



SOLUTION TO  
OPEN  
DEFECATION

SUMMER  
SCHOOL REPORT

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# TOILETS IN KUTCH

KHULE MEIN JANE SE KANHA KOI NUKSAAN HOTA HE! TOILET KYU BANAYEN!

- GEETA BEN(agariya)

Most of the village population do not have access to safe and reliable toilets. A good toilet, together with a safe reliable water supply and the practice of good personal hygiene can do much to improve personal and family health and wellbeing. There is an urgent need for the construction of simple, low cost, affordable toilets that are easy to build and maintain and are relatively free of odours and flies.

The compost is useful in the vegetable garden and can also be used for growing trees. The simplest are low cost pit toilets and a builder is not required once the householder has learned how to make it.



## OPEN DEFECACTION IN THE VILLAGE AND IN LITTLE RUNN OF KUTCHH BY AGARIYA COMMUNITY.

During the salt farming season they practice open defecation in kutch and in villages, despite of having toilet they prefer to defecate in open.

### SURVEY, ANALYSIS AND MEETING WITH STAKEHOLDERS

We surveyed 43 agariyas families and recorded their views over the open defecation problem. We asked questions and even tried to make them realise the importance of it.

#### 1. Jaga bhai

- working as a salt farmer since childhood.
- never used a toilet in his 60 years of life.
- earns rs.25000 per year.

#### 2. Babulal d. Bathrani (ex. Sarpanch)

- Water is not available in village
- Main concern of villagers is privacy
- Only 15 percent of villagers have toilets
- Portability should be the main factor of consideration
- He spent 7000 inr to make toilet in his house
- On an average agariya earn 2lakh per year and is able to save 50k

#### 3. Tripon varbhan ji

- Water is the main problem.
- 20km is the distance of farm from village
- They make toilet with sheets and bamboo structure.
- Main concern is privacy

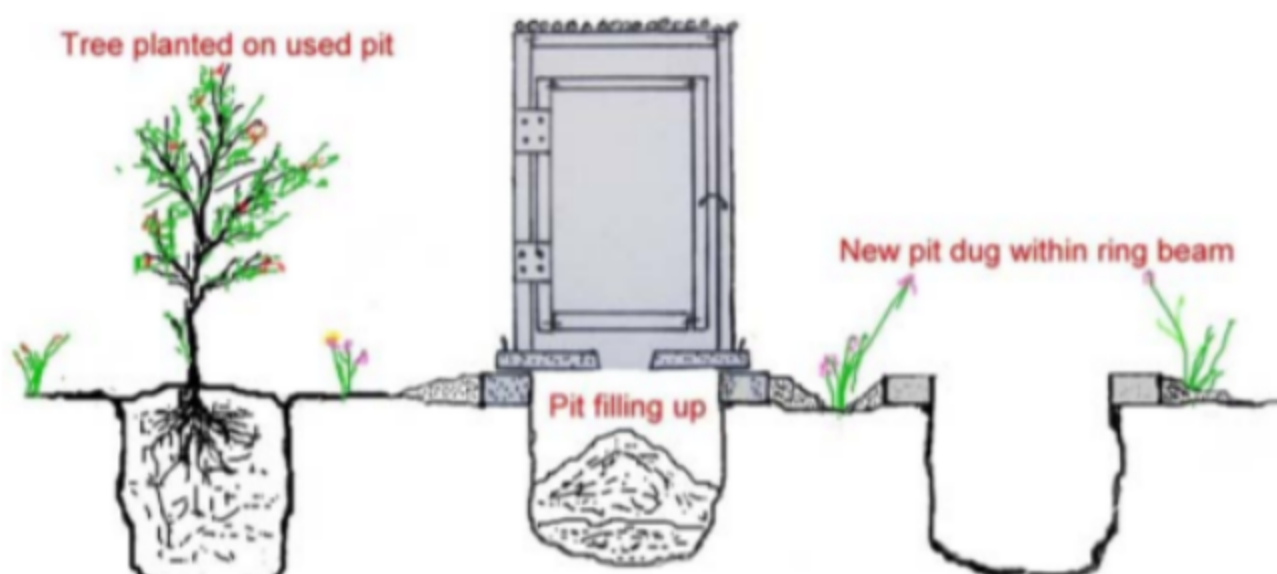
## Observations

1. Everyone was willing to use a toilet.
2. Many never used toilet and only few privileged houses had one.
3. There were some families who had a toilet constructed in their houses but they were not using it because of some of their beliefs. They have to use it in rainy season as they can't go far as there is water all around them.
4. Cost was one of the major factor for them. It took around INR 10,000 for a pukka toilet construction. When we asked them their limit, it was between 2000 to 5000 INR.
5. Few years back two families in the village was given plastic toilets that were portable but they got damaged in 2 months and they were not durable.
6. Few agariyas families dig the pits and cover four sides with plastic bags sort of enclosure, but again only 2 families said us so. Rest said they are fine by going in open.



# TYPES OF TOILETS

AFTER STUDYING THE CONDITIONS IN KHARAGHODA AND ANALYSING THE SURVEY, IT WAS CLEAR TO US THAT WE HAVE TO MAKE A COMPOSTING TOILET. TRANSPORTATION OVER THERE IS POOR SO TOILET HAS TO BE EITHER STORING OR SELF TREATING!



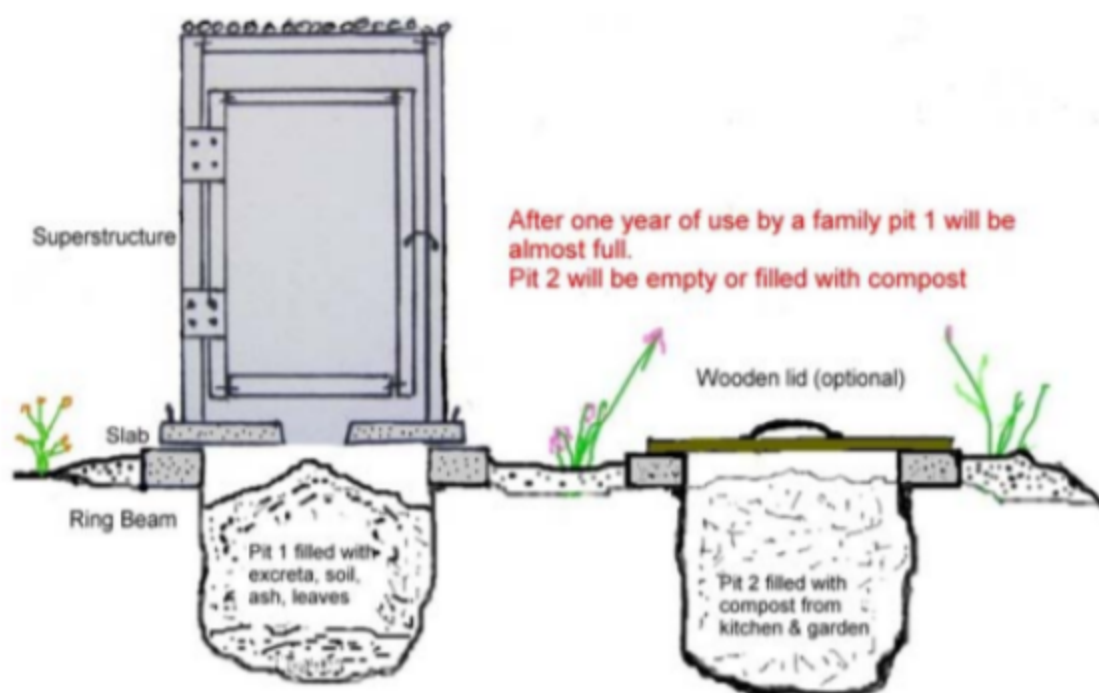
The simplest single pit compost toilet. In this concept the pit is shallow, about 1.0 to 1.5m deep, and the toilet site is temporary. Excreta, soil, ash and leaves are added to the pit. The toilet - consisting of a ring beam, slab and structure - moves from one site to the next at 6 to 12-month intervals. The old site is covered with soil and left to compost. A tree is planted on the old site, preferably during the rains.



## Arborloo

# FOSSA ALTERNA

- THE DOUBLE ALTERNATING PIT COMPOST TOILET

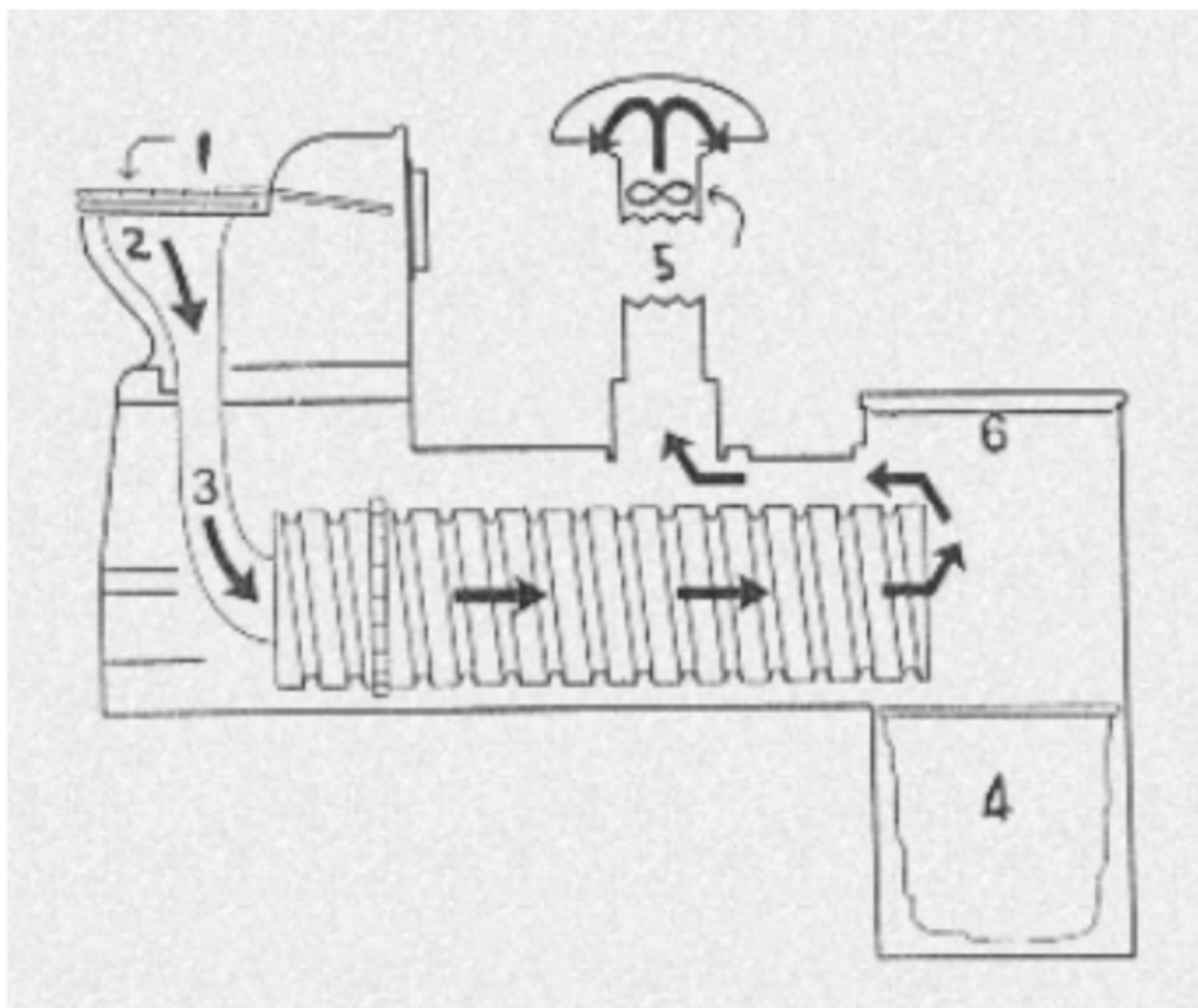


In this concept there are two permanently sited shallow pits, about 1.5m deep and dug close to each other, which are used alternately (Figure 2-2). For a medium sized family the pit takes about 12 months to fill up and this same period allows sufficient time for the mix of excreta, soil, ash and leaves to form compost which can be excavated. Every year one pit is excavated whilst the other becomes full. If the pits remain stable this process can continue for years.



excavating the humus from the pit

# ECOSAN TOILETS



The human excrement falls down a vertical chute (2) and into one end of a specially designed helical screw conveyor (3). Every time the toilet lid (1) is lifted, a mechanism rotates the conveyor. With each rotation the human excrement slowly moves along, taking approximately twenty five days before falling into a reusable collection bag (4). It takes six months for the bag to fill with dry and odourless waste.

Through the uniquely designed ventilation pipe (5), adequate airflow is provided for the dehydration / evaporation, deodorising process. Human excrement consists of roughly 95% moisture. As the solids dry in the conveyer the urine and moisture is vented into the atmosphere. The solid waste then dries into a compost-like material, roughly 5 - 10% of it's original mass.

The dry waste is manageable and can be processed in the following ways.

Use it in the making of compost

Dispose of it by using municipal waste services

Use it as a source of fuel

Large objects like beverage cans, disposable nappies or other objects accidentally dropped down the chute will not block the system, It is however not advisable to do this

# DESIGN IDEOLOGY

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Based on these observations we started designing. Earlier we thought to take inspiration from ecosan toilets that were proven to be successful in Africa, then we switched to composting toilets and looked up few of the already functioning designs.

Design Aims -

- 1. It has to possess a indian toilet seat.
- 2. It should be UNDER 5000 INR.
- 3. IT SHOULD BE PORTABLE



# WORKING PRINCIPLE

**We evolved the final design with a concept and them made it with the locally available crap and materials.**

**We made the toilet modular so that villagers can assemble it in 3 easy steps.**

**Design description -**

**Design has three parts**

- 1. Toilet seat which is made of bamboo.**
- 2. Barrel or composting pit along with ventilator.**
- 3. Drainage system**



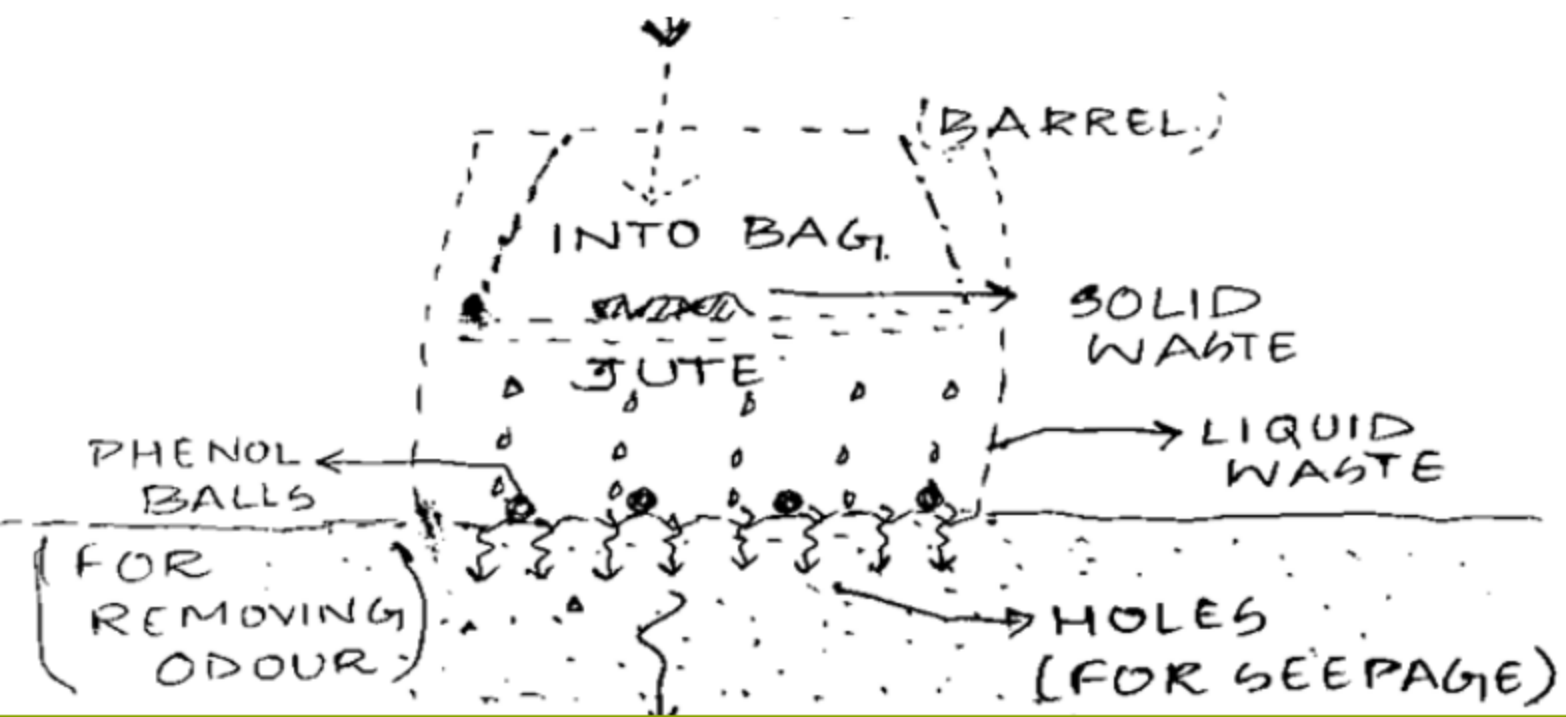


## DIAGRAMATIC REPRESENTATION

Barrel is the main component over which the seat made of bamboo will rest. The barrel has holes below till the height of 1ft on the periphery of drum, so that seepage can take place easily of the liquid waste.

The solid waste will be collected in the jute bag tied inside the barrel which is treated with soil. When the person will use it, he has to use soil and ash mixture instead of water. He can use little water to wash himself which will step down and move to soil. There is also a pipe that is attached to the surface, so if the level of liquid waste rises then it can even drain out from that pipe. Other than this, we used a lid to cover the toilet sheet after use.

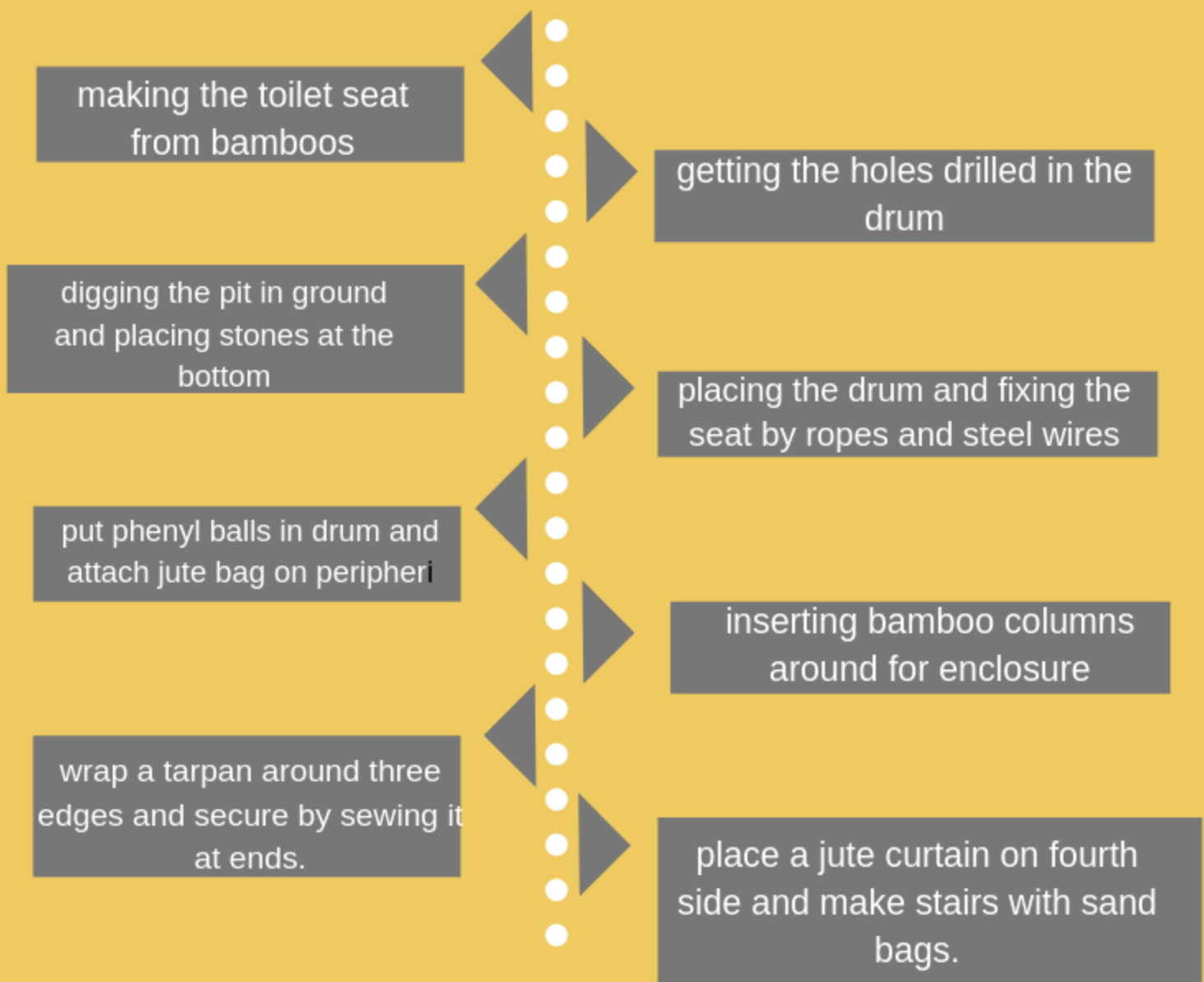
In 15 days the waste will become the manure and when they will open the toilet seat the ropes attached to the sear will move apart closing the bag and bringing it up.



# PROTOTYPE 2

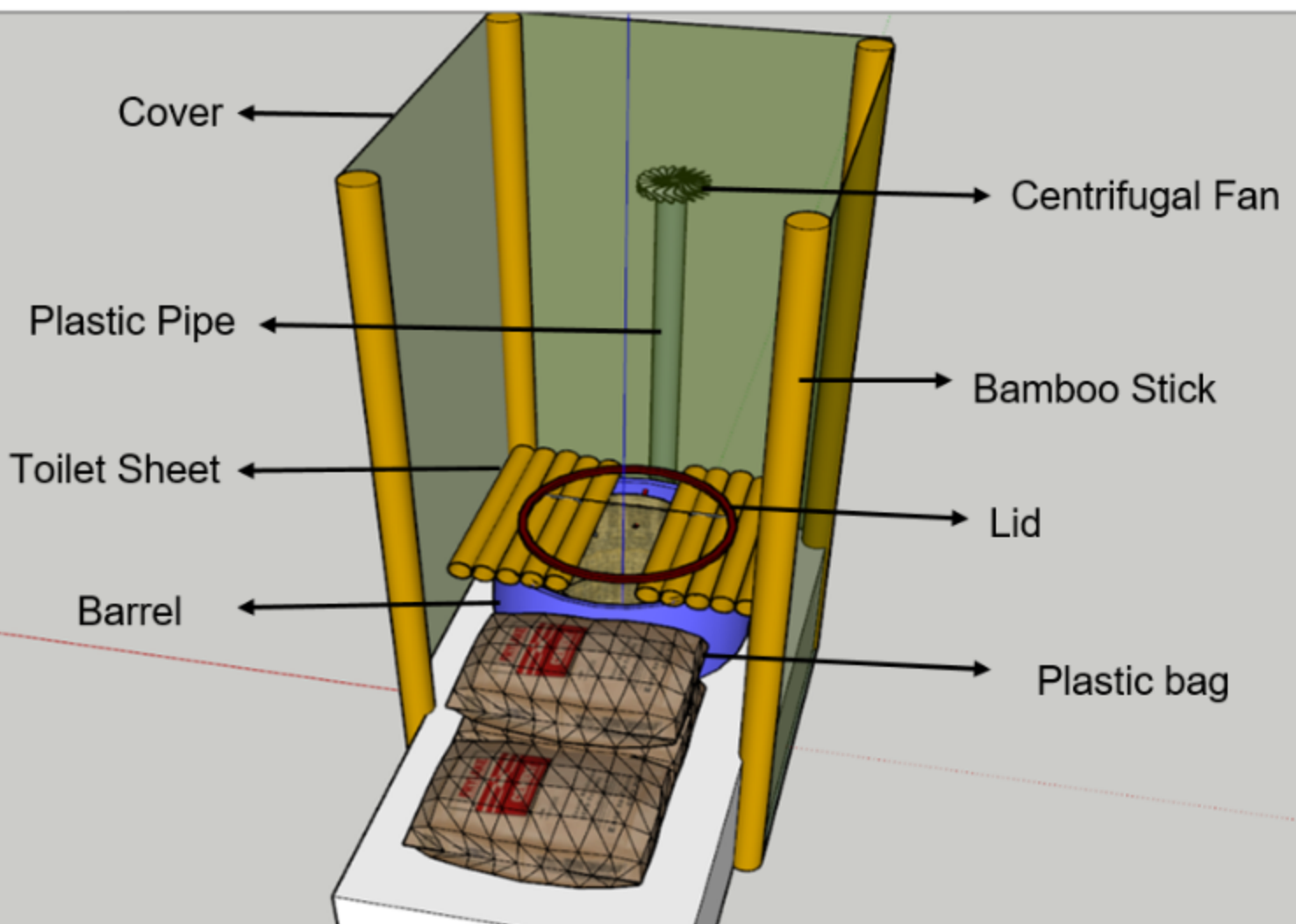
improvements made in previous model taking user comments into account!

## Construction



# PROTOTYPE 2

improvements made in previous model taking user comments into account!



MODEL

# PHOTOGRAPHIC DOCUMENTATION

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making off toilet seat by local labour



marking of holes on the drum



**Drilling and marking holes in the drum**







fixing bamboo columns



sewing the tarpaan



fixing the ventilation system

# PROS AND CONS

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- Portable (modular)
- Uses Locally available materials
- THREE STEP DIY
- ONE TENTH the cost of normal concrete toilet construction.
- No odour
- Proper ventilation and treatment of both liquid and solid waste.

## PROS

## CONS

- Not tested yet, so weak proof of concept.
- Construction not completed on field due to bad weather.
  - Misses aesthetic criteria
- Assumption made on the durability of jute bag for storing faeces till 30 days.
  - Its possible that bamboo will start foul smelling due to gases and sewage water. Toilet seat had to be replaced after 6 months or a year.



# FINAL TOILET PROTOTYPE

