

Air and protection of the natural environment

The air that we breath, just like the rest of the environment that surrounds us, significantly affects the quality of our life. Comfort and well-being, the greater number of services available today compared to the past have a rather high impact on the Earth's ecosystem, both in terms of consumption of the soil and resources and in terms of pollution. The current situation cannot be sustained forever and this is being gradually accepted, especially by Europe, which since years is holding first place in the struggle against climate change and greenhouse gases and in the promotion of renewable energy sources. Since years the individual Member States of the EU have been committed to the activities outlined by the various laws and regulations of the European Parliament on environmental protection and sustainable development. The commitments made to respect environmental target and objectives involve all the institutions at the different levels, from the highest to the lowest, from the international to the local. In this chapter, attention is first of all focused on the quality of air in Veneto, with particular reference to particulate matter (PM), the sources of pollution and on how much is being done to alleviate the effects of pollution. Attention is focused particularly on those areas that are critical for particulate matter control, i.e. the areas of the Tangenziale Ovest ring road in Mestre, the motorway bypass ("Passante") and the Marco Polo airport. Following this, this chapter deals with another important environmental aspect, that of wildlife protection, analysing the protected areas present in Veneto and therefore focusing attention on how much is being done to defend the regional natural heritage.



Air and the protection of the natural environment





12. Air and the protection of the environment

12.1 Particulate matter in Veneto and the impact of the Mestre ring road

The first aspect considered is is air quality, with particular reference to particulate matter suspended in the atmosphere (PM, and PM,). Particulate is made up of various substances that can be primary, i.e. matter directly emitted into the air, or of secondary, i.e. matter generated by physical and chemical processes. The anthropic sources of particulate matter are essentially industrial activities, road traffic and heating plants. Concentration and persistence of particulate matter in the atmosphere is linked both to the quantity emitted and to the climate factor, showing a strong seasonal variation: the greatest concentrations are found in the winter months, characterised by atmospheric conditions of little dispersion of pollution and by greater emissions from sources such as the heating systems of buildings.

Another factor that determines the persistence of particulates in the air is their average size, on which the PM degree of penetration into the respiratory system and of the subsequent risk to human health also depend.

The main regulatory reference on assessment and management of air quality in Italy is Legislative Decree no. 155 of 13th August 2010 (amendements and additions were made to this by Legislative Decree no. 250 of 24th December 2012). It transposes Directive 2008/50/EC (on the quality of ambient air and for cleaner air in Europe) and 2004/107/EC (concerning arsenic, cadmium, nickel, mercury and polycyclic aromatic hydrocarbons in ambient air). In addition to bring order in the previous legislation, which was guite fragmentary, Legislative Decree 155/2010 has introduced new and important aspects. One of these is the obligation, from 2011, to carry out PM₂₅ (fine particulate) assessment. This fine particulate are highly hazardous as their small size allows them, once inhaled to penetrate the respiratory system very deeply. Legislative Decree 155/2010 has set the objective of reducing PM₂₅ concentration and in particular has fixed the average annual limit value at 25µg/m³ to be

respected by 2015. Legislative Decree 155/2010 also provides for an assessment of the contribution coming to pollution from to transport of natural particulate in the atmosphere from arid zones such as the Sahara desert; this is among the natural events that have a major impact on atmospheric pollution, in particular on PM_{10} levels.

The quality of air in Veneto

What are in detail the current situation of air in Veneto and the trend over time?

An analysis was conducted on the quality of the air we breathe in Veneto and its trend over the years with reference to the particulate matter (PM, and PM,). With regard to PM,, the first data analysed is that of the annual average in the monitoring stations of urban traffic - TU, mainly used to measure pollution from traffic and located along urban roads with high traffic flows -, urban industrial traffic - U - stations in areas where the level of pollution mainly depends on individual industrial sources or neighbouring industrial zones, as well as in suburban areas, i.e. largely built-up areas usually characterized by settlements made of separate buildings interspersed with non-urbanised areas -, and of urban background - BU, stations used to measure all the pollutants and located in areas such as parks, green areas, rural areas, which are not influenced directly by sources of traffic such as roads and motorways or by industrial sources. The data collected by ARPAV, the Regional Agency for Environmental Protection and Prevention of Veneto, through its monitoring stations were examined. ARPAV's stations are located in various contexts: 10 in traffic/industrial zones and 19 in background zones (figures referring to 2012). Straight away a downward trend is observed until 2010 with the averages values below the threshold of 40 μ g/m³ starting from 2007 for the monitoring stations located in urban background zones, and starting from 2009 for those in traffic or industrial zones. In both cases, in 2011 the situation worsened with respect to 2010, especially in the case of the traffic/industrial stations, where the average value returned to above the target level and then fell back in 2012. Two determining factors of the average trend of PM, can be identified: the level of the emissions and the climate conditions.



The climate conditions significantly influence the persistence of the particulate matter Climate conditions, for example, explain for example the increase recorded in 2011, when

the months of February, November and December were characteristed by high pressure and air stagnation, which is a factor favouring the persistence of particulate matter. That recorded average concentrations above or within 40 μ g/m³ increased to 4: Via Tagliamento (Venice), Arcella (Padua), Via Lanceri (Treviso) and Belluno (city), respectively with 40, 39, 37 and 20 μ g/m³.

The most critical aspect linked to particulate matter pollution is the number of times that the daily limit of $50 \ \mu g/m^3$ is exceeded over a year.





Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data

Going into detail on some specific monitoring stations located in particular urban and of urban traffic areas, what said above on the overall average values is generally confirmed, i.e. that the trend was downward trend until 2010 and then in 2011 the average concentrations of PM, increased. The areas where these monitoring stations are located, i.e. areas with high density of population, traffic and industry, are the most critical, with average annual values that are often above 40 µg/m³. In 2011 the only monitoring station out of those examined with values within the limits was that of Belluno-city, with an average concentration of PM. equal to23 µg/m³, but Belluno, however, has an overall favourable climate and traffic situation with respect to the other cities considered, as it is on the Dolomites. This situation saw a slight improvement in 2012, the year in which the monitoring stations according to Legislative Decree 155/2010, they must not exceed the number of 35.

The little ventilated climate of the plain greatly contributes to the determination of unfavourable situations as it facilitates stagnation of the particulate matter. The data of the monitoring stations located in the city centres show a constant exceeding of the

The daily concentration of 50µg/m³ of PM, should not be exceeded more than 35 times per year regulatory limits, even if with fluctuating trends. The trend shows a general drop until 2010

and then an increase in 2011. As already observed for the annual averages, in 2012 there was a drop in the number of days in which the thresholds were exceeded, even if the data were still showing critical situations with values well above those outlined by the legislation, with the exception of Belluno.



Fig. 12.1.2 - Annual average* (values in µg/m³) of PM10 in some monitoring stations in urban and urban traffic areas Years 2005:2012



(*)According to Legislative Decree 155/2010 the annual limit value for human health protection is equal to 40 μg/m³ (**) The monitoring station of Via Circonvallazione was dismantles at the end of June 2009 following the closure of the old Umberto I hospital, whereas the monitoring station of Via Tagliamento has been operating since 2008. Source; Processing by Veneto Region -Regional Statistical System Section on Arpav data

The problem of excess over the daily thresholds of PM,₀remains a pressing emergency for Italy overall and, in confirmation of this, on 19th December 2012 a conviction was made against our Country by the EU Court of Justice (cause C-68/11) relating to the cases of excess over the limit in 2006 and 2007.

Aside from the $PM_{_{10}}$ there are particles that are even finer, with a diameter less than 2.5 µm (micrometres), the so-called $PM_{_{2.8}}$ Legislative Decree 155/2010 requires, as for $PM_{_{10}}$, a limit for the protection of human health equal to a concentration and annual average of 25 µg/m³ to be reached by 1st January 2015. An intermediate objective of 27 µg/m³ were also set for 2012.

Fig. 12.1.3 - Number of times the daily limit value (*) for PM, was exceeded in some monitoring stations in an urban and urban traffic setting - Years 2005:2012



(*) According to Legislative Decree. 155/2010 the daily limit value of 50µg/m³ must not be exceeded more than 35 times per calendar year (**) The via Circonvallazione monitoring station was dismantled at the end of June 2009 following the closure of the old mberto I hospital, whereas the monitoring station of Via Tagliamento has been running since 2008

Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data



In the light of these considerations we will analyse the data relating to the various ARPAV monitoring stations. The monitoring is not currently complete as that for the

By 2015 the average annual concentration of PM₂₅ must not exceed 25 µg/m³ PM_{∞} is, as the findings started later. It was therefore not possible

to generate a historical series of the findings.

The data of the last three years is available for the stations in urban and suburban areas. Out of the monitoring stations in industrial urban and suburban areas, data from 3 stations only are available, whereas for the urban traffic and rural and rural/suburban areas only a few data is available for analysis as of today.

The findings on urban and suburban background areas are the most complete ones and for the years 2010, 2011 and 2012 show a trend that confirms what already observed for PM10: a peak occurred in 2011 followed by a drop in 2012. Nevertheless, an overall critical situation is found also in 2012, with values very often exceeding the 27µg/m³ threshold, except in the centre of Belluno-city - where 19, 17 and 16 µg/m³ were recorded in 2010, 2011 and 2012 respectively - and Via Lancieri in Treviso - where in 2012 the value is exactly 27 μ g/m³, i.e. that set as a threshold. With regard to the monitoring stations located in the industrial areas (urban industrial and suburban industrial context) only data from the two areas of Padua subjected to the monitoring is available together with the data of Monselice (only 2010 and 2011).As rgards the two aforesaid areas of Padua, the highest values were observed in 2011 and remained above the limit of 27 µg/m³ over almost all the three-year period considered. In Monselice, on the other hand, the two years available show values that are a bit lower, with 21 and 26 µg/m³ respectively. For the urban traffic areas, the data available come from the monitoring stations of Via Tagliamento in Venice for the years 2010 - 2011 and from the centre of Rovigo for 2011-2010. Due to the scarcity of the data it is not possible to identify a trend; however, it is clear that the highest values are in both cases those of 2011, which supports the previous considerations on the major criticality of that year. Finally, in relation to the rural and suburban areas, the only monitoring stations for PM₂₅ are those in Cason, Verona and Treviso, Mansuè.

Fig. 12.1.4 -The average concentrations of $PM_{_{25}}$ in the monitoring stations in urban and suburban setting (µg/m³ average annual) - Years 2010:2012



(*) The station is active for PM₂₅ monitoring since 2011 Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data





Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data

For the latter, data is available only for the last two years and in both cases the values are always above the limit set by the regulations, 29 and 28 μ g/m³ respectively.



4.5%

♦ 2007/05

THE EMISSIONS OF PM, IN THE PROVINCES OF THE VENETO

There are reassuring data on particulate matter emissions: from 2005 to 2007 almost all the provinces have reduced them, with significant variations in Rovigo (-34,9%) and Venice (-23,3%), a sign that beyond the ever present criticality, we are nonetheless making steps to reduce the anthropic contribution to pollution.



2007

The emissions of PM₁₀ (tons/year and % variation) by province in 2005 and in 2007... ... And the most pollutant sectors in each province (% impact on the provincial total) - Year 2007

For each province the sectors that make the greatest contribution in terms of 10, i.e. those that have a cumulative percentage impact of around 90% of the total have been highlighted. It can be noted that the situations are not homogeneous in the different provinces, which reflects their areas being mutual different even if within the same region. Nevertheless, some predominant sectors can be observed which contribute to PM10 emissions to a very significant extent almost everywhere, such as road transport and non-industrial combustion (e.g. domestic heating). This provides a further indication on where to direct the precautionary measures with greater accuracy.





Source: Processing by Veneto Region- Regional Statistical Sytem Section on Arpav and Inemar data



In Cason the situation is better even if the criticality of 2011 was confirmed by a value that increased from $24\mu g/m^3$ to $28 \mu g/m^3$ before going back to $24 \mu g/m^3$ in 2012.

As said previously, the state of health of the atmosphere depends on several factors, and that relating to polluting emissions by anthropic activities is certainly one of the most relevant. For this purpose the Veneto Region has adhered to an inter-regional agreement for the monitoring of pollutant emissions into the air via software developed by the Veneto Region itself and managed by Arpa Lombardia. This software is named INEMAR after the Italian acronym for Air Emissions Inventory, and is actually an inventory of emissions.

PM10 year 2007: total 11,992 t/year

6,0%

0.1%

7,4%

28,1%

0.4%

2,1%

1,8%

45.6%

Fig. 12.1.6 - Emissions of PM, and PM, by macrosector (percentage values). Veneto - Years 2005 and 2007



PM2,5 year 2005: total 11,651 t/year



- Energy production and transformation of fossil fuels
- Industrial combustion
- Use of solvents
- Other mobile and machine sources
- Agriculture

PM2,5 year 2007: total 10,253 t/year

4,4%

3,9%



Other sources and absorption

Source: Processing by Veneto Region – Regional Statistical System Section on Arpav-INEMAR data



As regards Veneto, the data is managed by ARPAV and the currently available ones are those for 2005 and 2007. Beyond the criticalities still present a positive figure emerges however: the emissions are falling both as regards PM_{10} (-12.5&) and for PM_{25} (-12%). The three main macrosectors in terms of emissions of particulate matter, are respectively a) non-industrial combustion (including the processes of combustion aimed at the production of heating for non-industrial buildings such as shops, premises of public bodies, homes and offices); b) road transport; c) other mobile sources and machinery. This situation continues in the two years under examination, with an increase in the impact of the first two.

The emissions of particulate matter are on the decrease

A general decrease can be observed in almost all the sectors, and in some

cases it is particularly remarkable, as in the case of the other mobile sources (-60% for $PM_{...}$ equal to around 1,300 tons less and -59% for $PM_{...}$ around 1,270 tons less) with particular regard to the emissions of agricultural vehicles and maritime transport, as well as in the case of the energy production sector (-44% around 160 tons less).

The Venetian area

We will now focus on the Municipality of Venice, analysing all findings and data from the particulate matter concentration monitoring stations for the years from 2003 to 2012 and trying to explain that which we are doing and the various activities underway to alleviate the problem of atmospheric pollution in this city which, due to its geographical characteristics, is a case practically one of its kind. It should be remembered that in the municipal area various measures aimed at containing PM, emissions have been in force for year, ranging from systematic control of boilers to the driving ban for vehicles without catalytic-converters, from the limitations to circulation of Euro 1 and Euro 2 vehicles to the control of car emissions. Measures such as the enlargement of pedestrian areas, the establishment of zones with a speed limit of 30 km/h zones, the introduction of trams and creation of peri-urban woods have also been implemented.As for the rest of Veneto, the historical series of the average annual concentrations of PM, of

the Municipality of Venice highlights downward trend in the concentration, which in 2010 reached values below the annual limit value in all the monitoring stations. The average concentration of 2011 increased with respect to that of 2010 by 6-7 μ g/m³ in all the locations monitored before the decrease of values between 2 and 6 μ g/m³ in 2012. Thanks to this drop, in 2012 all the monitoring stations of the Municipality of Venice recorded average annual concentrations of PM, below or equal to the limit set by the legislation. Going into detail on the single monitoring stations, those located in Malcontenta, at Parco Bissuola, at Sacca Fisola and in Vvia Circonvallazione (replaced from 2009 by that of Via Tagliamento) are considered. The station of Malcontenta is located in an industrial/urban context and therefore represents a situation in which the industrial area coexists with a human settlement. The data available only cover the last two years, 2011 and 2012 and show a rather serious situation with over 80 cases of exceeding the daily limit of PM, and an annual average that only decreases in the last year and is equal to the limit set by the legislation.

On the other hand, Parco Bissuola represents a strictly urban context and the series of findings is complete since 2003. Over time, a trend is observed that reflects that occurring on a regional scale, i.e. a difficult three. year period from 2005 to 2007 followed by a reduction over the following years, with a new increase in 2011 and a slight drop in 2012. In terms of cases of exceeding the daily limit, the situation continues to be difficult: over the last year 76 cases were recorded, more than double the number permitted, whereas the data on the annual average is more reassuring since it remained, even if for a short time, always below 40 µg/m³ since 2008. Another monitoring station located in an urban context is that of Sacca Fisola, of which the available data ranges from 2004 to 2010. An average and rather fluctuating trend is observed between 2004 and 2007, a year in which a peak was reached in the average of the concentrations, equal to 43µg/m³. To follow there has been a three-year period below the limits, another peak in 2011 and a reduction in 2012 with 34 µg/m³. Again in the case of Sacca Fisola the greater problematic linked to the number of cases of exceeding the 50 μ g/m³ daily limit: compared to a ceiling of 35 annual cases of excess over the threshold from 2004 to 2012, the average was equal to 75. In 2008, 2009 and 2010 there was a good a decrease in the phenomenon, reaching the

291

³ Source: Osservatorio acquisti CartaSì.

⁴ Source; Osservatorio acquisti CartaSì.



value of 52 over the last year. However, in 2011 another increase up to 79 and in 2012, even if with a reduction, the cases of excess over the limit were 71. The last measurement point is represented by two monitoring stations, that in Via Circonvallazione, dismantled in 2009, and that in Via Tagliamento, which has replaced the first one since its dismantling. These two monitoring stations are representative of a zone decidedly of urban traffic and therefore particularly perceptive to PM. pollution. And the values demonstrate this: the annual averages remained above 40 µg/m³ until 2009 even if a small drop was noticed. In 2010 the first value below the target was noticed, to then go up again in 2011, whereas in 2012 the average concentration was exactly 40 µg/m³.Shifting attention to the number of cases exceeding the daily threshold, strong criticalities are found for this phaenomenon in the urban traffic zone, recording on average of 118 excesses over the limit. However, this value is in part invalidated by the threeyear period 2005-2007 during which there were very high peaks for more than 170 excesses.

In addition to road traffic, domestic heating and industrial production, for the Municipality of Venice another potential source of pollution is the Marco Polo airport and, in particular, the air traffic and all the activities connected to this, which above all affect the hamlet of Tessera. SAVE S.p.A., the company responsible for the airport management, in collaboration with Università Ca' Foscari di Venezia and Ente Zona Industriale di Porto Maghera has promoted the project "Monitoring Emissions of Airport Origin" in order to keep the concentrations of some pollutants under control at the airport. This result is particularly significant considering that the airport is located close to the Venice lagoon, which is complex and very delicate ecosystem. The monitoring started at the end of 2008 and takes place constantly over the course of the year via a mobile monitoring station which is the protperty of Ente Zona Industriale. The pollutants monitored also include PM... The monitoring has confirmed the strong impact of the meteorological factor, and in particular of wind intensity and direction, on the values of particulate matter.

Fig. 12.1.7 - Annual average (values in $\mu g/m^3$) and number of daily cases of excess over the daily PM,_ limit in the monitoring stations of the Municipality of Venice - Years 2003:2012



Sacca Fisola





(*) The monitoring station of Via Circonvallazione has been dismantled at the end of June 2009 following the demolition of the old Umberto I hospital, whereas the monitoring station of Via Tagliamento has been operating since 2008. Source: Processing by Veneto Region - Regional Statistical System Section on Istat data



Greater criticality was observed in the winter periods despite the reduction in air traffic, in confirmation of the fact that the climate affects stagnation of particulate matter almost more than emissions. The data from the monitoring station of the airport is compared with that of the neighbouring stations in the Municipality of Venice. In particular this comparison involves the monitoring stations located in Parco Bissuola and Via Tagliamento, which are representative of zones of urban background (BU) and of urban traffic (TU) respectively. On the basis of the data collected by the monitoring stations in the three-year period 2010On the other hand, the significance of the climate factor is confirmed; in the case in question it is an disadvantage due to the lack of ventilation and the wind increases the concentration of PM10 decreases, regardless of wind direction: this suggests that presence of particulate matter is widespread in the Venetian area and the airport is not the main factor in determining its concentration. To summarise, the contribution the the airport to pollution from particulate matter is not higher than that of the other sources such as vehicle traffic, industrial production and domestic heating.





Source: Processing by the Veneto Region- Regional Statistical System Section on Ente Zona Industriale and Arpav data

2012 it emerges that close to the Airport the average concentration of PM_{10} remains a bit lower than in Parco Bissuola and Via Tagliamento. The same is also true as regards the number of annual cases of excess over the daily limit of 50 µg/m³: even if always above the number of 35 outlined by the legislation, these have always been below the values recorded in the other two reference monitoring stations. A more thorough analysis shows presence of similar daily trends, which confirms that the sources of pollution are the same and that the airport is one of these but is not the main one.

In addition to the annual data from the monitoring stations located at the airport and neighbouring areas, the graphs below also shows the average values

The airport does not impact more tha traditional vehicle traffic on pollution and the quarterly excesses over the limit recorded by the station at the

Marco Polo airport in the period from 2010 to 2013.







(*) According to Legislative Decree 155/2010, the annual limit value for the protection of human health is equal to 40µg/m³, whereas the limit value of 50µg/m³ must not be exceeded more than 35 times per calendar year Source: Processing by the Veneto Region- Regional Statistical System Section on Ente Zona Industriale and Arpav data

The ring road and motorway bypass in Mestre

We are now going to focus on a very serious aspect linked to PM₁₀ pollution: traffic on the main road connecting the North-East to the rest of Italy, i.e. the Tangenziale Ovest ring road of Mestre up to 2009 and subsequently the motorway bypass (32-km in length) which has relieved part of the ring road's traffic.

It should be remembered that the growing awareness about the health issue and the consequent fight against pollution sources has led to an epidemiological survey on the effects of pollution on the health of the population resident in proximity of the Tangenziale Ovest ring road. This survey was carried out by the Department of Molecular Medicine - Public Health Laboratory and Population Studies of the University of Padua in the period 2011-2012. The objective of the survey was to check for a possible connection between the health state of the residents of the area in question and the air pollution generated by through traffic on Tangenziale Ovest, making use of the epidemiological instrument of the Venetian censusbased cohort established from 2001 as a part of the national network of census-based cohorts, a project by the Italian National Statistical System (SISTAN). The diseases identified mainly concern diseases of the respiratory and cardiovascular systems, which are the most dependent on exposure to atmospheric pollution. Identification of the size of the residential area mainly involved and, consequently, of the population subgroup considered and exposed, is based on the modellistic study of the impact of PM₁₀ concentration generated directly from the vehicles travelling on Tangenziale Ovest in the winter period (six-months) of 2002, before opening of the third lane.

Overall, the results obtained using sources such as certificates of death or hospitalization do not show constant links with the estimates on exposure to PM₁₀. On the other hand, the results obtained using several integrated disease parameters are more significant.



Excesses in the incidence and prevalence of cardiorespiratory system chronic diseases such as Chronic Obstructive Pulmonary Disease and Ischemic heart diseases in the population resident in the closest proximity of the Tangenziale Ovet ring road are attributable to the pollution generated by the traffic of Tangenziale Ovest over the years.

These results are consistent with what is currently known about the extent of damage from atmospheric pollutants, they are not influenced by socio-economic variables and are not attributable to random variations as they are over the statistic significance threshold.

In order to better understand the more recent developments, it is necessary to compare the data on traffic in 2008 with that on 2013 so as to have a first view of the change which occurred after the Mestre motorway bypass came into use in 2009. The data considered is the number of entries and exits at the motorway toll booth of Padova Est and that of Venezia-Mestre Ovest, with reference to the daily averages and comparison to the figures of the whole of the years considered. These data show that the overall traffic volume at Padova Est increased by over 8% from 2008 to 2013 and despite this, the total volume at the motorway toll booth of Veneziae-Mestre decreased by 31% which demonstrates the impact of the Mestre motorway bypass, which has certainly reduced the traffic on the Tangenziale Ovest ring road.

To complete the analysis, attention was then focussed on the Mestre motorway bypass in an attempt to define its environmental impact in terms of PM... As early as when the motorway bypass was under construction, ARPAV was entrusted with the monitoring of air quality in the district in order to assess the impact of the bypass on the resident population; following this, an agreement was stipulated on 13th November 2011 between ARPAV and Società Concessioni Autostradili Venete - CAV S.P.A. - the company responsible for the management of the bypass - for a specific survey to be conducted after opening of the bypass to traffic. Under this agreement, 16 monitoring campaigns were performed in 6 different sites neighbouring the bypass, with the use of mobile monitoring stations; each campaign had a duration of around 45 days. In each site the monitoring campaigns were performed both in a cold period and in a warm period in order to also assess the difference connected to the climate factor, which, as said above, has a strong impact on the

nvironmental state of air. In order to better understand the impact of the Mestre motorway bypass, the data from the mobile monitoring stations was compared with that from the fixed monitoring stations located in urban background (Parco Bissuola) and urban traffic areas (Via Tagliamento) in the Municipality of Venice. The monitoring campagins were carried out at Mirano-Vetrego, in the cemetery zone, 300 metres away from the bypass in a suburban context; in Spinea, in via Rossini bis, 77 metres away from the bypass, in a residential zone; in Martellago, Via Zigaraga, 120 metres away from the bypass, in a suburban context; in Mogliano Veneto, Vvia Colombo, 290 metres away from the bypass, again in a suburban context; in, Martellago/ Scorzè, Via Moglianese, 10 metres away from the bypass, in a suburban traffic context; and in Quarto d'Altino, between Via Pascoli and Vvia Torcello, 1,300 metres away from the bypass, in a suburban context.

To summarise, the daily trends of $PM_{,\circ}$ concentration were found to be in line with those recorded at fixed monitoring stations, the situations emerging in the

Fig. 12.3.10 - The entries and exits of vehicles at the tollbooths between Padova Est and Venezia Mestre (total values and % variations) - Years 2008 and 2013*



* In 2008 the Mestre motorway bypass was not yet open whereas in 2013 it was regularly open.

Source: Processing by Veneto Region - Regional Statistical System Section on Concessioni Autostradali Venete (CAV) data



monitoring points were therefore similar to the situation founds on average in urban and urban traffic context areas, which are typically rather critical and require to be constantly kept under control.

Fig. 12.1.11 - The Veneto motorway network and the air monitoring stations (the Mestre ring road and the monitoring stations close to it are highlighted) Year 2013



The Veneto motorway network and the air monitoring stations

12.2 The protected areas

The second aspect dealt with concerns the so-called "protected areas", i.e. particular areas that are the subject of protection and preservation programmes due to their specific natural features. These protection programmes aim at protecting and preserving specific natural habitats and their flora and fauna, with particular attention to rare and threatened animal and vegetables species. These protected areas have been arranged in a network of sites called "Natura 2000". This network is based on two fundamental pillars: Directive 1979/409/ EC of 2nd April 1979 and Directive 1992/43/EC of 21st May 1992 (the "Habitat" Directive). The first concerns the conservation of wild birds and has been transposed into Law no. 157 of 11th February 1992 "Regulations for the protection of the homeothermic wild animals and their hunting". This Directive requires, inter alia, the Member States to classify as Special Protection Areas (SPAs) the areas more suitable for the conservation of the bird species included in the annexed lists or anyway the migratory species regularly present there, by adopting suitable protection measures (art. 4, paragraphs 1, 2 and 4). Directive 1979/409/EC was then superseded by the Directive 2009/147/EC "Birds". Directive 1999/43/ EE, also includes the other wildlife domains as well as habitat conservation. Via the latter Directive the Council promoted the constitution of the European ecological network of Special Conservation Areas (SCAs) named Natura 2000, with the objective of ensuring maintenance or, when needed, recovery of a satisfying state of conservation of the types of natural habits and species habitats listed in the annexes to the Directive.

The network Natura 2000 is made up of Sites of Community Importance (SCIs) identified by the Member States according to that established by the Habitat Directive and subsequently designated as Special Conservation areas (SCA); Natura 2000 also includes the Special Protection Areas (SPAs).

The Habitat Directive introduces some particularly innovative elements including the recognition of the importance of some landscape elements that perform a connection role for the wildlife (art. 10) The Natura 2000 network also includes areas that are not protected exclusively against anthropic activities, since the "social, economic and cultural needs as well as the regional and local peculiarities" are all taken into account (art. 2) In this way importance is also placed on the areas where a balance has been achieved between Nature and Man over the centuries. For this reason, the Directive specifies the objective of conserving not only the natural habitats but also the semi-natural ones, such as traditional agriculture areas, exploited woods, pastures. etc.

Source: Processing by Veneto Region – Regional Statistical System Section on Arpav and Veneto Region data





Structure of the Natura 2000 network

The constitution of the Natura 2000 network entails identification of the SCIs and subsequently attribution of the SCA or SPA designations. The designation of a Special Conservation Area requires a three-stage procedure, as follows:

1. Identification by each Member State of sites - called Sites of Community Importance proposed (pSCI) - that host habitats and species listed in Annexes I and II of the Directive. The sites are selected on a scientific basis. The European Commission has published a reference manual for identification of these sites. The data gathered are then sent to the Commission complete with the site-related cartographic documents.

2. Based on the lists of pSICs submitted by the Member States and the criteria specified in Aneex III (stage 1), and after consultation with the Member States, the European Commission adopts the lists of Sites of Community Importance (SCIs), one for each bio-geographical region of the EU is divided.

3. Once the lists of the SCIs are adopted, the Member States have to name all the sites as "Special Conservation Areas" as soon as possible and in any case within a maximum deadline of six years, giving priority to the sites that are more threatened and/or of greater significance to conservational purposes.

In Italy identification of the pSCIs is the reponsibility of the Regions and Autonomous Provinces, which are also in charge of sending related data to the Ministry of the Environment and Protection of Land and Sea; the Ministry then checks that the data is complete and coherent and sends the databank and the cartographic documents to the European Commission. After publication of the list of the SCIs by the Commission, the Ministry issues a Decree publishing and approving the lists of the Italian SCIs. The Regions and Autonomous Provinces then establish specific conservation measures for the SCIs, which are consequently designated as Special Conservation Areas by a Ministerial Decree adopted in agreement with the interested Region and Autonomous Province.

With regard to the identification of the sites relating to the Birds Directive - the SPAs - the procedure is more brief: these areas are designated directly by the Member States and are automatically included into the Natura 2000 network. Identification and delimitation of the SPAs is based entirely on scientific criteria and is aimed at protecting those areas that for their number and surface of the conservation of the species listed in Attachment I of the Bird Directive and of migratory birds that are not listed but return regularly. The data on the SPAs is transmitted to the Commission via the same Standard Forms used for the SCIs, complete with cartography. The Commission assesses whether the sites designed are sufficient to form a consistent network for the protection of the species. In the event of insufficient designation of SPAs by a Member State, the Commission can implement an infringement procedure.

In Italy, as for the SCIs, the identification of the SPAs is also the responsibility of the Regions and Autonomous Provinces, who transmit their data to the Ministry of the Environment and Protection of Land and Sea; after the verification of the completeness and congruency of the information acquired, the Ministry sends the data to the European Commission. The SPAs are intended as designated on the date the relevant data are forwarded to the Commission; after that, the Ministry issues the list approved through a Ministerial Decree.

The SCIs, SCAs and SPAs in Italy

Italy transposed Directive 92/43/EEC into Law no. 145 of 22nd February 1994 and Presidential Decree no. 357 of 8th September 1997, regulating their implementation by the State, the Regions and the Autonomous Provinces. As the conclusion of a complex work that involved the Ministry and Regions, Presidential Decree no. 357 was then amended and integrated with additions and Presidential Decree no. 120 of 12th March 2003 was thus issued. Currently in Italy, the SCIs, the SCAs and the SPAs overall cover around 21% of the national territory.

As of today the Italian Regions have identified 2,310 Sites of Communitary Importance (SCIs) made up of 1,886 SCIs of type B1, 89 Special Conservation Areas (SCAs), 321 SCIs that are also Special Protection Areas (SPAs, type C¹) and 14 SCAs which are also SPAs (type C¹). Aside from these there are also 275 SPAs of type A amounting to an overall total of 2,585 Natura 2000 sites.

Out of the Natura 2000 Italian sites, the following are subjected to overall protection: 130 habitats, 89 species of flora and 111 species of fauna (of which 21 of mammals, 11 of reptiles, 16 of amphibians, 25 of fish, 38 of invertebrates) pursuant to Habitat Directive

In Italy there are 2,585 Natura 2000 sites, covering around 21% of the national territory and around 381 species of bird fauna pursuant to the Bird Directive.

¹ Type B indicates a SCI that is not related to other types of special protection site, whereas type C indicates SCIs and the SCAs that coincide with SPAs.



Tab. 12.2.1 - The Natura 2000 sites by Region and Autonomous Province (number, extent in hectares* and percentage of regional territory occupied). Italy - Year 2014

Region	Site no.	Area (hectares)	% of the total territory		
***Abruzzo	58	390495	36.2%		
Basilicata	58	176998	17.7%		
Calabria	185	328078	21.8%		
Campania	124	398135	29.3%		
Emilia Romagna	158	269814	12.2%		
Friuli	63	151736	19.3%		
***Lazio	200	441646	25.7%		
Liguria	133	149093	27.6%		
Lombardy	242	372154	15.6%		
***Marche	95	141935	14.6%		
***Molise	88	118724	26.8%		
**Piedmont	141	396899	15.6%		
Bolzano AP	40	149931	20.3%		
Trento AP	142	176181	28.4%		
Puglia	84	477327	24.7%		
Sardinia	124	574834	23.9%		
Sicily	238	638759	24.9%		
Tuscany	150	390842	17.0%		
Umbria	102	130092	15.4%		
**Valle d'Aosta	30	98968	30.3%		
Veneto	130	418019	22.7%		
Italy	2585	6390660	21.2%		

* The extent is calculated excluding any overlapping.

** Since the site IT 1201000 falls partly in Piedmont and partly in Valle d'Aosta, the calculation of the surface areas was carried out by considering for each Region the part of the site effectively located on its territory.

*** Since the site IT7110128 falls in Abruzzo, Lazio and Marche and the site IT 7120132 is located between Abruzzo, Lazio and Molise, its surface areas was calculated by attributing to each region the part of the site which is effectively within its boundaries.

Source: Ministry of the Environment and Protection of Land and Sea

The protected areas in Veneto

Veneto has a total of 130 Natura 2000 sites which cover a total of 418,019 hectares, amounting to 22.7% of the total regional territory. Of these 130 sites 26 are SPAs, 63 are SCIs and 41 are at the same time both SICs and SPAs. In Veneto there are 130 Natura 2000 sites, covering 22.7% of the regional territory The province where the Natura 2000 sites reach the greater extent is Belluno, with almost

199,000 hectares, 54% of the total provincial surfaces and 10.8% of the regional surface. After that is the province of Venice with over 62,000 hectares, equal to 25% of its territory, affected by the strong impact of the Lagoon, which is a Site of Community Importance. The third province with the greater expanse of Natura 2000 sites is Vicenza with 49,5000 hectares, 18% of the territory where the SCIs/SPAs of the Vicenza "Little" Dolomites, the Plateau of the Seven Municipalities and the Berici Hills area.

Treviso is fourth place with 33,665 of Natura 2000 sites that represent 14% of the provincial territory. The sites identified in the province also include, among others, the SCIS/SPA of mount Grappa, which is partly in the province of Treviso, the Cansiglio forest, the Montello hill and the pre-Alpine Ridge between Valdobbiadene and Seravalle.

Rovigo is ranks fifth among the Veneto's provinces, with a total expanse of Natura 2000 sites of 28,436 hectares, equal to 16% of its territory, most of which consists of the SCI of the Po Delta (terminal stretch and delta) and the related SPA.





* the total surface area is calculated by subtracting the areas where SCIs and SPAs mutually overlap

* the total surface area is calculated by subtracting the total overlapping surface of SCIs and SPAs Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data



Tab. 12.2.2 - The Natura 2000 sites by region and type (number, extent in hectares and percentage of regional territory occupied). Italy - Year 2014

	S	PAs (A type s	site)	S	Cls (B type s	ite)	S	CAs (B typ	e site)	SCIs/SPAs (C type site)		(C type site)			
Region	No. of sites	Surface area (hectares)	% of the total territory	No. of sites	Surface area (hectares)	% of the total territory	No. of sites	Surface area (hectares)	% of the total territory	No. of sites	Surface area (hectares)	% of the total territory	No. of sites	Surface area (hectares)	% of the total territory
Abruzzo**	4	288114	26.7	53	236117	21.9	0	0	0	1	19886	1.8	0	0	0.0
Basilicata	3	135280	13.5	29	33171	3.3	12	10708	1.1	6	7136	0.7	8	20116	2.0
Calabria	6	262257	17.4	179	95752	6.4	0	0	0	0	0	0.0			
Campania	15	178766	13.2	93	321966	23.7	0	0	0	16	41847	3.1	0	0	0.0
Emilia Romagna	19	29458	1.3	71	78139	3.5	0	0	0	68	162218	7.3	0	0	0.0
Friuli V. G.	4	59819	7.6	3	1997	0.3	52	75544	9.6	0	0	0.0	4	56631	7.2
Lazio**	18	383948	22.3	161	118885	6.9	0	0	0	21	24238	1.4	0	0	0.0
Liguria	7	19715	3.6	126	147201	27.2	0	0	0	0	0	0.0			
Lombardy	49	277656	11.6	175	204430	8.6	0	0	0	18	19769	0.8	0	0	0.0
Marche**	19	117097	12.1	68	95237	9.8	0	0	0	8	10195	1.0	0	0	0.0
Molise**	3	33875	7.6	76	65607	14.8	0	0	0	9	32143	7.2	0	0	0.0
Piedmont*	19	143158	5.6	91	117618	4.6	0	0	0	31	164790	6.5	0	0	0.0
Autonomous Province of Bolzano	0	0	0.0	23	7306	1.0	0	0	0	17	142626	19.3	0	0	0.0
Autonomous Province of Trento	7	124192	20.0	123	151373	24.4	0	0	0	12	2941	0.5	0	0	0.0
Puglia	6	101182	5.2	73	303035	15.7	0	0	0	5	170105	8.8	0	0	0.0
Sardinia	31	177621	7.4	87	364689	15.1	0	0	0	6	118305	4.9	0	0	0.0
Sicily	15	379994	14.8	208	469022	18.2	0	0	0	15	19478	0.8	0	0	0.0
Tuscany	17	50215	2.2	89	233742	10.2	0	0	0	44	142420	6.2	0	0	0.0
Umbria	5	29123	3.4	95	103209	12.2	0	0	0	2	18121	2.1	0	0	0.0
Valle d'Aosta*	2	40624	12.5	0.0	0	0.0	_25	25926	7.9	1	37046	11.4	2	8680	2.7
Veneto	26	189263	10.3	63	202538	11.0	0	0	0	41	170606	9.3	0	0	0.0
Italy	275	3021357	10.0	1886	3351034	11.5	89	112178	0.1	321	1303870	4.6	14	85427	0.0

* Since the site IT1201000 is partly in Piedmont and partly in Valle d'Aosta, its surface area was calculated by attributing to each

** Since the site IT710000 is party in realmont and party in value and social, its surface area was calculated by attributing to each region the part of the site IT7110128 is located between in Abruzzo, Lazio and Marche, and the site IT7120132 is between Abruzzo, Lazio and Molise, the surface area was calculated by attributing to each Region the part of the site that effectively is within its boundariesn. Source: Ministry of the Environment and Protection of Land and Sea

And finally come Verona and Padua with 22,915 and 22,525 hectares respectively (7% and 11% of the provincial total). As regards Verona, the greatest share of said percentahe is taken by the SCI/SPA "Lessini

mountains - Pasubio - Vicenza Little Dolomites", which are mostrly within the provice, whereas Padua includes the area "Euganean Hills - mount Lozzo - mount Ricco".



Tab. 12.2.3 - Number* of protected area that are part of the Natura 2000 network by type and province. Veneto - Year 2013

Provinces	No. of SCIs	No. of SPAs	No. of SCIs/ SPAs		
Belluno	21	6	9		
Padua	6	4	3		
Rovigo	7	3	0		
Treviso	16	8	8		
Venice	12	9	10		
Vicenza	7	1	5		
Verona	7	0	12		
* The areas spreading over two or more provinces are counted					

The areas spreading over two or more provinces are counted several times so as to account for the total of areas in each province. As a consequence, some areas are duplicated and therefore this table does not specify the regional totals. Source: Processing by Veneto Region – Regional Statistical System Section on Arpav data

Fig. 12.2.2 - Surface of the protected areas that are part of the Natura 2000 network by province and percentage share of the territory. Veneto - Year 2013



* The total surface area is calculated by subtracting the areas of overlapping of SCIs and SPAs Source: Processing by Veneto Region - Regional Statistical System Section on Arpav data

In Veneto, in addition to the Natura 2000 sites there are also other protected areas, in particular the Nature Park of the Ampezzo Dolomites that covers

In Veneto there are almost 57,000 hectares of nature parks... over 31,000 hectares,

Fig. 12.2.3 - The 10 largest protected areas in Veneto that are part of the Natura 2000 network (surface areas in hectares) Year 2013 74000 70 397



Source Processing by Veneto Region - Regional Statistical System Section on data from Veneto Region - Forests and Parks Project Unit

5 Regional Parks for a total surface area of 56,734 hectares, 14 State Nature Reserves 6 Regionals and 3 International wetlands.

It therefore has a huge naturalistic heritage to conserve that extends from the Dolomites to the

... as well as 20 nature reserves and 3 wetlands pre-Alpine areas, from the hilly areas to the

wetlands of the plain: "crossing Veneto from North to South you find at the Regional Nature Park of the Ampezzo Dolomites, where our eyes can rest on the majestic peaks that surround Cortina d'Ampezzo, with the Tofane and Fanes mountains and the Cristallo group, which are the most important of the mountains characterising the Belluno Dolomites Nature Park, which is home to the deer, roe deer, chamois, Western capercaillies and golden eagle, where flowers of rare beauty brighten up the landscape.

The Lessinia Regional Nature Park allows visitors to plunge into the past thanks to the areas where you can admire fossils dating back over 50 million years and the Karst formations which are still visible today: think of the Bridge of Veja, the largest natural bridge in



Fig. 12.2.4 - National and regional nature parks in Veneto (hectares) - Year 2013



Source Processing by Veneto Region - Regional Statistical System Section on Veneto Region data - Forests and Parks Project Unit

Fig. 12.2.6 - State Nature Reserves in Veneto (hectares) - Year 2013



Fig. 12.2.5 - International Wetlands in Veneto (hectares)

Source Processing by Veneto Region - Regional Statistical System Section on data from Veneto Region - Forests and Parks Project Unit

Europe, and to the Spluga della Preta, a karstic abyss approximately 1,000 metres deep.

Leaving the mountains, you get to the Treviso plain, in the Regional Nature Parkof the Sile river, where



* Areas within the Belluno Dolomites National Park

Source Processing by Veneto Region - Regional Statistical System Section on data from Veneto Region data - Forests and Parks Project Unit



Fig. 12.2.7 - The Regional Nature Reserves in Veneto (hectares) - Year 2013



Source Processing by Veneto Region - Regional Statistical System Section on Veneto Region data - Forests and Parks Project Unit around 100 species of birds still nest and the marshy environment is rich in a wildlife made up of micro- and macro-invertebrates that, although invisible at a first glance, can be discovered in its full beauty by the attentive visitor. The river can still be sailed along and the gradual changes in its natural beauty admired as it approaches the sea and Venetian lagoon.

The Regional Park of the Euganean Hills extends over the Veneto plain and offers a hilly landscape of volcanic origin which makes this territory unique. Despite its anthropisation level being greater than that of the other Regional Parks, it still hosts various valuable species of flora and fauna.

One of the most important nature areas of Europe is the Veneto Regional Nature Park of the Po Delta. The peculiarities of this land bathed by the Po river and the sea and in the past subjected to reclamation, offers a wide range of flora and fauna, with over 400 species of birds nesting and over 1,000 plant species"².

How is the air that we breathe in Veneto?

Pollution from PM10 (and PM2.5) now represents a criticality to be kept under maximum control.

Unfortunately persistence of particulate matter in the lower layers of the atmosphere (those where most of human activities occur) is not only due to direct or indirect emission but also to the climate conditions of the area. A lack of ventilation and consequent air stagnation favour the persistence of high quantities of PM10 (and PM2.5). Veneto, as with the rest of the Po Valley, is penalised by such a climate situation and actually the data shows that climate conditions are instable depending on the season and in winter periods (i.e. the periods when air stagnation of is even greater) are often outside of the limit ranges set out by current laws on human health protection. A positive data is however present and shows the downward trend over time of the of particulate matter emission in the atmosphere of anthropic origin.

What is the nature heritage of Veneto?

In Veneto there are 130 Natura 2000 sites that cover a total of 418,091 hectares, equal to 22.7% of the regional total surface area. In the province of Belluno the Natura 2000 sites cover almost 199,000 hectares of land, corresponding to 54% of the provincial total and to almost 11% of the regional total.

Besides the Natura 2000 sites there are also 1 National Park in Veneto (the Dolomites National Park, spread over more than 31,000 hectares) and 5 Regional Parks with a total surface area of almost 57,000 hectares. In addition to these there are 14 State Nature Reserves, 6 Regional ones and 3 Wetlands.



303