



# Catch and store energy

Compost is key

## Soil

# Third of Earth's soil is acutely degraded due to agriculture

Fertile soil is being lost at rate of 24bn tonnes a year through intensive farming as demand for food increases, says UN-backed study



[3,468](#)
[421](#)

Jonathan Watts

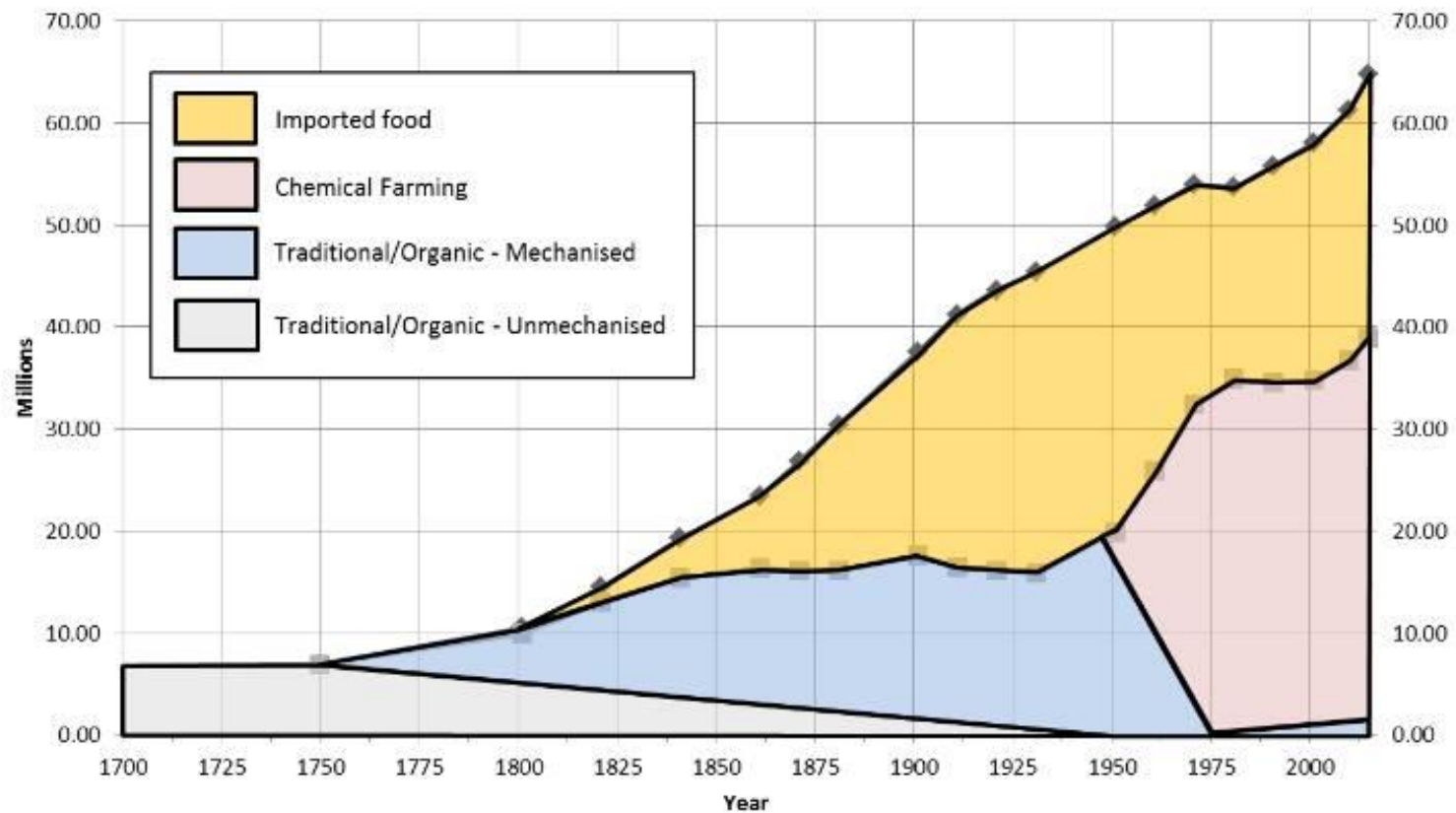
Tuesday 12 September 2017 18.18 BST



Advertisement

" "

**Britain's Population and Food Supply, 1700-2015**





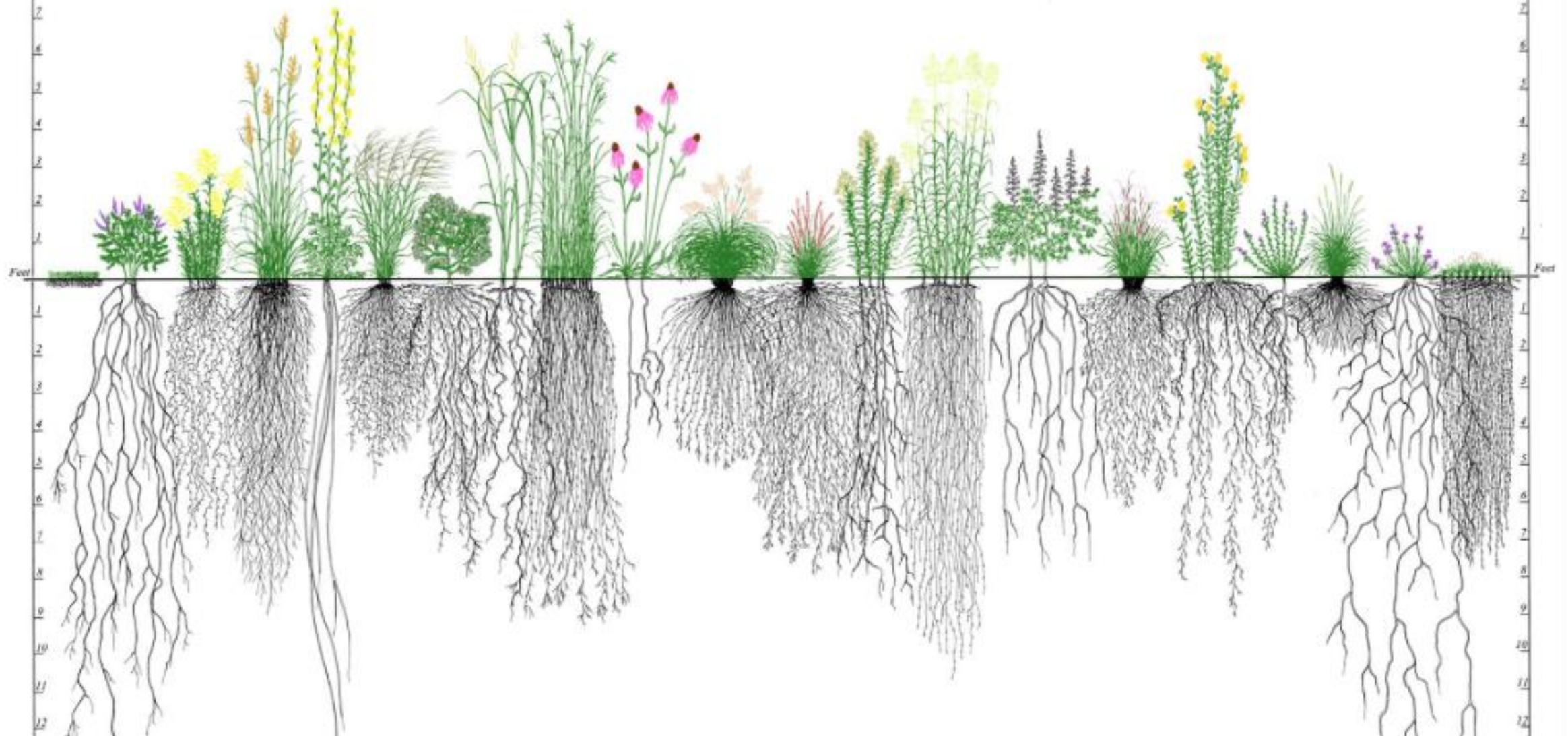
Single root depth = competition



## Root Systems of Prairie Plants

Conservation Research Institute

Abdellatif Hammad 1995  
©





























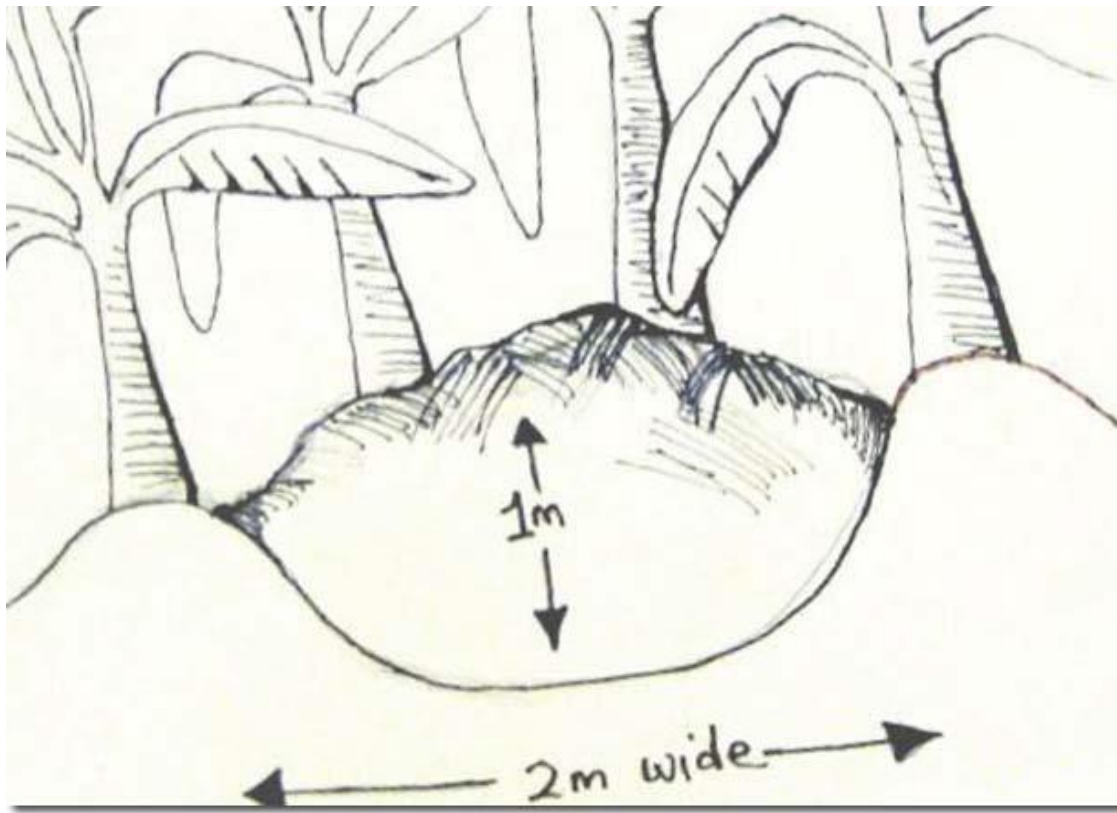
# Community power






















-  Organic matter
-  Banana
-  Cassava
-  Vetiver, Lemongrass, or Citronella
-  Sweet Potato
-  Taro

1 in= 50 cm  
  
 SCALE







# Yacouba Sawadogo - the man who stopped the desert





DESTA et al. 2005







# Why Use Mulch?

Watered



ThePermacultureStudent

Watered but Bare



Mulch



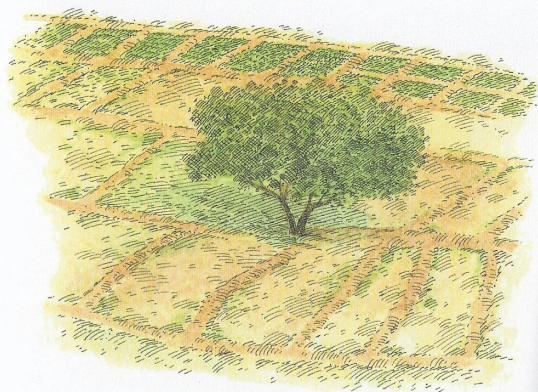
Watering only took bare soil from 140F/60C to 116F/46.6C, but 4-6"/10-15cm of mulch brought it down to 78F/25.5C.

Mulch was ~2x as effective as watering twice

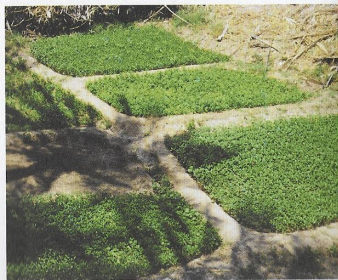
—Matt Powers

## Mulch





**Grid gardens** are often used to help capture rainfall in arid regions. Raised beds, developed for wet areas, are more widely known and promoted, but waffle-like sunken beds work better in dry lands. The ridges between basins are compacted, kept weed-free, and often paved with stones. They divert rain into the planted areas, while the depression of the soil in the basin captures water and allows it more time for deeper infiltration. The basin also reduces wind stress and evaporation.



The **Anasazi people** of the Southwest developed sophisticated rainwater harvesting systems with dams, reservoirs, and control gates. Crop yields were good in most years. Here is a farming terrace with a series of check dams at Mesa Verde.

### Curb Cuts

Street landscaping in Tucson is increasingly irrigated with rainwater. Curb cuts, which the city now allows with a permit, let water flow out of the street and into landscape plantings. These cuts can be done with hand tools or machines. A concrete cutting contractor would be helpful for multiple cuts. Rainwater harvesting from streets can transform a neighborhood from barren to fruitful.



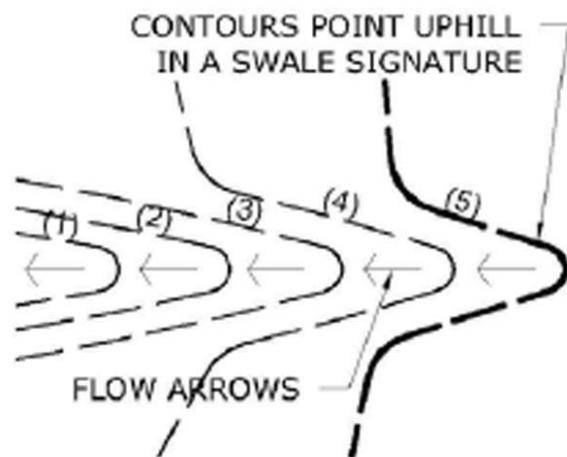




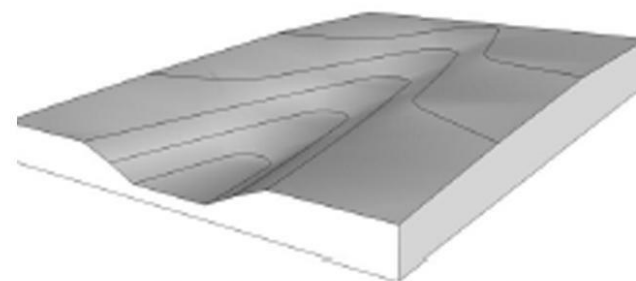


# Contour catchment





Swale Signature  
 1"=20' • Interval = 1'



Terrain Model of a Swale





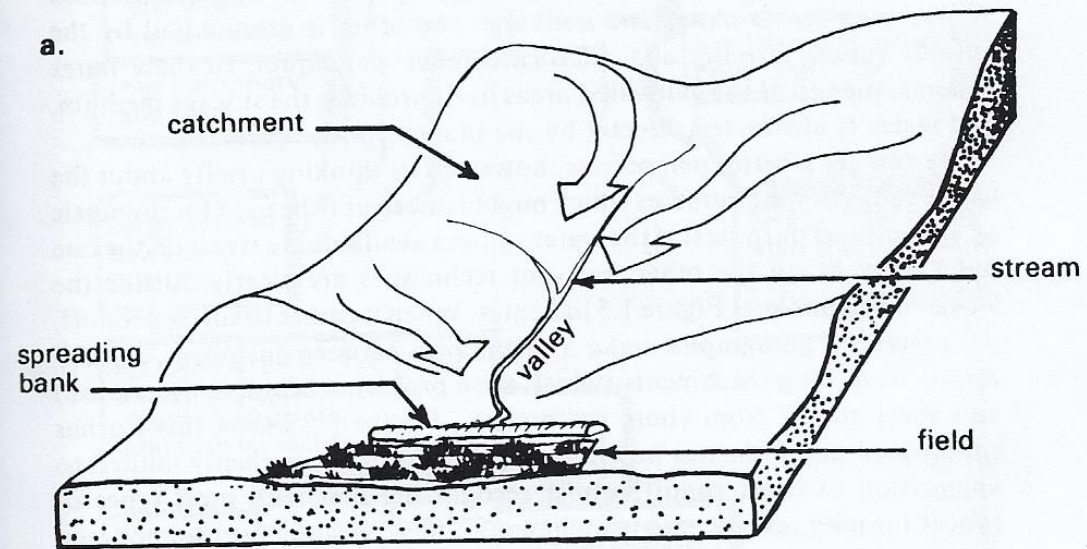
# Bhutan

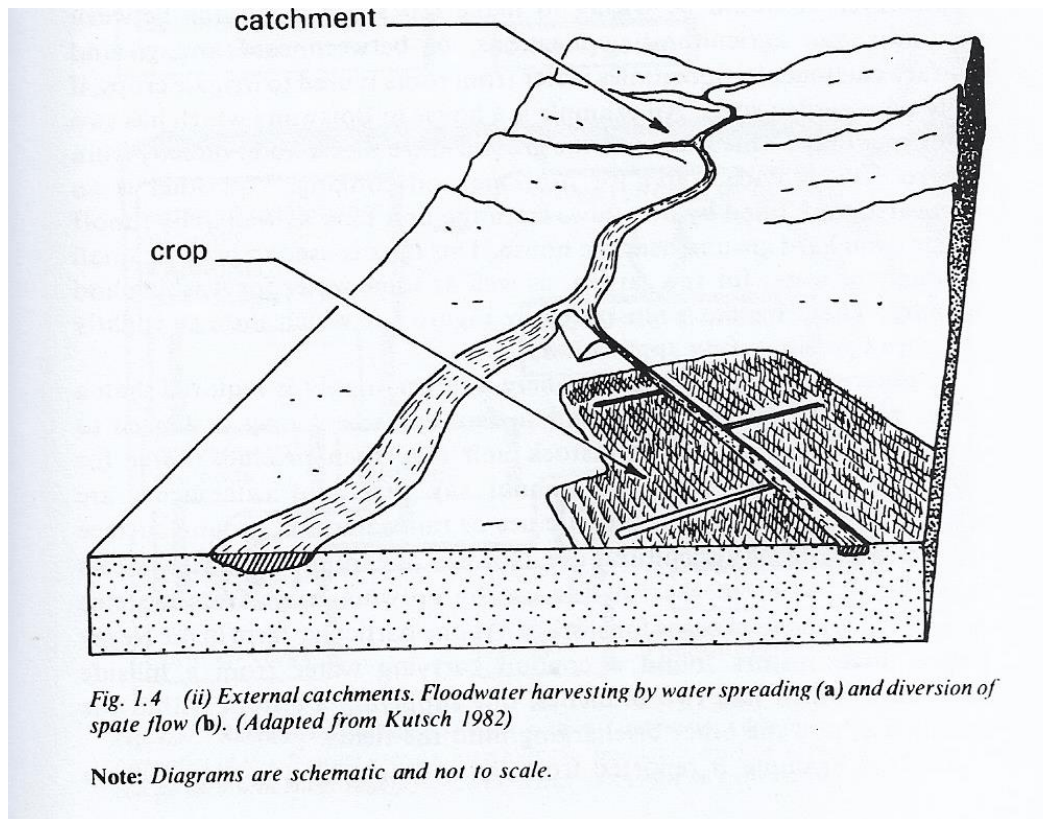




harvesting'. This distinction can be emphasized by saying that in diagram 1.4i, the aim of both systems is to *concentrate* rainwater on cultivated areas, whereas in 1.4ii, it is necessary to *distribute* an already concentrated flood flow onto a field.

a.

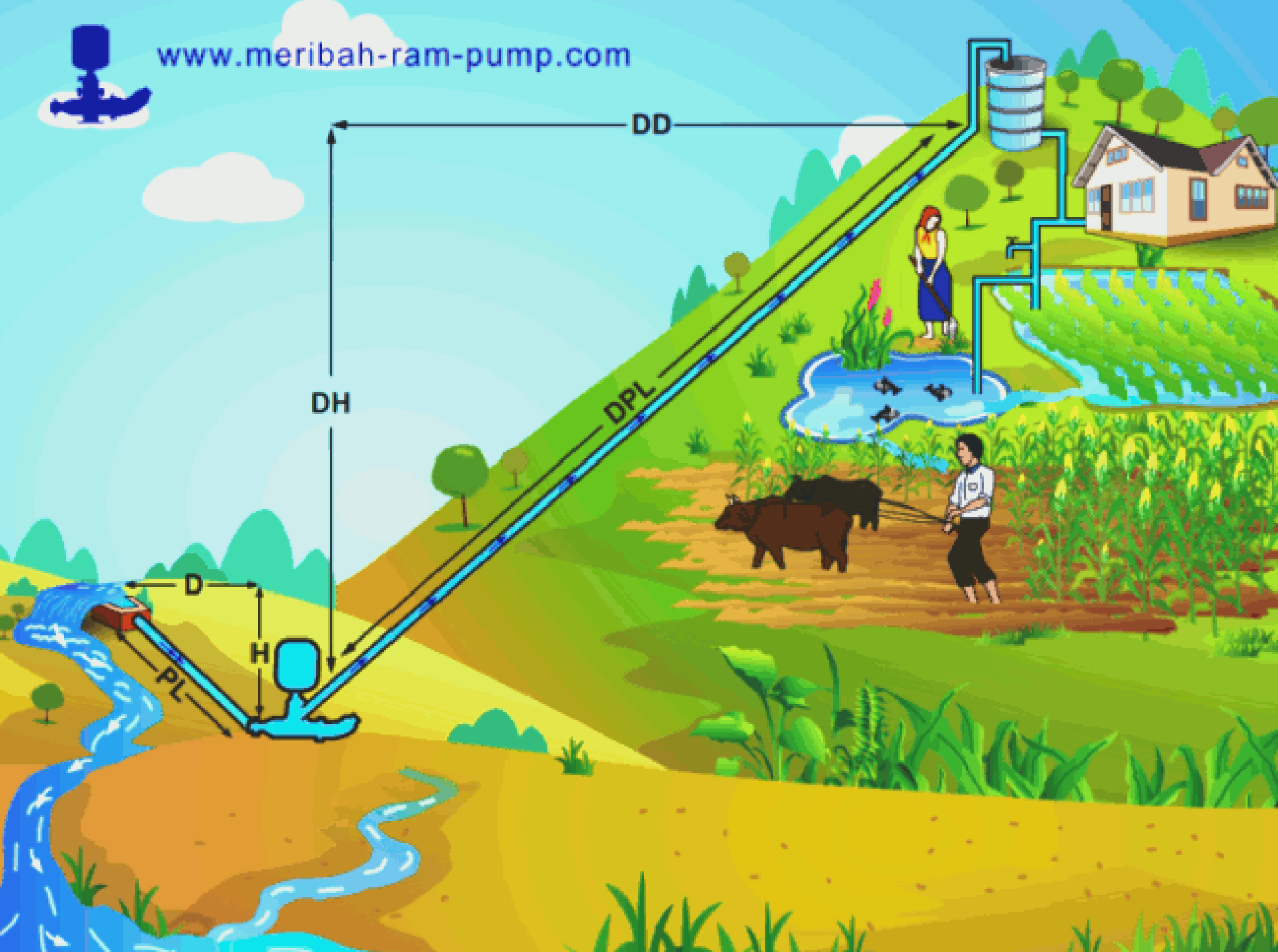




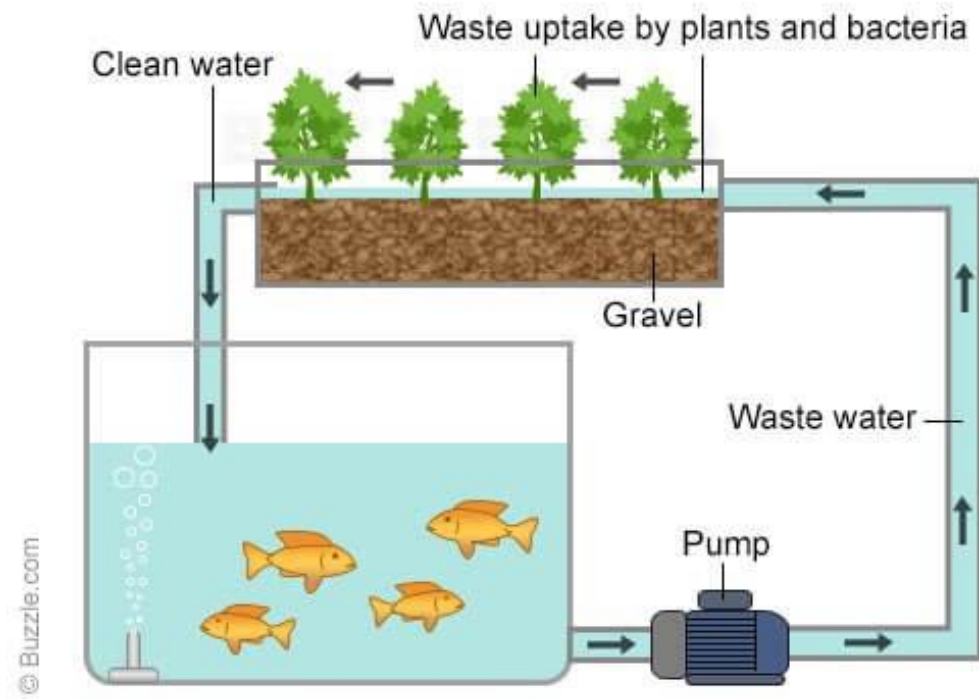




[www.meribah-ram-pump.com](http://www.meribah-ram-pump.com)



## Media-based System









**LIMESTONE FARM – May 2017**





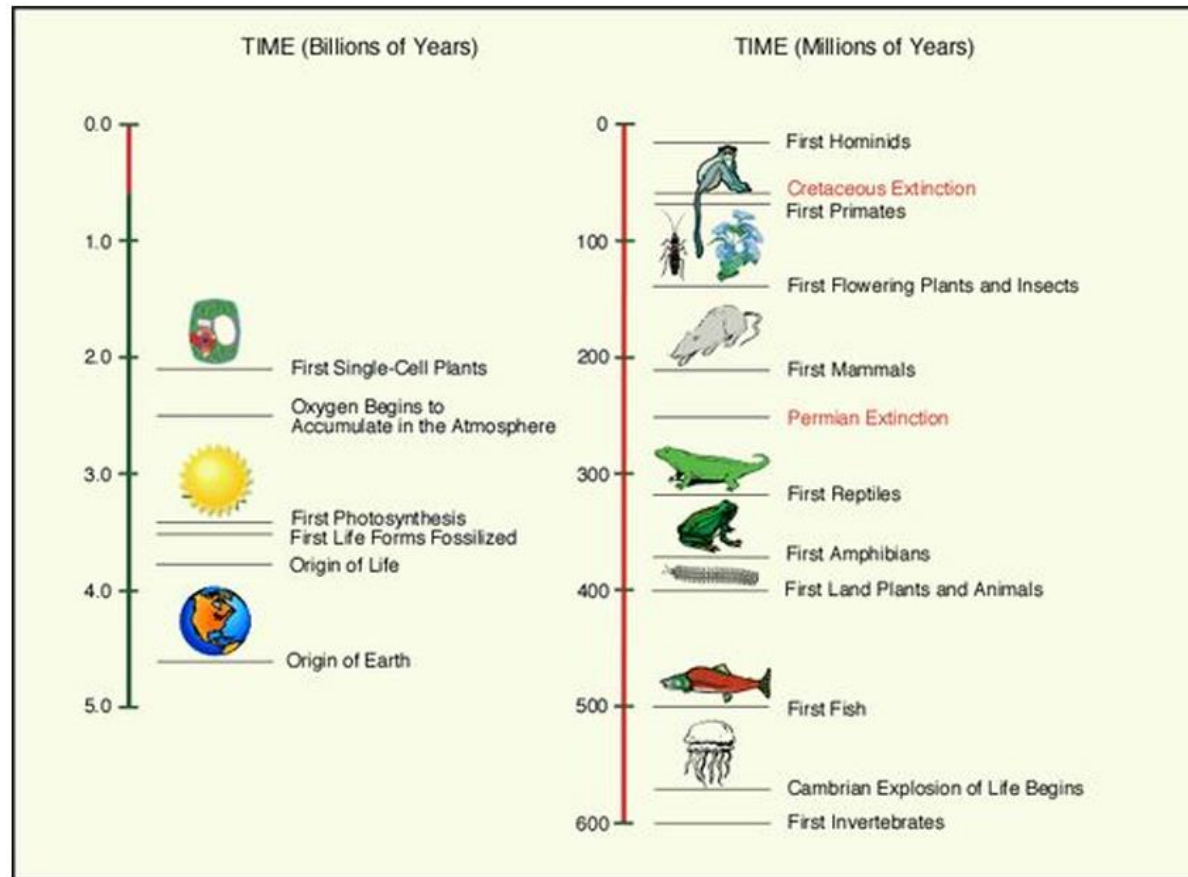


# Evolution

- ▶ Over time nature builds ever more complex systems
- ▶ There have been several mass extinctions, but each time diversity is restored a new and in greater number



Evidence suggests the Earth is more than 4.5 billion years old. Life began in very simple forms surprisingly soon afterwards, less than one billion years later. The oldest fossils are about 3.7 billion years old and show simple structures that were already changing the biochemistry of the planet - most notably by producing oxygen. As the atmosphere developed so did the planet's capacity to support complex lifeforms.



It is interesting to also note that life began in the sea and didn't arrive on land until 400 million years ago. Paul Stamets has suggested that the first organism to move onto land was fungi and that they have been largely responsible for creating the soils and other habitats on which other species depend.

# Evolution: life on Earth is one big extended family



Ch. Darwin



Alfred Russel Wallace

In 1858, Charles Darwin and Alfred Russel Wallace independently proposed a theory of biological evolution to explain the diversity of life on Earth. Since then the fossil record and DNA

studies have added, and continue to add, overwhelming support for this view of life's history. Evolution today is one of the best documented and widely accepted principles of modern science.

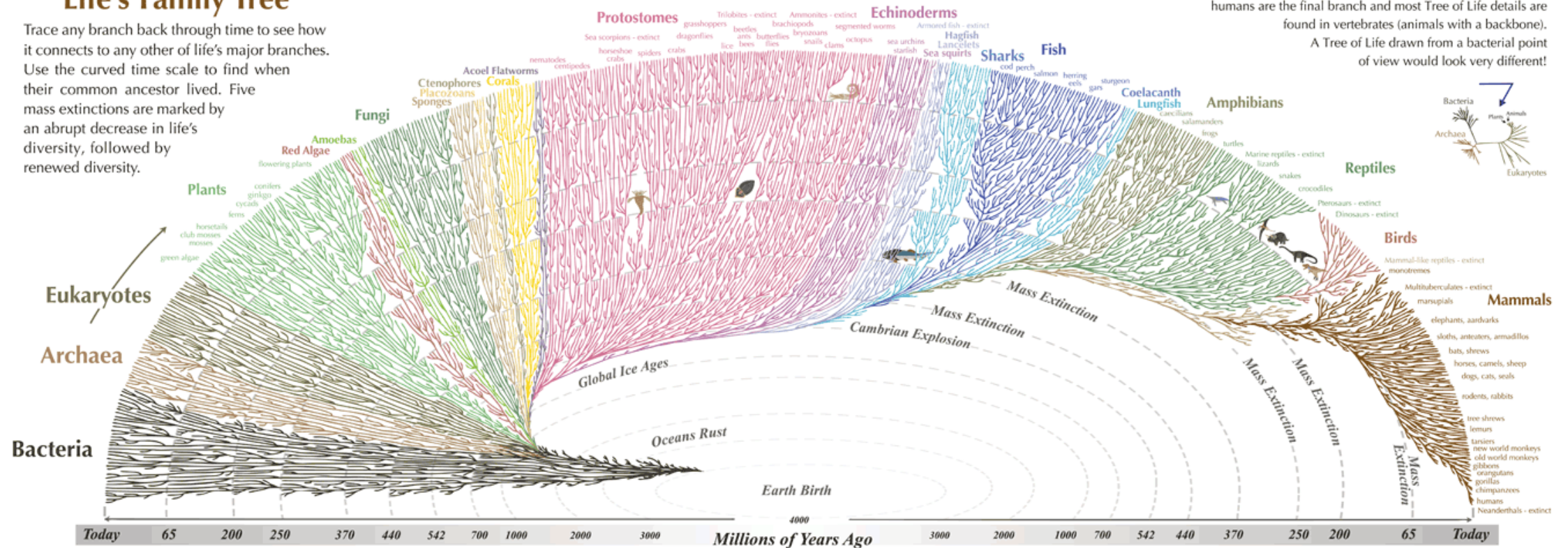
Life on Earth has changed dramatically through time. The theory of evolution proposes that through the process of natural selection and other natural events stretching over millions of

generations, living things diversify, branching from one species into many. This means that all living things are related to one another through common ancestry with earlier, different

life forms. In other words, if you follow your family tree far enough back in time, you will find a common ancestor not only with every other living thing, but with every thing that ever lived.

## Life's Family Tree

Trace any branch back through time to see how it connects to any other of life's major branches. Use the curved time scale to find when their common ancestor lived. Five mass extinctions are marked by an abrupt decrease in life's diversity, followed by renewed diversity.

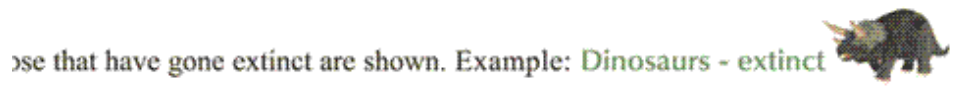


All the major and many of the minor living branches of life are shown on this diagram, but only a few of those that have gone extinct are shown. Example: Dinosaurs - extinct



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