LESSON 1 INTRODUCTION TO ALTERNATIVE BUILDING

People have been building shelters from natural materials since the dawn of civilisation. Mud, straw and wood are materials that have always been plentiful. A wide range of construction techniques have developed and been refined, based on the use of these materials.

These alternative materials have been coupled within natural building techniques to construct walls of buildings, small or large - from storage sheds to commercial buildings, and homes. They can also be used to create freestanding garden walls and a variety of other structures.

At a fundamental level, there are three main ways these natural materials have been used in building:

1. Plant material such as wood, grass or cane is joined together (e.g., by weaving, tying, or nailing) to create a solid structure.
2. Mud is stacked, plastered or in some other way used to create a structure. Mud has also been used to fill in spaces between timbers in wooden buildings.
3. Plant material such as wood or straw is used to create a structure which is then plastered over with mud.

A fourth type of natural material is rock or stone. Stone has often traditionally been used as a foundation below structures built from mud or plant materials.

Mud brick wall

Suggested Tasks: ▼

Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column.

Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.

Strength and Durability

Structures built with these natural materials can be vulnerable to collapse if they are not constructed properly. If built solely with plant material the building can be easily damaged if the organic material decomposes, if there is insufficient quantity of material, or the quality of construction is poor.

The weight of a roof on walls built from plant material and/or mud can also lead to collapse if the walls are not strong enough to support the weight above. Weaker walls can be strengthened and made resistant to wind and rain by either reinforcing them with steel or logs; or by thickening them with stronger materials (e.g., plastering with several layers of earth cement or concrete).

Strength and durability can also be compromised by building on a weak or unstable foundation. Stone or concrete are common traditional materials used for foundations.

With the right composition, construction and environmental factors, structures made from natural materials may last for hundreds of years.

Covering the Structure

Shelters can also be strengthened and made more resistant to degradation by being roofed separately. It can sometimes be easier to create a roof made from lighter weight materials such as canvas, fibreglass, or metal sheet. Traditional roofs may have been made using animal skins or woven reeds spread over a structure.

Roofs may also be created from waterproofed mud (e.g., earth cement) plastered over a lightweight temporary cover. Effective domed roofs have also been created from mud bricks. When mud dries, it becomes stronger. However, it is not necessarily strong enough to withstand extreme weathering unless it is reinforced, given support by strong beams, and/or waterproofed.

Types of Straw, Wood & Mud Construction

1. Mud bricks are made by placing mud into a mould, then removing the mould and allowing the brick to air dry. The earth used to make a mud brick needs to have a high percentage of clay, though pure clay alone does not make a good mud brick. Instead, about 60 to 70% clay content works best. Water is mixed thoroughly to create an evenly moist consistency that will hold firm and not slump when the mould is removed. As little as 40% clay may be used, but with less clay, chopped straw or some other material may need to be added so that the earth binds together and does not crumble once dried.

2. Poured earth construction involves creating moulds for walls, then pouring a slurry made from soil and water, often with straw added. The mix is like mud brick, but with more water in it. The aim is for a consistency like a cake mix.

3. Cob is a method that involves stacking balls, lumps, or ‘cobs’ of mud one on top of the other. Here, it is important to avoid stacking too much wet cob on top of a layer until the cob below has properly dried. Good cob building takes time. It involves gradually building up the height of a wall layer by layer once

the bottom layers have dried out and strengthened.

4. Rammed earth involves setting up moulds for walls as with poured earth construction. Unlike poured earth though, the mud is only moistened to a stiff consistency. It is then put into the mould and rammed down to remove any air pockets and produce a solid, stiff construction.

5. Wattle and daub involves first building a framework from branches taken off plants and woven together. These branches could include thick timbers down to thin stems. Once this framework structure is in place, it is then plastered over and any gaps are filled in with mud. This plaster may have cement mixed into it (creating an earth-cement) or it may just be mud. Once solid and dry, the construction may be covered further with a waterproofing material.

6. Straw bale is in many respects similar to wattle and daub. It involves stacking straw bales and tying them together (e.g., with reinforcing rods or wire mesh). Once the wall structure is built, it is then plastered over to create a solid, permanent wall, enclosing the straw bales inside.

7. Reeds, bamboo or other grass-like materials can be woven together to create natural buildings which may be semi-permanent but could decompose over time unless attended to. This type of construction can be relatively lightweight and may be used to create roofing, though it will often be impacted by extreme weather events. Thatched roofs can be created using these types of materials.

Bamboo structure

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Suggested Tasks

What materials is the oldest traditional type of building made from in the country you live in?

Find out by talking to a friend of colleague, or asking someone with knowledge of local history.

Are there still examples of these types of buildings in existence?

Rammed earth walls

What Can be Built & Why

All these natural building techniques are still being used today, and they are increasingly used in developed countries. One may jump to the conclusion that the primary reason for using natural building techniques is to save money. However, there are many reasons. For example, these techniques are environmentally friendly because they use materials that are eco-friendly to the environment and they often have biophilic benefits. Also, they don't contain harmful chemicals and they are often able to insulate buildings well against extreme temperatures. Some other benefits of using natural building materials include:

- Reduced contributions to landfill
- Reduced noise pollution throughout construction processes
- Reduced chemical runoffs and pollution emissions
- Materials are often sustainable and/or replenishable
- Better overall health (mentally, emotionally and physically) for humans, animals and the environment

One can build all sorts of things with these natural techniques, from small to large projects and structures. Consider beginning by building a small shed, garden wall, fence, BBQ or seating. It's often best to start with small projects to test ideas and refine skills. As one learns more it seems reasonable to attempt larger projects such as a free-standing garden room, a gazebo, an office space, or a community project.

Natural building can take a lot of time and manpower. However, if the right materials are readily available, these construction methods can be well suited to various community projects (e.g., building a community hall or church). Working with natural materials is something that people of any age can participate in.