



# SoilsForLife

## Rothesay - The Transition Story

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## Case Study



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# Narrative Report



## The Soils For Life Approach

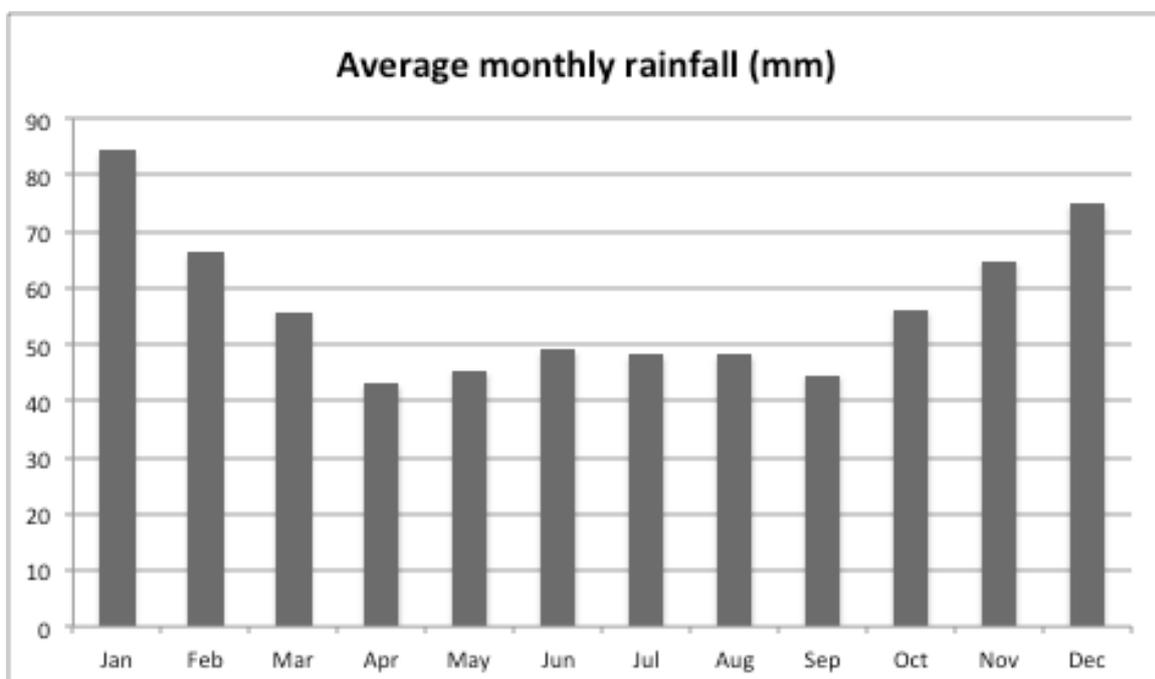
Each Soils For Life case study is an interwoven story supported by evidence about how the land has changed the land manager and how the land manager has changed the land. Using a process of expert elicitation, we understand each property in terms of four distinct phases of land management then seek to understand how the approach to land management has impacted the landscape and the people managing it in social, economic and ecological terms. To prepare the case studies, we rely on each farmers' expert knowledge of their landscape as well as expert elicitation and observation, published and unpublished research/data collection, our own interviews, soil testing and external economic analysis.

The Soils For Life team travelled to Rothesay in 2019 but due to relatively short tenure of the current land managers, were unable to complete a full case study according to our usual methodology. We look forward to working with the family to document their transition to regenerative practices and in time developing the ecological and economic portions of this case study.

### The Rothesay story

Maddy Coleman (now Pursehouse) and her father, Malcolm, purchased Rothesay in 2016. They added the adjoining Springfield block two years later and now the combined Rothesay property comprises 1,629 hectares. While Malcolm visits to help occasionally, Maddy makes all the day-to-day decisions about managing the farm.

Rothesay is located on the foothills and lower slopes of the Liverpool Ranges, in the catchment of the Mooki River. Omaleah Creek and Black Creek run through and join on the property. The creeks only flow intermittently, so water for stock is obtained from bores. The long-term average annual rainfall as recorded at Blackville (2 km south of the farm) is 691 mm, with summer dominant rainfall pattern (Figure 1; based on Bureau of Meteorology data).



While the average annual rainfall is 691 mm, variation from year to year is large (Figure 2; based on Bureau of Meteorology data). Down from around 800 mm in 2016 when Maddy and Malcolm bought the property, rainfall was barely 400 mm in 2018. A scan across the years in Figure 2 shows that this is a common pattern over the decades.

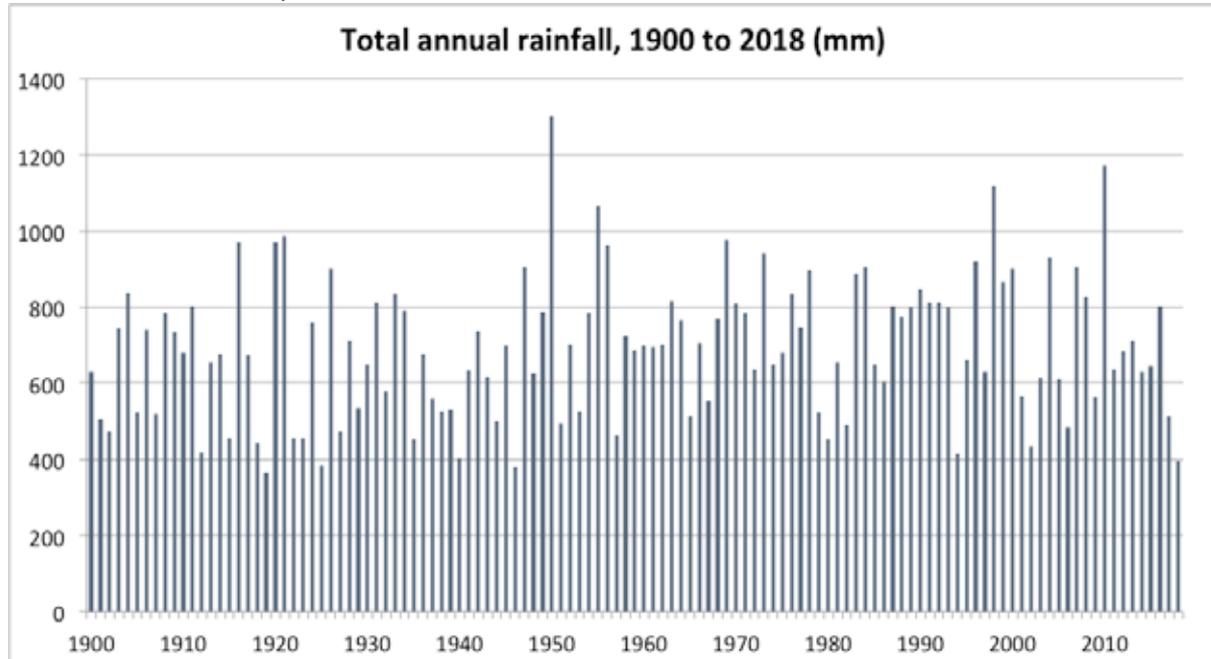


Figure 2. Long-term rainfall, based on Bureau of Meteorology data.

### The landscape

The main soil type is deep cracking clay (vertisols) derived from basalt (figure 3). This soil type is well-structured and intrinsically fertile and can be highly productive given enough water. Maddy arranged soil testing to be done soon after she took over Rothesay. This showed an abundance of phosphorus and magnesium but insufficient nitrogen, sulphur, calcium, zinc and boron. A fertilisation program incorporating a trial to test different mineral and/or biological approaches to addressing the deficiencies was recommended, but it is too soon to tell the results.



Figure 3. Well-structured clay soil.

Native vegetation on the cracking clay soils of the Liverpool Plains region is mainly native grass with a range of small forb and herb species. The main grasses include Plains Grass (*Aurolistia aristiglumis*), Queensland Bluegrass (*Dichanthium sericeum*), Red Grass (*Bothriochloa macra*) and Wallaby grass (*Austrodanthonia sp.*). It also contains scattered and patchy shrubs and trees, including Myall (*Acacia pendula*), Rough-barked Apple (*Angophora floribunda*), Fuzzy Box (*Eucalyptus conica*), Bimble Box (*E. populnea*) and Yellow Box (*E. melliodora*).<sup>1</sup> Rothesay, which stretches from the plains onto the lower slopes, also hosts Wallaby grass (*Austrodanthonia spp.*), Red grass (*Bothriochloa macra*), Lobed Blue Grass (*Bothriochloa Biloba*), River She-oak (*Casuarina cunninghamiana*), which proliferates along some reaches of the creeks, Kurrajong (*Brachychiton populneus*), White Box (*E. albens*) and Cypress Pine (*Callitris spp.*).

## Water management

The Blackville Floodplain Management Plan (2003) recognised that land management practices in upstream areas of the Mooki River catchment have increased erosion, and that ‘downstream landholders have not been able to pass on the additional flow or sediment ...’.<sup>2</sup> The ‘additional flow’ evidently exacerbated flooding and waterlogging, and became an issue for cropping on the plains. The plan prescribed various ‘solutions’ for the Upper Catchment Zone, in which Rothesay and Springfield are located. These solutions included:

- maintaining 70% ground cover on slopes up to 75% and 80% ground cover on steeper slopes;
- using a stocking strategy to take account of ‘climatic variability’ (i.e., high rainfall periods versus drought)
- avoiding overstocking by using rotational grazing,
- preventing concentration of run-off using ‘appropriate limited’ earthworks to stabilise gully heads, and
- to promote overland flow

These practices seem eminently sensible and desirable. Individual landholders were nominated as being responsible to implement them. To what extent those landholders took up the challenge is unclear, but Maddy is endeavouring to do that today on Rothesay. As such she is initiating a ‘catchment rehydration’ approach to make the most of all the rain that falls and to reduce erosion.

She has made a start in three ways.

1. Firstly, by increasing the number of paddocks to 68 (figure 4; more paddock subdivision is planned) grazing pressure can be managed better to maintain ground cover. Subdividing paddocks can be done more cost-effectively by installing a trough at the intersections, so that one new trough can water up to four paddocks (figure 5).
2. Controlling grazing pressure in riparian areas has allowed River She-oak to regenerate within the creek system (figure 6). The build-up of vegetation can already be seen to be holding back the intermittent flows that would otherwise be racing downstream, eroding the creek banks and carrying away soil and nutrients. As well as reducing erosion, slowing the flow increases infiltration and groundwater recharge.
3. Early in 2019 shallow level contour banks were built running out of a gully. In a flood, the level contour bank picks up water and runs it along the contour until it is dispersed at a ridge where a spill way has been created. The aim is to use the flood water which would have ended up in Omaleah Creek to instead be diverted to rehydrate paddocks on the property.

<sup>1</sup> <https://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=10550>

<sup>2</sup> [https://www.industry.nsw.gov.au/data/assets/pdf\\_file/0008/143288/Liverpool-plains-Blackville-floodplain-management-plan.pdf](https://www.industry.nsw.gov.au/data/assets/pdf_file/0008/143288/Liverpool-plains-Blackville-floodplain-management-plan.pdf)

This contour bank is perhaps the first of many such drainage control interventions. The work was designed and implemented with advice from Peter and Stuart Andrews and regional catchment authorities including Local Land Services and Landcare.



*Figure 4. Shallow level channels carry water from the gully and allow it to disperse across the paddocks where it can infiltrate, rehydrating the soil.*

## Grazing management

When Maddy took over Rothesay the business focus was breeding Angus cattle. Based on the good seasonal conditions at the time, she invested in breeding stock. As dry conditions quickly set in, maintaining a breeding herd and trade steers became a challenge.

One cow and calf per four hectares is the expected carrying capacity for the region. While that might be a useful 'rule of thumb' over the long term, year-to-year stock management requires a far more nuanced approach to adjust for rainfall variability from year to year. Using the tools of observation and pasture budgeting, Maddy has found the Maia Grazing software pasture management system very useful. She feels it enables a more detailed analysis of grazing stock management than the traditional paper grazing chart. There are many software systems available and can be found, for example at Trethewey (2018).<sup>3</sup>

<sup>3</sup> Trethewey, S., *A nice to have, or a need to have? – Farm Management Software*. <https://www.beefcentral.com/ag-tech/a-nice-to-have-or-a-need-to-have-farm-management-software/>

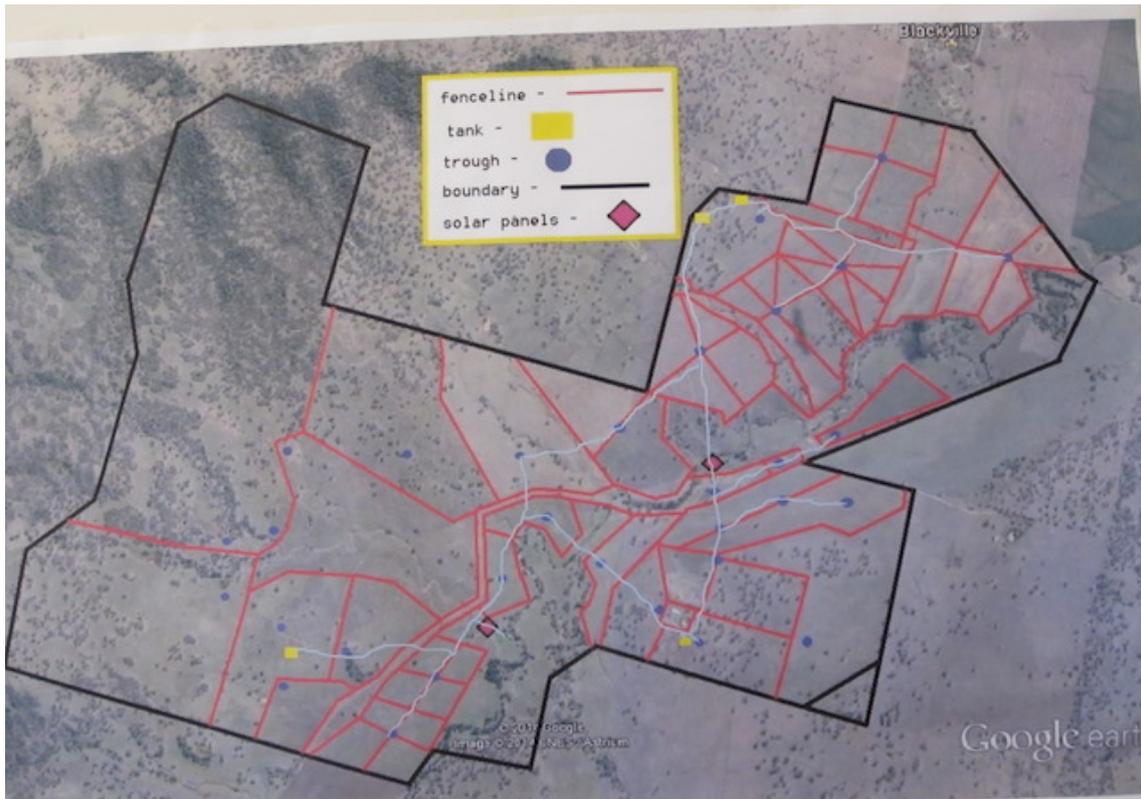


Figure 5. Paddock sub-division

Rotating livestock through grazing cells allows Maddy to increase the stocking density and animal impact by moving larger mob sizes over short time periods. Her feed budget calculates the time period a mob should stay in any one paddock, calibrating this pasture management system through observation has proven successful.

The objective is to maintain adequate ground cover by moving stock on once fifty percent of the available grass is consumed. This allows plants to recover more quickly, keeps the roots in active growth phase and provides for longer recovery periods.



Figure 6. Subdividing paddocks cost-effectively; one new trough can water up to four or more paddocks depending how paddocks are set up. Electric tapes are used to separate paddocks as required. Turning off water to the trough when the cattle have been moved on.

By March 2017 Maddy had started to destock and over the course of the next year, she sold all her trade steers. As the dry spell progressed, Maddy's feed budget was telling her that the breeding cattle needed to be sold. Short-term pain for long-term gain. Selling the herd, even at a loss, ensured that the paddocks were not over-grazed and would therefore recover sooner after rain (figure 6). The cost of hand feeding was avoided and instead of increasing her overdraft on feed bills, she had the money from the sold stock available for re-stocking when the time was right.

By December 2018, there was enough growth in the paddocks to enable Maddy to start trading. She managed to trade cattle from December 2018 to September 2019. With a combination of careful feed budgeting, the use of the forecasting tool in Maia Grazing and KLR Marketing Spreadsheets, skinny cows were purchased to fatten and sell on short trades. Although at significantly reduced numbers, Maddy was still generating cashflow – and this during the worst drought in history!



*Figure 7. Carefully planned grazing enables paddocks adjoining creek lines to be rested long enough for tree regeneration to become established. The build-up of vegetation then retards storm flows, prevents erosion and leads to increased infiltration of run-off.*

However, from mid-September 2019, once again Rothesay is completely destocked. Leaving sufficient ground cover has been the key and of particular importance to the farm management. It protects the soil, reduces erosion and improves the micro climate at ground level.

From Maddy's observations, having plants with roots already established is fundamental to paddock recovery. They are sitting there waiting for the rain and even if there is a small shower, they just start to green up and grow, unlike seeds that must germinate and take time to be established as occurs in bare paddocks.

"I have seen it repeatedly in this dry period where we get a shower, and a seed will germinate, only to die because we don't get the follow up rain it needs. It has been a continuous trend throughout the last few years".

Keeping ground cover has been fundamental and the reason Maddy has been able to make trades for the past eight months. An added advantage is that by turning off water to troughs when the cattle have moved on, you remove the attraction for Kangaroos and minimize grazing pressure.



*Figure 8. Ground cover on Rothesay after two drought years. Maintaining ground cover during a drought ensures that topsoil is protected and rain that falls is able to penetrate, meaning pastures will grow back rapidly.*

With sound advice and using grazing tools Maddy is turning over cattle every couple of months. She is using both commercially available tools and her own observations to determine how much feed is available at a moment in time and hence how many cattle can be run and for how long. Using marketing tools, she knows the profit margin before purchasing cattle to ensure a profitable trade.

During the current dry period, Maddy makes sure she has enough feed available in the paddocks to finish a trade before cattle are purchased. It is too risky to purchase cattle with the “hope” it is going to rain to grow feed to finish a trade. To take the hope and risk out of her trades, Maddy matches her stocking rate to carrying capacity – in effect the number of mouths to the available grass.

While it is early in the story, indications are that Maddy Pursehouse is showing the way to considerably improve the resilience of her farm business. She is keeping an open mind about grazing strategies and adapting them to seasonal circumstances, and she is keen to learn about new approaches or practices and willingly consults on possible options.

### **A personal journey**

Maddy is from Sydney. A city girl through and through. However, she grew up with a love of horses and competed in equestrian events. Maddy had been heavily influenced by her reading of women in agriculture. In particular, she was influenced by Rachael Treasure, whose books predominantly feature young women in agriculture, often with the story underpinned by a theme of regenerative agriculture.

After leaving school Maddy decided that she wanted an equestrian career and enrolled in Tocal College to enhance her equestrian knowledge and skills. Having initially qualified for a Certificate IV in Agriculture, Maddy went on with further studies to qualify for a Diploma in Agriculture. This widened her view to the opportunities presented by livestock production.

### **New horizons**

Maddy's first job after graduation was with a local cattle feed lot. As she gained experience with cattle, Maddy saw opportunities for the production of grass-fed beef to be sold direct to the consumer market place. Her interest initially extended to lamb and pork, but the prime focus was beef cattle. Maddy also noted the suitability of the Liverpool Plains to start her venture and began looking for a suitable property. Up to this point, Maddy's reading, studies and practical experience, impressed upon her that regenerative agriculture principles and practices would best suit the type of operation she had in mind.

When Rothesay, near Blackville in NSW, came on the market, Maddy, in partnership with her father, purchased the 1620 ha property. They initially purchased the 940ha "Rothesay" section, adding "Springfield" in 2018. The property had been used for beef production, which had included rotational grazing based on some sixty paddocks, and the fencing and watering infrastructure reflected this land use. The grass was of good quality and ground cover close to 100%. On the strength of all this, Maddy bought cattle and set up a mixed operation based on breeding and opportune trading of cattle.

With her qualifications Maddy had the skills and knowledge to start her farming venture, what she missing was the managerial and financial skills to make decisions and balance the books. On the positive, in Maddy's words: "I had no fixed approach" she was flexible and able to adjust her business plan to suit. Initially there was plenty of grass and she rotated her cattle herd conservatively. Maddy increased her managerial skills and financial literacy by completing a Grazing for Profit course, conducted by RCS. She also attended numerous field days where she built a network of friends and asked lots of questions.

Then came the drought.

### **A hard reality**

To begin with, Maddy purchased 100 cows as the breeding herd and 180 steers to trade, along with some agistment cows for Rothesay. She continued to manage her breeder herd and follow her rotational grazing practices. However, she began to notice that feed in most paddocks was losing quality and not recovering as quickly from the grazing operations as it had previously. Basically, the rate the grass was growing had slowed down and Maddy determined that she had not been matching the stocking rate to carrying capacity. In discussions with Terry McCosker, she realised that the business was on a downward spiral - she was gradually going backwards. Over the following year she destocked the 180 steers.

There was still adequate ground cover and dry roughage but not enough to maintain recently calved cows. The only course of action was to sell the breeding herd and try something new. Selling the breeders was a mighty wrench as Maddy had become attached to them. She knew it was the best decision for three reasons – her bank balance, ecological aspects of the farm and most importantly her mental health.

Reluctantly, for the good of the cattle and for the business, the breeders were sold. The cattle were in good condition, but Maddy believes that had she overcome her emotional ties and acted three months sooner, the price would have been better and the paddocks left in better condition. Maddy is no longer emotionally attached to her stock. They come in, they eat and grow, and they go to market and make way for the next lot.

### **Finding a way**

There were bills to pay so a new strategy was necessary. At the very least, some adjustment of her vision was necessary. Maddy bought skinny, underweight cattle and introduced a small herd to her property to be fattened, all the while matching her stocking rate to carrying capacity.

By this time, Maddy had established Maia Grazing as her preferred grazing management tool and she was fortunate that experienced local graziers and teachers became her mentors.

With sound advice and using her grazing tools to match the numbers of cattle and their timing on and off the property to the available feed, Maddy is turning over her small herd every couple of months. Feed budgeting and careful stocking supported some slow pasture regrowth and maintained ground cover. She has livestock when conditions are suitable, she has cash flow and she is also helping out on other cattle properties to gain valuable experience and supplement her income.

For Maddy, the drought conditions have brought for her a “new normal”. She intends to keep trading cattle for at least five years before considering another change of strategy. Underpinning her trading strategy are the practices of regenerative agriculture: “It makes sense to me. It is how nature works. The key issues of soil health and plant diversity are common sense” and with this trading strategy she is able to be flexible to look after her country.

Maddy’s network is an essential part of the way forward. Her Dad provides support and encouragement and comes to help out from time to time. However, he does not have a farming background and leaves all the farm management decisions to Maddy. Her mentors are in frequent contact. Field days and training courses provide exposure to new ideas and help grow her network.

Maddy is keen to share knowledge. She has hosted a Tarwyn Park Training course on soil hydrology management. She has hosted an RCS *Keep in Touch* seminar and welcomes conducting other group knowledge sharing activities on Rothesay.

### **Into the future**

Looking back, Maddy recognises that she made mistakes, but also knows they were learning experiences. She highlights the need for education and skills development and has more in mind for the future. Her mentors have been invaluable, and she continues to build her network. As she says: “the drought will end .... some day” and in the meantime, she sees herself as a grass farmer now.