

Agronomic aspects of study area. English resume¹

General overview

The intervention area is partly located in the City of Turin and partly in the City of Moncalieri, about 8 km far from the inhabited zones of Turin, in the NE, and less than 1 km from the inhabited zones of Moncalieri, in the E.

The area is located in the province of Turin and it's part of the geographical sector called "Pianura di Torino" ("Plain of Turin") characterized by: several and wide anthropical settlements, large surfaces used for intensive crops and low forest coverages.

The territory is delimited by the municipal road "Corso Trieste" and by the regional road S.R. 20 "strada Carignano" in the W, by the road E 70 "Tangenziale Sud" in the S, by the highway A6 Torino-Savona and by the municipal roads "Strada Torino" and "Corso Moncalieri" in the E.

From the hydrographical point of view, the area is characterized by the river Po, that goes across the area from N to S, and by its two right tributaries, the torrent Sangone in the N, marked by the presence of the wastewater treatment plant of the SMAT S.p.A., and the torrent Chisola in the S, marked by the derivation that works for the thermoelectric plant of the IREN Energia S.p.A.. Within the study area there are also artificial reservoirs coming from the quarrying activities, on the left hydrographical side of the Po, on the SE side of the area.

It's also necessary to underline how the study area is interested by two Nature Reserves: the Nature Reserve "Le Vallere", that besides a wide park includes a large eighteenth-century farmhouse (Cascina Le Vallere), used as an office of the managing body of the Park, a playground for children, two areas for dogs, staging points in the verdure, a botanical-phenological garden, a dockage to allow the ferry boats from the Po to moor, cycle routes and trail rides; and the Nature Reserve "del Molinello", to date subject of works of renaturalization of the quarry lakes and the building of facilities for sports (currently one of the quarry lakes is used for the water ski) and the fruition of the park itself.

Climate

Rainfall

According to the "Carta Climatica del Piemonte" ("Climatic Paper of Piedmont"), the study territory is located in the Northwestern area of the region and extends along the NE – SW axis, including the northern side of the Western Alps, the canavese and the plain of Turin, characterized by a type A pre-Alpine rainfall regime.

In such contexts, the rainiest month is May with about the 13% of the total amount of the year precipitations; April and June follow it with about the 10% and 11%, and October with the 9%. The highest water deficit is estimated in January, with about the 4% of the year precipitations, followed by December with about the 6%.

The average of the year precipitations, around the place of the quarry, amounts to 811,9 mm; this value is confirmed, although with a higher approximation, by the trend of the isohyets on the Carta Climatica del Piemonte. The datum related to the year average number of rainy days is settled at about 74; the values of the daily precipitation average (year average value / No. rainy days) result rather restrained, at around 11 mm per day.

Table 2.1.: Values of the monthly and year precipitation averages and number of the rainy days estimated by the weather station of Moncalieri (maximum in bold type, minimum in cursive and bold type).

¹ Translation by Alberto Sotirios D'Acquisto, Elena Rigas, Francesca Demarie, Martina D'Ambrosio.

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Nome Stazione	Quota [m s.l.m.]	Gen	Feb	Mar	Apr	Mag	Giu	Lug	Ago	Set	Ott	Nov	Dic	Anno
		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
		(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)	(gg)
Moncalieri	270	32,4	46,9	59,4	87,5	103,4	89,2	54,3	71,1	60,8	75,1	70,0	46,3	811,9
		4	5,2	6,5	7,6	8,9	8,5	5,5	6,5	5,5	6,0	5,6	4,4	74

Thermometry

Regarding the temperature, the data are fewer but meaningful: the Carta Climatica del Piemonte shows that the year temperature average is between 11 and 12 °C.

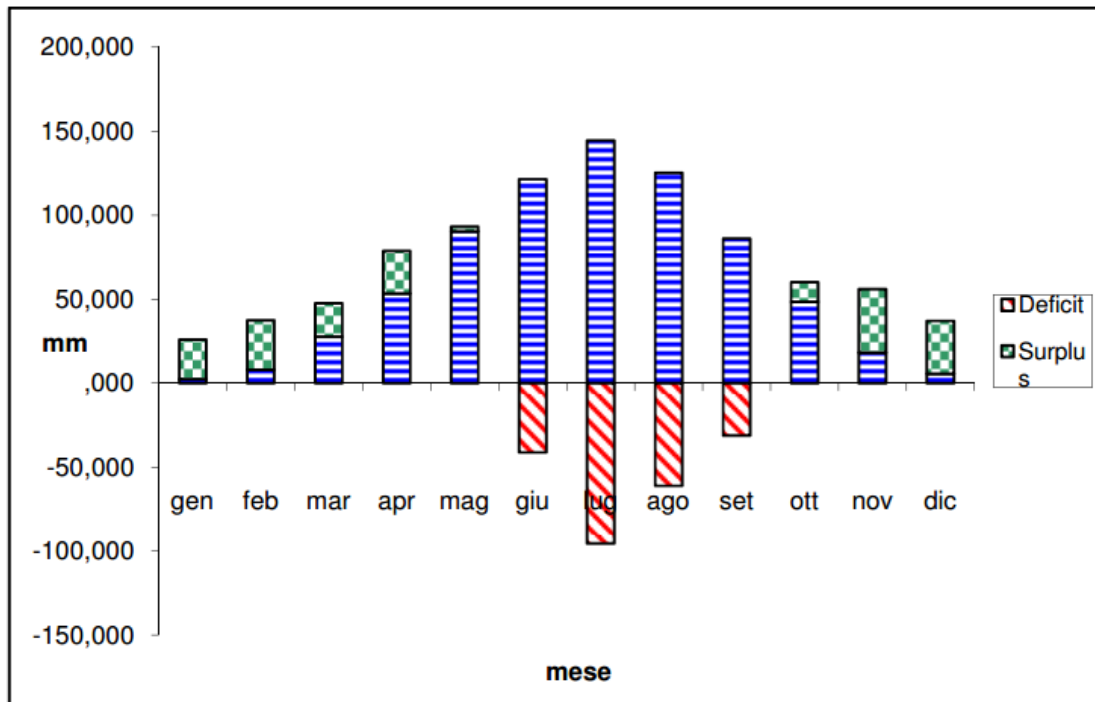
The "Atlante climatologico del Piemonte" ("Climatological Atlas of Piedmont") allows to calculate the thermometric values related to the average altitude of the selected area: in Moncalieri, at the average altitude of 221 meters above sea level, the year temperature average is about 13 °C, the average in the month of July is 23 °C, the average in the month of January is 1.5 °C.

Potential evapotranspiration

The calculation of the Potential evapotranspiration (PET), defined as <<the amount of transpired and evaporated water (in mm) coming from a soil with a dense and uniform herbaceous cover (mixed meadow stable) in the period of maximum development, having a discrete water availability>>, is a more accurate parameter for the determination of the restricting climatic factors.

The potential evapotranspiration shows a total year average of 730 mm and reaches, as normal, the highest values in the summer trimester (about 391 mm, equal to the 53%), with the rainfall that reaches its relative minimum (July); this concomitance determines a decrease of the water reserves. Furthermore, as shown by the chart reported below, the area is characterized by 4 arid months, with water deficit for the plants (from June to September).

Chart of the water deficit



According to the classification of Thornthwaite, the study area is meant to be a climatic type "from humid to subhumid", that involves about the 20% of Piedmont, with a water deficiency null or almost null, climatic variety "first microthermal".

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Environmental data

For the area under review, the main value is definitely the widespread contamination, meant as "the introduction of contaminants that can damage or destroy the various functions of the soil and cause forms of indirect contamination."

Soil contamination from diffuse sources, considered one of the main forms of environmental degradation, is mainly associated with atmospheric deposition (missions of industry, traffic jam, power plants and waste treatment, etc..) and dispersion in agriculture pesticides, fertilizers, animal manure and sewage sludge.

The reference data for the area, South Turin – Moncalieri, are schematically shown in the following table:

Contaminant	Homogeneous area of concentration	Average concentration value (mg/kg)	Limits of law (mg/kg)
Cr	c	225	150
Ni	c	213	120
Co	c	28	20
V	b	71	90
As	a	7	20
PCDD/DF	a	1,6	10
PCB	b	0,0179	0,06

Geology

In the field to right and left, regarding the mainplain of the Po, between it and the prealpine zones on one side and the hilly reliefs from the other, deposits widely appear on the surface terraced with pebbles gravels altered, in abundant fine matrix and covered by *paleosuoli argillificati* and slimy sediments, sometimes of remarkable power (highland of Poirino, balcony mindeliano of Piosasco).

From the geomorphologic point of view, according to the information brought in the "Paper of the grounds" staircase 1:50.000, adjoined to 2012, the area in exam mainly reverts in the district of the "lowland terraced of the Po", area constituted by weakly level and uniform surfaces, formed by the predominantly slimy and calcareous deposits of the river, sometimes object of overflowing of the same one (with ten-year return period) and in small part in the river bed of the Po (the directly contiguous zones of the river), where the grounds are constituted from gravel and sand and anticipate pedogenesis insufficient or null.

The grounds of the area turn out lacking in stones, alkaline reaction, and with variable webbing from frank (7 - 27% of clay, 28-50% of loam and \leq 52% of sand) to Franco- sandy, in proximity of the water course (7 - 20% of clay and \geq 52% of sand or $<$ 7% of clay, $<$ 50% of loam and \geq 43% of sand) near more superficial layers of ground, and between Franco- silty (\geq 50% of loam and 12-27% of clay or 50-80% of loam and \leq 12% of clay) and Franco- sandy (7 - 20% of clay and \geq 52% of sand or \leq 7% of clay, \leq 50% of loam and \geq 43% of sand.) in adjacency to the Po river, depth. The water-drainage is good (= the water is removed from the ground and is ready available for the plants for the greater part of the season of increase without humidity excesses happen limiting for the vegetable development. Grounds generally lacking in characters of idromorfia) on the great part of the surface, becoming moderately fast (The water is removed from the ground quickly, ground has commonly rough webbing and is superficial. It is subject irregularly to seasonal water deficit). The protecting ability to deep waters related to pollution varies from moderately high, near the great part of grounds of the area, to moderately low, in proximity of the Po, in order to the webbing of the same ones.

Pedology

The fluvio-glacial alluvial deposits more or less recent are the balconies to the River.

The grounds of Class II are grounds free from planning restrictions, fertile, tendentially flat, deep, generally very drained and easy workable. For such reason turns out apt to a range wide of agrarian cultivations that, in specific, they are identified with seeded (winter corns, summery and legumes that give grain), the stable and/or alternated meadows, several horticultural cultivations (potato, sugar beet) and fruit (lives, kernel), cultivations ? and poplar plantations of ripa field and/or full load, often associated to the other agrarian cultivations.

Also grounds that particularly turn out to the wood arboriculture with species of virtue.

The lands of east hilly reliefs.

They are generally insufficient deep grounds and with many limitations due to:

slope emphasized (also beyond 40%), diffused and intense susceptibility to the water erosion and the landslides, low ability to water deduction or, otherwise, low ability drains in presence of elevated humidity of the ground, and insufficient water amount in the ground because of insufficient annual medium

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precipitations (from 700 to 800 mm). Such factors shrink the choice of the cultivations or demand taken care of practical agronomic in order to reduce the erosion, to conserve the humidity and to maintain the fertility. The main agricultural attitude of lands of this class is represented by the meadow, even if locally cereal growing, horticultural and the lives can find space. Between the forest attitudes is cited the cultivation of Pedunculate oak and other broadleaved trees to high forest; of Castagno and Robinia to coppice, having good productivity, and of species from wood.

Potential vegetation

According to the Forest Paper of the Piemonte, the zone under investigation falls back partially in the climax of Pedunculate oak (*Quercus robur*), of Frassino (*Fraxinus excelsior*) and of Carpino white (*Carpinus betulus*). In such climax the formations vegetables anticipate one predominance of Pedunculate oak, except along the plain rivers, where the forests enrich of species characteristic like the black Alder (*Alnus glutinosa*), Poplar (*Populus spp.*), and Willow (*Salix spp.*). Then, species near the area of participation, there are shrubby to prevalence of Kernel (*Corylus avellana*).

The termoplumiometric regime, the superficial hydrographical order, altimetric configuration and the geomorphologic characteristics of the area of participation is framed well with the phytoclimate of the Querceto carpineto of the lowland plain. This type constitutes the potential vegetation of recent alluvial grounds of lowland of Piemonte plain and of the alluvial valleys alpine, until 600 m s.l.m and it turns out to be characterized from the predominant presence of the Pedunculate oak (*Quercus robur*), generally accompanied from Carpino white (*Carpinus betulus*) and Frassino (*Fraxinus excelsior*). The underbrush is constituted from species mesophile and neutrophil which: *Polygonatum multiflorum*, Wins minor, *Geranium nodosum*, *lutetiana Circaeums*, *sylvatica Carex*, glutinous Sage, *Euphorbia dulcis*, *ficaria Ranunculus* and others.

These formations are very fragmentary and often along the belts fluvial they turn out to be replaced from the Robinieto, forest type "of pervasive invasion" and, constituted mainly from Robinia (*Robinia pseudoacacia*) often in purity and sometimes in mixture with oaks and other broadleaved trees.

Near the hilly reliefs of the East area, the Querceto carpineto of the lowland plain is replaced by Querceto durmast oak to *Physospermum cornubiense* of the hilly reliefs insides, where to the species mesophile they accompany species weakly acidophil like the Chestnut tree (*sativa Castanea*), the Beech (*Fagus sylvatica*), the Ciavardello (*Sorbus torminalis*) and others. Tendentially absent the Pedunculate oak.

Restrictions

Regarding the presence of restrictions on the area, it has been found that this area does not turn out to be interested from hydrogeological tie (former R.D n. 3267/23) and from environmental and landscaped tie (former D.Lgs n. 42/04).

However, according to the Plan of Hydrogeological Order (PAIRS), the area is characterized from "elevated" a hydraulic and hydrogeological risk, which "they are possible problems for the safety of the people, functional damages to the buildings and infrastructures, with consequent unfitness for use of the same ones and the interruption of the associate-economic activities, damages to the cultural patrimony", because of overflowing and landslides.

Moreover near the area two Nature reserves are found: Nature reserve "The Vallere", instituted like Area Equipped with L.R n. 37 of 9 December 1982 and then transformed in the current Nature reserve with L.R n. 19 of the 29 June 2009, it occupies a surface of approximately 130 has, and Nature reserve "of the Molinello", instituted in 1990, it interests an area of approximately 242 ha.

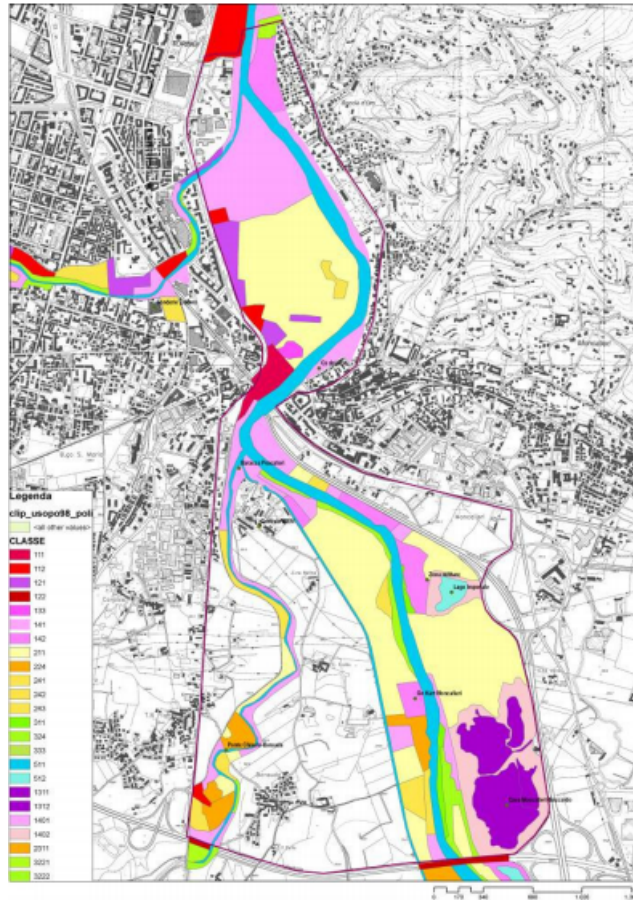
From the water point of view then, in order to the PTA, the feature of Po under investigation it turns out to be characterized from a level of quantitative compromissione of superficial water resource that can be estimated like mean, in relation to the others regional basins, had mainly to an elevated rate withdrawal of money from the water-bearing one. The state of environmental quality of superficial waters is gives to consider itself it under investigation expire in the feature of Po, because of the producing pollution to work of phytosanitary and, marginally, the presence of derivations.

Land use

In order to clarify aspects of the current state of agricultural use of soils, reference was made to the map provided by the Park of the Po (see image); this map is not complete and dating back to 1998.

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Within the area there is the presence of a cereal matrix with rotation of autumn-winter cereals (wheat) and summer (corn), permanent meadows are scarce or almost absent, this aspect shows the 'absence of livestock activities. In the garden crops are present to a lesser extent with some greenhouses and field crops concentrated in the north (bordering the Park headquarters at Vallere) and in the south to the village of Barauda. There are also two areas of private urban gardens, only partially regulated.

The part dedicated fruit growing is located in the range between the bypass and the Moncalieri railway station. Also in this area is placed a small piece of land for the production of lawn rolls. Finally, it is appropriate to report the presence of Moncalieri Golf Club, which occupies a fairly large portion of the area, this has an impact on the environment certainly not irrelevant.

Comments and suggestions (scattered notes)

- It shows the presence of derelict land near the ex artisanal or playful activity (disco area).
- It shows the presence of tree species (exotic conifers) as an ornament but not related to the landscape and, of course, is degraded.
- It emphasizes the sparse presence of short rows of trees and arboreal elements isolated as *Morus alba*, *Salix alba*, *Quercus sp.*, wrecks compared to past agricultural use more extensive and with a certain ecological and landscape value.
- It emphasizes the presence of exotic weeds in the range between the bank and the area of the quarry.
- It shows the presence of a dense network of services: power line, pipeline.
- In addition to the arable crops and more intensive agricultural, who insist over the whole area, in areas along the Po similar to the one object of our study (for such as in the municipalities of Saluggia, Livorno Ferraris or Brusasco) only recently, cultivation is catching on, at the moment only in marginal areas not destined to the most valuable crops, *Arundo donax* (giant reed), species with high productivity, especially in irrigated soils but tolerates drought well and other stress.

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On the portion of land to the east of the river Po could propose the planting of crops with a solid biomass (poplar or willow trees short rotation forestry crops, Arundo donax full field, etc.); these are crops with low environmental impact and compatible with the presence of the park, and that could diversify the existing mosaic in terms of landscape.

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Do not underestimate the low environmental impact, which limits the treatments (1-2 mild nitrogen fertilizers per year), while they are not needed phytosanitary treatments and weed killers in the first 2 years after implantation can be performed mechanically.

In the areas west of the Po, to the S.S. 20, it could increase the presence of horticultural crops (in field and / or under the tunnel) in anticipation of

possible forms of marketing "on the spot". It would be good to keep in mind a buffer zone from the main roads, at least a few tens of meters, in order to avoid contamination by fine dust or provide for the creation of groups of plants (hedges of tall shrubs / small trees native) to act as a "filter".

Even in the city of Turin are spreading and organizing groups of families gathered in associations with the objective of consuming local products, respecting the environment and the social fabric, not favoring the exploitation of workers. These promote a fair remuneration for farmers also small, which otherwise are often forced to sell their products through large distribution channels.