

# Flood mitigation model guide

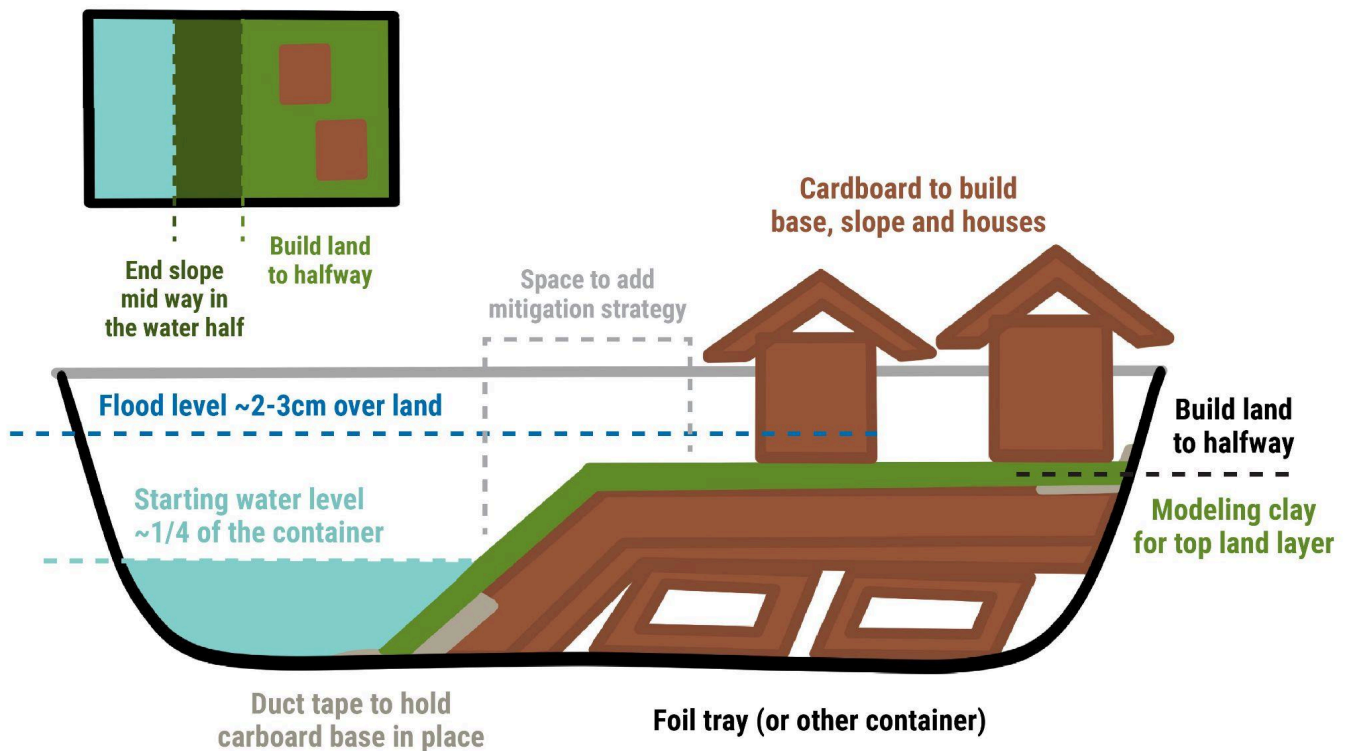
Teacher reference sheet showing the standard model base and example designs for each flood-mitigation method.

A full list of materials and costs can be found in the *Teaching materials and resources* table in the accompanying [lesson plan](#).

## Control/base model

This is the **standard town setup** without flood defences.

**Every group should build from this same base** to ensure results are fair and consistent.



### **Container:**

- Use [rectangular foil trays](#) or similar containers for each model
- All containers should be roughly the same size to keep testing consistent

### **Land area:**

- The land section should take up about **half of the container's length**, and be built to **around halfway up the container's height**
- Use **cardboard and tape** to create a gentle **slope** down to the lower end of the container – this slope represents the riverbank or coastline
- Cover the land area with **modeling clay or dirt** to form the surface

### **Town setup:**

- Use cardboard to build at least two houses, each slightly smaller than a sticky-note
- More houses can be added depending on the container size or chosen scale
- Ensure the number, size, and placement of houses are consistent across all models for fair comparison
- Place them on the flat land section, **a few centimetres back from the slope**, leaving space at the front for building the flood-mitigation structures

### **Water area:**

- Leave this half of the container empty until testing the models (instructions are at the end of this document)

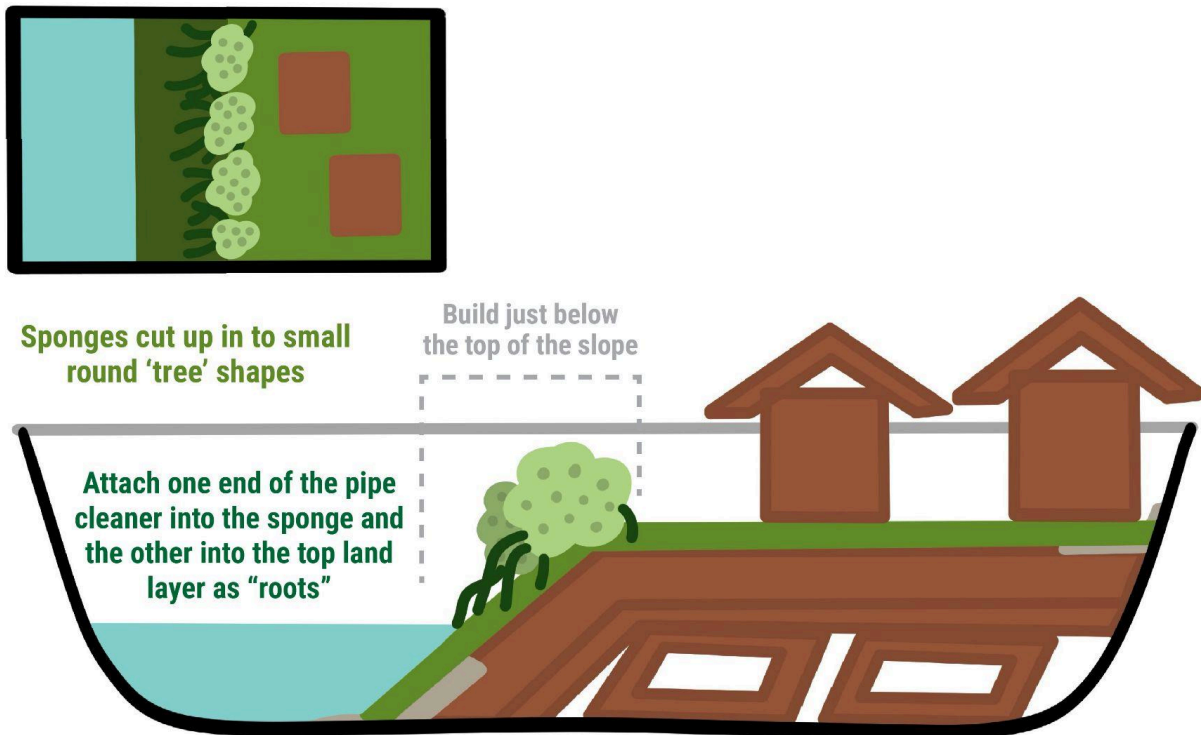
## Mitigation models

### Mangroves

Students should cut small pieces of **sponge and pipe cleaners** to represent the dense roots and trunks of mangrove trees.

Place them tightly together **along the coastline or lower slope**, covering the area between the water and land.

This represents how mangroves slow the flow of water and trap sediment before it reaches the land.



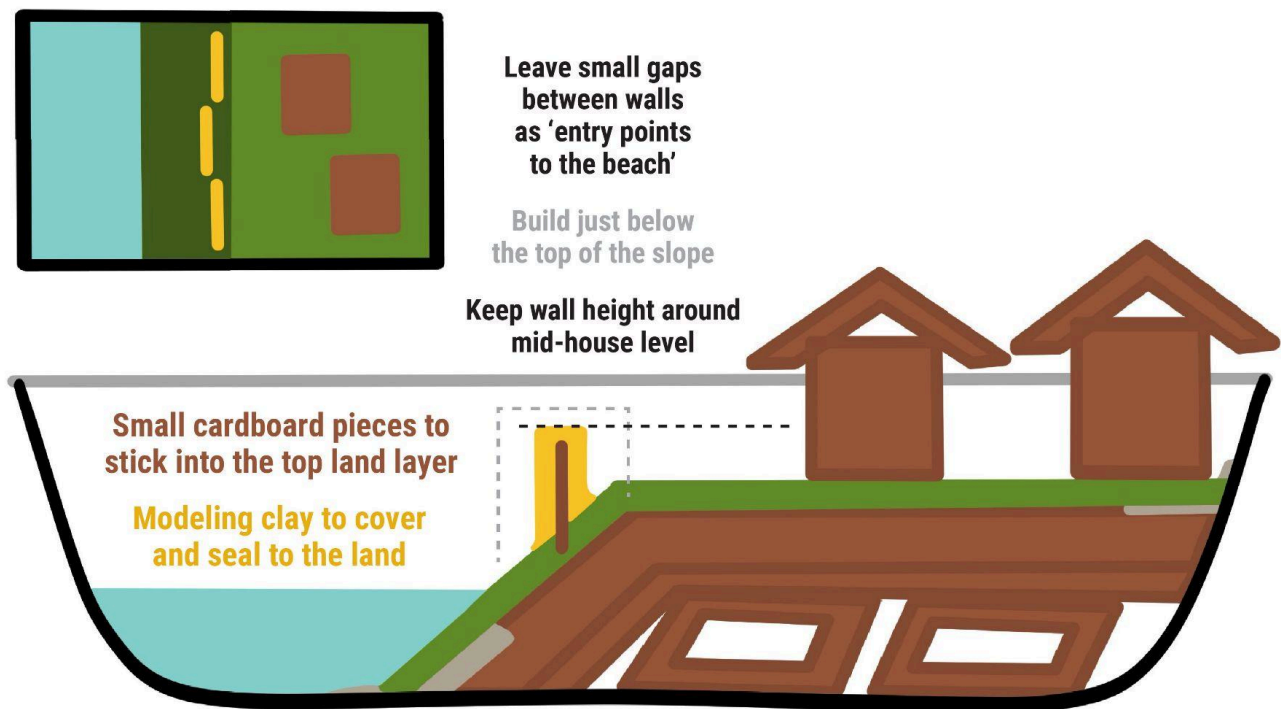
## Sea walls

To create a sea wall, students should cut a strip of cardboard to form a barrier along the front edge of the town where the slope meets the water.

Cover the cardboard with clay or play-dough to seal it to the land.

To keep the test realistic, the wall shouldn't completely block off the town – leave small gaps at the edges or make the wall slightly lower so water could leak through.

**Optional extension:** Gently tilt or tap the container to create waves, showing how sea walls deflect wave energy before water reaches the land, or how when strong storm surges happen, the water can go over the top.



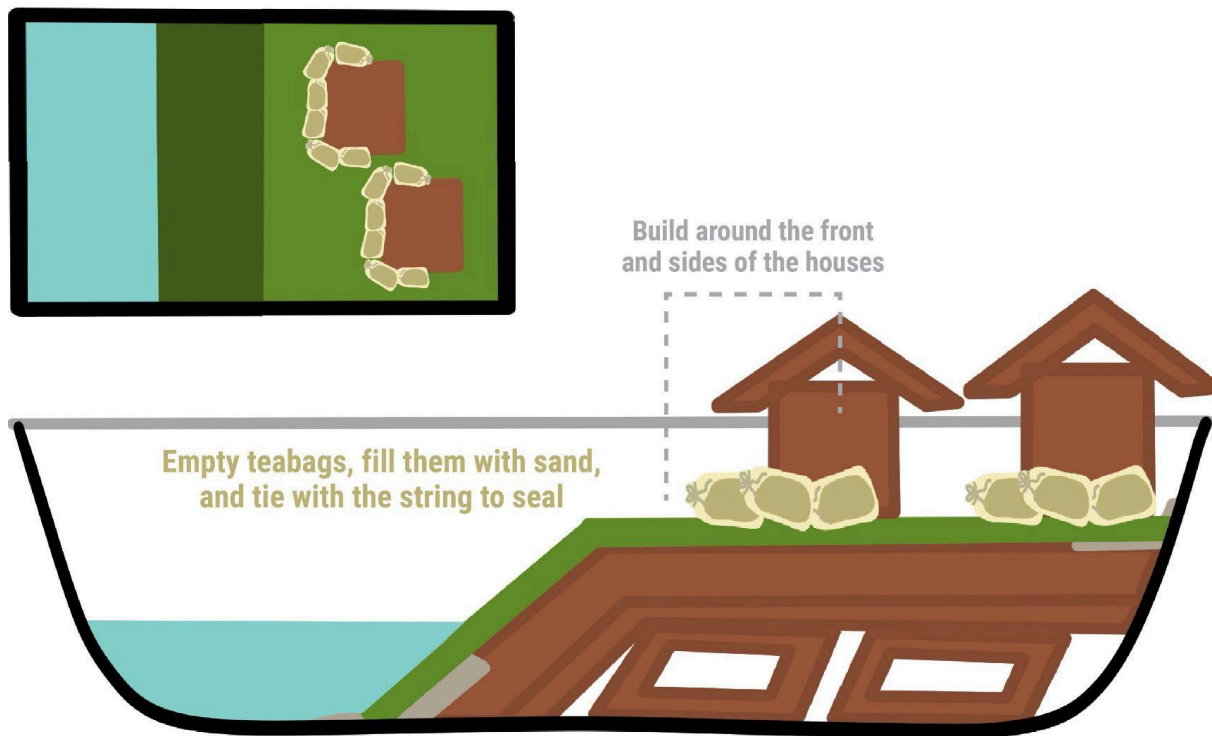
## Sandbags

For sandbags, students can empty the contents of **tea bags and refill them with sand** to create miniature sandbags.

Seal or tie the tops with the attached string (or use tape or staples) so the sand stays inside.

Place the sandbags around the houses, touching and slightly overlapping to form a continuous barrier.

This represents how sandbags can slow or barricade against rising water, while still leaking and eroding under pressure over time.



## Drainage

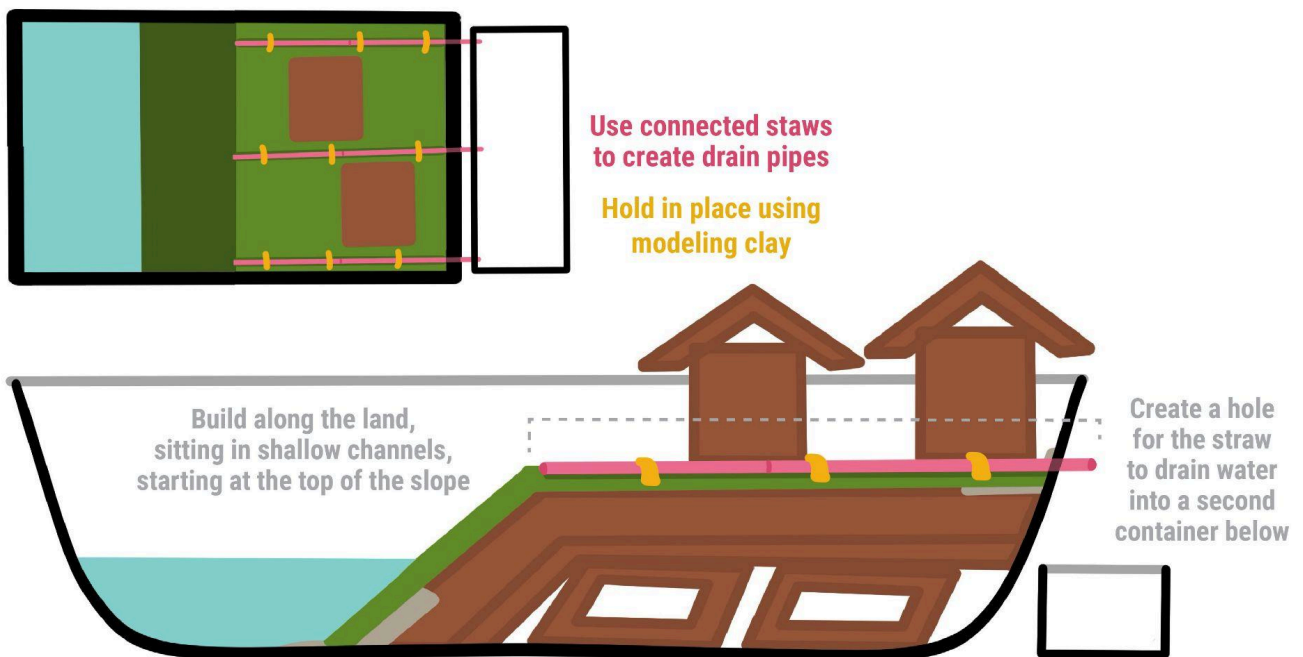
To create drainage systems, students should create **three small channels** along the land to represent stormwater flow.

Insert **connected straws** horizontally through the channels, with the inner ends starting near the top of the slope and the outer ends exiting through a hole in the side of the container.

Place a **second container beneath the exit points** to catch the draining water.

Use modelling clay around where each straw enters and exits the land to hold it in place and stop leaks through unwanted gaps.

During testing, water entering the channels should flow through the straws and collect in the second container, showing how drainage systems move excess water away from built-up areas.



## Stilts

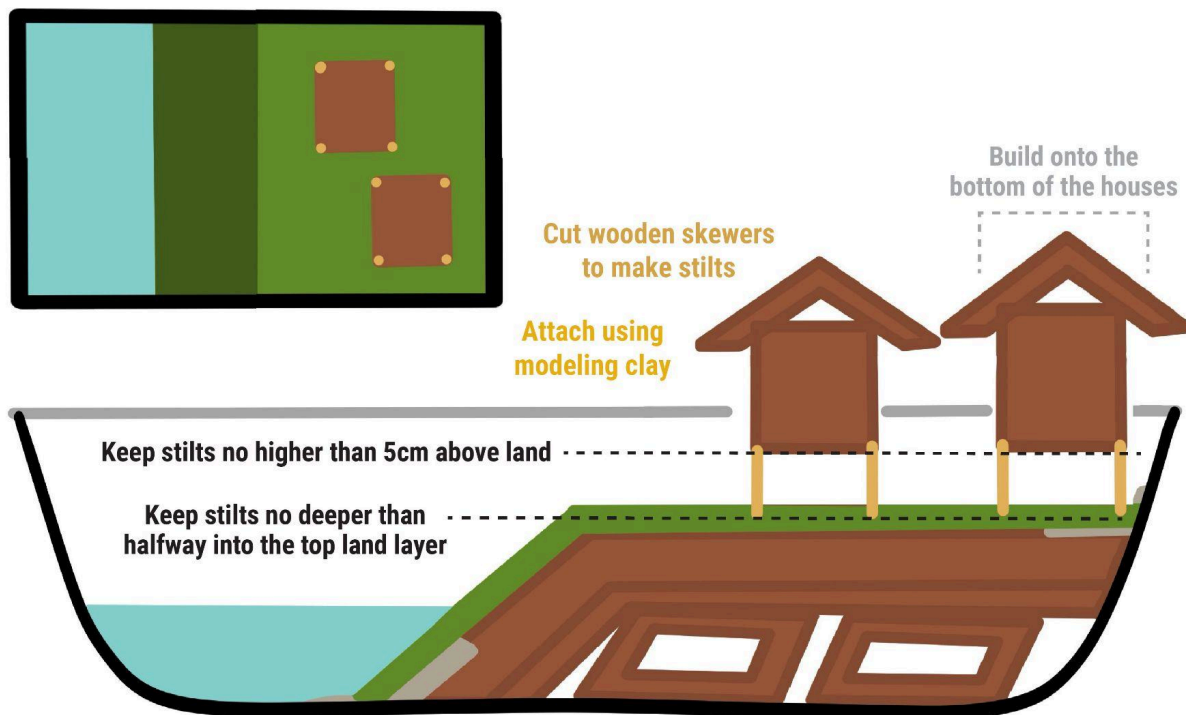
To create stilts, students should cut wooden skewers to an even length and attach them externally to the base of their cardboard houses using modelling clay or blue-tack.

Press the skewers firmly into the clay land area, but do not push them all the way to the bottom of the container.

They should sit within the land to a depth of around halfway to stay balanced but not unreasonably secure.

**Do not** seal around where the stilts enter the ground.

This demonstrates how stilts lift buildings above rising water, while highlighting that supports can still shift or, in extreme scenarios or if constructed poorly, collapse under pressure.



# Model testing instructions

## 1. Model setup (should align with the 'control' example):

- Each group should use the same-sized container and base layout
- The **land area should sit roughly halfway up the container's height**, with a slope into the water section

## 2. Starting water level:

- Fill the water section until it sits a **few centimetres below the top of the land** (just under half the container's total height)
- The land should remain dry before testing begins

## 3. Simulating flooding:

- Slowly pour additional water **into the water section only** – never directly onto the land
- This is important, as methods like mangroves and sea walls are built to hold back water from the coast, not rainfall from above
- Add water in small, steady amounts (around **200-300ml at a time**)
- Maintain the same pouring height, speed, and total volume for all models
- Mark a **maximum fill line** in the water section (around  $\frac{3}{4}$  of the container's height) to avoid overflow
- If the water reaches that line **before** flooding the land, note it as "*contained under current conditions.*"

## 4. During testing:

- Ask students to answer and discuss:
  - What do they predict will happen?
  - What worked well?
  - What didn't work?