



**Rome, 23<sup>rd</sup> June 2011**  
**Parallel Session**

Present and future role of forest resources in the socio-economic development of rural areas

## **Parallel Session 1**

*Forests, conservation of biodiversity, landscape protection and public services.*

# ***Evaluating the restorative potential of different urban green space typologies***

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# Benefits of urban green spaces: evidence

- Urban green spaces provide public services which can significantly improve human well-being and quality of life in cities (Takano et al., 2002; Groenewegen et al., 2006).
- **Public services:**
  - conservation of biodiversity (Fuller et al. 2007)
  - mitigation of atmospheric pollution (McPherson & Simpson, 1998), urban microclimate (Dentamaro et al., 2010), noise (Fang & Ling, 2005) etc.
  - Promotion of physical activity (Pretty et al., 2005), social cohesion (Kuo, 2003) and **psychological restoration** (van den Berg et al., 2007)



# Psychological Restoration: framework

## What is “Restoration”?

- “Process of renewing physical, psychological and social capabilities diminished in ongoing efforts to meet adaptive demands” (Hartig, 2004, p. 2)
- Several studies in environmental psychology show that green spaces are more likely to promote psychological restoration than urban ones (e.g. Nordh et al., 2009; Purcell et al., 2001; van den Berg et al., 2007).
- ***Attention Restoration Theory*** is a cognitive framework on recovery from mental fatigue or directed attention fatigue (Kaplan & Kaplan, 1989; Kaplan, 1995; Kaplan et al., 1998)

# Psychological Restoration: framework

## Restorative properties (Attention Restoration Theory)

### ***Being-Away***

Psychological and physical escape from aspects of people's usual environments, routines and situations.

### ***Extent (Coherence and Scope)***

Immersion in a coherent physical or conceptual environment that is of sufficient scope to sustain exploration.

### ***Fascination***

Effortless attention as drawn by objects in the environment or engaged in the process of making sense of the environment.

### ***Compatibility***

Good match between personal inclinations and purposes, environmental supports for intended activities, and environmental demands for action.

# Case of study: Bari (south of Italy)

## ASPEN Project

### ***Objectives:***

- Assess the restorative outcomes of common typologies of urban green spaces which differ in degree of naturalness.
- Understand the mechanisms underlying the relationship between green spaces typologies and restorative outcomes.
- Analyze the predictors of restorativeness.

***Geographical context:*** Bari, Padua, Florence, Rome.





# Case of study: methods

## *Participants*

- 50 undergraduate students of the University of Bari (25 M, 25 F; age: 19-30 years)

## *Material*

- visual stimuli (Ivarsson & Hagerhall, 2008; Laforzezza et al., 2008)
- 10 color photographs of different typologies of urban green space: 5 (Bari, south of Italy), 5 (neutral and unknown city)



# Typologies of urban green spaces

DEGREE OF NATURALNESS

## *Bari*



A



B



C



D



E



## *Neutral City*

- Photographs spanned the range from minimum levels of naturalness to maximum levels

# Case of study: methods

## Instrument

### *Questionnaire*

- Visual perception of the environment: open, complex, mysterious, natural etc. (10 items)
- Perceived Restorativeness Scale (PRS; Hartig et al., 1997): 5 items, 1 for each of the 5 restorative properties, i.e. being away (BAWAY), fascination (FASC), Coherence (COHE), scope (SCOP) and compatibility (COMP). Other items not concerning the restorativeness measurement were also present: e.g. preference for a place (PREF), familiarity with a place (FAM), recovery of the concentration (REC) etc.
- 5-point scale: 1 = “Not at all”, 5 = “Very much”
- Demographic questions (gender, age, and residence)



# Case of study: methods

## Analysis

- Mean item scores for each of the 5 restorative properties were computed for all typologies
- REST was computed by averaging the 5 restorative properties (Berto 2005, Ivarsson & Hagerhall 2008):

$$REST = (BAWAY + FASC + COHE + SCOP + COMP)/5$$

- One-way analysis of variance (ANOVA) + Post-hoc Duncan test
- Linear regression analysis

# Case of study: results

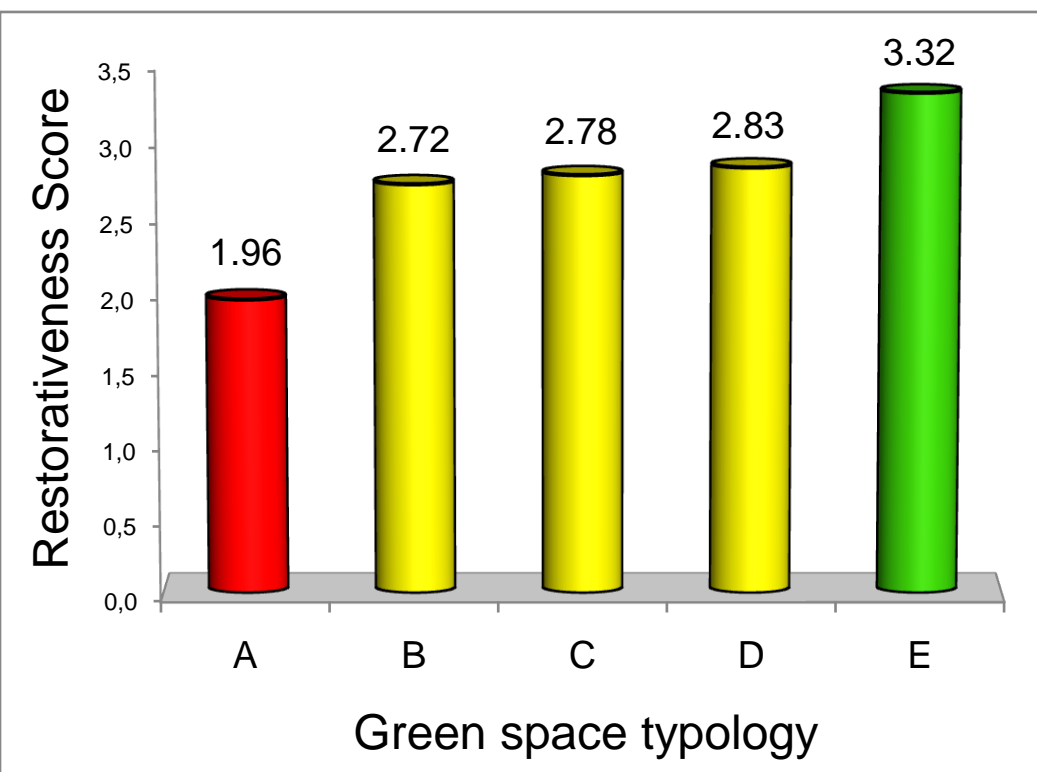
## Evaluating the perceived restorativeness of different urban green space typologies of Bari

***Restorativeness:  $F_{(4, 245)} = 21,69$   $p < 0.05$***

Restorative properties	Urban green space typologies	N.	Mean	Std. Dev.	Std. Error	ANOVA	
						F	Sig.
REST	Urban park	50	2.78	0.609	0.086	21.688	0.000
	Urban square	50	1.96	0.629	0.089		
	Urban forest plantation	50	2.72	0.740	0.104		
	Periurban green area	50	3.32	0.802	0.113		
	Botanical garden	50	2.83	0.891	0.126		
	Total	250	2.72	0.856	0.054		

# Case of study: results

## Evaluating the perceived restorativeness of different urban green spaces typologies in Bari



Urban green space typology	N.	Subset for alpha = 0.05		
		1	2	3
Urban square (A)	50	1.96		
Urban forest plantation (B)	50		2.72	
Urban park (C)	50		2.78	
Botanical garden (D)	50		2.83	
Periurban green area (E)	50			3.32
Sig.		1.000	0.513	1.000

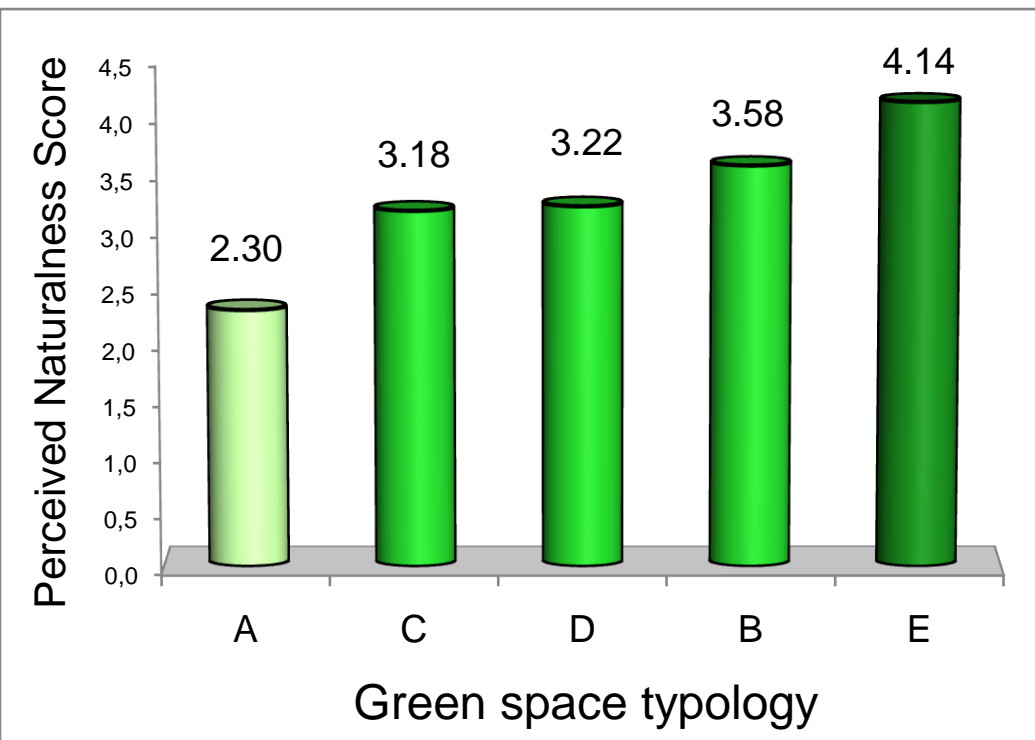
Means for groups in homogeneous subsets are displayed

Duncan uses Harmonic Mean Sample Size = 50.000

- Urban green space typologies with more natural elements (E) seem to promote moderately restoration, whereas those dominated by built elements (A) have lower restorative potentials

# Case of study: results

## Evaluating the perceived naturalness of different urban green spaces typologies in Bari



Urban green space typology	N.	Subset for alpha = 0.05		
		1	2	3
Urban square (A)	50	2.3		
Urban park (C)	50		3.18	
Botanical garden (D)	50		3.22	
Urban forest plantation (B)	50		3.58	
Periurban green area (E)	50			4.14
Sig.		1.000	0.117	1.000

Means for groups in homogeneous subsets are displayed

Duncan uses Harmonic Mean Sample Size = 50.000

- Botanical garden, urban park and urban forest plantation had the same degree of perceived naturalness.
- The periurban green area obtained the higher mean score whereas the urban square the lowest one.



# Case of study: results

## Comparison of restorativeness scores between Bari e neutral city (Cagliari)

***Restorativeness (B):  $F_{(1, 98)} = 10.92$   $p=0.001$***

### ***Urban forest plantation***

Restorativeness	Cases of study	N.	Mean	Std. Dev.	Std. Error	ANOVA	
						F	Sig.
REST	Neutral city	50	3.22	0.749	0.106	10.922	0.001
	Bari	50	2.72	0.739	0.105		
	Total	100	2.97	0.781	0.078		

- Results were significant only for ***urban forest plantation (B)***.

# Comparison of the restorative potential of urban forest plantation between Bari e neutral city

- ***Physical features influencing restorativeness:*** percentage of ground surface covered by grass, understory vegetation (Nordh et al. 2009), and topographic variation (Brush, 1981; Kaplan & Kaplan 1989)



NEUTRAL CITY  
REST = 3.22



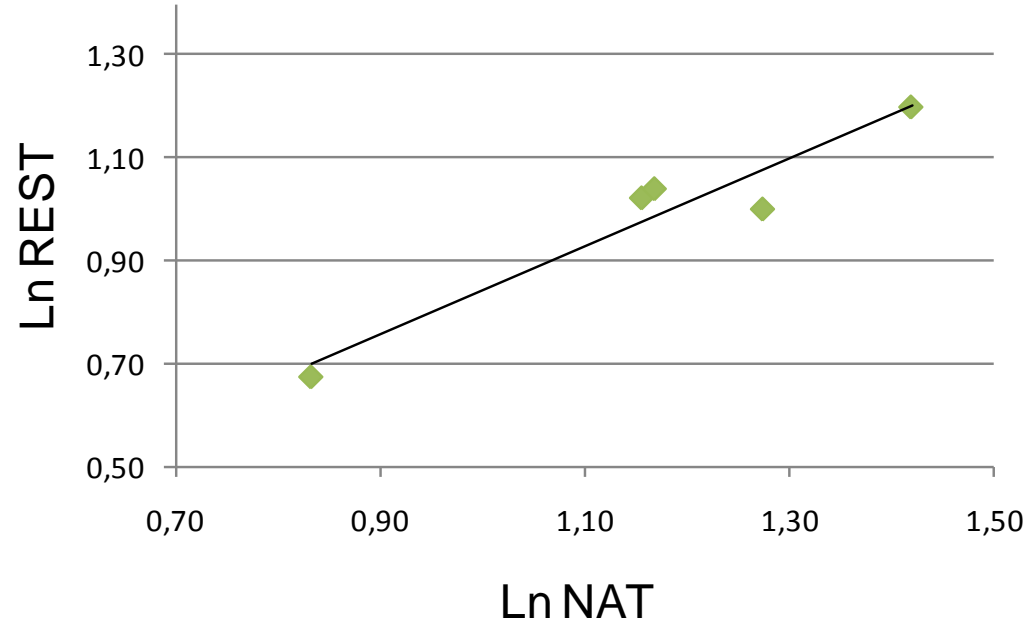
BARI  
REST = 2.72

# Case of study: results

## Linear model regression (BARI)

- $y = \text{Ln Restorativity (Ln REST)}$
- $x = \text{Ln Perceived Naturalness (Ln NAT)}$

$$y = 0,8532x - 0,0119$$
$$R^2 = 0,92$$



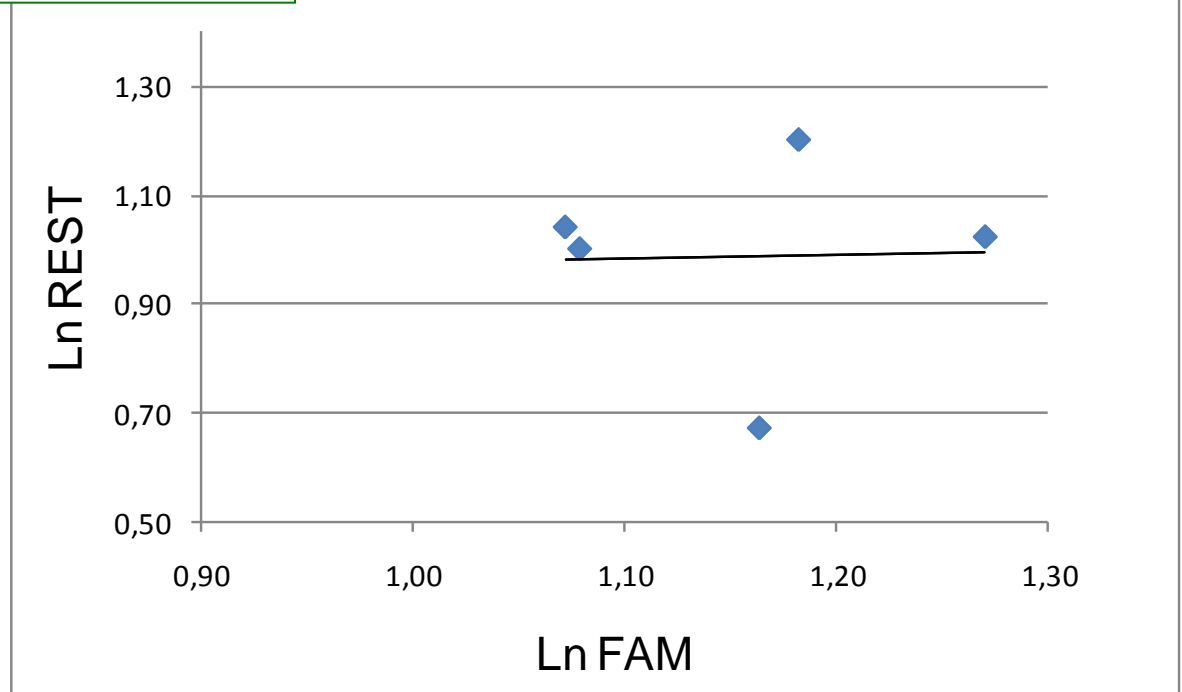
- There is a robust relationship between ***naturalness*** and ***restorativity***

# Case of study: results

## Linear model regression (BARI)

- $y = \text{Ln Restorativity (Ln REST)}$
- $x = \text{Ln Familiarity (Ln FAM)}$

$$y = 0,0641x + 0,9134$$
$$R^2 = 0,0007$$



- There is no relationship between **familiarity** and **restorativity**



# CONCLUSIONS

- Urban green space typologies with more natural elements are more restorative than those with less natural elements, regardless of the environment a person is most attached to.
- The results of this study represent an important contribution to the process of planning green spaces, in order to guide the design methods and sustainable use of these spaces in an urban environment.
- Future studies need to collect more data on a greater number of examples within each urban green space typology, and to involve different participant categories.

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