



Mulloon Institute
For environment, farming and society.

Creating models to learn about landscapes

Models are powerful tools in education. Even a very simple model can engage the imagination and support hands-on, collaborative learning. Model-making introduces the element of play, which is known to deepen learning for adults and children alike.

Whether you're working with landholders, students, teachers or community, you can create models to provide:

- A birds-eye view of a landscape, and to identify key features.
- An illustration of how a property, school or neighbourhood sits within a larger catchment.
- A simulation of how water flows through a landscape under different conditions.
- An illustration of how land has been shaped by natural forces and human impact over time (eg, recent erosion patterns, or the formation of a floodplain over thousands of years).
- An opportunity to bring forth perspectives on a landscape from different stakeholders (e.g. farmers, Indigenous custodians, government, conservationists).
- A visual tool to share scientific and technical information in situations where a specialist vocabulary or assumed knowledge can be a barrier to understanding.
- A prop for different landscape futures to be visualised and discussed (for example, a new approach to land management, a flood event, a different enterprise mix).
- A “safe-to-fail” experience of decision-making, so that potential consequences, both positive and negative, can be explored.
- Playful and humorous exercises for learning. For example, small groups can rotate around models, creating hypothetical landscapes that the next group has to modify in response to certain questions or prompts.

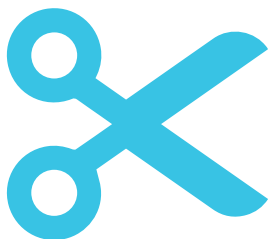
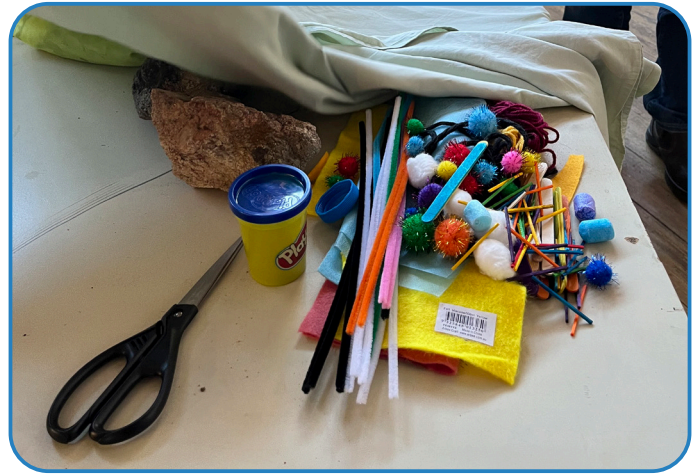


A variety of models can be easily adapted for use in workshops, schools and out in the field. They use both natural and widely available materials.

Fabric and craft models

You will need:

- a table set at a comfortable working height.
- a large tablecloth or bedsheet.
- cushions, cardboard and bits of fabric to create rises and dips in the landscape.
- cotton balls, pipe cleaners, string, wool, coloured scraps of fabric, paddle pop sticks.
- torn or cut strips of paper.
- anything else that is handy for creating waterways, trees, fences, rocks, animals and other landscape features, such as plastic animals, Monopoly pieces, buttons etc.
- post-it notes for labelling landscape features.



Clay models

You will need:

- a large rectangular container, such as a bread crate or bigger, lined with plastic to retain water and elevated at one end on a slight angle for water flow.
- white or terracotta clay. Sometimes you can source clay from the landscape, or you can purchase from an art supply store.
- small leafy branches, sticks or herbs to use as trees, logs.
- pebbles to use as rocks.
- household items such as paddle pop sticks, fabric offcuts, string, cotton balls etc to create dams, fences, animals etc.
- spatulas, spoons, butter knives to sculpt the clay into landforms and waterways.
- water to add to the 'creek' you create, to show how water flows (blue food colouring optional).



Soil and silt models

You will need:

- an area of dirt on a slope.
- a large container to hold the soil.
- a large tarp with barriers such as wooden planks to keep the soil in place.
- trowels and spatulas to sculpt the soil.
- various materials as listed already to create landscape features.
- a hose, jug or spray bottle (for rain) to add water to the model.



Fine silt is very effective for showing how water shapes landscapes over time (fluvial morphology). To create a good quantity of silt you can saturate a supply of clay, and strain it over a bucket using sieves and fine mesh. You will need to do this in several stages to allow finer and finer sediment particles to settle in the bottom of the bucket. Once you have a good amount, make sure you have the means of catching it and conserving it as part of your silt model kit.

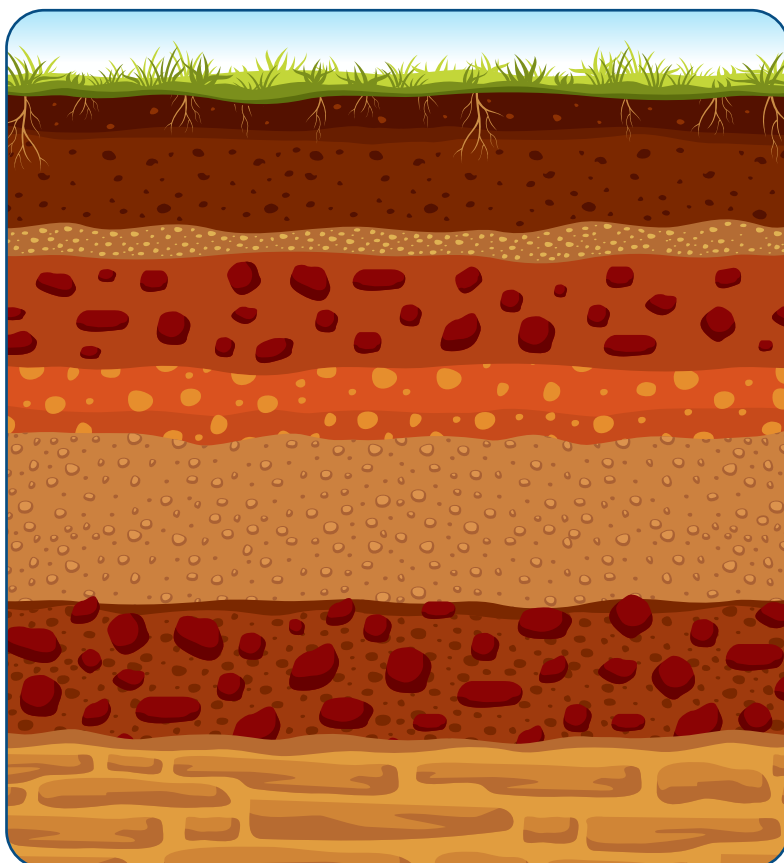


Layered sponge cake models

A sponge cake model can be a tool for understanding chain-of-ponds systems, or other sub-surface features of the landscape such as aquifers and soil types.



Soil types



- 1 BUFF COLOURED SANDY LOAM
- 2 RICH CLAY
- 3 GREY BROWN CLAY
- 4 RED / YELLOW MOTTLED CLAY
- 5 MASSIVE SAND
- 6 GRAVEL

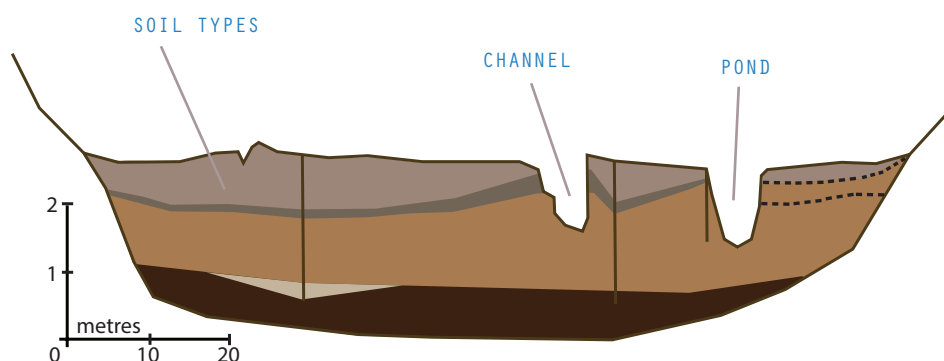


What are chain-of-ponds?



Chain-of-ponds systems are discontinuous river systems with irregularly spaced deep water reservoirs (ponds) which are sources of permanent water. These ancient water systems were once widespread throughout Australia. Many chains-of-ponds have been damaged since colonisation, due

to deliberate channelisation to make land more suitable for grazing, and the loss of vegetation in the wider landscape. Chains-of-ponds are often referred to as 'sponges', because of their capacity to absorb and store water and keep a landscape hydrated during extended periods when there is low rainfall.



SEDIMENTARY CROSS-SECTION (MOULD & FRYIRS 2016, P.355)

Basic sponge cake recipe

You will need:

- 1/3 cup (50g) plain flour
- 1/3 cup (50g) self-raising flour
- 1/3 cup (50g) cornflour
- 1/4 tsp salt
- 4 x 60g eggs at room temperature
- 2/3 cup (150g) caster sugar



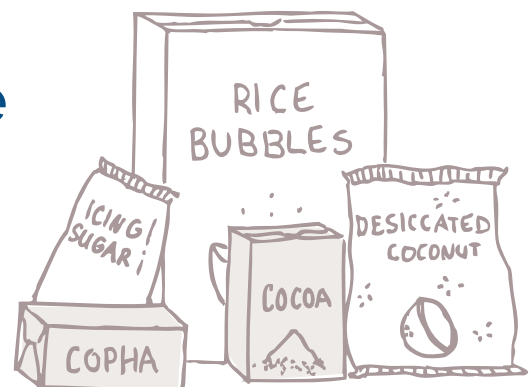
NOTE: To create five layers of cake double the recipe and divide into five baking trays. Add food colouring and cocoa powder to achieve the desired colours.

- STEP 1** Grease 3 long baking trays or shallow pans and line the bases with baking paper. Sift flours and salt together three times to aerate.
- STEP 2** Preheat oven to 180C. Using an electric mixer, beat eggs and sugar in a large bowl on medium-high speed for 6 minutes, or until mixture is thick, pale and tripled in volume.
- STEP 3** Gradually sift flour mixture over egg mixture while simultaneously folding in with a large metal spoon until just combined. Divide mixture between prepared tins. To level batter, gently spin tins on kitchen counter. Bake for 20 minutes (or as directed in individual recipes), or until cakes have shrunk away from the sides slightly and spring back when gently touched.
- STEP 4** Turn out on to baking paper-lined wire racks. Carefully peel away baking paper, then leave to cool.

Chocolate crackles recipe

You will need:

- 4 cups of rice bubbles
- 1 cup icing sugar
- 1 cup desiccated coconut
- 250g copha - chopped
- 3 tbsp cocoa



- STEP 1** In a large bowl, mix Rice Bubbles, icing sugar, cocoa and coconut.
- STEP 2** Slowly melt the copha in a saucepan over a low heat. Allow to cool slightly. Add to Rice Bubbles mixture, stirring until well combined.
- STEP 3** Spoon mixture into greased long flat pans or baking trays, pressing down with a spoon to compact mixture and refrigerate until firm.

Assembly

Assemble your thin sponge cakes to create a 5 layered stack using your chocolate crackles as a base layer for the gravel. Once you have achieved your core soil structure, dig out a reasonable well-hole through your sponges with a spoon, taking care of your soil layers as you go. Dig down through 3-4 layers of sponge. Now get creative by adding animals and land features as you wish.

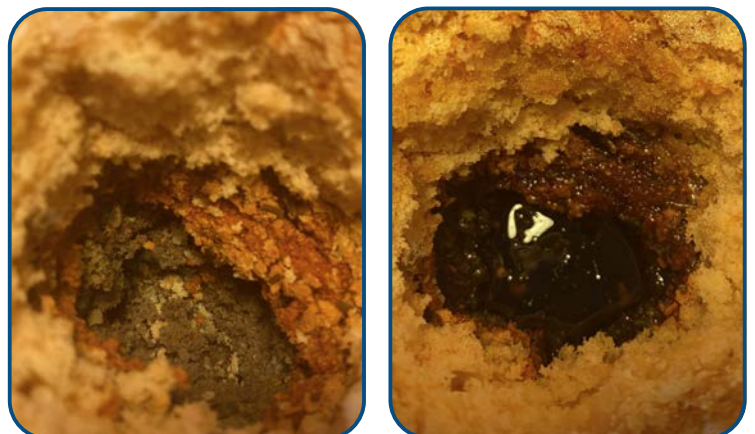
Curly Wurllys or Kit Kats make excellent fence lines to keep away cattle, sheep and rabbits. Fencing livestock and pests from your chain of ponds is a key preservation strategy for these unique river systems. Livestock naturally damage these ponds via hard hooves and excess grazing. Add confectionary frogs, and other sweets to mimic plant life and small pond dwellers that thrive in this aquatic habitat.



Activate

Now it's time to activate the ponds. Pour syrup or warm honey down the deep well you have carved. Watch how your pond holds the liquid, before filtering it through the layers of sponge.

Unlike the water containment properties of naturally occurring chain-of-ponds, the syrup or honey won't well in the borehole permanently, as your sponge will soak up the liquid quickly. However, all models emulating natural phenomena have their shortcomings, so perhaps don't spend too long dissecting the sponge cake's limitations, it's now time to eat. Grab a cuppa and tuck into your creation.



More ideas



Use transparent beakers, vases or a fishbowl to create a cross-sectional view of soil or a stream bed.



Use toys, herbs and nuts as features for cake models.



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This booklet is part of a series of educational resources produced by Mulloon Institute. The Institute is a not-for-profit research, education and advocacy organisation dedicated to sustainable agriculture and land regeneration. It specialises in restoring the movement, storage and cycling of water in landscapes at both property and catchment scales.

This resource is an outcome of the Citizen Science project *Modelling Landscape Rehydration for Catchments, Communities and Curriculum (2021-2023)*. Supported by the Australian Government, this project saw Institute staff work with artists, university students, school students and community members on a variety of modelling projects.

We acknowledge the creativity and input of the following people:

Courtney Coller (clay model featured at top on page 4).

Olivia-Ann Primmer (cross-sectional vase model at left)

Kim Williams (cake model at left)

Gary McGuigan (silt model featured on bottom of page 5).

Eloise Lindeback, Emily Ianno & Toni Bird (produced the Cake Model Instructible reproduced on pages 6- 9).

Kandos School of Cultural Adaptation (an art cooperative who staged the modelling exercises featured on page 4)

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REFERENCES

Williams, T & Fryirs, K 2020, 'The morphology and geomorphic evolution of a large chain-of-ponds river system', *Earth Surface Processes and Landforms*, No.45, pp.1732-1748

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<https://riversofcarbon.org.au/wp-content/uploads/2019/07/Swampy-Meadows-and-wetlands-fact-sheet.pdf>

