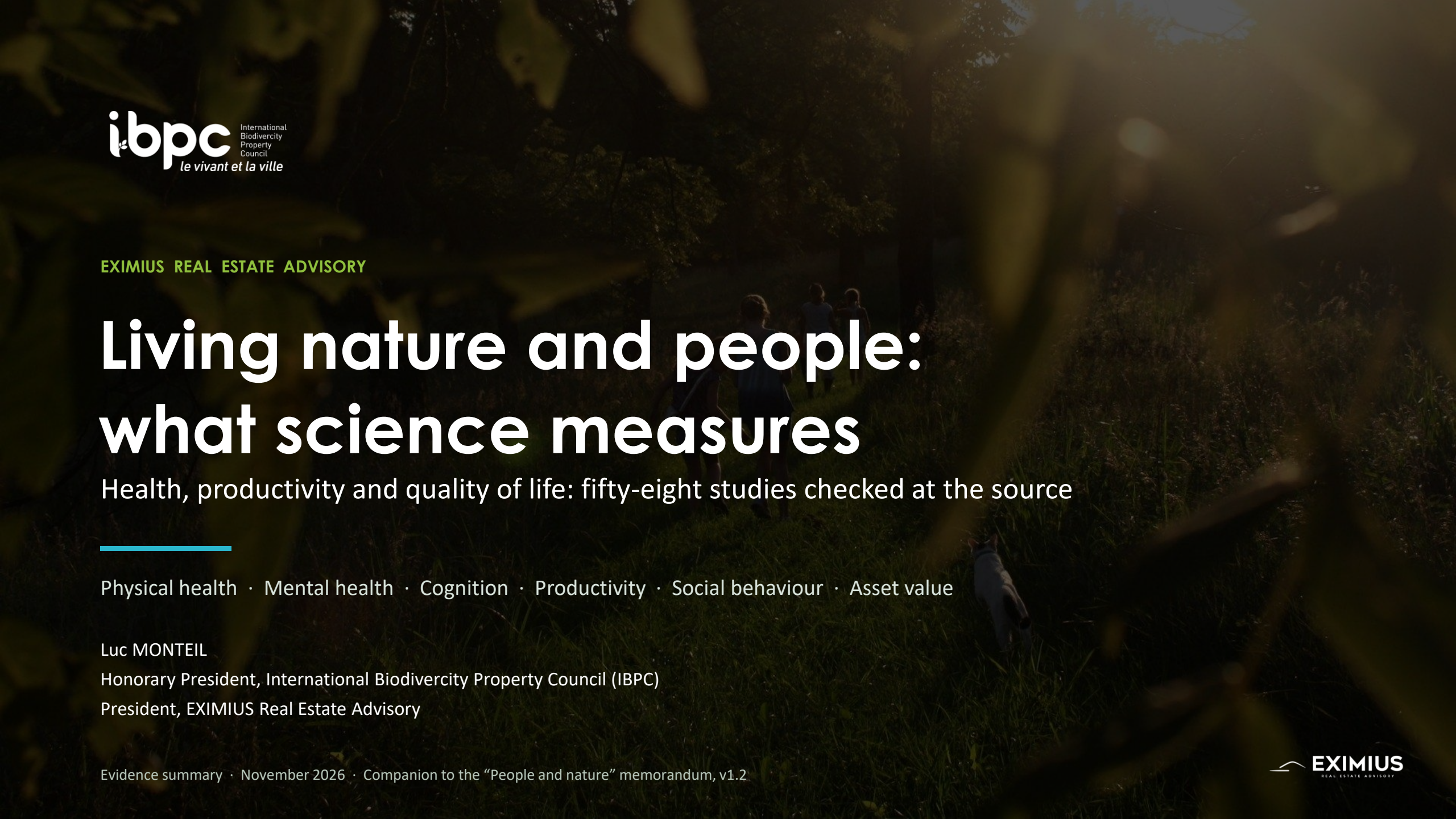


ibpc International Biodivercity Property Council
le vivant et la ville

EXIMIUS REAL ESTATE ADVISORY

# Living nature and people: what science measures

## Health, productivity and quality of life: fifty-eight studies checked at the source

Physical health · Mental health · Cognition · Productivity · Social behaviour · Asset value

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Evidence summary · November 2026 · Companion to the “People and nature” memorandum, v1.2

EXIMIUS REAL ESTATE ADVISORY

# Six themes, fifty-eight studies, one rule

## 01

### What the body measures

Hospital stays, cortisol, blood pressure, immunity, mortality. Cohorts of 100,000 people and a meta-analysis of 143 studies: the most robust part of the corpus.

## 02

### What the mind measures

Stress recovery, well-being, attention, school results, aggression and crime. Effects appear within minutes and increase with species richness.

## 03

### What the market measures

Sick leave, task speed, sales, rents, prices and avoided health costs. Real, measured, and more modest than the slogans in circulation.

**The rule: every figure comes from the original publication, checked online in September and November 2026, never from a second-hand report. Figures that cannot be verified are left out.**



# A label certifies a process. Science measures the features that the label makes mandatory.

None of the figures that follow is an effect of the label. All are effects of soil, trees, views, daylight and species.

*The right study, the right figure, the right level of evidence: that is how ecological value stands up to due diligence.*

1 THEME 1 OF 6 · PHYSICAL HEALTH

# A window onto nature shortens the hospital stay

The oldest and most cited result in the field. Forty years of replications with daylight, views and gardens: patients recover faster, take fewer drugs and complain less.

**POST-OPERATIVE STAY WITH A VIEW OF TREES**

**-8.5%**

7.96 versus 8.70 days after surgery, fewer strong painkillers (Ulrich 1984, n = 46)

Painkillers -22% per hour with 46% more light (Walch et al. 2005, n = 89)

Stays for depression -2.6 days (-15%) in a sunny room (Beauchemin and Hays 1996)

Bipolar stays -3.67 days with morning sun (Benedetti et al. 2001, n = 602)

*Ulrich 1984, Science; Walch et al. 2005; Beauchemin and Hays 1996; Benedetti et al. 2001 · Level: peer-reviewed, small to medium samples*

1 THEME 1 OF 6 · STRESS PHYSIOLOGY

# Twenty minutes among trees and the body shifts gear

Cortisol, pulse and blood pressure move within minutes of entering a green space. Measured in the field, in Japan and Finland, and confirmed by meta-analysis.

**SALIVARY CORTISOL, FOREST VERSUS CITY CENTRE**

## -13 to -16%

Pulse -4 to -6%, parasympathetic activity +56 to +102% (Park et al. 2010, 280 subjects, 24 sites)

Heart rate -2.5 bpm, systolic pressure -3.6 mmHg in an urban forest (Lanki et al. 2017, Helsinki)

Across 143 studies: lower cortisol, heart rate -2.6 bpm, diastolic pressure -2 mmHg (Twohig-Bennett and Jones 2018)

Blood glucose from 179 to 108 mg/100 ml after a forest walk, diabetic patients (Ohtsuka et al. 1998, n = 87)

*Park et al. 2010; Lanki et al. 2017; Twohig-Bennett and Jones 2018; Ohtsuka et al. 1998 · Level: field experiments and meta-analysis*

1 THEME 1 OF 6 · LONG-TERM HEALTH

# Living amid greenery is associated with living longer

The highest level of evidence in the corpus: a prospective cohort of 108,630 women followed for eight years, and a systematic review of 143 studies.

## MORTALITY, GREENEST VERSUS LEAST GREEN NEIGHBOURHOODS

**-12%**

Cancer mortality -13%, respiratory -34%; mental health explains 30% of the effect (James et al. 2016)

All-cause mortality OR 0.69, cardiovascular OR 0.84, type 2 diabetes OR 0.72 (Twohig-Bennett and Jones 2018)

+10 street trees per block = perceived health as if 7 years younger; +11 trees = cardio-metabolic conditions as if 1.4 years younger (Kardan et al. 2015, 31,109 residents)

Childhood asthma in New York: -29% per standard deviation of street-tree density, ecological study (Lovasi et al. 2008); effect through air quality not established (Eisenman et al. 2019)

*James et al. 2016, Environ. Health Perspectives; Twohig-Bennett and Jones 2018; Kardan et al. 2015; Lovasi et al. 2008; Eisenman et al. 2019 · Level: cohort, meta-analysis, ecological study*

2 THEME 2 OF 6 · MENTAL HEALTH

# The benefits start within minutes and level off at two hours a week

The dose question has an answer. Short exposures already count; the association with good health becomes significant beyond two hours a week, however the time is split.

TIME IN NATURE ASSOCIATED WITH GOOD HEALTH

## 120 min/week

19,806 adults: good health OR 1.59, high well-being OR 1.23 beyond 120 min; plateau at 200-300 min (White et al. 2019)

Self-esteem d = 0.46, mood d = 0.54; gains from 5 minutes, water strengthens the effect (Barton and Pretty 2010, n = 1,252)

Stress recovery 9 to 37% faster with nature sounds than with noise (Alvarsson et al. 2010)

A 90-minute walk in nature reduces rumination and subgenual prefrontal activity (Bratman et al. 2015)

*White et al. 2019, Scientific Reports; Barton and Pretty 2010; Alvarsson et al. 2010; Bratman et al. 2015, PNAS · Level: survey, meta-analysis, experiments*

# The psychological benefit grows with the number of species

This is the result that matters for a biodiversity label: users of urban green spaces gain more where plants and birds are richer, and the gain from a greener home lasts for years.

**MENTAL HEALTH GAIN AFTER MOVING TO A GREENER AREA**

## 3 years

Lasting improvement over the three years after the move, GHQ score (Alcock et al. 2014, 1,064 people)

Reflection and attachment increase with plant and bird richness (Fuller et al. 2007, 312 users, 15 parks)

The more frequent the visits, the fewer stress-related illnesses (Grahn and Stigsdotter 2003, 953 respondents)

Refuge, Nature and Rich in species: the three most restorative dimensions (Grahn and Stigsdotter 2010)

*Alcock et al. 2014, Environ. Sci. & Technology; Fuller et al. 2007, Biology Letters; Grahn and Stigsdotter 2003, 2010 · Level: cohort and surveys*

# Attention is a resource, and nature restores it

Directed attention tires; natural settings restore it (Kaplan 1995). The effect is measured with standardised cognitive tests, in adults, in children with ADHD and in the classroom.

## WORKING MEMORY AFTER A WALK IN NATURE

**+20%**

+1.5 digits of backward span versus +0.5 after a walk in town (Berman et al. 2008)

Children with ADHD: better concentration after 20 minutes in a park, effect d = 0.52 to 0.77 (Faber Taylor and Kuo 2009, 17 children)

40 seconds looking at a green roof: fewer errors, sustained attention (Lee et al. 2015, 150 students)

Daylit classrooms: progress +20% in maths, +26% in reading; scores +7 to 18% (Heschong Mahone 1999, 21,000 pupils)

*Berman et al. 2008, Psychological Science; Faber Taylor and Kuo 2009; Lee et al. 2015; Heschong Mahone Group 1999 · Level: experiments, commissioned study*

4 THEME 4 OF 6 · PRODUCTIVITY

# A view of nature shows up in the sick-leave register

Results in offices are modest, measured and consistent: fewer hours of sick leave, faster task handling, better memory tests, higher satisfaction.

SICK LEAVE PER YEAR, BEST VIEW VERSUS NO VIEW

## 57 versus 68 h

Light and view explain up to 10% of the variance in sick leave (Elzeyadi 2011, 175 employees, University of Oregon)

Calls handled 6 to 12% faster, memory and attention tests +10 to 25% (Heschong Mahone 2003, Sacramento)

Plants added to a bare office: productivity +15% on objective tasks (Nieuwenhuis et al. 2014, 3 experiments)

82% of employees satisfied with plants and a window, 60% with neither (Dravigne et al. 2008, n = 449)

*Elzeyadi 2011; Heschong Mahone Group 2003; Nieuwenhuis et al. 2014, J. Exp. Psychology: Applied; Dravigne et al. 2008 · Level: field studies*

# The 90 / 9 / 1 rule

**Life-cycle costs of an office building. A few percent gained on occupants' health or productivity outweigh, on their own, all the savings on energy, water and waste.**

**90%**
staff costs

**9%**
real estate

**1%**
energy

*World Green Building Council 2014 · Office scope. A household's cost structure is not that of a company: the reasoning carries over, the ratio does not.*

## WHAT THE STUDIES MEASURE

· Daylight in retail: sales +40% (1999 study); 0 to +6% on average in a second chain (2003)

· View of nature in offices: cognition and memory tests +10 to +25%; calls handled 6 to 12% faster

· Hospital patients discharged 8.5% sooner

· Sick leave: 57 versus 68 h a year depending on the view; plants in a bare office: productivity +15% (Nieuwenhuis 2014)

*WorldGBC 2014; Heschong Mahone Group 1999, 2003; Ulrich 1984; Elzeyadi 2011*

**Kats, 2003: over 20 years, a green building returns about $49 to $67 net per square foot, of which $36.90 to $55.30 from productivity and health, against $5.80 from energy, $8.50 from operations and $0.50 from water. Value is created by people, not by utilities.**

# Greener surroundings, fewer conflicts

Two twin studies in Chicago public housing, with police records and interviews; two others, in New Haven and Portland, point the same way. The mechanism put forward in Chicago is attention fatigue: bare surroundings wear people down.

## REPORTED CRIMES, GREENEST VERSUS BAREST BUILDINGS

**-52%**

98 buildings: property crimes -48%, violent crimes -56%; vegetation explains 7 to 8% of the variance (Kuo and Sullivan 2001)

Women living in the bare buildings report more aggression: one third to one half of a standard deviation, mediated by attention (Kuo and Sullivan 2001, n = 145)

Children: a green view = 20% of the variance in girls' self-discipline (Faber Taylor et al. 2002, n = 169); nearby nature buffers stress (Wells and Evans 2003, n = 337)

New Haven: +10% canopy, violent crimes -15%, property crimes -14% (Gilstad-Hayden et al. 2015); Portland: street trees, fewer crimes (Donovan and Prestemon 2012)

*Kuo and Sullivan 2001a, 2001b; Faber Taylor et al. 2002; Wells and Evans 2003; Gilstad-Hayden et al. 2015; Donovan and Prestemon 2012 · Level: peer-reviewed, one city per study*

6 THEME 6 OF 6 · ASSET VALUE

# The premium is real, measured, and more modest than the slogans

Hedonic studies of tens of thousands of transactions give a consistent range. The most favourable case is dense vertical housing, where parks are scarce.

**PRICE PREMIUM, QUALITY GREEN SPACE NEARBY**

## +3 to +17%

Warsaw, 43,075 sales: +2.8 to 3.1% within 100 m, +8 to 8.6% for new homes (Trojanek et al. 2018)

Hong Kong, vertical housing: neighbourhood park +16.9% (Jim and Chen 2010, n = 1,471)

Office rents +7% with quality landscaping and large shade trees; -7.5% if the building is screened from view (Laverne and Winson-Geideman 2003)

Full water view +58.8%, lakefront +126.7%: the value of a view, not of greenery (Benson et al. 1998, 7,305 sales)

*Trojanek et al. 2018; Jim and Chen 2010, Land Use Policy; Laverne and Winson-Geideman 2003; Benson et al. 1998 · Level: hedonic, peer-reviewed*

# Shade and species translate into degrees, sales and health budgets

Cooling is measured by meta-analysis; effects on consumers and public health come from surveys, commissioned studies and modelling: useful, but at a lower level of evidence.

**URBAN PARK VERSUS BUILT-UP AREA, BY DAY**

## -0.94 °C

-1.15 °C at night; larger, tree-covered parks are cooler (Bowler et al. 2010, 47 studies)

Shoppers accept prices 9 to 12% higher in tree-lined shopping streets (Wolf 2005); daylit shops: sales 0 to 6% higher on average (Heschong Mahone 2003)

+10% green space = €94 million a year saved on asthma and hypertension in France (Asterès for Unep, the French landscape contractors' union, 2016, modelling)

Sacramento: $19.9 million a year in avoided health costs thanks to physical activity in parks (Harnik and Welle 2009)

*Bowler et al. 2010; Wolf 2005, J. of Forestry; Heschong Mahone Group 2003; Asterès / Unep 2016; Harnik and Welle 2009 · Level: from meta-analysis to grey literature*

# What is robust, what needs qualifying

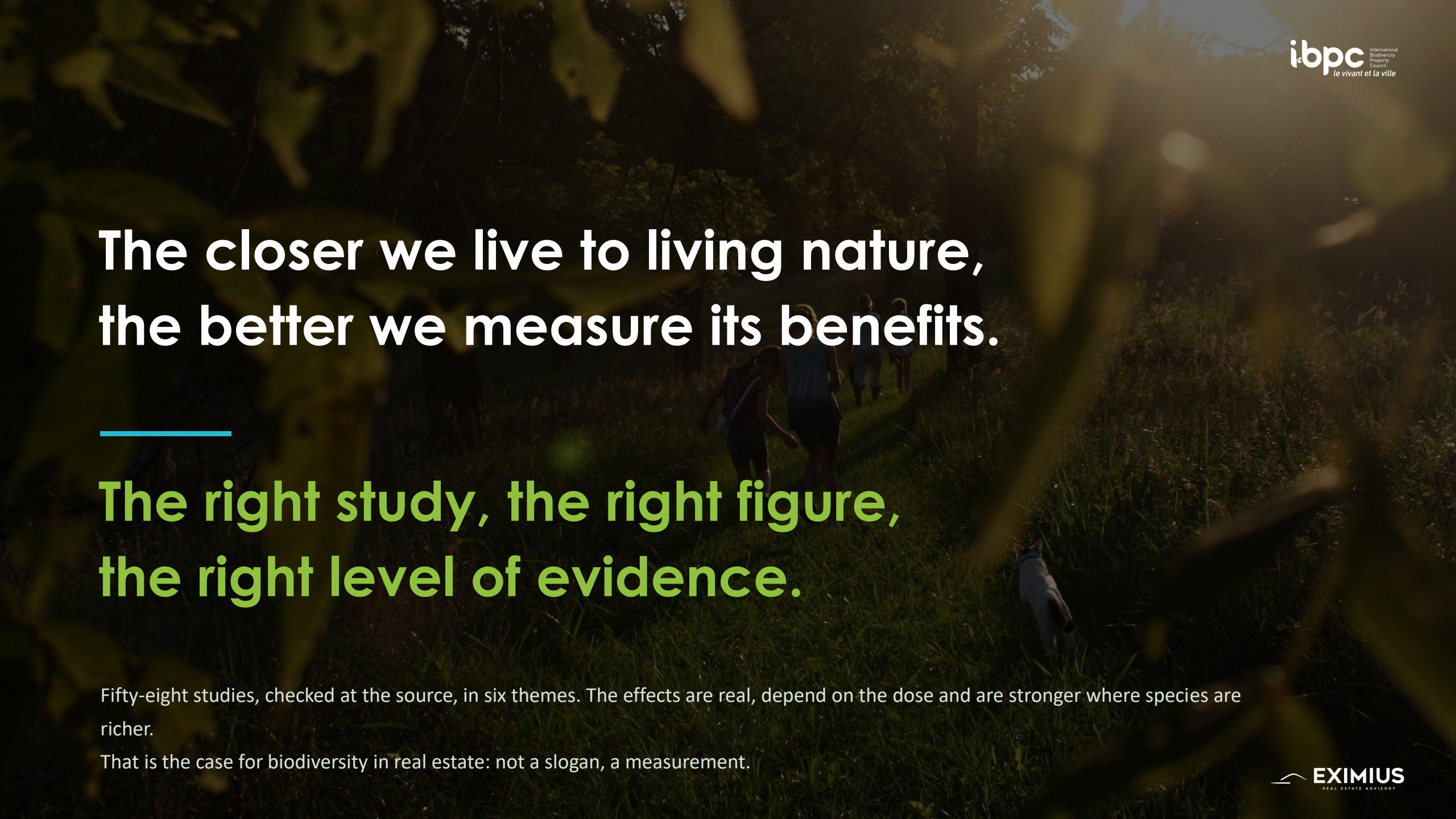
## BUILD THE CASE ON THESE

1. Cohorts and meta-analyses: mortality -12% (James 2016), all-cause mortality OR 0.69 and diabetes OR 0.72 (Twohig-Bennett and Jones 2018), 120 minutes a week (White 2019).
2. Field experiments replicated across several sites: cortisol -13 to -16% and pulse -4 to -6% (Park 2010), cooling -0.94 °C (Bowler 2010, meta-analysis).
3. Studies that isolate biodiversity itself: benefits increasing with species richness (Fuller 2007), Refuge, Nature and Rich in species (Grahn and Stigsdotter 2010).
4. Large hedonic studies: +2.8 to 3.1% in Warsaw (43,075 sales), +16.9% in vertical housing in Hong Kong, +7% on office rents.

## QUOTE WITH CAUTION

1. Seminal studies with tiny samples: Ulrich 1984 (46 patients), Berman 2008 (38 students), Faber Taylor and Kuo 2009 (17 children). Historical value, limited power.
2. Commissioned reports and corporate cases: Heschong Mahone (California Energy Commission), Kats 2003, Romm and Browning 1994, Asterès 2016. Sound statistics, no peer review, sponsor's interest.
3. Extrapolated amounts: $93 million in hospital savings, $470 million in productivity in New York, $1.7 billion in crime. Projections by Terrapin, results of no study.
4. Daylight studies quoted as biodiversity evidence: Heschong Mahone, Walch, Beauchemin, Benedetti measure windows and sun, not plants or species.

**The first column stands up to due diligence. The second calls for a footnote.**
**Eighteen figures circulating in the sector had to be corrected at the source; none of them appears on these slides.**



# The closer we live to living nature, the better we measure its benefits.

## The right study, the right figure, the right level of evidence.

Fifty-eight studies, checked at the source, in six themes. The effects are real, depend on the dose and are stronger where species are richer.

That is the case for biodiversity in real estate: not a slogan, a measurement.

# Sources and levels of evidence

**Every figure on this page comes from the original publication, checked online in September and November 2026. Level: peer-reviewed literature, meta-analysis, commissioned report or survey. Full references, links and caveats in the "People and nature" memorandum, v1.2.**

| FIGURE | VALUE | SOURCE | LEVEL |
|---|---|---|---|
| **Hospital stay, view of trees** | -8.5% (7.96 versus 8.70 days), fewer painkillers, n = 46 | Ulrich, 1984, Science | Peer-reviewed |
| **Stress physiology, forest versus city** | cortisol -13 to -16% · pulse -4 to -6% · parasympathetic +56 to +102% | Park et al., 2010, Environ. Health Prev. Med. | Peer-reviewed |
| **Mortality, greenest neighbourhoods** | -12% all causes · -13% cancer · -34% respiratory, 108,630 women, 8 years | James et al., 2016, Environ. Health Perspectives | Cohort |
| **Green space and health, 143 studies** | mortality OR 0.69 · diabetes OR 0.72 · heart rate -2.6 bpm · diastolic -2 mmHg | Twohig-Bennett and Jones, 2018, Environ. Research | Meta-analysis |
| **Dose of nature** | good health OR 1.59 beyond 120 min/week, n = 19,806 · gains from 5 min, d = 0.46 to 0.54 | White et al., 2019; Barton and Pretty, 2010 | Survey · meta-analysis |
| **Biodiversity and well-being** | benefits increasing with plant and bird richness, 312 users · Refuge, Nature, Rich in species | Fuller et al., 2007; Grahn and Stigsdotter, 2010 | Peer-reviewed |
| **Attention and memory** | working memory +1.5 digits (~+20%) · children with ADHD d = 0.52 to 0.77 after 20 min | Berman et al., 2008; Faber Taylor and Kuo, 2009 | Peers, small n |
| **Sick leave and task speed** | 57 versus 68 h/year depending on the view · calls 6 to 12% faster · tests +10 to 25% | Elzeyadi, 2011; Heschong Mahone Group, 2003 | Conference · report |
| **Plants in offices** | productivity +15% on objective tasks · 82% versus 60% satisfied | Nieuwenhuis et al., 2014; Dravigne et al., 2008 | Peer-reviewed |
| **Crime and aggression, public housing** | crimes -52% (property -48%, violent -56%) · 7 to 8% of variance | Kuo and Sullivan, 2001, Environment and Behavior | Peer-reviewed |
| **Price and rent premiums** | +2.8 to 3.1% (100 m, Warsaw) · +16.9% (park, Hong Kong) · office rents +7% | Trojanek et al., 2018; Jim and Chen, 2010; Laverne, 2003 | Hedonic, peers |
| **Cooling and avoided costs** | park -0.94 °C by day, -1.15 °C at night · +10% green space = €94 million/year (France, modelling) | Bowler et al., 2010; Asterès / Unep, 2016 | Meta-analysis · report |



*Sources checked online in September and November 2026 (EXIMIUS REA for the IBPC-CIBI). Excluded as unverifiable: Paris +17% (Ahamada 2007), factor of 1.6 (Kahn 2008), Bolloré Nantes employee survey, 2026 label counts.*