

QUADMAP
quiet urban areas

Closing Conference QUADMAP

19-20 February 2015

QUIET URBAN AREAS IN BILBAO ISLAND SOUND STRATEGY



Itziar Aspuru (TECNALIA): itziar.aspuru@tecnalia.com

Igone García (TECNALIA): igone.garcia@tecnalia.com

Karmele Herranz (TECNALIA)

Alvaro Santander (TECNALIA)

Cesar Conde (TECNALIA)

Fran Vinez (Ayuntamiento de Bilbao)

*María Teresa Fernandez Bustamante
(Ayuntamiento de Bilbao)*



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“To transform knowledge into GDP”.

Non profit Foundation
Research Center

- ✓ Sustainable constructions
- ✓ Energy and Enviroment
- ✓ Innovation Strategies
- ✓ ICT-European Software Institute
- ✓ Heath
- ✓ Industry and Transport
- ✓ Technological Services

1415 people, 21 locations, 4000
client, 15 NTBCs and 303 patents



“to make Bilbao a space for
sound coexistence to provide
quality of life to citizens”

More than 350,000 inhabitants. In a
metropolitan area with 1 million.

In the last 50 years a deep urban
trasformation, from and industrial
municipality to a service one.
With new challenges regarding the
activation of the city to become a
lively and economically dinamic one
in all the district



Island Sound Strategy



“absolute” and “relative”

Island Sound: “(public) area with a soundscape that promotes relaxation”.

Acoustic Comfort for “quiet”, “tranquil” “peaceful” activities.

At least one per district.

Thresholds that must be met:

- ✓ LAeq (noise)
- ✓ Sound pressure levels (absolute)
- ✓ % people that would use it for resting
- ✓ % people highly satisfied with the area (global).



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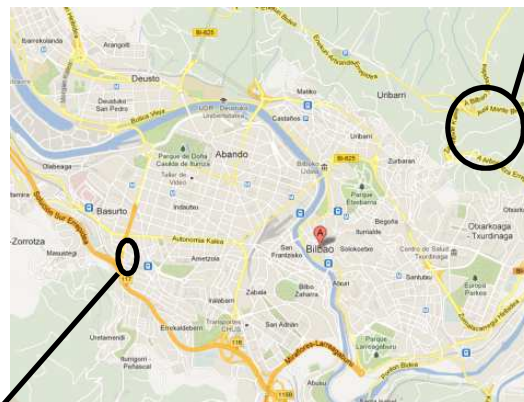
Quadmap Pilot Cases

Bilbao



Case study **Urban Area:**
General Latorre Square

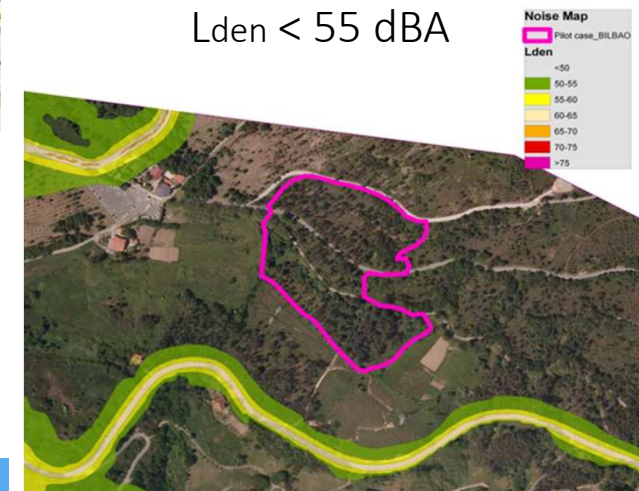
Used for resting
To be renewal



Case study **Peri-Urban Area:**
Green Ring recreational area

Used natural value
(walking)
To be maintenance
(greenery)

Lden < 55 dBA



Quiet Areas Assesment to define the
intervention/manteinance activities
to promote quietness



Assesment

Method fot Quiet Areas Assesment

Analysis of Non Acoustic Criteria (expert, visits): landscape, cleanliness and maintenance, safety, urban context, proximity, accessibility, proximity to noise sources, multi-source scenario, noise reduction interventions, *behavior analysis*.

Psychosocial analysis (questionnaires): sound/acoustic variables and also general information.

Analysis of Acoustical Factors (measurement and recordings): L_{Aeq} , Sound events, Noise Mapping (binaural recordings)

- ✓ Short time: to be linked to the psychosocial analysis.
- ✓ Long time: to analize the evolution and fluctuation during time periods, week days and seasons.

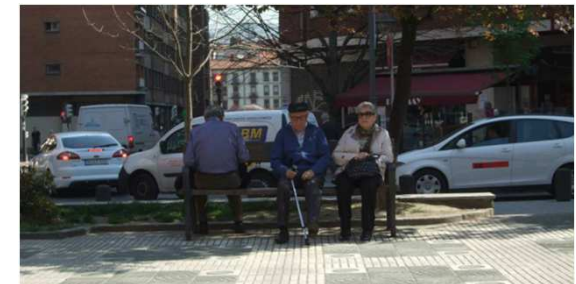


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PRE-OPERATIONAL STAGE_2012: GENERAL LATORRE

Non Acoustic Criteria- Remarkable Aspects

- Far from key points
- Presence of a multi-sources scenario
- Mainly use
 - At mid day and during the evening
 - for resting, social interaction, reading and relaxing (benches fully occupied) and going through.
 - by elder people > 50 years old.
- Presence of a few homeless (that can imply an insecurity perception) who use benches and drinking-water fountain.

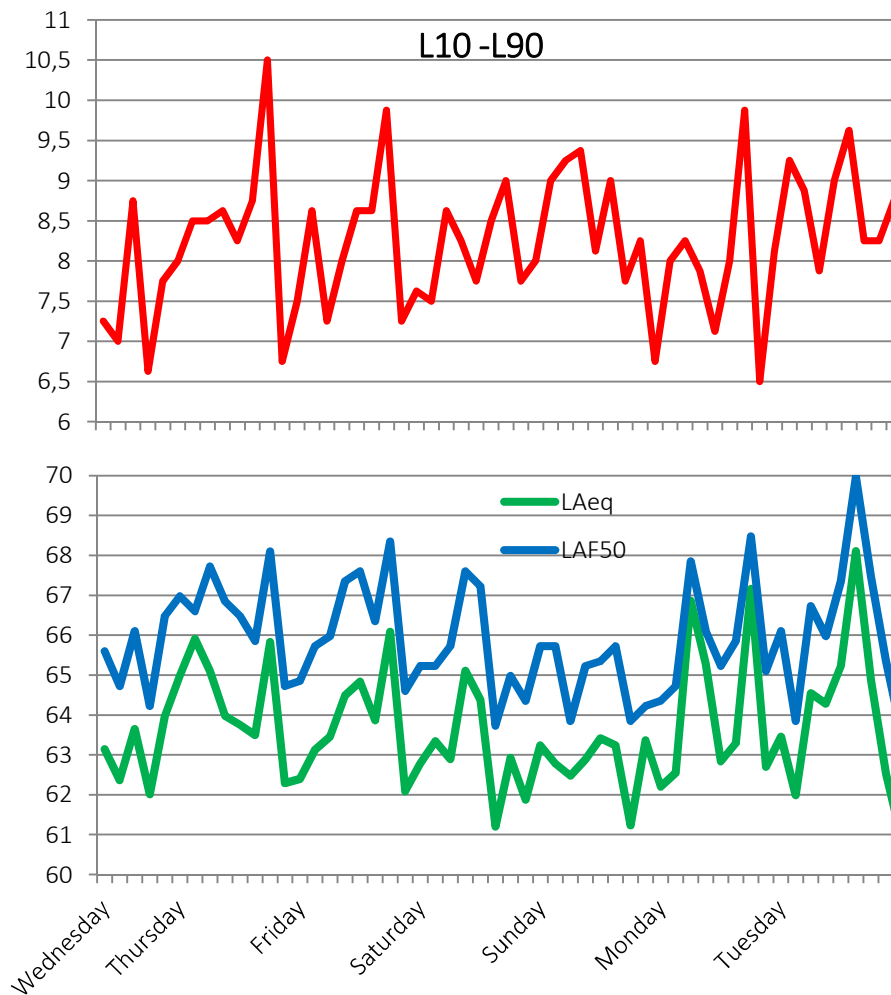
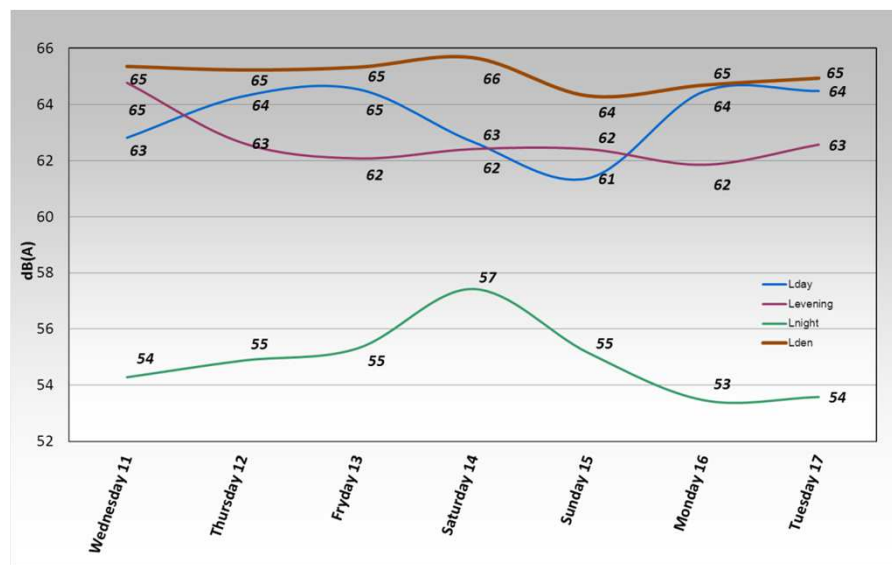


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PRE-OPERATIONAL STAGE_2012: GENERAL LATORRE

Analysis of Acoustical Factors

Long term measurements



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PRE-OPERATIONAL STAGE_2012: GENERAL LATORRE

Psychosocial analysis -Remarkable Aspects

Sample: 85 people

% users consider sound atmosphere as:

32.9 % CALM

37.6 % PLEASANT

37.6% CONGRUENT

% users perceived the area as: (free evocation in open question)

18.8 % safety

21.2% clean and maintenance

28.2% accessible

9.4 % pleasant from a visual point of view (free evocation in open question)

-Sound sources (dominant): traffic (unpleasant) and birds (pleasant).

-Activity: passing by (53%), enjoying their free time (20%), shopping and errands (11%), waiting for someone (7%).

-Reason for use: going through or relaxing.

-Duration stay: less than 15 minutes.



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PRE-OPERATIONAL STAGE_2012: GENERAL LATORRE

Analysis of Acoustical Factors –Sort term measurements Remarkable Aspects

	Morning		Evening	
	11:00-11:30	11:30-12:00	18:00-18:30	18:30-19:00
L _{Aeq}	67 dBA	62 dBA	64 dBA	62 dBA
Events (negative)	6	8	9	2
Events (positive)	0	0	0	0



ESEI Index:
Morning: 4,8
Evening: 5,4



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PRE-OPERATIONAL STAGE_2013: GREEN RING AREA

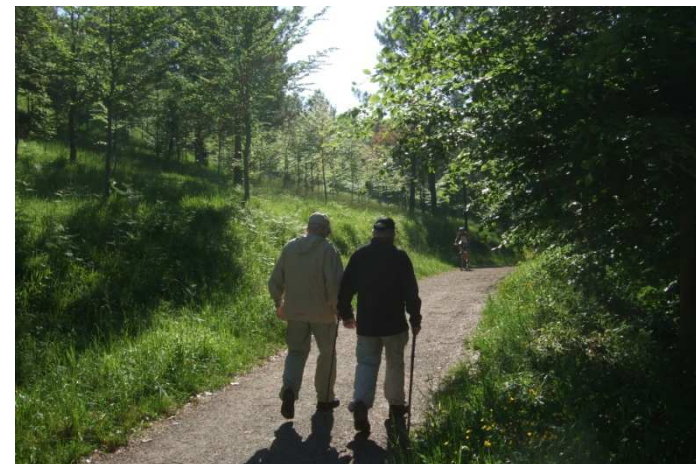
Non Acoustic Criteria- Remarkable Aspects

- 2 km far from the city center.
- Presence of a multi-sources scenario.
Sound of the background of Bilbao city and natural sources (birds, insects and wind)
- Walking and resting with different users depending on the periods of the day and week:

All days: pilgrims

Labour days: mountaineers, and elder and employed people

Weekend: families and residents in nearby urban area.



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PRE-OPERATIONAL STAGE_2013: GREEN RING AREA

Psychosocial analysis- Remarkable Aspects

Sample: 38 people (invited)

% users consider sound atmosphere as:

60.5 % CALM

76.3 % PLEASANT

66,7 % CONGRUENT

% users perceived the area as: (free evocation in open question)

60.6 % safety

69.7 % clean and maintenance

75% accessible

80.7 % pleasant from a visual point of view (free evocation in open question)



-Sound sources (dominant): natural sound (pleasant) and traffic (unpleasant).

-Activity: passing by and walking (100%)

-Reason for use: contact with nature.

-Duration stay:

33% more than 120,

26% 31-60,

22% less than 16 minutes.



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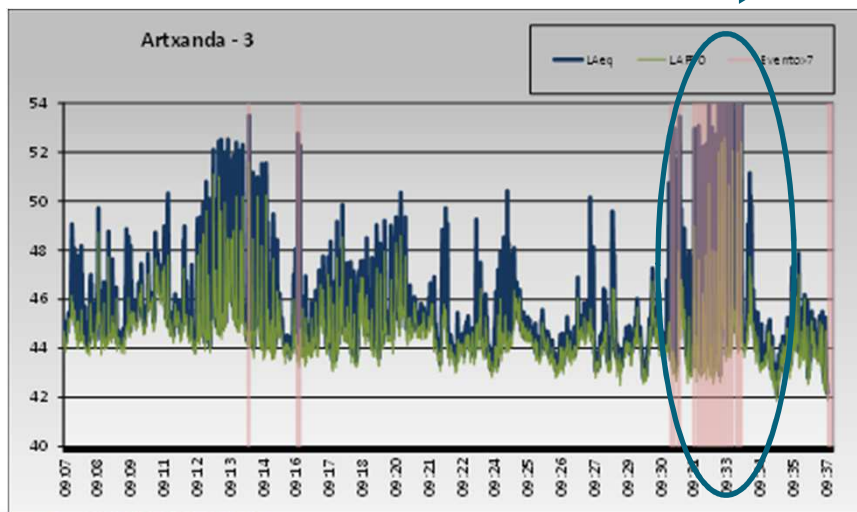
PRE-OPERATIONAL STAGE_2013: GREEN RING AREA

Analysis of Acoustical Factors -Remarkable Aspects

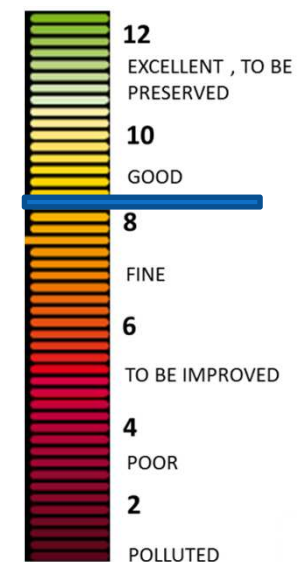
	Morning		
	8:00-8:30	8:30-9:00	9:00-9:30
LAeq	47 dBA	46 dBA	46 dBA
Events (negative)	6	3	28
Events (positive)	0	0	19



Birds singing



ESEI Index: 8,5



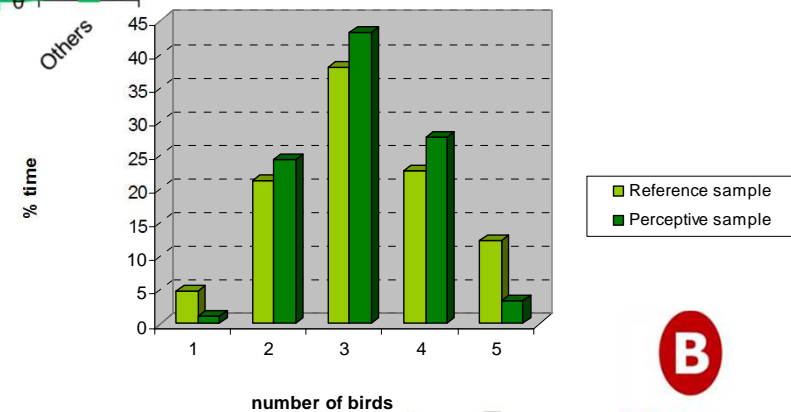
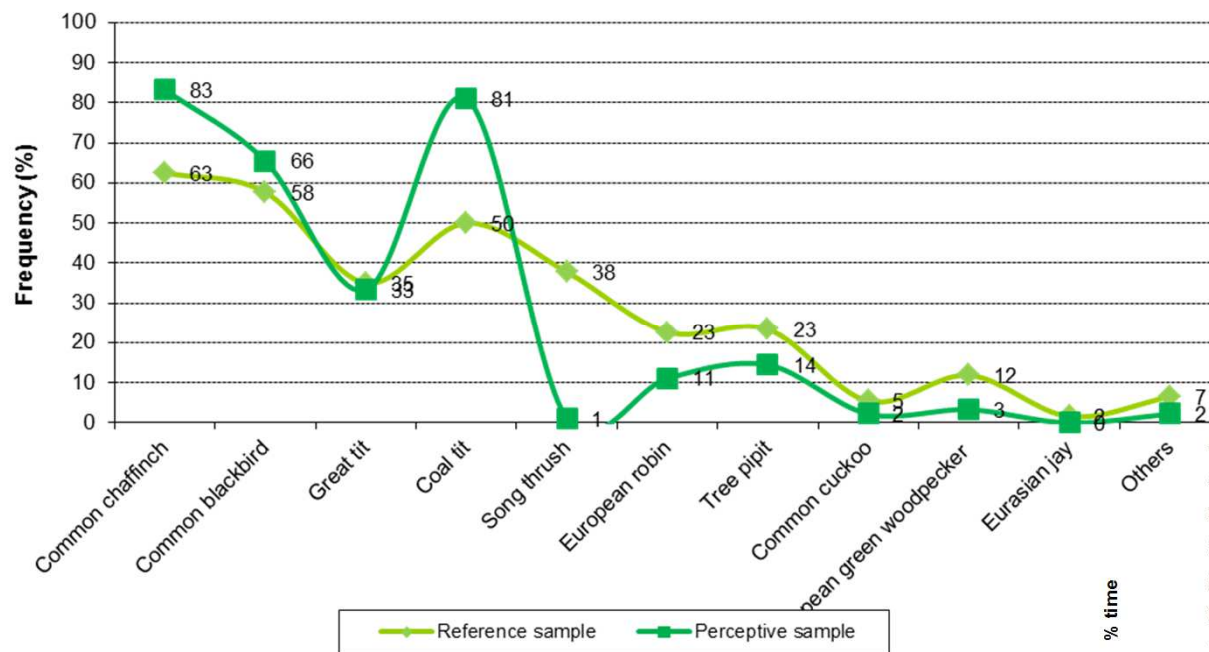
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PRE-OPERATIONAL STAGE_2013: GREEN RING AREA

Biodiversity Analysis



Appart from the number of birds (positive events),
can the type of song influence the perception of
quietness?



number of birds
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PRE-OPERATIONAL STAGE: CONCLUSIONS

General Latorre square is not a QUIET AREA
neither an Island Sound. Actions must be
integrated in the renewal process:

Reduce Traffic noise and its events (possibilities)

- P1: Traffic reorganization (traffic directions)
- P2: Creating a pedestrian preference area
- P3: Give fluency to the traffic (avoid events of traffic jam)
- P4: Urban barrier for traffic noise (street Felix Landin Dotorea)
- P5: Increasing sound absorption

Modify dominant sound sources and increase positive events

- P1: Improving and adding greenery.
- P2: Urban furniture with water.
- P3: Increasing presence of children in the area (less than 3 years old)

Green Ring is a QUIET AREA

- ✓ Analyzing the posible influence of maintenance activities on acoustic biodiversity.
- ✓ Analisising the influence of acoustic biodiversity (in terms of type of events in the quieteness perception (or acoustic quality)



Interventions IN GENERAL LATORRE

(OCT 2012-JAN 2013)

The project...



- ✓ Increasing the pedestrian accessibility:
 - Creating elevated pedestrian steps and marked for pedestrian priority
 - Reducing the height differences in the square to leave a maximum gradient of 1.5 %
- ✓ Creating visual permeability:
 - Opening the square to the pedestrian pathway
 - Creating clear pedestrian itinerary.
- ✓ Improving the construction quality in materials and services: putting 43 trees in the area and increasing the presence of benches.
- ✓ Increasing the resting area in the square (the total surface has been increased, almost double) and the area for greenery (a 60% of increase).
- ✓ Acoustic confort in the area

Noise reduction actions in the noise source:

- Low noise pavement.
- More traffic fluency (Pablo Alzola-Pintor Lekuorra streets): parking space elimination.
- Reduction of speed (Pablo Alzola – Estrada Mala streets): using elevated pedestrian steps.

Actions to protect the resting area in the square (1 meter high):

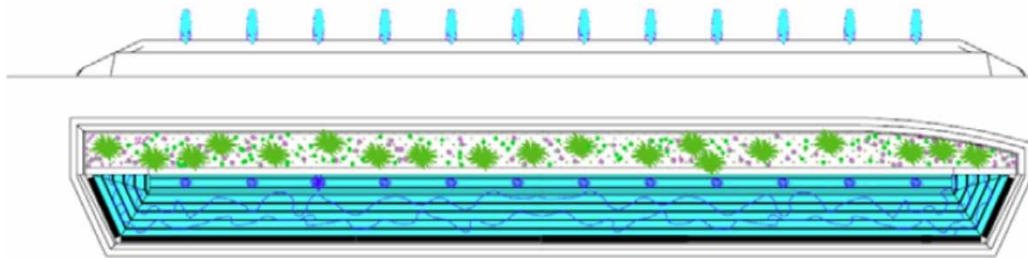
- 1 meters high hills with greenery.
- Urban barrier for traffic noise combined with urban furniture with water: 12 vertical water dispenser that generate natural sound events and contributes to modify the acoustic atmosphere.



Interventions IN GENERAL LATORRE

(OCT 2012-JAN 2013)

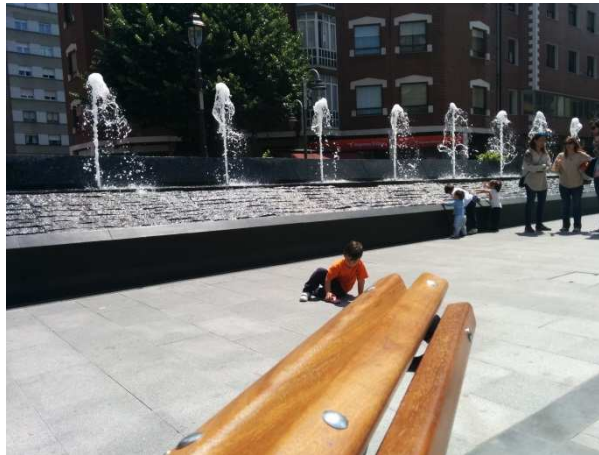
The fountain...



Interventions IN GENERAL LATORRE

(OCT 2012-JAN 2013)

The result...



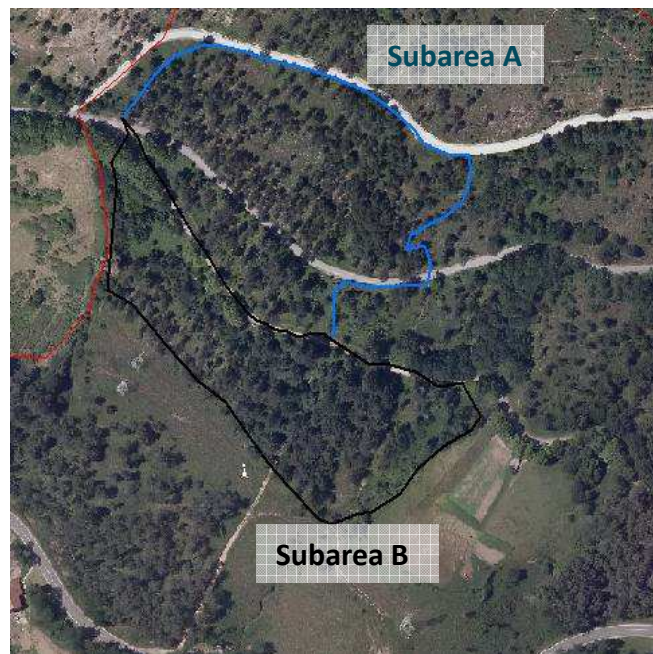
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B
Bilbao
UDALA
AYUNTAMIENTO

Maintenance Activities IN Sta MARINA

(FEB 2014)

Selective tree thinning of non-autochthonous plants: Pinus Pinaster that was developed during February 2014



Subarea A: 29 trees were cut, from 210 trees/ha to be 198 trees/ha.

Subarea B: 24 trees were cut, from 242 trees/ha to be 329 trees.



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Maintenance Activities IN Sta MARINA

(FEB 2014)



Post-operam (2014)_GENERAL LATORRE

Acoustic Criteria (comparison)

	Morning		Evening	
	11:00-11:30	11:30-12:00	18:00-18:30	18:30-19:00
LAeq	64 dBA (-3)	66 dBA (+4)	64 dBA (0)	66 dBA (+4)
Events (negative)	2 (-4)	2 (-4)	2 (-7)	0 (-2)
Events (positive)	0	0	0	4 (+4)

More presence of people and children (an the sound of water) increase the background sound (LAeq) and the number of possitibe envent. The urban barrier reduce the traffic sound and its events (negative ones)

ESEI Index:

Morning: 6 (↑1,2)

Evening: 7 (↑1,6)



Post-operam (2014)_GENERAL LATORRE

Non Acoustic Criteria (comparison)

- More benches (more use for resting) and more easy to go through (increasing surface and modification of leve).
- More presence of children (less than 5 years). Fountain as attraction element.
- Reduction of presence of homeless (more perception of security).

Psychosocial analysis (comparison)

Global pleasantness with the place

PRE-OPERAM	POST-OPERAM
28,2 %	97.5%

% users consider sound atmosphere as:

73.4 % CALM (↑40.5%)

78.8 % PLEASANT (↑41.2%)

% users perceived the area as:

77.2 % safety (↑58.4%)

81% clean and maintenance (↑59.8%)

87.2% accessible (↑59%)

69.6 % pleasant from a visual point of view (↑60.2%)

- **Sound sources (dominant):** from traffic to water, from birds to child. After intervention traffic sound is still remarkable.
- **Activity:** same but including “enjoying nature”
- **Reason for use:** relaxing and enjoying nature
- **Duration stay:** from less than 15 min to more than 30 min.



POST-OPERAM (2014)_SANTA MARINA

Non Acoustic Criteria (comparison): No changes

Psychosocial analysis (comparison)

% users consider sound atmosphere as:

62.2 % CALM (↑1.7%)

79.5 % PLEASANT (↑3.2%)

% users perceived the area as:

68.2 % safety (↑7.6%)

84.1% clean and maintenance (↑14.4%)

90.7% accessible (↑15.7%)

81.8 % pleasant from a visual point of view (↑1.1%)

- Sound sources (dominant): no changes
- Activity: no changes
- Reason for use: no changes
- Duration stay: no changes

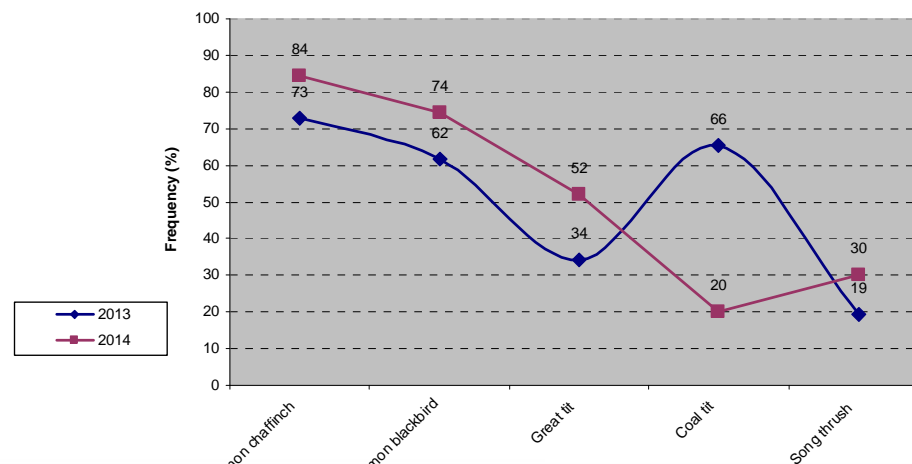
*Global pleasantness
with the place*

PRE-OPERAM	POST-OPERAM
87 %	93.2%

Maintenance developed may affect to the sound perception and affect to the area perception.

Biodiversity Analysis (comparison)

The intervention carried out has not produced significant changes in the composition of the bird community and the behavioral pattern of birds.



POST-OPERAM (2014)_SANTA MARINA

Acoustic Criteria (comparison)

	Morning		
	8:00-8:30	8:30-9:00	9:00-9:30
L _{Aeq}	48 dBA (+1)	48 dBA (+2)	48 dBA (+2)
Events (negative)	0 (-6)	0 (+3)	0 (-28)
Events (positive)	1 (+1)	0	0 (-19)

The result of ESEI are compatible with a soundscape to be preserved.
 But must be highlighted that the ESEI parameter is developed to be apply in urban areas. ¿can the green ring be considered as an urban area? ¿does people's expectations regarding soundscape the same in the green ring than in the city center (GLT)

ESEI Index: 10 (↑1,5)



CONCLUSIONS Quas IN BILBAO

- The composition of sound atmosphere (dominant sound sources) and the number and type of events have more influence on quietness perception than the LAeq (example of GLT).
- Other aspects (safety, clean and maintenance, accessibility, visual) can influence on the perception of quietness. (example of green ring).
- Requirements of quietness in urban and peri-urban areas can be different due to expectations. Different thresholds and approaches (questionnaires) must be defined for open country quiet areas and quiet urban areas.
- The results of the project were not enough to analyze the potential influence of sound biodiversity in quietness/sound quality perception.
- GLT square is the first island sound in Bilbao and it is considered a successful experience in a noisy area.
- The working process for quietness requires:
- Involving citizens in the process (psicosocial evaluations and participatory process) to understand interest and expectations,
- Collaborative work between acousticians and architects from the beginning is required.
- Action Plan should be connected with the strategy of maintenance and renovation of the city: identifying opportunities in the city to incorporate the management of potential quiet urban areas.

