of climate change; the resources available to farmers and how to understand the implications of the different indexes. With the help of the information Graeme provided, farmers can develop their climate literacy and make informed decisions. Graeme’s team have developed a number of animations to explain climate drivers in a scientifically correct yet extremely understandable way – the climate dogs – and we were lucky to have a new dog MOJO to meet. When Graeme talked about climate change he said, referring to the next Tuesday’s Melbourne Cup “the race favourite is to be warmer but with variability.”

When talking about predicting a season Graeme used a footy metaphor. When you are evaluating your teams likely performance in the finals you usually have a heads up by July. The same with predicting what type of spring we are going to have. You have a fair idea by winter by looking at the climate drivers.

The afternoon session of the forum moved into an open discussion about the type of information the Climate Change Adaptation Project could provide. Graeme had touched on the hierarchy of decisions in the morning session, consisting of the first decisions (often the decision to do nothing - ‘it will rain next week’) the bigger decisions and the tougher decisions. The Climate Adaptation project endeavored to help farmers understand the options available to them to make the big tough decisions.

Graeme Anderson’s link document is here tinyurl.com/graemes-links

Climate dog animation here tinyurl.com/enso-indi-sam
We made a video about the workshop. Click here to see it.
https://vimeo.com/189861686

Don’t get bogged down in theories; look at your plants and learn from them - Joe Aiello"
SUMMER SERIES
VEGETABLE GROWING IN A CHANGING CLIMATE

The Project started the 2015 program with a series of four workshops exploring the effects of climate change on fruit and vegetable crops. Targeted at small growers who typically supply local distributors, we looked at all the climatic influences on food crops and what climate change threats and opportunities may become apparent.

The first workshop held on Sunday January 11, 2015 looked at vegetable crops using the local knowledge of three presenters. Held at the Korumburra food hub, the opening speaker Meredith Freeman from Grow Lightly Connect outlined the program she had prepared for the day.

The workshop targeted small commercial growers/farmers, markets suppliers and farmers who wish to diversify into a cash crop. Our speakers covered a range of experience and enterprises and included Meredith, Jo McLeay from Kilmorack Farm Produce in Ranceby who supplies Grow Lightly and Joseph Aiello from Jjaras Farm, Inverloch a commercial vegetable grower and farm gate retailer.

Meredith spoke about how Grow Lightly Southern Gippsland grew from a need to do something about global environmental trends, particularly global warming, use of fossil fuels, the depletion of soils, and the prospect of ongoing water shortages. Meredith noted that ‘people must eat, and we believe it’s important to make truly fresh food available; to reduce food miles to an absolute minimum by eating local wherever possible; and to recognise the environmental cost of food production. We also know that growing food locally assists the local economy’.

Meredith provided the workshop attendees with a number of handouts that included
- Germination Temperatures for Vegetables
- How Day length affects vegetable production
- What can I sow this month?
- Acid tolerance of food plants

The handouts are available [here](tinyurl.com/veg-notes)

We discussed physically adapting to a changing climate – shelter for plantings, soil improvement for plant health and water retention, water management and irrigation, varieties that can adapt to earlier spring, less winter chill, reduced insect pollination and other constraints that may be a result of climate change.

Opportunities for crops that may now be able to be grown was also covered.

Jo McLeay is a relatively new farmer and her insights into her choice of property, and how she developed her vegetable growing business were valuable. Her session was entitled “Vegetables: why we chose Ranceby; what we have done; what we have learnt” was very well received by the participants.

Joe Aiello, principle of Jjaras farm in Inverloch grows a variety of heirloom vegetables and fruit for their fuller flavour and nutritional value. Jjaras has extensive vegetable plots, a small orchard, a vineyard and a berry patch. The farm uses organic farming practices. Joe’s talk discussed vegetable growing in Inverloch (a coastal environment); how to decide what to plant and when; changes he had noticed since starting; how he looks after the soil and water/irrigation.

People must eat and fresh local food is best

Climate variability and change presents a major challenge to the Australian vegetable industry. Extremes in temperature and rainfall have become more frequent, while suitable climatic zones for crops are shifting.
We made a video about the workshop. Click here to see it.
https://vimeo.com/189862139

A wicking (self watering) bed is water efficient as plants are watered from below and there is less evaporation. The gravel filled reservoir at the bottom of the bed needs filling less often. Workshop participants came along to the Food Hub in the Coal Creek car park, Korumburra and learned how to construct a wicking bed during this hands on workshop led by Juneen Schulz, a local gardening expert. Notes and support were provided so the participants could use their new skills in their own food producing system.

What is a wicking bed?
A wicking bed is an enclosed system that has a reservoir of water at the bottom of the bed which keeps the soil/compost in the top of the bed moist by capillary action. This system of gardening can be adapted to big or small garden beds and have above or below ground construction.

Wicking beds are more expensive and take time to construct, however the benefits outweigh the negatives. Wick garden beds offer many benefits over normal garden beds.

- The wicked raised garden beds can be built on top of poor soil.
- There is less watering maintenance, as water is stored under the plant roots.
- The vegetables have a higher chance of survival during intense hot summer conditions.
- Raised beds become warm faster than normal garden beds, to allow vegetables to grow more quickly in spring and longer in autumn.
- Plants remain alive if not watered daily therefore needing less care. This is great if you want to go away for a few days.
- Nutrient is not loss to the subsoil when the garden bed is watered.
The wicking garden bed are ideal for heavy feeders and quick climbers, such as corn, pumpkin, cucumbers, peas, beans and tomatoes.

The wicking system can be adapted for aquaponic systems, where the water is constantly flowing in the drainage material.

**Wicking bed construction**

Your wicking bed can be a wooden box (say a reinforced old fruitbox), an old bath, a water container such as we used, or can be a trench dug into the ground. It needs to be sited somewhere level and stable—it will quickly become very heavy! And it needs to be level to work properly.

- If the bed framework is porous—wood or a soil trench or similar, it will have to be lined with a waterproof layer.
- Heavy duty plastic such as dam or pond liner is suitable. Don’t forget this stuff is usually not UV stabilised, so exposed areas will break down over time and need to be replaced.
- If your container is rough or has sharp bits or stones it will need to be lined before the plastic is used. Use old carpet or underlay, an off cut of builders blanket insulation or other thick soft material that you have to hand. Sand is suitable for trench beds.

The bed consists of a layer of gravel, scoria, sand or other drainage material with a water delivery pipe embedded in the material and also extending to the top of the bed. PVC drain pipe type material is suitable. Using recycled offcuts is ideal, as generally short lengths are needed. A cap prevents mosquitos from breeding. Larger wicking beds need a slotted pipe to deliver water to all parts of the bed effectively. The drainage layer should be one third of the depth of the bed. Two drains are necessary in the bed, one at the level of the bottom of the growing medium so the bed does not become waterlogged, and one at the bottom of the water well to allow monthly flushing out. The bottom drain needs a tap so it can be closed off, but the drain at the junction of the mediums should be always open to keep the water below the level of the growing medium. It can be covered on the inside with some shade cloth to keep the drainage material in if it is fine enough to escape through the drain.

Place a layer of shade cloth or similar between the drainage layer and the soil layer to prevent intermingling.

The growing medium can be potting mix or soil with layers of lucerne hay, compost and lime (similar to the construction of a ‘no dig’ garden). This layer should be two thirds of the depth of the bed. Mulch completes the bed.

These notes can also be found here. tinyurl.com/wickingbed

*Wicking beds are more expensive and take time to construct, however the benefits outweigh the negatives.*
FRUIT GROWING IN A CHANGING CLIMATE

Participants enjoyed tasting the fruit

At this workshop we learned about varieties suitable for this area and the opportunity to grow new varieties to take advantage of a changing climate.

The third workshop of the Summer Series was again held at the Food Hub in Korumburra. Grow Lightly hosted the workshop for the project.

The three speakers are all local fruit growers who had lots of insight into the varieties suitable to grow in this area both now and in the future.

Our first speakers were Mark and Margaret Brammer from Strzelecki Heritage Apples. Mark’s presentation was supported by data Margaret collects at the orchard. Margaret records the flowering date of each of the varieties of apples they grow, and is graphically very telling. Flowering times are up to twenty days earlier for some varieties.

This can be concerning if flowering and frost coincide, more likely if flowering is earlier in spring. Apples need winter chill to initiate budding and flowering and some varieties will be able to cope with this more than others. The notes for this presentation can be found here, (tinyurl.com/strz-apples)

Di Tod spoke next, talking about the orchard she has established on her 15 acre property at Koorooman. With over 700 fruit trees, over 100 of which are avocados, Di had a lot of insights to share with the workshop participants.

Established in 2006, her property was planted in zones, with the six edible plant areas surrounded by native plantings that act as wildlife corridors and provide shade and shelter to the fruit and nut trees.

Much of Di’s talk was devoted to mulch, and the quest for good cost effective mulch material. Mulch retains moisture, creates a micro climate in the root zone, and encourages soil microbes which help the trees obtain nutrients. Di can use as much as 50 truck loads of mulch a year, applied in summer, autumn and into winter.

Di’s orchard grows citrus trees, including oranges, mandarins, lemons, limes and grapefruit. She has olives, pomegranates, persimmons, berries, a bunya bunya pine, pistachios, pine nuts, chestnuts, hazelnuts, walnuts and pecans. She also has some feijoas, wampee, longan, mulberries, carob, figs, apples, pears and of course the avocados. Di says avocados don’t require high soil nutrient levels, they can be harvested 10 months of the year and they don’t ripen until they are picked. Di has five different varieties of avocado. The fruit take a year to mature on the tree and then they will hang there for another six to eight months. Di picks to order. Di mainly wholesales her produce, however some goes into Grow Lightly’s weekly veggie boxes and she does several farmers market’s with them as well.

Rhys Freeman was our next presenter and he explained about the range of unusual fruit trees he grows in South Gippsland. White Sapote - which can bear fruit twice a year that have a flavour which is like a mixture of Canteloupe, Pear and banana; Cherimoya or Custard Apple requires a warm temperate climate as it is frost sensitive. Custard apples prefer moist well drained soil in a sunny position. Grafted varieties are required for reliable fruiting. The tree is deciduous in spring; new leaves grow immediately.
Mark reminded us of the words of wisdom on the cover of the Hitchhikers’ Guide to the Galaxy.....Don’t panic.”

American Paw Paw or Poor Man’s Banana likes a temperate climate but is frost tolerant. It prefers very reliable moisture, grows in part shade to full sun in a well drained position. Grafted varieties of this tree are required.

Babaco - the fruit of which tastes like a lemon melon needs a temperate climate as it is very frost sensitive. It prefers moisture, full sun and a well drained position. It is deciduous in winter in South Gippsland.

Macadamia - an Australian bush food tree which prefers moisture, full sun and a well drained position is heavy fruiting with the right varieties; Chilian wine palm - with fruit like mini coconuts and lemon Aspen grow in this area and produce fruit that is unusual and sought after.

Rhys also talked about Tasmannia lanceolata (Mountain Pepper), Eucalyptus olida (Strawberry Gum), Backhousia citriodora (Lemon Myrtle), Syzygium anisatum (Aniseed Myrtle), Syzygium luehmanii (Riberry), Hicksbeachia pinnatifolia (Red Bopple Nut), Podocarpus elatus (Ilawarra Plum) which are Australian bush foods that will also grow here. Find Rhys’s notes here tinyurl.com/rhys-fruit.

The workshop was held in February 2015 just as the Phillip Island Community Orchard (PICO) was installing an irrigation system using Class A water from Westernport water. With an emphasis on building liveable and healthy communities, PICO is a community-run project that aims to share, inspire, educate and engage the local community. Established on a one hectare plot in Wimbledon Heights the community is developing an attractive and sustainable orchard and garden, which will demonstrate how recycled water can provide for safe and healthy food production. This provided a perfect opportunity to discuss the design and principles behind installing an irrigation system. With a hotter, dryer climate expected due to climate change, the use of irrigation and recycled water will become an important part of growing food crops in this area.

Twenty people came along to take part in this hands-on workshop. Adrian James of the community orchard talked through the design of the irrigation system, and demonstrated the use of the various fittings. Adrian then took participants to the actual area to show the layout of the irrigation piping. As the community orchard is organic, the weeds were being suppressed on the orchard site by black plastic, using the heat of the sun to solarise the area.

As the community orchard is so close to the Westernport Water’s water treatment facility recycled water is readily available through the purple pipe network. Using this resource will make the community orchard much more resilient to dry weather, and the irrigation system will deliver water to the tree roots without waste.

Benita Russell from Westerport Water was on hand to outline all the facts about the classes of recycled water
and the purple pipe system, plus the constraints to using recycled water on food crops. Benita told the workshop that class A recycled water is safe to use within residential areas as well as for commercial and agricultural production.

A range of benefits include:

- Not subject to Permanent Water Saving Rules
- Preserves precious drinking water supplies particularly in times of drought
- Reduces impact on the environment by diverting wastewater that would be discharged to sea
- Nutrients in the water reduce the necessity to fertilise gardens and crops
- Provides an ongoing water source for lawns, gardens, vegetable patches & fruit trees

The workshop finished with a garden walk in the community garden.

This workshop was held in partnership with the Phillip Island Landcare Group’s Urban Landcare Program, Phillip Island Community Orchard and the Local Food Network.

Links; Fact Sheet about class A irrigation water
(tinyurl.com/recycledfacts)
PICO’s facebook page link
(https://www.facebook.com/islandorchard/)

Water wise irrigation.

In response to requests from participants in the summer series of horticultural workshops, three farm visits were arranged to see how farmers have installed irrigation systems to water their food crops. Held on the last day of February, 2015 10 participants visited the three properties.

The first property we visited was the Woodleigh property of Alexandra and Lucas Farmer. This couple grow pumpkins commercially and have developed an irrigation system that is innovative and effective. Lucas reuses the pipes in different areas of the property, as the pumpkin crop is rotated around the farm. He performed a demonstration of fitting an irrigation dripper, which participants were welcome to try. Lucas also discussed farm water supplies, and the volume of water needed to get the farm through a growing season.

Our next stop was at Kitlake Farm, the Outtrim property of Gina and Sid Cowling who grow organic vegetables that are distributed through Grow Lightly Southern Gippsland. We looked at their unique drip irrigation system, T-tape, which was developed in Israel for irrigating desert kibbutz. This system does not require a lot of water pressure and the unique design of the drip tape keeps water flow even along the length of the irrigation tape. Attendees were very interested in the farm layout and the fully enclosed orchard areas, to protect fruit trees from bird predation.

The last stop of our water wise irrigation tour was the Inverloch property of Joe and Suzanna Aiello; Jjaras farm gate and café for a tour and lunch. Joe (a speaker from our vegetable growing in a changing climate workshop) led us through the market garden and orchard. Joe’s method for maintaining soil moisture during hot weather is to build up the soil with compost and humus. This highly enriched soil maintains water levels so successfully that the only watering the vegetable beds require is hand watering for a few minutes every few days.

Participants then ended the tour with a discussion over lunch in the farm café.

Links;
Grow Lightly Southern Gippsland
www.growlightly.com.au
Jjaras farm gate and café
www.jjaras.com.au
Irrigation Australia publications
tinyurl.com/irr-pubs
Gardening Australia irrigation fact sheet
tinyurl.com/irrigation-link

With a hotter, dryer climate expected due to climate change, the use of irrigation and recycled water will become an important part of growing food crops.”
Our healthy soil field was held on Jenny and Graeme Cope’s dairy farm in May 2015.

Twenty five people were keen to find out how the soil health of this highly productive farm was developed and maintained.

The impetus to hold this day came out of our Summer Series of horticultural workshops. Participants at those days indicated on their feedback forms that they wanted to explore the topic of soil health in greater depth — especially with regard to assessing soil condition.

Food producers know they need deep, humus rich soil to give better resilience to the effects of climate change which include hotter dryer summers, a later autumn break and more severe rain events, and this field day gave them some ideas about how to assess and improve their soil.

The Copes’ 840 acre property milks 700 cows. To operate at this level Graeme and his agronomist Kevin Hughes from Soilwise Farm Services have used applications of soil microbe cultures and manures, as well as lime and chemical fertilisers.

Kevin and Graeme described how soil microbes develop a soil that has deeper rooting grasses, and make the nutrients from the fertilisers more readily available to the plants. As Graeme explains “before we used the microbes we grew what I considered a lot of grass, but the cows weren’t happy to consume it. After the microbes and manure were applied the palatability of the feed increased and we doubled our milk production off the same area.”

Also speaking at the field day was Lindsay Hyde from the Department of Economic Development, Jobs, Transport and Resources. Lindsay gave an overview of the New Zealand developed Shepherd method of Visual Soil Assessment. Luckily Graeme was fairly sanguine about the number of holes we dug in his pasture during the farm walks. We were able to see the root development of the pasture grasses, and the colour and depth of the topsoil in the soil profile. By using touch, smell and other criteria we were able to make an assessment of the condition of the soil. The colour of the grass and the number of worm casings on the surface of the soil were other clues to its health. The soil wasn’t bad even in the compacted gateways.

The Copes have very healthy soil. In wet years, the soil is impacted, but it handles it better than others in the area. A resilient soil will cope well in all conditions. Agronomist Kevin Hughes explained that “A healthy soil not only provides the plants growing in it with support, it is a living, dynamic whole environment. We need to understand this to develop soils on our farms that maximise pasture growth and are resilient to climate change.”

Kevin works with the Copes using Petrik Soil Technology. Graeme said that involves applying microbes to the pasture once a year. “It enhances the biology of the soil, and along with using some lime, it seems to work well. We’re a bit different because we’re still using NPK fertilisers but
“A healthy soil not only provides the plants growing in it with support, it is a living, dynamic whole environment.”

we get a better response using these fertilisers with the biology.”

We took some of the soil back to the house where we had set up a microscope. We were able to see the diversity of the microbiology with a range of both bacteria and fungus hyphae present in the sample.

Attendees found out how to nurture the soil microbiology, and what that means to nutrient utilisation and soil fertility.

Links;
Access key information on soils from the Victorian State Government here; (tinyurl.com/VROsoil)
Graham Shepherd’s Visual Soil Assessment webpage here; (tinyurl.com/ShepherdVSO)
Soils are alive webpage here; (http://www.soilhealth.com/soils-are-alive/)
A free online course; Getting to know your soil soilfoodwebcourse.com/
Farming Secrets farmingsecrets.com ; search for soils
Healthy soils Australia www. healthysoils.com.au
CLIMATE CHANGE CAFÈ

Adaptation requires skill and support
We need to talk about optimal and effective decision making."

When we talk about climate change adaptation, the thing that is adapting is of course the farmer. Farming systems may change, cow breeding may introduce new traits, calving may be in a different month and the variety of pumpkin may be a different cultivar – but driving the decision making is the farmer.

How do you optimise effective decision making?

Reactive decisions made in the heat of a crisis are often wrong decisions, but how do we become proactive? Do we change our systems in anticipation of climate change effects, or do we wait until change is noticed? How do we afford it? How do we make good decisions, both from a business perspective and manage personal stress.

The Climate Change Café introduced these topics for discussions over dinner. Our first Climate Change Café was held in Foster in June. Held at the Foster Golf Club, our expert guests led the conversations and talked about how we can develop agricultural resilience whilst maintaining our personal equilibrium.

Our second Climate Change Café was held two months later at the Railway Station building in Korumburra and the same expert guests helped facilitate discussion over a delicious local ingredient meal prepared by Lucy May’s Café. In all 37 people attended the cafés.

Expert guests included Diane Robinson from Rural Family Resources an Alberton based business that specialises in delivering programs to farmers to help them manage effects of trauma and stress associated with natural disasters and drought. Diane is therefore very well qualified to discuss with us effective ways to deal with the stresses that climate change and associated weather extremes may bring.

Effective decision making requires a good head space, and Diane pointed us in the right direction in that regard. Also from Rural Family Resources was Ross Robinson is a Rural Business Management specialist. Ross has spent many years training in the field of agriculture and was instrumental in developing the Advanced Diploma in Agriculture (Dairy) for Melbourne University. He chatted with us about making sensible business decisions when developing adaptation strategies.

Simone Dodge is the area manager for WFI insurance and joined us to discuss risk management and how an insurance company works with farmers to mitigate risk.

We had James Ristrom from Hico herd improvement cooperative to discuss sire selection in terms of climate change.

Ross Garner also joined the dinner bringing a wealth of expertise in marketing and planning. For dinner attendees planning to diversify or change the way they marketed their product, Ross was well worth having a chat with.

The Climate Change Café was to be held in Dalyston and Wonthaggi for residents in the Bass Coast Shire, however both events were cancelled due to lack of bookings by the RSVP date.

For farmers needing help resources are available; Diane and Ross Robinson can be contacted through tinyurl.com/RuralFR
VFF rural mental health services links tinyur.Com/VFFruralhealth
Look over the farm gate program http://www.lookoverthefarmgate.com.au/

Mental health and risk management can be an uncomfortable topics. Chatting over a good meal can make it easier.
Foot and mouth disease is the biggest threat to farm businesses in Australia

Foot and mouth disease could cost the Australian beef market billions of dollars if an outbreak was allowed to spread due to poor biosecurity.

That was the message heard at the Agricultural Climate Resilience Project’s biosecurity information session at Inverloch on the 19 Nov 2015.

11 participants heard from Craig Swain a biosecurity officer from DEDJTR, who outlined the services the department offers farmer. Craig explained the biggest biosecurity threat to Australian farmers is foot and mouth disease, and the constant monitoring that occurs. The department has a help line that farmers can call if they are at all concerned about unusual animal health issues, which is 1800 675 888.

Dr Pat Kluver from the Livestock Biosecurity Network then outlined the practical steps farmers can take to safeguard their herds from introduced pests and diseases.

Pat outlined the vectors that hot wet summers, which are part of a climate change, are most likely to bring diseases south. Bluetongue, which is carried by a sandfly like midge can be blown south by a strong cyclone, the intensity of which will increase due to a changing climate, as can the mosquitos that carry other diseases. Liver fluke is also spreading south due to warm wet summers, and can be found in Southern Gippsland.

Threats include drench resistant worms, footrot lice OJD and brucellosis in sheep herds and BJD pestivirus, nematodes and theileria in cattle herds.

A farm biosecurity plan can help manage the threat of introducing pests and diseases with bought in livestock and farm visitors, which includes stock agents and veterinary surgeons – a vector many of the participants had not considered. Quarantine drenching is a procedure to treat new livestock introduced onto a property and involves drenching with multiple chemicals and isolation from the herd for some weeks.

There is good economic sense in monitoring the disease status of your herd and taking immediate action if an unusual disease is noticed. If Foot and Mouth for instance is detected once it has spread to many properties, the price of cattle will fall 80% and will only recover to a fall of 20% after 10 years, however if the outbreak is confined to 5-6 properties, there is only a 10% loss.

Tools to help you develop a plan for your property can be found at http://www.farmbiosecurity.com.au/
The Project welcomed New Zealand soil expert Graham Shepherd to our district to share with farmers his method for assessing and improving the drought resistance of grazing paddocks.

We had learned Graham’s method of visual soil assessment when we held our healthy soils workshop earlier in the year, so the opportunity to bring Graham to Australia to work with local farmers was eagerly taken up. October 2015 had been brutally dry with rainfall 10% of district averages. It seemed timely to talk about drought resistance, and 37 people agreed.

The workshop, in late November was held in the hall at Outtrim for the theory portion of the workshop, then out to the windy paddock to do some spade work after lunch. Sylvia and Gordon Vagg bravely lent us their worst paddock to analyse, and for this we thank them.

There are 20 key measures that farmers can address to increase the drought resistance of their farm. These key factors provide a Drought Resistance Index (DRI) of whether a field is likely to have a high, moderate or low resistance to dry conditions.

Any one of the indicators affects the resistance of a field to drought but collectively, the 18 factors have a significant influence on the drought tolerance of a farm. The Drought Resistance Scorecard (DRS) requires about 20 minutes to complete in the field.

Each of the indicators are scored according to rating scales provided. As the farmer scores each indicator, it becomes immediately apparent what factors are limiting a farms resistance to drought and what specific aspects need to be addressed. This leads to the management options required to increase the drought resistance of a field.

The workshop on the Drought Resistance Index entailed a seminar where each of the 20 drought resistant indicators and the science that underpins them are presented and discussed. This was followed by a practical exercise in the field filling out the scorecard and addressing the management options required to raise the drought resistance of a farm. While the Drought Resistance Index, i.e. the total score gives an overall assessment of whether a field has a high, moderate or low resistance to dry conditions, the individual scores of each indicator provide an action plan as to what needs to be addressed to increase drought resistance; i.e. any indicator scoring 1 or less needs to be looked at as to what has to be done to raise the score to 1.5 or better.

Like the Visual Soil Assessment (VSA) method Graham wrote, the Drought Resistance Scorecard incorporates a number of visual soil indicators but also requires management
input and input from soil and herbage tests. To complete the field exercise, the course participants received a six page handout of the scorecard and the defining drought resistant rating scales for each indicator. This scorecard is available on our Sustainability Gippsland web page link here.

The 20 indicators for pastoral farming are:

1. Percent cover by drought resistant pasture species
   Establish a good botanical mix of grasses, legumes and herbs that have a good resistance to dry conditions. For example, the inclusion of plants such as: cocksfoot, phalaris, prairie grass, lucerne, chicory, plantain, arrow leaf clover, red clover, sub clover (cool season) etc. Seek the advice of a seed merchant as to the varieties that would suit your area.

Quite apart from improving dry matter production during dry periods, presenting the animal with a ‘salad’ has major benefits in terms of increasing the nutrient density, nutrient diversity, palatability and digestibility of the feed.

Incorporating a mix of drought resistant species in a pasture mix can be achieved by a variety of means including drilling during regrassing, under or over-sowing. The use of a Soilkee Renovator (www.soilkee.com.au) for example is a cost effective means of under-sowing. A seed mix can also be over-sown by adding to fertiliser and spread by a normal ground or aerial spreader.

2. Residual pasture levels
   While pasture residual levels can vary during the seasons for practical reasons, maintaining residuals around 1500 kg/ha encourages good regrowth and growth, promoting the photosynthetic capacity, photosynthetic rate and the root length density of the pasture. Over-grazing results in severe defoliation of pastures, does not allow the plant to recover well, and the plant dies when a stress period such as droughts occur. Grass grows grass; allow good residual levels.

3. Rooting depth
   The root system is instrumental in helping mitigate drought susceptibility. Increasing the rooting depth increases the ability of plants to utilise water and nutrients in the soil. Roots also produce strigolatones (hormones) which control root extension, branching and the production of root hairs. Increase the rooting depth by:
   1. Developing and maintaining good soil structure and aeration. Good soil structure creates channels for the ready extension of roots.
   2. Ensuring good vegetative leaf cover by avoiding over-grazing. Good leaf cover (the plant's solar panels) increases the photosynthetic capacity and photosynthetic rate and therefore pasture growth, producing and maintaining a good, deep root system.
   3. Maintaining good soil life. Mycorrhizal fungi for example attach to the roots enabling the bi-directional flow of dissolved organic carbon (liquid C) from the plant across a microbial bridge to feed the microbes in the soil, in return for the supply of nutrients and water to the plant.
   4. Maintaining good soil fertility by addressing any nutrient deficiencies. The plant and the root system cannot develop if the plant is nutrient deficient. Consult up-to-date soil and herbage tests and also an analysis of the microbial biomass and activity of the micro-life of the soil (see points 15-19).

4. Root density
   The same recommendations for developing the rooting depth apply for developing the root density.

5. Soil structure
   Well-structured soils have a greater water-holding capacity than compacted and pugged ground. Soils with good structure allow the ready infiltration and movement of water into and through the soil enabling the capture and retention of water from even light showers and heavy dews. Soils with good structure also provide open channels for the development of the root system. Develop and maintain good soil structure by:
   1. Mechanical intervention in the first instance using machinery such as the Soilkee Renovator, Yeoman's plough, Ground hog, Jumbo buster etc.
   2. Avoid or at least minimize pugging and compaction
by stock treading and over-cultivation

3. Developing the biological life in the soil; they are extremely good bio-engineers

4. Getting the soil chemistry right. Ensure good soil fertility by addressing any nutrient deficiencies with bio-friendly fertilisers. Ensure the percentage cations are balanced and they are present in the right amounts. High Mg and Na levels cause dispersion producing compaction but this can be countered by adding lime and sulphur

5. Developing the root system (see above). Root produce root exudates (glues) which help bind soil particles together increasing aggregate stability.

The next four indicators deal with the basic cations. They play a pivotal role in determining the drought resistance of a plant.

6. Ca levels
Good levels of Ca not only improve the efficiency of nutrient uptake increasing the resistance to drought but the addition of lime converts to 18% water (by atomic weight). Calcium also allows plant cells to communicate with each other, regulating their reaction to water stress by influencing transpiration and stomatal closure. In addition, Ca helps to create soil structure thereby increasing the infiltration of water and the water-holding capacity of the soil.

7. Mg levels
Mg has an affinity for water thereby increasing the availability of water to the plant. Magnesium is also necessary to produce chlorophyll, improves the utilisation and mobility of P, increases the utilisation of Fe, and activates enzymes, all of which are necessary for plant growth and the efficient uptake and use of water.

8. K levels
Potassium plays a major role in the transport of water (and nutrients) through the plant in the xylem and is sometimes referred to as ‘poor-man’s irrigation’. It is important for osmotic regulation to maintain a favourable water status in plants by opening and closing the stomates on the underside of the leaf.

Avoid elevating K too high; it suppresses the wetting up of the soil. High K levels also suppress the uptake of Ca & Mg making the plant less water-use efficient.

9. Na levels
If Na levels drop to below 0.25 me/100g of soil, apply salt (NaCl) and preferably Himalayan rock salt if economic to do so. If salt is applied to the fertilizer mix, it needs to be spread on the paddock quickly because it is hydroscopic and adsorbs water from the atmosphere making spreading difficult if left too long.

Like K, Na also has a function in osmotic regulation to maintain a favourable water status in the plant and is therefore important to monitor. High Na levels however inhibit the activity of many enzymes and the subsequent availability of water. When Na is taken up by the plant, cells start expanding especially under hot temperatures by absorption of cell moisture. This leads to cell wall rupturing and oozing of cell components and the slow death of the plant. Good Na levels promote the efficient uptake of nitrate-N and therefore growth of the plant.

10. Fe levels
Iron is normally one of the most common elements present in the soil but where deficient, ensure iron is brought to near optimum levels by referring to recent soil and herbage tests. Iron is a key element allowing pastures to come back to life after drought stress and excess heat. Iron is necessary for photosynthesis, chlorophyll formation and cell division and therefore necessary for efficient plant growth and utilisation of water. Depending on the soil and herbage tests, apply Fe as ferrous sulphate (FeSO4.7H2O).  

11. Zn levels
Ensure zinc is at or near optimum levels by referring to recent soil and herbage tests. Zinc affects the capacity for water uptake and transport in the plant and reduces the adverse effects of short periods of heat stress. Zn is also important in enzyme systems affecting the absorption and usage of water by plants, chlorophyll production, the production of carbohydrates and starch, plant growth and tissue respiration. Too much P and Ca will suppress Zn. Excess Zn interferes with the uptake of Cu and reduces the palatability of pastures.

12. B levels
Ensure boron levels are at or near optimum levels by referring to recent soil and herbage tests. Boron influences water metabolism and water interactions in plants and is the micronutrient most likely to limit yields under drought stress conditions. It helps to regulate salt absorption, cell division, cell wall formation, nitrogen and carbohydrate use, sugar translocation, hormone movement and action, and assists in the metabolic function of the plant. Boron is available in many different forms including Borate, Borax pentahydrate, granular boron, SoluBor, Organibor boron, etc. Seek advice to add the appropriate amount of B based on the form of boron to be applied and the results of soil and herbage tests; typically spread rates can vary between 2–5 kg/ha but is greater if Organibor is used.

13. Brix levels
Brix is a measure of the refractive index (concentration) of dissolved solids such as sucrose, fructose, vitamins, minerals, amino acids, proteins, hormones and other solids in the sap of the plant. The higher the Brix (refractive index) the greater the density of dissolved solids and therefore the quality of the forage to the animal. Plants with a high Brix sap has a reduced water activity (i.e. a lower leaf water potential) which is the ratio of sap to water vapour pressure. This reduced water activity reduces stomatal conductance and consequently the transpiration of water and so pastures have a greater tendency to retain moisture with an increased heat wilt resistance resulting in a higher resistance to drought.
The simplest way to increase Brix levels is to ensure the fundamental sugar making elements are present at optimum levels in the soil and plant; these include P, Ca, Mg, S, B and Na. Refer to the soil & herbage tests and apply the nutrients accordingly as a folia or in a solid fertiliser. Good grazing management by avoiding over-grazing and allowing 24–45 days between rounds enables the photosynthetic build-up of sugars and dissolved minerals (Brix) in the sap of the pasture. A 24–45 day grazing round also allows Brix levels to increase by allowing sufficient time for rye grasses to reach the three-leaf stage.

14. Soil organic C

Soil organic carbon increases the moisture storage capacity of the soil significantly. An increase of 1% organic C in the top 30 cm of soil increases the soils capacity to hold water by 144,000 litres/ha, or 144 litres/sq m. Soil organic carbon plays an important role in regulating most biological, chemical and physical processes, collectively determining soil health. It cushions the impact of wheel traffic and stock treading and promotes soil structure, maintaining good infiltration and storage of water. It reduces the potential for wind and water erosion, maintaining the depth of topsoil and therefore the available water-holding capacity of the topsoil. In addition, soil organic C is an important food source for soil life and an important source and a major reservoir of nutrients for plants, collectively promoting dry matter production. Its decline reduces the fertility and nutrient-supplying potential of the soil, reducing the health and production potential of the plant when under dry conditions.

Soil C is most effectively increased by raising the biological health of the soil by increasing the photosynthetic capacity and photosynthetic rate of the pasture and its root-length density. To this end, it is important to minimise pugging, apply bio-friendly forms of fertiliser and avoid over-grazing.

15. Mycorrhizal colonisation

Mycorrhizal fungi provide a microbial bridge that allows the bio-directional flow of nutrients (such as phosphorus) and water from the soil to the plant in exchange for photosynthate (dissolved organic carbon) from the plant to the soil to feed the life. This is a very efficient process that allows the ready uptake of water by the plant. High analysis fertilisers including urea disrupt the mycorrhizal colonisation of roots and therefore the microbial bridge. The over-use of these types of fertilisers is one of the reasons why soils have become more droughty over time.

Mycorrhizal fungi can sequester (add) 15 times more carbon into the soil than non-mycorrhizal soils and importantly can decompose organic matter to form glomalin, a stable form of soil carbon. Glomalin can hold up to 25 times more water than organic matter. Mycorrhizal fungi also raise the plants immune system, suppressing disease thereby increasing plant health and its resistance to drought. Raising the level of colonisation would significantly improve the drought resistance of the field.

To build the mycorrhizal colonisation of a soil, promote the root system by increasing the photosynthetic capacity and photosynthetic rate of the pasture and raise the biological health of the soil. To this end, try and minimise pugging, apply bio-friendly forms of fertiliser avoiding the over-use of high analysis fertilisers; the more phosphorus that is applied, the lower the mycorrhizal colonisation and activity. Avoid over-grazing. Apply fulvic acid at 3 litres/ha to feed the mycorrhizal fungi and improve the colonisation.

16. Total fungi and diversity

Saprophytic fungi help to break down organic matter into more stable forms of soil carbon that have a higher water-holding capacity, increasing the water availability to the plant. They also help to develop soil structure, developing the macro-porosity of the soil thereby increasing its water-holding capacity. In addition, they provide an important food resource for predacious microbes. They are important for nutrient cycling and hold on to Ca preventing the loss of Ca from the soil. They also increase the immune system of the plant suppressing disease. Raising their levels would significantly improve the drought resistance of the paddock.

Total fungi and fungal diversity can be increased by applying the same measures described above to increase
mycorrhizal colonisation. Total fungi can also be increased by the addition of fulvic acid (3–5 litres/ha) to a compost tea and applied as a folia. These can usually be incorporated into a fertiliser blend or spread separately as a folia.

17. Active fungi
Active fungi can be increased by raising the Ca and pH by liming and by applying a bio-activator. TM Agricultural from BEST Environmental Technologies and NutriSoil from NutriHealth International work well together as biological activators and can be applied as a spray or incorporated into a fertiliser blend. Fungal activity can also be increased by the application of fungal compost or woody mulch, or 3–5 litres/ha of liquid humic acids, or 30–50 litres/ha of a fungal compost tea with 1–2 litres/ha of molasses. The addition of fungal foods such as good quality raw humates and/or oily fish products is also effective.

For further information and potential sources of supply of these products, contact Dr Mary Cole; Agpath P/L, Website: www.agpath.com.au.

18. Total bacteria
Bacteria help to break down organic matter into more stable forms of soil carbon that have a higher water-holding capacity, increasing the availability of water to the plant. They also help to develop soil structure, developing the micro-porosity of the soil thereby increasing the water-holding capacity and availability of water. In addition, they provide an important food resource for all soil organisms and enable the efficient cycling and supply of nutrients including nitrogen to the plant. They also play an important role in suppressing disease promoting the health of the plant. Raising bacteria levels would significantly improve the drought resistance of the paddock.

Total bacteria can be increased by increasing the food supply to the soil by boosting the photosynthetic capacity and photosynthetic rate of the pasture and raising the biological health of the soil. To this end, try and minimise pugging, apply bio-friendly forms of fertiliser to optimise soil fertility avoiding the over-use of high analysis fertilisers; the more nitrogen and phosphorus applied, the lower the bacterial numbers and activity. Avoid over-grazing. Applying compost and compost teas along with molasses at 1 litre/ha will increase bacterial biomass and add missing species.

19. Active bacteria
Active bacteria can be increased by raising the Ca and pH by liming and by applying a bio-activator. Bacterial activity can also be increased by adding seaweed products and simple, high energy sugars or an amino-sugar source and molasses, especially if it is mixed with a good compost tea.

20. Amount & form of fertiliser & N applied
While the application of nutrients in the form of different types of fertilisers is a big subject, generally speaking, try to apply those forms of fertiliser that provide the nutrients required and in a form that promotes the biomass, diversity and activity of the soil biology. Promoting the natural release pathways of N from free living N-fixing bacteria, archaea, diazotrophs and from legumes can provide more than sufficient N for a high producing dairy farm. However the provision of sufficient nitrogen by the biological pathways can take a year or two to achieve and until this is reached, spraying on an ammonium humate is a good way of applying N with the ultimate aim of progressively reducing its use and the amount of N applied. While not recommended, if granular urea is to be used, its value can be increased by dissolving urea in water to which a form of organic carbon can be added including for example, molasses, humic and fulvic acids etc. and applied as a folia.

Given the fundamental importance of the role of the micro-life of the soil to increasing drought resistance, products like Carbo-Phos, guano and Sechura RPR and similar products with a carbon additive provide a good bio-friendly form of P. Depending on the nutrient status and pH of the soil, Mag2000 (Mg2CO3), dolomite (CaMg(CO3)2) and kieserite (MgSO4) provide a good source of Mg, while potassium sulphate (K2SO4) is recommended as a form of K and Brimstone 90 as a form of S.

Summary
Once the score card for a paddock has been completed and the drought resistance index has been calculated an action plan can be put in place addressing each of the indicators as the budget permits. Tackling any one of the limiting indicators will have a beneficial effect on improving the drought resistance of a paddock. Collectively, addressing all or most of the indicators scoring 1 or less would markedly improve the drought resistance of a paddock and therefore its productivity and environmental footprint. If anyone would like assistance in assessing the drought resistance of their farm and help in putting together an action plan, Graham is happy to visit the farm.

Graham Shepherd’s Visual Soil Assessment webpage here; tinyurl.com/ShepherdVSO
Link to the score card filled in during the field day link here; tinyurl.com/ShepherdScoreCard
This Workshop was held on the Phillip Island property of the Davie Family, Bimbadeen, in February 2016.

Our keynote speaker was Robert Fenton from the National Environment Centre (NEC), a specialist campus of the Riverina Institute of TAFE. Rob, an ex-Phillip Island resident, is an organic farmer and teacher at the NEC in Albury. This is a unique educational facility set on a 182 hectare organic farm producing organic lamb, free range pork and eggs, olives, honey vegetables and herbs which are sold locally. Rob shared his experiences with participants of the processes he went through of setting up diversified income streams on the property and selling to the local market.

Rob noted that the centre was an organic facility, but the cost of organic chook food was unaffordable. So the NEC has systems in place to encourage the growth of invertebrates on the farm.

The centres’ chickens are not fed with any externally sourced inputs. As long as the hens can forage for the equivalent of 2 grasshoppers a day they will meet their methionine and lysine (amino acids) for their requirements. Worms from the centres worm farms and wattle seeds from the trees planted for chicken forage, are other sources of protein.

Rob explained how smart farm design and a diverse range of enterprises empowers the farm steward when dealing with external influences that can potentially cause negative impacts on the farms ecosystem. A healthy ecosystem is a resilient system. Heavy reliance on industrial energy for farm production can have detrimental effects to the farmer. Things like climate change and oil prices can leave monocultural farming systems susceptible to things like financial and ecosystem collapse. The NEC organic farm is designed to still function and produce food when oil prices fluctuate and their customers still get to eat.

Rob’s talk was filmed by Farming Secrets and the clips are available to view on YouTube link here. (tinyurl.com/NECyoutube)

After a delicious lunch held in the farmhouse back yard, Steve Davie talked about the property and the new directions the family run business is taking. After the talk we had a farm walk taking a circuitous route past the new farm-stay cottages, the cattle paddocks, the chicken tractors and the bee hives. The shade and shelter belts planted as part of the Davie families carbon neutral strategy are prime forage for the bees.

The 360 acre farming property was first used for dairying and pigs before beef cattle were introduced in 1968. Bimbadeen has become renowned for its award winning premium quality beef and innovative environmental practices. The Davies have planted over 40,000 trees and ground-cover, protected remnant vegetation, created a wildlife corridor, fenced waterways and dams and addressed salinity issues.
Today over 200 Angus cattle graze the paddocks with 500 Isa Brown hens, 2 Alpacas and a very friendly lamb, Spot, whom we met as part of Rob Fenton’s presentation. As part of the new direction for Bimbadeen free-range eggs are being produced – Bimbadeen being the first and only commercial free range egg producer on the Island. As Phillip Island is fox free, chicken farming was natural choice for the farm.

And the Davie family’s integrated farm management of diverse agricultural enterprises, not only has made them more resilient, but it has allowed both sons to come home to the family farm without requiring the acquisition of more land.

Steve and Bimbadeen was filmed by Farming Secrets and the videos are on YouTube here, (tinyurl.com/Bimbadeenyoutube) NEC farm web page address; www.greengatefarm.com.au Bimbadeen web address; bimbadeen-philipisland.com.au

"Things like climate change and oil prices can leave mono-cultural farming systems susceptible to things like financial and ecosystem collapse.”
This forum was held at the Community College Gippsland in Leongatha in March 2016. Leading on from our very well attended Resilience through Diversity field day the month before, this workshop was designed to give people wanting to diversify some tips and advise from farmers who were running diverse and integrated farm systems.

Our keynote speaker was Tom Abbottsmith–Youl a diverse, regenerative farmer from Tom’s Paddock in Glenburn. Tom inspired the room with his passion for and knowledge of his farming system. Chickens follow the rotationally grazed beef cattle on the farm, there are Murray Cod in the dam and. Wildlife abounds as his farming system works with the natural environment. Starting with make-do chicken tractors, the farm now boasts two purpose built mobile chicken houses.

Tom says “Our ecologically sustainable farming practises produce food products, which are appropriately integrated with the maintenance, improvement and conservation of our environment and biodiversity. This balance between agricultural land uses and ecological conservation is made possible with the use of high tech electric fencing, reticulated stock watering systems, land class fencing, native wildlife wetlands, stock exclusion areas and local vegetation revegetation works.”

“Remnant vegetation areas are monitored for healthy biodiversity and for invasive weeds (in particular blackberry). If intervention is deemed necessary control is implemented in the most unobtrusive way possible.”

“We believe that public awareness and education is the key to improving our food system from an environmentally destructive one to a regenerative one. Every time we eat, we are voting for the production system that produced that food.”

Malcolm Cock from Farm Dynamics ran a half hour session before lunch discussing farm business planning. Malcolm has had a long career in beef, sheep & goat farming who nowadays helps others develop their agribusinesses through his consulting company.

Lunch, prepared by Yooralla students, was followed by a tour of the Leongatha Community Garden so participants could see where their lunch came from. This was a cue for the heaviest downpour of rain we had fall for some time to occur. South Gippsland farmers are a resilient lot, and no one complained about the much welcome rainfall.

The afternoon program featured a panel of local farmers who have a diversified their farm output. They spent about 20 minutes each introducing their enterprises and explaining to
the forum the reason for their choices, followed by a Q&A session.

Our first speaker was Amelia Bright from Amber Creek Farm and Sawmill who produces pasture raised pork, which is sold locally. The Brights ‘hogs and logs’ enterprise has synergies with the sawmill waste becoming pig bedded for instance. The Brights farm regeneratively.

Nadine Verboon from Wattlebank Park Farm, a dairy farmer who diversified into beef, pork and smallgoods, talked about her need to find a solution to income that is at risk from dairy price fluctuations and flooding.

Ilan Goldman from Mirboo Pastured Poultry, who range rears and markets Sommerlad breed of chicken was our next speaker. Ilan’s farming practice “operates within the ecological boundaries of his property, regenerating the land & soil.” Ilan outlined the journey he has undertaken to produce sustainable, ethical food, after a tree change from Melbourne.

Meg Parkinson from Annies Free Range Eggs spoke with authority about the regulations and requirements facing egg producers. Meg has been heavily involved in Victorian Farmers Federation and egg industry for many years and her insights were valuable.

Bronwyn Brandon, from Prom Country Cheese, who milks sheep and makes and markets sheep's milk cheeses spoke about why she and her husband Burke moved to South Gippsland from the Mornington Peninsula. Incredibly hard working, the couple milk sheep, make cheese for themselves and others, and run a farm gate shop and cafe.

These farmers’ enterprises, which although different had a surprisingly common theme. Passion for their animals and produce, and the capacity for lots of hard work with initially little income was common to all, with the potential to make a living from a family farm the reward for value adding.

Malcolm Cock’s presentation is here. Meg Parkinson’s powerpoint is here.

A document with links to other presentations can be found here.
Our first shade and shelter farm walk was held at a Fish Creek grazing farm in June 2016. The farm, owned by Jason and Sarah Keays, contains extensive revegetation and remnant vegetation protection, which was undertaken by the farms previous owners. Jason and Sarah have built on this legacy as they continue to undertake revegetation works in targeted areas.

Shelterbelts are not a short term panacea but a mid to long-term proposition that requires a flexible approach and site-specific solutions. More than this they contribute to equity for future generations, position farmers for a ‘low-carbon’ future, and adaptation to a variable climate.

During the session we explored why we need shade and shelter on our farms. Hot winds can accelerate water evaporation from dams and paddocks and pasture growth is minimal at cold and hot extremes (<5°C >30°C). Animal welfare considerations require that livestock be protected from heat stress and cold stress including wind chill.

Biodiversity is enhanced by shelterbelts that also function as wildlife corridors allowing native animals to move around the environment.

Climate change may bring longer hotter heat waves and rain events may be more intense. Lightning strikes are predicted to increase, however sheltering under trees in a thunderstorm is not recommended! Stock that shelter under single trees in open paddocks can be killed by lightning strikes, however many large trees in a shelter belt can mitigate this.

Windbreaks can slow hot northerly and easterly winds over the surface of farm dams and so reduce evaporation by 20 to 30% as windbreaks produce a down wind ‘quiet zone’ which can be five and ten times the windbreak height. Shade reduces water temperature and therefore evaporation losses. Well designed planting can filter water entering the dam, improving water quality.

When considering where to plant your windbreak it is important to take into account the topography of your land, where the prevailing wind direction is and which areas are in need of shelter.

An effective windbreak should be planted at right angles to the prevailing direction of cold winter and hot summer winds.

Species choice is important; we are keen to promote ‘thinking outside the box’ on species choice, both to ensure longevity of the plants under climate change and promote the preservation of species that may be impacted by climate change and therefore vulnerable in their historical range. Whilst planting from the areas Ecological Vegetation Class promotes biodiversity and local trees are adapted to local conditions, shelter plantings could also include a few species that are not endemic. In Southern Gippsland These ‘novel’ species could include E. cephalocarpa (silver leaved stringybark), E. pryorniana (coastal manna gum) Busaria spinosa (whether included in the area EVC or not), Blackwood (A. melanoxylon irrespective of EVC), E. mannifera and possibly E. kitsoniana. E. muelleria (yellow stringybark), Kunzea eriacoides, Pultenaea daphenoides and Mountain Ash (E. regnans) are other possibilities for planting outside their normal range.

These are all possibilities for more exposed positions – with the boggier areas planted to the usual suspects – E ovata, strzleckii, and viminalis, with maybe banksias and bottlebrush in the mid story.

During the farm walk we measured the temperature on the exposed hillside and in the sheltered paddocks. There was a gain of 7°C, with the sheltered areas reading at nearly 20°C,
During a farm walk we measured a temperature difference of 7°C between the exposed hillside and in the sheltered paddocks.”

much more pleasant than the chilly hill at only 13°C. John and Trish Fleming, who did some of the original plantings were on hand to discuss the history of the property. The small grants program funded by the ACRP and administered in South Gippsland Shire by the South Gippsland Landcare Network gave six landholders the opportunity to plant shelter belts on their property. Over 6000 trees will be planted in 2 kilometres of shelter belts. This is 2.47 hectares of revegetation.

Bass Coast Landcare Network partnered in the farm walk we held in West Creek in October 2016. In this Landcare network, the choice was to contribute to the direct seeding of one demonstration property. The farm owned by Danielle and Brad Carr, is flat and exposed, so planting shelter belts will aid productivity and animal welfare. On the day Geoff Trease, a BCLN project officer, demonstrated how to undertake a direct seeding project with a changing climate in mind. Geoff and the Carrs have selected several species from drier areas which will be sown into the site. The workshop gave the participants the opportunity to learn about direct seeding methods and explore ways of adapting revegetation plans within a changing climate. 2.92 hectares of shelter belts were prepared and planted.

A map of the planting and some notes about shelter belt design can be found here and http://tinyurl.com/directseed
The financial literacy workshop for farmers was held at Inverloch on the 2nd of September 2016. A range of agricultural industries were represented in the room, with dairy, beef, sheep and potential poultry and horticultural farmers present.

Warren Blyth from Meridian Agriculture led the 15 participants through the four-hour workshop. The short time frame meant the workshop was an overview of farm financial and enterprise planning and risk management, but still giving farmers the tools to go home and look at their enterprise in greater economic detail and devise a business plan.

Farmers were encouraged to identify their strengths and weaknesses and see where they needed help.

To deliver a sustainable outcome you need a plan. Business planning is something that every farm business needs.

Warren suggested that we identify what the ‘light on the hill’ is for our enterprise – as all of us have different goals and aspirations. It should be well thought through and define our vision. By describing it as a ‘view from the verandah’, we were asked to consider what we wanted the view to be like in one, five or 10 years’ time. The plan should be strategic, living document which is reviewed annually. It should contain production targets and income expectations. Using industry benchmarks, it should also be realistic. The need to have a plan was understood by most participants, however most did not have one. Lively discussion amongst the attendees suggested that it was something that they would go home and do. Consensus was that it was hard to take advantage of opportunities or respond to risks if it could not be measured against a business plan.

Agribusiness planning can be achieved in three steps

- Strategic Planning – which sets mission, vision and goals for the next ten years
- Tactical Planning – which is medium term planning which assesses the current position and asks ‘what can I influence and how?’ Tactical planning is proactive and short term.
- Operational Planning – is the seasonal adjustments that happen as the farm manager responds to current and expected weather conditions and commodity prices.
The next topic covered was dollars in/dollars out. Warren led discussion of the Malcolm/Krause diagram which simply breaks down farm gross income, variable costs, overhead costs, interest, tax and depreciation. A number of case studies was presented to illustrate how farmers can manage fixed and variable costs to impact profitability, including such things as; faecal egg counts prior to drenching; using soil tests to make objective decisions about fertiliser and reducing reliance on supplementary feed. The participants were encouraged to cost their own labour into their equations.

Ways of reducing costs were discussed with the cost of finance (and ways to reduced it); the need to upgrade plant, reducing repairs and maintenance, using contractors and sale of underutilized assets all being considered.

The options available to increase income were also discussed with stocking rates, genetics, skimping on inputs, animal health, enterprise mix, operator skill set and marketing all being factors affecting the bottom line. The use of software packages to measure production and cash flow were encouraged so that any time you know how your business is tracking.

The last session after lunch dealt with risk and risk management. We talked about the definition of risk management, and understood that it very much depended on an individual’s attitude to risk. As part of the workshop notes we were given a risk checklist which will help assess the risks in our own business. The risks associated with untrained staff and contractors was the topic of in depth discussion.

We learned about risk assessment using a Heat Map and how to mitigate risk. Risk management alternatives including multi-peril farm insurance; the right type of insurance and Farm Management Deposits were covered.

Risk can have negative consequences but also rewards. When assessing risk, likelihood and consequence must be considered. Farmers use their heads (logical, rational processing), hearts (which is an emotional response which taps into goals, beliefs and preferences) and gut (which is intuition shaped by experiences – good and bad).

We ended the session talking about human risk – Occupational Health and Safety. Standard operating procedures for risky activities were suggested, to keep personnel and contractors safe and the business Work Safe compliant. Farm managers should audit, develop and action plan and apply mitigation to all risky activities.

Link to course notes here, tiny url.com/finlitnotes
Rural financial services information here, tiny url.com/ruralfininfo
During the project we have met some inspirational Southern Gippslanders and have explored some essential topics when looking at climate change resilience. Our video case study series examines some of these.

Our Vimeo Channel has all our videos and case studies on it. Find us on Vimeo; https://vimeo.com/user58020982/videos

The 340 acre farming property, ‘Bimbadeen’, is located between the Phillip Island Grand Prix Circuit and the Penguin Parade. Bimbadeen has become renowned for its award winning premium quality beef and innovative environmental practices winning awards at both at State and National levels. Today over 200 Angus cattle graze the paddocks with 500 Isa Brown hens, 2 Alpacas, 300000 bees and a very friendly lamb.

The Bimbadeen Case Study can be found here; https://vimeo.com/189958774

Waratah Hills is one of the southern most vineyards on the Australian mainland. The cool climate wine region is acknowledged as one of the best Pinot Noir producing areas in Australia. Owners’ Judy and Neil Travers and winemaker Marcus Satchel are therefore ideally placed to discuss the effects of climate change on Southern Gippsland wine makers.

The Waratah Hills Case Study can be found here; https://vimeo.com/189919251
Amber Creek ‘Hogs and Logs’ are artisan pork and timber producers located on a 165 acre property in Fish Creek. Their produce is a reflection of the region and environment it comes from. Owners Dan and Amelia Bright aim to produce what the land can comfortably create and sustain without mining the soil. This makes the farm highly resilient to climate change.

The Amber Creek Case Study can be found here
https://vimeo.com/189903187

On a three acre farm at the top of the Strzelecki Ranges, Mark and Margaret Brammer grow Heritage apple trees. They tend the many varieties of apples but also pear and plum trees. These passionate growers and comprehensive record keepers have an interesting perspective on climate change and fruit growing.

The Strzelecki Heritage Apples Case Study can be found here
https://vimeo.com/190051849

Wattlebank Park Farm is a family owned and run farm in the Bass Coast Shire running a diverse range of animals from dairy cows to pigs. Nadine and Clive Verboon are passionate about growing exceptional quality meats with little impact on the environment. Their business supplies locally grown meats direct from the farm and also at local farmers markets and festivals.

The Wattle Park Farm Case Study can be found here
https://vimeo.com/189958776

Shelter belts are a key adaptation to the extreme weather effects of climate change. They are not a short term panacea but a mid to long-term proposition that requires a flexible approach and site-specific solutions. They contribute to equity for future generations, position farmers for a ‘low-carbon’ future, and adaptation to a variable climate.

The Shade and Shelter Case Study can be found here
https://vimeo.com/190424162
Australia’s first food politics documentary, Fair Food, was screened in Phillip Island and Foster to celebrate Fair Food Week in October 2015.

The film stimulated discussion about how things might be done differently by incorporating culturally appropriate food production with ethical distribution. Produced by the national fair food campaigning organisation, the Australian Food Sovereignty Alliance (AFSA) ‘Fair Food’ documents the work of Australian farmers, social entrepreneurs and communities pioneering new approaches to food production, marketing and distribution.

The ACRP screened the film, in partnership with Manna Gum, the Foster and District Community House and the Phillip Island Community & Learning Centre.

The project was asked to screen the Polyface film, and due overwhelming support from Landcare groups and Manna Gum community house, showed it four times to over 120 people. ‘Polyfaces’ is a joyful film about connecting to the land and the community. Produced over four years it follows the Salatin family, as they produce food in a way that works with nature, not against it. Using the symbiotic relationships of animals and their natural functions, they produce high quality, nutrient-dense products. Set amidst the stunning Shenandoah Valley in northern Virginia, Polyface Farm is led by “the world’s most innovative farmer” (TIME) and uses no chemicals and feeds over 6,000 families and many restaurants and food outlets within a 3 hour ‘foodshed’ of their farm.

At the Fish Creek screening, which we did in partnership with the Foster and District Community House, Juneen Shultz
local community garden facilitator and caterer, prepared a wonderful supper of locally produced food, much of it from the Manna Gum community garden. Amelia Bright spoke about her farm growing ‘hogs and logs’ and how this echoed the ethos we had just seen on screen. Before the screening Tom Nicholas, Chair of Healthy Soils Australia talked to the crowd about his organisation, and how important soil is to sustainable farming.

At Kongwak, a screening hosted by the Kongwak Hills Landcare group, chatting over a shared supper of local food was the ideal way to discuss the issues the film raised.

The Polyfaces film screening at Newhaven was held at the Cape Kitchen. The screening was a partnership with the Bass Coast Landcare Nework. They are a talented bunch, with staff members who also are also part of the duo, Little Oberon, who entertained us before the film. The Cape Kitchen provided wonderful local finger food before the screen, with delicious dessert after. Adrian James spoke after the film about the community garden at Wimbledon Heights.

The last screening (for us) was held in Mirboo North at the Baromi Centre. Mardan Mirboo North Landcare group hosted a Friday evening screening. Again, local food was on the menu with everyone bringing something to share for supper.

Fair food film: tinyurl.com/fairfoodfilm
Polyfaces film: http://www.polyfaces.com/
Polyfaces farm: http://www.polyfacefarms.com/
Tom Nicholas’s Healthy Soils Australia information given out at the film screening Link: tinyurl.com/HSAnotes
Healthy Soils Australia: http://www.healthysoils.com.au
You can find links to all our project information on our Sustainability Gippsland Web Page. Look for the Agricultural Climate Resilience project on the groups page. Use the tabs to navigate to our information page.


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