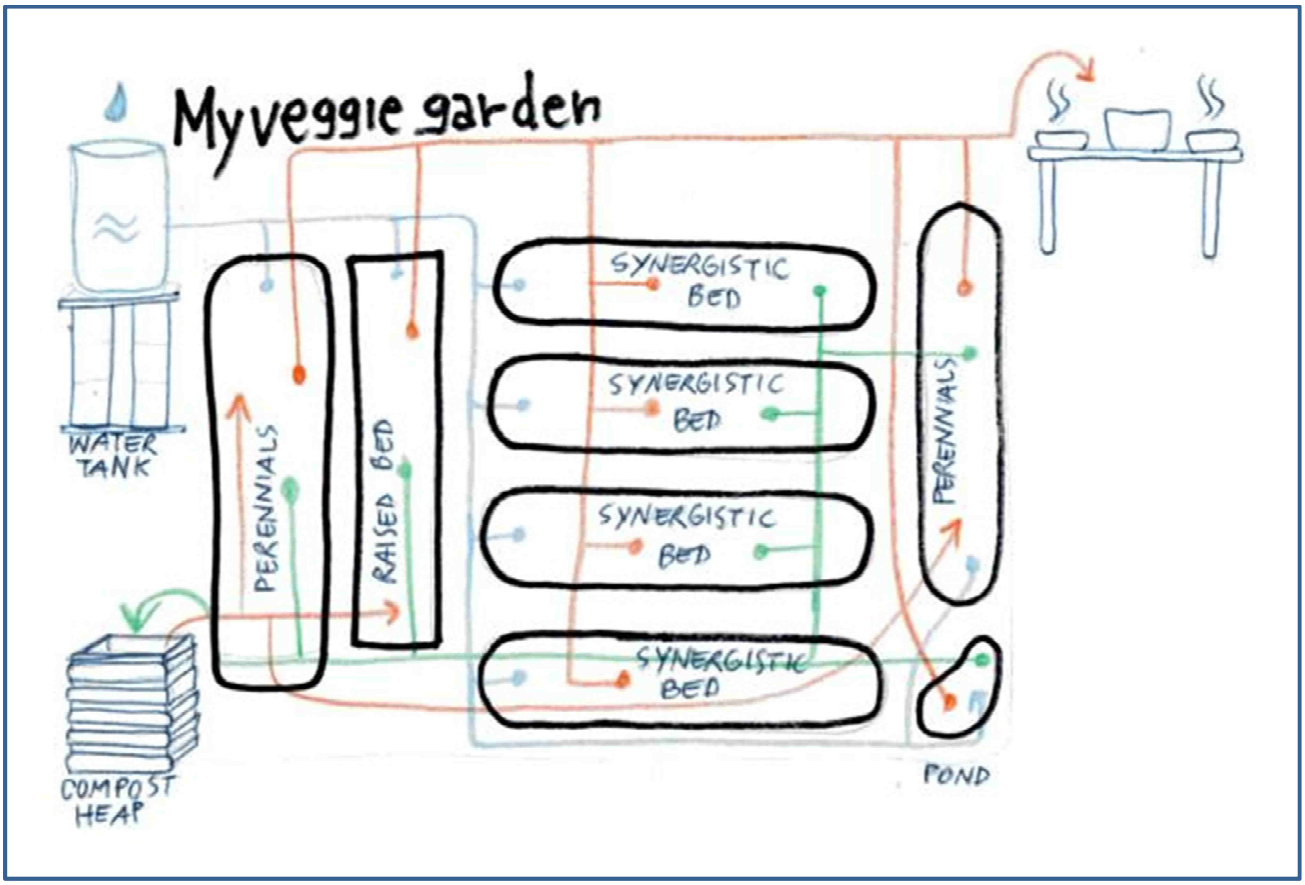
MY VEGETABLE GARDEN

Fiume Conca Road (Ravenna) – Italy



March 2015

Summary

I SUMMARY

I.1 ETHICS

Earth Care: I will take care to the earth and soil by regenerating a soil that is very low in fertility.

People care: It's well known that taking care at a garden is very good for the health. In the garden I will grow very good veggies and I will rest after the day work.

Fair Share: The management of the garden during the summer organises every year a donation for those who need food. I will share the food also with my relatives.

I.2 PERMACULTURE PRINCIPLES:

Observe and interact: I check all the present weeds in order to understand the needs of the soil. I also observe the lot after heavy rains in order to manage the water logged in the ground and where to place a pond.

Catch and store energy: I am storing the sun's energy in the form of vegetables. I need to develop a system to catch the rain water in order to store it in the water tank, at the moment I'm storing it in the small pond and in the mulch layer.

Obtain a yield: I will collect food (veggies, fruits and flowers) from the garden beds and from the perennial beds (tree and shrubs).

Produce no waste: All the waste produced within the garden will remain on the garden beds or, together with the grass mowing and the rest of the organic material, will be put in the compost heaps to produce compost.

Use and value diversity: that's way I decided to put a Zone 5 (the pond) into the lot.

II INTRODUCTION

At the end of 2014 I asked for a space at the Municipal gardens to grow some veggies. At that time it seems to me that I would have to wait many years to have a garden assigned, because there were 24 people before me in the Municipal list. But what a surprise in March when a letter from the municipality informed me that there was a garden lot for me in the municipal gardens not far from home (6 minute cycling).

The area is composed of 70 vegetable gardens the majority of which (let's say 90%) managed by old retired people. The dimension of every lot is more or less 80 square meters. One of the most important aspect of these gardens is a wind edge (zone 5) in two side of the gardens (East and South) running along the railroad and along a canal. It is an hedge of 6 meters full of trees and shrubs and full of life!

Figure 1: Map of the Municipal gardens; in yellow is highlighted the garden number 47 assigned to me.

The Permaculture design method chosen for this project is the **S.A.D.I.M.E.T.:**

Survey, **A**nalysis, **D**esign, **I**mplementation, **M**aintenance, **E**valuation and **T**weaking

II.1 LIST OF DESIGN TOOLS USED

1- Base maps
2- Overlays
3- Zones
4- Sectors
5- Client interview
6- PASTE
7- Microclimates
8- Soil analysis
9- Web of connections
10- PMI

III SURVEY

III.1 OVERVIEW:

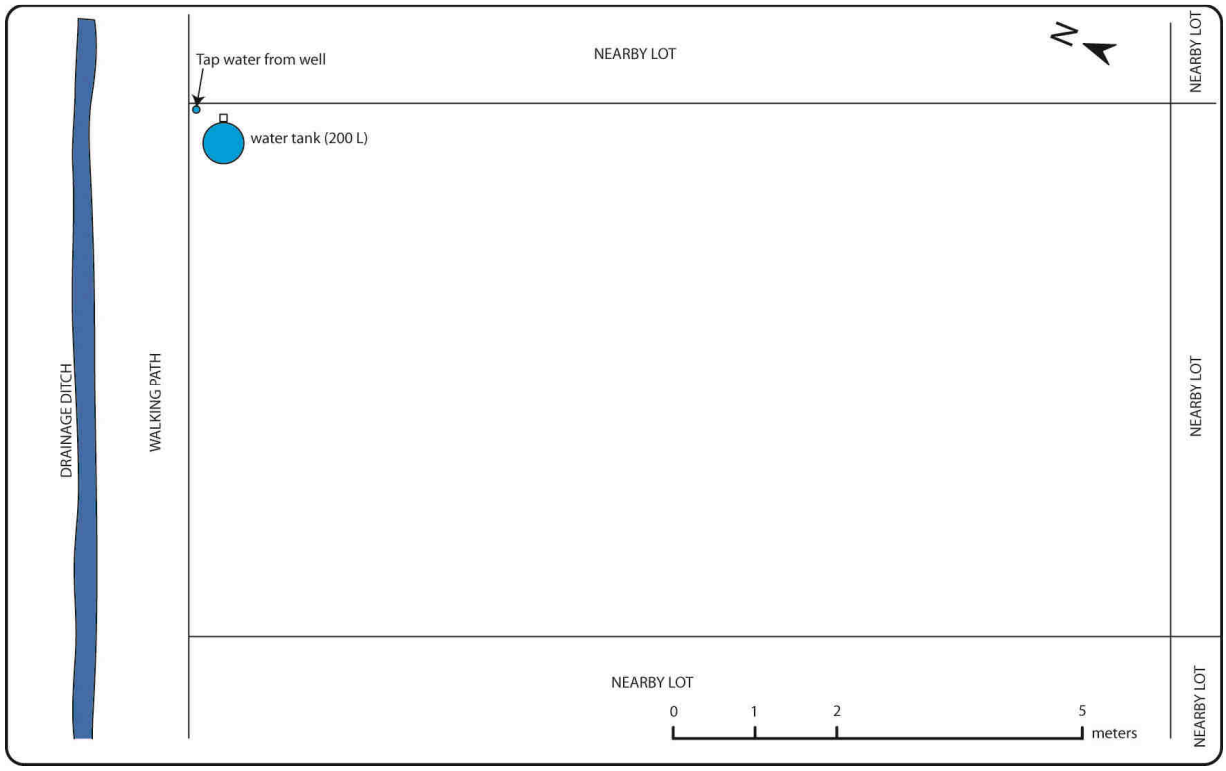


Figure 2: Draft map of the lot n°47.

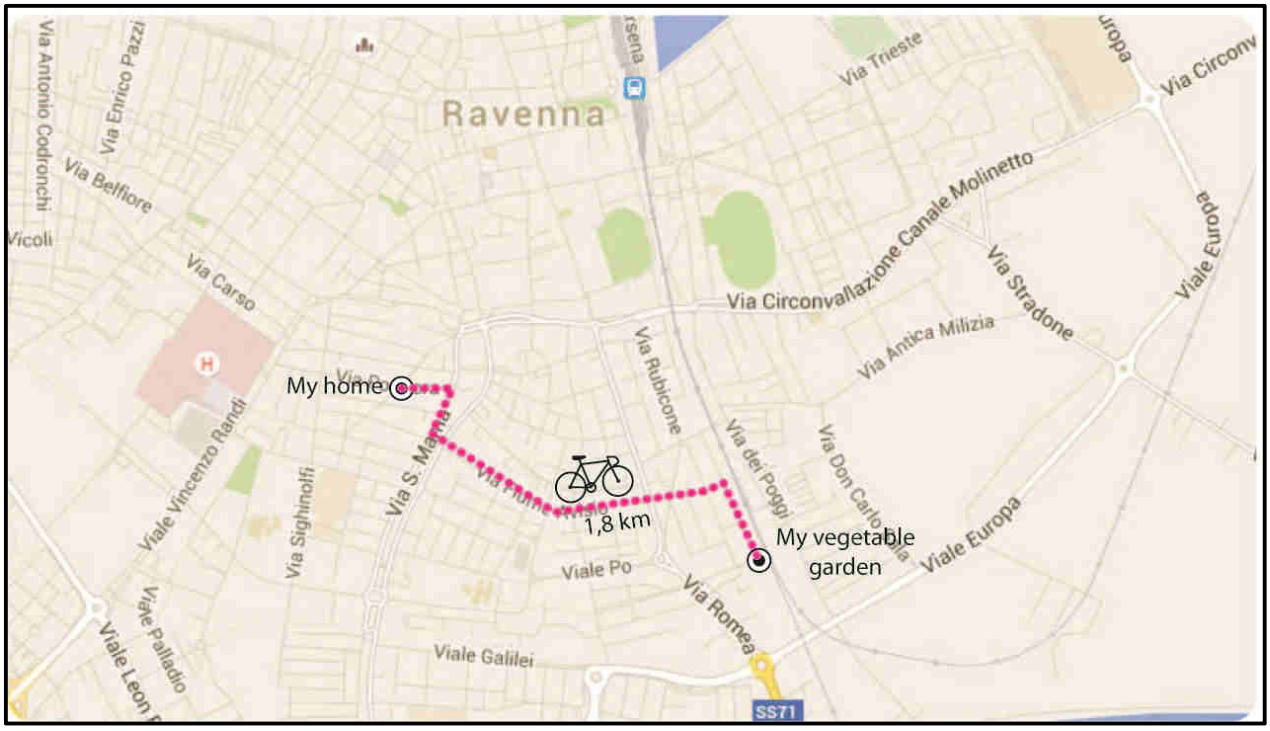


Figure 3: The position of the garden in respect to my home.

III.2 CLIMATE

Altitude: less than 15 m wsl

Precipitations:

769.2 mm/year average 1960-1999;

546.4 mm/ year average 2000-2010

Snow: normally between December and March, max 50cm. Late frost in April with an average of 2,8 days of frost in April.

Drought: very high from April to May and medium from May to July.

Temperature: Min -5° C, Max 35°C

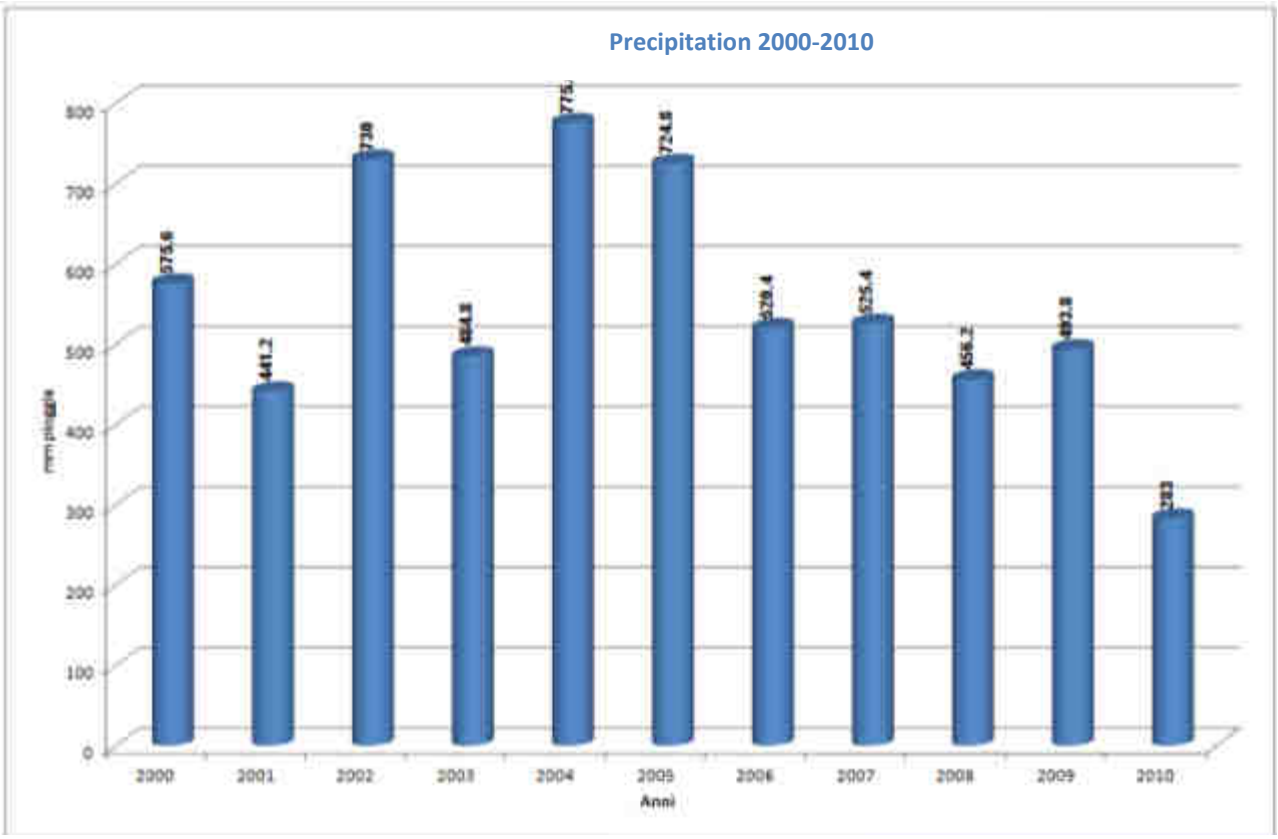


Figure 4: Last 10 years of precipitation

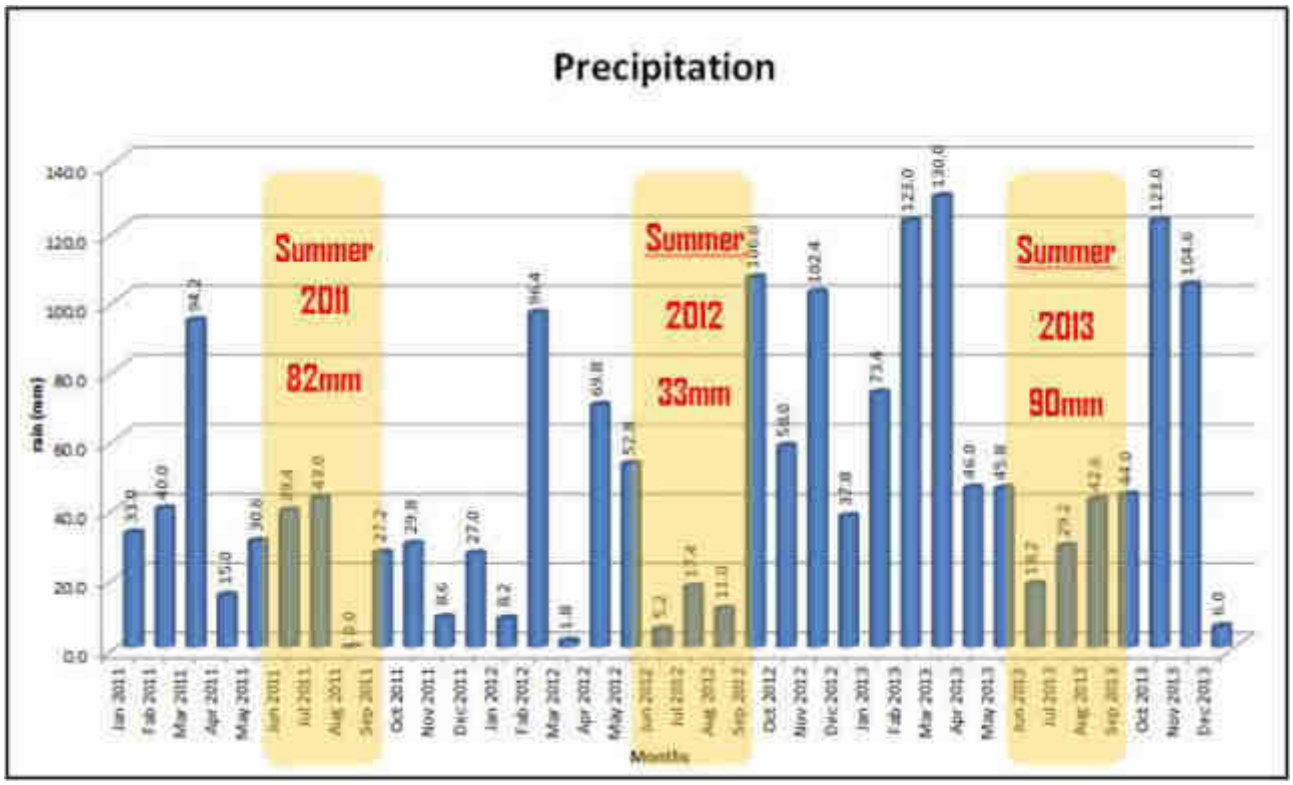


Figure 5: Precipitation (year 2011, 2012 and 2013) with highlighted the small amount of precipitation during the summer time.

Winds: Winter: from North-West, Spring and Summer: from East and South-East and Autumn: from West and North-West.

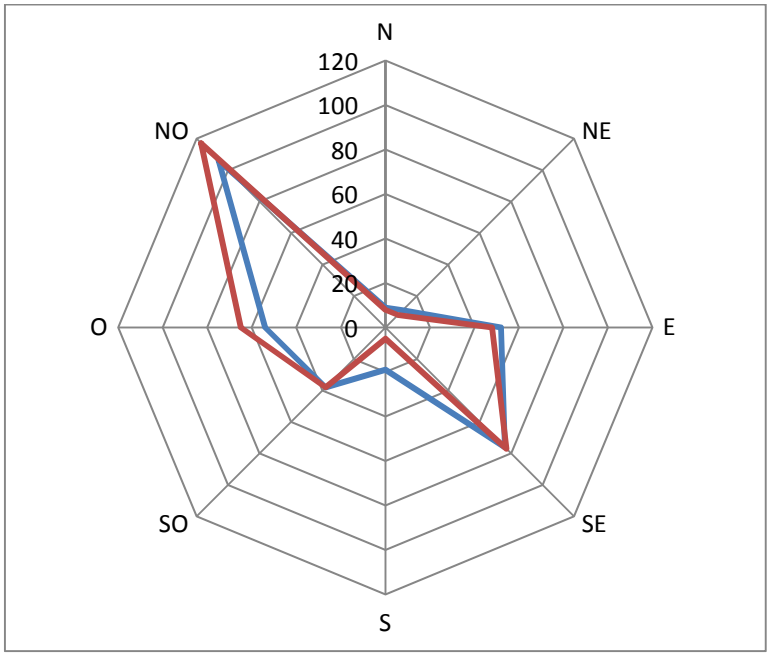
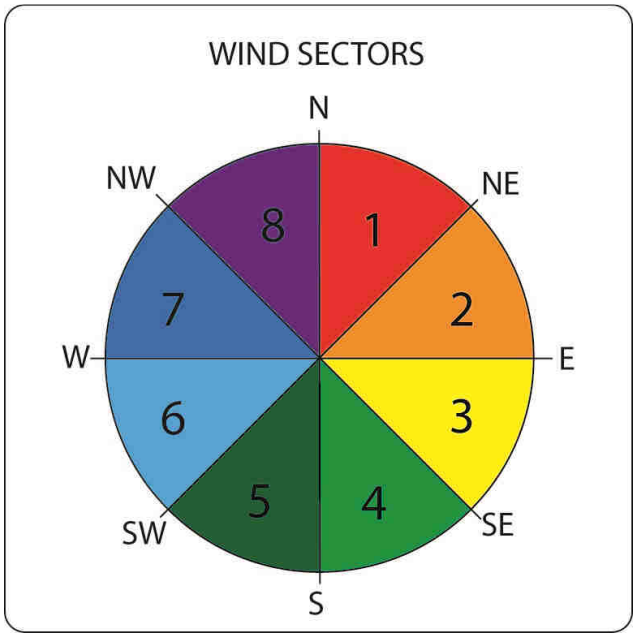


Figure 6 Wind direction. In red the wind direction for year 2013, in blue the 10 years average.

III.3 WIND

A few more word on the winds that blow in the area. The Figure 7 shows the sectors of the winds for every day of the year 2014. It is quite clear that the dominant winds are those coming from the North – North-West sector, especially for the Autumn and winter while for Spring and Summer the warm winds coming from the South- East sectors.

Figure 7: Sectors of the wind for every day of the year (2014) The colors refers to the sector, a map of the sector and relate color is showed below.



	WIND SECTORS							
MONTHS	1	2	3	4	5	6	7	8
JANUARY	0	1	1	7	0	3	2	16
FEBRUARY	0	0	0	5	4	1	3	15
MARCH	1	3	6	5	0	3	3	10
APRIL	2	0	5	12	0	4	2	5
MAY	0	1	5	12	3	4	0	6
JUNE	0	0	11	7	1	5	3	3
JULY	0	0	3	8	3	3	4	10
AUGUST	0	0	5	10	3	7	2	4
SEPTEMBER	2	0	4	11	0	1	4	8
OCTOBER	0	0	4	4	2	2	7	12
NOVEMBER	1	2	0	9	2	0	6	10
DECEMBER	0	1	1	2	1	0	5	21
TOTAL	6	8	45	92	19	33	41	120

Figure 8: Colors of wind sectors (left) and sum of events (days) of wind divided per sectors for the year 2014.

One more note about the wind velocity: the winds are normally very low intensity winds. As shown in Figure 9 except for a few events (10) the winds are normally classified as light air (in green).

Figure 9: Wind velocity/Intensity. Green: light air, Yellow: light breeze, Red: gentle breeze (Beaufort Wind Scale). The winds are expressed in Knots.

III.4 CLIENT INTERVIEW

The interview has been done on the 10th of March 2015.

11- **Name:** Andrea Minchio and family.

12- **Address:** Via Fiume Conca (RA) - ITALY.

13- **Dimension of the lot**: 7 x 12 m (84 square meters)

14- Number of people in the lot: 4 (my family)

15- People visiting and living the lot : friends.

16- Works and skills: Good

17- **VALUES**: organic food, sustainability, solidarity, permaculture, no waste.

18- **Food attitude**: Omnivorous but mainly vegetarian.

19- **Age**: from 2 to 43.

20- **Economic situation**: Not a lot of money to invest (say less than 500 €)

21- **Resources:** tap water from the well

22- **Type of property**: I can use the lot as long as I want, no restriction.

23- **Restrictions**: No big trees, no fences, no pesticides, no herbicides

24- **Potential weather adversities**: Snow and ice, heavy rain and hail, water logging.

25- **Maps:** land register maps, Google map/ Bing

26- **Requested products:** differnent kind of gardens for growing food.

27- Privacy: no

28- **Priorities:** regenerate the soil.

29- **Water:** tap water and rain water.

30- **Soil:** Silty-clay with very low humus.

31- **WANTS:** synergistic garden, perennial, veggies, aromatics, flowers, fruits, raised beds, pond.

32- **NEEDS:** low maintenance systems, good and healthy food, stay outside, optimize times, a place to show permaculture principle.

33- **Winds:** from North West and North-West

III.5 FIELD SURVEY

The field survey has been carried out on the 08th of March 2015

Figure 10: The lot number 47 from the access path

Figure 11: The access path close to the drainage ditch.

Figure 12: The tap for the water and the water tank buried in the soil..

Figure 13: View of the lot from the left (East) side.

Figure 14: The side path is covered with plastic and bitumen sheets.

Figure 15: A depressed area in the neighbor lot shows some water accumulation.

Figure 16: The neighboring lots.

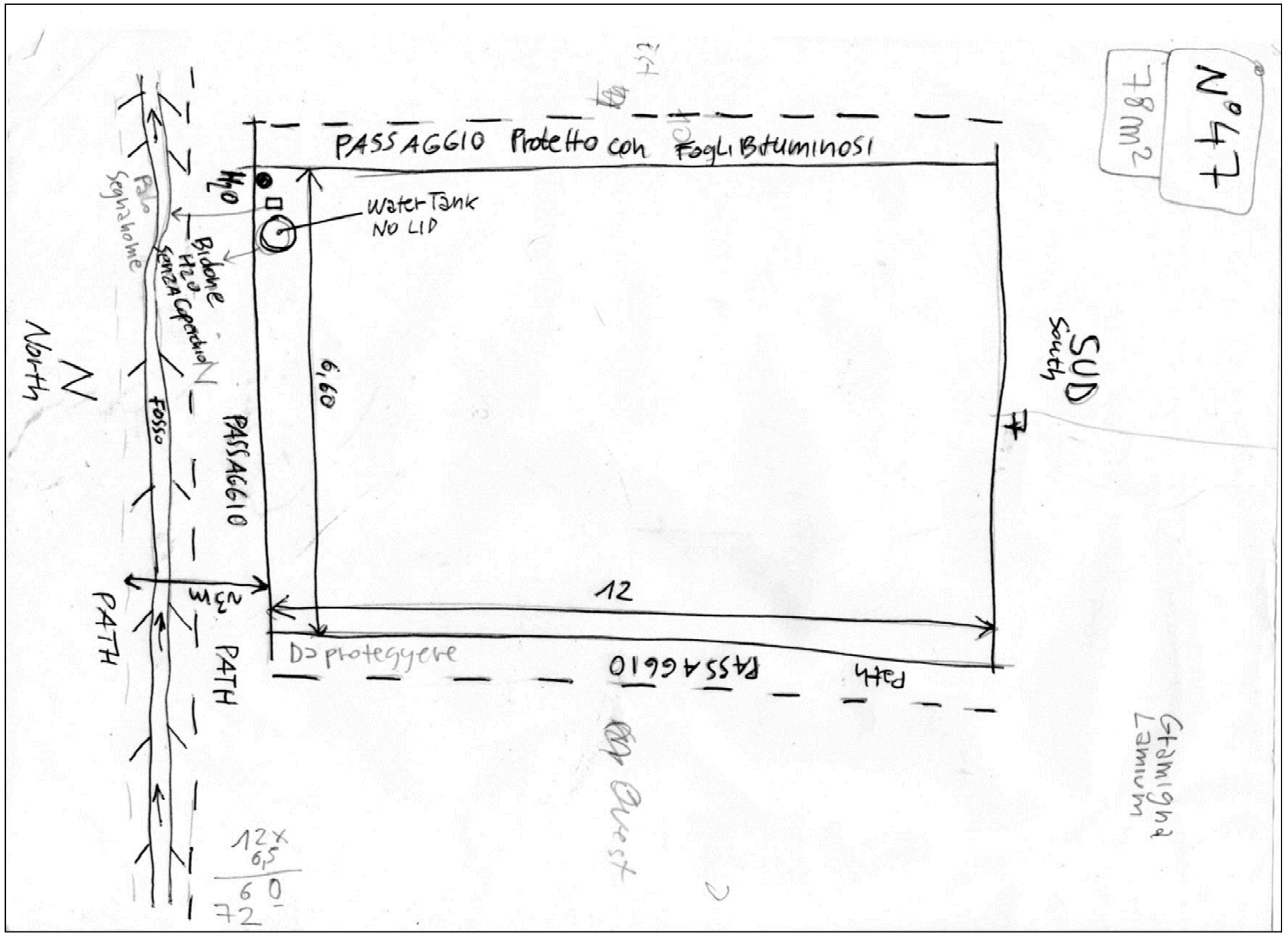


Figure 17: Survey draft map.

III.6 P.A.S.T.E. (Plants, Animals, Structures, Tools and Events)

PLANTS	ANIMALS	STRUCTURES	TOOLS	EVENTS
Grass (close to paths) (D) Borage (A) *Potentilla reptans* (A) *Convolvulus arvensis* (A) *Veronica Persica* (F) Rumex (O) Chicory (O)	Worms Spiders Birds (blackbird, robin, sparrow, great tit, etc…) Cats Snails and slugs	A 200 L water tank without lid Tap water (from the well)		Flooding Demonstrative site Waterlogged soil

The letter between brackets stand for the DAFOR acronym (Dominant, Abundant, Frequent, Occasional and Rare)

Figure 18: Left: Borage and *Veronica Persica*, right Lamium

Figure 19: Chicory and ranunculus

Figure 20: Rumex acetosa and the poor silty soil.

The present plant are telling me that the soil need to be regenerated and cured. Some deep root plants (*rumex*, borage, grass) indicate that the soil is compacted and need to be aerated.
Some others like *ranunculus*, *potentilla*, *lamium* and *veronica* indicate me that the soil is claly or made of a mix of silt and clay, wet, and maybe also waterlogged. I need to aerate the soil and also to plant the veggies in raised beds to avoid roots to stay too much in the water.

IV ANALYSIS

IV.1 NEEDS, WANTS AND VALUES

NEEDS	WANTS	VALUES
Low maintenance system Good and healthy food Optimising time A demonstrative site where to show permaculture principle applied to a small garden Relax Clean and polite	Synergistic garden Perennials Veggies Aromatics Flowers Fruits Raised beds Pond Demonstrative site	Organic food Sustainability Solidarity Permaculture No waste No tilling
GARDEN NEEDS: Pest control Biodiversity Regenerated soil Care Organic material Compost Water Edges		

IV.2 LIMITING FACTORS

- Heavy soil waterlogged in winter-spring and hard in summer
- Not a lot of time to invest
- No tool deposit
- Cold and salty water from the well

IV.3 FUNCTIONS, SYSTEMS and ELEMENTS

FUNCTIONS	SYSTEMS	ELEMENTS
Food production	Raised bed	Recycled wood Nails and screws Tools Soil Mulch Watering system Compost Plants and seeds
	Synergistic beds	Soil Mulch Watering system Tools Support poles Compost Plants and seeds
	Perennials	Soil Mulch Watering system Artichokes, Rhubarb, Asparagus Apricot tree, N-Fixer shrub Aromatics (rosemary, sage, etc…) Strawberry, currants
	Pond	Stones Plastic sheet Plants Fishes
Optimising time	Dripping lines	20 m. PVC tube Ø 25 mm 50 m. dripping line tube Ø 16 mm

		6 taps 6 T connections 6 connections between tube Ø 25 mm and . dripping line tube Ø 16 mm
	Planting and sowing schedule	Detailed map of the garden Planting time calendar
Clean and polite	Paths managements	Cardboards Water Sawdust Wood shavings
Biodiversity	Pond	Stones Plastic sheet Plants Fishes
	Aromatic edge	Trees Shrubs Aromatics Flowers Artichokes and Rhubarbs Mulch
Pest Control	Mulch	Straw Rice chaff Sawdust Wood shavings
	Beneficial insects hotel	Recycled wooden box Canes Straw Wood logs Drill and tools Nails and screws
	Pond	Stones Plastic sheet Plants

		Fishes
	Bumble-bee nest	Straw Flower pot
	Reptiles nest	Stones Branches
Water system	Dripping lines	20 m. PVC tube Ø 25 mm 50 m. dripping line tube Ø 16 mm 6 taps 6 T connections 6 connections between tube Ø 25 mm and . dripping line tube Ø 16 mm
	Rain water tank	Water tank (200 L) 1 tap 6 concrete bricks Wooden boards Gravel Concrete plate
Relax	Area for resting	Bench in the shade
	Mulched paths	Cardboards Water Sawdust Wood shavings
Fertilisation	N-Fixer	Caragana arborescens or Eleagnus umbellata White clover Alfa-alfa beans Lupins
	Compost	Compost heap Organic matter Straw Water
	N-fixer leaves mulching	N-Fixer shrub pruning Leaves of legumes (beans,

		peas, fava bean, etc…)
Move waterlogged water from the soil	Drainage pipe	12 m. drainage tube Geotextiles material Ropes Altimetric survey Bunyip
	Pond excavation	Stones Plastic sheet Plants Fishes

IV.4 WEB OF CONNECTION

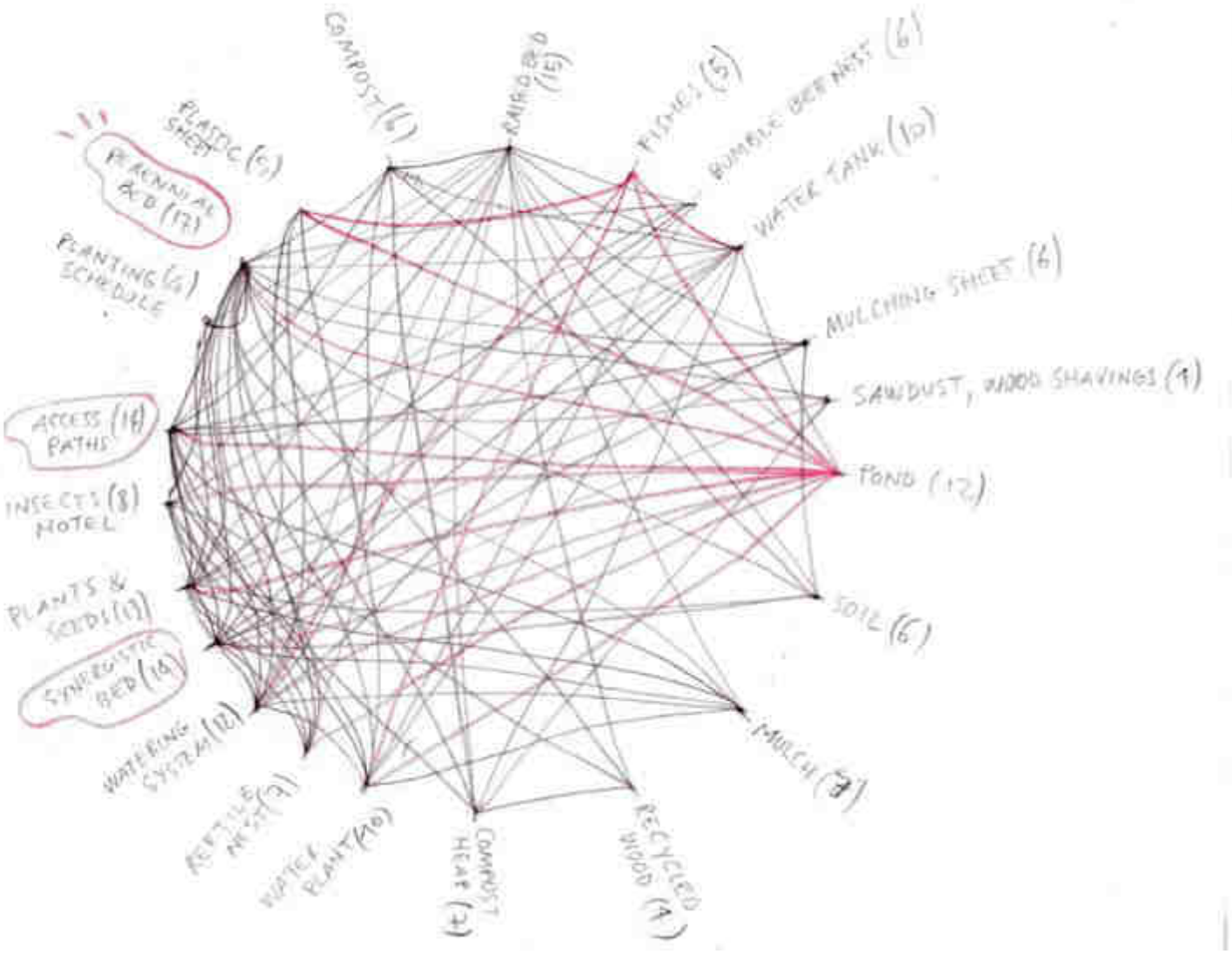


Figure 21: Web of connection scheme.

I have analysed a few elements in order to understand some priorities, the following is a table with the result of the web of connection analysis:

ELEMENT	CONNECTION
Perennial bed	17
Raised bed	15
Access Paths Synergistic bed	14
Plants and seeds	13
Watering system Pond	12
Water plants Water tank	10
Insects hotel	8
Reptile nest Compost heap Mulch material	7
Compost Bumble bee nest Mulching sheet Soil	6
Fishes Plastic sheet	5
Planting schedule Recycled wood Sawdust, wood shavings	4

As expected the most important element and system to develop at the beginning of the project are the beds for growing food and the accesses for moving through.
Also the water system and the pond, together with the other elements regarding water (water plants and water tank) are well connected and result very important for the garden.

I also understand that the material I will use to cover the access paths are not very important, the important are to design and realize the paths.

Regarding the soil, I was expecting the soil to be more useful in this kind of garden, but the result of the web of connection say it isn't. Since the soil in the garden is really heavy and not very easy to work I still need to understand if I will need to buy and import some different soil or not. I will use a PMI to clarify my ideas.

IV.5 PMI

	PLUSES	MINUSES	INTERESTING
Dirt added	Easier to manage Easier to sowing Easier to planting Easier to build mounds (beds) No water in the paths Less work	Cost (54€ for 2 cubic meters) More drainage (use more water) Low fertility	More drainage Need regeneration The beds will be built on top of the ground level
Dirt not added	Use less water No adding cost	Need to dig to fill beds More water in the lower areas More work	

Despite the adding costs (I think I will need at least 6 to 8 cubic meter of soil) and despite the fact that the dirt will be taken from the old river banks and the fertility will be very low, I will buy and bring some cubic meters of dirt coming from outside the lot to build the synergistic mounds on top of the ground, to build the perennial beds for the asparagus (need sandy soil) and to fill the raised beds. In this way I will not need to dig and I will have less problems with the rains in winter and spring.

V DESIGN

V.1 ZONES and SECTORS

For this project I have identified 3 zones:

34- **Zone 0**: is where I live, 6 minutes cycling from the garden.

35- **Zone 1**: the area (in yellow in the map) where the synergistic beds and the raised bed are.

36- **Zone 2:** this will be the zone of the perennials, very low maintenance, some yield of aromatics and fruits and some compost tea spraying.

37- **Zone 4:** the pond, source of biodiversity.

38-

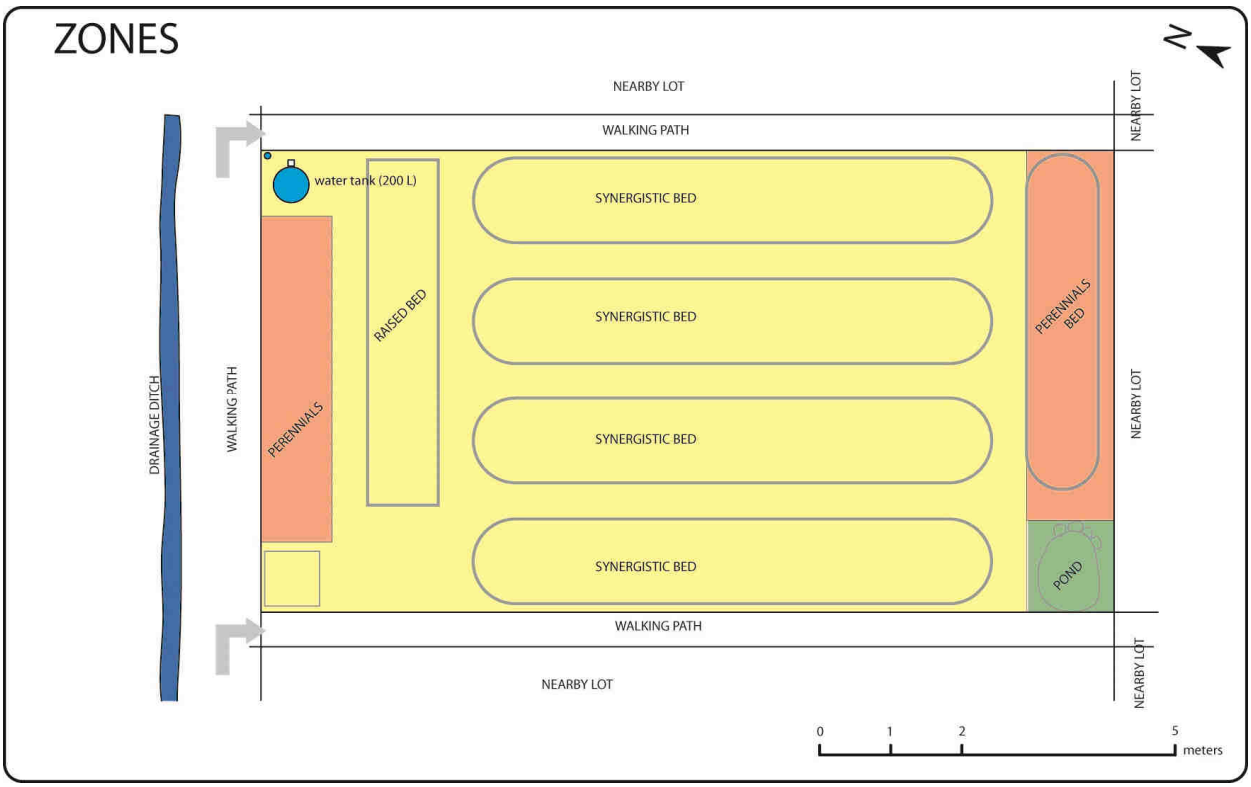


Figure 22: Zones map

The most important sectors to highlight for this design are the winter winds and the sun exposition. The orientation of the synergistic beds is almost North-South in order to have only few areas in the shade. The beds for the asparagus will be 30 to 40 cm high but this is not a problem with the insolation, while the tree and the shrub are in the North side of the garden, so they will shade the path and the drainage ditch.

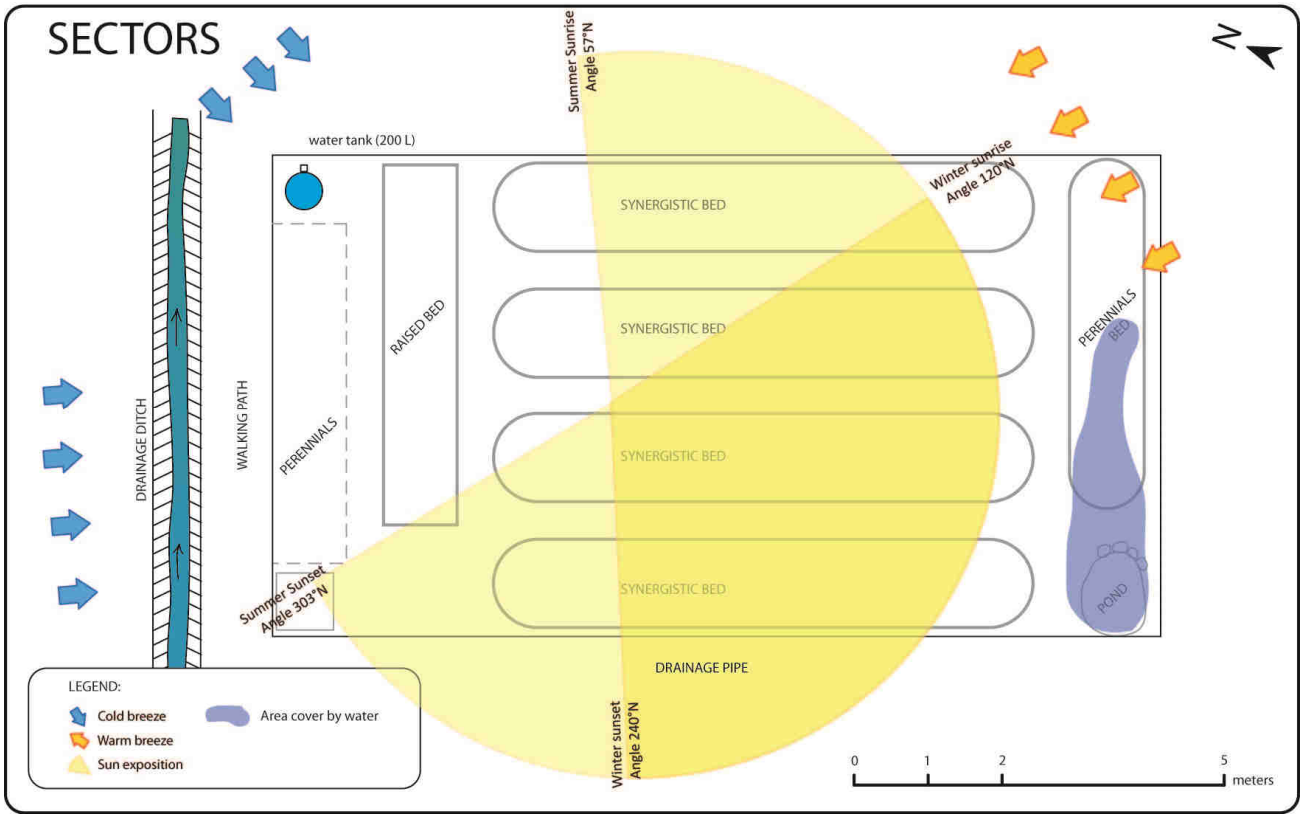


Figure 23: Sectors map.

The winds in this area are not strong winds, if we follow the Beaufort scale we should call them breeze, but they blow all winter long.

At the end of march 2015 there was some heavy rains after a very rainy winter; I visited the lot after the rains and I was lucky to discover that the soil was really full of water and there was some part of the lot covered with water. These areas are marked in blue in the map.

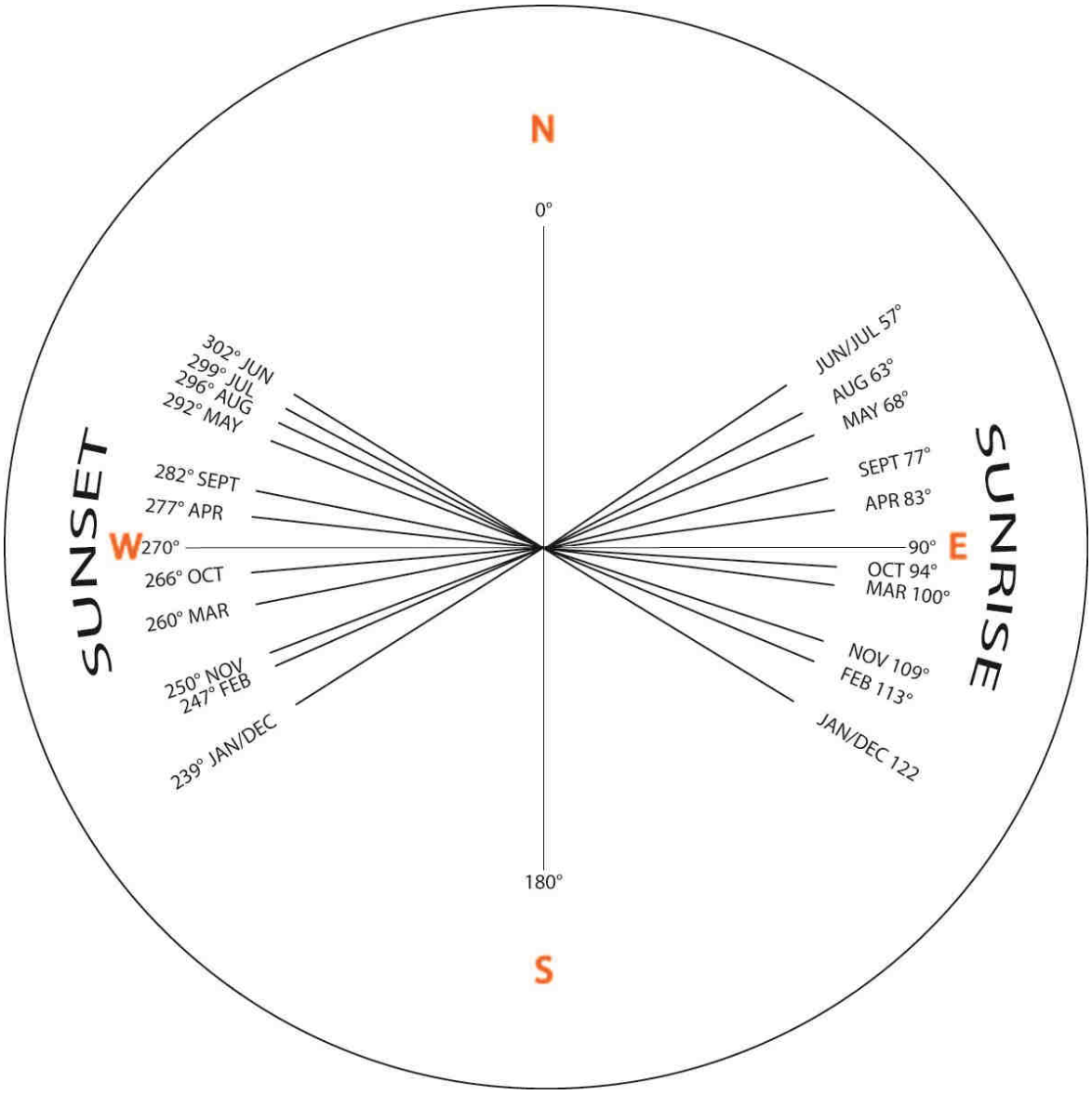


Figure 24: Angles of sunset and sunrise for the area.

V.2 WATER SYSTEM

The design of the water system is very easy. Normally all the people in the allotment tend to keep the water tank half buried in the soil, this because they use to fill a watering can from the tank and water manually the plants. They keep the tank half buried in the soil because in Autumn and Winter the rains saturates the soil and the water in the soil tend to lift up and move the tank of water.

I decided to lift up the tank and to put it on some concrete bricks and to connect the tank to the dripping lines.

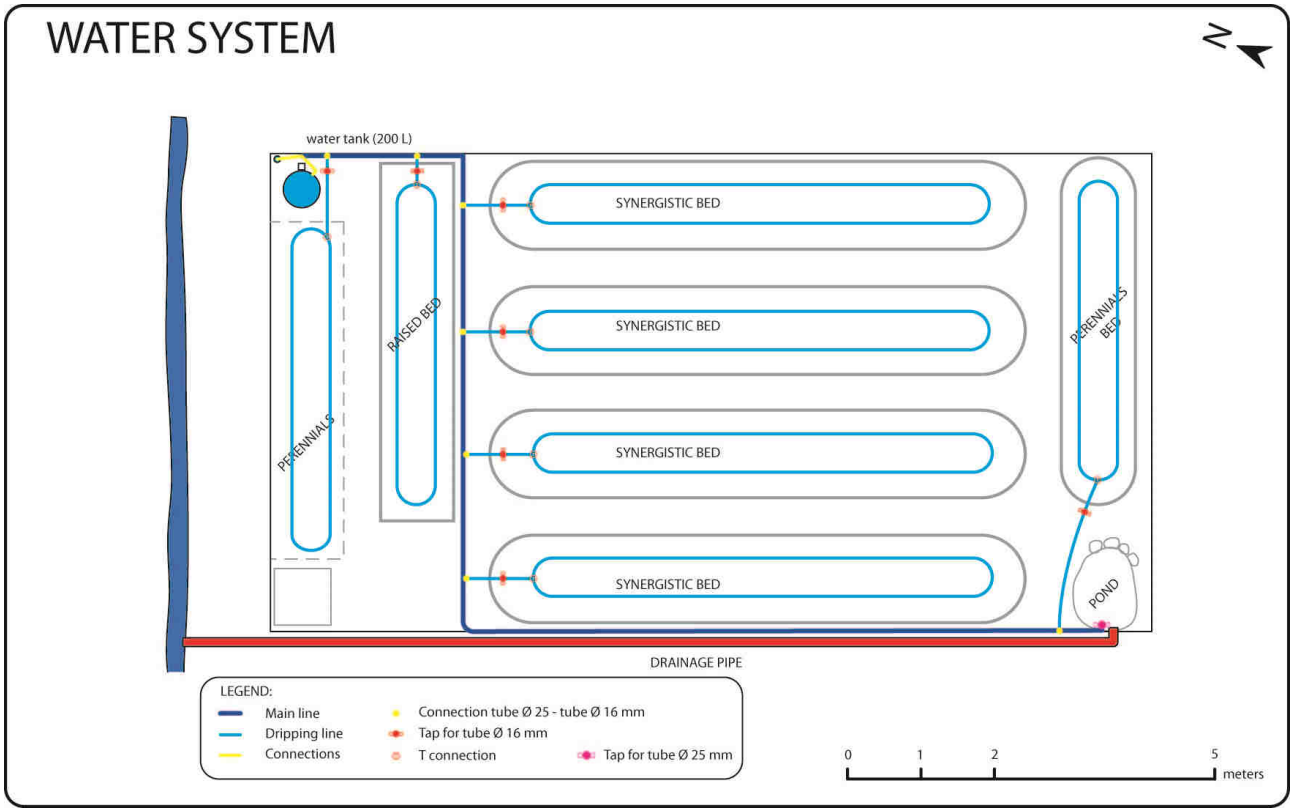
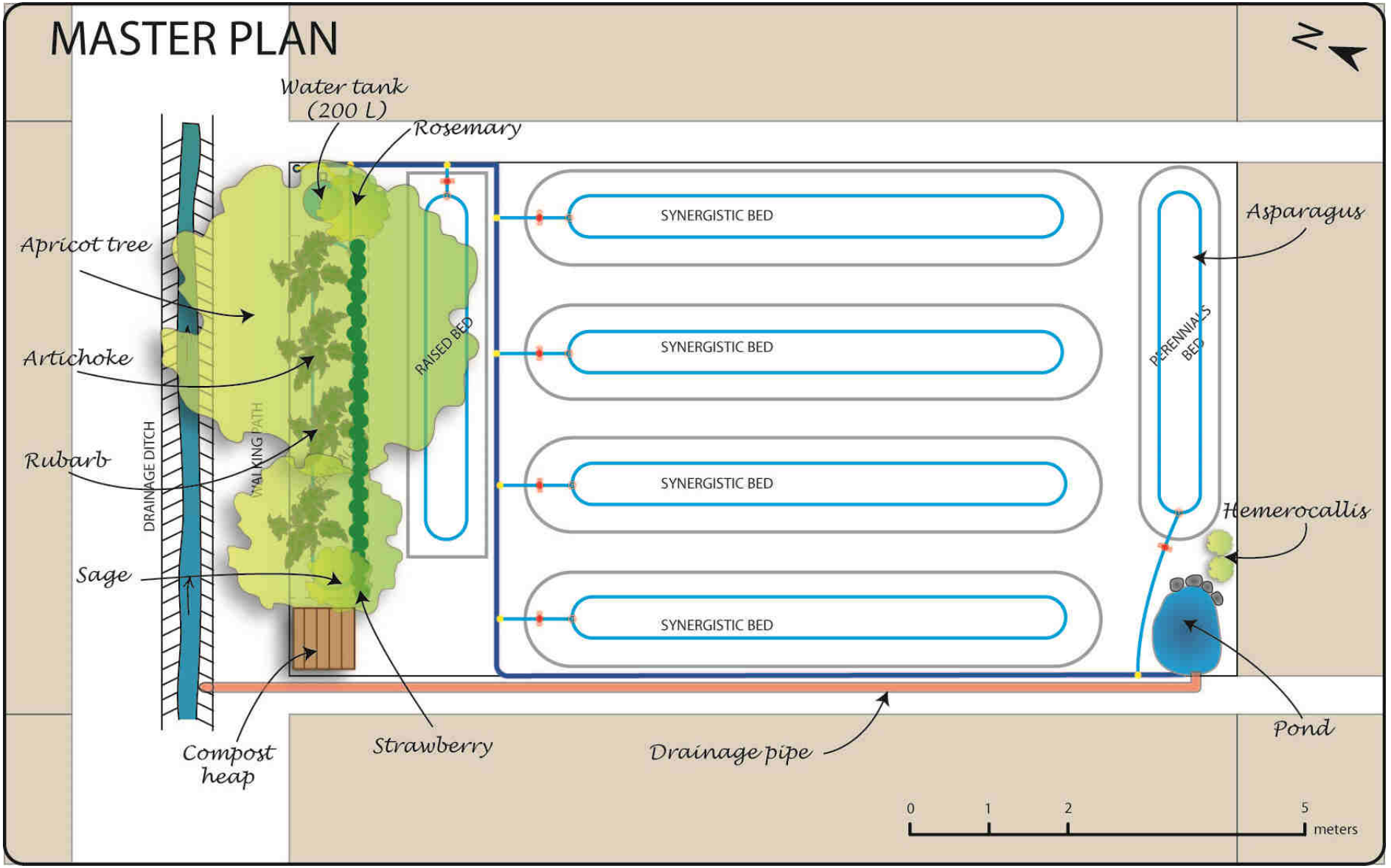


Figure 25: Water system scheme.

V.3 MASTER PLAN



V.4 COSTS

Drainage Pipe:	70,00€
Earth:	216,00€
Water system:	130,00€
Green manure seeds:	40,00€
Pond EPDM:	20,00€

VI IMPLEMENTATION

19 march 2015

Excavation of drainage ditch

31 march 2015

Drainage pipe buried in the drainage ditch, cutting of the grass, cover part of the area with mulch fabric sheet to prevent grass and weed growing, pond excavation.

3 April 2015

Compost heap construction

7 April 2015

Construction of the first raised bed, aerating the soil under the perennial bed with spade.

9 April 2015

Sowing of three different kind of potatoes under the cardboards. I planted the potatoes every 30 cm on the row and three rows in 1 meter of bed. Between the potatoes I planted beans. In the first row I planted corn associated with climbing bean and potatoes.

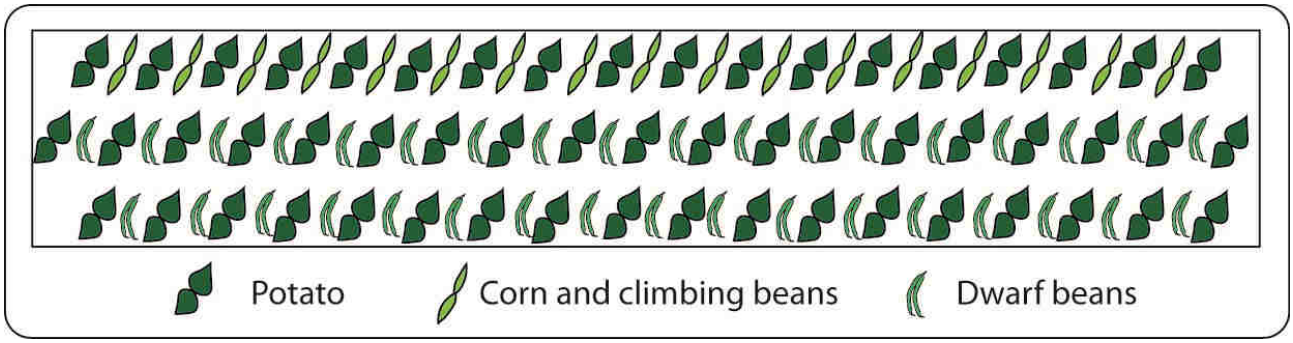


Figure 26: Photo of the potato bed – 19 may 2015

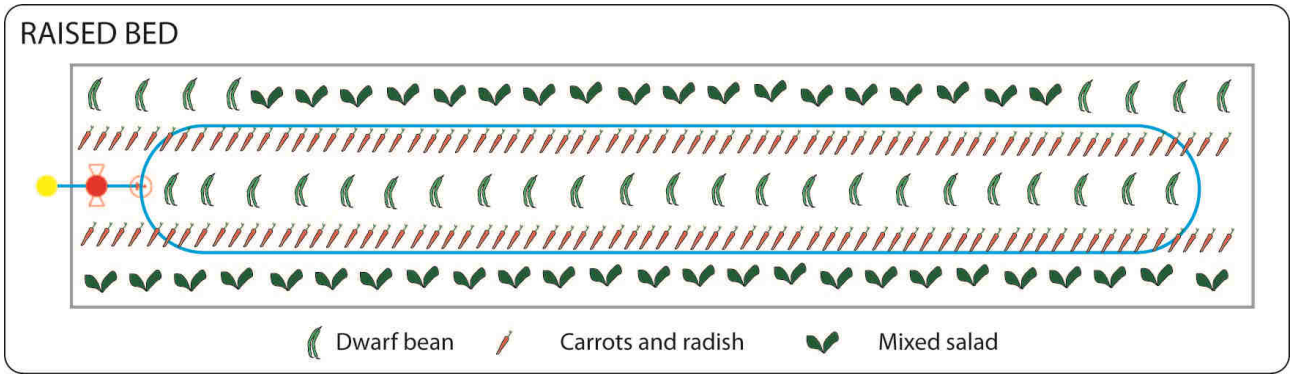
8 May 2015

Creation of the synergistic beds, 4 cubic meters of soil has been discharged on the lot. On top of the first bed I add a mix (50/50) of bio char and homemade compost.



10 May 2015

Sowing of carrots, mixed salads, dwarf beans and radish



13 May 2015

Connected water system on raised bed, and on two synergistic beds to the main water pipe.

To do:

- Fix the connectors between main and secondary pipes ■ (27.05.2015)
- Fix the connection between main pipe and tap ■ (21.05.2015)
- Fix tap in the pond □

19 May 2015

21 may 2015

Construction of second raised bed. Fixed the connection between main pipe and tap.

To do:

- Water system on raised bed ☐

22 may 2015

Checking the lot after 2 days of heavy rains. Everything is ok, the water in the ditch has the same level of the access path, and the water in the pond is over the drainage pipe level (I need to put a net in the pipe in order stop fishes from escaping through the pipe). Some water in the paths between the synergistic beds.

27 may 2015

Fixed the connectors between main and secondary pipes, fixed the raised bed structure and eliminate some weeds from the potato bed.

July 2015

Flowers from the synergistic bed.

The first synergistic bed covered with the green manure.

The raised bed

3 august 2015

The two beds with the green manure, on the right the manure has been cutted

Potatoes under the cardboards and straw.

5 august 2015

After a long, hot and dry summer spent at the seaside with only few visit per week, I came back to Ravenna ant to my garden. Today I built the two remaining raised synergistic beds and sowed beans, spinach, and planted broccoli, lettuce, chicory and onions.

In the mean time:

- The tap in the pond has been fixed
- The water system on raised beds has been finished.

Some consideration:

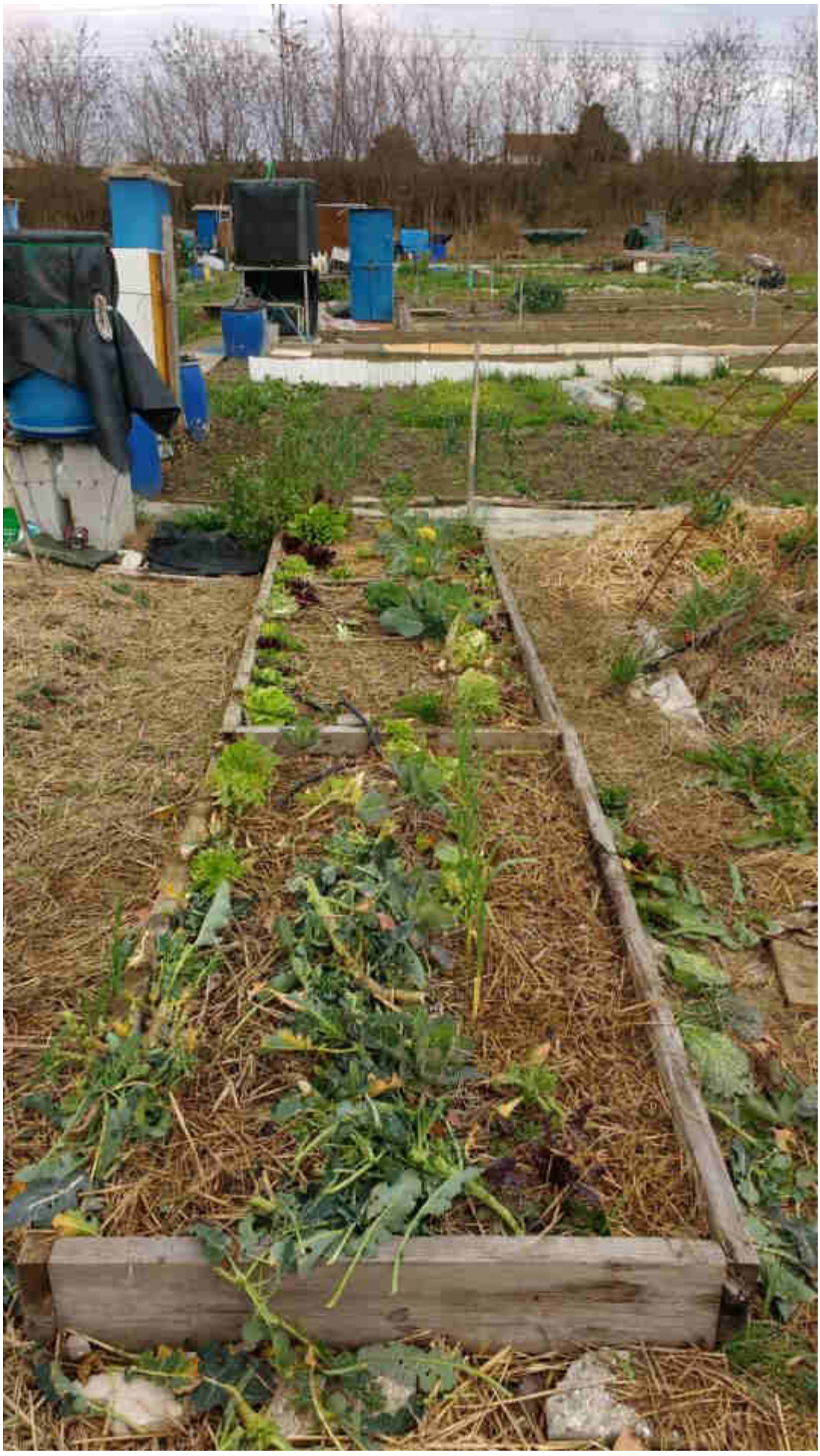
The potatoes did a good yield, the violet potatoes are weaker and suffered from pests that dig holes in it.

The beans planted in between the potatoes did not well, they did not grow at all. And also the corn with the climbing beans.

The beans did not well in general, maybe the summer was too hot, we experienced more than a month without rain.

September 2015

February 2016



April 2016

VII MAINTENANCE

JANUARY	Harvest garden products
FEBRUARY	Start to seed in containers to obtain plants for the garden and put them in the small greenhouse
MARCH	Transplant small plants to small singular containers to obtain strong plants easy to transplant Start to harvest garden products
APRIL	Spray compost tea on the leaves of the tree and shrub. Check the water system Start transplanting plants from containers to soil. Start with seeding Check for low temperatures and in case protect plants with protective fabrics
MAY	Seeding and transplanting Harvest garden products
JUNE	Spray compost tea on the leaves of the tree and shrub. Harvest garden products
JULY	Harvest garden products
AUGUST	Seeding and transplanting for autumn harvesting Harvest garden products

SEPTEMBER	Harvest garden products
OCTOBER	
NOVEMBER	Empty the water tank and clean from algae and dirt Seeds onion, peas and broad bean for spring harvesting
DECEMBER	Spray humic acid on the ground over the veggie beds.

VIII EVALUATION

The project transform a piece of land full of weeds in a polyculture. The veggie garden is composed of different elements:

4 synergistic beds

2 raised beds

2 perennial beds

Small pond

Water tank

Compost heap

The soil used to build the beds came from outside the garden, I had to import soil to lift up the level of cultivation, otherwise in winter and spring time the veggies have the roots in the water. The material used for the beds was dirt coming from the river banks, it was made of sand and silt with no organic matter inside. I am investing time in regenerating the soil.

The garden is producing any kind of vegetable and flowers, and also biodiversity, but it is still not enough for my family.

Because we move away from Ravenna it is difficult for me to take care at the garden in the summer times, so I think I will change the typology of culture from annuals to perennials to be able to create a more resistant garden for the summer time with no control and no rain water.

The elevated tank is good as a backup system, but the top opening is too small to accumulate enough rain water and I need to fill it with the tap water. Normally I use the tap water connected controlled by a timer to water the whole beds.

I am discovering how this type of garden is time consuming. Having a veggie garden means to visit it at least every two days, otherwise the weed take the control of the garden.

A garden of annual is very time consuming system. The watering system helps to minimize the time use for this and the addiction of the timer help me to manage this. At the same time it seems to me that in some cases and for some typologies of plants the system based on two tubes is not enough. More observation need to be carried out.

The management of the plants and the overall garden is not going very well. In spring and summer time the garden need too much time (weeding operation, taking care of plants, etc..) and I have

not a lot of time for doing this. I will try to better manage the layer of mulch and also the number of plants in the mounds (at the moment they are not a lot). The two raised beds have produced food during autumn but now they are very poor. I need to better manage them too.

ON DESIGN TOOLS

In designing a garden one of the most important tool is the SECTOR tool, veggies are easily damaged from winds both cold in winter and hot in summer and foreseeing a hedge which act as a wind stop may save the or at least help veggies. On the basis of the orientation to the North I decided how to build the beds.

A good survey phase is important to discover all the possible limitation to the veggies growth: the weeds indicate the necessary action needed in the soil, the presence of areas covered with water or with water plants indicate that there could be a waterlogged soil, at least in some season. And more over ask to neighbors what are the main problems of the garden is the best option for finding solutions.

Very useful the PASTE tools, it showed me the needs of the soil but also the condition and the nature of the soil. On the basis of the existing plants before I start doing my garden, I should have planned how to manage the three major weeds of the garden: the *Cynodon dactylon*, the *potentilla reptans*, the perennial *convonvolus*.

The web of connection showed me the main connections between elements and it has been important for deciding what system need to be implemented first.

PMI also was important for deciding to import soil from outside the garden. This choice was costly but necessary to raise the level of cultivation in the garden

The **S.A.D.I.M.E.T.** framework has been useful for understanding was going on in the garden, for analyzing all the choices and to design the possible solution. It is clear and simple to follow.

IX TWEAKING

At the beginning of the design I decided to make three raised beds and an hugelkultur bed, together with three synergistic beds to have more diversity in the garden. While the design was proceeding I realised that for building the raised beds I would have needed a lot of material, mainly wooden board that I should have bought. The same for the hugelkultur bed, I should have travelled to find wooden material and miscellaneous organic matter to be buried below the mound. Because of this I made some changes to the design and modify the shape and the number of the beds.

X REFLECTION

PMI

PLUSES

The watering system is working very well and even if I am not at the garden daily, the veggies are not suffering during the summer time.

Weed management. the weeds in the garden were well established and also quite diversified. I decided to cut the weed with a lawnmower and cover a big part of the lot with a mulching layer. I keep it till the beginning of May. I should have keep the mulch layer at least for 6 months to have the desired results and after less than two the weed were not totally eliminated, but the majority of them were disappeared and a lots of warms appeared in the soil.

I started with managing the water. In march we had two events of heavy rain and the lot was totally covered with water. I decided to excavate a trench and put down a drainage pipe. I made myself the drainage pipe by making holes in a normal 8 cm pvc pipe. At the moment the system is working but after three days of heavy rain in May, the drainage ditch was so full of water that the level of water in the pond was higher than the drainage pipe. If I want to add the plastic sheet to keep the water in the pond and to add plants and fishes in the pond I will need to add a net to the pipe to avoid fishes and plant to escape from the pond.

MINUSES

The regeneration of the soil is a slow process. In two beds I have planted a green manure to enrich and add organic matter to the soil. The soil is improving but I have problems with perennial plants (alfalfa mainly) which is still present and growing on the beds.

I am not able to find and bring to the garden a lot of straw which I need to keep the soil covered and to add organic material to it.

During summer time we as a family used to move away from Ravenna for at least 2 months and we stay in village which is 20 minutes by car from the garden. We decided to spend the summer time away from Ravenna after I decided to have a garden.

I did not implement a valid system for the veggies map and the planting calendar. I have to try new solution and systems.

INTERESTING

The weeding operations are time consuming too, more than watering. To limit this operation the use of mulch is mandatory and also the thickness of the mulch layer is important. At the moment I

see part of the mounds cover with mulch but in particular on the top of the sides they lost a lot of it. The big problem is to have and to store mulch material in order to use it when necessary. In the path it works very good a double layer of cardboards (in autumn) with a lot of mulch on it, but this is not possible on the mounds.

In the green mulch planted at the beginning on two mounds there are a plant which is a perennial: the *alpha alpha*. At the moment I find it a bit tricky to manage because it grow fast and very high; I took away some plants with all the roots and they are not growing anymore, but there are still a lot of them growing. On the other hand by cutting them, they are adding nitrogen to the soil which is good for annuals. I would suggest not to plant it.

The compost heap is not necessary, I leave all the plants on top of the mounds or in the paths and the microorganisms in the soil seems to appreciate this. In autumn I will take away the compost heap and create a small greenhouse to produce my own plants from controlled seeds.

Then I move to the beds, first I made the raised bed and than the synergistic. I think that in this particular kind of soil is necessary to plant the veggies on a raised bed to avoid roots to lay in the water. Moreover in the raised bed I will be able to easier protect young veggies from the slugs and snails.

TOP TIPS FOR BUILDING A GARDEN

On the basis of the carried on design and after some years gardening I feel that my skills in designing gardens have increased, here is some indications for building one:

- Find a good piece of land with water access (water is a key factor);
- Observe and survey the site very well and write all the data and information in order to access them later(this phase could take also 1 year);
- Take time to take care of the soil
- Introduce permanent or semi-permanent beds of culture and paths for walking. This will help in regenerating the soil;
- Diversify the system by adding annuals, flowers, perennials and by mixing them;
- A compost heap could be useless if all the material is used on top of the soil;
- Foreseen a small greenhouse for making plants from seeds
- Use cardboards (double layer) and straw in the path for eliminate weeds and for increasing fertility
- Use thick layers of mulch for preparing the soil for the cultivation and keep it for at least 6 months, better to start in summer.