One size does not fit all – the complex relationship between wellbeing and biodiversity

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The detrimental impacts of urbanization

Species extinctions, biodiversity background

Extinction of experience

Physiological benefits

Social benefits

Psychological benefits

Well-being

Miller 2005; Keniger et al. 2013; Lin and Fuller 2013

Conserving urban biodiversity as a 'win-win' solution

(-)

(+)

(+)

Species extinctions, biodiversity background

(-)

Connection to nature

(+)

Wellbeing

Aligning the agendas of public health and conservation

Dearborn and Kark 2010; Pett et al. 2016

Systematic review demonstrate lack of evidence

Interdisciplinary systematic review of 787 papers → these hypotheses are not established empirically

(?)

(?)

(?)

Species extinctions, biodiversity background

(?)

Connection to nature

(?)

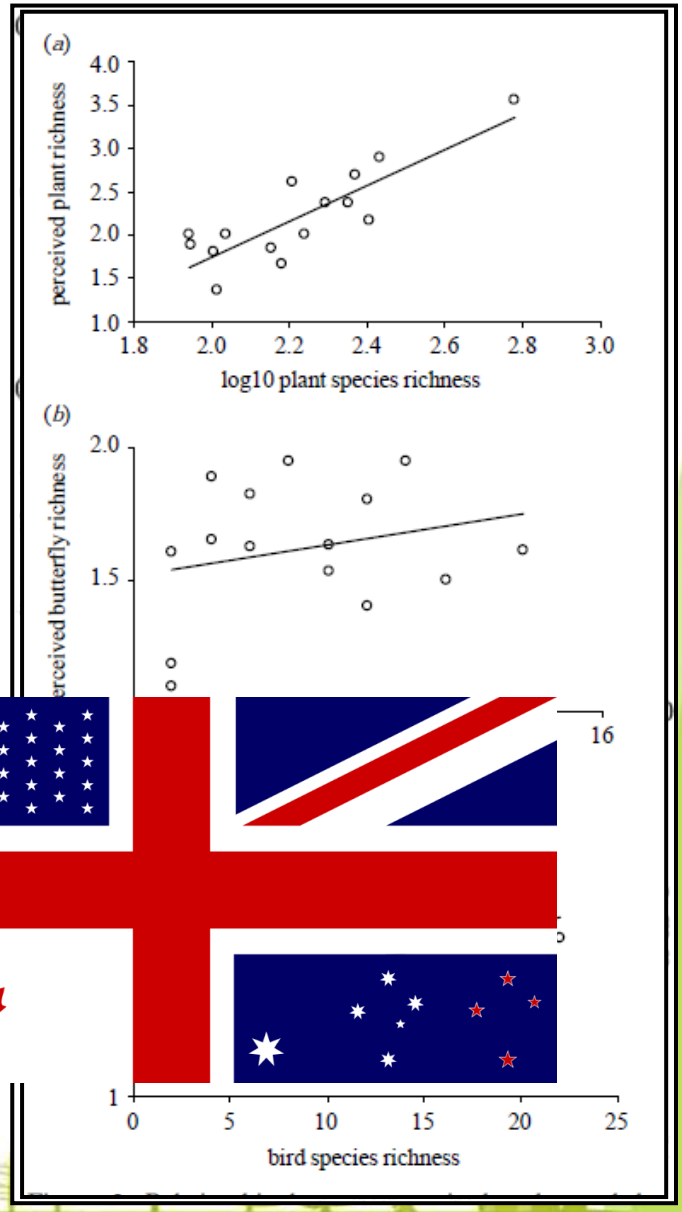
Wellbeing

Goal: How does biodiversity relate to components of subjective wellbeing for public gardens visitors?

Shwartz et al. GEC 2014

How does species diversity influence subjective well-being

- Fuller et al. 2007 (greenspaces in Sheffield, England):
  - SWB of garden visitors ~ Habitat diversity, plant & bird richness
  - Perceived richness ~ Sampled richness
- Luck et al. 2011 (neighborhoods in southeastern Australia)
  - SWB ~ Bird and plant richness
  - SWB ~ Demographics + ~~Bird and plant richness~~
- Dallimer et al. 2012 (riparian areas in Sheffield, England):
  - SWB X Birds, butterflies and plant richness
  - Perceived richness X Sampled richness
  - SWB ~ Perceived richness
  - Poor ecological skills

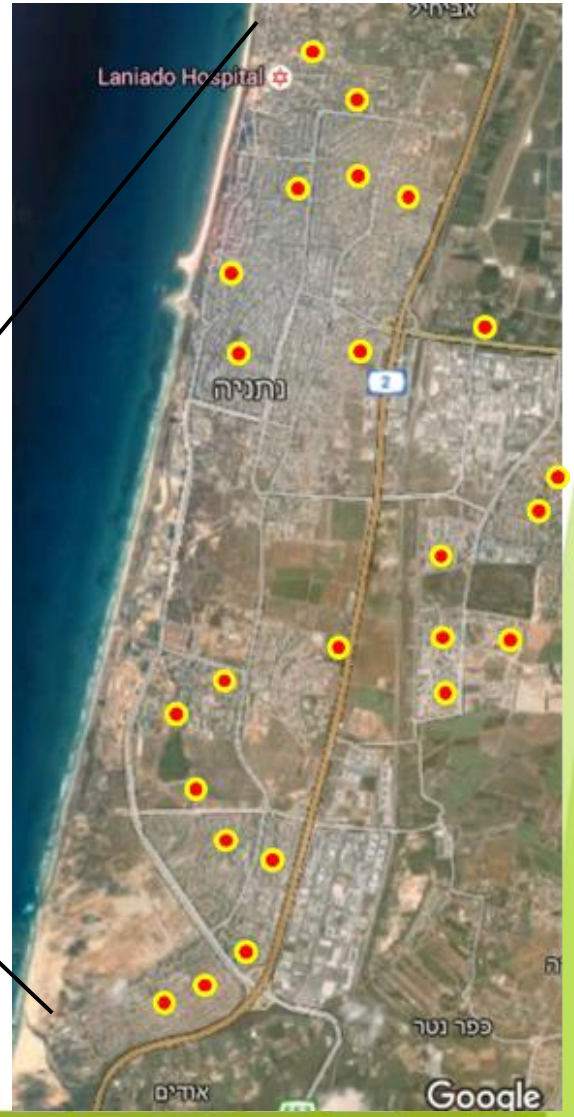


Methods

- Study was conducted in 24 small public gardens (<2ha) in Netanya, Israel:
- Spring 2015 (Mar-Aug) we sampled:
  - Birds (8 visits)
  - Butterflies (8 visits)
  - Plants (flowering and woody species, one visit)



- Passed 600 questionnaires *in situ* with garden visitors:
  - Garden contribution to subjective well-being (Fuller et
  - Nature relatedness scale (Nisbet et al. 2009)
  - Perceived richness
  - Socio-demographic variables (e.g., income, age…)
  - Ecological knowledge



Methods

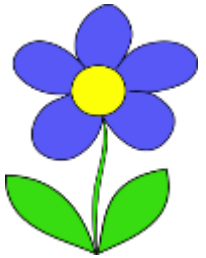
- Ecological knowledge
  - 12 most common species (Dallimer et al. 2012)
  - Do you know the species (yes/no)
  - Can you name them?
- For each interviewee we calculated:
  - Subjective well-being scores
  - Nature relatedness score
  - Perceived richness
  - Ecological knowledge
  - Socio-demographic variables
- Linear Models

Results

- Diversity in the gardens:
  - 34 species of birds (7-16)
  - 14 species of butterflies (2-9)
  - 296 species of plants (7-46)
- Ecological knowledge was poor (av.=2.21)
- Species richness was strongly underestimated
- No effect of ecological knowledge on the relations betw
- No direct relations between perceived & sampled richn

1.36/4

0.07/4



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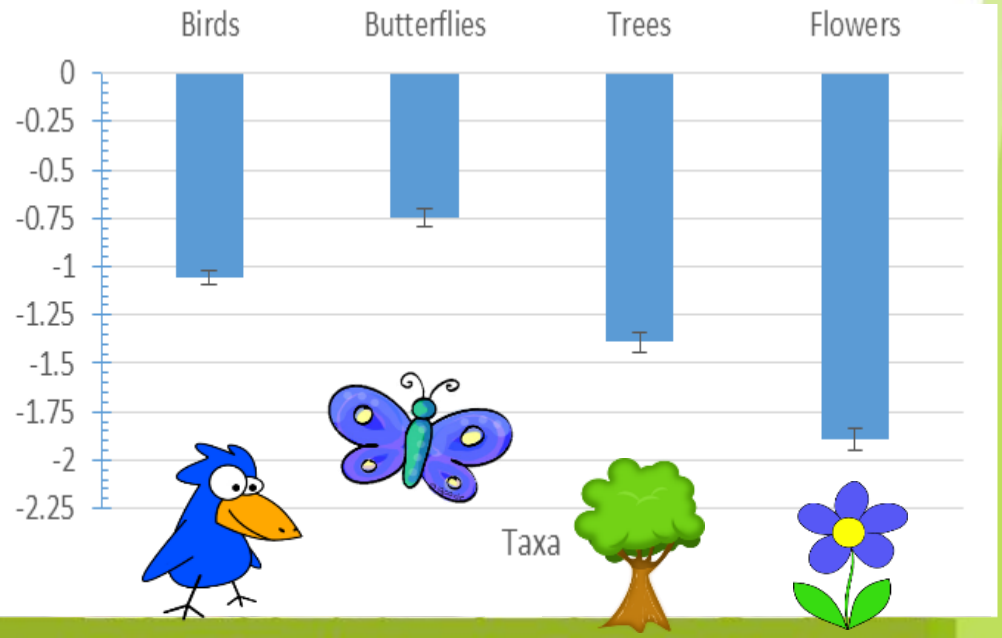


Relations between perceived and sampled richness

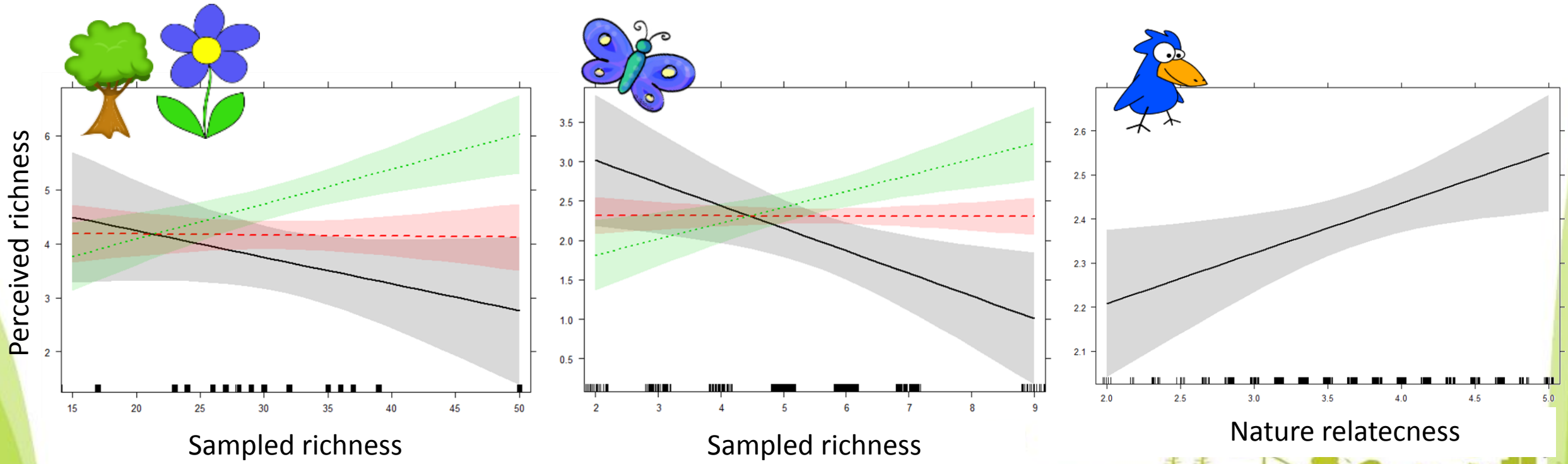
- Nature relatedness moderated the relations between perceived and sampled richness

Level of nature relatedness

Low (17%)

Medium (56%)

High (27%)



Relations between subjective well-being and species richness

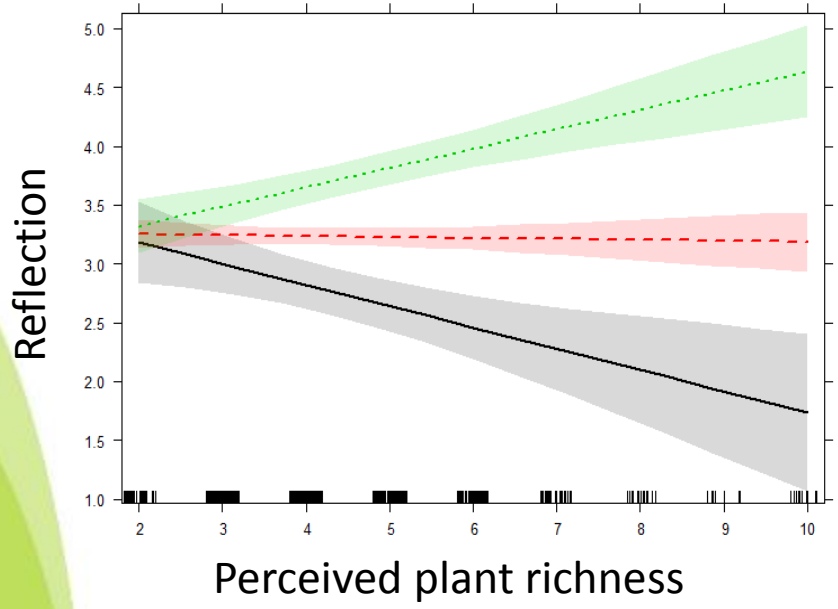
- No direct relations
- Strong relations with garden size (in all models)
- No effect of ecological knowledge on the relations subjective well-being & species richness
- Relations between richness and components of SWB were moderated by relatedness to nature

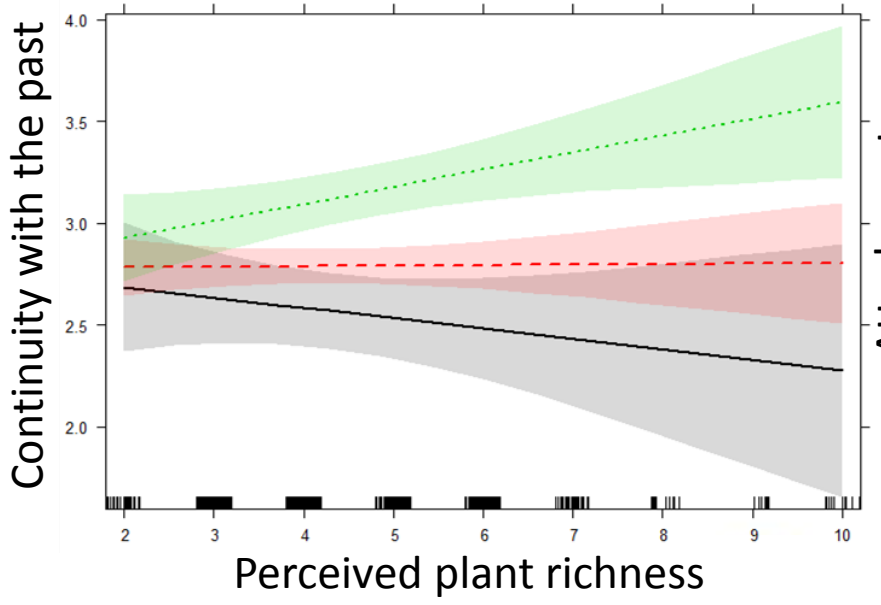
Level of nature relatedness

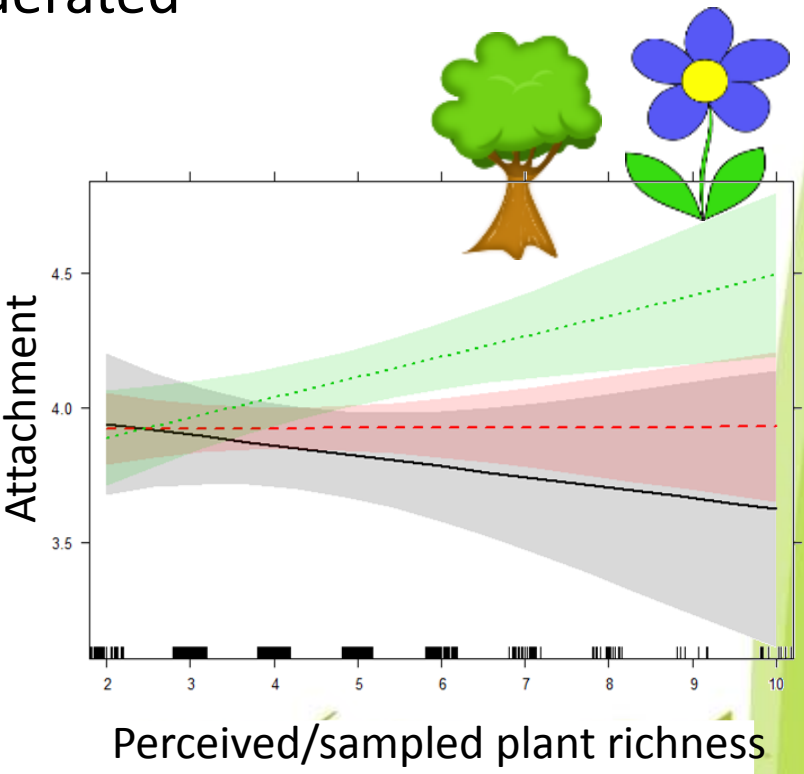
Low (17%)

Medium (56%)

High (27%)







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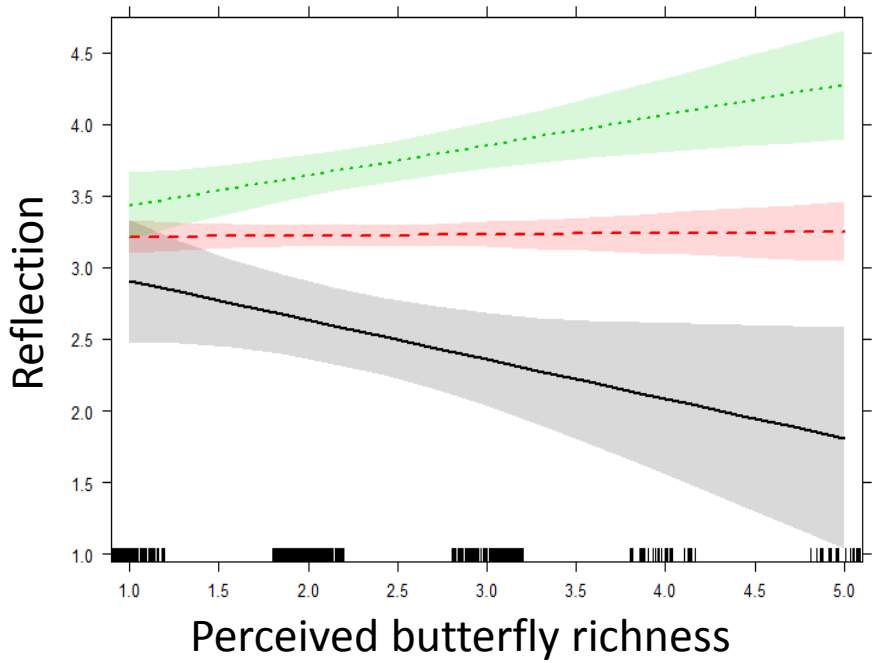
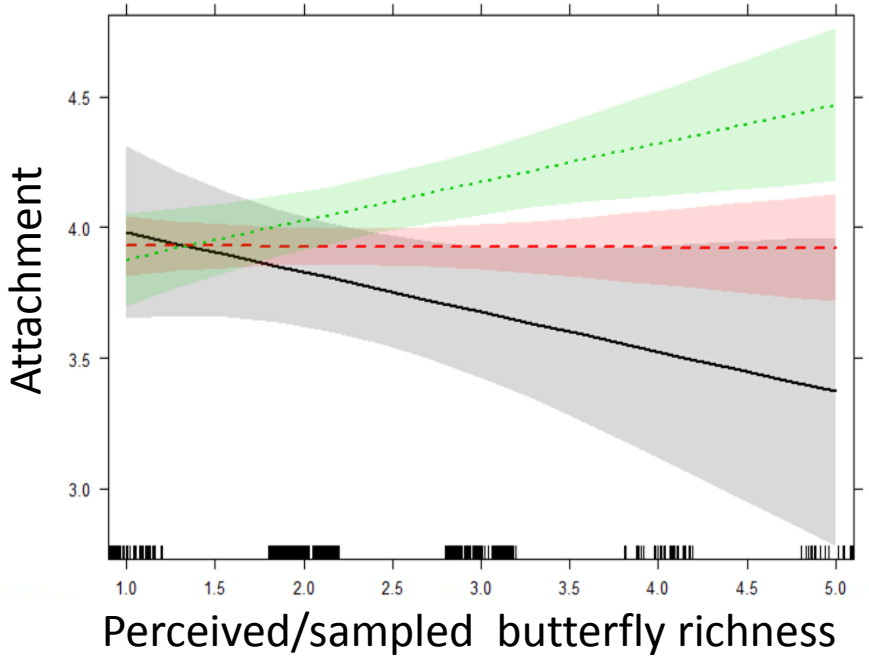




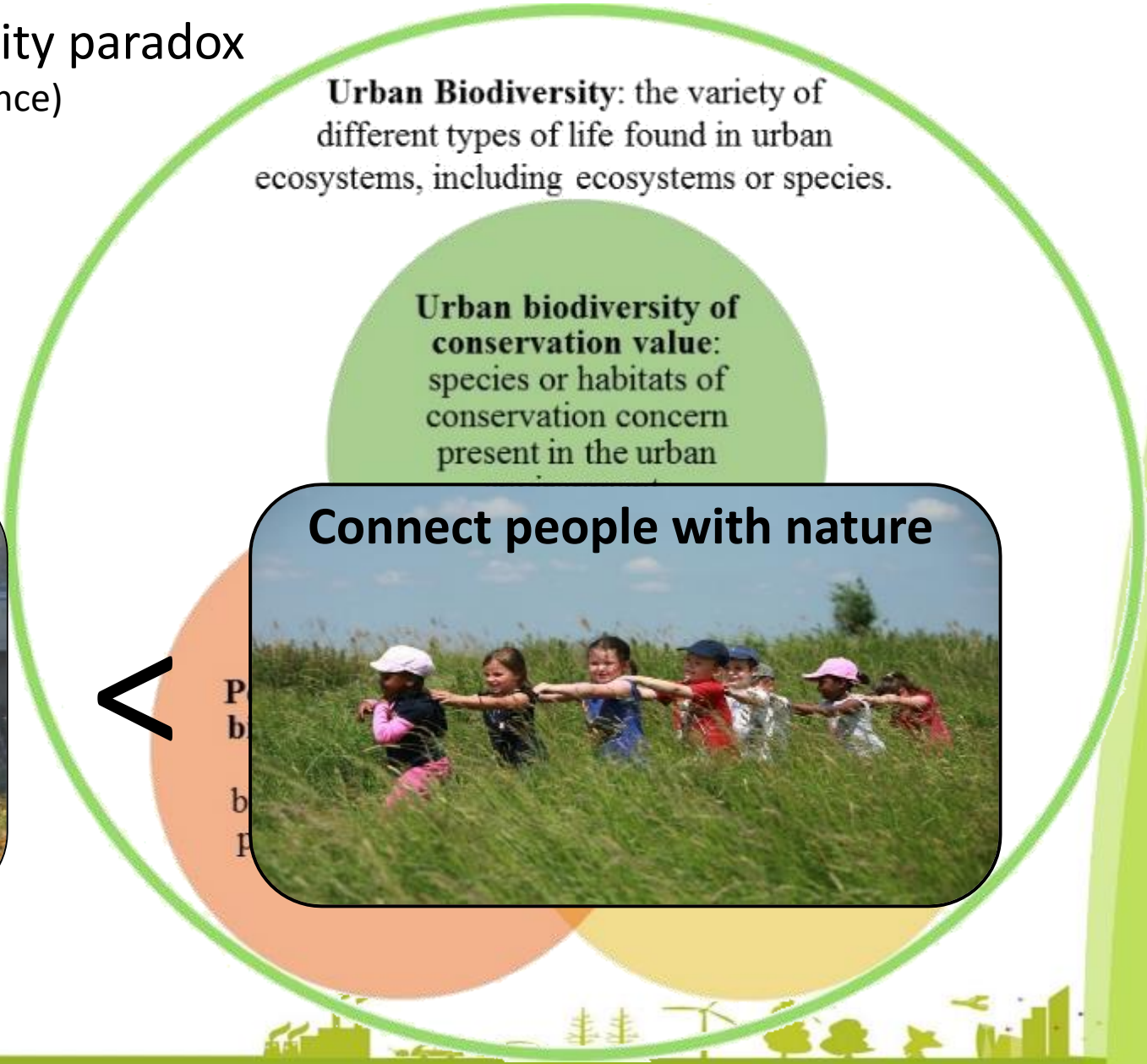
Summary and conclusions

- One size does not fit all - people-biodiversity paradox
  (Shwartz et al. 2014 Biol. Cons.; Pett et al. 2016, Bioscience)

- A key objective in urban ecology:

  → Enhancing biodiversity is not enough

  → Shift in the paradigm



Thanks….

Maya Tzunz

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Hagar Leshner

Aviv Avisar

Netanya Municipality

All participants

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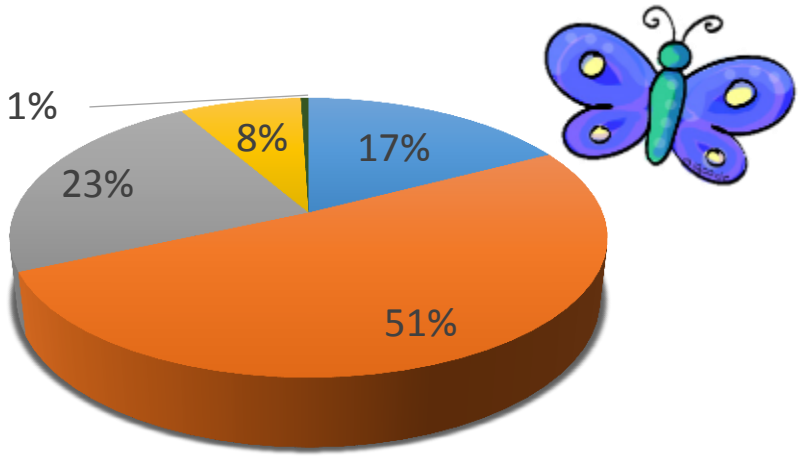
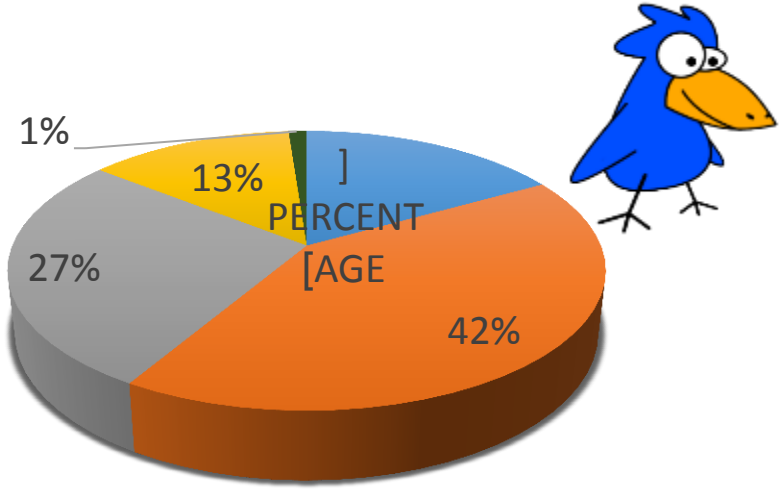
For listening

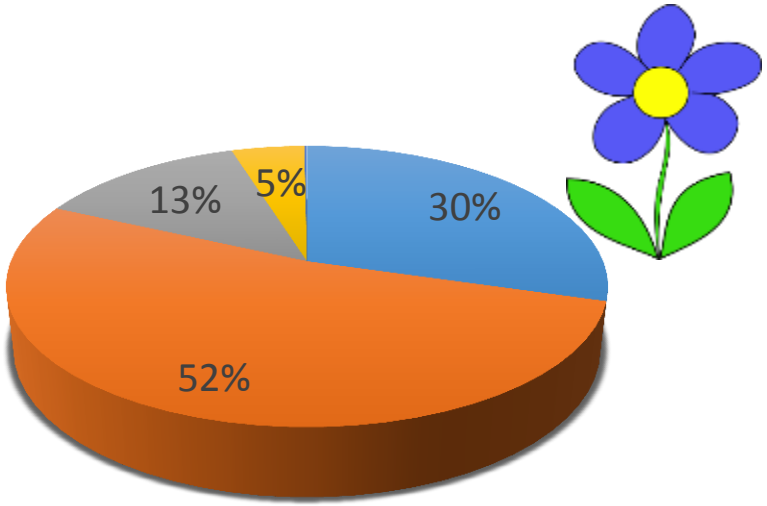
Relations between subjective well-being and species richness

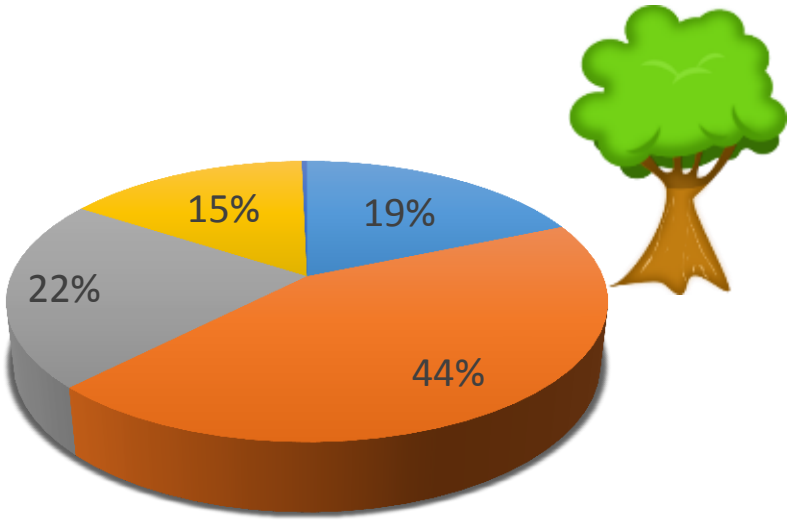
Well-being component					 	
	Sampled	Perceived	Sampled	Perceived	Sampled	Perceived
Reflection		✓				✓
Attachment		✓				✓
Continuity with the past	✓	✓	✓ No interaction		✓	✓

Most people wanted more species in the gardens









Much More

More

Indifferent

Don’t want more

Don’t want at all

How does biodiversity influence the well-being of city dwellers?

- Biodiversity → Species diversity (richness, abundance)
- Well-being a complex concept:
  - Personal security
  - Personal health
  - Financial security
  - **Subjective well-being (SWB)**
    - *Reflection* (the ability to think and gain perspective)
    - *Attachment* (the degree of emotional ties with a place)
    - *Continuity with the past* (extent to which the sense of identity is linked to a place)

Goal: How does species richness relate to these components of SWB for public gardens visitors?

Fuller et al. Biol. Lett. 2007; Dallimer et al. Bioscience 2012

Table 11a

Taxonomic group	Variable	Attention restoration	Attachment	Sense of identity and continuity with the past
PLANTS	Intercept	24.28±	4.09±	29.59±
	Area	0.25±0.05*	0.08±0.03	0.08±0.04
	Nature relatedness	-0.14±0.15*	-0.11±0.16*	-0.20±0.20*
	Perceived richness	-0.35±0.10*	-0.03±0.08*	-0.06±0.10*
	Richness	-	-0.02±0.01	-0.04±0.02*
	Knowledge	-0.06±0.05*	-	-0.06±0.06
	Birth year	-0.01±0.00*	-	-0.01±0.00*
	Income	-0.11±0.02*	-	-0.08±0.02*
	Gender (female)	-		
	Gender (male)	0.10±0.06	-	-
	Education	-	-	-0.02±0.01
	Nature relatedness * perceived richness	0.10±0.02*	0.03±0.02	0.04±0.02
	Nature relatedness * richness	-	-	0.01±0.00

Table 11b

Taxonomic group	Variable	Attention restoration	Attachment	Sense of identity and continuity with the past
BIRDS	Intercept	21.09±	4.27±	27.11±
	Area	0.28±0.05*	0.16±0. 04*	0.15±0.05*
	Nature relatedness	0.32±0.18*	-	0.42±0.17*
	Perceived richness	-	-	-
	Richness	-	-0.04±0.03*	-
	Abundance	0.00±0.00	0.00±0.00*	0.01±0.00*
	Knowledge	-	0.03±0.05	-
	Birth year	-0.01±0.00*	-	-0.01±0.00*
	Income	-0.11±0.03*	-	-0.09±0.02*
	Gender (female)	-		
	Gender (male)	0.10±0.06	-	-
	Education	-	-	-0.03±0.01*
	Knowledge * abundance	-	-0.00±0.00	-
	Nature relatedness * abundance	-0.00±0.00	-	-0.00±0.00*

Table 11c

Taxonomic group	Variable	Attention restoration	Attachment	Sense of identity and continuity with the past
BUTTERFLIES	Intercept	20.50±	4. 69±	25.87±
	Area	0.26±0.05*	0.06±0.04	-
	Nature relatedness	-0.00±0.16*	-0.16±0.15*	-0.09±0.17*
	Perceived richness	-0.38±0.21*	-0.13±0.16*	-0.02±0.09
	Richness	-	-	-0.14±0.13
	Abundance	-	-0.05±0.04	-0.08±0.05
	Knowledge	-	-0.05±0.05	-0.08±0.06
	Birth year	-0.00±0.00*	-	-0.01±0.00*
	Income	-0.12±0.03*	-	-0.09±0.02*
	Gender (female)	-		
	Gender (male)	0.10±0.06	-	-
	Education	-	-	-0.02±0.01
	Nature relatedness * perceived richness	0.12±0.04*	0.06±0.03	-
	Knowledge*perceived richness	-	-	0.03±0.01
	Nature relatedness * abundance	-	0.02±0.01	0.02±0.01

Table 11d

Taxonomic group	Variable	Attention restoration	Attachment	Sense of identity and continuity with the past
LAND COVER	Intercept	21.35±	3.88±	26.87±
	Area	0.27±0.07*	0.09±0.05	0.11±0.06
	Nature relatedness	0.24±0.10*		0.10±0.12*
	Woody cover	-0.78±0.71	-0.54±0.54	-0.85±0.67
	Birth year	-0.01±0.00*	-	-0.01±0.00*
	Income	-0.11±0.03*	-	-0.09±0.02*
	Gender (female)	-		
	Gender (male)	0.09±0.06	-	-
	Education	-	-	-0.02±0.01
	Nature relatedness* woody cover	-	-	0.30±0.14