WHAIAO
Education for Sustainability Otago

Better Building

Addressing Climate Change, Health & Wellbeing

EBANZ
Earth Building Association of New Zealand
...promoting the art and science of earth and natural building

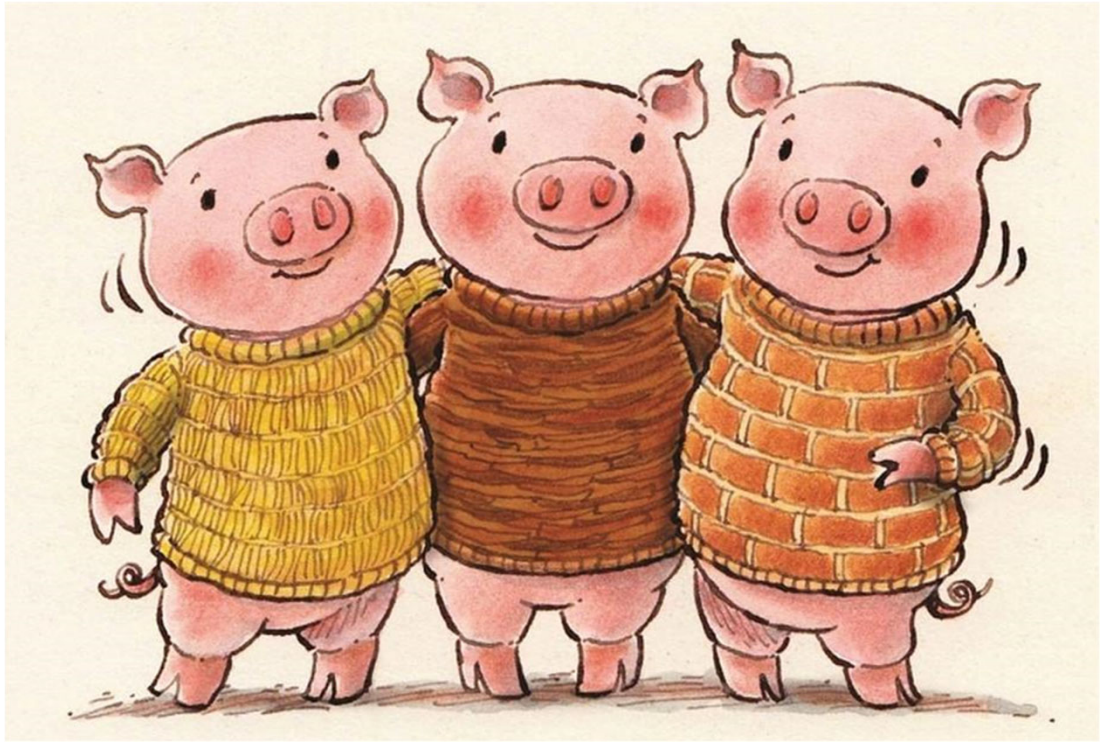
DESIGN & MAKE ARCHITECTS

Enviroschools

OTAGO POLYTECHNIC
Te Kura Matatini ki Otago

SUSTAINABLE DEVELOPMENT GOALS

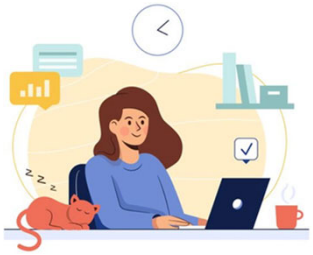
Why we need to think about what we build with



https://www.youtube.com/watch?v=7V8oFI4GYMY

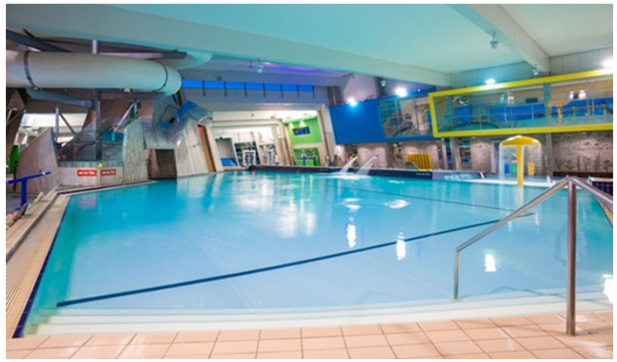
What are buildings for?









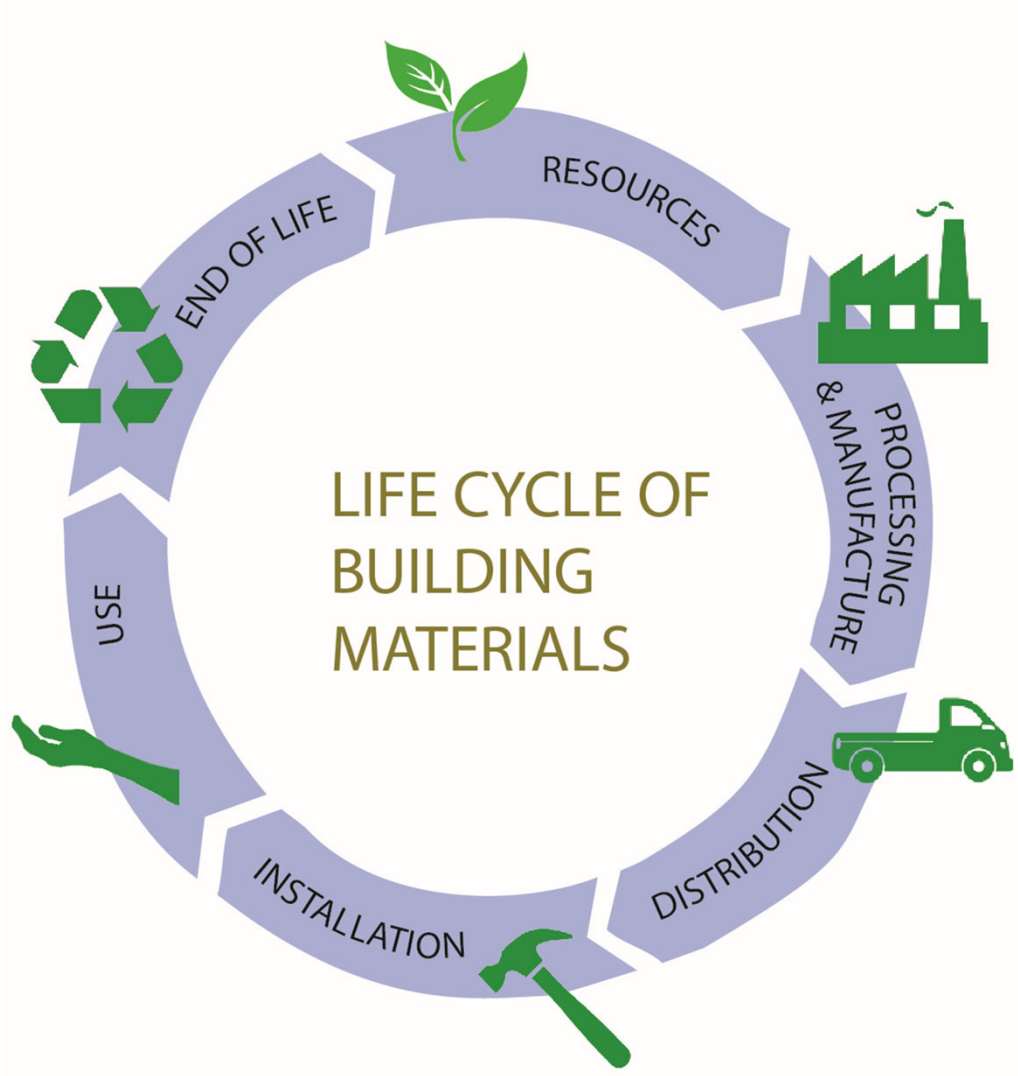






What are buildings made of?

What do you think was used to build these simple homes?


LIFE CYCLE OF
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MATERIALS
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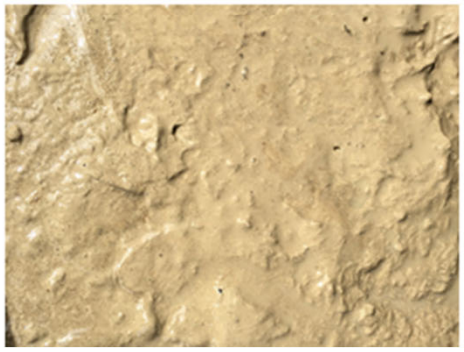
Earth building techniques use mostly these materials:

Fibre (light)

Straw /
Cellulose
Hemp

Binder

Clay



Aggregate (heavy)

Sand
Stones

Earthen Floors - alternative to concrete floors (except for under load bearing walls)

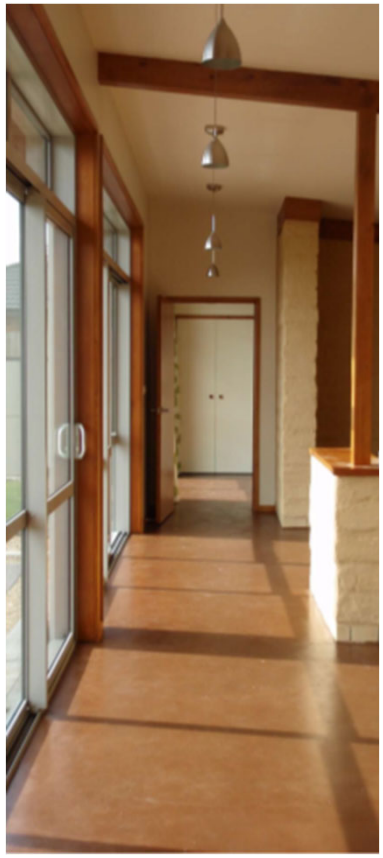
Materials:

Clay

Sand

Chopped straw

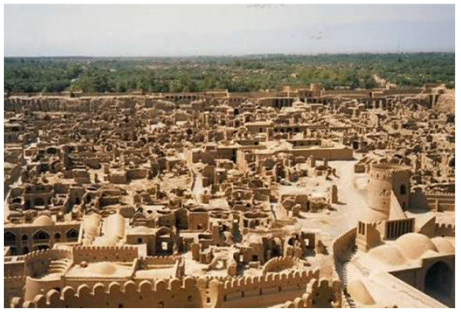
Linseed oil finish



History of earth building

Egyptian Adobe

Great Mosque, Mali, 1907



Moroccan Town

Rammed earth village in Germany

Strawbale House in Nebraska, USA

Straw-clay, plaster and timber in Germany

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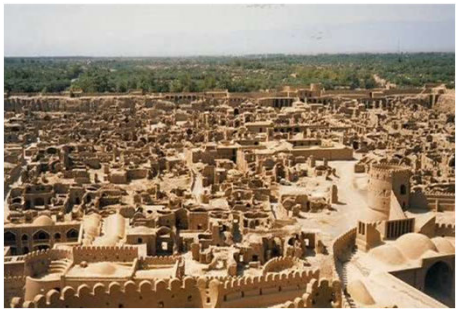

Moroccan Town

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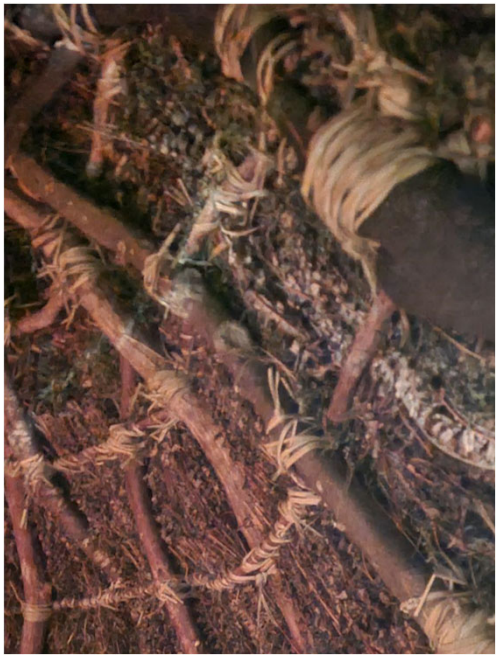
Strawbale House in Nebraska, USA

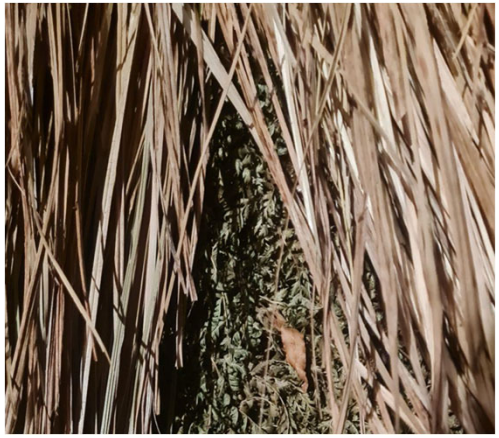
Straw-clay, plaster and timber in Germany

History - Maori building techniques

Earth, Timber, Cabbage Tree leaves, Raupo

Weaving & carving skills were utilised as building techniques





The local iwi taught the first settlers about materials and building techniques so that the settlers could build the shelters they needed to survive.

The settlers used earthen cob wall techniques from their tradition homes with raupo and manuka roofs using Maori techniques.

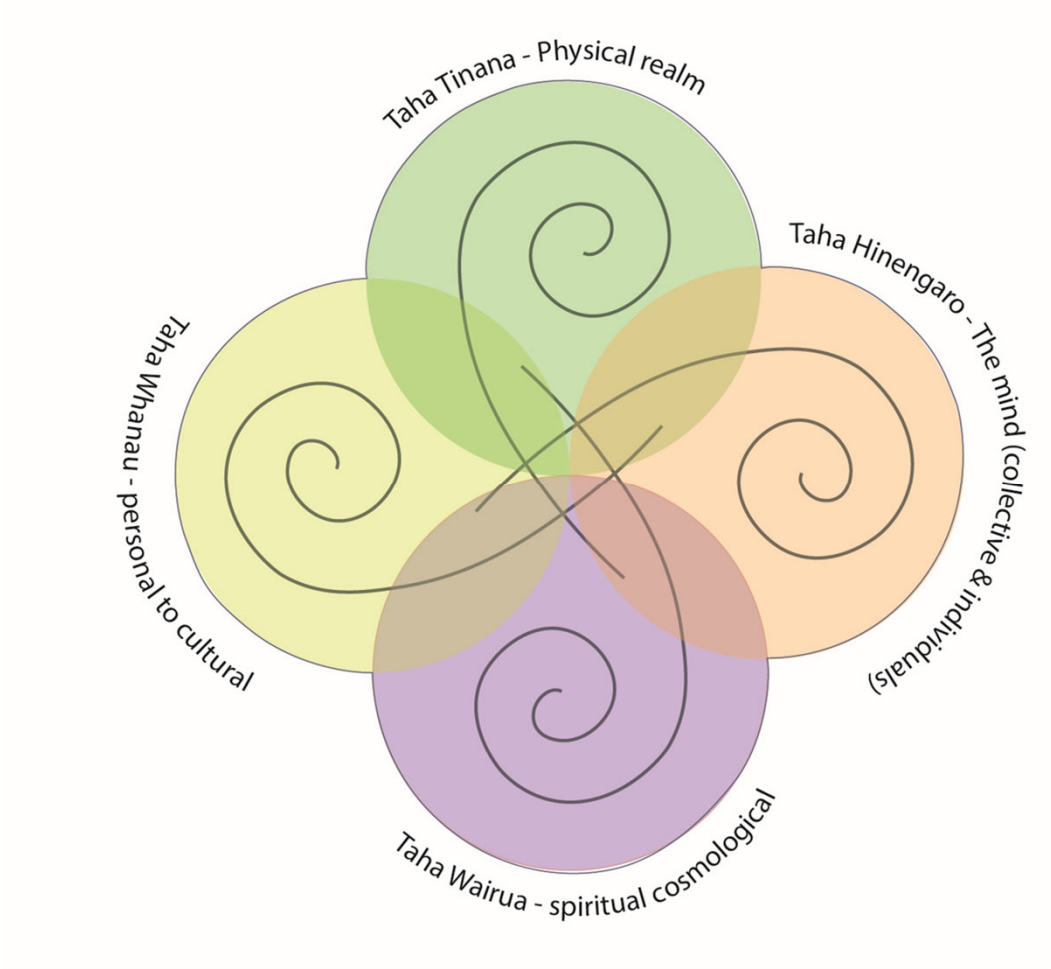
History earth building - Otago New Zealand

Murphy’s Cottage in Fruitlands built in the 1870s approximately. Unattended Cob Building.

Gay Tans at Macraes – Rendered mud brick. An example of a bigger structure.

(Photos taken: Salmond, 2005).

The golden point historic reserve huts at Macraes – Some examples of sod buildings.



Four threads of Mātauranga

I feel, therefore I understand (spoken)

- All participants outside.

Contemplation exercise - sensory experience.

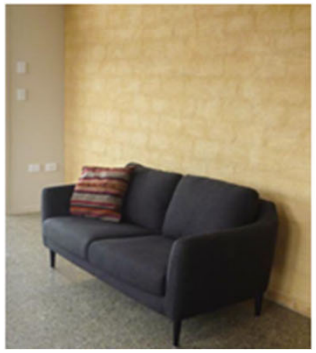
Thinking about the materials themselves. Show some examples of the materials.

(little paper cups with samples of materials provided to each person to touch and smell). Or, Everett goes around with a bucket of material and puts a piece in each person's hand. He could have gloves on.

What does it feel like, smell like. Could you technically taste it?

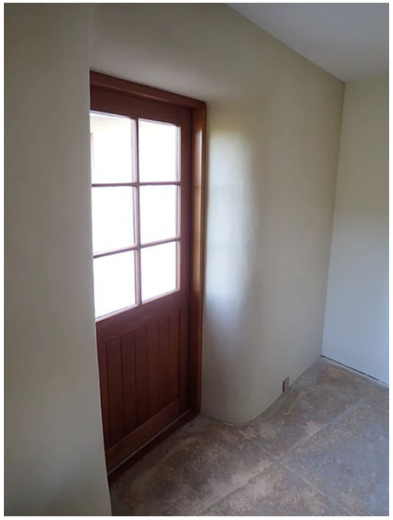
Natural Building options overview

Light to → Heavy

Straw bale	Light Earth Mix / Straw clay	Low density Earth Bricks	Adobe / Cob Mud Brick	Rammed Earth & pressed earth brick
				

Cobb, Adobe brick & Rammed earth

Strawbale houses with plaster finish



Straw as a building material





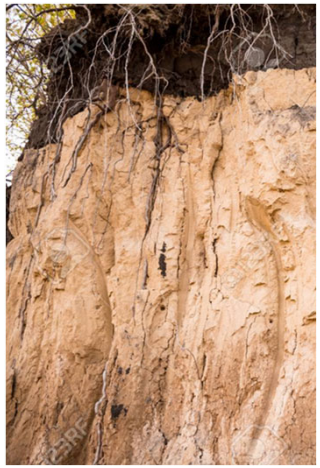
Straw is NOT Hay!

Dried stalks of grain, left over from grain production

Dried grass, cut and baled to feed animals

From clay to interior plaster

From the Ground → To the finished wall lining

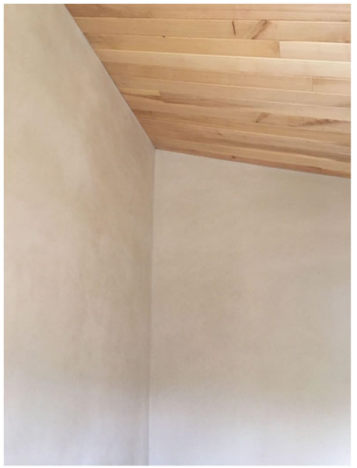


Clay in the ground

Clay being soaked

Clay mixed with some sand and small pieces of chopped straw

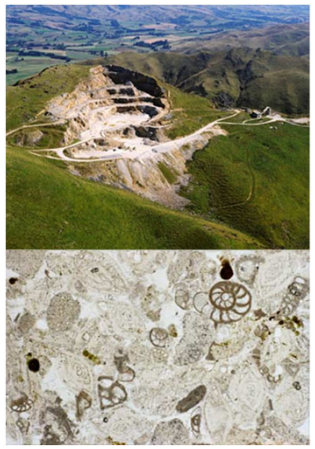
Clay plaster on the strawbale walls



Final finish plaster on the interior walls

From limestone to exterior plaster

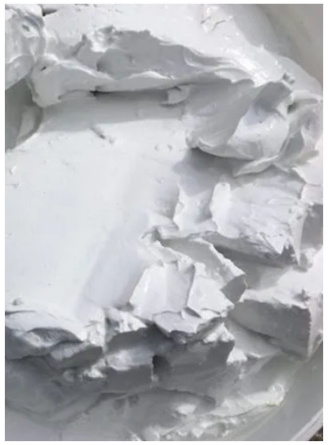
From the Ground → To the finished wall exterior



Limestone in the ground

Traditional burning of the limestone to change the chemical properties

Hydrated lime mixed with some water



Lime putty ready to apply to walls

Final finish plaster on the interior walls

Straw bale building - fire resistance

A plastered straw bale wall achieved a 90 minute fire rating.

Without the plaster, the straw bales will withstand heat and flames for 30 minutes.