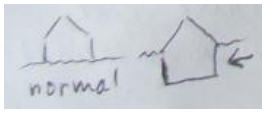
Science: Tricks with Mother Earth in agriculture

for the rural population of the whole world

presented by Michael Palomino 2019 (version 3)

Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (17)

https://naturbauhof.de/lad_pka_funktion.php

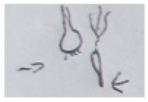


Michael Reynolds - El Guerrero de la Basura (Subtítulos en español) (34'40")

Vegetable patch with wood inside

Wood in form of trunks, boards, or in big pieces -
in a depth of 30 to 50cm

Companion planting e.g. with onions+carrots



They suck the nutrients in different depths

Companion Planting Made Easy (15')

Science: Tricks With Mother Earth In Agriculture - Michael Palomino 2019

by

Michael Palomino
www.hist-chron.com
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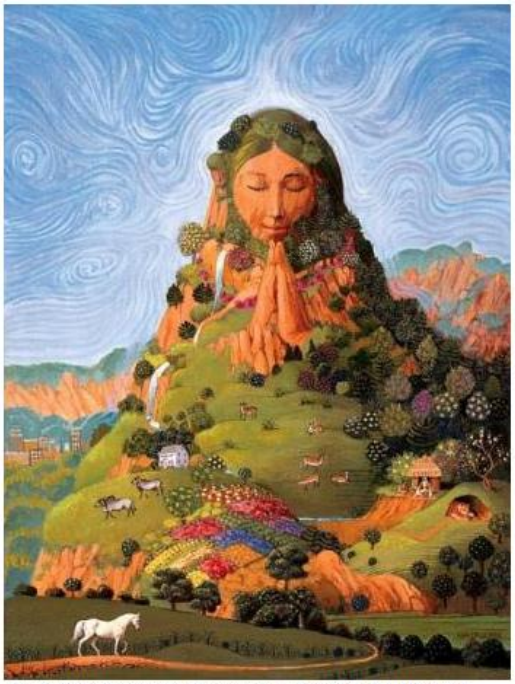
for saving money and work on this planet - with the help of Mother Earth



http://kissfm.emisorasunidas.com/content/22-abril-dia-de-madre-tierra

Version 3 from Oct. 2, 2019 – translations of the book: D – ESP

Contact
Michael Palomino, Lima (langages: English, French, German, Spanish)
Contact and donations: http://www.med-etc.com/kontakt.html
E-mail: michael.palomino@yandex.com
Facebook: Michael Palomino Ale
VK: https://vk.com/mpnatronetc

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1. Solar water with the ultraviolet radiation of the sun (UV radiation) made in 24 hours FOR FREE

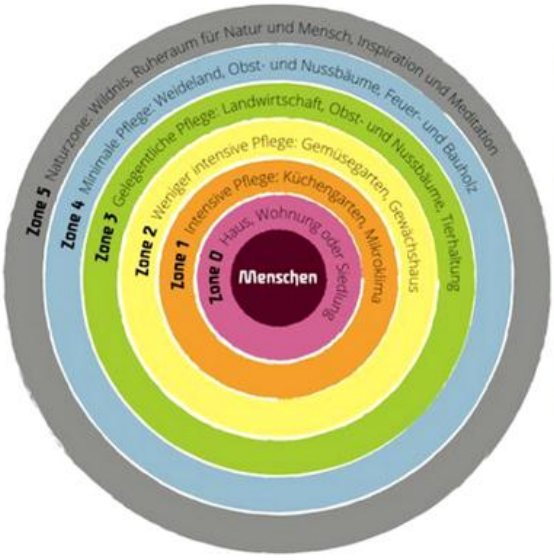


Photos: by Michael Palomino

1) Have a PET bottle without label filled by 3/4 with tank water or tap water.
2) Close the bottle and shake it strongly during 1 minute (count to 60).
3) Now put the bottle outside during 8 hours in the sun, or better 24 hours in the shadow (so the water will not warm), 24 hours also count for cloudy or rainy weather etc.
→ UV radiation of the sun is purifying the water which is enriched with oxigen
→ Tank water or tap water becomes drinking water, the results have been tested several times in the laboratory of San Marcos University in Lima (Puno Street).

2. The zoning of a farm

Generally, a farm should be divided into zones
0) with the dwelling house and the stocks and stables in the center
1) with the garden around it
2) with fields that need a lot of care - with some fruit trees and possibly a pond
3) with fields that need less care - with forests and ponds
4) with areas that require little care: pasture, fruit trees, trees for timber
5) The last zone is nature zone for wilderness, rest room, inspiration, meditation.



Zoning of a farm according to efficiency (permaculture)

Zone0: house, flat or settlement
Zone 1: kitchen garden with microclimate: intensive care
Zone 2: vegetable garden and greenhouse: less intensive care
Zone 3: fruit trees, nut trees, animals: care from time to time
Zone 4: pasture, fruit trees, nut trees, trees for fire wood+construction wood: minimal care
Zone 5: nature zone: wildness, calm zone for nature+humans, inspiration+meditation: no work, it comes as it comes

Photo: a farm being devided into 6 zones: https://www.pinterest.de/pin/808536939321315185/

Zone 1: The kitchen garden must be close to the house
The kitchen garden has a microclimate right next to the house walls. There vegetables, berries and next to the sunny house walls also kitchen herbs are cultivated. Some trees are a protection giving a loose partial shade. Sheds can be in the immediate vicinity, or in zone 3.

Zone 2: The big vegetable garden - and the greenhouse
In zone 2 there is a large vegetable garden for vegetable sales, and there is a greenhouse for producing seedlings and plants that appreciate the very warm microclimate.

The greenhouse can also be located half underground (pit greenhouse, "Walipini") with earth walls, which then allow the cultivation of vegetables also during winter.

Zone 3: fruit trees, pastures, meadows and cattle
In zone 3 are the fruit trees, nut trees, and the cattle sheds (which also can be in zone 1). In general, the cattle on the pastures eats a lot, and pastures should not be "overgrazed".

Meadows and sages must have stable fences, best are dry stone walls, where beneficial organisms live. Stables can consist of large halls with open entrances. The animals know when they want to go to the stable.

During very dry times, it is worthwhile keeping the livestock close to the dwelling house and bring the fodder from the pasture to the livestock so that the pastures are not "overused".

Zone 4: Minimal maintenance with timber
Pastures, fruit trees, nut trees, trees for firewood or timber.

Zone 5: untouched nature and forests
Zone 5 belongs to nature itself: with wild life, recreation area for nature and for the people, area for inspiration and meditation.

Fountain chains on mountain slopes
To create a more natural environment, and for washing hands or fruits, one can install chains of fontains on slopes. The water from the uppermost well is filtered and then reused for each lower well. This can be applied in rural areas as well as in cities on mountain slopes.

Ponds + trees + dry stone walls on the farm
Ponds are installed with excavators and reed is the guaranty for water quality. Ponds are the habitat of many beneficial animals, but should always be combined with trees and dry stone walls to provide shelter for more beneficial animals, and the birds then eat the insects, caterpillars and harmful bugs.

Ponds must have an inflow and an outflow to guarantee the exchange of water, or reed for water quality. Ponds guarantee a favorable groundwater level and thus cause more fertility in the region. Ponds are also a common water reserve and can be used for fish farming or crayfish farming, or for humans to swim. Farms on mountain slopes can set up whole pond systems, also for electricity production.

3. Hot water for the shower for 1 year FREE: The compost pile of wood chips with the water hose

Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (12')

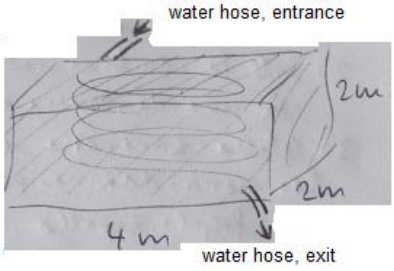
Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (13')

1) Install a surface for a compost pile of e.g. 4x2x2m, with a base layer of wood chips and a chicken wire around it.

2) Then the water hose is installed in circles, then again a layer of wood chips, then again the water hose, up to 2m height can be achieved.

Compost pile of wood chips is like a thermic power plant with water of 40ºC for 1 year long

Daily water is given from above. Decomposition provokes heat inside which brings the water insice to 40ºC, during day+night, summer+ winter, 1 yeaar long. At the end there is new earth of a maximum quality.



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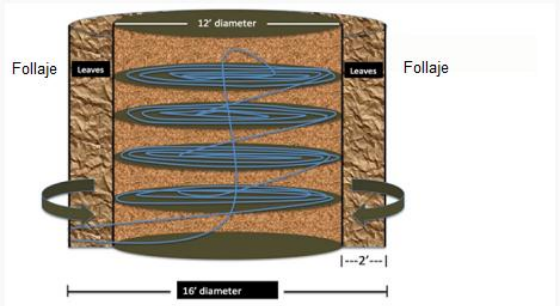


Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (39')

This creates temperatures of up to 60 degrees Celsius (140 degrees Fahrenheit), look how:

3) Daily the compost heap is watered from above, so that inside the moisture starts the process of decomposition of the wood chips. The heat is so strong that in the water hose the water is heated up to 40 or 60ºC. (I think, the watering can also be with tubes and timers).

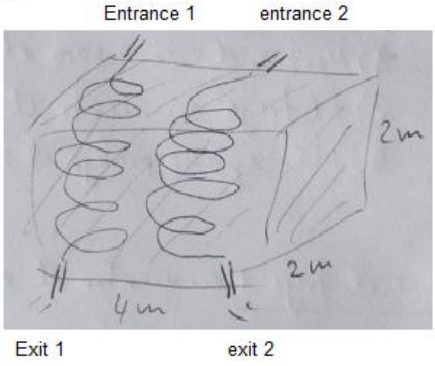
Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (42')

Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food. (228')

4) For two farms the compost heap can have also two hoses:

Compost heap of wood chips working like a thermic power plant with 40ºC warm water for 1 year - with 2 hoses for 2 farms

Daily water is given from above. Decomposition provokes heat inside which brings the water insice to 40ºC, during day+night, summer+ winter, 1 yeaar long. At the end there is new earth of a maximum quality.



5) The reduction process of wodd ships needs 1 years, and at the end fresh compost earth comes out, of maximum quality for cultivation in the garden.

4. The garden bed with wood in the ground - becomes warm - and dryness no longer harms the plants

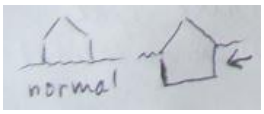
Vegetable patch with wood inside

Wood in form of trunks, boards, or
in big pieces -
in a depth of 30 to 50cm

1) At a depth of 30 to 50cm wood is inserted, which always remains moist.
2) The degradation process of the large wood (logs) takes up to 5 years, the wood becomes warm, the garden bed has a higher temperature than the environment and the plants grow faster
3) The roots of the plants reach the moist wood, and therefore they survive any dryness.
→ Well, a drought can last for 5 months and the plants keep growing.

5. The pit greenhouse ("Walipini") - cultivation also in winter (!)

In winter, the temperature of the earth is maintained because of the inertial reaction and the earth walls are radiating the heat even in winter, and thus, in winter, safe cultivation is possible.



or also like this

or a green house can be sunk into a sunny slope – or one can attach a greenhouse to a dwelling house:

Photos:
-- Walipini sunk into the ground: Video: WALIPINI EN ALTIPLANO BOLIVIANO
https://www.youtube.com/watch?v=YN722I2eg7Q
-- slope green house: https://greenhouseglimpses.blogspot.com/2009/02/greenhouse-design.html
-- attached greenhouse: https://solarinnovations.com/gallery/?product=104

Web site: http://www.med-etc.com/natur/Ldw/walipini/walipini001-ENGL.html

Comentado [T1]:

Conditions:

1. **Stable micro climate in earth pit houses because earth layer needs months for reacting**: Deep earth is always moderately warm in winter times and moderately cold in summer times because of thermal inertia: the earth layer needs several months to adapt the temperature outside.
2. **1,2m: The minimum depth** of a pit house in the earth is 1,2m.
3. **Wall materials**: Wall material can be earth, earth bricks, natural stones, earth bags, water barrels.
4. **The walls are a heating battery**: The walls are storing the heat and give the heat during the night so it's never too cold during the night, also earth walls are like a battery and give off the heat at night.
5. **Heating from 5 sides: 4 walls and the floor are heating during the night**: The heating in the night comes from 5 warm sides: 4 warm walls and from the warm ground - in a normal greenhouse only 1 side is warm: the ground
6. **Heating with rain water barrels installed at the back wall**: this is the best method of heating in a Walipini greenhouse because water stores the warmth most and is radiating this warmth most during the night - the barrels just need their space.
7. **Watering plants with rain water in the water barrels**: Rain water can be collected in the water barrels. Whoever uses permaculture layering in raised beds with wood, leaves and compost never has to water anything.
8. **Watering the plants with the rain water**: When the water barrels are full another water tank can be filled for watering the plants with living water.
9. **1m over groundwater level**: Pit houses have to be installed at least 1m above the groundwater level or there can be a water desaster
10. **Window side to the sun**: The window side always has to be installed to the sunny side: In the northern hemisphere the windows are installed to the south, and the northern wall is storing most of the heat. In the southern hemisphere the windows are oriented to the north and the southern wall is storing most of the heat.
11. **Inclination of the window side**: The inclination of the principal window side is optimal when the angle to the sun during the winter solstice is 90º - or the window side is formed round in form of a half U well adapted to any angle of the sun
12. **Little windows for ventilation**: The little windows are installed within the window side
13. **Window materials / transparent roof materials**: Windows are made of glass or plexiglas (four-walled polycarbonate sheets) with a thickness of 7/8". The Plexiglas is then bendable to form half a U.
14. **Plastic film is toxic** because the weathering provokes that constantly microplastic is emitted into the air and the air is contaminated and poisoned.
15. **The tube pit house**: the longer a pit greenhouse is (a tube pit greenhouse), the warmer it will be and the more stable the temperature will be at night. A pit greenhouse must not have any holes at night to keep the cold air outside.

16a. **Roofs (transparent)**: may be in form of a V (glass, plexiglass) or U (plexiglass). Plastic film (PVC) is TOXIC, is emitting constantly microplastic into the air contaminating everything.

16b. **Roofs (hard material)** can be a normal roof combined with a window front to the sunny side, or the roof can be a slope of a mountain combined with a window front to the sunny side.

17. **Waterproff, dreinage, ventilation**: All has to be waterproof, no holes in the construction, there has to be dreinage, and for summer times ventilation respectively open windows have to be possible
18. **Hail damage can be awoided with chicken wire**: One can span a glass roof or plexiglass roof with a chicken wire so big hailstones will not reach the glass roof / plexiglass roof. **Pit greenhouses with a stable roof and a window front, or hillside greenhouses (embankment greenhouses) built into a mountain do not have a hail problem**. A small canopy made of chicken wire can be installed to prevent the window front from being damaged by big hailstones.

Do not use PVC plastic films: One should not use PVC plastic films, because the films always release microplastic and plasticizers into the air due to weathering, so the films poison and contaminate the air, which is then absorbed by the plants. A plastic film weathers in 3 to 4 years. The "plastic air" is highly toxic.

6. Plowing without plowing: cultivation fields are plowed with pigs or goats - NO plow any more (!)

1) Around a cultivation field a fence is installed.
2) Now pigs or goats are brought to the fenced field, they are plowung the field now with their pointed little hooves, without damaging soil nests or animals.
3) Pigs and goats eat away all the weeds, and in this way they prepare the field for a new sowing.
4) Goats also give milk and also eat unnecessary, hanging branches of trees (as well as donkeys).

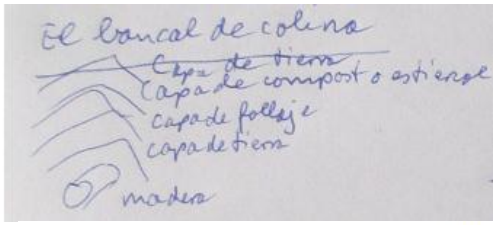
Photo of free pigs which are plowing fields: Video: Permaculture – the farm Krameterhof of Sepp Holzer (original German: Permakultur – Der Krameterhof von Sepp Holzer)

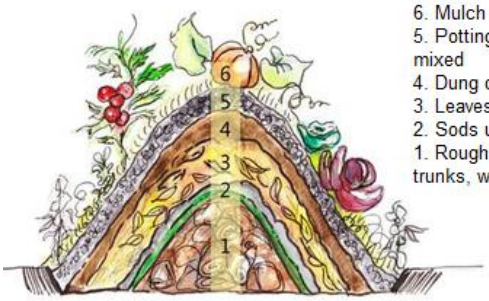
Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004d01-permaculture-Sepp-Holzer-farm-krameterhof.html

7a. The hillbed: 30% more cultivation surface - layers with decomposition processes - up to 8ºC higher temperature

The hill bed

Earth layer
Compost+dung layer
Leaves layer
Earth layer
Wood





6. Mulch layer
5. Potting soil+compost mixed
4. Dung or course compost
3. Leaves / foliage
2. Sods upside down
1. Rough material trunks, wood, branches

Hillbed

Photos:
Layering of a permaculture hillbed: https://www.pinterest.de/pin/487866572112059521/
Layering of a permaculture hillbed: https://www.pinterest.de/pin/74942781278034076
Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a03-permaculture-raised-bed+hillbed.html

At the end, the heaped earth is fixed with branches (this is the technique of Sepp Holzer in Austria).

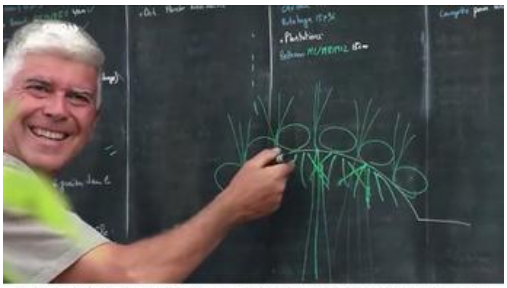

Hügelbeet bauen - Hugelculture (Sepp Holzer Style) (727")


Hügelbeet bauen - Hugelculture (Sepp Holzer Style) (745")

Photos are from the Video: Construct a hillbed – hill culture (Sepp Holzer Style) (original German: Hügelbeet bauen – Hugelculture (Sepp Holzer Style) (3'25'') - https://www.youtube.com/watch?v=1KafYj_AcVs&t=30s – YouTube channel: TrilightShowroom

A hillbed has several layers and at the top is a hollow for rainwater:
-- A hillbed offers 30% more surface than a flat bed
-- A hillbed is warmer by up to 8ºC, because the decomposition processes inside generate heat inside (wood and dung)
-- everything grows faster

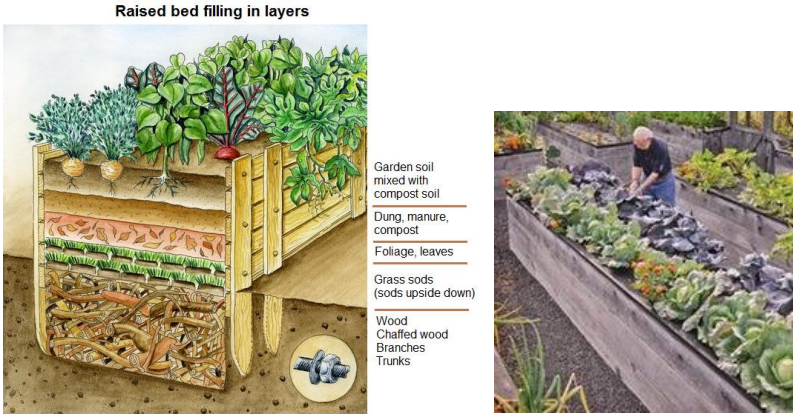
-- when also dense planting with companion planting is applied, the hill bed is shaded almost everywhere and the roots reach the ever-moist wood, so there is no need to give water any more, and dryness cannot harm the plants any more.



Hillbeds forming a mandala - on the farm of Le Bec in France - the pioneer Charles Hervé-Gruyer explains a hillbed with vegetables with different roots

Photos: docu movie "DOKU – our agriculture is killing insects and poisoning the waters" (original German: "DOKU – Unsere Landwirtschaft tötet Insekten und vergiftet das Wasser" (29-32min.)
https://www.youtube.com/watch?v=CXl71o8MrOQ

7b. The raised bed with permaculture layering with wood, leaves, manure etc.



The stratification is like the hillbed, but in a wooden box. At the bottom, a protection grid against rodents is installed. With raised beds one can work with the plants at waist height. Raised beds in the greenhouse for potato cultivation are very well suited because the protective wire protects the potatoes from mice. Raised beds outside with a lot of rain are not possible due to rainwater accumulation.

Photos from:
-- https://www.haus.de/garten/hochbeet-befuellen-diese-schichten-steigern-den-ernte-erfolg
-- https://www.pinterest.de/pin/432486370453479224/
Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a03-permaculture-raised-bed+hillbed.html

8. Install ponds, make dry areas fertile, plant fruit trees, shrubs and install dry stone walls for beneficial animals

Ponds:
1) Each hectare of land should have a pond to guarantee the balance of wildlife, e.g. ducks eat slugs, and birds need quiet water corners to drink.

2) Ponds are also used for fish farming, crab breeding, or ponds are also recreational space for swimming etc. On slopes one can produce the own electricity

3) With each pond, the groundwater level rises slightly and the fertility of the area increases.

4) Ponds are installed with excavators and reed for water quality. Ponds are the habitat of many beneficials animals, but they should always be combined with trees and dry stone walls to provide more beneficial animals, and the birds will then eat insects, caterpillars and harmful bugs.

5) Ponds must have an inflow and outflow to guarantee water exchange, or reed for water quality. Ponds guarantee a favorable groundwater level and thus cause more fertility in the region. Ponds are also a common water reserve and can be used for fish farming or crayfish farming or swimming.

6) Farms on mountain slopes can set up whole pond systems, also for electricity production

7) The pioneer with a pond system on a mountain slope with 73 ponds with fish farming, crayfish breeding and electricity production is Mr. Sepp Holzer from Austria.

Photos:
-- House on the farm of Sepp Holzer with 3 ponds and forest around it:
http://www.holzerpermaculture.us/krameterhof.html
-- The pioneer of permaculture with ponds: Sepp Holzer: Video "Water is life " (original German: "Wasser ist Leben")
https://www.youtube.com/watch?v=2MJllVO3tLI&t=375s

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004d03-permaculture-Sepp-Holzer-krameterhof-72-ponds+low-forest-grazing.html

Bring dry regions to life again with ponds and artificial lakes

Dry regions can be brought to life again with a series of ponds or artificial lakes with clay dykes. One of the pioneers for this is e.g. Mr. Sepp Holzer from Austria, for example in Tamera in Portugal. The photos show the dry conditions of Tamera region around 2005, and the transformed landscape made fertile by ponds and an artificial lake in around 2010.

Photos from the Video "Water is life" (original German: "Wasser ist Leben – die Wasserretensionslandschaft von Tamera"): https://www.youtube.com/watch?v=2MJllVO3tLI&t=375s

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004d02-permaculture-Sepp-Holzer-Lake-landscape-Tamera-Portugal.html

Fruit trees

1) Every fruit tree is a source of life not only for mankind but, e.g. also for animals.
2) A row of trees protects the zone from strong winds, a protected microzone for sensitive plants.
3) Most of birds install their nests in trees, eliminate harmful insects and caterpillars and distribute seeds of shrubs eating their berries.
4) In certain barks live larvae and spiders, which are the food for birds.
5) The most valuable combination is of many DIFFERENT trees, so that a large variety of beneficial animals is available on a farm and the balance of the animals is always guaranteed.
6) Garden beds with seeds are protected from birds by a cloth with approx. 20 to 30 cm high edges, or the seeds are protected with cut PET bottles, or reflective strips are installed over the fields to blind the birds, or one can produce the seedlings in the greenhouse.

Shrubs and bushes

1) Shrubs produce berries and some also nuts and they are food for the birds.
2) In bushes, ground birds live with nests on the ground. On bushes live butterflies, the caterpillars, maybe pupating there too. Many beneficial insects live in shrubs, hunting at night.

Dry stone walls and stone heaps – habitat for beneficial animals

Beneficial animals in a dry stone wall (European fauna)

Web site: http://www.med-etc.com/natur/trockenmauer/ENGL/002-animals+nests.html

1) Dry stone walls without mortar are useful for beneficial plants and beneficial animals that need this hot position in small gaps between stones in the sun.
2) Even on the shade side without sunshine plants are growing and beneficial animals are settling.
3) Beneficial animals are hunting especially during the night hunting harmful animals on fields and meadows, for example the weasel, the hedgehog, snakes and spiders. Bedbugs hibernate in dry stone walls, and when there are no dry stone walls, they invade dwelling houses.

Heaps of stones (cairns)
The same principle applies to piles of "wild" stones: They make sense as a shelter for beneficial animals in the cultural landscape, they are the home for snakes, hedgehogs, lizards, etc.

Therefore, "modern" First World states, which have "over-ordered" their landscape by "cleaning" dry stone walls and cairns, are in a state of emergency, because certain animals practically no longer exist there, because the perfectionist architects and land owners have destroyed their habitat.

The combination of a forest garden / fruit forest garden

It is possible to combine fields, shrubs, fruit trees and nut trees in such a way that a "forest garden" is created
-- which always has a pleasant partial shade
-- which is well structured with dry and humid areas
-- which automatically develops fertility with it's falling leaves of the trees
-- which has a natural wind protection with its trees
-- which guarantees a balance in the wildlife with the beneficials on the trees, in the shrubs, in the dry stone walls and in the heaps of stones (cairns) etc.

The pioneer for the forest garden / fruit forest garden is the Japanese Mr. Masanobu Fukuoka. He used to sew seedballs in clay, spread them in his orchard, and let nature decide which seeds should sprout where - and there were many unexpected surprises, with vegetables growing in places where it was least expected. His radishes on the photo are as big as the big thigh bones.



Fruit forest garden of Mr. Fukuoka with citrus trees and vegetable fields - seed balls in clay - Fukuoka with gigantic radishes

Photos:
-- Obstwaldgarten von Fukuoka mit Zitrusbäumen:
http://tsukeshoin.eklablog.com/masanobu-fukuoka-en-ses-demeures-a119621418?noajax&mobile=1
-- Fukuoka, Samenbällchen: https://www.pinterest.de/pin/791296597005799235/
-- Fukuoka bei der Ernte von riesigen Rettichen: https://tomchurch.co.uk/masanobu-fukuoka-on-natural-farming-philosophy-and-doing-nothing/

Links about pioneer Fukuoka with seed balls and fruit forest gardening:

1) Report about Fukuoka's farming in Japan:
http://www.med-etc.com/natur/Ldw-perma/ENGL/004c01-permaculture-farm-Masanobu-Fukuoka-Japan.html
2) Movie protocol about Fukuoka's farming and traveling to India:
http://www.med-etc.com/natur/Ldw-perma/ENGL/004c02-permaculture-Masanobu-Fukuoka-in-Japan+India-movie1h.html

9. Install warm air traps - apples, kiwis and grapes grow in the mountains

In cold areas with sunny stone walls, it's possible to arrange garden beds at it's bottom, or sunny slopes, can be arranged as hot air traps by lining certain parts of the slopes with stone walls (terraces) that are so hotly heated by the sun that they can be used to grow fruit that normally grows only in warm areas: apples, grapes and kiwis can also be grown in the mountains at over 1000m above sea level. The pioneer is Sepp Holzer from Austria.

Photos from the video: Permaculture – Krameterhof Farm of Sepp Holzer

Every high altitude farm with a sunny slope can install heat traps with rock walls harvesting own fruits.

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004d01-permaculture-Sepp-Holzer-farm-krameterhof.html

10. Grow seedlings - and place them in a damp hole in the planting bed

Seedlings can be grown in various vessels, for example
-- in small vessels
-- in egg cartons
-- in eggshells
-- in toilet paper rolls.



Photos:
-- seedlings growing in egg cartons: https://www.pinterest.de/pin/400820435580282187/
-- seedlings growing in eggshells in egg cartons: https://www.pinterest.de/pin/570479477780222321/
-- toilet paper rolls are shut by folding so seedlings can grow inside::
https://www.pinterest.de/pin/310326230556451966/

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a06-permaculture-tricks-in-the-greenhouse.html

Setzlinge wachsen
-- in zugedeckten Beeten, z.B. mit einem starken Stoff oder Jute – da muss man dann nichts umpflanzen
-- in kleinen Treibhäusern aus alten Fenstern


Fotos:
-- Beet mit Setzlingen, mit Plastikplane zugedeckt (ist negativ wegen der Plastikluft):
https://permaculturenews.org/2011/04/11/spring-permaculture-tips-and-tricks/
-- Mini-Treibhäuser aus alten Fenstern:
https://www.nafeusemagazine.com/15-astuces-pratiques-et-economiques-pour-vous-faciliter-la-vie-au-jardin_a1310.html

Seedlings grow also
-- in showcases
-- in old railway cars, where the sun provokes a strong heat
-- in the back of a car, where the sun also provokes a strong heat, so, in an old car, which is in the sun.

After 2 to 3 weeks, the seedlings transplanted with the earth on the roots or with the eggshell being put in a hole in the vegetable patch. This hole was poured before with much water so that the seedling has a moisture reserve for a week.

Photo: Seedling in an egg shell is put into a vegetable bed: https://www.pinterest.de/pin/570479477780222321/

The soil around the seedling is covered with dry soil so that snails and slugs are blocked and do not reach the seedling. The seedlings can also be protected from snails or slugs with cut PET bottles.

In general plastic PET bottles are not so good for gardening because of the plastic air, but sometimes they are the best solution for protection of plants.

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a06-permaculture-tricks-in-the-greenhouse.html

11. Mulch on the garden bed: straw provokes condensation water


Photos:
-- Garden bed with straw mulch: https://www.pinterest.de/pin/1477812358910669/
-- Garden bed with bark mulch: https://www.pinterest.de/pin/1477812358910669/

Web site about mulching: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a02-permaculture-mulch.html

A mulch layer of 10 to 15cm protects the garden bed from the sun and prevents the growth of weeds - and if the mulch is straw mulch, condensed water is coming up during the night on the bottom of the straw, which also comes up in desert regions, so that a garden even in the desert is possible (!):

-- Put **straw mulch** and this is producing condensed water every night → in this way everybody can win against any drought.
-- **Mulch from tree leaves** is also possible
-- **Grass mulch** must be very well controlled, so that no unwanted seeds get on the garden bed, or just mulch plants will grow
-- **Mulch from grass clippings** must be dried a bit, then the clippings keep the garden bed well humid with layers of only 3cm, but this does not last long, but a replacement has to be every 3 weeks.
-- **Sand mulch or wood chips or chaff or bark mulch** will give lots of nutrients and it will take half a year for the decomposition, but in the beginning, to start the degradation process, they will consume many nutrients. The sand remains sand, the wood chips, chaff or the bark mulch are transformed into the best, new earth. Even the bark of coniferous trees is no problem.
-- **Mulch from half-ripe compost** is also possible.

Mulch prevents erosion, prevents siltation of heavy soils, guarantees basic moisture and the soil never dries up and never becomes hard, watering is not much necessary, and as the soil remains loose, the weeding the few remaining weeds is no problem – there is not much hard work - mulch during a fallow protects and improves the soil - mulch should never be laid out on grassy meadows, otherwise the meager alcaline meadow is no longer a meager alcaline meadow and the flowers disappear.

Combinations of vegetables with mulch
-- Straw mulch and grass clippings go with all possible vegetables and plants
-- Nettle mulch goes with cucumbers, tomatoes or beans
-- Mulch of spruce branches goes with strawberries, potatoes, garlic, blueberries.

Mulch with trees

must keep a distance to the tree trunk, so it must be placed in "ring shape" around the tree trunk, NOT building a "volcano", otherwise the bark will be damp, weakened and vulnerable.

Photos from: https://www.pinterest.de/pin/173951604327201661/

Mulch for trees

This can be chaff mulch, organic mulch, wood chips, bark mulch of red pine, wood straw of pine etc.

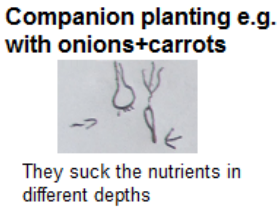
The natural tree protection against cats and dogs that urinate on the trunk, can consist of large pine cones and large pebbles.

Photo from: https://www.pinterest.de/pin/747949450588399856/

Web site about mulching: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a02-permaculture-mulch.html

12. Companion plants ("dream partners") protecting each other

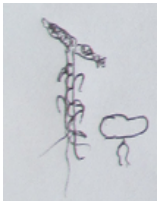
Dream partners: onions and carrots



1) The roots have different lengths and absorb the nutrients at different heights
2) Therefore, e.g. the combination onion + carrot is well possible, at a distance of only about 10cm, because the two plants pull their nutrients from the ground to different depths and do not dispute each other's nutrients
3) Onions and carrots also protect each other by their scents against harmful flies
4) The dense planting, where virtually everything is in the shade, protects the soil from drought and weeds.

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004a05-feeders+manure-plants+companion+plants.html

Three dream partners: the "three sisters": corn + beans + pumpkin



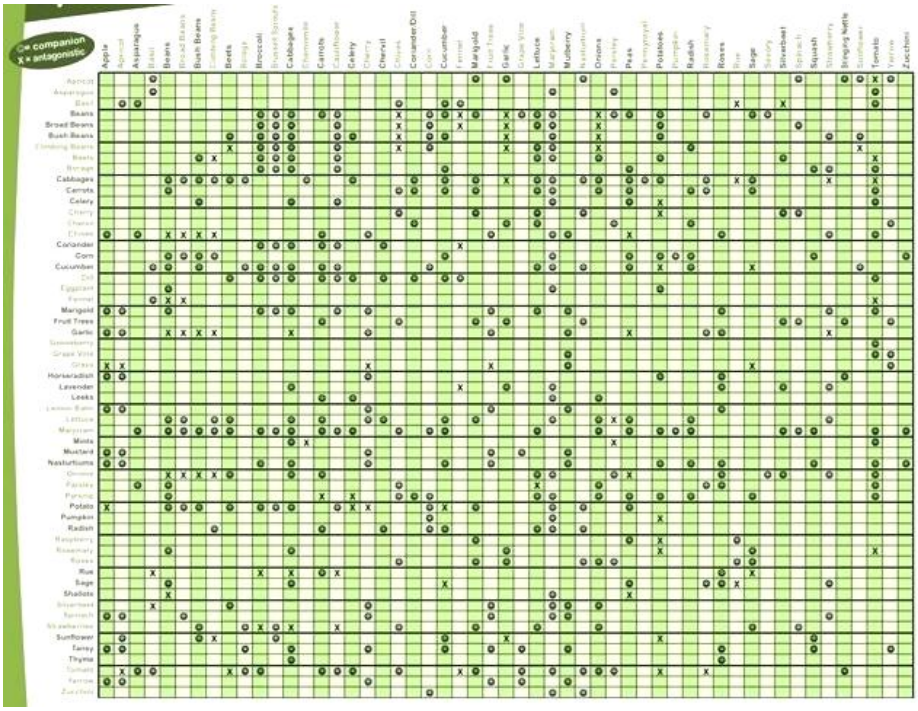
"Three sisters": corn+beans+pumpkin

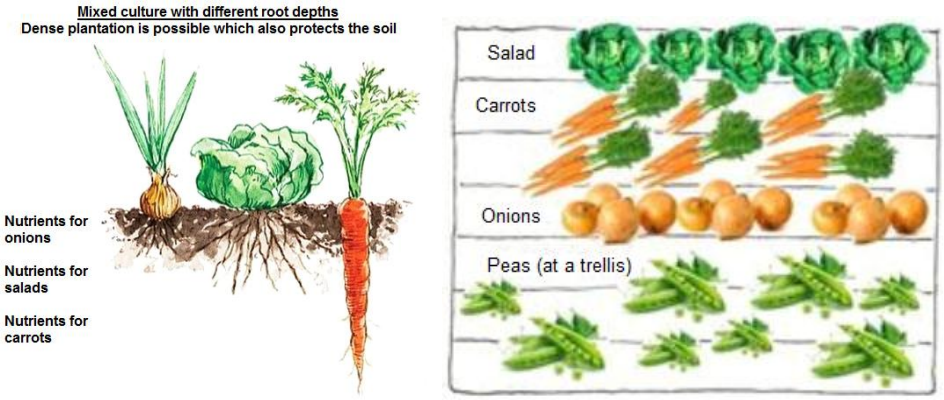
1) The corn is the stem for the bean.
2) Beans accumulate nitrogen in the soil.
3) The pumpkin with its big leaves protects the ground from the sun.

Clover + beans as "added plants"
1) Both are enriching the soil with nitrogen, and
2) Thus, the harvest is getting bigger, in 30 years, the harvest doubles always sowing white clover and scattering straw mulch.

The case: The Japanese pioneer Fukuoka was sowing rice and barley in a constant change, and with barley was always sowing white clover, too. This white clover and straw mulching doubled his harvest in 30 years: the ears doubled.

There are many more possibilities, just look in the Internet searching a little bit. Here are examples:





Photos:
-- table of mixed culture: http://imged.me/img/
-- Mixed culture with different root depths: https://www.pinterest.de/pin/400257485615397831/
-- Vegetable bed with mixed culture, scheme: https://www.pinterest.de/pin/496662665142307910/

Web site with companion planting:
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a05-feeders+manure-plants+companion+plants.html

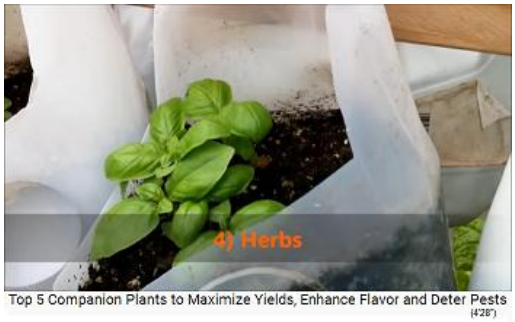
12.1. Video no.1 about companion planting ("dream partners"): Top 5 Companion Plants to Maximize Yields, Enhance Flavor and Deter Pests (8'6")

from: https://www.youtube.com/watch?v=QpK7lzkOv3k –YouTube channel: The Urban Patio Gardener

Video Protocol:
1) Beans + peas both enrich the soil with nitrogen (1'30 ") [and also clover]
2) Plants of the Allium family such as onions or garlic or leeks etc. repel pests, including rabbits, killerworms and maggots or Japanese beetle (2'3 "). The Allium plants confuse the pests (2'6 "). Specifically, they can be combined with cabbages (2'10 "), so all cabbages, broccoli, cauliflower, choi (2'27 "). In addition, the Allium vegetables hardly need space, so they are really handy (2'41 "). Allium plants also go with tomatoes, carrots, celery, or with pepperoni (2'50 ").

Partner plants (dream partner): beans + peas - pepperoni + garlic

3) Marigold spreads through the roots a kind of natural pesticide against pests in root areas in the soil (4'15 ")
4) Herbs such as basil, rosemary, thyme, sage enhance the taste of tomatoes and keep moths, mosquitoes and flies away (4'43 ").



Marigold – herbs (for example basil)

5) Radishes grow quickly in combination with eggplant, which grows slowly and only grows when the radishes are already harvested (6'6 ").

12.2. Video 2 about companion planting ("dream partners"): Great companion plants (6'3")

from: https://www.youtube.com/watch?v=Z21qaQCPrII –YouTube channel: Gardening Australia

The video protocol:

Basil combined with tomatoes gives the tomatoes a better taste and the basil also goes well with tomato salad (1'10 ").

For having enough bees for pollination, you can plant 10% of flowers between the vegetables (1'28 ").

Lettuce is combined with Alyssum flowers (1'31 ''). The hoverflies are attracted to the flowers, and the hoverflies' offspring eat aphids away (1'46 '').

Alyssum flowers attract hoverflies, and their larvae eat aphids away.

With flowers in the vegetable patch, a balance between pests, pollinators and attractive plants is created (1'58 '').

Daisy flowers attract very positive insects (2'13 '').

Daisy flowers have much pollen

There are the Asteraceae plants with the daisy flowers, lettuce, chicory, artichokes also can be in bloom attracting insects (2'30'').

It's possible to let certain vegetables bloom, which then attract pollinating insects, such as lettuce, chicory, artichokes (2'43 '').

Great companion plants (2'35")

Great companion plants (2'39")

Salad flowers - and the blue blossom of chicory


Great companion plants (2'45")

The blossom of artichoke

Umbel flowers (umbelliferae) also attract many positive pollinator insects (3'3 ''). The insects can see the giant umbels from afar and thus certainly will not forget to land in this garden (3'8 '').


Great companion plants (2'48")


Great companion plants (2'52")

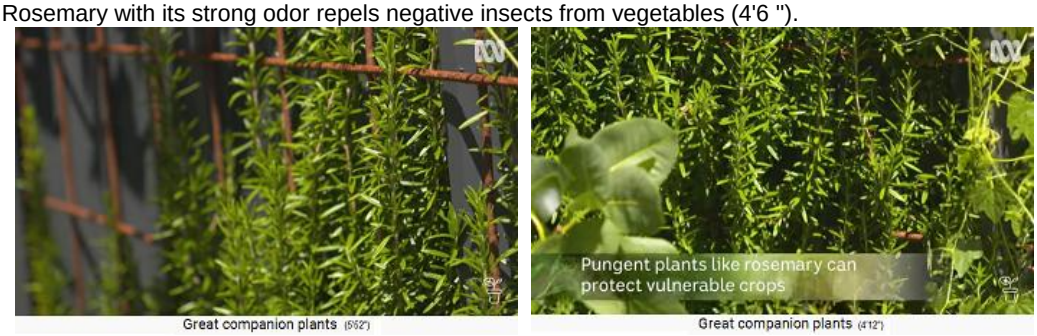
Great companion plants (3'3")

Great companion plants (3'5")

Partner plants for vegetables are also fennel, dill, parsley, garlic, and coriander (3'17 "). Partner flowers for vegetables are also the flowers of the mint family: lavender, sage and catnip (3'38 "). The catnip is the "landing plant" for many pollinating insects landing always first there (3'44 ").

Catnip - the "runway" for insects with catnip

Rosemary flowers also in the [mild] winter, so the pollinator insects come throughout the year (3'52 "). Rosemary with its strong odor repels negative insects from vegetables (4'6 ").



Odor-intensive plants such as rosemary confuse pests and protect vulnerable vegetables

With many scented spices among the vegetables, the negative insects are so confused that they no longer know where is which plant (4'13 "). An row of amaranth is e.g. a protective wall for chilies and tomatoes growing behind it. The insects do not find the vegetables, because they do not find the silouettes of tomatoes and chilies (4'31 ").

Just plant a "wall" with amaranth and thus confuse the pests, the vulnerable harvest is protected

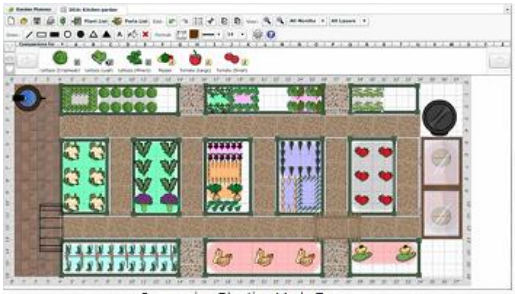
In autumn, Brassica flies and cabbage caterpillars have to be under control (4'48 "): they can be distracted with cress: the cabbage butterfly lays the eggs on the cress, and the offspring eats cress and dies (5'7"). So one can plant, for example, broccoli with cress installing an archwire and plastic tarpaulin installing a small hothouse over it (5'34 ").

Cress seeds

The flowers in the vegetable patch also promote biodiversity (5'49 ").

12.3. Video 3 about compantion planting ("dream partners") Companion Planting Made Easy (5'45")

https://www.youtube.com/watch?v=-NLPmuXCzFY – YouTube channel GrowVeg – uploaded on Jan.13, 2017



Well, there are thousands of ways to combine plants, but it's important to know which combinations are the best. Here is an English app program: "Garden Planner" - where you can also choose the dream partner plants:
https://gardenplanner.almanac.com/
or also here:
https://gardenplanner.motherearthnews.com/

Mixed crop plants: Flowers attract insects that eat pests
(2'31 ").

Douglas Marigold (poached egg plant): The poached egg plant can be planted next to salads, because it attracts hoverflies that eat lice (2'37 ").

The poached egg plant (Douglas marigold) attracts hoverflies eating lice

Borage attracts bees and also wasps that eat pests (2'39 "), may be planted for example next to tomatoes (2'44 ").

Crimson clover next to broccoli favors the spread of the local spider population, which in turn eat pests (2'54 ") [and clover enriches the soil with nitrogene].

Crimson clover promotes the spider population, which eat pests - and is accumulating nitrogen

Indian cress (Nasturtium) attracts pests so the vegetables remain undamaged (2'59 "). One combines e.g. Nasturtium with thick beans (fava beans) (3'2 "). So the black bean aphid attacks nasturtium and leaves the beans in peace (3'7 "). Nasturtium also attracts caterpillars, which then leave the cabbage in peace (3'13 ").

Indian cress (Nasturtium) is victimizing for aphids and caterpillars

Partner plants with a strong odor confuse pests

Some partner plants smell so strong that they confuse the pests and the pests thus no longer find their victim plant (3'19 '').

Garlic deters the green peach aphid (3'23 ''). Garlic protects peaches and nectarines (3'29 '').

Partner plants promote the growth of the main plant with shade + nitrogen etc.
(3'35 '')

Sunflowers are promoting pumpkins through the shade, and sunflowers also promote beans to climb up the shady sunflower (3'44 ''). [Beans, in turn, accumulate nitrogen in the soil].

The Three Sisters Corn + Beans + Pumpkin: Plant corn, beans and pumpkin together (3'49 ").

The large leaves of the pumpkin give so much shade that weeds hardly have a chance (3'55 "). Beans and corn simultaneously confuse the pumpkin pest "squash vine borer ", a big pest in "America" (4'1"). The beans use the corn as a climbing pole and the bean roots enrich the soil with nitrogen at the same time, so that corn and pumpkin grow very well (4'9 ").

Legumes such as peas and beans enrich the soil with nitrogen, promoting the growth of other vegetables (4'11 "). Beans next to potatoes provoke larger potatoes (4'22 ").

Legumes enrich the soil with nitrogen and, so, next to potatoes, provoke larger potatoes

Borage enriches the soil with trace elements and provokes strawberries, larger and tastier strawberries (4'29 ").

Negative plant combinations

Roots can weaken each other, or roots give off chemical substances that block other plants, like e.g. black walnut or fennel, which block many other plants from growing (4'43 '').

Tomatoes next to apple tree are also blocking each other (4'59 '').

12.4. Video 4 about companion planting ("dream partners") The combinaciont of sweet corn with cabbage or pumpkin

from the Video of Patrick Whitefield: Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 - https://www.youtube.com/watch?v=bePqJL4Oedw – YouTube channel: LOVE IT TV - Nature, Learning and Life

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (6')


Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (53')

Patrick Whitefield with seedlings: corn and cabbage


Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (17')


Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (19')

Sweetcorn and cabbage: Now: the corn grows slender and tall, and the cabbage is low and bushy (47''). This is a good combination because the two vegetables do not or barely block each other the sunlight (54''). You can measure the distances of the plants with a small blade length (3'10 '').

Corn must be planted in blocks because they have wind pollination without insects (6'15 ''). For the seedlings you make holes, which are poured with water, so that the water then seeps into the ground. Then place the seedlings in the holes and protect the seedling with cut PET bottles over them (8'30 '').

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (6'20")

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (7'21")

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (7'30")

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (8'25")

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (5'6")

In addition, pumpkin and corn grow together very well (9'20 '').

These combinations are giving a 150% harvest instead of just 100%.

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (9'36")

Patrick Whitefield plants a pumpkin seedling near corn seedlings:

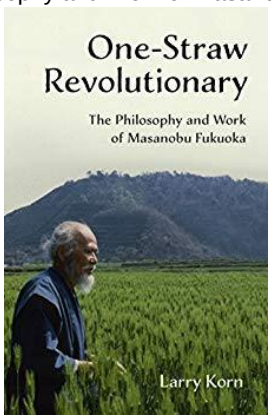
Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (10'20")

Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield - video 3 (10'50")

Patrick Whitefield with a CD mobile that is meant to dazzle birds

13. Effective rice cultivation: without long floods, but with clover+ barley+mulching

The pioneer of efficient rice cultivation is once again the Japanese Mr. Fukuoka. He discovered that rice grows better on dry soil than in a zone where flooding is going on for months. Here is his book: "One-Straw Revolutionary. The Philosophy and Work of Masanobu Fukuoka":



Book by Masanobu Fukuoka: One-Straw Revolutionary (1978):
https://www.amazon.com/One-Straw-Revolutionary-Philosophy-Masanobu-Fukuoka/dp/1603585303/ref=sr_1_1?ie=UTF8&qid=1544312622&sr=8-1&keywords=one+straw+revolutionary

The decisive video about dry rice cultivation of Fukuoka is this here:

Vídeo: Natural Farming with Masanobu Fukuoka (1h0'36'')
https://www.youtube.com/watch?v=nzs8iFGNdBo

Web site: http://www.med-etc.com/natur/Ldw-perma/ENGL/004c02-permaculture-Masanobu-Fukuoka-in-Japan+India-movie1h.html

Point 1) In his big fields the pioneer Fukuoka has operated a rotary agriculture, with
-- **rice** and
-- **barley**.

Point 2) This cultivation is always accompanied by
-- **slightly scattered straw mulch** (rice straw, barley straw) against weeds and for more nutrients

Natural Farming with Masanobu Fukuoka (26'57")

-- and together with the barley, always **clover** is sown: The clover breaks through the loose straw, and its long roots enrich the soil with nitrogen, making the plants stronger and more resilient every year

Mulch + clover cause a bigger harvest each year.

The new sowing by Fukuoka is always one month BEFORE the harvest. During the harvest, the new plants are already growing and must survive some footsteps, but recover quickly. With this method of sowing 1 month BEFORE the harvest, the soil never remains "empty" and vulnerable, weeds have no chance.

With mulching and with the sowing of barley + clover, Mr. Fukuoka has doubled his harvest in 30 years without doing anything - clover and mulch have worked for him. The ears have DOUBLED!

3) The factor of flooding only during 8 to 10 days:
With Fukuoka, the flooding of the rice fields takes only 8 to 10 days. Then the water is drained and the rice grows on dry soil. The effect of short flooding for 8-10 days:
-- Weeds and pests are dying enough to stop multiplying, but at the same time new beneficials can install on the ground (!)
-- Rice roots from dry fields of Fukuoka are healthy WITHOUT pesticides and without infections from permanent flooding - the neighbors' rice roots are sick and lazy and with pesticides.

Healthy white rice roots of Fukuoka - neighbor's black sick and rotten rice roots with permanent flooding and pesticides

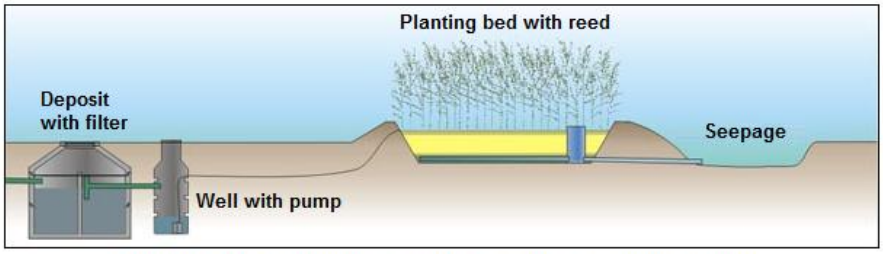
Have a good meal with pesticide-free rice!

14. The natural plant purification plant WITHOUT chemicals

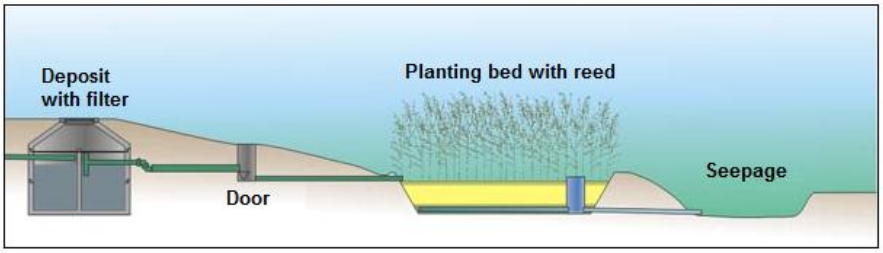
A natural plant purification plant cleans the wastewater in 2 stages:
1) Before the first basin the wastewater is filtered mechanically with a filter
2) In the second basin, the wastewater is biologically cleaned with reeds [web02].

The reed consumes many nutrients, and microorganisms populate the reed. These organisms release antibacterial substances to the water and therefore purify the wastewater [web03].

Natural plant purification plant in a plain: with water pump



Natural plant purification plant on a slope: no water pump



https://naturbauhof.de/lad_pka_funktion.php

Photo from: https://naturbauhof.de/lad_pka_funktion.php

The natural plant purification plant
A plant purification plant consists of
1) a reservoir with inflowing wastewater, with 1 rake against large objects in front of it
2) a decomposition basin: with gravel, sand and reeds (eg Phragmites australis)
3) a control well at the outlet, where the purified water is checked with measurements [web01].

The central basin, where the degradation processes take place, can naturally reduce most wastewater constituents. This is where the effects are combined of
-- **Filter** (mechanical process)
-- **Bacteria**: they absorb or reduce wastewater components (biological process)
-- **organic processes**: wastewater components are absorbed or reduced (biological process)
-- **the soil**: absorbs the waste water components (physical process)
-- **between the roots**:there is the precipitation of substances (chemical process) [web01].

The degradation processes are mainly about
-- the **reduction of carbon**
-- the **nitrification** [web01].

Natural sewage treatment plants are oriented vertically or horizontally
There are plant purification plants
-- **vertical** ones: The waste water flows automatically from top to bottom (with optimal results) with a high nitrification rate, but less denitrification.
-- **horizontal** ones: The sewage flows with mechanical pumps from the entrance to the exit with a low nitrification rate, but more denitrification.
They are like moors and can cause a mosquito horror [web01].

Conditions for a natural plant purification plant: pumps and some electricity
-- The nitrogen cycle must be controlled by the pH value and by water temperature
-- Natural plant purification plants do not freeze in winter, but continue running
-- Natural plant purification only need a few pumps, other machines are NOT needed
-- All in all, the maintenance of a natural wastewater treatment plant is cheap
-- The bacteria of the decomposition process are in the soil and are not dependent on a "living sludge", which must be added
-- That meands, that a natural plant purification plant works in almost every environment in the world [with some pumps and some electricity] [web01].

The center is the septic tank with pebbles, sand and reeds - or only with roots

Photos from: https://www.aquant.de

Normally a natural plant purification plant consists of 3 basins. The center of the natural sewage treatment plant is the second basin with gravel, sand and plants (reed) [web01].

There are also natural sewage treatment plants with only one long pit into which the sewage enters from one side and the purified water is leaving at the end of the basin [web01].

Variations of the pit (of the middle basin)

Variant 1) with fecal sludge
In a central basin of a natural purification treatment plant
-- Substances which are heavier than water settle down forming the fecal sludge (fecal mud, silt feces)
-- There are substances floating on the surface that are lighter than water
-- In some cases, almost no faeces are present and almost no fecal sludge (siltfoils) is formed [web01].

Normally the basin is filled with fecal sludge within one year and should be removed once a year. But there are also cases of natural sewage treatment plants in which fecal sludge is degraded by biological processes in the reservoir itself and almost nothing is accumulating [web01].

Variant 2) with wood chips – and there is a compost dough

A basin with a dry filter with two compartments is installed:
-- The floor is a felt
-- On this filt a thick gravel layer is installed
-- In this thick gravel layer a layer of wood chips of deciduous trees is installed (conifers are not possible because of their antibiotic effect) [web01].

The feces settle in the wood chip filter and in the gravel, but at the same time remain in contact with air. There is no rot and stench. When the first basin compartment is full, the second one is used. The end product is compost mass [web01].

Variant 3) with composting toilet with separate urine

When the natural treatment plant is only connected to compost toilets with separate urine, there is no stool deposit in a central reservoir. The natural wastewater treatment plant only needs half the area [web01].

Variant 4) without soil layer only with plant roots

It is possible to install a natural wastewater purification plant without excrement layer, without gravel or wood, simply with the plants that stand on their own roots. The big part of the purification work is done by the plants and by the microorganisms in the roots. In this way it comes to a greater water movement and weight can be spared, so that the installation is also possible on roofs [web01].

The processes in the pit

-- **There are no bad odors**: Principally, everything is always in motion and therefore here are no bad odors coming from natural plant purification plants
-- **Plants are absorbing**: plants are absorbing a part of the wastewater constituents for growing
-- **The roots of the reed**: The roots of the reeds keep the soil permeable for oxygen, etc. - Compactions caused by walking on the layer are compensated, or there is a compensating effect in the formation of new fecal layers
-- **Microorganisms and soil bacteria are cleaning**: Microorganisms and soil bacteria clean most of the waste water through chemical reactions [web01].
-- **Gravel** binds phosphates [web02].

1) **Plant roots enrich the soil area with oxygen**: Many marsh and aquatic plants transport oxygen to their roots by distributing it at depth in the soil water (oxygen-rich zone, aerobic zone). In this way, autotrophic microorganisms can work on the first step of purification: a nitrification [web01].

2) **Oxygen in chemical compounds**: There is the case when oxygen is only in chemical compounds (oxygen-poor zone, anoxic zone), e.g. in nitrate, the product of nitrification. Heterotrophic microorganisms that have a carbon source work with this nitrate, and therefore nitrogen comes out as a gas. That's denitrification [web01].

3) **Cleaning in oxygen-free zones (anaerobic zones)**: The result is an unpleasant odor of putrefaction, which only occurs in special cases such as anaerobic cleaning [web01].

The decomposition processes: cycles
Most of the wastewater consists of nitrogen compounds. The decomposition processes are referring
- to the nitrogen cycle
- to the phosphorus cycle
- to the sulfur cycle
- to the ammonia cycle (ammonification) [web01].

The main processes are denitrification, ammonia processing and ammonia oxidation. This process of ammonia ("anammox") is especially important when little chemical oxygen is needed [web01].

Particles are decomposing and by a metabolism they are accumulating as microbial biomass. This leads to ammonia due to microbial biomass or plant residues. Mineralization occurs by conversion into inorganic nitrogen [web01].

Atmospheric nitrogen is coming out in small water soluble amounts and is an element of the system [web01].

Further nitrogen decomposition processes
-- with **precipitation** (nitrogen enrichment)
-- with **ion exchange** (nitrogen enrichment in clay minerals)
-- with **degradation processes** (nitrogen enrichment in remnants of dead plants as a supplement to incomplete microbial ammonification of plant residues) [web01].

Precipitation of phosphate: The natural basin's floor contains iron salts or other minerals that combine with phosphate into an insoluble compound that falls to the ground (precipitation) [web01].

Side effects of a natural water treatment plant: phosphorus
-- There may be phosphorus in the setting layer
-- When this plant biomass is removed, the phosphorus is also removed
-- When the plant biomass is always eliminated, the plants absorb phosphorus as a nutrient and is thus partially eliminated from the wastewater
-- All in all, the phosphorus does not react like a gas and remains [web01].

The last basin with the final control

The purified water ends up in a control well with measurements [web01], with tests on the purified water [web02], and
-- Nitrogen is measured
-- Phosphorus is measured
-- Carbon is measured [web01].

For carbon, a reaction control is used
-- how long a biological reaction of microorganisms takes
-- how long a chemical transformation takes, etc. [web01].

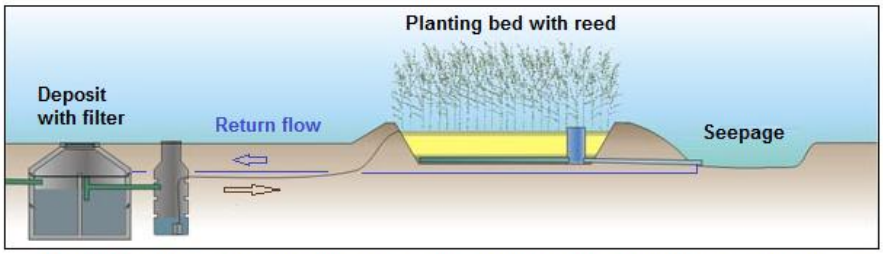
In contaminated regions, there may be a burden on ingredients that can not be degraded by plants [web01]. At the end
-- the purified water enters the waters of the region, or
-- the purified water seeps into the ground, or
-- the purified water is stored for reuse, for example [web01]

-- to water the garden [web02].

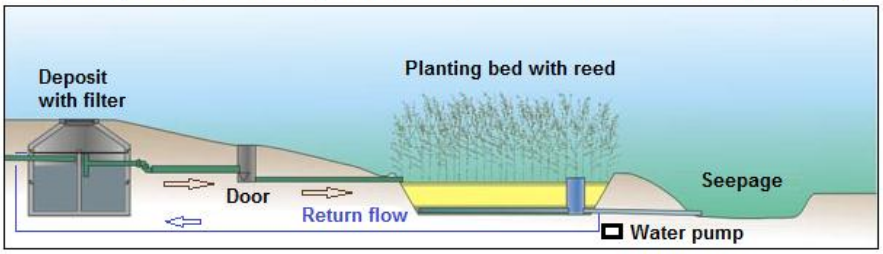
Or a partial reflux with the purified water is installed:

Reflux of a part of the purified water

Natural plant purification plant in a plain: with water pump and return flow



Natural plant purification plan on a slope: with return flow with water pump



https://naturbauhof.de/lad_pka_funktion.php

For maximum water quality: a part of the purified water flows back into the inlet

When a maximum water quality is needed
-- in a sensitive area
-- in an area with an ecological groundwater reserve
-- in case of water drainage into a swimming pool
-- in the production of service water
-- with stricter ecological limits due to the conditions of the customer [web02]

then a part of the water which is leaving the treatment plant is returned to the entrance:
-- to dilute the incoming wastewater
-- to prevent the formation of sulfur odor (hydrogen sulfide)
-- to prevent the formation of fecal sludge (manure sludge)
-- to "vitalize" wastewater already in the first phase
-- to improve all stages of the decomposition process [web01].

For **vertical** natural wastewater treatment plants, which return purified water, a pump is needed.
In **horizontal** natural wastewater treatment plants, the return of purified water takes place by gravity [web01].

It's possible to add a pond yet [web02].

https://naturbauhof.de/lad_pka_funktion.php

Photo from: https://naturbauhof.de/lad_pka_funktion.php

Or it's possible to install a swimming pond, with a small, natural sewage treatment plant with reeds:

https://www.aquant.de/

Photo from: https://www.aquant.de

[web01] https://de.wikipedia.org/wiki/Pflanzenkläranlage
[web02] https://naturbauhof.de/lad_pka_funktion.php
[web03] https://www.dehner.de/produkte/schilfrohr-X008313884/

15. The natural bathroom

Wastewater is different:

-- There is waste water from the kitchen ("gray water"), which can be reused for the toilet bowl or used as a garden fertilizer.
-- There is wastewater from the shower and from the washing machine ("greywater"), which can be reused for the toilet bowl or used as a garden fertilizer.
-- Urine water from the toilet can be used as fertilizer water for the garden area.
-- The waste water No. 2 from the toilet bowl is flowing to the natural plant purification plant.

It's possible to build houses according to these guidelines so all runs automatically fulfilling these conditions. For example, the architect Michael Reynolds from the "USA" has been doing this for decades with his house form of "Earth Ship".

16a. The warm house without heating: the "Earth ship" by pioneer architect Michael Reynolds

Photos from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship03-movie-garbage-warrior-Reynolds-fight-ag-authorities+tsunamis.html

Pioneer engineer Michael Reynolds from the state of New Mexico ("USA") has invented with his "Biotecture" the warm house without heating:
1) with window front to the sunny side with maximum utilization of the sunlight
2) with about 1m thick earth walls, which store the summer heat radiating this heat in winter due to the inertial reaction - as a structural element for the walls Reynolds uses old tires
3) with ventilation systems with ducts and skylights that replace an electric air conditioner
4) with systems to generate electricity using solar energy and a small rotor
5) with systems for water supply with a metal roof
6) with greywater system for saving water by reusing greywater
7) with sewage treatment plants for greywater and toilet water
8) with a greenhouse in the house for own production of fruits and vegetables.

The 1 m thick earth walls serve as heat storage. The angle of the windows is in relation to the winter sun's position so a maximum of solar energy comes in during winter and the walls are also heated by sunshine also in winter. See here an example of an earth ship:

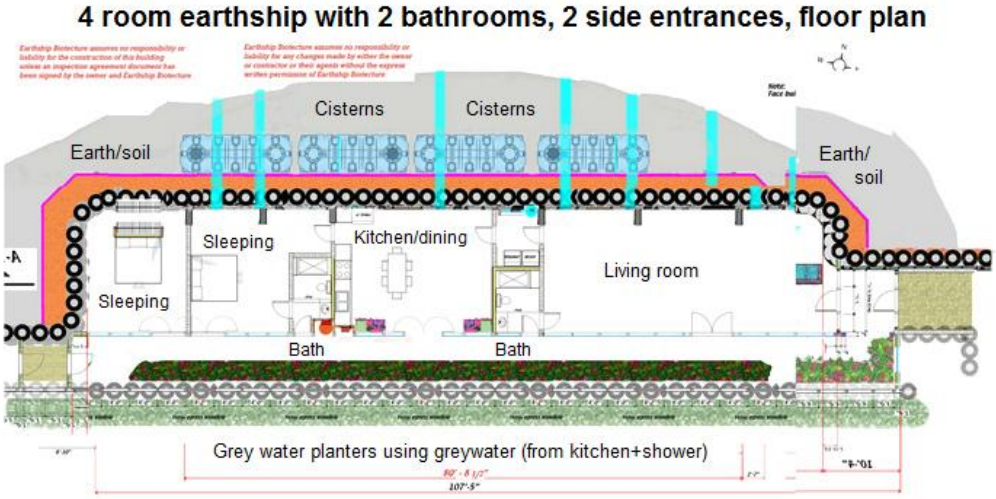


Photo from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

In this way, giant houses are installed (small castles) with a height of about 3m, at a reasonable price and absolutely independent, **WITHOUT heating costs NOR costs for water, electricity and sewage**.

Example 2 of a plan of a Earth ship:

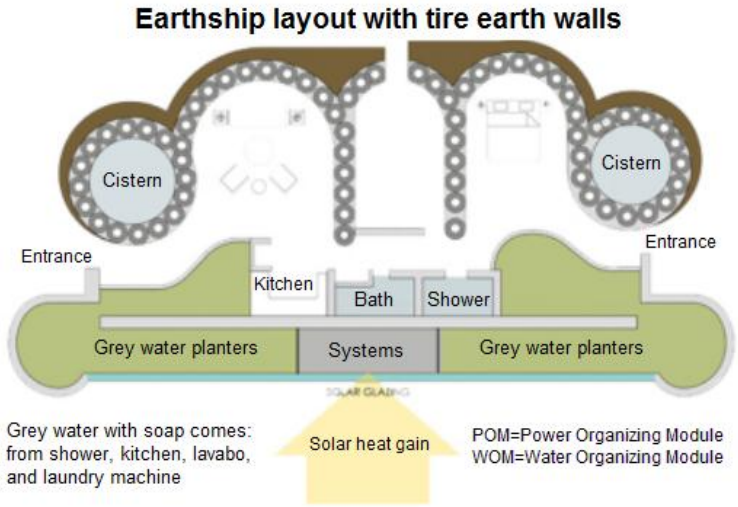


Photo from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

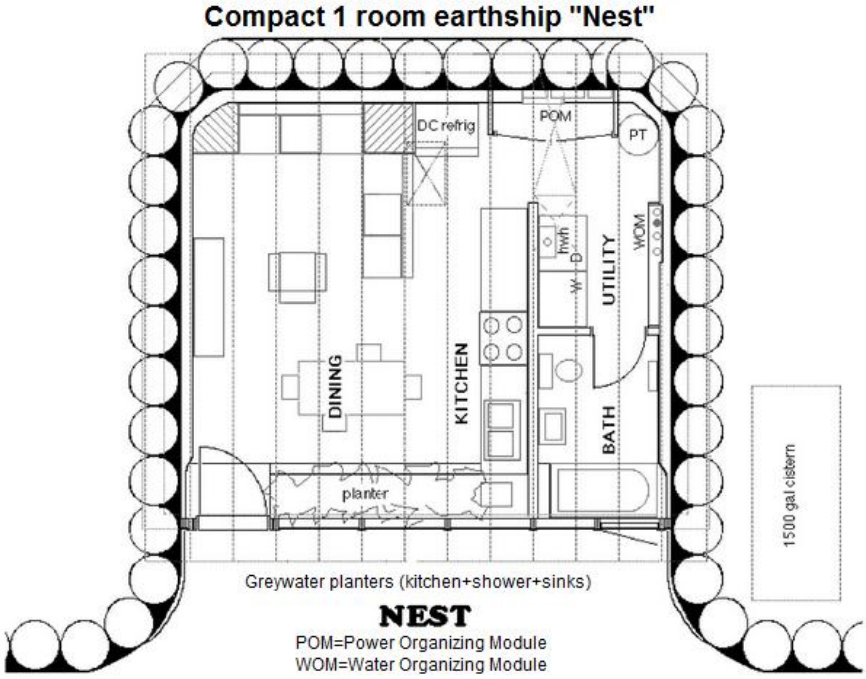


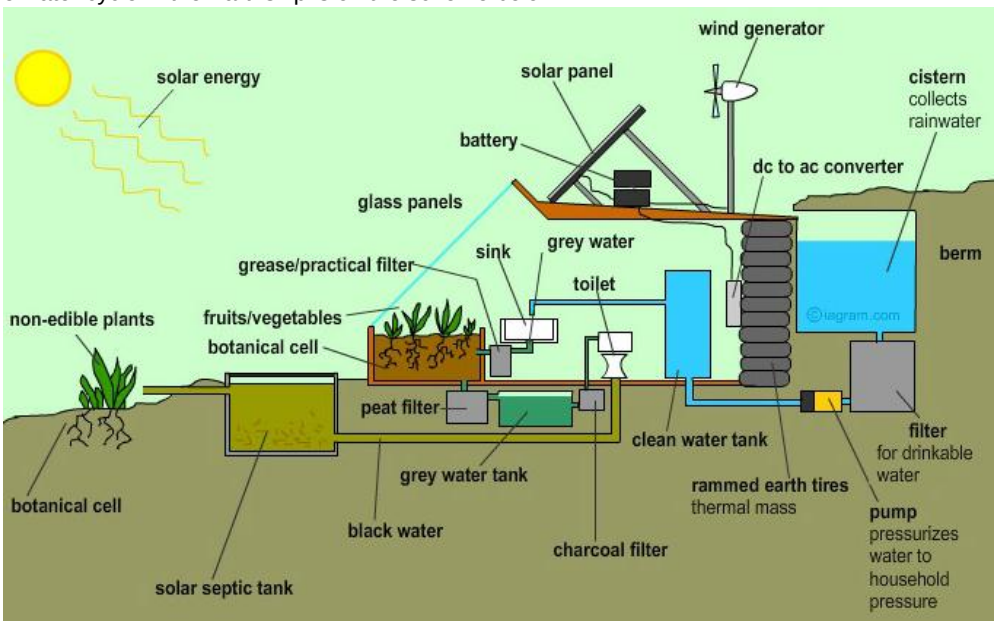
Photo from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

The construction of an Earthship – example from Killaloe ("USA")

Photos from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

The colored lights are colored bottles that are integrated in the inner wall.

The water cycle in the Earthship is on the scheme below:



Photos from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

Electricity comes from a small solar system and a small wind rotor.

Water comes from the metal roof due to the condensation of water at night.

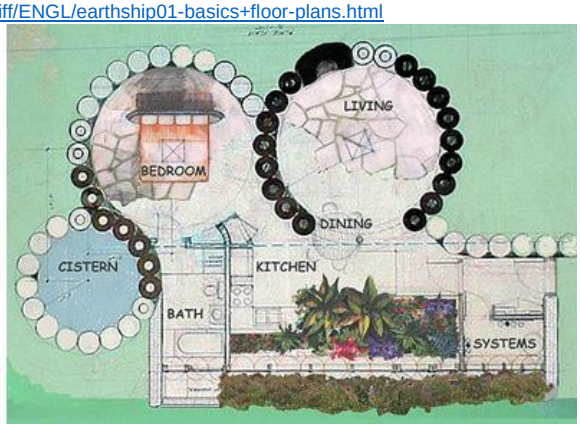
16b. The Earthship for the tropical zones without winter

There is also the Earthship for the tropical zone without heating effect, but with a large water tank and with sufficient interior ventilation, so no electrical air conditioning is required:

Haiti: Earthship for warm regions without winter with dome and skylight, cross section - and real

Photos from: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html

Earthship on Hawaii with three cupola
1) Living room - 2) sleeping room - 3) cistern



Architect Michael Reynolds now offers the Earthships in the "USA" as a kit.

Architect Michael Reynolds gives courses around the world - see his website
https://www.earthshipglobal.com/
In the meantime, an academy has been set up with employees and monthly courses (Earthship Academy Sessions - 2500 dollars) and also with an online academy:
https://www.earthshipglobal.com/academy-sessions

And THIS way, **all people with cold winters in the world can live in Earthships with Mother Earth on comfortable terms, WITHOUT GREAT COST**.

Here are the logos of Michael Reynolds about the 6 necessities in life:

Photos from: https://www.earthshipglobal.com/

17. Turn desert into forest and jungle

With a few tricks from Mother Earth, it's easy to turn deserts into forests and jungles. This applies to dry areas and complete deserts. There are several pioneers doing this around the world. The strategies are different:

17a) Turn desert into forest in Africa: The pioneer Yacouba Sawadogo in Burkina Faso

Pioneer Yacouba Sawadogo: Trick 1: Install holes, sprinkle seeds, then put manure, compost and leaves in layers

Photos from:
http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest01-Yacouba-Sadabogo-in-Burkina-Faso.html

In Africa in Burkina Faso in the village of Gourga lives the pioneer Yacouba Sawadogo, who had to fight against the authorities to realize his vision:
1) Install large holes ("Zai") for plantations, seeds are sprinkled into these holes, and then dung, compost and leaves are put in layers, and finally a light layer of earth is put on top.
2) Build low stone dams to slow down rainwater run-off.
3) Settle termites, because they are constructing tunnels in the earth provoking a many fold of water absorption of the soil.

Trick 2: Build low stone dams to slow rainwater runoff - Trick 3: Termites build tunnels in the ground

With his technique, Mr. Sawadogo was even able to train students who copied his technique, and so entire regions in Africa were rescuing themselves from eternal drought and people came back. In the end, Mr. Sawadogo became world-famous with a movie: "The Man Who Stopped the Desert". The militaristic authorities of Burkina Faso, however, did not want to give him a prize - but in the end even planned to rob a part of his property.

17b) Turn desert into forest in France: The legend of Jean Giono about the shepherd Bouffier who planted oak trees

In France, Jean Giono wrote a legend about a shepherd Bouffier, who collected acorns and used them to set up oak trees, secretly increasing oak forests.

In 40 years, the barren landscape has been transformed by the strong oak roots into a fertile paradise with water springs, and the new forests reduced the southern French wind "Mistral".

At the end of his life, Jean Giono confessed in a private letter that there had never been any shepherd Bouffier. The legend, however, remains valuable as a signal how to rescue complete ecosystems.

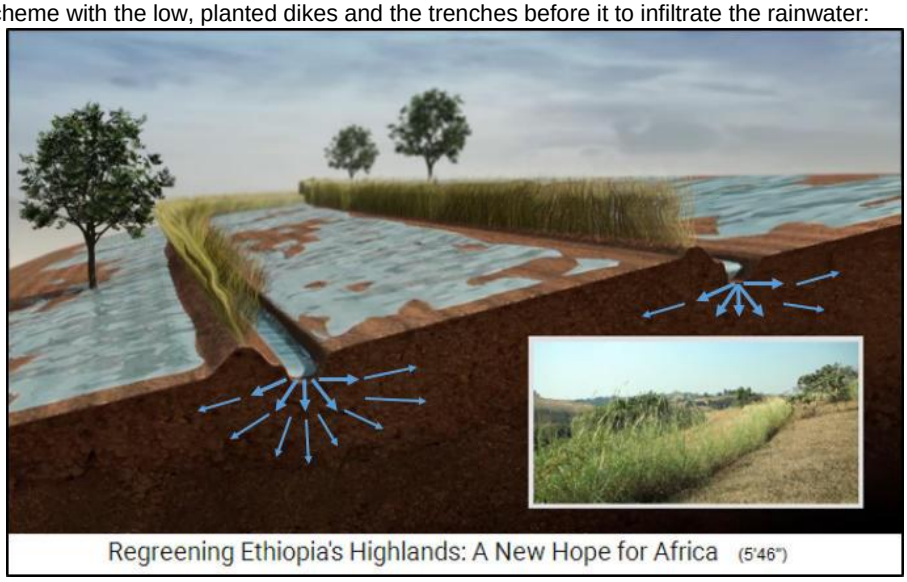
Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest02b-South-of-France-Bouffier-southern-alps-oaks02-real.html

17c) Turn desert into forest in Africa: Etiopia with trees, planted dikes, ditches, ponds, terraces and cattle at the farm

The Ethiopian government with its Department of Agriculture had an idea and installed
-- trees
-- planted dikes and in front of each trenches
-- ponds
-- terraces
-- and for the recovery of pastures, the cattle was kept at the farm and food was brought to the farm.
With these measures, the desert was transformed into a green landscape.

Tigray province, a whole village installed planting holes for trees - Oromia province, low dikes were installed in the fields against erosion

The scheme with the low, planted dikes and the trenches before it to infiltrate the rainwater:



Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest03-Ethiopia-highlands-Amhara+Tigray+Oromia.html

Whole populations built the dikes and ditches against erosion, and so the water should infiltrate the earth:

Regreening Ethiopia's Highlands: A New Hope for Africa (7'5")


Regreening Ethiopia's Highlands: A New Hope for Africa (7'18")

Ponds

In addition, where it was possible, ponds were installed which made it possible to fish and as a side effect the groundwater level was rising.


Regreening Ethiopia's Highlands: A New Hope for Africa (6'16")

In the province of Oromia, a farmer was assisted to have installed a fish-breeding pond installed - and at the same time, the pond is a guarantee of the area's ground water level

Terraces

In addition, old terraces were renovated on steep slopes to prevent erosion there as well:


Regreening Ethiopia's Highlands: A New Hope for Africa (4'50")


Regreening Ethiopia's Highlands: A New Hope for Africa (4'58")

Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest03-Ethiopia-highlands-Amhara+Tigray+Oromia.html

But in the film, the Ethiopian government does not say who gave the idea to the program.

Livestock husbandry at the farm

In addition, the cattle were taken down from the pastures and kept at the farm. The family members of the farmers cut the grass by hand on the meadows and brought it to the farm:

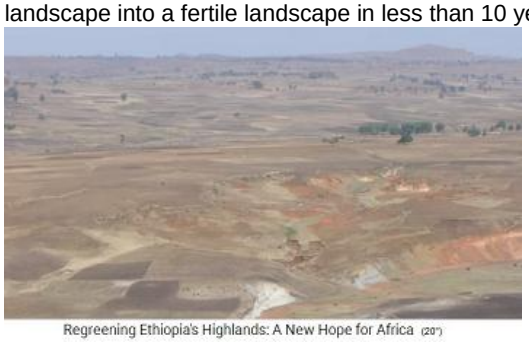
The side effect of this measure was that the livestock felt better at the farm and gave more milk ...

Dams and ponds in the high mountains

In the high mountains of Ethiopia, some weirs have been created to hold water against erosion and to raise the groundwater level:

The transformation of the Ethiopian landscape in less than 10 years (2005-2014)

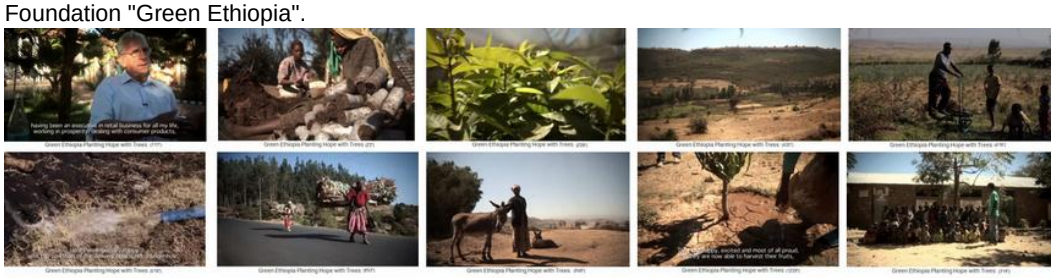
With all these measures, the Ethiopian Ministry of Agriculture has succeeded in turning the 2005 desert landscape into a fertile landscape in less than 10 years:



Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest03-Ethiopia-highlands-Amhara+Tigray+Oromia.html

17d) Turn desert into forest in Africa: Ethiopia with Kurt Pfister with holes for trees, nursery and tree care

The Swiss pioneer Mr. Kurt Pfister was once in Ethiopia on holiday, and since then he always returns there to plant trees there. In this way the life of the rural population improves. Mr. Pfister leads the Foundation "Green Ethiopia".



Kurt Pfister - compost rolls - seedlings - a mountainside turns green - water pump with foot drive
Water from the water pipe - rural women with heavy loads - donkeys - the school tree - school class

Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest04-Ethiopia-foundation-Green-Ethiopia.html

The seedlings grow up in compost rolls.

Thereafter, the seedlings are brought in groups on mountain slopes. The population regularly returns to take care and to give water the new trees, creating a forest with birds and shrubs.

The groundwater level is rising, the old springs are bubbling again, creeks are flowing again as before, and dams are being installed to hold back the water and raise the groundwater level again.

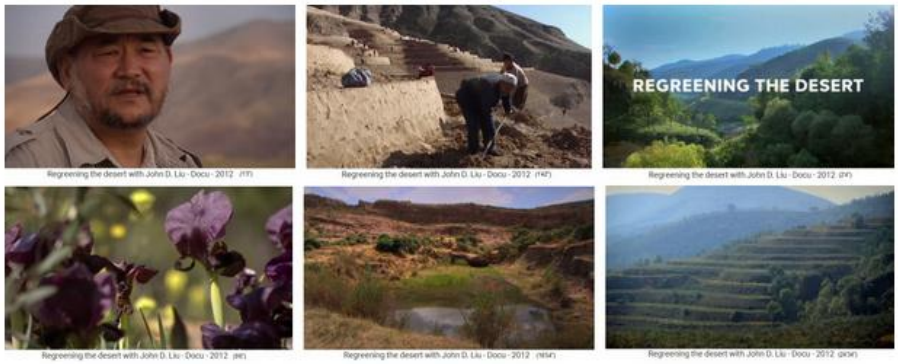
With water pumps with foot drive, the water is directed to the fields.

Since the rural women in Ethiopia have to bear heavy burdens, donkeys are donated to a family from time to time.

In the curriculum, the authorities have introduced tree planting as a school subject, and each child has "his" / "her" tree.

17e) Turn desert into forest: John D. Liu in China, Jordan, Africa (Ethiopia, Rwanda) + Geoff Lawton (as of 2012)

Pioneer John D. Liu is an environmental reporter who could watch how in China desert was turned into a green landscape again - and that's why Mr. Liu has become a propagandist for turning deserts into forests and green landscapes. Mr. Liu has thus encouraged the re-transformation of deserts into green landscapes in China, Africa and Jordan.



John D. Liu, Portrait - The Loess Plateau in China, the desert landscape until 2000 - China, the regeneration of the Loess Plateau, the farmers install new terraces and dykes with shovels – Jordan: plants believed extinct are blooming again - Ethiopia, the village Abraha Atsebaha gets new life with ponds in the mountains - Rwanda, terraces against erosion

Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest05a-John-D-Liu-in-China+Jordan+Africa.html

Terraces are installed, as well as dikes, ponds, and so the groundwater level rises. Dead springs are giving water as before.

In Jordan, pioneer John D. Liu met permaculture pioneer Geoff Lawton, who is also working on desert transformation projects in the desert. Families are also instructed on how to create a garden in the desert with straw mulch and permaculture, harvesting etc.

Photos from: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest05b-Liu+Lawton-in-China+Jordan+Bolivia.html

18. Snails and slugs

Table: Animals that like to eat snails / slugs or their eggs	
• amphibians • birds • blackbird+thrush • blindworm • centipede rob snail eggs • crow • ducks • escargot eat eggs of slugs • frogs • ground beetles • harvestman • hedgehog • hornflies (as parasites) • larvae of fireflies • larvae of plaster beetles	• Leopard slugs eat common slugs • lizards • magpie • mole • newts • salamander • shrew • silphid beetles • snakes • stork • turtles • toads (especially common toads)

Sources: see

-- web site about sociology, natural medicine and nature with Mother Earth:
http://www.soz-etc.com/index-ENGL.html (doubled on http://www.med-etc.com/index-ENGL.html)

1. **Solar water** with the ultraviolet radiation of the sun (UV radiation) made in 24 hours FOR FREE – p.5 -
http://www.med-etc.com/natur/wasser/wasseraufbereitung-Dt-01-m-uv-strahlung.html

2. The **zoning** of a farm – p.5
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a01-permaculture-farm-principles.html

3. **Hot water for the shower for 1 year FREE**: The compost pile of wood chips with the water hose – p.7
Compost-Powered Water Heater provides Free heat for the Hot Tub and helps me grow organic food.:
https://www.youtube.com/watch?v=zbArnw2Tfu0

4. **The garden bed with wood in the ground** - becomes warm - and dryness no longer harms the plants – p.9 -
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a03-permaculture-raised-bed+hillbed.html

5. The **pit greenhouse ("Walipini")** - cultivation also in winter (!) – p.9
Walipini from Bolivia and variations: http://www.med-etc.com/natur/Ldw/walipini/walipini001-ENGL.html

6. **Plowing without plowing**: cultivation fields are plowed with pigs or goats - NO plow any more (!) – p.11 - http://www.med-etc.com/natur/Ldw-perma/ENGL/004d01-permaculture-Sepp-Holzer-farm-krameterhof.html

7a. **The hillbed**: 30% more cultivation surface - layers with decomposition processes - up to 8ºC higher temperature – p.12
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a03-permaculture-raised-bed+hillbed.html

7b. **The raised bed** with permaculture layering with wood, leaves, manure etc. – p.13
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a03-permaculture-raised-bed+hillbed.html

8. **Install ponds**, make dry areas fertile, plant fruit trees, shrubs and install dry stone walls for beneficial animals – p.14
The pond series of Sepp Holzer (Austria): http://www.med-etc.com/natur/Ldw-perma/ENGL/004d03-permaculture-Sepp-Holzer-krameterhof-72-ponds+low-forest-grazing.html
Have dry zones made fertile, example Tamera in Portugal by Sepp Holzer:
http://www.med-etc.com/natur/Ldw-perma/ENGL/004d02-permaculture-Sepp-Holzer-Lake-landscape-Tamera-Portugal.html

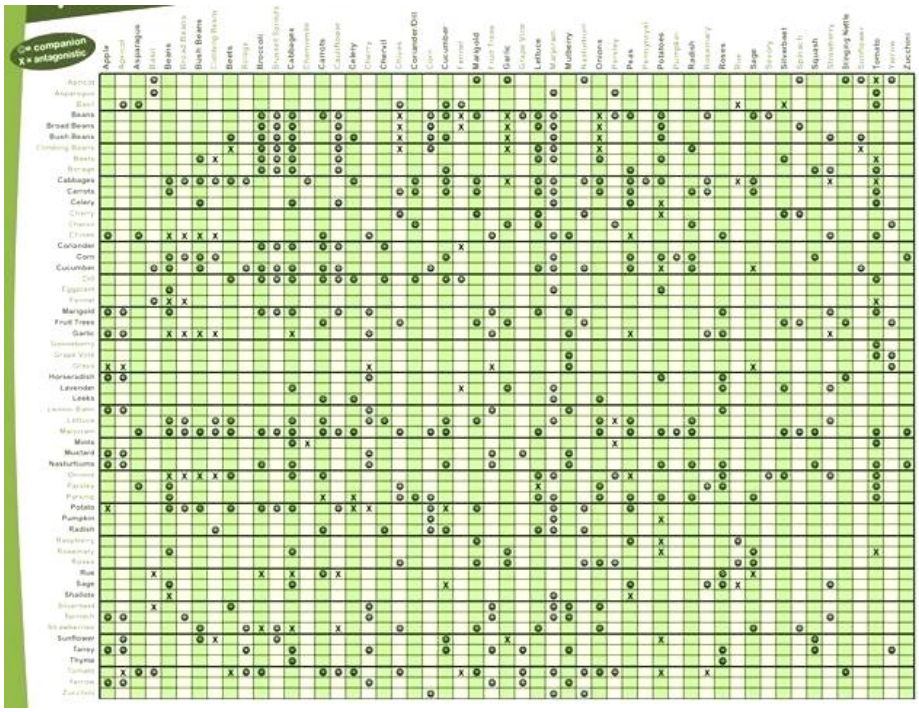
9. **Install warm air traps** - apples, kiwis and grapes are growing in the mountains – p.18
http://www.med-etc.com/natur/Ldw-perma/ENGL/004d01-permaculture-Sepp-Holzer-farm-krameterhof.html

10. **Grow seedlings** – and place them in a damp hole in the planting bed – p.20
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a06-permaculture-tricks-in-the-greenhouse.html

see also the video of Patrick Whitefield: Growing Vegetables 'The art of companion planting and watering' Patrick Whitefield – video 3
https://www.youtube.com/watch?v=bePqJL4Oedw – YouTube channel: LOVE IT TV – Nature, Learning and Life

11. **Mulch** on the garden bed: straw provokes condensation water – p.21
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a02-permaculture-mulch+mulching.html

12. **Companion plants ("dream partners")** protecting each other – p.23
http://www.med-etc.com/natur/Ldw-perma/ENGL/004a05-feeders+manure-plants+companion+plants.html



13. **Effective rice cultivation**: without long floods, but with clover+barley+mulching – p.39
http://www.med-etc.com/natur/Ldw-perma/ENGL/004c02-permaculture-Masanobu-Fukuoka-in-Japan+India-movie1h.html

14. **The natural plant purification plant** WITHOUT chemicals – p.41
[web01] https://de.wikipedia.org/wiki/Pflanzenkläranlage
[web02] https://naturbauhof.de/lad_pka_funktion.php
[web03] https://www.dehner.de/produkte/schilfrohr-X008313884/

15. **The natural bathroom** – p.46

16a. **The warm house without heating**: the "**Earthship**" by pioneer architect Michael Reynolds – p.49 – and:
16b. The **Earthship for tropical zones** without winter – p.53
Web site 1: plans: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship01-basics+floor-plans.html
Web site 2: lecture: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship02-types-rectangular-round-combined-Lecture-Reynolds-2013.html
Web site 3: movie: http://www.med-etc.com/soz/arch-erdschiff/ENGL/earthship03-movie-garbage-warrior-Reynolds-fight-ag-authorities+tsunamis.html

17. **Turn desert into forest and jungle** – p.54
Index: http://www.med-etc.com/natur/wald-pflanzen-index-ENGL-planting-forest.html

17a) **Africa: The pioneer Yacouba Sawadogo in Burkina Faso**
http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest01-Yacouba-Sadabogo-in-Burkina-Faso.html

17b) **France: The legend of Jean Giono about the shepherd Bouffier with oak trees**
http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest02b-South-of-France-Bouffier-southern-alps-oaks02-real.html

17c) **Africa: Ethiopia with governments**: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest03-Ethiopia-highlands-Amhara+Tigray+Oromia.html

17d) **Africa: Ethiopia with Kurt Pfister**: http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest04-Ethiopia-foundation-Green-Ethiopia.html

17e1) **Turn desert into forest: John D. Liu in China, Jordan, Africa** (Ethiopia, Rwanda)
http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest05a-John-D-Liu-in-China+Jordan+Africa.html

17e2) **Turn desert into forest with the pioneers Liu + Lawton** (as of 2012)
http://www.med-etc.com/natur/wald-pflanzen/ENGL/turning-desert-into-forest05b-Liu+Lawton-in-China+Jordan+Bolivia.html

18. **Snails and slugs** – p.61
-- http://schneckenhilfe.de/die-fressfeinde-von-nacktschnecken-im-garten-ansiedeln-was-kann-man-tun/
-- https://www.gartentipps.net/schnecken-laufenten/

Mother Earth is life. One just has to know how the tricks are going.

And this here is only an election of gifts which Mother Earth is giving to mankind!

Michael Palomino, Lima 2019

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Contact
Michael Palomino, Lima (languages: German, English, French, Spanish)
Contact and donation account: http://www.soz-etc.com/kontakt.html
E-mail: michael.palomino@yandex.com
Facebook: Michael Palomino Ale
VK: https://vk.com/mpnatronetc