

ACOUSTIC MONITORING, THE SAMPLE OF MOUNTAIN COMMUNITY DOWN SUSA VALLEY AND CENISCHIA VALLEY

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Abstract

This paper acts to study about large area pertaining extra metropolitan zone with rural, urban and naturalness characteristic. In such area has been done a research pertaining global evaluation of diversely points of noise generation at last to reach a qualification of condition of people's exposition.

The acoustic measurements have been involved the entire territory of alpine valley (Down Susa Valley and Cenischia Valley) in the West of Turin in Piemonte.

The present sources are constituted from road and railway transport infrastructures of national and international importance, it is from industrial areas and of quarry.

Acoustic investigation have been in kind finalized in function of the requirements, to the appraisal of the climate and eventual the acoustic impact and to singularity that, of time in time, were manifested.

The measure points in fact have been select for their criticality answered to demands for the local administrations, deepening therefore the problematic of immense area and single source, however always being involved over communal territories.

it has been possible effectuate the measures in various periods of the year, and for being able to estimate the effect legacy to the fluctuation of emissive noise sources and the and the variations deriving from the meteorological conditions.

1. The area study

The area that has been taken to sample is a classic alpine valley with an elevated anthropization and with a strongly presence of transport infrastructure.

Of this valley we go has been taken in consideration above all the lower-middle part.

The Susa valley has a sole with a medium width of 1,5 km in which is present the greater part of dwelling, all industries and infrastructures of transport.

These infrastructures are street that railway they represent a connection of international type (through tunnel or pass) and for 2002/49 European Directive [1] would have to be adopted the strategic mapping in how much the passage is advanced to established how much from the same Directive.

In the figure 1 is showed the acoustical planning ("Piano di Classificazione Acustica" PCA for Italian law) elaborated in 2002-'03 by DITAG – Politecnico of Turin for 23 Municipalities of the Susa Valley.

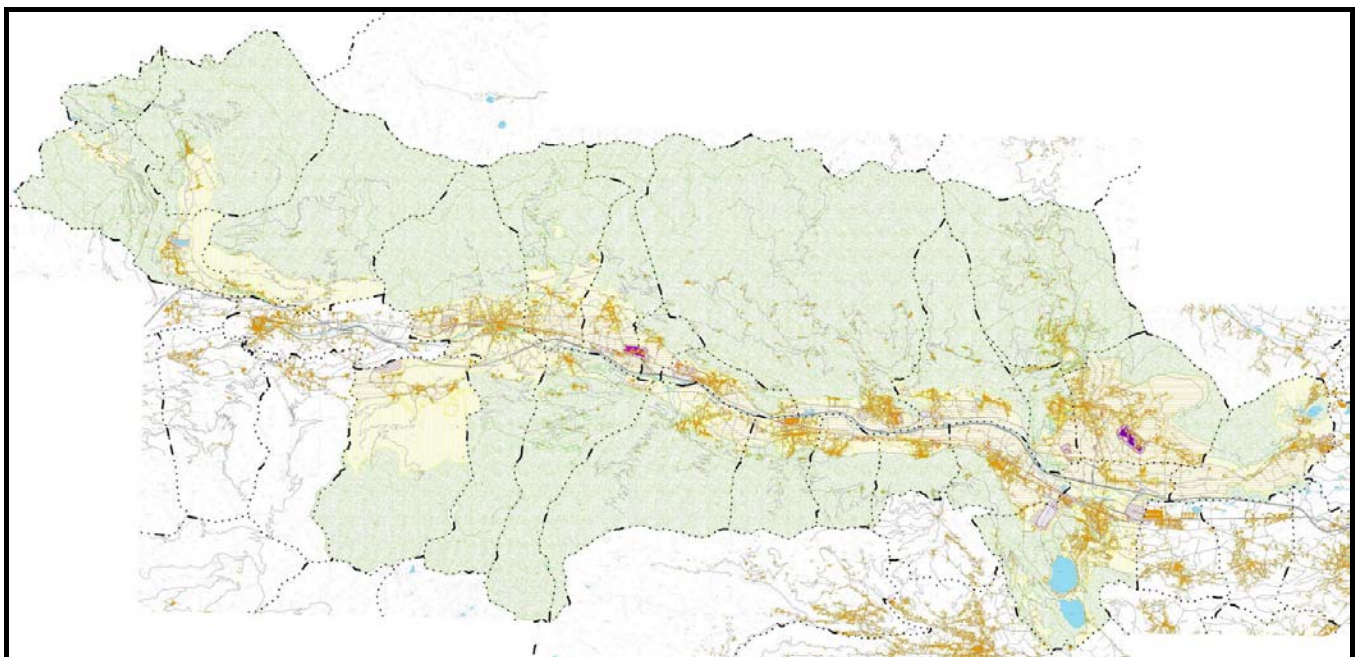


Fig.1 The acoustic classification of the territory interested from the monitoring

2. The measure points

The choice of the measure points has been made based on criticality found is through the study of the plans communal of the territory, is through recognition.

A part of measure points have been select in order to determine the acoustic impact that it produces one determined source in its confronts in agreement with the finality of noise mapping. Such immission is due to the activity of a road, railway infrastructure, or a company with determined workings and to times also to the combination more sources. A second series of points are finalized to evaluation of the acoustical conditions (“clima acustico” in Italian law) in the zone anthropized and sensible.

Greater criticality is those verified in the pressed ones of the sensitive receivers, schools and cemeteries in the road and railway infrastructure vicinities, which shows of the advanced values of LAeq much to how much established from the Law 447/95 [2], law picture in acoustic pollution matter acclimatizes them and from DPR 30/03/04 n.142 [3] relative to deriving the pollution the traffic to veicular, in which it arranges the protection to the sensitive receivers to the inside of the bands of pertinence of street infrastructures with diurnal limits of LAeq of 50 dB(A) and 40 dB(A) nocturnal.

The measurements have been 33, on 28 points of measure (in figure 1 come indicate the points on the cartography of the area). It has had a duration that goes from a minimum of 30 minute to a maximum of one week. The measures have been executed are in strongly antropizated zones, are in zones deserted in total harmony with the natural processes of the territory. The quota the measure points goes from 200 m s.l.m. until approximately 1000 m s.l.m.

The measures have been carried out in the period of two years in various periods of the year, for being able to estimate, where necessary the variations deriving from the meteorological conditions.

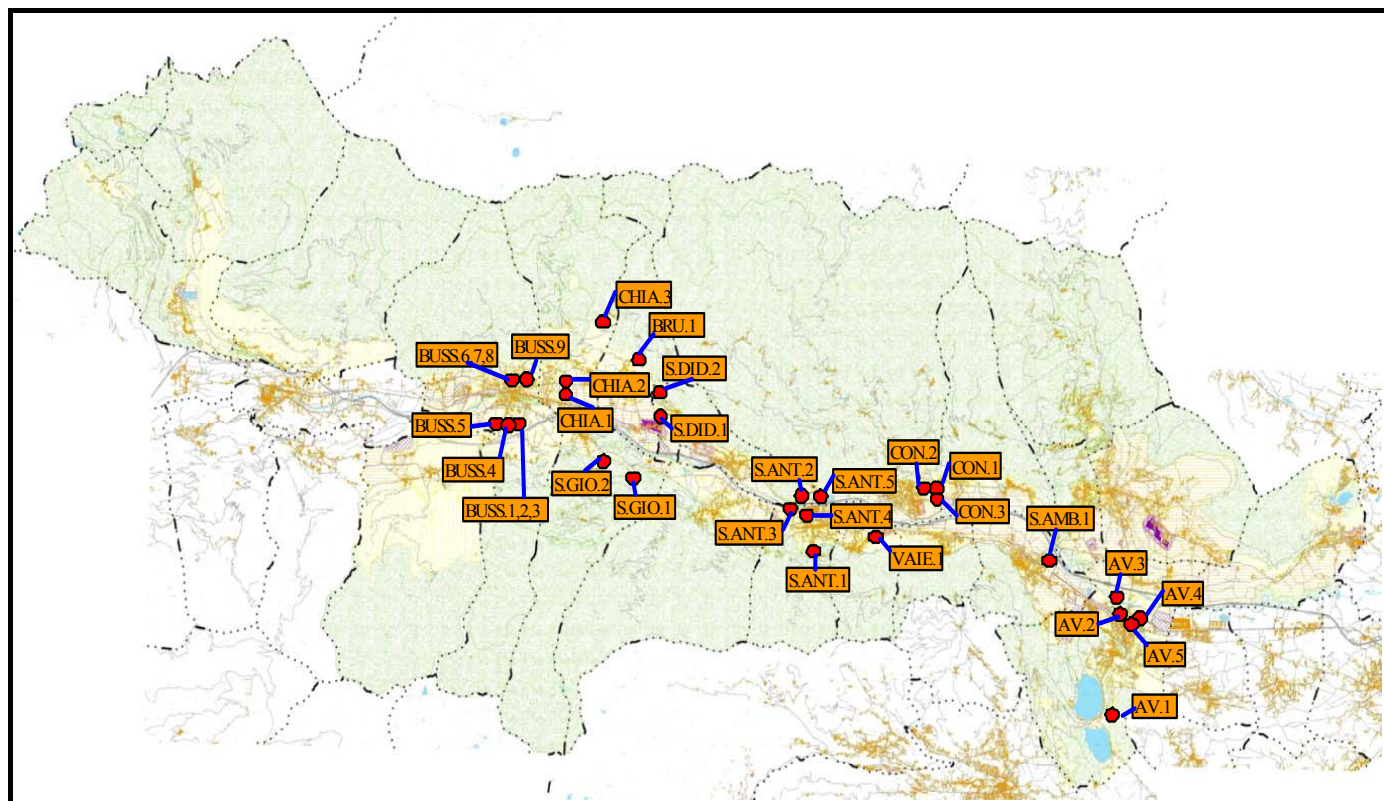


Fig.2 Points of measure

Recapitulation of the limits of the single acoustic Classes:

classes of destination of use of the territory		times of reference:	
		<i>day(6.00-22.00)</i>	<i>night (22.00-06.00)</i>
I	particularly protect areas	45	35
II	mostly residential areas	50	40
III	areas of mixed type	55	45
IV	areas of intense human activity	60	50
V	mostly industrial areas	65	55
VI	exclusively industrial areas	65	65

3. Results of measurements

From the 33 campaigns of measure some of results are in the table 1, the most meant between those obtained. For Tab.1 has been chosen the structure of DPSIR, but the “Response” are not present because out of scope of this paper.

DRIVING FORCE		PRESSURE			STATE						IMPACT			
Point	Suorce	Observation time (h.m.)	Leq(A)[dB(A)]		Class	Llim [dB(A)]		Band	LlimBand [dB(A)]		ΔPCA		ΔBAND	
			Day	Night		Day	Night		Day	Night	Day	Night	Day	Night
SGIO1	/	2h 16m	46,0	/	I	45	35	/	/	/	+1,0	/	/	/
BRU1	Prod.Activity	3h 11m	56,5	/	I(s.r.)*	45	35	/	/	/	+ 11,5	/	/	/
BUSS1	Prod.Activity	24h 30m	60,1	59,9	II	50	40	/	/	/	+ 10,1	+19,9	/	/
AV1	Road	24h 30m	55,5	51,6	II	50	40	A	70	60	+5,5	+11,6	-14,5	-8,4
SANT4	Road	168h 00m	63,8	58,8	I(s.r.)*	45	35	(A)	45	35	+18,8	+23,8	+18,8	+23,8
CHIA2	Railway	23h 51m	68,7	68,2	III	55	45	A	70	60	+13,7	+23,2	-1,3	+8,2
CHIA1	Railway	23h 21m	64,7	62,2	II	50	40	A	70	60	+14,7	+22,2	-5,3	+2,2
SAMB1	Prod.Activity Railway	24h 31m	53,7	53,4	II	50	40	B	65	55	+3,7	+13,4	-11,3	-1,6
VAIE1	Prod.Activity Road	35m	58,6	/	II	50	40	B	65	55	+8,6	/	-6,4	/
SANT5	Prod.Activity Railway Road	66h 24m	64,1	68,8	I(s.r.)*	45	35	B	45	35	+19,1	+23,8	+19,1	+23,8

Tab.1: Results

*s.r.: sensible receiver (school, hospital, cemetery,)

The limits listed are exceed of a value that varies from the 6 to beyond 20 dB(A).

An example, on all, is that of the scholastic area of the point S:ANT4, in which through a monitoring of a week (of which it is brought back in pic.3 the Time history), has been evidenced an overcoming of the limits that varies medium from the 15 to the 20 dB(A) every day, while of night it goes from the 22 to the 25 dB(A).

The overcoming of the nocturnal acoustic limits has an importance much inferior, because the anthropic activity that is developed to the inside of a scholastic building in the nocturnal period is null.

Beyond to the sensitive receivers there are also of the residential receivers of class II and III in bands of pertinence of the railroads, that they endure an elevated acoustic pollution.

The example is that one of point CHIA2, in which the residenziality in the pressed of the railway they are subordinates to a LAeq that has a difference of little dB between the diurnal and nocturnal period. For which of day it comes respected the limit place from DPR 18/11/98 n. 459 [4], that inside the bands of pertinence A of the railway, but not the limit indicated from the Acoustic Class of the Acoustic Classification; while of night it does not come respected not even, already elevated, limit of bands of pertinence A.

In detail, in the specific case, the limit of acoustic class II with the adoption of the pertinence bands comes carried from the limit of 50 dB(A) diurnal and 40 dB(A) nocturnal to a limit, of 70 dB(A) diurnal and 60 dB(A) nocturnal for band it of pertinence To and 65 dB(A) diurnal and 55 dB(A) nocturnal for band it of pertinence B.

It turns out obtained to you in the nocturnal survey of point CHIA2, show a LAeq of 68,8 dB(A) for point 1, which for the acoustic classification it is in class III and the one LAeq of 62,2 dB(A) for the point 2 in acoustic class II diurnals and 55 dB(A) nocturnal for band of pertinence B.

The results obtained in the nocturnal measurements of point CHIA2 show a LAeq of 68,8 dB(A), which for the acoustic classification it is in class III and nearly in the point CHIA1a LAeq of 62,2 dB(A) which in acoustic class II.

4. Conclusion

The case study analyzed has indicated how a rural zone in deep alpine valley can modify the acoustic climate through the excessive insertion of transport infrastructures and errors of city planning, on acoustic base, placing productive activities in zones in which future anthropized is hypothetical or however there is a modest presence of population yet.

Aggravating of the physical situation it is the Italian norm that demands the insertion of bands of acoustic pertinence, for infrastructures of transport, not consistent dimensions to the morphology of a alpine valley, which in some drawn is inferior width to the same bands of pertinence.

Concerning the population is certain the limits of the bands of acoustic pertinence (70 dB(A) diurnal 60 dB(A) nocturnal in the first 100 meters, and 65 dB(A) diurnal and 55 dB(A) nocturnal in following 150 m came caught up without being exceed, would place a series of problematic tied to the health.

The excessive acoustic pollution on sensitive and residential receivers can be reduced through of the participations of reorganization.

The participations of reorganization have the following scale of priority:

- directly on the noisy source;
- along the way of propagation of the noise from the source to the receiver;
- directly on the receiver.

The participations on the receiver are permissible in the moment in which it is to technical level that economic the other participations are not realizable. Moreover such participations have the asset of being of the timely methods of reorganization, but they do not guarantee an implementation to the law limits, which it can be created with a plan to mean - along term, through the adoption of a City Plan of the Traffic, the insertion of fonoadsorbent street mantles and the possibility to have of the vehicles with minor an acoustic impact.

It goes emphasized that in the Acoustic Classification there is a homogenization between the several areas, that is us they cannot be adjacent acoustic polygons with more than one class than difference, for which maximum 5 dB of difference between the two polygons. But with the introduction of DPR 30/03/04 n.142 it can to happen, and it is frequent, that a class II is adjacent with band of pertinence of the infrastructure, that has of the equal limits to Class IV, for which finds a difference of 10 dB(A) resultant from a jump of class between the two adjacent polygons. In this case the law cannot demand homogenization and much less it indicates the way: the contrast between the various law is real and evident and it does not allow to the attainment not even of the objectives minimums of protection of the population, accepting and imposing also for the residential zones values limit (in particular nocturnal) does not adapt to the rest conditions that the same WHO and the Directive 2002/49 CE ask to guarantee.

5. Reference

- [1] Directive 2002/49/CE Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise.
- [2] LEGGE 26/10/1995, n. 447 “Legge quadro sull'inquinamento acustico”.
- [3] DPR 30/3/2004 n.142, “ in materia di prevenzione ed contenimento dell'inquinamento da rumore avente origine dalle infrastrutture stradali.
- [4] DPR 18/11/1998, n. 459. “Regolamento recante norme di esecuzione dell'articolo 11 della legge 26 ottobre 1995, n. 447, in materia di inquinamento acustico derivante da traffico ferroviario”.
- [5] M. Clerico, G. Soffredini, 2003, The noise mapping of a rural land in a narrow valley, First Congress of Alps Adria Acoustics Association and third Congress of Slovenian Acoustical Society, Portaroz, Slovenia, proceedings pp 445-452.