DCMR milieudienst Rijnmond

Assessing and improving the soundscape of urban parks

ICBEN 2014, Miriam Weber

Structure of presentation

1. ‘New branding topic’ of quiet (urban) areas
2. QUADMAP delivering practical approaches
3. Report on ongoing project – no results yet
4. Future challenges and discussions

Today's research : overview by EEA

Topics Data and maps Indicators Publications

You are here: Home / News / Finding Europe's quiet areas

Finding Europe's quiet areas

Topics: Environment and health Noise Urban environment

At least 110 million people are adversely affected by noise from Europe's busiest roads alone. People need to escape this pollution and access quiet places to work, relax and live a healthy life. Such 'quiet areas' should be protected under EU legislation, but how does this work in practice?

Today's research into "quiet (urban) areas"

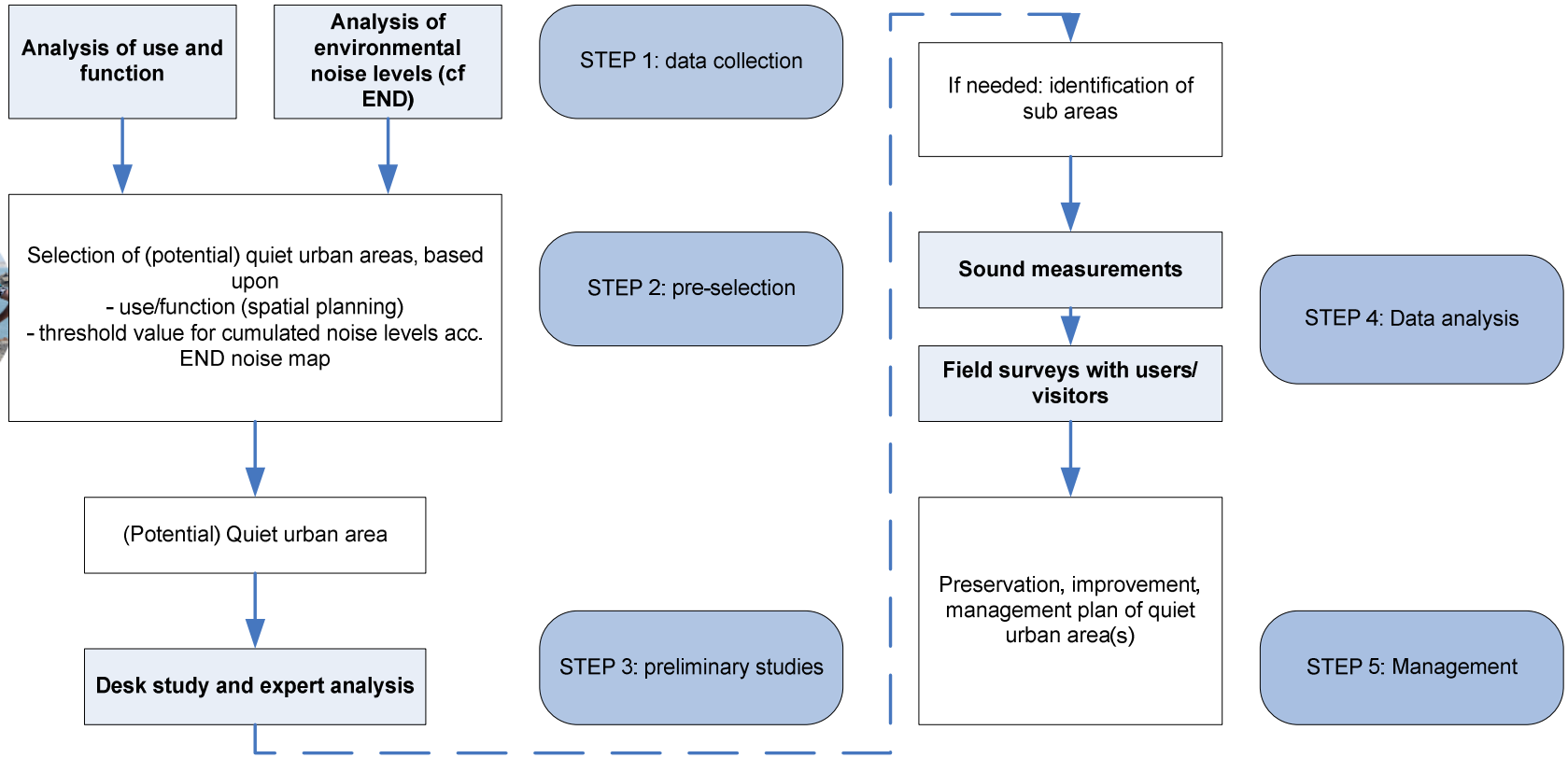
Today's research into "quiet (urban) areas" - QUADMAP

TABLE OF CONTENTS

Welcome to this website which belongs to the QUADMAP project being a LIFE+ project on Quiet Urban Areas. The acronym QUADMAP stands for **QU**iet **A**reas **D**efinition and **M**anagement in **A**ction **P**lans. The project aims to deliver a method and guidelines regarding identification, delineation, characterisation, improvement and managing Quiet Areas in urban areas as meant in the Environmental Noise Directive 2002/49/EC.

The project will also help understand the definition of a Quiet Urban Area, the meaning and the added value for the city and their citizens in terms of health, social safety and lowering stress levels in men.

QUADMAP: proposed methodology (≈EEA Good practice guide on quiet areas)



Preselection of (potential) quiet urban areas

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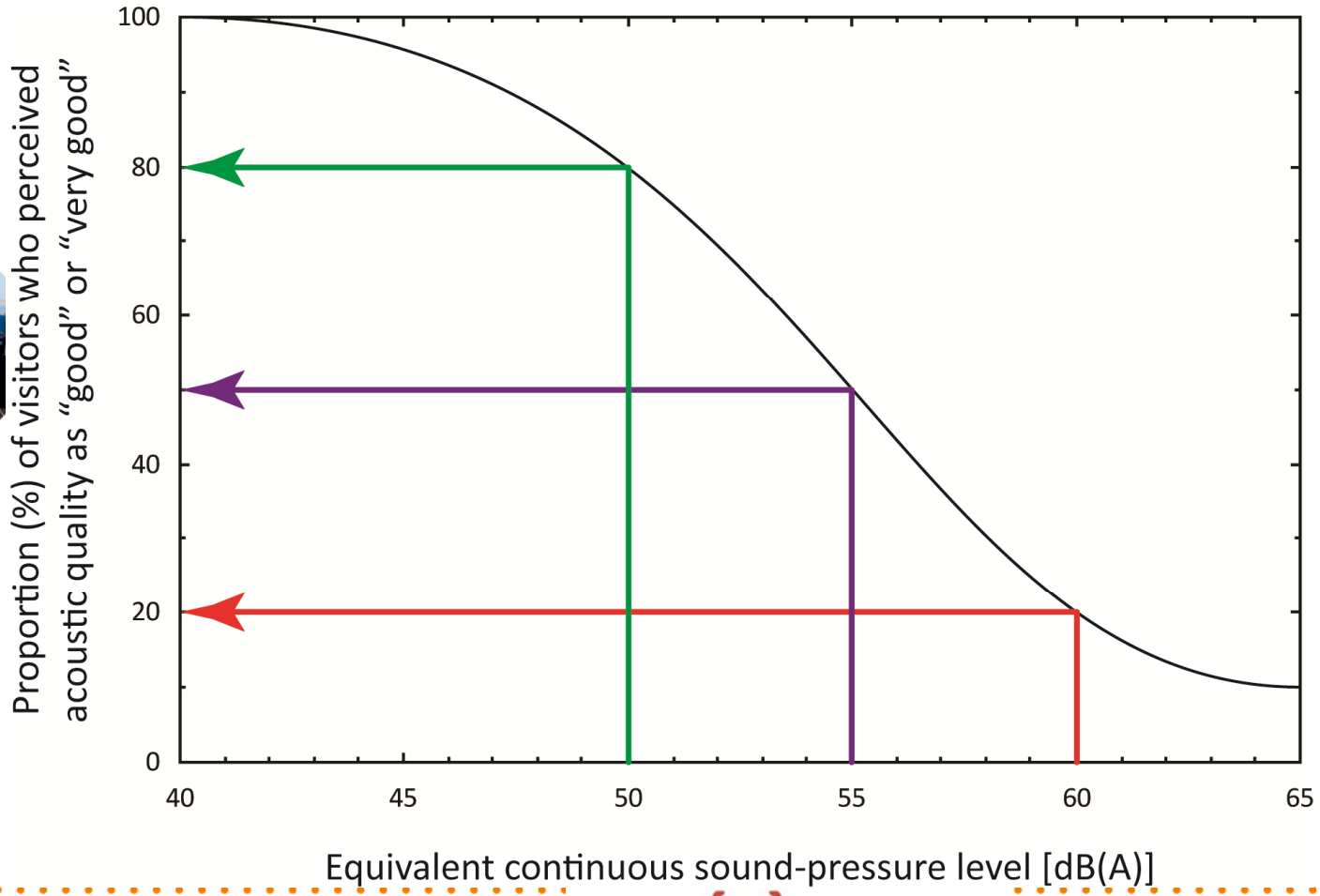
Methodologies/approaches

→ Noise map (cf END) of cumulated environmental noise sources

→ rQUA method for sound gradient or sound contrast analysis

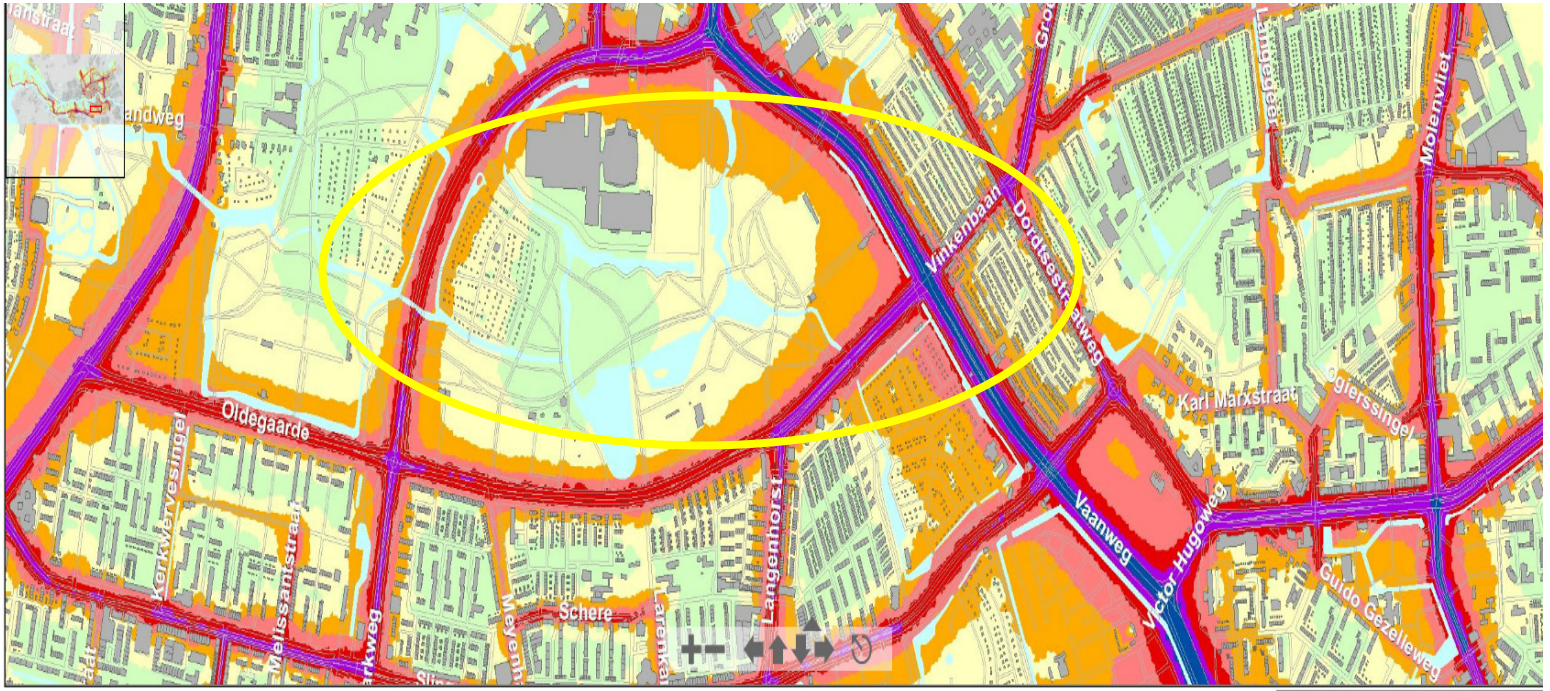
Colour	$Lden\_absolute$ dB(A)	$\Delta = Lden_{\_arithmetic\_average} - Lden\_absolute$
Green	≤ 55	> 10
Yellow	≤ 55	≤ 10
Orange	> 55	> 10
White	> 55	≤ 10

Preselection: based upon sound levels?



Source: Nilsson 2007

Preselection: example from Zuiderpark (1)



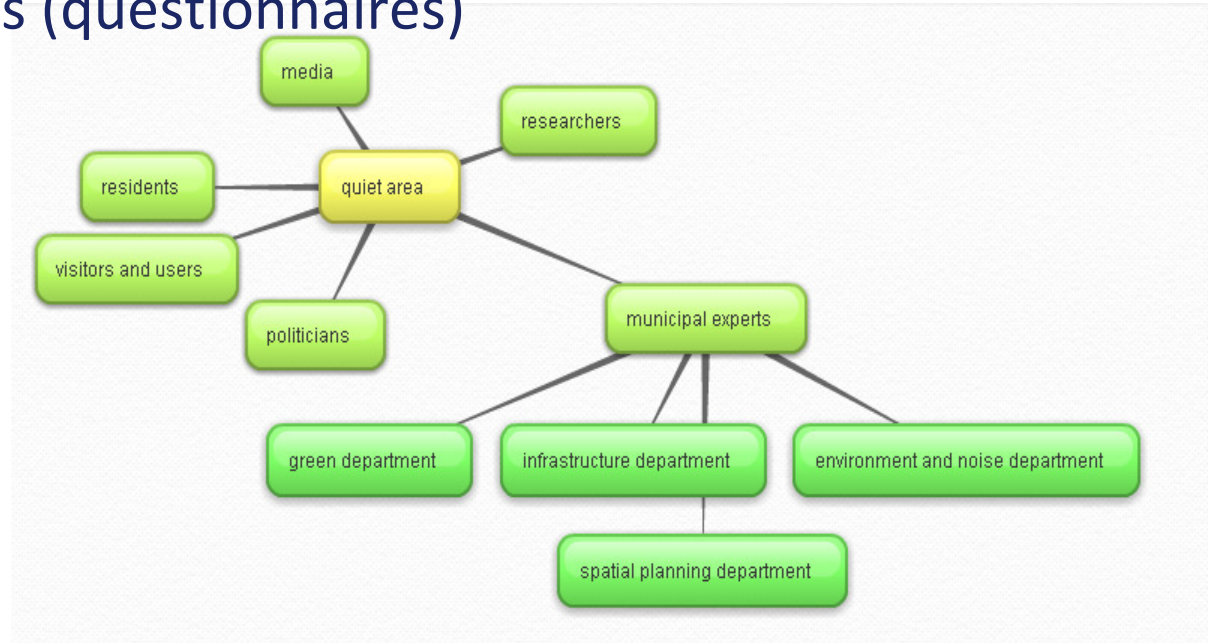
Preselection: example from Zuiderpark (2)

Preselection: example from Zuiderpark (3)

Description and analysis of quiet urban areas

Methodologies/approaches:

1. Expert analyses
2. Noise measurements
3. Field surveys (questionnaires)



Expert analysis: example from Zuiderpark (1)

Criteria	Description	Parameters	Rating	Comments, explanations
Urban equipment	Presence and location of urban equipment	% m^2 or n. of benches, games and other facilities		
Proximity from/to noise sources	Proximity to noise sources means possible high noise levels. If users can see noise source it influences on their noise perception psychologically.	Main noise source is next to QUA and it is visible by users Main noise source is next to QUA and it is invisible by users Main noise source is far to area		Depending upon which position within the park. Along the borders of the park main roads that are visible, but ample opportunity to get deeper in the park and out of sight (and ear) of noise sources.
Presence of a noise sources	Presence of one or more kind of noise sources	Road, rail and airplane traffic noise Road and rail traffic noise Road traffic noise		See above regarding road and railway (metro) noise
Taxonomy of noise sources	Identification and classification of noise sources	Traffic sounds (cars, tractors, buses, planes)		All sources can be heard in different parts of the park and in different combinations (and perception/valuation).

Expert analysis: example from Zuiderpark (2)

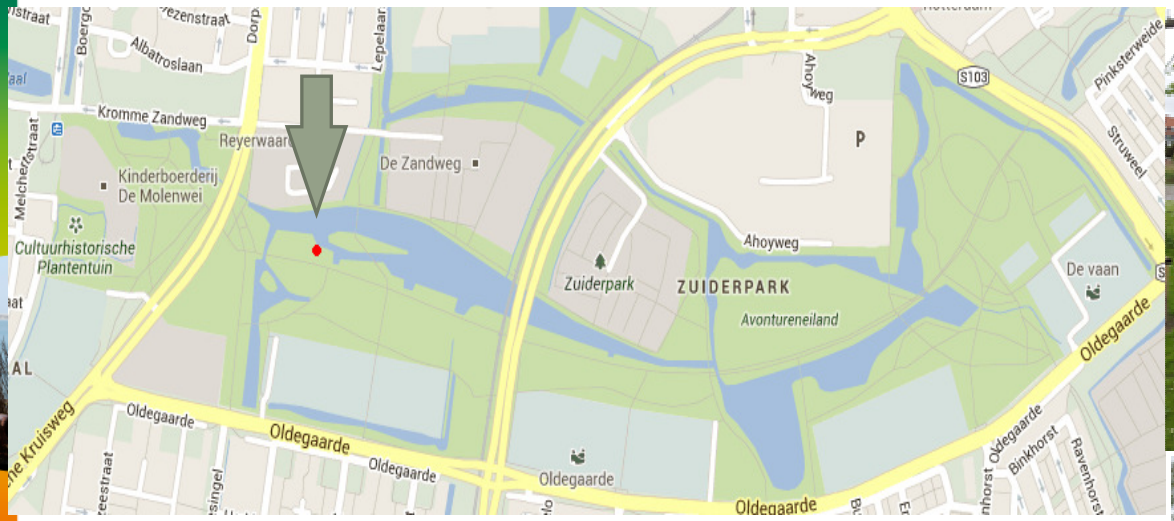
Criteria to be scored are the following:

→ 'Visual' factors (e.g. landscape, natural elements, cleanliness and maintenance);

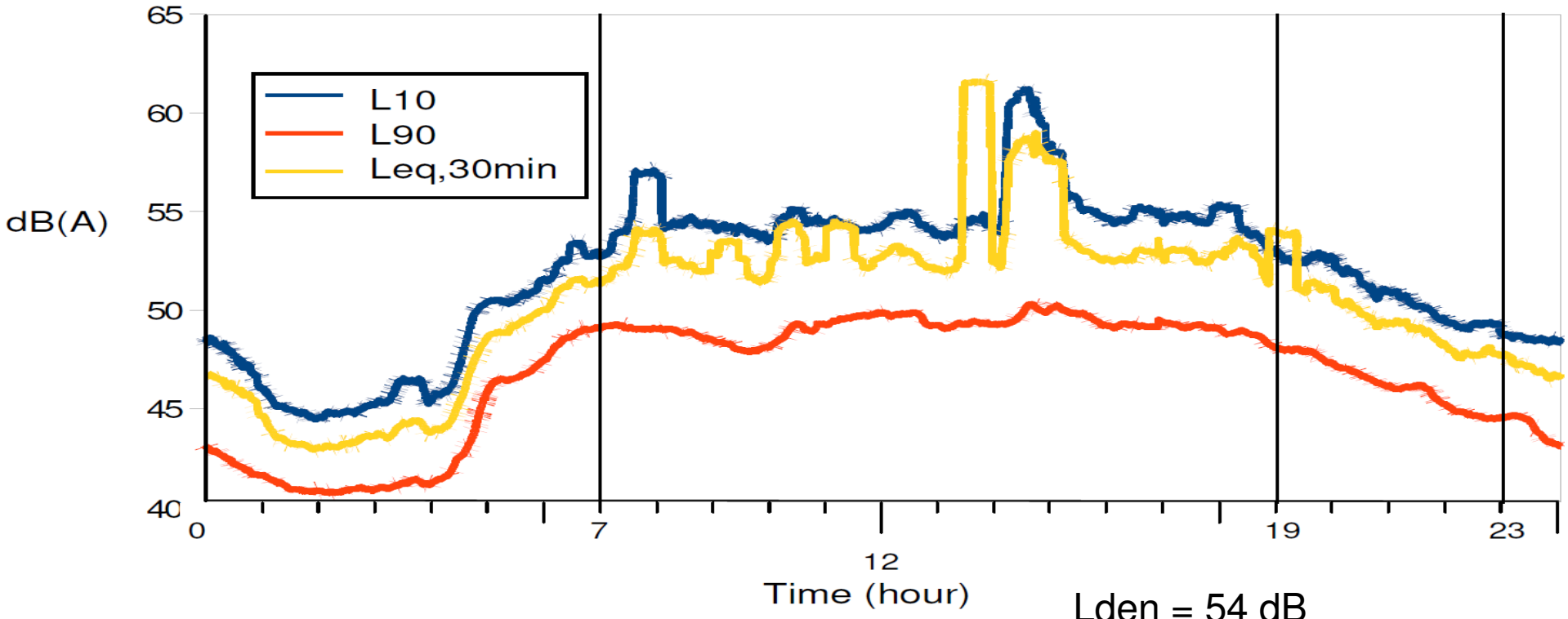
→ General area characteristics and acoustic factors (e.g. urban context, proximity from/to residential areas, accessibility, proximity from/to noise sources, presence of noise sources, and options for noise reduction interventions);

→ 'Behavioural and social' factors (e.g. safety, number of users, distribution of users, activities performed by users)

Noise measurements: example Zuiderpark (1)



Noise measurements: example Zuiderpark (2)



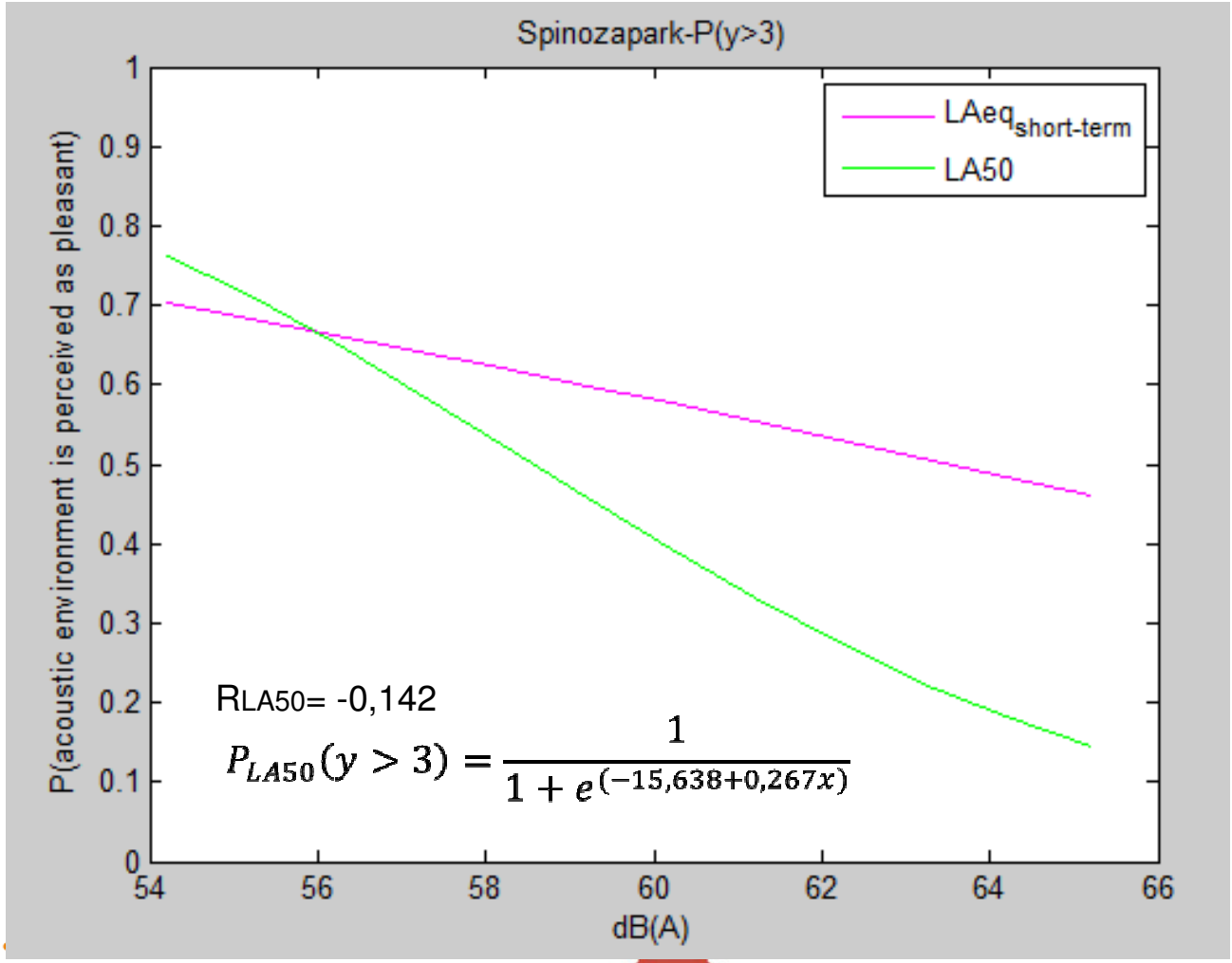
Lden = 54 dB

Lnight = 50 dB

L10 = 54 dB

L90 = 48 dB

Noise measurements: example LA50 short term



R_{LA50}= -0,142

$$P_{LA50}(y > 3) = \frac{1}{1 + e^{(-15{,}638+0{,}267x)}}$$

Noise measurements: long term

- → Validation of noise maps
- → Scenario studies of (acoustic) intervention effects (modelled and calculated)
- → Evaluation variability acoustic climate in terms of average noise levels based upon LAeq or LA50
- → Evaluation variability acoustic climate in terms of peaks based upon LA10-LA90
- → Identification of (acoustically) homogenous time periods

LA50(T) - 3 < LA50(hour) < LA50(T) + 3 or
LAeq(T) - 3 < LAeq(hour) < LAeq(T) + 3 or
LA10-LA90(T)-3< LA10-LA90(hour) < LA10-LA90(T)+3

Field surveys: questioning visitors/users of quiet urban areas

- → Sound sources and perception
- → Soundscape semantic differentials
- → Valuation of area specificities, such as safety, accessibility, facilities
- → Characteristics of visits, such as duration, frequency, activities
- → Valuation of acoustic quality as well as overall quality

Field surveys: indicators for appraisal (1)

→ Example from Rotterdam pilots of (highest) correlations of indicators from field surveys (statistically significant $p < 0,05$)

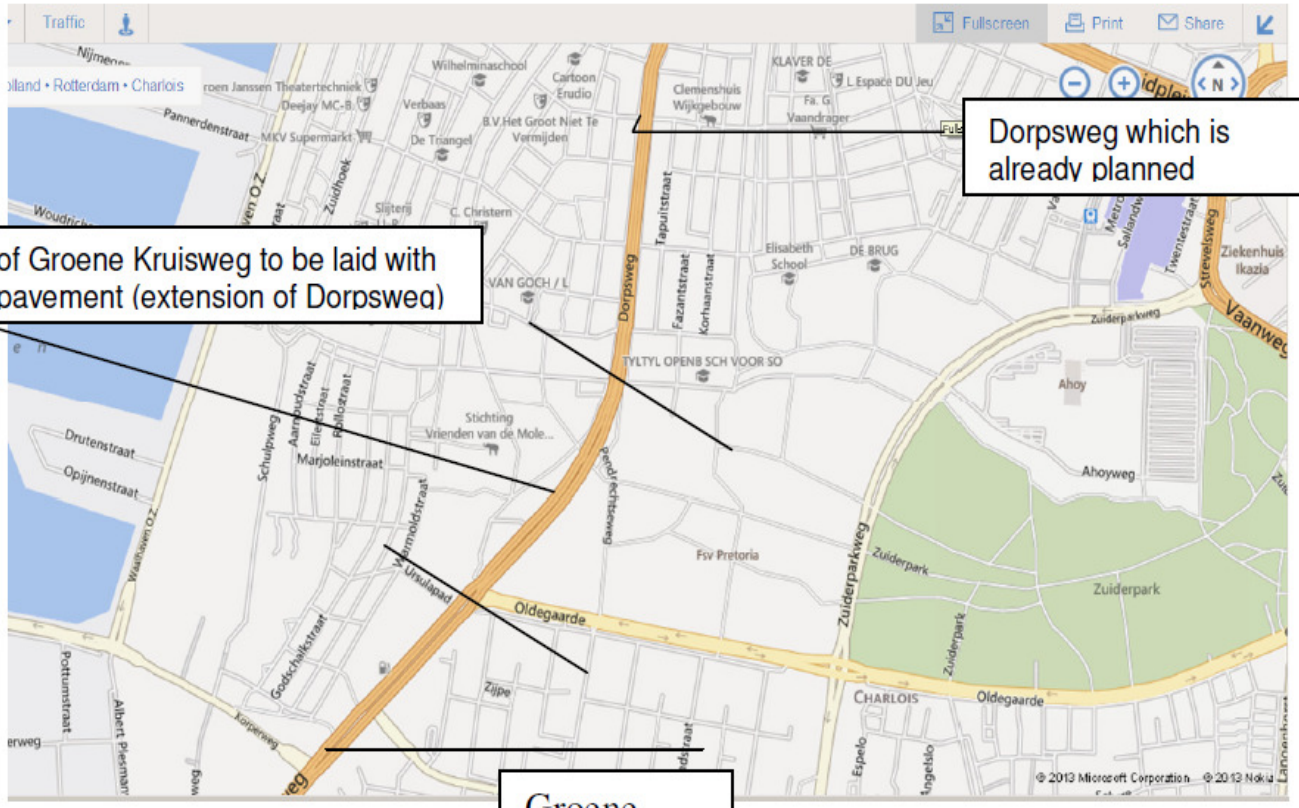
Parameter	Parameter	Correlation
Soundscape evaluation	Soundscape unpleasant_pleasant	,561
Soundscape evaluation	Soundscape annoying_relaxing	,606
Overall quality	Visual pleasantness	,524
Soundscape evaluation	Soundscape characteristic_normal	,560
Acoustic quality at home	Annoyance_at home_cars	,774
Audibility of nature sounds	Importance of nature features	,427

Field surveys: indicators for appraisal (2)

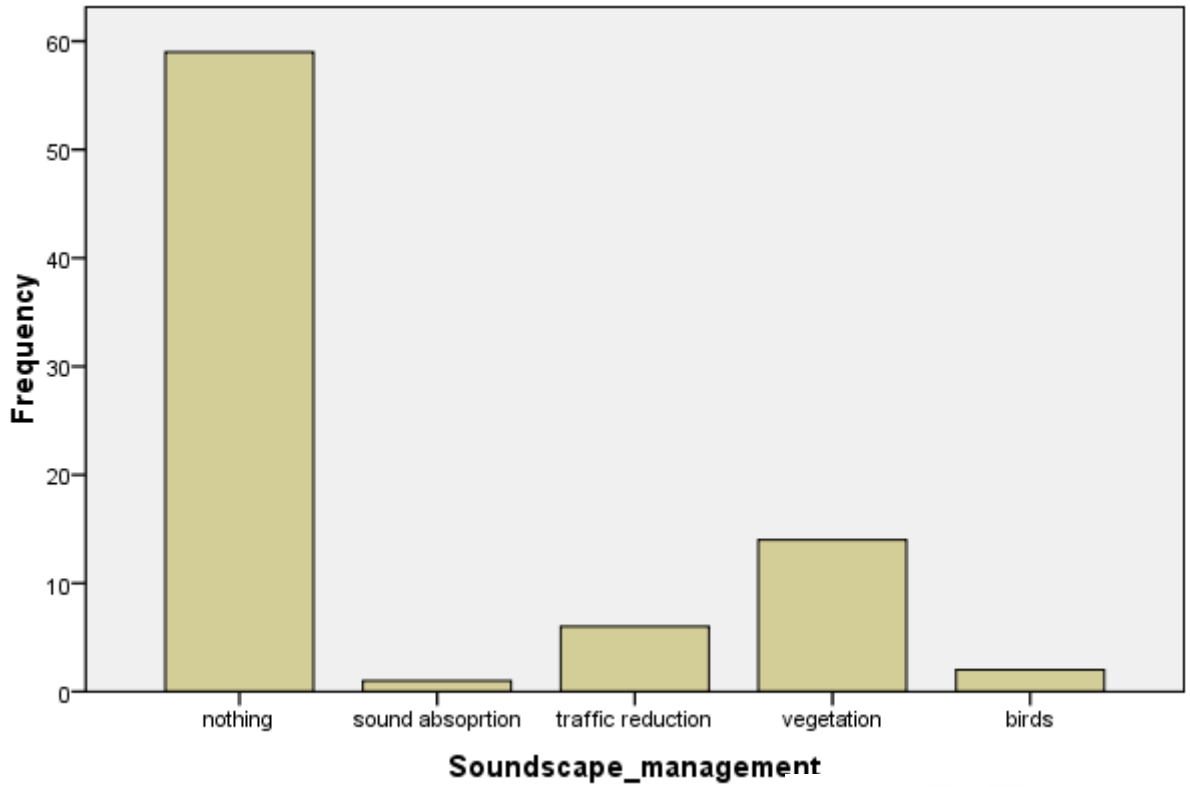
	Positive scores	Relative positive scores
Air quality	66.3%	69.6%
Safety	62.7%	63.3%
Maintenance	86.7%	78.6%
Services, and materials (banks, play-areas etc.)	79.5%	74.7%
Accessibility	92.8%	83.4%
Noise in the surrounding	72.3%	68.7%
Natural elements (green areas, water, birds etc.)	96.4%	82.8%
Climate (humidity, brightness, wind etc.)	68.7%	69.6%
Visual aspects	86.7%	79.8%
Scent	56.6%	68.1%

Interventions: example Zuiderpark (1)

Trajectory of Groene Kruisweg to be laid with quiet road pavement (extension of Dorpsweg)



Future steps and challenges: intervention effect



Correlations

		Sound_ traffic_audible	Soundscape_ management
Sound_traffic_audible	Pearson Correlation	1	-,271*
			,014
		81	81
ation		-,271*	1
		,014	
		81	82

l (2-tailed).

Discussion

- → Which acoustic indicator links best with perception and appraisal of sound environment?
- → Could this acoustic indicator (better) predict population respons to changes (increase and/or decrease) in noise exposure in terms of annoyance? Or in terms of appraisal?
- → What are implementation challenges and risks of these ‘guidances’?

Acknowledgments

→ LIFE+ programme

→ And project team members from:

PARTNERS

Further questions and updates on research results:

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