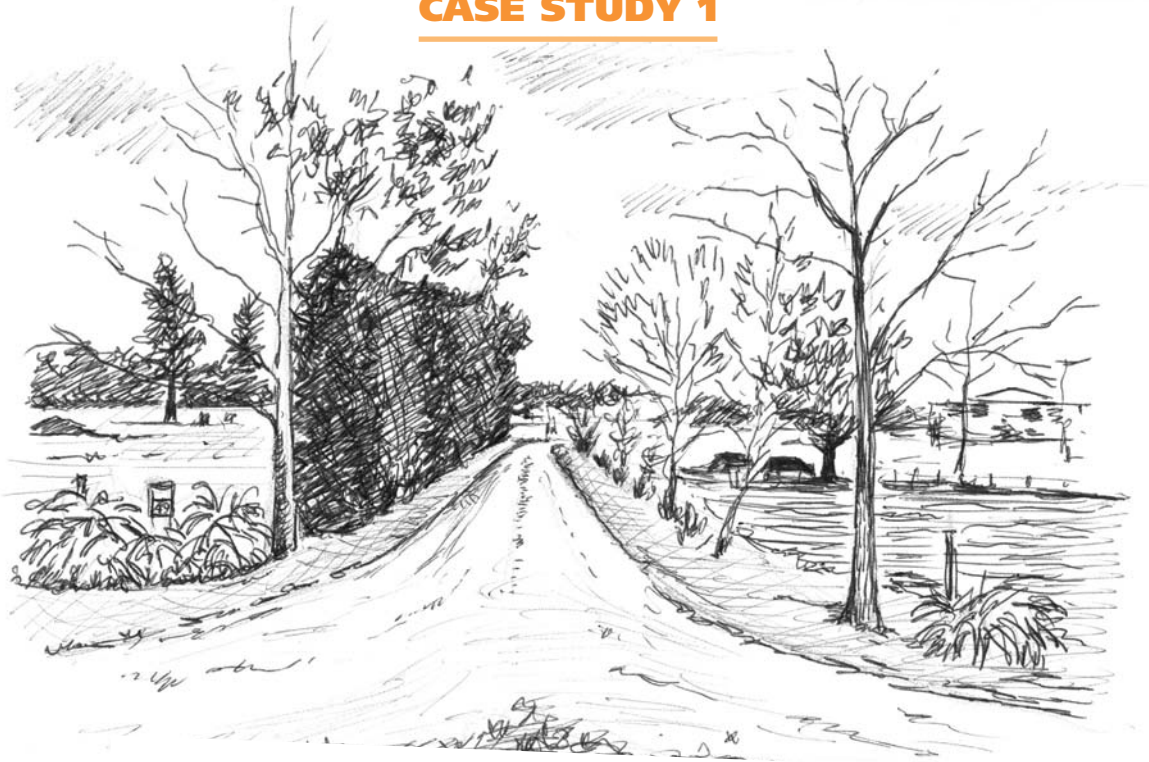


## **CASE STUDY 1**



**Graham and Margaret Evans**

*Edgecumbe, Rangitaiki Plains, Bay of Plenty*

**A series of crises  
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## Key facts

**Farm size and type:** The farm is 77ha in area, located in the heart of the Rangitaiki Plains, a predominantly dairy farming area. It is a beef and cropping unit.

**Production focus:** Beef animals (about 40ha), maize for silage (about 40ha), winter grazing (77ha).

**Soil type and topography:** The soil is a Paroa silt loam on peat over gravel. It is a poorly drained gley soil type from very fine pumice alluvium (backswamp lowland). Until the late 19th and early 20th century the Rangitaiki Plains were predominantly swamp. In 1914 a channel was dug at Thornton to allow the Rangitaiki River to drain out to the sea. There is little topographic variation on the farm. The most notable variation is a consequence of the 1987 Edgcombe earthquake, with an approximate two-metre drop on part of the property.

**Climate:** Average rainfall is about 1100mm (ranging from 800mm to 1400/1500mm). The annual rainfall total is similar from year to year. Rainfall tends to balance out through the year, ie dry spells are compensated for by wet spells.

**Water sources and availability:** Water is provided by the Braemar supply, which is a public (mains) water supply that covers most of the Rangitaiki Plains. It is spring fed, with plenty of water.

**Social:** When they were milking everybody was involved, it was a family effort. Now, things are less pressured and Graham manages on his own. Graham and Margaret make decisions together, with Graham doing the farm work while Margaret does the books. Graham has a number of interests outside

the farm. He participates in discussion groups, is a Rotary member (for the last two years), goes fishing, is involved with Federated Farmers (secretary/treasurer for Whakatane branch; vice chairman for the meat/fibre section in Bay of Plenty), and is chairman of the Board of Trustees for Rangitaiki Independent School.



## Main climate feature and challenges

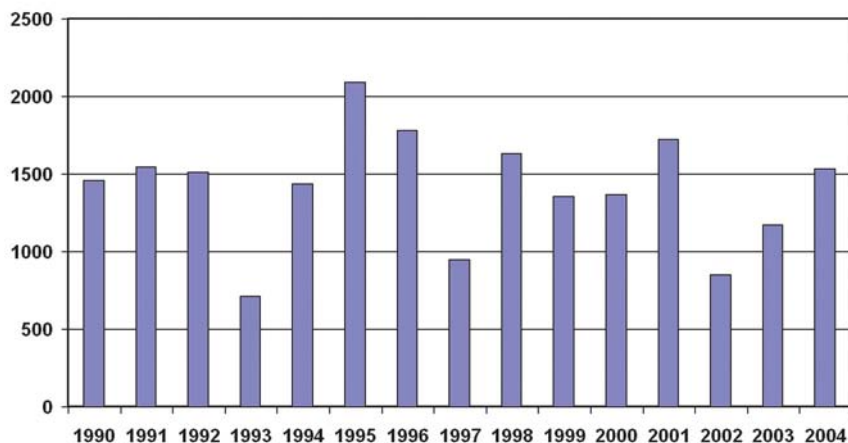
**Wind – from all quarters:** A major goal of Graham's is to reduce the effects of wind on the farm, which include damage to maize crops, storm damage to buildings and cold winds in winter.

**Wet winters:** Hump and hollow paddocks to shift water quickly.

**Hot summers:** Shade for animals. Reduce wind to grow more grass or crops.

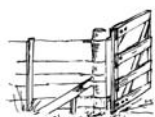
**Extreme wet and dry:** Subsoil maize crops.

Evans Farm Annual Rainfall, 1990 to 2004



# Historical development and influence of climate and weather extremes

Period	Production focus and major changes <i>Climate and weather effects</i>
<b>Pre European</b>	The Rangitaiki Plains were predominantly in swamp.
<b>Pre 1947</b>	The farm was originally part of Awaroa Station, a 400ha farm that was subdivided into rehab farms after the war. Graham's father gained the farm as a result.
<b>1950s</b>	Low stocking rate. Wet land. Focused on drainage and fencing.
<b>1960s</b>	Jerseys to Friesians. Increased fertiliser inputs.  <b>Major flooding.</b> Floods – 1964, 1966, 1968, 1970. Destroyed pastures, created grass shortages. The 1966 and 1968 floods were man-made. Flow from the Matahina dam was controlled by people in Wellington who were not able to act quickly enough in controlling water levels in the dam and manage the amount and extent of flooding. Since this time the flows have been controlled locally – they now use rain gauges in the high country to monitor and control water levels.  <b>The 1964 flood was the big one.</b> It was a result of this flood that flood-protection schemes were developed in the Rangitaiki. Control of grazing animals in the catchment (Ureweras) and understorey regrowth may also have contributed to a reduction in flood risk.
<b>1970s</b>	Dry summers. Increased farm size.
<b>1980s</b>	Higher production; higher stocking rate; higher fertiliser inputs. Graham bought the farm from his father in 1980. New cowshed.  <b>Drought, 1982</b> (Sept to April was dry – only two thirds of budgeted production). This nearly put them out of business as they had just bought the farm. It took five years to recover. Economic costs were high. There was a lot of stress. Had to work harder. Couldn't afford a social life.  <b>Earthquake, 1987.</b> Financially, cost \$17,000. Worked off-farm for two years (Graham was able to do this because he is a qualified fitter and turner. Stressed. Low income. Repair costs.
<b>1990s to present</b>	Increased farm size but things were still a struggle. They had to pay out for the new dairy company. Graham and Margaret made the decision to change to beef and maize in 2001/2002 and haven't looked back since. Production is still as intensive, but life is a lot less stressed and income is greater. The alternative was to get bigger as a dairy unit, which would have meant buying a 40ha runoff.  <b>Flooding, 2004</b>



## Adaptations to develop the resilience of the farm

The 1980s were a real struggle. Determination kept them going, and some good fortune. In 1986 they couldn't afford fertiliser. The local dairy company was trucking out whey. Graham got them to spread some on the farm. Initially they trucked it on, but this wasn't good for the soil because of compaction. So Graham set up an irrigation system, piping the whey from the factory. He installed half of the system in the first year (1986) and completed it in 1987. The completed system had been operating for three weeks when the earthquake hit and it was destroyed. By this time the dairy company had realised the benefits of spreading the whey in this manner and covered the cost of replacing the system.



In 1989 they made the decision to sell their cows and put on a sharemilker. This gave them capital to reorganise what they were doing. Selling the cows reduced stress (pressure to perform). Since 2001/2002 they've been running beef animals. They can squeeze them more than dairy cows. They made a lifestyle choice. Rather than getting bigger they chose to change what they were doing. In 2003 they spent two and a half months travelling overseas. People who have expanded are potentially more vulnerable. Graham's view is that you have a 10-year vulnerability zone with decisions that you make. It takes that long to make progress and become re-established. Within the first five years you are extremely vulnerable. Once you've become established you can afford to buy in feed to weather extremes. Graham agrees that drought risk is higher with more intensive systems.

How you cope depends on where you are on the change/vulnerability curve.

A big focus at present is planting shelter trees, principally poplars. They aim to divide the farm into sheltered blocks. For the maize cropping, they are re-contouring the paddocks with humps and hollows to reduce the impact of wet events and improve responses to dry events.

For the future Graham will continue fine-tuning his shelter planting and re-contouring of paddocks. He feels that he has enough flexibility in the system now to adapt to climate change. Diversification could be an option, with a possibility that the farm could be subdivided into 6ha blocks by 2050.

**Trees:** There used to be Kahikatea forest in the Rangitaiki Plains when it was swamp-land. While these could be a suitable native species for shelter, Graham isn't interested in them for two reasons. First, they are too slow growing. Second, they aren't deciduous. Conditions would stay cold and wet in winter time with Kahikatea shelterbelts.

Planting shelter across all farms in the region would bring benefits to the local climate and environment. Graham believes that such benefits have already resulted from the planting of the Kaingaroa forest inland.

Graham has identified a suitable poplar species through trial and error. The main benefits are that they are easy to grow, have an upright growth habit, are deciduous, and appear to be disease resistant.

There is a risk in planting the farm with one poplar cultivar if they are attacked by an invasive pest or disease. Graham believes, however, that he would have sufficient time



to change. He would diversify his shelter only if it is within the parameters of what they want (deciduous, low maintenance, narrow growth habit, strong root structure). Further planting is planned.

**Benefits:** Shelter and shade, higher temperatures in winter, higher grass and maize yields. If this effect is multiplied over the farm it could change enough to make a difference. If multiplied over farms in the region it could make even more of a difference.

**Information:** Information was picked up over a long period of time and through trial and error on the farm. Graham and Margaret used to be Tree Crops Association members.

**Constraints:** Powerlines. They are legally not allowed to plant within 10m of the stopbank. There is a risk involved with a single species shelter if a pest/disease wipes things out.

**Water:** There is no limit to a quality water supply. Humping and hollowing of paddocks is being done to reduce water-logging and improve responses when dry. Part of the plan with shelterbelts is some filtering of runoff.

**Diversification:** Growing maize to harvest surplus fertility from whey.

**Benefits:** Can survive dry and wet if subsoiled.

Takes advantage of humps and hollows.

**Long-term:** Possibly into horticulture? Frosts and wet would be limitations.

**Soil:** The soil needs to be managed carefully to buffer against extremes. Graham is working on this proactively. He is humping and hollowing paddocks – with about 30m between humps. Subsoiling is done for maize growing. This allows a deeper root system to develop and helps build soil organic matter.

**Benefits:** Negates impact of extreme wet or dry. Aim to grow more maize and grass. Better drainage.

**Information:** Observed over a long period of time. Idea of humping and hollowing used by other farmers (eg, in the Hauraki Plains).

**Constraints:** Have to manage fertility when doing it. You can't just drag topsoil.

**Pasture management:** Able to renew pastures faster to eliminate weeds from high whey use. Managing weeds positively. Graham has learnt to farm docks (keep young and leafy).

**Benefits:** Using latest varieties for strategic purposes. Docks are beneficial to stock (minerals etc.).

**Stock management:** Changing to Angus beef animals as they're hardier. Changing

Rather than getting bigger, they chose to change what they were doing.



to autumn calving after buying in some autumn calves and observing that they were six to eight months ahead of spring calves.

**Benefits:** Adapting calves' growth to feed supply. Fewer health problems.

**Information/support:** Part of a beef discussion group.

**Constraints:** Use of supplements in winter.

**Infrastructure:** Vulnerable to earthquakes.

**Biodiversity:** They don't spray their pasture. More biological life is encouraged, and more biodiversity. They've recognised the value of weeds in providing a balanced mineral diet for the animal. They don't spray maize for insects.

For the future, Graham will continue fine-tuning his shelter planting and re-contouring of paddocks.



The homestead and surrounding paddocks.



## Meso connections

The Regional Council stopbank will restrict planting of trees. Aside from this, neighbours don't affect the Evans farm. They're presently leasing three adjoining lifestyle blocks as grassland. All of them approached Graham.

A note on Kaingaroa forest – this was planted in the 1930s and the observation of farmers is that this made eastern Bay of Plenty warmer with much less frost risk.

Graham gets on well with people in the Regional Council as a rule, but generally feels that the regulatory side tends to prevail over working with farmers to find solutions. The cost of dealing with objections needs to be addressed. A lot of issues could be resolved with parties

working together rather than going through the Environment Court.

Pressure on amalgamation – Graham started with 125 cows and ended with 250. He had to work twice as hard to earn the same income. All of his energy was directed at chasing dollars – a lot of financial pressure. Their response was to change the picture.

Change in rural schools – 30 years ago all of the children used to be from dairy farms. Now there are only about 20 children from dairy farms at Awakuri school. The community is not as close knit as it was. However, on the positive side, Graham is confident in people's capacity to come together in a crisis. This confidence was reinforced with the July 2004 flooding of the Rangitaiki River (see below).



## The July 2004 floods

Graham's confidence in people's capacity to come together in a crisis, despite social changes in the area, was put to the test in July 2004. A wet winter preceded a period of intense rainfall in the Rangitaiki River catchment. Water from the Aniwhenua and Matahina dams was released to increase storage capacity. The Rangitaiki River stopbank breached just above Edgcumbe leading to significant flooding. Graham's farm was partly affected but he missed the worst.

Graham took on the job of coordinating flood relief work. This gave him plenty of insight into the impact of the flood on people in the area and was cause for further reflection on climate change.

**'A change of thinking is needed to accept that climate change is here and that proactive measures are needed. Some people will change, but this may not all be visible. Others won't change, they'll just go back to normal. This is already happening, in the aftermath of the flood. Graham believes a series of crises may be needed for some people to realise that change is required.'**

Reflecting on his own farm, where he spent every day this winter moving stock, Graham is now looking to go almost totally to maize cropping. The farm can't sustain the high water levels, with stock, that they have experienced this winter. Unlike many dairy farmers they don't have the option of moving their stock on to a runoff.

While individual farmers may or may not change, Graham believes that central government needs to be more proactive in creating greater resilience around the regions. Immediate changes that he believes are needed in the eastern Bay of Plenty include:

- 1) A widening of the main drainage channel all the way out to Thornton. This can be done in a 'win-win' manner, a few farmers may have to accept that part of their farms need to be sacrificed to carry surplus water during floods, but this could be done in a way that ensures the farmers

are not losers. The biggest constraint is likely to be finance to cover the cost of widening the channel.

- 2) Addressing erosion problems. No one seems to want to know about slip damage. The view presented to Graham is that Government doesn't recognise slips as a recoverable situation, apparently citing the East Coast experience.

Graham's experience with the Regional Council in the aftermath of the flood has been overwhelmingly positive. This is the first time, since the establishment of the Regional Council, that farmers and Regional Council staff have worked together to such a high degree. Graham's view is that this experience has broken a lot of barriers and that in future farmers and Environment Bay of Plenty staff will find it easier to work together.



The Rangitaiki River stopbank breached just above Edgcumbe leading to significant flooding. Graham's farm was partly affected but he missed the worst.

