Making Nature's City

Greening our cities for health and biodiversity

SFEI | AQUATIC SCIENCE CENTER

SAN FRANCISCO ESTUARY INSTITUTE & THE AQUATIC SCIENCE CENTER

Feb 17, 2022

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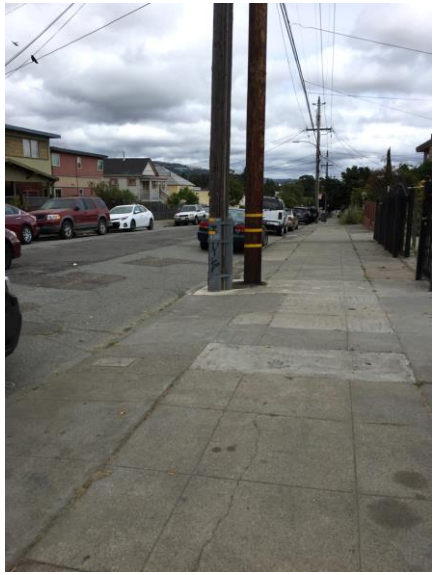
Urban Nature Lab

Nature for biodiversity and health in cities



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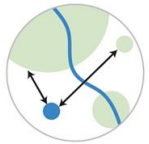
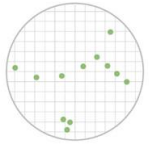
Ecology in cities

Patch Size



Connections



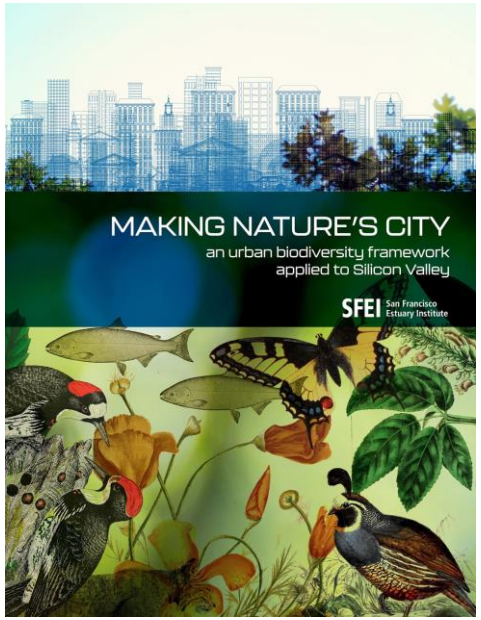
Matrix Quality

Habitat Diversity

Native Plants

Special Resources

Management



Making Nature's City

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PATCH SIZE

Local Habitat Patch

2-10 acres

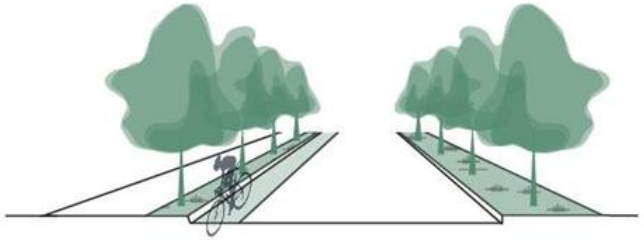
local parks
schoolyards

Local Hub
10+ acres

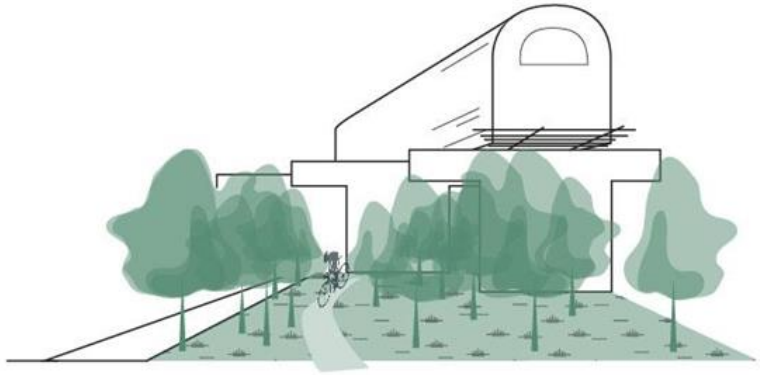
larger park complexes

large parks, campuses, preserves

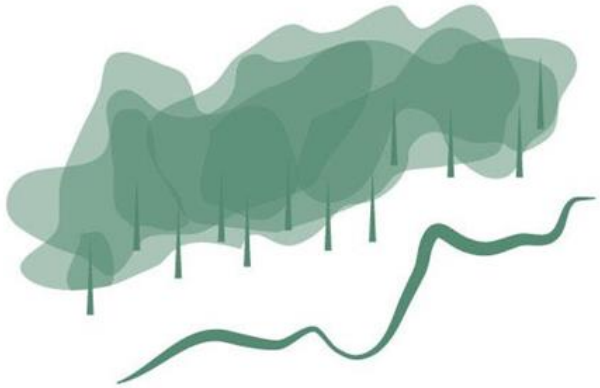
CONNECTIONS



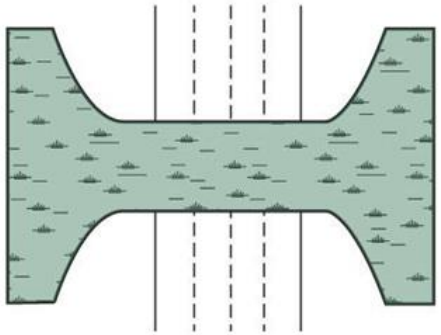
green streets



greenways



riparian corridors



wildlife crossings

MATRIX QUALITY

Landscaped areas

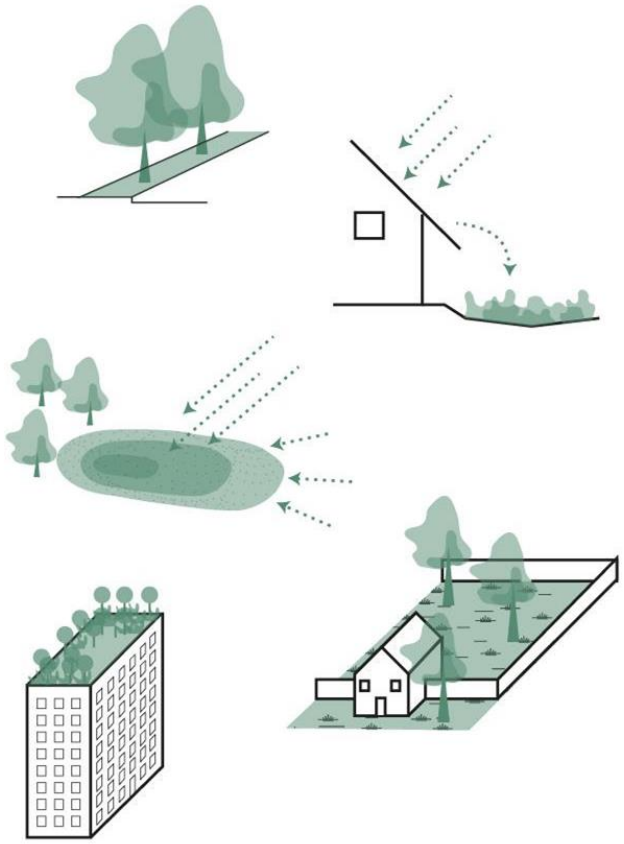
Residential yards

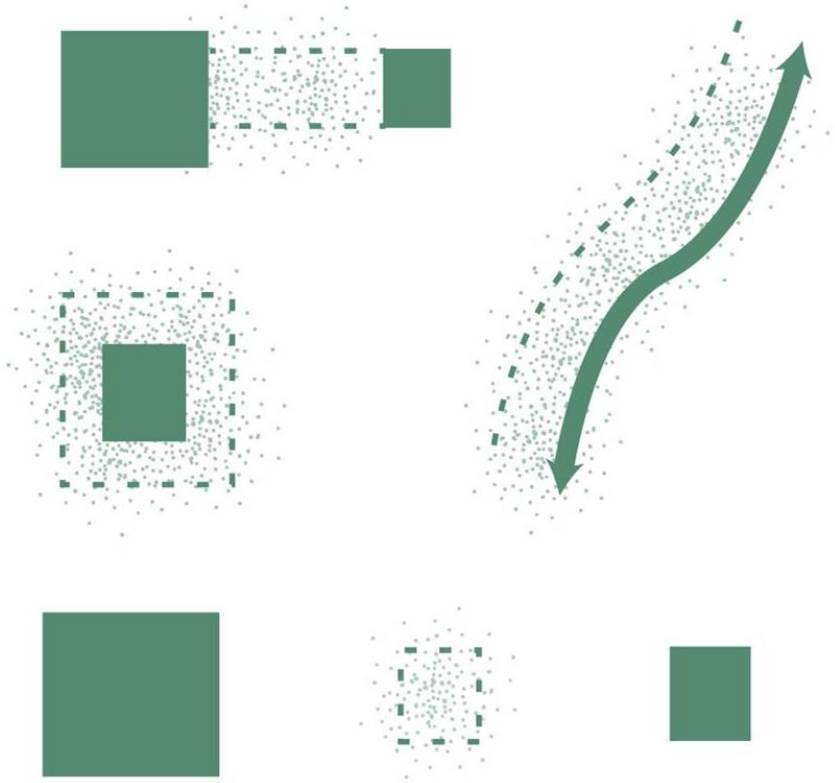
Street trees

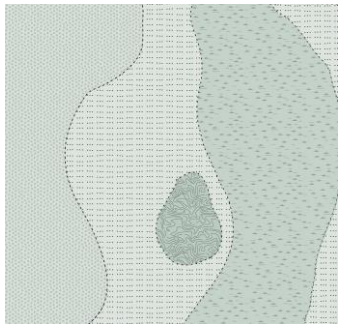
Green roofs

Green infrastructure

Flood detention basins



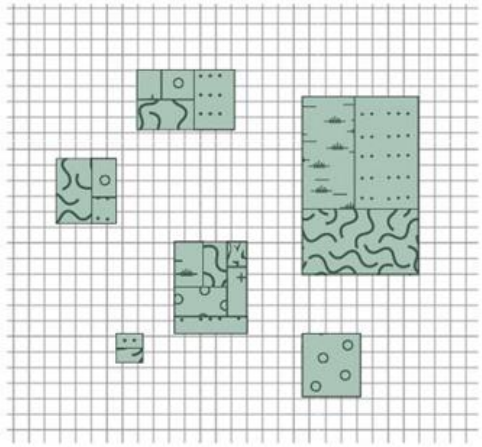




HABITAT DIVERSITY

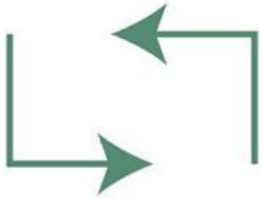
increases coherence
@neighborhood scale

Appropriate habitat type
for a place



Creates heterogeneity of
habitats across cities

NATIVE VEGETATION



removing invasive species

year-round resources for wildlife

diversity and abundance

complementary plants

planting & protecting native species

flowers, fruits and nuts

SPECIAL RESOURCES

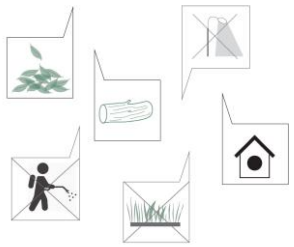
streams

ponds

large trees

lakes

wetlands



MANAGEMENT

light pollution

lawns

frequent mowing

pesticides and herbicides

What other benefits will come along?

Comparing grey and green solutions

Pest control

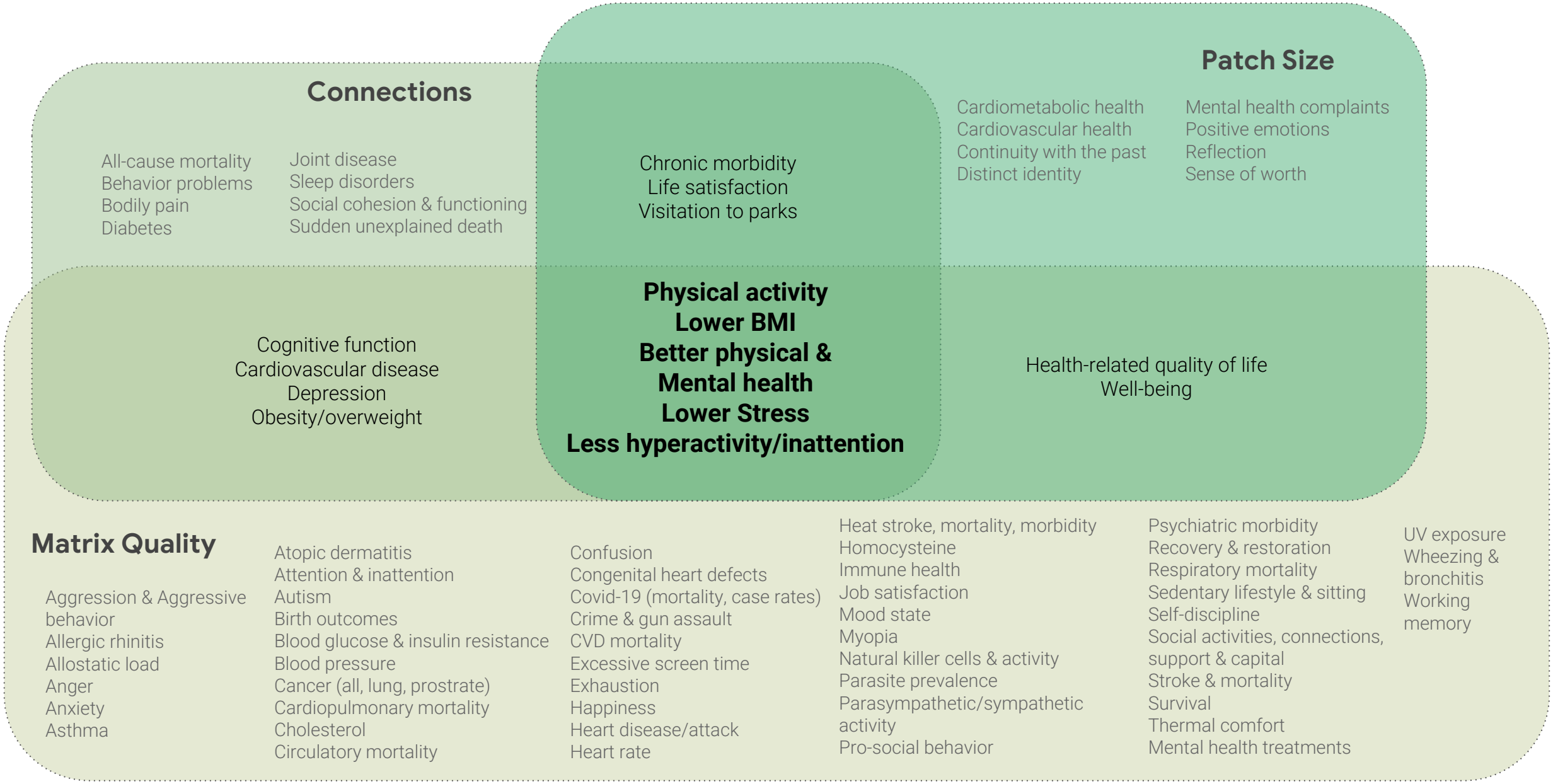
\+
Pollination
Human health
Pro-environmental behavior

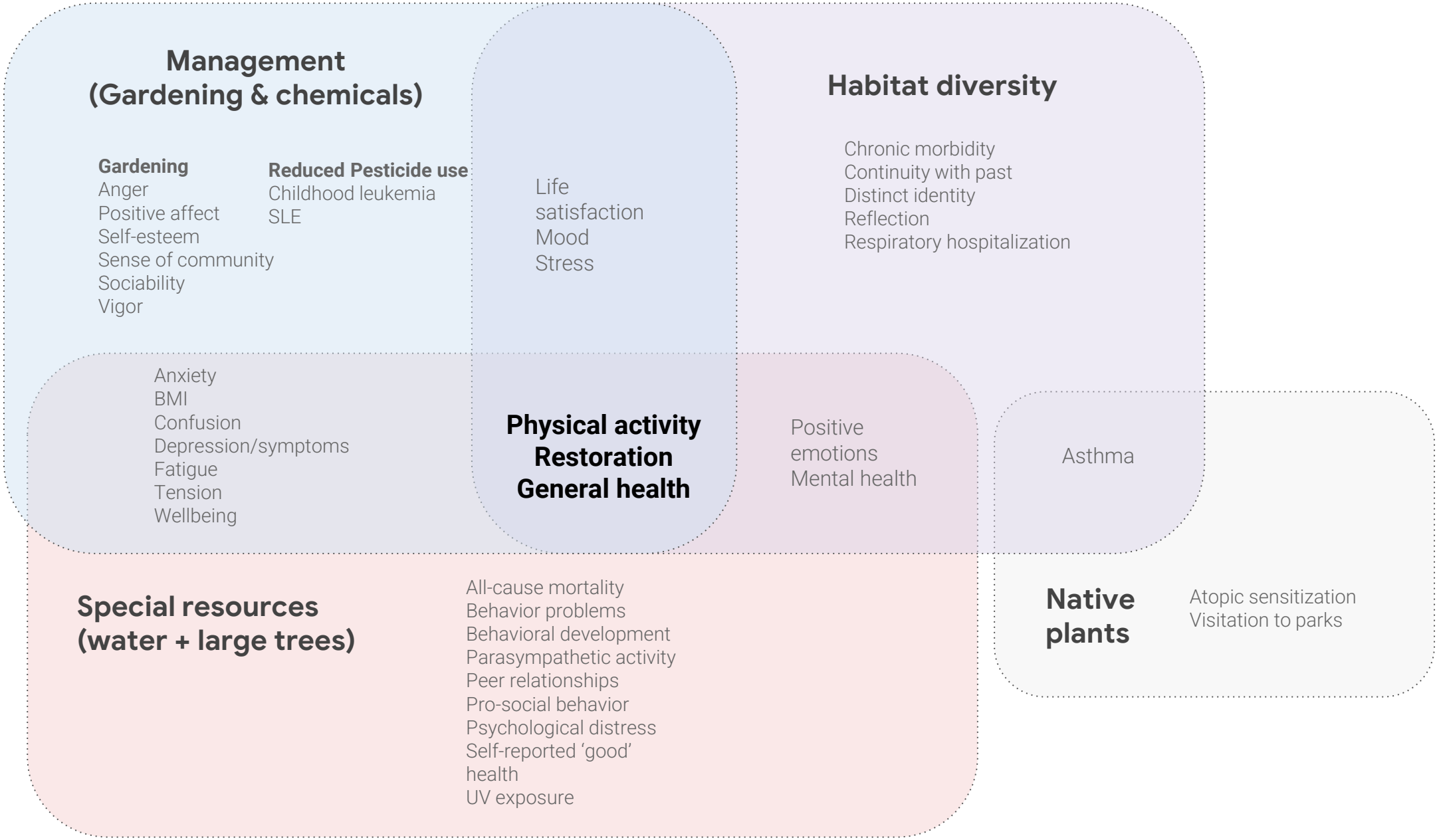
Stormwater management

\+
Pollution mitigation
Human health
Habitat

Shade

\+
Carbon storage
Runoff reduction
Traffic calming
Human health
Beauty
Habitat


Connections
All-cause mortality
Behavior problems
Bodily pain
Diabetes
Joint disease
Sleep disorders
Social cohesion & functioning
Sudden unexplained death
Patch Size
Cardiometabolic health
Cardiovascular health
Continuity with the past
Distinct identity
Mental health complaints
Positive emotions
Reflection
Sense of worth
Chronic morbidity
Life satisfaction
Visitation to parks
Cognitive function
Cardiovascular disease
Depression
Obesity/overweight
Physical activity
Lower BMI
Better physical &
Mental health
Lower Stress
Less hyperactivity/inattention
Health-related quality of life
Well-being
Matrix Quality
Aggression & Aggressive behavior
Allergic rhinitis
Allostatic load
Anger
Anxiety
Asthma
Atopic dermatitis
Attention & inattention
Autism
Birth outcomes
Blood glucose & insulin resistance
Blood pressure
Cancer (all, lung, prostrate)
Cardiopulmonary mortality
Cholesterol
Circulatory mortality
Confusion
Congenital heart defects
Covid-19 (mortality, case rates)
Crime & gun assault
CVD mortality
Excessive screen time
Exhaustion
Happiness
Heart disease/attack
Heart rate
Heat stroke, mortality, morbidity
Homocysteine
Immune health
Job satisfaction
Mood state
Myopia
Natural killer cells & activity
Parasite prevalence
Parasympathetic/sympathetic activity
Pro-social behavior
Psychiatric morbidity
Recovery & restoration
Respiratory mortality
Sedentary lifestyle & sitting
Self-discipline
Social activities, connections, support & capital
Stroke & mortality
Survival
Thermal comfort
Mental health treatments
UV exposure
Wheezing & bronchitis
Working memory


Management
(Gardening & chemicals)
Gardening
Anger
Positive affect
Self-esteem
Sense of community
Sociability
Vigor
Reduced Pesticide use
Childhood leukemia
SLE
Life
satisfaction
Mood
Stress
Habitat diversity
Chronic morbidity
Continuity with past
Distinct identity
Reflection
Respiratory hospitalization
Anxiety
BMI
Confusion
Depression/symptoms
Fatigue
Tension
Wellbeing
Physical activity
Restoration
General health
Positive
emotions
Mental health
Asthma
Special resources
(water + large trees)
All-cause mortality
Behavior problems
Behavioral development
Parasympathetic activity
Peer relationships
Pro-social behavior
Psychological distress
Self-reported ‘good’
health
UV exposure
Native
plants
Atopic sensitization
Visitation to parks

Case Study

Ecology at Google in Mountain View

patches large & small

Large ecological features (e.g. patches of habitat of 1 or more acres in size) alongside other smaller landscaping creates more functional habitat across larger spatial scales

Small patches mixed in with large provide stepping stones and enhance connectivity

Our recommendation: Aim for the largest consolidated patches of habitat possible for each site, and try to build in early in design

small spaces & trees

Tiny urban features (medians, parking strips, softscape around parking lots) improve matrix quality, and cumulatively add up to a lot

Lawn removal reduces water use and improves matrix quality

Native tree planting alongside native planting with focus on oaks, willow groves, and riparian habitat depending on the site

diverse native plantings

Combining multiple different species together in diverse assemblages

Including multiple individuals of some species, particularly those with wildlife value

Experimenting with a diverse array of native species, including those not typically used in designed landscapes, and beyond cultivars of native plants, pushing nurseries and creating demand

wildlife supporting features

Designed for wildlife, including bird-friendly window design and wildlife-friendly lighting

Plants that bloom throughout year, pollinator gardens, milkweed for monarchs

Water fountains

tending & maintenance

Downed logs left and put deliberately in place

Little/no pesticide use

Vegetation left messier, reduced mowing, and irrigation only during establishment

Charleston retention basin

Large patch of habitat expanded in 2016/17

Important water feature, willow grove, bordered by and planted with valley oaks, creating coherent habitat and enhancing regional habitat diversity

Also serves as public space with trail and boardwalk - place for respite, supporting wellbeing for public & Google

Patch size Connections Matrix quality **Habitat diversity** **Native plants** **Special resources** Management

Is Google’s work transferable?

Ecology at Google in Mountain View

- Social norms
- Municipal ordinances
- Desire for ‘low maintenance’
- Preferences for ‘manicured’ look

+ Corporate leaders & public examples
+ Perceived vs. actual social pressure
+ Shifts in public attitude

Thanks!

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