

# **Sustainable Food Production Training**

*Kundapur, India, 18 to 25 November 2018*



**CCIVS**  
70 YEARS  
Coordinating Committee for  
International Voluntary Service  
1948-2018



**IVS** for **Climate  
Justice**

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IVS for Climate Justice Don't just say it! Do it!  
Volunteering to Create a Network of Knowledge through Ecological  
& Sustainable Practice

# Sustainable Food Production Training Report

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## Project coordinator



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# BASIC OVERVIEW

## The Project

This project is issued from a review of the White Paper in 2016 and the Plan of Action 2017-18; it seeks to provide new skills and revive traditional techniques in the field of environment and sustainability whilst taking into account ways that the network can tackle poverty reduction and health promotion issues. The project uses the preexisting tool of the IVS for Climate Justice programme which was set up in 2015 as a banner to highlight the actions of different IVS networks on environmental sustainability, and to emphasize the contribution of IVS to the attainment of the SDGs.

## More information about the IVS for Justice programme

IVS for Climate Justice is a worldwide programme taking place in over 100 countries, coordinated by CCIVS (A global network focusing on International Voluntary Service), bringing together the activities of four International Voluntary Service networks, CCIVS, Service Civil international (SCI), Alliance of European Voluntary Service organisations and Network for Voluntary Development Asia (NVDA). It engages volunteers with local communities to work on grassroots projects that combine manual work and awareness raising actions. These address issues such as: climate change, carbon offset, environmental sustainability, protection of ecosystems, water and soil management and conservation.

## The project incorporates 5 phases:

1. **Visibility/networking:** Conference on the Role of IVS and Climate Justice including a Forum on this subject in UNESCO, Paris April 2018. Different visibility events on each activity and the 70th anniversary celebrations of CCIVS through 2018
2. **Workshops:** practical and theoretical work, Bio-construction in Ecuador June 2018, Sustainable Food Production in India November 2018
3. **Follow-up system:** monitoring, impact measurement, online campus for 31 local projects in Africa, Americas, Asia-Pacific and Europe. Final Online interactive panel meeting with the Steering team to close the project.
4. **Online Results:** Global communication campaign. Collecting the impact measurement results and the reporting of the process from the local projects and diffusing them internally and externally
5. **Sustainability:** inviting external stakeholders to follow the process and to become engaged with the organisations

## Sustainable Food Production Training

During the training in India each participant will produce a DESIGN and ACTION PLAN which they will implement during the 9 months follow up period. During this period, they will be expected to participate in regular (every 4-5 weeks) online meetings. They will also receive Modules/ Information Packs and an assignment each month. There will be feedback, question time, review and reporting of progress and challenges.

These meetings will allow us to enter into more detail on climate-specific strategies and techniques.

Focus:

- Permaculture Design (Ethics, principles and design methods)
- Soil (compost, vermi-compost, regeneration, mulch, etc)
- Water Conservation Methods (infiltration, storage, capture, appropriate plant choices, irrigation)
- Seeds (the importance of heritage, diversity, autonomy)

- Nursery Management
- Planting Patterns (integrated pest management, diversity, perennials, annuals and Seasonal)
- Food forests/ agroforestry
  - How:
    - theory & classroom sessions
    - practical examples/ walk and talks onsite
    - hands-on: learning through doing
    - design time and group work

## The Programme of the activity

	14	15	16	17	18	19	20	21	22	23	24	25	26
	Breakfast												
Morning	Arrival team	Prep team	Prep team	Introduction to the workshop; Expectations of participants	Perma-culture: An Introduction	Perma-culture: Ethics and Principles	Practical: WATER	Practical: SEEDS	PLANTS: food, forest, bio-intensive, annuals, perennials	De-signing Social Systems for Change: Systems Thinking & Social Perma-culture	Meeting with community leaders and local stake-holders	Departure partici-pants	Departure team
	Coffee Break												
Morning				Site tour / group building activity	Prac-tical: SOIL	Design tools and methodol-ogy	Perma-culture: Ethics and Principles	Perma-culture Design Principles	Design-ing Social Systems for Change: Systems Thinking & Social Perma-culture	Sustain-able Leadership in Action	Meeting with community leaders and local stake-holders		
	Lunch												
After-noon		Prep team	Arrival pax	SDGs and Climate Change	Site tour	Practice: Site Tour	Practice: Obser-vation Exercise	Local Food Systems: Food miles & Systems of Produc-tion	Practice: Edible Land-scapes/Food forest	Practice: Making Seed Balls	Project Plan-ning: What Next? Action Plan	Evalu-ation team and next steps for fol-low up	
	Coffee Break												

After-noon				Collective Knowledge Sharing: Who we are and what we want to do?	Design Process Methodology	Group Design Work	Group Design Work	Group Design Work	Group Design Work	Presentation of Designs	Evaluation & Reflection		
				Evaluation groups									
				Team meeting									
	Dinner												
	Evening activities												

## Profile of Participants

Each organisation have sent a participant with the following profile: an activist who will then take what he/she have learnt back to the projects- and ensure the transmission of information. Participants will be expected then to implement what they have learnt during the 9-month online follow up process which will start from December 2018.

During the training in India each participant had to produce a DESIGN and ACTION PLAN which he/she will implement after the training, during the 9 months follow up period. During this period, participants will be expected to be involved in regular (every 4-5 weeks) online meetings. They will also receive Information Packs in Modules and an assignment each month and there will be feedback, question time, review and reporting of progress and challenges.

These meetings will allow us to enter into more detail on climate-specific strategies and techniques.

Therefore, it is important that each participant have a confirmed location to implement their design (school garden, community garden, kitchen garden, local food project, small plot, etc)

Prior to the training, participants should know the location, size and situation and some basic climate data of their planned food production site. This will be necessary to create the design.

It is also essential that participants can access the online data and information packs during the 9-month follow-up period. They are expected to be able to attend the online meetings (via skype or similar program) and to deliver the feedback and reporting each module. (Photos, short report, video, questionnaire or similar). The work will be both physical and mental.

## INTRODUCTION

The very first activity of the Sustainable Food Production Training was FSL-India welcoming through a powder ceremony.

Afterwards, the trainer Kate introduced the first activity, asking the participants to put themselves on an imaginary map, specifically on their countries and created the reflection groups for the follow-up process, based on the geographic proximity.

Then Kate gave a presentation of the project, focusing on the sustainable food, implementation and



taking action topics, following with a brief presentation of:

- the other trainer Govinda, founder of HASERA Agriculture research and training center Nepal and one of Kate's teacher;
- the expert and guest Deepika, met by Kate at Pebble Garden, a seed saving and reforestation project in Auroville, started by Deepika and her partner: Deepika works on seeds saving in India and with farmers in heritage seeds and exchange;
- Rosie and Peter: Rosie is from France and knows a lot of temperate climate and planting. She follows together with Peter a project in Goa, working in a small area with numerous plants and experimenting with perennial ones.



Afterwards, during the presentation, Kate briefly presented the main topics of the programme: permaculture, soil, water, seeds, planting patterns and agroforestry.

Then she asked everyone to share their personal expectations, which have been generally about:

- the practice of permaculture, involving also local farmers, kids and the community;
- the exchange of experiences, especially on companion planting or plant associations like mango and pepper; the creation of organic pesticides;
- the food self-production;
- the food production for the community, preserving the soil;
- the kitchen garden production;
- planting in an urban environment;
- sustainability tips.

Supriya Spandana, FSL-India's LTV Communicator presented then the organisation: its activities started in 2001, through projects with other local NGOs in the South of India and kept working under the vision statement "global youth for a sustainable future".

## HASERA presentation

Govinda Sharma, Kate's co-trainer during the training, is an expert in permaculture and HASERA's founder. He introduced permaculture's concept by explaining that according to this approach, people live to pursue happiness, but development has brought both good improvements, like the increase of life expectancy and its standards, and also many side effects.

Permaculture is no news, as it combines traditional knowledge with development good improvements: it has existed since the beginning of human agricultural history and only in 1974; there has been a revitalisation of it. Nowadays there's an international gathering, called the International Permaculture Convergence Council (IPCC), which was held in India in 2017 and will be in Argentina in 2020.

Going back to the concept, we should think at permaculture as a design concept which enables to find a balance among food, energy, shelter, material and non-material needs (like health, food, nature, society, material and psychological facilities) and experiences and science researches. The three key words in permaculture are design, sustainability and ecosystem and it is important to keep in mind that it is possible to avoid sticking always to traditions, because science enters in support: from this combination and the use of the available technologies, these are the three permaculture ETHICS: Earth Care, People Care and Fair share (sometimes called Future Care).

Although while thinking about permaculture some people might consider using just what nature gives, there are different approaches and points of view: an interesting example is that some farmers use Coca Cola as pesticide, "following the need and not the greed" and in general another say is to change problems into

opportunities.

## Food Production and related topics

Kate underlined some topics related to food production: First of all, biodiversity, which includes life and wildlife, animals, plants and land: it is still complicated for human beings to understand how complex our systems are and how the world operates, therefore, it is important that people working on the land respect that and not take away and decrease the multiply biodiversity. Reflecting on a global scale when growing food, it is important to feel connected with the surroundings, most of all at the very beginning of a little project in a village: this means partnering with others and nature, finding wisdom within and beyond the community and creating resilience.

About farming, it is relevant to think about the relationship between nature and ourselves, because in permaculture and sustainability work means collaborating with nature. Then the next level perhaps consists on regenerating the nature and one of the training's aims has been understanding that is possible to grow food, feed ourselves and regenerate nature, all at the same time, instead of simply exploiting and destroying nature: for instance, it is important, when we use a natural resource in general, to put something back in exchange.

Another crucial point is climate change: there are many different versions of what it is and to explain them, she was supported by some videos. Then trying to answer the question of how can the sustainable food production help with this issue, she replied that among others, planting is one of the best ways, as deforestation is in fact affecting climate change by releasing carbon dioxide in the atmosphere and most of all, regenerating an abandoned land helps combating climate change.

## Permaculture design: first steps

At the beginning of the second day, the group did a recap of the previous one and Kate underlined the three permaculture ethics Earth Care, People Care and Fair share (or Future Care. These three are very interconnected and it is advisable to find the balance in the middle. For instance, if there is some surplus now, it is convenient to invest it back for the system: this use is called the reinvestment of surplus and it involves cooperating with nature, promoting and supporting locals, exchanging, producing and an action plan.

About the design, it is important in order to see the bigger picture first and help making predictable mistakes only on paper, to try to limit them on the field. Another relevant "slogan" in permaculture is: refuse, reduce, re-use, recycle, repair.

Govinda then proposed then to the group an exercise about the creation of a land, following the permaculture design: the division in zones and sectors.

As many projects live on funds and afterwards they do not receive them anymore, they just finish: it is always fundamental and advisable to design first the idea that is on mind.

Permaculture divides the land in zones, because it allows to order elements based on needs and the required management and natural features of the ground. Therefore are 6 zones to take into account, that go from 0 to 5:

- zone 0 = the house, starting point of our life;



- zone 1 = the area around the house, with nursery, kitchen garden, milky animals (especially in the Asian culture) and everything needed for everyday care;
- zone 2 = milky animals (in Europe, the US and Australian culture in general), a natural fish pond, cereals, an extensive livestock system, an extensive bee system, a fruit system and crops are here: this zone requires care and management at least once a week;
- zone 3 = in here there is something that needs to be managed once a season;
- zone 4 = it is the zone for harvesting, therefore does not need management, there could also be the forest and sometimes bees (in some cultures);
- zone 5 = it is left as it is.

There is a lot of diversity in zones 1&2; some in zone 3 and 4, while zone 5 may not have it. (Examples Garlic, onion: kitchen garden, zone 1

Banana tree has many advantages, as its leaves work as a natural fan increasing the speed of the wind and also being a natural water storage system: it should be planted in zone 2 if in a tropical climate, especially next to the house and towards to the wind direction, as it gives good protection against fire, while in temperate climates farmers can use trees with steady leaves (no easily moving leaves) like cypress.

## Soil: colour, texture and porosity

In permaculture, soil is the source of life and of our food, this is why there is a say, which says that “soil is where the food begins”. It is fundamental to avoid compressing the soil and in order to do it, it is useful to create some paths to step on and the so-called “beds”, which are the soil parts on which it will be worked on: beds can be easily created by using the arm as measure. Another important thing to keep in mind is that it is always good for the soil to be covered, especially with mulch and clover can be used as living mulch, as it protects the land from compaction made by the rain and fixing nitrogen.

There are different kinds of soil, which differ for colour, texture, humidity, earth space and minerals. Among others, there are two main kinds of soil: one that is best in colour and the other one in texture.

Regarding the colours, soil can be white, yellow, brown, red, black and combinations of different colours: red soil is the best, but black is also good. Principally, red soil is good in general, because it holds all nutrients for the following season: for the same product and same volume, its weight if produced in red soil would be 10-15% more than the other kinds of soil. On the other hand, it has the disadvantage of being difficult to be worked, both if it has rained recently, as it is sticky, both if it is dry: the own family/coworkers and useful tools can give some help. Also, black soil can be a good option, as it is easier to work when it rains and practically it is good for farmers. In a red soil the colour is given by the big quantity of iron (ferric oxide), while in the black one there is a lot of organic matter, or humus. A fertile soil commonly used in the UK is the peat.

About the texture, Govinda introduced the theory with an observation and tact exercise of two different kinds of soils, thanks to which we discovered that there are three different particles in the soil: sand ones, which can be felt in separate parts, silt, which particles are visibly recognisable but uncountable, and clay ones, very soft like a cream.

Another characteristic is porosity: sand can be worked easily, but does not hold water, then it has less minerals and is infertile; clay is heavy, very difficult to work and silt has a flat structure, so can be compacted very quickly. While mixing them, the good “loam” can be obtained and the black one is the best for its texture: in case of infertile soil, it is advisable need to add organic matter: 10% of organic soil is good.

## Testing the soil

To understand how the soil is, a very easy and useful test can be done by observing its behaviour in a jar with the double of water and waiting 24 hours, as the clay takes time to sediment: if there are too many layers of sand, it is a sandy soil, if too many of silt, it is a silty one and if of clay, a clayey one.

There are people who eat some types of soil, according to their composition: the white one is full of

calcium, the red soil of iron and the black one is full of carbon and salt.

The group did an exercise with different kinds of soil: each person took a bit of soil, then Govinda them with hydrogen peroxide (concentration of 20% is the best, because it shows the result immediately, while the one we used was of 6%). This is a test for general/basic gardening, which consists in taking a bit of soil underneath the surface and naturally moist (not too dry): colour is one indicator of its composition, but it is still better to test the soil with hydrogen peroxide. If while testing, the soil makes many bubbles, it means is fertile enough, if it does it only once, maybe it is good for zone 2 or 3, but not for zone 1 (it needs more fertility as full of products to grow); if it does not produce any bubble, it needs much more organic matter.



In general, it is important to avoid using a dry soil, as it could have organic matter, but is currently dry and cannot be tested properly: it can also happen to be “infected” by animal feces/pee and appears to be more fertile than actually is.

Therefore, in order to have a good picture of how the soil in a field is, it is good to take at least 5 samples from different parts of the land, 20 cm deep from the surface.

Deepening the design topic, Kate then talked about some design tools, which are:

- observation: it would be perfect to observe the land for one year, to see all the seasonal changes and research;
- boundaries/limitations, visible and invisible: forest, economic limitations, time
- resources again visible and invisible and physical and invisible (having a network, of funding)
- evaluation;
- implementation: step by step
- maintenance: to be taken into account during the design and evaluation;
- adjustment: the design needs to change as the situation changes.

Afterwards, the group did a brainstorming exercise in pairs about the design and action plan of each, to have a focus on the impact.

## Crop families

To introduce the crop families, Govinda started talking about diversity and the mutual aid plants give to themselves. Furthermore, while planting, it is important to avoid planting crops from the same families together and most of all, if planting one type of crop on the same land one season after another, then the soil will not produce the same good crop as the previous time: crops of the same family can be planted on the same land at least with a gap of 2 seasons. Some families struggle with each other, e.g: legumes and liliaceae are enemy families and it is better not to mix too many families; moringa is a tropical crop, very nutritive, which can be entirely edible.

There are plenty of crop families and among them there are:

- grass/grain (latin: poaceae);
- millet;
- brassicaceae, cauliflower;
- leguminose (lat: fabaceae), all beans;
- umbelliferae, like carrot, fennel;
- cucurbitaceae;

- malvaceae;
- nightshade (lat: solanaceae), like tomato, paprika;
- liliaceae, like garlic;
- Polygonaceae, like spinach;
- zingiberaceae, which is the ginger family;
- lythraceae, like amaranth;
- rutaceae; taro (lat: colocasiae).

## The compost

The first activity which involved the group on the field, has been the compost: compost is important to give to the soil the nutrients needed by plants and does not disturb the stratification of the soil, because only when putting and taking a plant, we “disturb” it, turning it. For flowers, it is possible to put compost once in a season.

In order to work, the compost needs some microorganisms to help rests of plants and animals to decompose, creating biomass: biomass needs diversity to have a balance of nutritious elements: in fact, plants need at least sixteen different nutrients, among which there are carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, boron, sulphur and iron. Therefore, if possible, it is advisable to try to mix twenty different kinds of green plants. Our group broke some tree branches into small pieces and put them in different parts of the pile, as having many entries invite many microorganisms, which are the key to accelerate the decomposition process.

There are 3 stages in the preparation of the compost: pressed compost, where it is possible to see the leaves; dynamic compost (after storage of 5/6 months, even if everything is almost powder, microorganism activity is still going on); humus, 1/1,5-2 years, nitrogen activity is almost finished and there is just carbon and no temperature rise. If there is the need to buy compost, it is better to buy a kind which is up to 6 months old, as it is important to use the one on the dynamic status and it is better not to store compost more than 1 year.

To invite the microorganisms, an effective method is mixing a starter (or inoculum) with water and sprinkling it on the compost pile: Govinda put some fresh milk, but anything sweet can be used, such as jaggery (raw/brown sugar or molasses) or leftover rice. In the jungle, it is possible to leave one night out some fresh milk, which glucose will invite bacteria, or filling a bamboo with rice and putting it underground for ten-fifteen days, so that lots of fungi will grow.



Secondly, it is useful to add a catalyser, which helps accelerating the process: Govinda added some goat feces, but any other animal ones are fine to accelerate th cow urine is the best: rabbit/horse/dog urine has a strong acid, so do not use it a lot and fresh and mix it with water.: if it is not available or the person prefers not to use it, it is possible to add fertile soil or jungle soil.

There are also different techniques to create an own catalyser: on the market, it is possible to buy prepared EM (effective microorganisms), which can be multiplied afterwards by composting, in case of need to be fast. Afterwards, Govinda added another green layer and a dried one: if wanted, kitchen waste is good to be added, but just keep in mind that it is better not to put a lot of onion, garlic, food rich of tannin, citrus peel and meat (because of rats, dogs, jackals, otherwise put it in the middle of the pile).

To prepare the dried layer, the measure of broken branches should be no smaller than 1 inch, which should decompose in 3 weeks/1 month, while on a bigger scale, farmers can use machines to cut trees to

accelerate the process. The group did 4 inches dig layer, foreseeable to be ready in two months: preparing all at once, participants starting from a layer of dry stuff at the bottom, because it requires more compression, temperature and microorganisms than the green and fresh one (more water inside). Then they we sprinkled water as the leaves and branches were too dry and were suggested to avoid using mango/orange/tea leaves and pine needles, because they have an oil, called tannin, which is a microorganism enemy and no good for composting; on the top they added the green leaves.

In the tropics it is important to find a shady area for a compost pile and needs to be above ground to have a cooler temperature, on a flat base; in a flooded area the pile needs to be put on a raised base, while in a temperate area (like in Europe), sun is needed and it is better to put the compost underground (eg: 1 mt deep), because outside is cold and it takes more to be prepared: it is better to use compost when it is pressed because at low temperature nutrients are released very slowly.

If the area is very humid/ rainy, sprinkling water above the pile help to create a sort of plaster (mud plaster), which avoid extra water to go inside: we did not do it, because it was not rainy season.

Regarding the area where the field is, it needs to be easily accessible for its maintenance and it be of very different shapes, like circular, rectangular or square. It must not be smaller than 1-1,5/2 mt (from 3 to 5 feet). In case of a bigger size, the inner temperature will become high and there will not be enough oxygen inside; if smaller, it will be difficult for it to reach the right temperature inside. The key to make compost is finding the balance between carbon and nitrogen: brown and green leaves are useful to create some biomass, as the brown ones create more carbon and the green ones give more nitrogen. In case of lack of dried material, it can be substituted by cardboard, newspapers and rice husk; on the other hand, in case of lack of green one, adding food waste, oil/press cake, butcher's powdered blood or fish guano, is fine, as it has a lot of nitrogen. For instance Lina, a participant from GREAT Indonesia, told that they put peppers and used cardboards, bamboo and pine needles on the bed top layer against the weeds.

The compost can be also made on a balcony in the city: in this case the suggestion is to reach a compromise and make it smaller, otherwise, if the land is really big and needs a lot of compost, the pile can be big too, but will need some kind of structure to let the air to circulate every 3 feet and if not possible, at least every 5. On the base of the needs, it is possible to create the compost area gradually or at once: usually making compost in the garden is a gradual process, adding it day by day: our group created the compost area at once, with a 5x5 feet size, using a stick as measure.

The final step for the pile is the protection, like mulch: put some soil on the top as load and pressure for the decomposition process, in order to obtain a proper balance of the air circulation inside and protect the soil from strong sunshine and heavy rain. In case of preparing the compost in a city, it is possible to cover it with any decomposable cover, like old clothes, cardboard or black plastic bag (which increases the temperature inside, but it is not recommended by permaculturers, because then the bag will go sooner or later into the trash).

Furthermore, some permaculturers say compost needs to be turned every day, but others disagree, because even if the oxygen circulates every day while turning the pile, on the other side good bacteria and nitrogen are exposed to the sun, which disinfects and destroys them: it depends mainly on the need. Govinda said he does it once a month, to preserve more nutrients and explained that there are two possible approaches: one which is more focused on preserving microorganisms, the second, which is the nutrients' saver one. Regarding the nutrients, it is very difficult to have enough potassium/potash in compost as it is not available in plant tissue: a trick can be adding anything that contains it, like banana tissue, buckwheat, corn stock. Regarding vermicompost, it is advisable to take the pile and put it in another bucket, to avoid taking the worms in the field.

In order to know when the compost is ready, we control the temperature, which has a cycle of ups and downs. It is possible to test it putting the hand from one side of the pile until the elbow and the right temperature is of 70/80°: if the compost is really hot, it is not yet ready, if it is comfortably cold, it is not ready neither; if it is not so comfortable to put the hand, because of the heat, it is ready. While in Kenya they compare the length of the pile at the beginning and how is it after a while: if the pile is 1/3 then the beginning, it is ready. Another technique is based on the time: after preparing the pile, it is advisable to check it after

2/3 months.

In order to prepare a new pile of compost, it is possible to use the same space where there was the previous one.

## Preparation of the beds

As beds can have different shapes, there are diverse techniques to prepare them: they can be flat, rectangular, sunken, mandala, circle, raised etc... To prepare them, first the marking/layout needs to be done, then there is a digging part, the addition of compost and in the end planting. Furthermore, according to the quantity of available water, raised beds often need more water (due to evaporation); sunken beds need less water (as they are insulated on the sides) and flat ones are suitable for an area with a balanced humidity. Circular beds are made for their beauty (like half circles as mandala) or because of need, like in case of old people or special mobility needs: it is possible to carve around the bed to give this shape.



Usually in the farms it is possible to find long rectangular beds, while our team did one of 1/2 m width, rectangular, 3 mt square and more than 6 feet

long: the group took some rope, made a visibility test to see if it was tight enough and used it to mark the borders of the bed and the path lines: the bed was a bit sunken, because the group was planting during the dry season.

Regarding the composition of the soil, normally a bed needs 10% volume of organic matter (o.m), which is compost of the area to be planted: 20% is the quantity in natural farming and 5% of om requires 150 earthworms x square mt, while 10% om, 200 earthworms. A healthy land can be recognised by the presence of earthworms. In the tropics you can find more termites than earthworms, especially in the dry season.

The final part of the preparation, the planting, cannot be done in a tropical area or in summer after 1-2 pm, because as the sun goes down, the plants do not have their time to find their space and to protect the soil and the compost. Mulch should be used to cover and protect the soil: it is also advisable, in case of strong sun, to put a shade cloth, which is also useful against wild animals.

Another kind of technique is lasagne bed: the compost is directly made in the bed through layers, with some soil on the top layer and plant small things into it. it will shrink down, so it's advisable to plant something that harvest quickly and then you can add more layers, without turning or transporting. It's really useful if you have compacted soil, as you build fertility above the ground. It was suggested to use the lasagne bed technique in schools where there's concrete: raising the bed up and keeping it without kitchen waste, just with green material. Frost is good because like the sun it sterilises: (reply to Ilona asking if it's possible to use this technique also in Bulgaria before the winter-snow period, in order to prepare it for the Spring); if made deep enough, it can work also in Bulgaria!

## Participatory Guarantee Systems

PGS (Participatory Guarantee Systems), is a way to overcome often expensive Organic Certification processes. It is trust based, peer reviewed Organic Standard- established and controlled by the members themselves- it assists with the promotion of farmer/kitchen garden producers (not necessary farmers) right, like fair price, the right to have a land, self-made labels or seeds banks and they are for instance suitable for small-scale farmers. Furthermore, there are many PGS networks, which are local and every PGS in a network

is autonomous.

Regarding HASERA, Govinda's association, it facilitates small farmers to create other PGS and grow. The PGS is a system in which farmers and consumer representatives are directly in touch and they can discuss about their agreements. The documentation is very basic and until now 70 countries have a PGS system, some also a national network, like India and sometimes this kind of certification is more entrusted than other ones.

## CSA

Another model which is used more in Europe and the US is the CSA, (Community Supported Agriculture): it is a basket system. This box system also promotes the direct relation between consumer and farmer, as it follows the idea of involving the consumers to participate in the production and helps the community to be together: the group watched a video about a CSA, Chagfoods CSA, an inspiring and successful market garden CSA in the UK.

The video also inspired a brief debate about using machinery in permaculture- actually there is no answer, as there are different kinds of approaches and among the many other questions to answer, it is possible to reflect on if it is appropriate, necessary to use them or possible to change that tool in the future. This is in relation with the European fair price issue for the farmers: in some states for instance, there are subsidies that encourage consumers to buy cheap and unhealthy food.

About farming communities, there is the "you-pick farm": here the labour is not payed, but there are members who give a contribution to support the farmers, during the harvest season, they go to the farm to collect the food themselves and then pay per kg: this model works very well. While in Chennai there is another project called "Acha Palak" (from palak = spinach): the farm grows different kinds of spinach which the farmers take into Chennai's market once a week, they do not have any organic certification as it is "trust based".

## Integrated Pest Management

In permaculture a good technique is mixing crops of different families to have a better differentiation of nutrients and trying to decrease the percentage of pests: as a test, it is also possible to mix all the families together to better understand which crops grow better on the land. Another difficulty can be given by mixing a lot on a big scale, as it could be tricky to manage all or mixing the same family of crops together, because it invites more pests. The first thing to do is decide which one is the major crop/vegetable to grow on one plot of the land. It is suggested to do mixtures of fruit & vegetable, root & vegetable, leaf & vegetable. Bean & vegetable for each plot: leaves give vitamins, roots minerals, fruits enzymes, beans proteins. In case of not much time, it is advisable to grow perennial crops, like fruit ones, or wild/perennial vegetables, fruits, low-input crops (like sweet potato), timber and herbs: but remember that the design is always fundamental.

During the plantation, correct timing is crucial (seasons, sun and rain, especially because of climate change) it should be thought how high the plants will grow: for instance, eggplants go under 60cm/2 feet, therefore on ground level there is some empty space and if not used for planting, nature will cover it with weeds. The group planted eggplants and then some coriander to take that space, using 2 bowls of water for every eggplant, sprinkling it on top of the seedlings and covering with a light mulch against the birds and in case it will not be possible to water them for 3-4 days. Moreover, it is possible to mix (but in few quantity) e.g. carrots, coriander and beans or less crops and more seeds in order to help cover the space.

Pests, which can be both insects and diseases, are less dangerous in permaculture farms, because of the mix of crops, as pests which are more attracted for instance by eggplant, do not like carrots and so on: garlic is a perfect natural repellent against insects and marigold and basil are also good against pests. It is normal that until a 25% of leaves can be eaten by pests, but otherwise, some pest management is required.

The participants planted a dense amount of coriander and carrots: coriander takes more or less 20

days to grow and it is advisable to pick it up where it is denser, so that the soil will loosen itself (and the mulch with it) and make some space. After another month carrots will be ready and again, it is better to pick them up where they are more concentrated, even if little, because otherwise after 20 days the soil needs to be loosened a bit. There are plants as broccoli, cauliflower, cabbage, brussels sprout, eggplant, peppers, kohlrabi and onion need to be transplanted, while plants like coriander, mustard and radish prefer to be on the direct sown.

As our group planted when it was dry season, the seeds needed to have water every day on the late afternoon, otherwise if in a moist, northern sloping area, water it is needed once in 8-15 days, with the exception of summer: until plants find the light, they will grow higher and take some space, but if there are more than 2 inches thick mulch, it could be a problem.

Mustard, carrots and cabbage can be found everywhere, while some crops are only local, but the most important thing is the season: the plan to follow is introducing, experimenting in a small area, multiplying and disseminating the crops. For instance, FSL India keeps the final crops as they are and at the end of the rainy season it dries them for the next season.

## The Role of water

“Water is life”: in the past, when human beings were nomads, they were very respectful of the value of water and the related fertility. After, when they started settling down close to rivers and lakes to increase the agricultural production, there was no need of worry to move for food and this helped the development of the civilisation.

Water has many purposes: among the most important, it cleans, loosens and softens the soil, giving to it nutrients. Unfortunately, the natural water cycle is decreasing day by day: for instance, Cape Town's example (2,5 million inhabitants), where in December 2017 a drought crisis forced the government to set up a 40 lt quota per household; it was the first large city to be threatened by running out of water!

The group was then invited to take a look at a picture of a Dutch industrial wooden area, where trees are planted to be cut and there is no second generation of natural greenery: these trees cannot hold the same amount of water as a forest (as there are many layers of trees). Other examples come from Kenya, where a lake completely dried up, or Nepal, where it is possible to notice a reduced water flow of the rivers or even dried up ones: among the causes, there are the urban, agricultural and industrial development - at the cost of nature. Natural resources are the ones to be used more easily by us, but if there are not enough trees for each of us (60 more or less), our oxygen decreases and we have consequences, like being depressed, tired and so on.

From these examples, it is possible to highlight that since some time now, the Earth is facing a water crisis, this is why every drop of water is precious! In the areas where there is water scarcity, desertification makes the land dry, hot air goes up very quickly and when cool air arrives, the speed of the wind increases, creating tornadoes. Plus, episodes of acid rains occur more often, provoking a phenomenon called “nitrification”: acid rains erode the soil, pushing its nutrients to the ocean and impoverishing the land. The ocean receives this big amount of nutrients through rivers, provoking a mass growing of algae, which consequently effect is the lack of oxygen for all other organisms under the surface and numerous die because of that.

All aquatic animals help controlling the speed of water flows, but these are getting affected by deforestation, as it brings to devastating floods of riverbanks and landslides, also sadly supported by pollution, overfishing, that reduce enormously the amount of animals in the water.

The importance of water can be also seen by different rising conflicts for the control of rivers: India has some tensions with China, Nepal and Bangladesh; Egypt and Ethiopia are in conflict for the Nile, Turkey and Iraq for the Tigris and Laos is facing difficulties with China, as its government decided to rent a cross-border river to empower its electricity lines. There are also tensions even inside the same country,

like India's Karnataka and Tamil Nadu regions: this is why water conservation is so important, as increasing infiltration, the organic matter in the soil, the water storage, mulching, evaporation and decreasing the water speed putting some barriers. In order to do this the "SSS" system exists, or rather "slow water, let it spread and sink/store it underground": part of it are a long-term observation process, marking contour lines, starting from the bottom of the land and storing water, starting from the top.

Some general advices are to:

- "start from small and simple";
- mulch a lot;
- plant perennials while contouring;
- keep in mind that it is possible to do a lot while storing & harvesting water;
- use contour itself to store water, for instance while making a terrace, it is possible to create a higher structure for a little pond, otherwise in a stony area, just lining stones will help store it.



To introduce this topic, Kate did an ice-breaker, during which the group discovered that the Earth water is divided among oceans, fresh water (rivers 0,49%, lakes 20,9%, glaciers ice caps, atmosphere 3%, lining things 0,26%, surface/other fresh water 1,2%, ground ice permafrost 68,7%) and saline. The groundwater (among which there are wells) constitutes the 34,5% and is the only resource water we have and there is a very important connection between soil and water: the first layer of soil on the Planet is moist. We learned that rivers need to meander as they work as a natural filtration system.

On the field, Govinda explained how to plant until 1 cm deep: in his farm they follow the moon calendar, so that when there is full moon, the air humidity is more and it is better to avoid putting out seeds which need to be dried, but it is perfect timing for planting, (also towards the full moon). In order to prepare the garden, it is useful to think about the need of more or less solar radiations on the garden: as our participants planted during the strong sunny season, a trick is planting eggplants, beans, or tall plants towards the sunny part of the bed, as tall plants will create some shade for the other ones, improving the microclimate a bit.

## Raised, Lasagne or Hugelkultur beds

Regarding beds, in case of a small area to cultivate and not much time to work on it continuously, it is advisable to prepare a raised, lasagne or Hugelkultur bed. The raised bed can be minimum 1 feet high from the ground (normally 1,5-2) filled with o.m, bamboo or brick lining to protect and cover and planted on the top: at the very beginning it is advisable to mix some compost (not much, but as a starter) and it will be obtained more production than from a normal bed. Another option can be preparing a compost pile as a bed, which gives 5 times more production than normal, without the need of digging or turning a lot: at the beginning, the need of water is average. Then when the decomposition starts, the water releases underneath by itself, but it is better to check when the humidity is not enough. The highest temperature is reached in the pile centre and planting on the top, there is always a contact with fresh air, so that the top layer will work as mulch. About yam or any plant which goes deep, an advice is not to plant it more than 3 feet and top side of 4 inches.

Sometimes, when there are a lot of wood logs, they can be used instead of biomass: it is possible to put them underneath, mixing them with green, covering with soil and mixing the topsoil. Because it is wood, it takes more time to decompose, even 10 years and it works like a sponge when it rains and releases the moisture when doesn't: this is mainly how hugelkultur works- suitable for cool-moist temperate climate.

In a dry climate the main aim is to complete the water cycle and re-infiltrate water into the landscape, even if there could be some waterlogging: in this case it would be needed to dig a trench to get water off towards a lake or a pond, or somewhere else where it is possible to store it in case of need. In most situations the interest is for infiltrating water into the landscape: for instance, on a flat land when it rains and there are roots, the water goes into the ground.

## Using Contours

Permaculture means conserving energy and resources as much as possible and among the useful techniques to do it, there is the contouring. Contouring is used to store and infiltrate water: to do it, a plant trench or roots of plants are needed, as planting helps recharging the soil with water, and to build it is useful to look for the horizontal level on the land. The ideal land to do contouring has 2% slopes and to take measures a tool called “A frame” is needed. Creating an A frame is really easy, as its main parts are 3 sticks, flat and straight, of more or less the same length and a small cross bar. The frame needs to create a triangle which sides (the sticks) are equidistant from each other: to do that a hanging stone is put on the exact centre to mark the so-called “level point”.

Normally to contour, the starting point is the bottom of the area, but for reasons of time our group delimited it with a pick and then searched for the level point with the A frame. Usually to put the picks it is useful to dig deeply and delimit a big zone, because when it rains the contoured land collects many leaves and biomass, which thanks to the trench stay there: for this reason, it is common to see many contoured areas in a farm. The participants then planted some lemongrass and vetiver grass to have diversity and hold more soil, make it more beautiful and slow the speed of the water. After some years and the deposit of the soil, you can obtain naturally a terrace. You can also create an irrigation canal. Multipurpose and efficient tool for soil-water management. You can plant also pineapple, agave, sugar cane or whatever you want, depending on your needs and chance to manage it a lot or not. We trimmed the tops of the grasses after planting to minimize shock to the plant and to allow the plant to give energy to the roots. We cut before and then used the leaves for compost or to cover the soil.

Following the slopes of an area, a trench can have different swales, which are depressions between the ups and downs. A wide contoured zone can become a terrace after one or two years and this is very good to conserve water and soil; in case of a sloped or flat land, a well can be appropriate and in case there is a spring it is even better.

In very dry areas, a common method is the imprinting, which implies a tool that makes holes on the ground and which helps catching the water while it rains on big lands. To create a water storage system, first, a barrage dam (a big storage system) needs to be created, then a river needs to be blocked: however, a big barrage dam can disturb the fishes, which usually move according to the season, changing their habitat and damaging the ecosystem. Therefore, it would be advisable to take it into account, in order to decide how big can the dam be, in order to facilitate the fishes to go up and how much slope should be made on the dam: according to the temperature/season, fishes go deeper in winter, while in summer more up. If the area of work does not have space to store the water, it is possible to divert the stream of the river to the farm: for instance, there are a lot of diverted rivers in Japan’s Biwa Lake area.

Sometimes, if the river is below the land level, a pond can store the water and to do it there are different techniques. If there is a sandy soil or a kind of soil that does not hold water, it



is necessary to need to seal it: some engineers or generally in stores, it would be suggested to use cement or plastic, but following the permaculture philosophy, it would be better to avoid them both, because both cement and plastic can have unrepairable cracks. On the other hand, using animals like buffalos, pigs or ducks, is one of the best ways to store water, as they perfectly press and mix the soil with their faeces: then the clay on top of the soil is ready to be mixed with organic matter and put in the pond. In case of lack of animals, it is possible to collect some clay and mix it with hummus/organic matter, but in case of urgency, also bentonite (type of clay) can be used, by putting it in the water of the pond and letting it increasing its shape and compressing the air.

Concerning irrigation, there are different techniques:

- if there is a lot of water, it is possible to prepare a raised bed, do flood irrigation letting the water going freely into the field and observe;
- hand irrigation;
- sprinkle irrigation in a dry area, which helps increasing the humidity in the air as it was natural rain;
- drip irrigation, mainly used by greenhouses, is useful in case of lack of water, it is very efficient in terms of water use, and it is possible just only by using waste water bottles, making a little hole on them, filling with water and putting them close to the plant root zone.



Another irrigation technique in very dry climate areas eg. the Mediterranean is made by using clay pots with a small opening, burying them in the ground and planting around them: people fill the pot with water once a week/every two weeks and opening the lid which is above the soil, filling it with water and closing it. This system is very efficient and natural, with a use of low tech and maintenance and plants around the pots take the quantity of water they need. Also in places like Zambia and Malawi, people use the sprinkle irrigation, while in places like Bangladesh and coastal areas in general, where there is plenty of water, it is advisable farmers use the chinampa technique (floating island gardens), thanks to which water infiltrates into the bed without irrigation, and the soil does not need to be fertilised, just harvested, as the water biome brings nutrition.

Another technique which involves mainly water is aquaculture: aquaculture puts plants/animals in-between and corresponds to any activity that allows to grow something or some animals in the water (e.g. fish): this water system is more productive than land one at least 3 times. Furthermore, aqua forestry is the technique used to grow trees around the water source.

## The banana circle

The banana circle system is very common in permaculture farms: it is useful to deal with grey water of a farm, kitchen, school, or shower, (thanks to some bacteria which are in the tree roots), to make compost and store water (or let it go underground). The banana tree has a capacity to digest more water than other plants and take the good nutrients from the grey water, which will go into the fruits.

There are different kinds of designs for a banana tree system, as it depends from the area of work. For instance, in an urban area, it is possible to create a collecting system in order to filtrate and store the water. Related to this, a collecting system is useful in presence of a heavy soil: it is advisable to use a paver and make a stone lining, adding some alluvial soil. After one year the soil will be lighter. If the soil is sandy, it is advisable to mulch and plant and if the soil has a hard rain fall, it is fundamental to cover it always.

In general, the most common is the circular design, for its many possible uses: as natural shower, natural toilet (in Nepal and India is still used with this purpose in the villages), harvesting bananas, a hide and seek place for children. For a big system, it is also advisable a rectangular or squared shape, to use it as a meeting/study/relax place (perfect with hammocks). The best place to have this system is close to the kitchen.

Lina, a participant from Indonesia, introduced the topic by sharing her experience about the banana circle: in the project she was involved, they put compost within the circles, made with a 2-foot-distance between the trees and planted lemon grass and potatoes (otherwise citronella is advisable). Then Ilaria, the Italian participant, talked about her association experience of a natural shower in a camping made with a banana circle, created using stones and myrtle plants. And Kate told the group that in the place she was in Thailand, people had less water, so they were using a bucket system to wash the dishes: they created a banana circle and use it to filter the grey water. To create it, they filled the centre with organic matter and planted some ginger, lemon grass and taro: if expanded, the system can help overflowing one pit into the next, helping regenerating the land (do not forget to put mulch).

A general advice, especially for banana circles, is using soap nuts and try to be as much ecological as possible, which means using detergents without colour and trying to use it as little as possible, because also natural soap can have a salinisation impact on the water. In case the water is very dirty, it is advisable to create a big circle, or one circle after another one.

In a temperate area, where there are no banana trees, it is possible to filtrate the grey water in different ways: in general, papyrus or any growing plant on a river edge is useful and in Italy, for instance, it is possible to use reeds. On the contrary, bamboo is not advisable, because it takes over: it is important to think about the microclimate needed by the plant, (ginger, for instance, could have been used in our case). And again, it is important and useful to put a lot of mulch in the circle.



## Seeds - Deepika Kundaji's presentation

During the training, the first guest trainer who shared her knowledge about seeds and seed saving was Deepika Kundaji: an Auroville member since 1994, she has been involved in land regeneration and wrote a beautiful, useful hand book based on seed saving. At the very beginning of her work in Auroville, the land was very dry and without trees: Auroville is an intentional community and Ecovillage on the East coast of India, South of Chennai, created in 1968 in a place which suffered centuries of deforestation during the colonial occupation (1700): when Bernard Declercq, one of Auroville's first pioneers arrived there, the top-soil was harshly eroded by heavy rain, so he started working on regenerating the land and in 1994 Deepika joined him in his work.

The aim of their work has been regenerating the original forest and create a cultivable area: Deepika worked on the cultivable area since 2002, under the "rules" of avoiding the addition of organic matter or soil from outside and having only Bernard and her working the land. After three years of work, many pioneer plants and indigenous trees have grown there. Then in 2011, there was a cyclone and thousands of trees fell, but again, after three years they were grown: the regeneration was really fast. Deepika commented on the indigenous forest's resilience after the cyclone, and noted how quickly it was able to recover, noting that the cyclone actually accelerated the natural succession of the forest.

For cultivated plants the challenge was different, as they need at least 9 inches of soil to grow: Deepika

and Bernard built up soil in a garden area of 2000 squared mts, dividing it in two parts. In 1000 sq. mts, Deepika has been doing seed conservation of 90 varieties of plants and on the other part there are some fruit trees and vegetables: there is a lot of high density of plants, so that they have started thinking “creative” ways to combine plants in order to grow many kinds in a small space. Deepika have been focusing on the home garden: she has been growing root crops, medicinal plants, herbs and vegetables of 90 different varieties (between 90 and a 100 until two years ago) in order to multiply and distribute them. The crops come from different parts of the world, but Deepika prefers to focus on Indian seeds, as India is very interesting for its many geological regions and microclimates: varieties change even from village to village, differently from other developed countries and the quantity she produces is little, a small-scale work, but with much diversity.

## Seed Conservation

Deepika’s aim is not only to grow a garden and keep it alive year after year: her goal is to revive all the varieties which have been lost and in order to do that, she distributes seeds among farmers during seed festivals, so that they can spread them again. The existence of such festivals is important and interesting, especially because many participants come from tribal areas where the use of wild plants is common and these occasions let them have a knowledge sharing of growing and cooking seeds. Some festivals are visited by 3000 people per day, but there are also small regional meetings and among them, Deepika and Bernard’s ones with their open days for schools every Friday.

## Productivity

There is a wrong idea about the productivity of traditional varieties, as it is said that they are not productive as the modern ones. Actually, this depends from different factors, such as:

- soil conditions;
- plants nutrition;
- the season (some plants are productive just in some seasons).

It is true that some traditional varieties face a genetic decline inside the seed, but the selection of the best seeds can generate improvements which can be seen after one, two or three generations. Furthermore, productivity mainly depends on the needs: it can happen that a tree mango cluster variety from central India produces a lot of fruits just once a year and dies, while somewhere else another plant produces the whole year. The first variety can be ideal for someone who needs or wants fruits only once and then let something else grow, while the second would be useful for a kitchen or market garden or a long term food forest. In fact, productivity is something relative, as it depends on many different factors.

## Vegetable Diversities and Productivity

As the land where Deepika has worked is small, she has been concentrating in preserving the vegetable diversity, instead of seeds for field crops. An example about vegetable diversity can be found in the region where we were, Karnataka, which is one of finger millet’s world diversity regions centre (known as “ragi” in the region): this kind of millet is not very well known, although it is also present in some parts of Africa: ragi is consumed in quantity in southern areas of Bangalore and nearly 45 varieties exist. Green Foundation (<http://www.greenfoundation.in>) used to have a seedbank to conserve all these varieties more than 20 years ago: that is to say that there are many different crops and varieties within the same family and by having a big range of crops, it is possible to be highly productive, during different seasons and conditions.

An Indian kind of eggplant which has numerous varieties, the brinjal, usually appeals far less to kids than adults. Now the GMO versions were supposed to be introduced, a fact that reminds us the need to preserve the heritage varieties before losing them, as people buy commercial varieties, contributing to the

erosion of traditions. In fact, brinjals differ among themselves for shape, dimension, colour and properties (the wild variety is medicinal) and the number of recipes to prepare them is huge. For instance, their fruits can be dried and filled with salt and butter milk and eaten in the summer when there are no fresh veggies, small varieties are used for stuffing, Eastern India, Bengal, Orissa and Vidarbha's big or large varieties are roasted. Furthermore, one green, long variety of brinjal is used for a recipe in Karnataka called "vangi bath" and the new generation of youngsters does not even know about it and the same happens for the gurkha recipe, for which you need a big brinjal.

During the training, Deepika showed the group pictures taken in Auroville and explained that in order to do a hands-on job, first it is important to know the differences among varieties. From the 40-50 varieties that Deepika experiments with, just two stood out by surviving two summers without irrigation and during the rainy season they started growing again. Year after year Deepika has grown many more varieties and even if the weather is particularly hot, they survive. In her opinion, there is no need of having much technical knowledge, but the personal experience is the key, for instance to learn which varieties are resistant to pests. Observation and relationship to the plants and seeds is key!

Diversity within edible varieties of plants is one of the most amazing achievements of humanity, because simple farmers were able to domesticate wild plants and within that, contributing to a multiplication of varieties. No scientists today have been able to do the same, as they combine and cross traditional varieties. Okra (also known as lady's finger) is a very popular plant in India and Indonesia, perfect for warm climates: some Deepika's friends managed to grow it in greenhouses in France's Atlantic coast. The Indian governmental department supported successfully the market release of only one variety of okra, while for instance among Maharashtra's traditional varieties (in Western India), there is a red one, now not so known. In 1995, a farmer gave some seeds of this variety to Deepika and she has kept growing it until now: red okra is very sweet, can be eaten raw, it is (like many red veggies) anticancer and anti aging, like many red veggies and in general there are many different ways to prepare lady's finger, like in salad, stuffed or steamed. Another variety of lady's finger from Eastern India (Assam), resists to 3 mt rainfall, which is the hardest in the whole country, with Karnataka as the 2nd highest region for rainfall: when the other lady's finger varieties were flowering, this one was just making huge leaves in Auroville and then grew 3 mt high, giving lots of fruits. Diversity in okra and in general in plants can be seen from the different shades of green, tastes and shapes: a long, small one variety from a Kerala's farmer is also typical in the West coast, it tolerates both high rainfall and high heat/dry periods.

If a plant is not productive, the causes can be:

- improper preparation of the soil;
- wrong season;
- climatic aspect that does not fit in that moment;
- genetic decline of the seed;
- many other reasons...

The seed is not static, but dynamic, and can be developed: for instance, Deepika had some issues with the red okra seeds, but after experimenting and planting in different seasons, she understood which was the best moment for some selected plants. To produce seeds, diversity is fundamental and to learn how to recognise it, it is advisable to take a look around the area and make a plant collection, plus exchanging knowledge and advice with the locals.

In Auroville, Deepika grows endangered plants collected from many parts of India: these plants are in danger because not present on the market anymore. In order to preserve different plants varieties, she urges us to learn how to keep seeds as a kind of responsibility, especially if having a good variety, spread and distribute it, because this is human heritage. Some governments keep them in seed banks- but she believes they are a heritage of community culture and the people themselves.

The NBPGR, National Bureau of Plant Genetic Resources, is the Indian national seed bank: it has its own farm and collects all the seeds in a cool storage, without letting any farmer to take seeds from there. It seems a mayor contradiction, as only researchers and scientists have access to them and study how to combine them with pesticides or chemicals. Due to such institutions, she encourages the idea that everybody

should have its private seed bank in the garden. There are strict laws about exchanging seeds and people can go to jail in some cases.

Among farmers and breeders, very few breed new varieties by selection; nowadays, farmers usually count on governmental seeds, while in the past all of them were breeders and seed savers and this is maybe one of reasons why plants were much more dynamic then, as the selection was done carefully and patiently.

## Crop selection examples

Diversity can be created naturally and by observation: Deepika suggests her own way, which is by growing several plants of the same crop and starting keeping the seed. She experimented this process with a Zinnia, which varieties were pink, white and red at the beginning: her purpose was doing a crop selection by spreading the red variety, succeeding and even cross breeding within the reds. A wild variety of lady's finger was domesticated by farmers: when wild, it was really thin, but after succeeding in making it cultivable, it became thicker, juicy and with bigger fruits thanks to a selection process. The wild banana was full of seeds strong as stones and not eatable, but again, the selection helped creating a variety suitable human consumption. Also, an old variety of tomatoes which grows in Europe, cannot be grown in India.

On the market, modern varieties can respond to chemicals, but people concerned about nutrition and health should be focused on seeds for home gardening, which are not the priority of modern plant breeders, who are concentrated, on the contrary, on varieties interesting for the market, such as a kind of tomato which gained the name of "cricket ball", because its skin is so hard that can be perfectly packed in a box and transported. Another interesting fact about Indian nutrition, is that in the past, eating rice was not the traditional diet in all of India. The transition to mainly rice has led to a rising problem of malnutrition, as people are eating foods they were not accustomed to, but fortunately, millet and ragi cultivation is starting to become popular again, as for instance ragi is full of iron, especially if grown in a red soil.

The rosella plant (or bissap), is typical from West Africa, Indonesia, India and Thailand: it grows in warm countries, with rain and without irrigation, every part of it can be used and there are many varieties: it is used to make teas, salad greens and jams, while in India it is used to dye the hair.

It is believed that corn came to India from America after Columbus, but there is a temple (1268) in Mysore, where there are some sculptures representing corn.

Nikolai Vavilov did a lot of research studies about seeds: he did an amazing research.

Corn has its maximum diversity in Central America and Mexico, while it is possible to find traditional varieties in Eastern India's tribal area. For instance, the Soliga tribes are growing multi colours and red varieties of corn in Karnataka, as in Jharkhand, where there is a seeds savers' network in which Deepika is involved and thanks to which people exchange seeds. India has also many varieties of chilli.

There are many different uses of bottle gourds and two traditional ones are as sitars, a musical instrument, or as swimming tool. Also, "ektara" from Bengal is a musical instrument which was made of a particular kind of bottle gourds, unfortunately not available anymore, so that they are now made of wood (Parvathy Baul is a world well known singer and ektara player), while women in tribes use them to create spoons and in Nigeria they are used as sort of backpacks. Now many varieties of bottle gourds have been replaced by others which are easy to be packed: again, this has brought to a loss of culture. Farmers have in their best interest growing something that people will buy: this is a problem for bottle gourds in India, as they are unpractical to pack. Despite this fact, if showing and explaining the good properties of plants, it is maybe possible to convince some consumers to buy them and help counteract the disappearance of many varieties, also contributed by climate change, and because of that everywhere crops from different countries are needed. In fact, plants in general are very adaptable, for instance Deepika received some pak choi seeds from a japanese girl and she has growing them since then: if a plant is not from the same place where it grows, this means that it is adjusting and working.

Snake gourd is a plant that grows in South India: Bernard and Deepika had a variety that reaches 2

mt high and has now disappeared, substituted by small ones which are more resistant and perfect to be packed. Unfortunately, Deepika does not have this variety anymore, but she gave the seeds to someone who is hopefully still growing it.

Auroville hosts farmers fairs where people sell and exchange seeds and tips: during one of these fairs, Deepika received an elephant tusk okra, which can be 54 cm long. Furthermore, in Auroville's seed conservation project, there are two big blocks against GMOs varieties (which are pushed a lot by the industry) and actions against fertilisers and pesticide industries.

## Green Manure/ Cover Crops

Green manure is a living fertiliser, composed by a mix of things which produce carbon and nitrogen. In order to produce carbon, some useful plants can be: grass, leaves, rice, millet, sorghum, wheat, oats, barley, rhye: the advantage is that they often have deep roots and produce "straw" for biomass and carbon input. To contribute nitrogen it is advisable to use beans, clover, or legumes like lentils, or alfalfa, clover and vetch (for temperate climates). In general, the climate and microclimate of the area is fundamental. Most of legumes have nodules on the roots, where the nitrogen concentrates and which can be released by cutting that part as it is flowering, but without killing it, just cropping it: in this way nitrogen becomes available for other plants and bacteria in the soil web and supports the nutrient cycle to work, similarly to a perennial crop behaviour.

It is recommended to add crops with more minerals (Brassicaceae), adding seeds of deep rooted radish, mustards, to loosen the soil and giving more possibilities for water infiltration.

Deepika and Peter had some discussion about *Leucaena* (nitrogen fixing tree), which for Deepika and Kate needs much management, otherwise takes over, while for Peter, if in a balance of biomass, it improves the soil quality.

## Production and Preservation of Seeds on a Small Scale

Promoting the preservation of seeds is very important among rural people and especially farmers, as they can make an income generating activity from it, because the demand of heritage seeds is always increasing and it is sometimes more convenient to sell seeds instead of veggies: for example the red okra cannot be found on the market.

In general, a good seed has two main characteristics, which affect the productivity:

1. quality of the variety, for example if it is shiny, good looking, germinates and sprouts well.
2. environment, which means how the soil is prepared and which season the seed is planted.

A good seed:

- is free from diseases and pests;
- has the necessary nutrients to grow and germinate;
- is the one with "eyes" in the Togolese tradition;
- should come from a good fruit and plant (expectation about the quality of the variety);
- should not float (heavy);
- have a good size, be shiny, whole-full,
- be dry, but also seasonal (fresh);
- no GMO;
- should be pure, which means of the desired and good variety.

On the commercial market, it is important to specify if the preference is a hybrid or open-pollinated seed and knowing the 3 standards and expectations about seeds, which are: germination, physical purity (no mixed varieties or similar looking seeds) and genetic purity.

An example of genetic purity can be made with green okra, which cannot cross breed with red okra.

In order to know it, it is useful to take a look at the flowers and the male and female parts and how does a seed form in a flower: in this plant the male part produces pollen, while the female one receives it and then the seeds grow afterwards. If a bee brings pollen of green okra to a red okra, anything can be expected and the purity has finished, bringing to a physical and genetic mixture. In order to maintain the genetic purity, the rule is that pollen from a different variety should be excluded. On the contrary, a farmer observed, while speaking with Deepika, that in past traditional farming the genetic purity did not exist, but that nowadays it is important to keep it, because it preserves crops from disappearing and to help supporting it, in some parts of India farmers have a basket system to raise awareness among consumers about red okra as a traditional and good variety and people are responding well to this initiative.

## Pollination

To maintain the purity in vegetable crops, it is important to understand how pollination happens: in some plants the process is delicate and needs human assistance, for example for plants with small sized flowers and for that Deepika grows one variety per time. When the male part of corn releases the pollen, it seems like a rain fall, because it is semi-pollinated by the wind.

Plants present three different behaviours of pollination:

1. male and female are on the same plant (“1 room, 1 house”, like for okra, tomato, eggplant, basil);
2. male and female live in different parts of the same plant (“2 separate rooms in 1 house”, like cucumber, pumpkin, mais, bottle gourd);
3. male and female parts are on different plants (papaya, parwal).

In case of growing different varieties of the same plant, to maintain its purity and avoiding crossing, a person needs to pollinate the plants as it were a bee: in order to do it, Deepika usually ties closed the female parts of some plants in the evening, cuts the male flower in the morning, puts it on the female ones (which she unties to do) and then pollinate them (being careful about doing it with the same variety), then ties and closes them too. In some cases as the ridge-sponge gourd, flowers are small and it is advisable to cover them with a paper bag: these particular flowers open in the evening, so it is better to tie them in the morning and pollinate in the evening.

This expedient is also useful in case of plants with little flowers, like chilly, tomato, capsicum and basil and the human intervention makes the process easier: it is advisable to tie the plants, marking them in the morning and letting the bees pollinate only the needed varieties. If the flower is of a brinjal, in which case it is small, it is useful to put a mosquito net (but not possible on okra because the plant is tall): the same trick can be also used when the need of seeds is less. The chilli flower, which is particularly small, Deepika puts it together with the brinjal’s one in the same net, otherwise it is possible to put some chilly flowers altogether.

## Germination

Germination is a process that brings the seed to become a plant: when the fruits of a plant are mature, their seeds need to be collected, cleaned, dried and stored properly. Seeds that can be used to plant are different from the ones of fruits on the market. We choose the seeds from the healthiest, strongest and most vital plants which have produced good food.

There are different ways to understand if a fruit is ready: for instance in Deepika’s experience, the okra fruit opens itself and this is the sign that it is ready to dry and be harvested, as otherwise insects go on it. About bottle gourds, seeds need to become brown. Interesting fact, it is also that for example in India, there are many cultural practices about the choice of which fruit to take (the first ones, the middle or the ending season ones).

After collecting the seeds, an important part is cleaning, as this affects their viability. In case of fleshy fruits, like tomatoes or snake gourds, seeds are big, and it is possible to clean them by hand if there are not

too many, otherwise fermentation is a good practice. In order to do it, a technique is to spread the seeds on the table, scoop them out, put them in water and check after one or two days the status of the white fungus on top. Then, with the help of a tool to clear this “juice”, it is smashed with hands, draining out the pulp: the good heavy seeds will be at the bottom, while the light ones on top. Basil has little seeds that need to be separated and cleaned from the pod by using a sieve (traditional seed separation technique).

Afterwards, seeds need to be dried in the shade (14 days is the minimum, 1 month is suggested for their longevity): the drying process needs to be slow and long, it cannot be done under the sun and it is advisable to use clay to put seeds to dry.

Deepika waits one month to dry the seeds, then puts them in little packages with some details about the name of the variety, the purity and then all the varieties of one seed in one big plastic bag. About rice, in the Indian traditional agricultural farming there are many ways to store it, which differ from region to region: in Orissa, for instance, people make bamboo baskets, while in Tamil Nadu they use straw, twisting it to create a basket.

In the afternoon break, part of the group went to visit a cashew nut processing factory, where they could meet the ladies working there and they were told about the different varieties of cashew nuts, the machines and they could see different phases of the production, from the shell, to the packaging.

## The natural farming approach

Kate introduced this topic, by mentioning and advising a book called “The One-Straw Revolution”, by Masanobu Fukuoka: Fukuoka was an agricultural scientist, who worked with seeds and genetics and arrived to the conclusion that nature is perfect as it is. His approach is different from the permaculture one, where design and planning are the core: for him, the important thing is understanding how to avoid to intervene in nature and change its perfection. He tried to prove his ideas working in his family farm, starting by leaving some pruned mandarin trees to grow without human influence and observed what happened: The trees branches started crossing each other, letting him realise that if a tree is wild, it is fine to leave it to grow as nature wants, but in case of human intervention, it is then important to be constantly responsible for it (it is the case of moringa, which can be cut so that it does not stay too tall).

Fukuoka also observed fields around his land and found an abandoned rice field, where there were both old straw, grass and organic matter and growing rice, even if the field had not been planted since the previous year. Furthermore, the straw was suppressing the weed and he thought that was maybe not necessary to plough up or dig the soil. He started then experimenting the use of different kinds of clover, discovering that the best for his purpose is the white one, as it covers the land leaving enough space to let the rice grow and fixing nitrogen: in this way there is no need to fertilise or plough up.

When growing the rice, Fukuoka developed a technique: he harvested the amount of rice he needed and left the rest to nature, covering it with straw. When the rain came, rice started growing and he kept harvesting a bit and growing the white clover: his rice grains were bigger than the neighbours’, without fertilisers, and in the morning it was possible to see spider nets between the grass, which work as pests against other insects and mice, leaving the harvest to be unaffected.

Fukuoka also had to replant and start again in his orchard, where there were veggies growing between the fruit trees; he tried to scatter seeds out in the orchard and let nature do the rest.

## Permaculture and the natural farming approach: a comparison

It is possible and useful to do a comparison between these two schools of thought: the main difference consists in the questions to reply, as permaculture asks “What can I do?”, while Fukuoka “What can I not do?”, but reaching similar results. In Fukuoka’s approach, zone 1 hosts the kitchen garden for the family, zone 2 a rice and white clover field where everything is made by hand and walked on as little as possible, zone 3 has the orchard with wild veggies and zone 4 the traditional japanese wood lots for fuel, timber and

mushrooms and zone 5 was the steeper “sacred grove”, wild forest spaces.

“The One-Straw Revolution” became a famous classic, but it is just another kind of approach: after its spreading, it became known as “natural farming” and has been used until today in India (and many other countries), where he went and remained impressed by the outputs of his approach, it was adapted in Thailand and Korea, where the practise of Natural Farming became slightly different.

Something that Fukuoka demonstrated and can be also useful for people using permaculture methods, is that clover, even if considered invasive by some, is a good plant to let big pieces of land to regenerate, instead of using much biomass or a big compost pile.

Moreover, an interesting innovation he introduced, is the concept of seed balls: when it is not possible to spend much time every day on the land, or the interested area is large and it is difficult to plant seeds just before the rain, this technique is quite useful. In order to prepare seed balls, it is needed to mix clay with seeds and very dry compost, prepare some little balls and throw them on the field: when the rain comes, the seeds will start germinating.

## Preparation of seed balls

Kate introduced this subject by talking of her experience in Auroville: there her group did not have biomass, therefore bought seeds for eating, as they have less chemicals as the ones for planting. Then, they tested them and bought more of the ones that worked, noticing also that they were cheaper than the ones for planting. They grew their own biomass to create soil by planting a mix of cereals, pulses and brassicaceae (millet, sorghum, lentils, beans, mustard)

In Kundapur we used red clay taken from the land, which is in general the recommended one, if possible. Fukuoka experimented both little and big seeds, powder clay and used washing machine barrel to mix them with the powder and water: this technique needs some practice. In order to prepare seed balls, it is useful to add very little quantity of water

(otherwise seeds germinate) to the clay, then put the seeds and prepare the balls. Fukuoka created little balls (1 cm size), because if the rain is not strong enough, seeds cannot have the chance to germinate; also, the number of seeds needs to be limited. Based on the needs, it is advised to put vegetable seeds, or tree ones, but still, being careful of the size of the ball.

The group prepared two piles of seeds balls, putting mustards, mung beans (green soya), red ragi (millet, which is quite good in the dry season), fenugreek (as medicine plant, full of omega oils and it also gives minerals to the soil). When the group finished preparing the seed balls, they put them on a newspaper sheet to let them dry in the shade.

Usually, Kate puts more cereals than legumes in the seeds balls, but again, this depends on the necessity: we had more carbon and less nitrogen, and for this reason we used those kind of seeds. In case of big seeds, it is better to put them altogether, otherwise it is difficult to do a good mix, which can be prepared by feet, even if is not always necessary. A useful step is taking a metal grid and pushing the little balls through it to make them more little, otherwise making little sausages and breaking them as a quicker way.

Furthermore, it is possible to create both winter and summer mixes of seed balls and they can be useful for areas of bare soil. , (but being careful about the use of invasive species: in Kundapur for instance, moat bean or cow pea are ideal.

A tip about seeds to plant: garlic functions as a steriliser, so it is better not to exaggerate when planting it together with other plants.



# Pest management

## The IPM

Govinda introduced the topic, explaining that in the system we need to have balance and this is why pests exist. For example, if caterpillars or flies did not exist, spiders would not survive: when the next generation of flies gets born, no spiders would eat them and their number will be increased. The same mechanism works for the use of pesticides: also beneficial organisms die while using them and insects in general develop a resistance to chemical pesticides quite fast, so that these are not useful after a while. That is the reason why there are at least 556 species of insects which cannot be controlled by pesticides and this brings to think that there should be a “compromise” between us and the insects, which need to be controlled, and the IPM, Integrated Pest Management, helps with that.

## The P4 method: Pest Preventive Planting Pattern

On the field the very first things to think about are observation and then design: first of all, it is important to understand which crop is suitable for the land and for which part of it.

For instance, a crop which needs a very sunny environment, like tomato, and is put in a shady humid one, like tomato, will probably attract fungus.

Therefore, Govinda suggests to follow some steps, such as:

1. Observe the land, consult who you can (technicians, friends), in order to understand which crops are suitable, as this is useful to avoid most of the problems;
2. Design according to the needs and the characteristics of the land and the soil;
3. Select good seeds through a pre-test: observe which plants on the land are the best and mark them at least three times during the crop cycle time. When the crops are growing it is important to observe, select the good ones and mark them, then when they start to fruit, mark them again, and final time, during harvesting: this means that these crops are suitable for every situation. That is why a good seed will have “three stars” and in case of emergency, it is possible to use a “two-stars” seed, but otherwise it is not advised.
4. Test at the planting time, putting some seeds in water and observing if they float or not. If they float, they are not good to be planted, but they can be used in the animal food mix, in the centre of compost pile, to be burn or bury really deep, as they should not germinate and touch the good seeds.

Following these steps, the field should be protected from pests, but sometimes because of neighbour or environmental effects, they can still reach the plants. Therefore, it is important to know that yellow colour attracts insects, while red deters them and that insects are disturbed by strong smells: while planting the bed, it is useful to remember to mix a major crop both with others with a strong smell and some red ones (beetroots, red roots, marigold, red lettuce, spinach, rhubarb, hibiscus). Tomato is not so useful as it becomes red very late and in case it is not possible to use red crops, another trick is tying the crops with some red cloth.

In general, this works more for sucking insects, but sometimes, because of a change in the environmental situation, for example, other measures are necessary. It is advisable, but not compulsory, to put it every 2-3 metres.

## Herbal/Natural Pesticide or Tonal tonic

There are different versions of this pest-deterrent, but the basics are the same and consist in the use of a bucket filled with water and some red cloth to avoid pests to come. During the training, Govinda

explained how to prepare it. First, something bitter in taste is needed, like neem, malabar nut, artemisia, eupatorium, bitter gourd or aloe vera; second, some pungent, spicy or strong-smell-plant, like onion, garlic leaves, coriander, orange peel, mint leaves. Third, some red to avoid pests to come and to help noticing it. It is possible to use something poisonous if the plant is not going to be eaten directly, for instance tobacco can be used on a plant, but it is better to avoid it on something like cauliflower or broccoli. Afterwards, some animal urine needs be added (cow one is the best!). In Kundapur november climate is sufficient to leave it for one week, stirring it once a day, while in a temperate climate two weeks are needed: in one week the leaves decompose, turning black and starting smelling. After 30 minutes of sprinkling the pesticide, it is possible to sprinkle some water, if necessary.

If young plants need to be treated, the mix should be of 19 parts of water and 1 of pest-deterrent; in case of grown-up plants, the proportion should be of 4 parts of water and 1 of pest, mainly because cow urine is really strong alone and needs to be diluted; in between the plants' growing, but without being sure about the percentages, it is better to dilute more, than risk losing the plant because of a strong mix. To start preparing the mix, our group put 4 parts of water in the mix and checked it with Govinda: when it was ready, every group used 10 gr of it for 1 square mt, and as they had 4 squared mt each, we used 40 gr overall.

This "pesticide" is also known as "tonic", because it functions both as growth facilitator (cow urine contains nutrients) and pest management and "tonal", because people sing while using it! Stomata leaves are open when "happy", so Govinda's suggestion during planting and spreading the pest, was to sing a gentle, happy song: a curious thing is that in Nepal and India people sing, while it is forbidden to whistle during harvesting. In many cultures this tradition has been lost, but still exists in Thailand: before entering a temple, people need to sprinkle some holy water from the lotus flower on themselves and sing in the meanwhile. This also happens in hindu temples, where the priest sprinkle water on people with some mango leaf or others and sings. Actually, in the past there were different songs for different farm activities, like for planting and harvesting.

In HASERA, Govinda's farm, they put the pesticide once a week in the early morning or late afternoon, when the sun is not strong and because of the strong smell, it works as repellent and that is why some insects die instantly and others go far.

Furthermore to protect crops, light traps against bugs are useful and easy to prepare. A bucket filled with water placed under and a light are needed: the day after, the bucket will be full of insects which can become food for farm animals (like chickens). It is possible to do it for 2 h per evening: some people put some kerosene in the mix, but in case of feeding the animals afterwards, of course it is not advised. Interesting fact, is that almost all of the beneficial organisms are diurnal and the pests nocturnal, so that this trap mainly harms just the pests.



## Natural Succession

Kate depicted a past scenario to the participants: a timeline and at its beginning, millions of years ago, only rocks. Then, water which starts to pass through, due t this, lichens grow on the rocks. This situation can also happen nowadays in degraded landscapes and in many countries where land is open and bare: except for lichens, spiky plants usually take over. After a while that they have opened up, there is some space through the rocks and biomass starts growing thanks to some shade. This leads the space for different kinds of plants, microorganisms and bacteria, organic matter and biomass. Diversity increases, so that insects

arrive and then new bigger plants and animals, bushes, birds and fruits. It is now possible to differentiate between temperate climate and tropics: in temperate climates this process is slower, as there is winter, frost, while in the wet-dry and wet tropics there are different conditions and each place has its own unique way and speed of doing this, but the concept and the process are similar.

At this point, the soil has improved, contains more organic matter and is moist, so that the spiky species cannot survive to these new conditions, leaving the place for bigger and more “friendly” species, like small trees. Then, the top soil increases, small mammals step in, but, still in the scenario, disturbance like a tornado may happen, appearing destructive, but helping nature to regenerate itself and accelerate plants to come back. Trees, like pepper and mango trees appear and bigger and larger animals, an abundant habitat evolves where human beings can start stepping in, as it is a system based on abundance of food, water, shelter.

Contrary to this idea of abundance, nowadays there is a practice, which consists in burning organic matter, releasing carbon which goes directly into the atmosphere and accelerating a natural “degradation” process, having a short-term positive impact, but like extracting nutrients from the land and sending them into the atmosphere, wasting them, on the long term. In extreme cases, burning is necessary, but otherwise, Kate does not advise it at all. It was indeed, an ancient practice in India and other countries, when it was much more forested, and tribes used to burn part of the forest to fertilize the land and obtain a piece of land to cultivate, but only staying for a season or two and then moving on, giving the time to the land to regenerate. Nowadays the rhythm and space have changed and burning creates a sort of spiral of degradation.

There are exceptional examples, like in Togo or California, where burning is kind of a need: Kossi, the Togolese participant, explained that people burn part of the woods every year to have a sort of control on them, while in California there is a problem with redwoods and in nature there are some seeds which germinate only with fire, but the use of it is infrequent and very controlled. Now in California, instead of burning, they cut redwoods with tools similar to machetes, and use a chipper and chainsaw. This is useful as it creates biomass, but of course, practices depend also from local cultures and in some places fire is used as prevention to wildfires- by backburning and keeping firebreaks open and clear. This is only really necessary when large key herbivores are missing from the environment. Burning should always be a very carefully considered option- as it releases a lot of carbon into the atmosphere and reduced biomass and therefore less food for the soil food web. If burning is chosen as a way to clear land- it should always happen in a controlled and monitored environment at the right time of year and during the right atmospheric conditions.

## Stratification of layers in the forest

In mature forests there are, by simplifying:

- tall plants, part of the emergent layer, which filter the 20% of light, leaving the other 80% to go through and reach the other plants;
- part of the high layer, for example a mango tree, which filters the 40% of light and plants are closer;
- down there is the medium layer, where plants have bigger leaves than the previous two, trying to catch more light and they filter 60%;
- the low layer, 80% of light, where ginger can be found and plants are more concentrated together.

In between these layers there are others and in general, there are different kinds of emergent layers and high, but by growing crops in the garden, it is possible to combine all these layers, letting plants to be happier, than by growing divided, concentrating more on their need of light, than their height and choosing species by stratification and time. For instance, there could be corn in the emergent layer, brinjal in the top one, ground cover underneath; Apple trees do not need full sun!

In France, Spain and Portugal people are experimenting, for example with poplars and willow (good for biomass), as emergent layer. Moreover, they do not necessarily need to be edible, as they can be nitrogen fixers, or used for wood production or mulch underneath, like eucalyptus. Another example is of the banana trees, which leave space to the light to grow vegetable crops in the middle: it is important to think and plan

how big the tree is going to become, in order to have enough light afterwards for the crops in the lower layers.

By planting avocado, it is possible to plant many veggies down for the first seven years, but afterwards it will be big and possible to harvest it and crops as cabbage would not be able to grow anymore: this system is based on the cycling of nutrients within layers and the stimulation of growth of the other plants, as there is a sort of communication between them, like in the case of some species of oranges, which if pruning after the first flowers, communicate somehow to the other trees, which flower more, leading to a better harvest. It is possible just to work on two main layers, for example, avocado and oranges, by making one line with two and the second one also, without growing the emergent layer; coffee and oranges down, or coffee and avocado.

In Auroville they tried to grow only native plants at the beginning of the regenerative process, but it was not working. They then introduced a kind of acacia from Australia with special properties: it grows fast, like a shrub, and can be cut quickly and used as biomass. Not everybody was enthusiastic about this idea, as they were concerned it would be invasive, while it actually helped the system by filtering the light and helping the native plants to grow the following year. On the other hand, acacia is banned in Karnataka because it has become invasive and takes a lot of water: in this context, it is important to avoid concentrating the attention on the species, if native, or not, while being focused on the function of plants in relation to the needs and the pruning.

An important part of stratification is dedicating the edges of the land to mulch production, which helps plants: in order to do that, the presence of strong grasses, like vetiver or perennial grasses is useful, as it helps producing organic matter, therefore support the other plants to grow. Of course, stratification can be organised, using machinery for instance: this work, on a large scale in a deforested land, can literally help changing the climate, as growing trees bring to transpiration and rain and it is not against permaculture to use machinery, even more if on large scale. As usual, it always depends on the needs and perceptions of the person how much and which machines to use.

On a small scale, usually in permaculture there is a frequent word, which is “guilds”. A guild is a combination of various plant species with diverse functions which surround a central element (usually a fruit tree): Kate offered an example of a tropical climate system, composed by a mango tree (which leaves work as mulch) in the middle and at least other four main species involved. The system could be with pepper, lemon tree in the shady area and not too close from the mango. This kind of system can be even recreated in a pot, or in rows or circles, always planting all together.

Plus, two support species need to help the system: if possible, they should have two functions, within which preferably one is nitrogen fixing. It is advisable to choose perennial ones, in order to avoid planting them every year and as ground cover and nitrogen fixing, they can be pigeon, cowpea or clover. Adding flowers can be useful to attract pollinators, like hibiscus, again, a bit far away from the mango, and marigold and tea can be as pest managers. In a temperate climate, a system could be formed by an apple tree in the middle and nasturtium, as they are companion plants, then some roots like comfrey, a peach tree with grapes or the weeping willow and clover underneath: sometimes Kate found difficulties about finding suitable species for temperate climates, because teachers were coming from tropical areas. It was recommended to follow is Martin Crawford, in the UK, for cool temperate climate food forest expertise.

## Optimising the Edges

One of the principles of permaculture design is to “optimise the edge”, which consists in making the fence living, or mulch producing, or planting a food crop: in this way the edge is optimised as it becomes productive. The edge is something in between two climates, which meet each other, and it is much more fertile and biodiverse than its two habitats taken alone. When a forest ends and grass meadow begins, crossing at one edge, this helps increasing biodiversity: in case of planting herbs on the edge, it is also useful to attract beneficial insects, like pollinators.

The typical example is when a pond or some water meets the land: there are fishes in the water, land

animals and plants that live on the edge and host specific insects, which cannot live neither on deep water, nor on the land. This is why in permaculture, people try to create “the edge” and then optimise it, by trying to create more microclimates. For example in cold climates it is possible to use lemon trees, that would not normally survive because of the cold: it is somehow also socially interesting, if in conflict with someone, because finding the edge (or common ground) can be useful as “fertile” soil to create a connection.

## Rosie and Peter - Kitchen Garden and Food Forest

Rosie and Peter have a kitchen garden in Goa, located in the southwest coast of India at sea level: it is a small garden, suburban, next to fields. 600 mt square, very long, it is an interesting piece of land to work on, bumps which are made of rocks, with coconut trees planted on them. They started two years ago and there was nothing growing except for grass and trees and since now they have planted more than 200 species of plants. Their aim is “to create a complete and closed loop ecosystem in which all of the needs of the garden are supplied from within”, based on independence and resilience: until now they have reached this scope at 80%, but they are working in order to be completely self-sufficient.

Peter explained what has been fundamental to create a home kitchen garden and a food forest, offering us a recap of topics the group already discussed about and new insights: the main topics he touched have been design, water, fencing, soil, mulch, compost, sunlight, plants/species and pests and disease.

He started talking about water: a precious element that can be available, among others, as rainfall and water table and that in water bodies and ponds increases diversity, hosting birds, frogs and lizards, with the support of sunny rocks, piles of branches and tree cuttings. It is relevant to consider the time of establishment of the food forest until its maturity, the water design, in order to understand where it is needed and if there are sections which require least water furthest from the well. About water harvesting, the best place to store water is in the soil, as it slows it down, spreads it out and lets it sink in. Moreover, living roots promote good soakage and hold moisture and organic matter works as a sponge that multiplies 10 times more water. In their kitchen garden, Peter and Rosie work on raising the water table.

Earthworks are useful for water harvesting, erosion control, soil building and micro-climates: some examples, among others, are swales, bunds, trenches, micro-earthworks and seasonal water bodies. About irrigation, they use well water during the dry months (8 per year), pumped to a raised tank and gravity-fed and hose pipes to hand water. They can do hand watering (“one size fits all” for mono-crops, which helps the garden of benefiting from a more attentive approach) as the garden is not too big: this is useful for the observation of plants’ maintenance and they mulch as much as possible, as it reduces a lot watering needs. About other natural resources to be used, the sun is the most powerful and sustainable energy source: it is useful to harvest it for energy, to grow food and medicine, biomass and fuel.

Then, Peter talked about fencing, suggesting that it is better to fence first and plant afterwards, otherwise it is likely to lose plants. There are different things to take into account, like what is important to keep out, and on the contrary, what to keep in the fence, the life-span of fencing hardware, the relevance of living fences and hedges and doing a hybrid mix of both, maintenance, longevity and extension of systems. Living fences are living materials, are regenerative, renewable, biodegradable and fulfill multiple functions, among which they support plants, create shade, are windbreak, visual screen, biomass, firewood, bird and insect



shelter. Parts of them are hedges, trellises, borders and stakes and a star species in Rosie and Peter's garden is the gliricidia.

As underlined previously, mulch is fundamental in a garden: it has many positive benefits: protection from direct sun, erosion and compaction, keeping the soil moist, giving less work thanks to less watering, providing organic matter to microorganisms and fungi (which play a vital role in the soil food web which feeds plants), suppressing weeds and if varied, providing different nutrients to the soil and plants).

Compost helps increasing the microbial life, is generally very simple and low-effort, can be done as pile, or banana circles, etc. One method known as "hot composting" or "the Berkeley Method" require more stringent monitoring, but give excellent results. In general, it is important to remember to turn it carefully, no more than absolutely necessary!

Vermicomposting kills root feeding nematodes, as they pass through the worm. Peter advised to avoid leaving compost sitting around and to skim the castings regularly, avoiding waiting to harvest the entire mass. While regarding in-situ compost, it can be done in the garden beds as natural decomposition of mulch and plant roots; in the food forest and on the borders or other selected places as cuttings and trimmings from living fences, shade-logging trees and "chop & drop". Banana circles, with the tree leaves and trunks thrown into the centre of the circle. Deep litter chicken/cattle systems, there will be no odour if mulched well. Moreover, dry composting toilets save water and turns waste into a resource: it can be prepared through various methods, with two simple buckets, or as more sophisticated, engineered systems: different designs suit different needs and different designs produce different qualities of organic matter. About that, a suggestion by Peter is the book "The Humanure Handbook" by Joseph Jenkins.

Peter then underlined the importance of having poultry in the garden: chickens, muscovy ducks, guinea fowl and geese. It is useful to let them free, except for the kitchen garden(!): they are great for the more mature food forest and as well as providing eggs (transforming kitchen scraps into high protein food) and meat, they fertilise the soil through manure; they are also good workers, scratching and turning compost and topsoil, as well as pest control- picking insects and slugs/snails from the garden.

Pioneer species, as already mentioned by Kate, can be grown on degraded or damaged land and are useful to prepare the way for more chosen species: they can be used as fencing, mulch, soil building, food and some favourite pioneer species are gliricidia, moringa, vetiver, pigeon pea, mung, sweet potato, talinum, banana. Focusing on the gliricidia, also known as quickstick, or madre de cacao, he explained that it is widely available in Goa (although less & less), works as nitrogen fixing, high nutrition mulch and compost: it grows from cuttings, 30cm to a few metres, can be used for fences, hedges, borders, trellises, stakes, tree-size supports (for passionfruit), arbors and as nurse plant to give shade and humidity (mainly in for plants, people, buildings and create microclimates. Moreover, it is deciduous (not entirely if irrigated) in winter, allowing the light and warmth in; it offers beautiful flowers in February and a full foliage in the hottest months of April, May and June, September and October. It can also be used as coppice according to the needs, creating layers in time and space: it is a self-regenerating, biodegradable, available on-site or locally plant. It is also a great animal fodder crop.

An important aspect to take into account in a home kitchen garden and food forest, is diversity, as it adds stability to the garden, gives the chance to produce on the table, it is like insurance, because if something fails, but there are many different crops available, then not all is lost. Furthermore, diverse plants exchange different things with the soil, encourage diverse birds, small animals, insects and soil life, most important in a world where diversity is disappearing. Focusing on perennial plants, the group learnt that they grow for many seasons, require less maintenance and often less water and there are in nature both short-



lived ones from a few years to many tens or hundreds of years. Something interesting that Peter underlined is that support species can be dynamic accumulators and hydraulic pumps and that they can be used as stakes such as bamboo for structures, starting from a stake to a building.

Regarding the pest and disease topic, Peter talked about the importance of crop separation and explained that they do not really use bio-pesticides, but crops such as garlic, chilli, cow urine and neem instead, prepare pheromone traps for fruit flies and hand squish aphids and physically remove caterpillars, but in general, accept some small losses to pests. The beds Rosie and Peter mainly use, are level beds, instead of the raised ones, which are heavier in infrastructure and the open sided ones are difficult to maintain, as they hold moisture less efficiently. Related to beds, they prefer not tilling, as it turns damaging for the important web of life in the soil: each layer of the soil harbours different species and it is important not to mix them up, or to have carbon, or undecomposed material, as it takes nitrogen out. It is assumed that a transition to a no-till approach takes time, but for instance Rosie and Peter now gives some occasional aeration to the land with a pitchfork.

In their home kitchen garden and food forest, Peter and Rosie have fairly narrow major paths for accessing different parts of the garden, with brick stepping stones for moving between the beds: all paths and beds are bordered with gliricidia to keep people and dogs off the beds, to avoid compaction and destruction of the soil life: paths are mulched heavily and used for storing mulch.

Thinking in a long-term perspective, it is relevant to plan and work on succession and change and how to do it: getting to know every space; getting pioneer plants to grow in the ground; thinking that small spaces have many microclimates a useful indicator for plantings and that small saplings will become larger trees. An aspect related to this, is fertility, which among the others, helps creating a closed-loop system, where the most important thing is organic matter, based on a healthy soil with microorganisms and fungi feeds on dead plant materials. Furthermore for succession, it is important to limit the size and increase diversity and to do it, Peter and Rosie prune regularly, to keep a larger diversity of species and varieties on a small space, have few trees of the same species, taking into account that different varieties mature at different times. A way to maximise the use of space is also “Espalier” or hedge pruning for fruit trees. Other elements which can support succession and change, are layers, such as roots and round covers, and thinking of the stacking time, which includes seasonality, deciduous trees and shade created by mature forests.

At this point, it is relevant to consider some doubts that can arise, in case of malfunctions and connections, in particular: is it better to grow food, fix nitrogen, or create shade? Building a trellis or restoring land? and pruning, harvesting or maintaining a fence? This, as mentioned, is always related to the needs and desired design! In a healthy ecosystem, for example, there is crop rotation, but also in this case, is it necessary? For Peter and Rosie, it can be seen as a good practice, which brings them fruiting crops with beans as a basic rotation: in small gardens with mixed plantings, there is less necessity for crop rotation and in general, understanding healthy soil networks can give a different perspective on rotation. This is also related to seasonality, which consists in growing the right plant, in the right place at the right time, reducing the risks of pests and disease: some crops are light sensitive; some ones provide different yields in different seasons; it would be interesting developing a seasonal calendar and occasionally pushing the boundaries, by creating microclimates.

Seeds can become a garden controlled resource: it is relevant to consider their provenience, better if local, but also climate adapted ones and heirloom which can be saved for future seed security. As a rule, Rosie and Peter do not grow hybrid seeds, except for hybrid tomatoes and they keep seeds in a storage, because it keeps them fresh, giving them longevity, viability, and refrigeration is a handy option! About germination and transplanting: some seeds require soaking or scarring or evening burning. If in doubt it is better to do a seed germination test and beans are great to get started with. About seed saving, it is useful to start with one type of seeds, also because there are many plants which are self-seeders, like most of weeds, which can be unfortunately suppressed with mulch: Peter and Rosie have in their garden some dedicated patches of densely planted, unmulched self-seeders, among which there are talinum, vietnamese crab claw and rosella.

Of course, a garden can mean hard work! Its maintenance can be supported by a careful design and

planning, this enables us to accomplish all tasks easily, plus a cautious choice of species, a regular interaction in the garden and most of all, mulching, which reduces watering, especially in winter. Regarding harvesting, it is useful to do it regularly, with the support of permanent stakes: first, mature fruits and vegetables will signal to a plant to stop producing, second, it will help getting more and fresher produce. Another useful method to help maintenance is doing cuttings: some can go straight into the ground, while others can be rooted in water first. And about trees, most of Peter and Rosie's have been grown from saplings and grafts, which can provide earlier fruiting: most fruit seeds do not grow true to type although the ones which sown directly into the ground can be stronger.

In the garden, Rosie and Peter water it about an hour a day: a tip after observing, is to touch the soil and only then water, also because the need depends from which plants are growing (more perennials, less work) and on the season (winter is busiest in Goa). In order to do that, they use tools like hand trowels, secateurs, shovels, pick axes, crow bars and saws. As all-seasons garden, they grow food all year: of course, some foods yield all year, others seasonally, even in the heat of summer and monsoon.

In the final part of the session, Peter and Rosie gave some practical basic tips about kitchen gardens. For example, "to grow what you eat" and knowing the foods, like which ones can be eaten raw and which not, always correctly identifying wild foods, changing habits, experiment and sharing. It is possible to get away from the garden, in case of necessity, but it depends from the duration of absence and season, which means the water needs, not leaving bare soil, but mulch and green manures. Some other important aspects are the local community of knowledge, sharing information, experiences and questions, demonstration and research, collecting and experimenting with local and analogue species and asking/having the support of gardeners and farmers: in order to do it, it is fundamental to talk and write about it, take pictures, experiment recipes for unusual foods, procure seeds, experiment with germination tests, volunteer, get involved in the CSA Market and encourage others.

## DESIGN

In general, when designing a farm, a kitchen garden or just a place where to plant, it is important to avoid thinking big, as it is possible and useful, especially for beginners, to start from something simple, but productive, even a balcony or a rooftop.

In a farm there can be animals from the little size of earthworms to the imposing ones of elephants. In case of a little place, it is possible to take advantage of it somehow (example of "inch garden"), or to do grafts, to grow two varieties of the same fruit on the same tree.

There are many things to consider when designing:

Sectors: north/south facing, slope, potential pollution, noise, fire threats, wind direction, paths, access

Water: access, in-flow, storage, irrigation, grey water, runoff, overflow

Soil Strategies: compost, planting patterns, bed and path designs, ipm

We learned about a tool called OBREDIMET:

- O-observation
- B- boundaries
- R- resources
- E- evaluation
- D- design
- I- implementation
- M- maintenance
- T- tweak or adjust

Another tool we explored was Input-output analysis.

This tool helps us to analyse each element we design into our system by seeing what they need and

what they give to the system (Eg. Chickens need: water, shelter, dust bath, food, access to green areas. Chickens give: eggs, meat, feathers, scratching, pest control, fertilizer)

We use the input-output analysis tool, together with the Zones and Sectors Tool to help with relative placement. This means we place elements in the system so that they can support and interact with each other in the most energy-efficient way. By placing a chickens not too close to the house, we avoid possible smells and noise pollution, yet we do not place them that far away that we have to walk too far to collect eggs, change their water or feed them.

While talking about the design, Govinda showed some pictures of Sepp Holzer's farm in Austria, others in Switzerland and Germany as examples of designs: in 1995 he went to a farm in Austria, where diversity is well visible from the pictures and the farmer uses only human power. While in Switzerland there is a farm where they mix crops, plot by plot instead of plant by plant, as they work using a tractor and everything needs to be at specific distances: sometimes Govinda also does this in HASERA.

## Livestock animal management as part of the design

Livestock is an integral part of a sustainable farming system. It can use or reuse farm by-products and can be an inhouse bank for the smallholding farmers. On the other hand, livestock is also a responsibility, as animals always need someone to take care of them, but through a wise designing of the system, the farm management can be smarter and less demanding.

In a permaculture farm, animals and birds are important elements of an integrated farming system, as they provide services which increase the overall sustainability of the place, such as:

- milk, ghee and eggs;
- eating the leftover food and increasing the waste recycling;
- helping preventing fires by keeping firebreaks grazed and clear;
- manure and urine with micro-organisms that quicken the decomposition of biomass;
- amusement and joy during farm activities, consequently reducing the stress and increasing the connections;
- easier management of pests and diseases
- energy for transportation and drafts
- maximizing the supply of farm and family needs

There are different things to consider while selecting the types and number of livestock: the property size; the family needs; the breeding behaviour; the suitability for local conditions (climate, landscape and society); time and resource availability; skills, interests and technical facilities; special needs of the livestock in concern; availability of space, feed, forage and fodder. Moreover, there could be many potential problems, among which there are the ability to supply fodder and forage, veterinary knowledge and proper / balanced integration and a lower productivity. These issues could be solved with an element analysis of the livestock in concern or a breed or fodder and forage improvement: farmers should calculate the amount of livestock they can responsibly manage on the farm. Focusing on fodder and forages, animals could be raised on terraces, in marginal lands, or on other unused lands of the farms: among the ways to improve the quality of available fodder and forages, there are the hay making and silage. Livestock should be fed three times a day and feeding whenever a person is available is not a very good practice: and shed improvement is very crucial.

During the training, Govinda invited the participants to do a practical exercise in pairs, to let them reflect on how to integrate domestic and wild animals in a farm and then explain it to the group, analysing what that animal needs, what it provides to the system, which problems are related to it, which opportunities it offers, recommendations and conclusions of having one or another animal: the analysed animals have been the buffalo, the sheep, the wolf, chicken, the dog, the tiger, the duck, the frog, the deer, the goat and the cow.

Buffalo: it has a heavy body weight, so that needs much food and produces unfortunately weak farm

yard manure, but has higher fat and sugar content in its milk, which makes it really tasty and needs water to wallow, otherwise a daily bath is compulsory and it is a good resource to keep the water in the pond.

Sheep: it is a very moody animal, so that it has seldom trust the owner/human. It prefers to graze in the lawn, needs a good shelter and thanks to it it is possible to produce wool.

Wolf: it is a wild animal, which needs space, such as a big forest, freedom and a pack. Among the problems for farmers, it eats human domestic animals and in general can be dangerous for humans, transmitting some diseases by biting. As opportunities, it can be seen as a guardian and it is part of the system as predator. In some parts of Italy there have been issues with wild wolves going close to urban areas: therefore there has been the introduction of another wolf breed in order to bring balance to the system.

Chicken: it gives eggs and meat and can be used to control pests (for instance in rice fields) and weeds in the garden. It eats kitchen leftovers. Unfortunately it eats in dirty places and does its clean ones, but it is the animal which can produce the maximum heat among all animals.

Dog: it needs love and care, food, water, shelter, especially when dark and cold outside. Among the problems, if sick it needs some medical care, it can escape, attack or worst eat animals of the neighbours, bite other people, it can do mess and noise. On the other hand, it gives protection and security, love and company; it is possible to train it to do different things (to guide a herd), staying with him/her reduces stress and it is like a therapy. There are many breeds of dogs.

Tiger: it needs space in the jungle, giving balance to the ecosystem being a predator. An issue whether it cannot have enough food, is that it can come close to the village, with the risk of eating domestic animals and attacking people. Many parts of its body are used in medicine and in case of a fire in the jungle.

Duck: this animal eats slug and snails, among a variety of things. It lays eggs and gives good meat. It helps dissolving oxygen in the water, cleaning water / polluting water bodies. Differently from chickens, ducks leave their eggs in different places and sometimes it can be difficult to find them.

Frog: it needs water, insects, green plant in the water. It makes noise, is dirty and attracts snakes and can escape. An important role that it has is pest control. In Sri Lanka in 1980 there was an incident, during which there was an incredible increase of the mosquitoes population, after the government encouraged, one year before, the use of breeding tractors. Moreover, there used to be buffalos, which need ponds, where there will be also frogs, which act as natural pest managers. A research which was conducted, related then the substitution of buffalos with tractors and the consequent disappear of ponds and frogs, with the incredible increase of mosquitoes.

Deer: it is a wild animal, which needs water and green grass. It lives in the forest, but if it does not have enough food, it will come close to gardens and eat what it can find there.

Goat: it was the very first domesticated animal; very handy, it provides with a variety of benefits. It is a very curious and fast runner (need of strong fences), which needs a very comfortable shelter, as it does not like wet and cold places, prefers to eat tree leaves than grass / straw and gives milk, meat, weeding and fur. Moreover, goat kids are very playful and add more liveliness to the farm.

Cow: it needs a good shelter, can compact the soil in the pasture and facilitate the erosion in sloped areas, and gives milk for a long period of time. Its urine has good pesticidal properties (tonal tonic!), it needs 40 kg green grass / 15 kg dry roughage per day and 6 - 7 hours for regurgitation, plus 12 spent by laying for sleeping. Its milk is less fat but more digestible than the buffalo's, it needs between 70 – 100 sq ft space per animal in a stall fed system and males (and some females also) can be aggressive to humans beings.

## Other animals

While designing all the zones which will be part of the farm, it is relevant to try to keep all the possible natural beneficial organisms, like insects and birds: regarding insects, among them the dragonfly, the dancer fly, ants and ladybirds are to be taken into account. Ladybirds, for instance, divide themselves in two categories: beneficial and pests. In order to recognise them, it is important to pay attention to the number of their spots: if even, these ladybirds eat plants and can ruin the system, while the ones with odd number

are “good”: the best ones have 7 spots and the worst ones 28. This is because the first ones are herbivores, while the second ones omnivores, eating especially other insects. Spiders also eat flies and gnats,, while also in the grasshoppers are often eaten by birds. There are both beneficial insects and pests: the ones with long antennae are good, while if short, bad for the system. In general on the field, it is useful to go around with a sweeping net, or insect catching net, as it is a handy tool with which insects are trapped, it is possible to check if they are beneficial or not and then can be given to chickens or fishes to feed them.

For what concerns pest management, a practical tip, to avoid it naturally, is by using ponds: putting a light on it for 2 hours in the evening will help fishes enjoying insects coming attracted by the light, as a very natural, simple and useful solution, instead of using chemical pesticides. In case of ants or other pests’ problems, it is advised to use the tonal tonic, or just some cow urine mixed with water, as the smell will get them away: in other cases also salty water can be useful and sometimes improving the soil quality helps too. Another trick is using pheromones. Pheromones are naturally generated by female insects and have a strong smell and can used by farmers to attract males into a “trap”, similar to the bucket-and-light one, but through a bottle with a hole to catch them. This helps preventing the insects population growing, as female eggs are not fertilised and it is useful before crop planting, to keep the insects’ population under balance. Spiders are needy animals, as they need to eat 17 times more food than their body: this can be useful as natural pest management, same as blue wasps. Vermicompost is another really useful part of the garden, which can be put close to the kitchen, in order to save energy and create a easy access for bringing out the kitchen leftovers.

## Plants

There are many different plants which can be really good natural pest deterrents, some examples include papaya, agave, aloe vera, black pepper, chilly, malabar nut, melia, neem, stinging nettle, lemongrass. Moreover, one of the best examples of companion planting which the design can involve, is the “three sister planting”: a traditional mix cropping of corn (or sunflower), sweet bean (or other kinds of beans) and pumpkin (or squash). Corn is tall and gives shade to the sweet bean and provides a support for the bean to climb, while the pumpkin provides ground cover, the beans fix nitrogen for both corn and squash.

## Implementation and follow-up: the Rafiki councils

Kate introduced the session focused on the training implementation and follow-up: she explained how the groups, as formed since the beginning, would work together. She proposed to call them “Rafiki (from the Swahili language, “friend”) councils”: councils in the sense of groups connected to each collaborating horizontally to help sharing issues, tips and the overall experience step by step. The councils were created following criteria of closer/similar geographical and climatic zones and participants were asked to provide Kate with the amount of rainfall per year there, specifying which months were the rainy season.

Regarding Zones: in an urban area, Kate mentioned rooftops in Singapore or Hong Kong, which host gardens and can be considered as a zone 1 in a design plan: it is advisable and interesting to be creative about the design of zones, as they do not need to be thought strictly and necessarily as the common ones. Moreover, there is a website which talks about urban zoning, in which an apartment is zone 1, the neighborhood or the streets or cycling routes that a person uses, zone 2, etc

Regarding villages, there was a discussion about digging around a whole village and the trainers replied that it is a very good idea: it is just important to be aware that if lots of water infiltrates up hill (in case of a hilly area), then it is important that it does not reach the foundation of the houses, it is advisable be aware of working with contours for infiltration, or off-contour to guide water away or towards a dam. The design should be made on a village scale and could be multipurpose, as protection from animals.

A good example of whole village permaculture design is Crystal Waters in Australia.

## Design and evaluation

While preparing the design of a kitchen garden or a food forest, it is important to have both a short and a long term vision: in order to prepare an action plan, it is useful to reply to some questions which can be considered guidance: who? where? when? what? how?

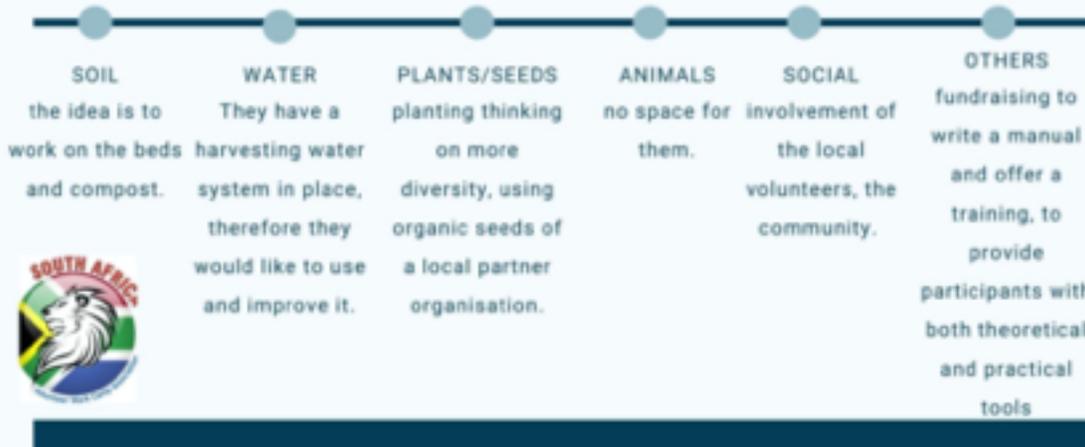
The proposed actions of every participant and representative of the organisations were related to the:

- soil (ex: how to manage its fertility?);
- water (ex: will there be water saving strategies?);
- planting (ex: ideas on how to manage different species);
- seeds;
- animals (if the groups have them);
- social (ex: if interested in connecting the activities for instance with a school);
- other (ex: anything else, new ideas).

# SAVWA

THE IMPLEMENTATION OF THE ACTION PLAN IS BEING DONE WITH THE COMMUNITY, IN SOSHANGUVE, AT 45 MIN FROM THE CITY CENTRE OF PRETORIA: THE FOCUS IS PLANTING A NUTRITIONAL AND HERBAL GARDEN.

THE MAIN AIMS ARE TO EMPOWER THE YOUTH AND TO RAISE AWARENESS AGAINST OBESITY AND ABOUT ALTERNATIVES TO THE USE OF GMOS IN AGRICULTURE.



**LEGAMBIENTE**

PLANTS: PLANTING ANNUALS, PERENNIALS (WEEPING WILLOW) TO KEEP WATER IN THE PLACE AND IMPROVING A NATURAL FENCE WITH FRUIT TREES WHICH PROVIDE CHILDREN'S SNACKS. NOT TOO MANY IN QUANTITY, AS NOBODY FROM THE ASSOCIATION LIVES IN THE PLACE



THE ACTION PLAN TOOK PLACE IN "IL CASONE - VALLE DELL'ANIENE", DURING THE SUMMER CAMPS (JUNE/JULY 2019). THE AIM HAS BEEN TO PLANT TREES AND CREATE A KITCHEN GARDEN INVOLVING THE EVS VOLUNTEERS HOSTED IN THE PLACE AND IF POSSIBLE, TRYING TO KEEP THE WATER, ALSO THINKING ON HOW TO "PROTECT" THE PLACE FROM THE CHILDREN

SOIL: COMPOST IS ALREADY AVAILABLE. BUT THE IDEA IS TO CHANGE THE DESIGN OF THE PLACE. TRYING TO IMPROVE IT AND PERHAPS PUTTING SOME VERMICOMPOST



SOCIAL: IL CASONE HOSTS MANY SHORT-TERM PROJECTS WITH CLASSES, WHILE THE SUMMER CAPS LAST FOR TWO MONTHS

**Social:** involvement of Church communities, where people mainly gather

**KVDA**

The long-term action plan aims to involve both volunteers of the association and specific target groups, helping improving the general conditions of income, innovation and focusing on women empowerment, to help them start their own project afterwards.

**ANIMALS:** BUILDING A DEDICATED AREA FOR CHICKENS AND OTHER ANIMALS

**WATER:** CONSTRUCTION OF WATER INCHES

**SOIL:** NEED OF A CHECK OF ITS COMPOSITION, PLUS THE AVAILABILITY AND USE OF MANURE AND COMPOST

**Plants:** perennials and annuals to plant and use of red plants against pests



**FSL India**  
Field Services & Agricultural Learning

**FSL-India**

**Plants**  
idea of building a guild around the mango tree, composed by lemongrass, lemon tree, vegetables

**the action plan has been a follow-up of our activities in FSL's CEL Training Centre**

**Animals**  
in FSL's CEL there are goats and chickens, plus animals of the in nature as ants, worms, pests...

**Social**  
Focus on the community




Fsl India has been also implementing other two projects: one in Bangalore, first, consisting in identifying sources for the community, then focusing on vermicompost and giving workshops for children; the second one, which aim has been to grow good and diversified crops and vegetables to provide healthy food for the local community, implicitly opposing to the monocultural approach and use of pesticides.

# SCI Sri Lanka

SCI SRI LANKA HAS HAD VOLUNTEERS AS TARGET GROUP TO BE INVOLVED IN THE ACTION PLAN: AMONG THE AIMS THERE IS REFORESTATION AND FOOD FORESTRY, THAT WAS DONE BETWEEN DECEMBER 2018- JANUARY 2019 (GOOD PERIOD)



Plants: fruits trees to be planted in the food forestry and possibly other trees/plants, as the space is wide; mulching



Soil&Water: the plan has been to contour



Animals: there are wild animals in the area which feed themselves with fruits, so part of the plan has been to create some protection on the plants to prevent this



**SOIL:** they have been implementing the techniques learnt during the training, to improve the quality of the soil

# GREAT INDONESIA



THE LONG-TERM ACTION PLAN IS BEING IMPLEMENTED WITH A LOCAL PARTNER IN A VILLAGE, WITH THE HELP OF VOLUNTEERS AND YOUNGSTERS, STARTING LAST DECEMBER.

Plants  
**IMPROVING THE PRODUCTIVITY AND INCREASE THE NUMBER OF PLANTS**

**SEEDS**  
creation of a seed bank, to share seeds with young people, farmers and the community in general

**WATER**  
Making beds to slow water flows



Animals  
LOTS OF COWS AND GOATS ALREADY PRESENT; IDEA OF BREED RABBITS AND CHICKENS AS NEW SOURCE OF INCOME

**SOCIAL**  
since 3 years the organisation has been involving people during the harvesting and an idea has been to do a training to encourage them to create their own kitchen garden



PART OF THE ACTION PLAN  
HAS BEEN TO CREATE A  
KITCHEN GARDEN IN THE  
TEMPORAL FRAMEWORK  
BETWEEN FEBRUARY AND  
OCTOBER 2019



**AJOV**

*Social*

*involvement of the school  
children and local community*



**FAGAD TOGO**



the action plan has been inspired by a EU project lead by  
FAGAD about reforestation and food production for the  
local families: the plan has been involving farmers  
meeting to discuss soil, water and forest



The other representative of CVS Bulgaria, Nathalie, talked about the Sustainable Development Centre, which hosts a permaculture garden that has been recovered after a fire in 2017.

Gardening with the involvement of farmers

VIN Nepal

“जीवन सम्पन्नताको मूल आधार, परम्परागत कृषि प्रणालीमा सुधार।”

**“परमाकल्चर (घर बगैचा ढाँचा) निर्माण तालिम”**

**"Permaculture Training"**

८-१२ चैत्र, २०७५ (22-26 March, 2019)  
ओखलढुङ्गा

SUSTAINABLE FOOD PRODUCTION

आयोजक

Empowering Marginalised Communities  
स्वयंसेवी अभियान नेपाल  
Volunteers Initiative Nepal



# THE OTHONA COMMUNITY

**Animals**  
the community hosts chickens

**Social**  
one of the main aims of the action plan has been to reach people who do permaculture in the area and try to involve the community as much as possible

**Plants&seeds**  
Experimenting a bit, focusing of the present nut trees and using and experimenting seeds' saving

**Soil**  
They have been composting a lot

**Part of the action plan has been to grow vegetables, trying to inspire people inside the community to do the same**

## VSA THAILAND

THE ACTION PLAN, WHICH STARTED TO BE IMPLEMENTED AT THE BEGINNING OF 2019, HAS BEEN FOCUSING ON IMPROVING AND CREATING A KITCHEN & FOREST GARDEN, WITH THE INVOLVEMENT OF FARMERS TO SUPPORT THEM HAVING MORE INCOME AND ON THE LAND OF A LOCAL PARTNER

**SEEDS:** they have been working on saving seeds

**WATER:** a lot at disposal

**ANIMALS:** the local partner has pigs, ducks, cows and chickens and they produce biogas

**SOCIAL:** As learning centre, they host and involve international volunteers, local childrens



**Plants:** focus on experimenting permaculture techniques and diversity

**Soil:** working on its improvement, use of compost



**Social:** local community invited to participate in the management of the garden and to buy food

## ZWA

the action plan has being implemented in the "Glory Orphanage" in Norton, at 40 km from Harare. Among the main aims, there has been the improvement of the existent monocultural kitchen garden and raising awareness among the community on sustainability



**PLANTS**  
regeneration of the area and plantation of local species with the help of local farmers

## Resilience.earth (SCI Catalunya)

**WATER**  
creation of water systems, irrigation and water conservation

THE ACTION PLAN HAS BEEN IMPLEMENTED IN AN ABANDONED AREA, INVOLVING CARLA'S GRANDMOTHER, LOCAL FARMERS AND THE COMMUNITY



## NICE JAPAN

THE ACTION PLAN HAS BEEN AN EXPERIMENTATION AND IMPLEMENTATION OF THE KNOWLEDGE GAINED DURING THE TRAINING IN NICE WORKCAMPS IN THE JAPANESE COUNTRYSIDE



## CYA

the action plan has been implemented in the Ruseydom's village learning centre. There, children learn english and participate in different activities, among which there has been gardening, composting and planting, with the support and involvement of international volunteers



## ESTYES



As part of the action plan, the first ideas have been to prepare compost to use both in the urban area and in the countryside and to learn how to protect and properly cover plants against the cold. The other important part has been the experimentation



The action plan has been implemented in an organic farm created by the association in 2015 in the suburban area

the land is managed by a farmer and there are various workcamps host here which involve volunteers



## RUCHI

THE ACTION PLAN HAS BEEN IMPLEMENTED AFTER RUCHI'S PREVIOUS AGRICULTURAL PROJECTS, WHICH INCLUDED IRRIGATION, FENCES, COMPOST



one of the main aims of the action plan has been the creation of garden which could be seen as example from the village community



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