



# **BEAT THE FLOOD**

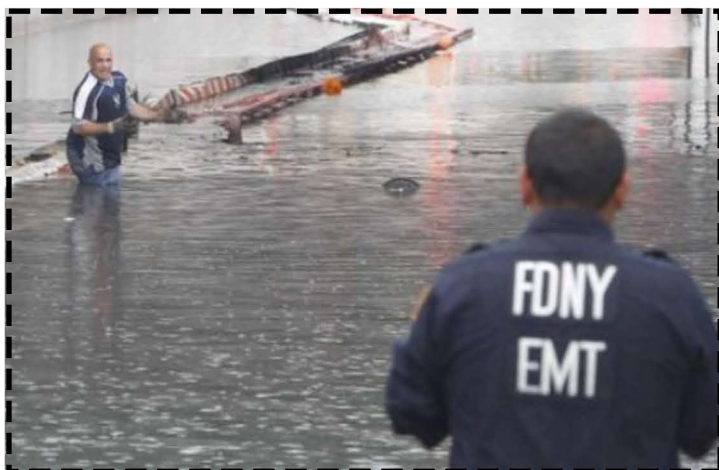


**Pupil activity sheets**

# Where in the world?

Working in small groups, look at the photographs below of people whose lives have been affected by flooding around the world.

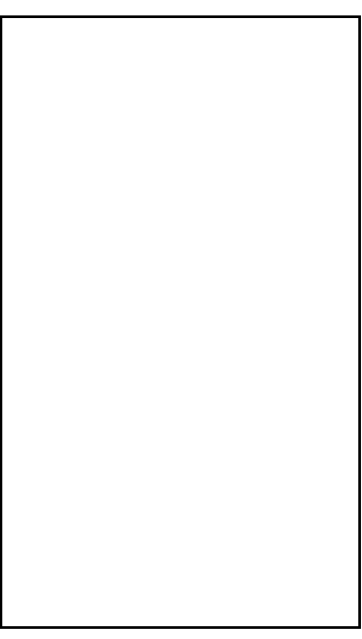
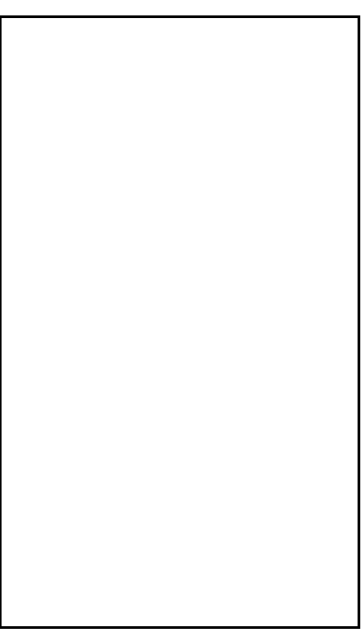
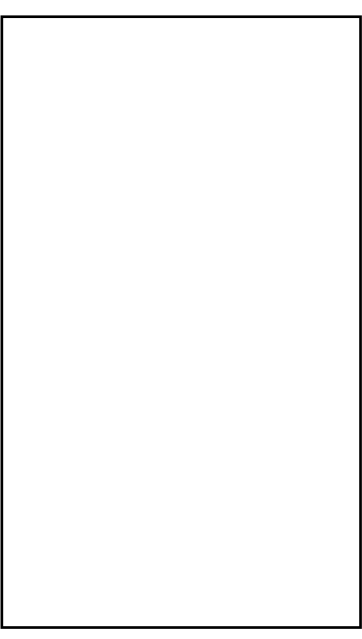
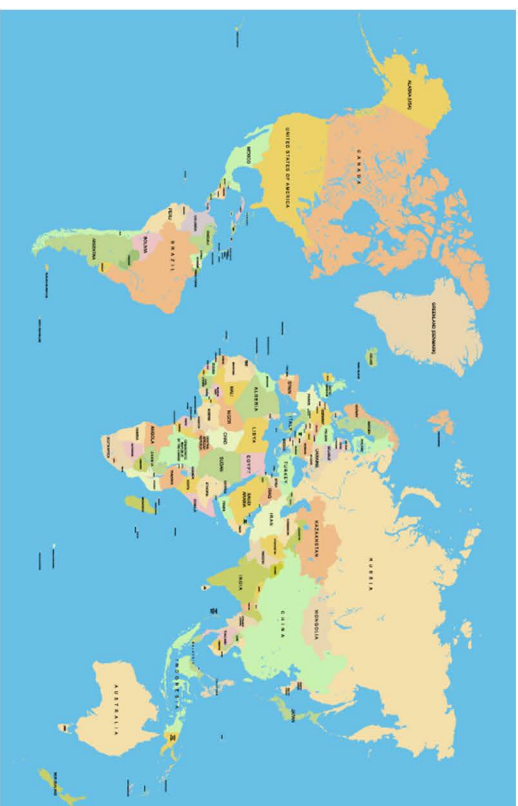
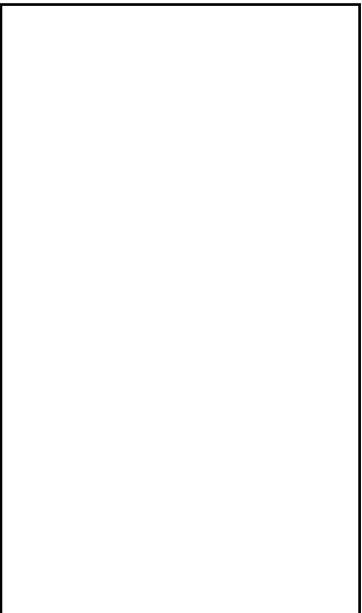
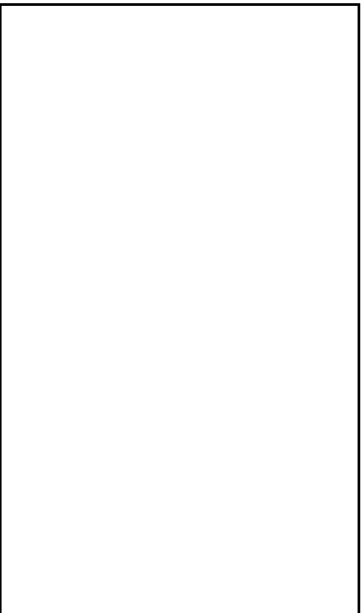
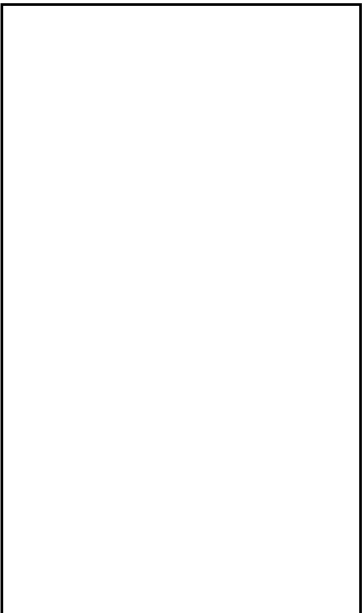
Cut out the pictures and discuss where you think the photographs are from before placing them on the world map.





# World map

Cut out the pictures of people affected by flooding and place them where you think they are from on the world map below.



Which of the people in these photographs do you think would be most devastated by flooding and why?

# The Sustainable Development Goals

	<b>No poverty</b>	End poverty in all its forms everywhere.
	<b>Zero Hunger</b>	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture.
	<b>Good Health &amp; Well-being for People</b>	Ensure healthy lives and promote well-being for all at all ages.
	<b>Quality Education</b>	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.
	<b>Gender Equality</b>	Achieve gender equality and empower all women and girls.
	<b>Clean Water &amp; Sanitation</b>	Ensure availability and sustainable management of water and sanitation for all.
	<b>Affordable &amp; Clean Energy</b>	Ensure access to affordable, reliable, sustainable modern energy for all.
	<b>Decent Work &amp; Economic Growth</b>	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
	<b>Industry, Innovation &amp; Infrastructure</b>	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
	<b>Reducing Inequalities</b>	Reduce income inequality within and among countries.
	<b>Sustainable Cities &amp; Communities</b>	Make cities and human settlements inclusive, safe, resilient, and sustainable.
	<b>Responsible Consumption &amp; Production</b>	Ensure sustainable consumption and production patterns.
	<b>Climate Action</b>	Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.
	<b>Life Below Water</b>	Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
	<b>Life on Land</b>	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss.
	<b>Peace, Justice &amp; Strong Institutions</b>	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
	<b>Partnerships for the Goals</b>	Strengthen the means of implementation and revitalize the global partnership for sustainable development.



# Frame and shell structures - pictures

**Bicycle**



**Skeleton**



**Cardboard box**



**Bicycle helmet**



**Chair**



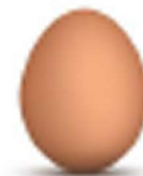
**Drinks can**



**Climbing frame**



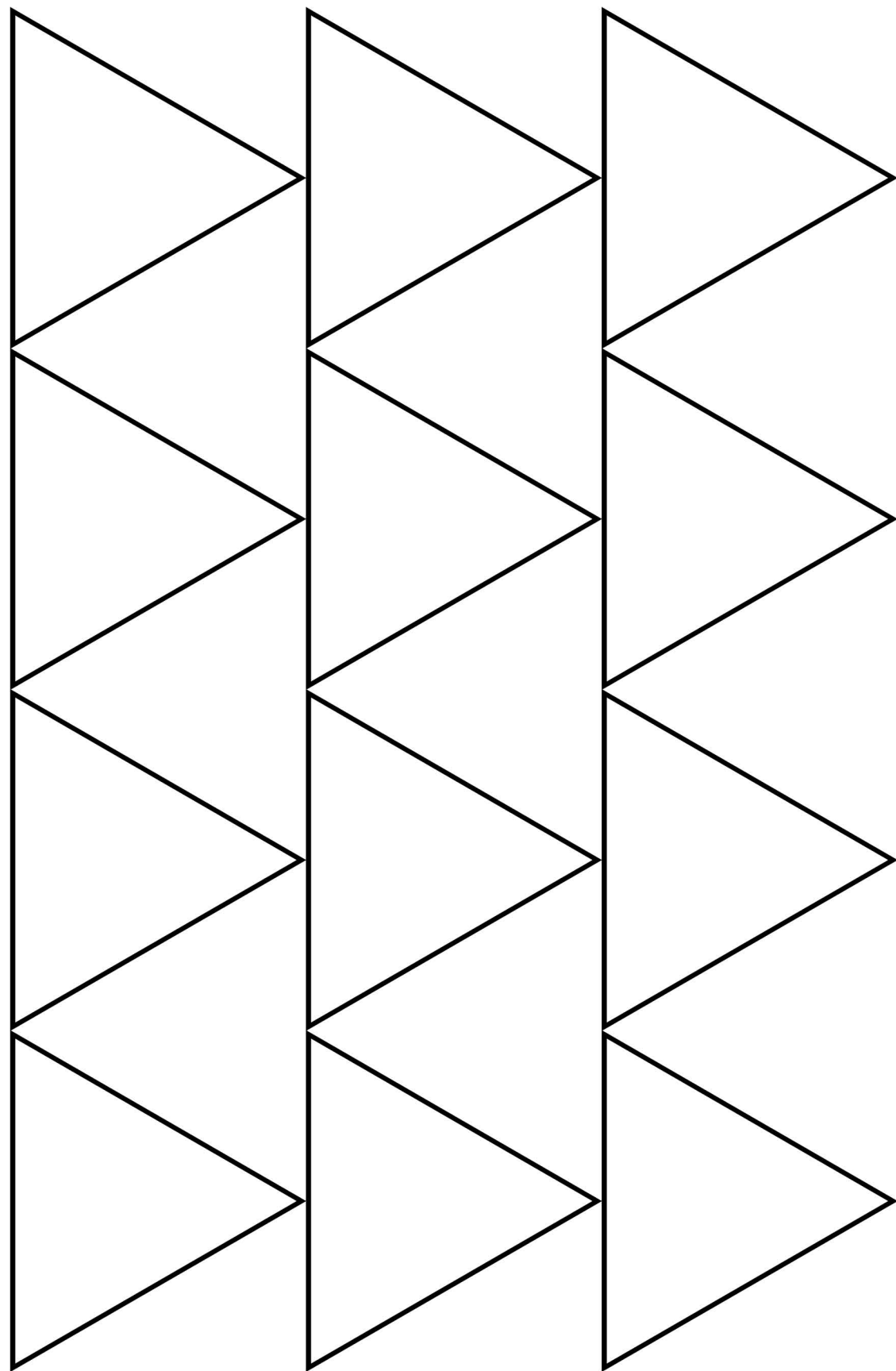
**Bird's egg**



# Structures template 1




# Structures template 2



# Testing materials for absorbency - results table

Name: .....

Class: .....

Material	Height that the water was absorbed to (cm)			Observations
	Test 1	Test 2	Average height	

Which material absorbed the least amount of water?



# Testing materials for strength - results table

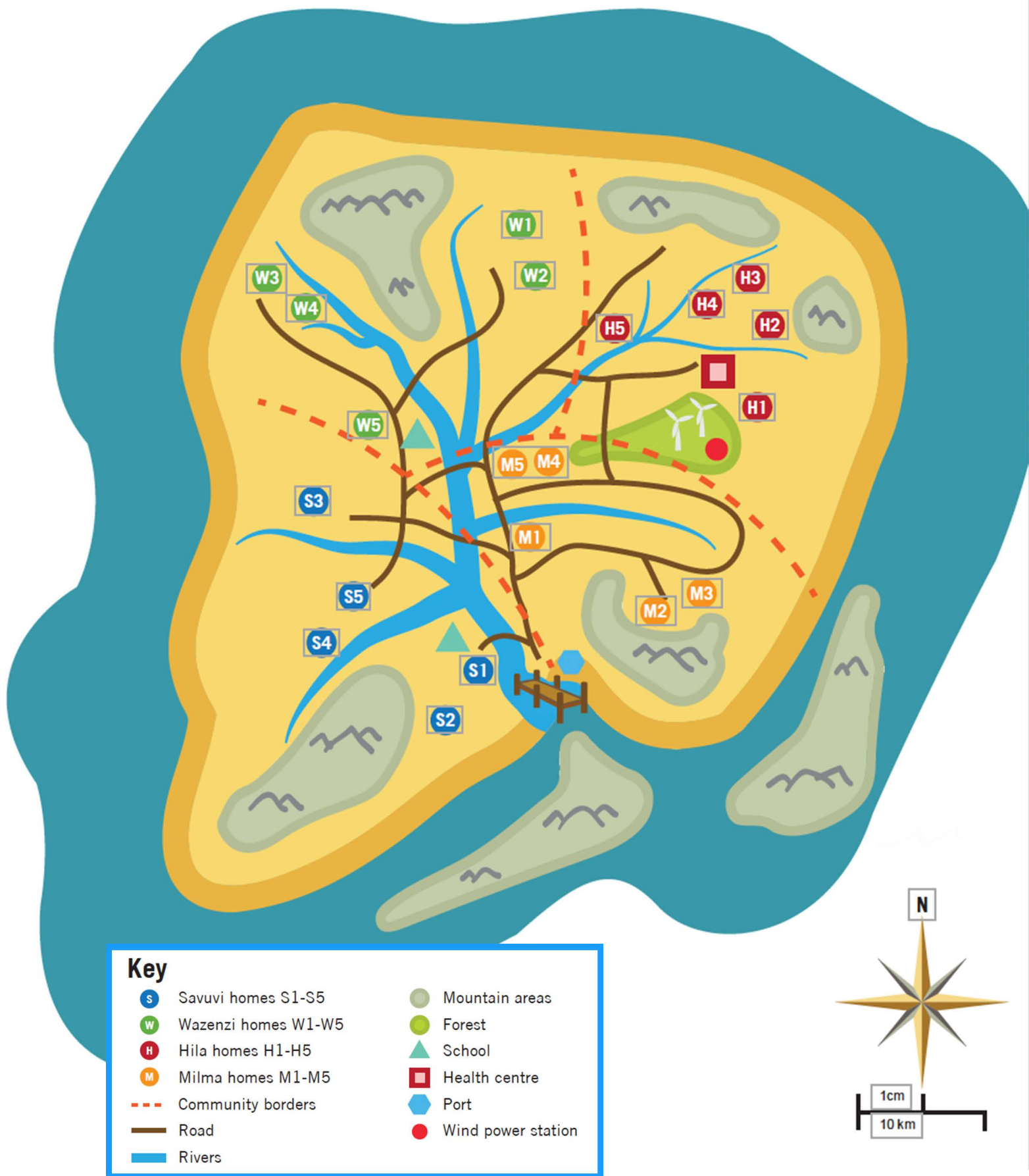
Name: .....

Class: .....

Material	Weight added to material (g)			Observations
	Test 1	Test 2	Average weight	

Which material was the strongest?

# Watu Island





# Watu Island community cards

## The Savuvi

**Location:** South West of the island

**Homes:** 5

**Other buildings:** primary school for children

**Average household size:** 6 people

**Main jobs in community:** fishermen, skilled at boat building and carpentry



## The Milma

**Location:** central area of the island

**Homes:** 5

**Other buildings:** wind turbine and generator supplying electricity

**Average household size:** 6 people

**Main jobs in community:** farmers and skilled foresters



## The Wazenzi

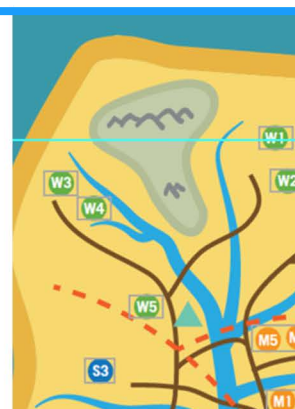
**Location:** North West of the island

**Homes:** 5

**Other buildings:** secondary school for 30 pupils

**Average household size:** 8 people

**Main jobs in community:** builders of traditional homes and brick makers



## The Hila

**Location:** North East area of the island

**Homes:** 5

**Other buildings:** health centre and hospital

**Average household size:** 7 people

**Main jobs in community:** land farmers and skilled craft people



# Materials cards

Use the cards below to help you to make decisions about the choice of materials for your flood-proof home, your modelling materials and the costs involved.



## Polythene Roll

*For modelling you could use cling film*

**Properties:** water resistant, does not provide structural strength, tears easily, malleable, non-recyclable, non-biodegradable

**Availability:** imported onto the island by boat - low transport costs due to its low weight

**Material cost:** £5 per roll (10m x 1m)



## Concrete

*For modelling you could use plasticine*

**Properties:** water resistant, very strong, difficult to demolish, durable, malleable, non-recyclable, non-biodegradable

**Availability:** imported onto the island by boat - weight of material leads to high transport costs

**Material cost:** £10 per sack covering 10m<sup>2</sup>



## Polyurethane Sheet

*For modelling you could use plastic bottles or polypropylene*

**Properties:** water resistant, strong, recyclable, difficult to cut, liable to cracking, non-biodegradable

**Availability:** imported onto the island by boat - low transportation costs due to weight

**Material cost:** £40 per roll (10m x 2m)



## Steel

*For modelling you could use foil food trays or card wrapped in foil*

**Properties:** water resistant, prone to rust, strong, recyclable, difficult to cut into sections, non-biodegradable

**Availability:** imported onto the island by boat - weight of material leads to increased transport costs

**Material cost:** £50 per sheet (2m x 3m)



## Bamboo

*For modelling you could use straws*

**Properties:** water resistant, reasonable strength but will need binding together, biodegradable, recyclable

**Availability:** easily available on the island

**Material cost:** £1 per 1m treated bamboo cane



## Softwood

*For modeling you could use wood splints or lolly sticks*

**Properties:** very absorbent, reasonable strength, susceptible to termites, biodegradable, recyclable

**Availability:** readily available on the island in all forest areas

**Material cost:** 2m per 1m lenth



## Dung/Soil/Ash

*For modelling you could use mud or clay*

**Properties:** malleable, recyclable, biodegradable, repels termites, fibrous which stops soil cracking

**Availability:** readily available in many areas of the island

**Material cost:** free



## Glass

*For modelling you could use perpex, plastic or clingfilm*

**Properties:** recyclable, non-biodegradable, water resistant, highly fragile

**Availability:** imported onto the island by boat - weight of material leads to high transport costs compared to locally available material

**Material cost:** £30 per sheet (2m x 1m)



## Hardwood

*For modelling you could use lolly sticks or balsa wood*

**Properties:** absorbent, strong, durable, resists termites, biodegradable, recyclable

**Availability:** this needs to be transported onto the island and then down the river. There is no readily available hardwood on the island

**Material cost:** £10 per 2m plank



## Corrugated iron

*For modelling you could use aluminium foil or corrugated plastic*

**Properties:** water resistant, prone to rust, strong, recyclable, difficult to cut into sections, non-biodegradable

**Availability:** imported onto the island by boat - weight of material leads to high transport costs compared to locally available material

**Material cost:** £40 per sheet (2m x 1m)



## Bricks

*For modelling you could use plasticine or lego bricks*

**Properties:** strong, weather resistant, durable, recyclable, non-biodegradable

**Availability:** can be made on the island or imported via boat

**Material cost:** 50p per brick



## Reeds

*For modelling you could use grass or leaves*

















**Properties:** need attaching to another structure, malleable, weather resistant

**Availability:** available throughout the island

**Material cost:** free



# Summary of costs

 <p><b>Polythene Roll</b> Cost: £5 per roll (10m x 1m)</p>	 <p><b>Concrete</b> Cost: £10 per sack covering 15m<sup>2</sup></p>	 <p><b>Polyurethane sheet</b> Cost: £40 per sheet (10m x 2m)</p>	 <p><b>Steel</b> Cost: £50 per sheet (2m x 3m)</p>
 <p><b>Bamboo</b> Cost: £1 per 1m cane</p>	 <p><b>Softwood</b> Cost: £2 per 1m length</p>	 <p><b>Dung/Soil/Ash/ Sand</b> Cost: Free</p>	 <p><b>Glass</b> Cost: £30 per sheet (2m x 1m)</p>
 <p><b>Hardwood</b> Cost: £10 per 2m plank</p>	 <p><b>Corrugated iron</b> Cost: £40 per sheet (2m x 1m)</p>	 <p><b>Bricks</b> Cost: 50p per brick</p>	 <p><b>Grass/Reeds/Jute</b> Cost: Free</p>
 <p><b>Nails</b> Cost: 10p per nail</p>	 <p><b>Metal fastenings</b> Cost : £5 per fastening</p>	 <p><b>Nuts and bolts</b> Cost: £1 per nut and bolt</p>	 <p><b>Rope</b> Cost: £5 per 10m</p>

# Design Specification

Name: .....

Class: .....

Before developing your ideas for your flood-resistant home, think about the features that you want your home to have, and give a reason why these are important.

**Materials** - What properties do you need the materials in your home to have?

**Suitability for the community/family** - What features do you want your home to have to make it suitable for the people who will live in it?

**Construction method** - What type of structure do you think best suits the conditions and materials available on the island?

**Environmental issues** - Will you consider the effect of your choice of materials on the environment?

**Cost** - What will you do to keep costs to a minimum?

# Design ideas

Name: .....

Develop a few ideas for your flood-resistant homes and sketch them below.

Class: .....

Annotate your design ideas with notes alongside your drawings to give additional information. You can include:

- details of hidden parts such as fixings, openings, interior elements
- information about materials and size
- how your design would be suitable for the community
- how the design meets the specification points

# Costing our flood-proof house

Name: \_\_\_\_\_

Class: \_\_\_\_\_

**Instructions:** Make a list of the materials you've included in your final design. Cost each material and then total the cost of your home.

Material	Quantity used	Cost per unit	Cost
Total cost of home			



