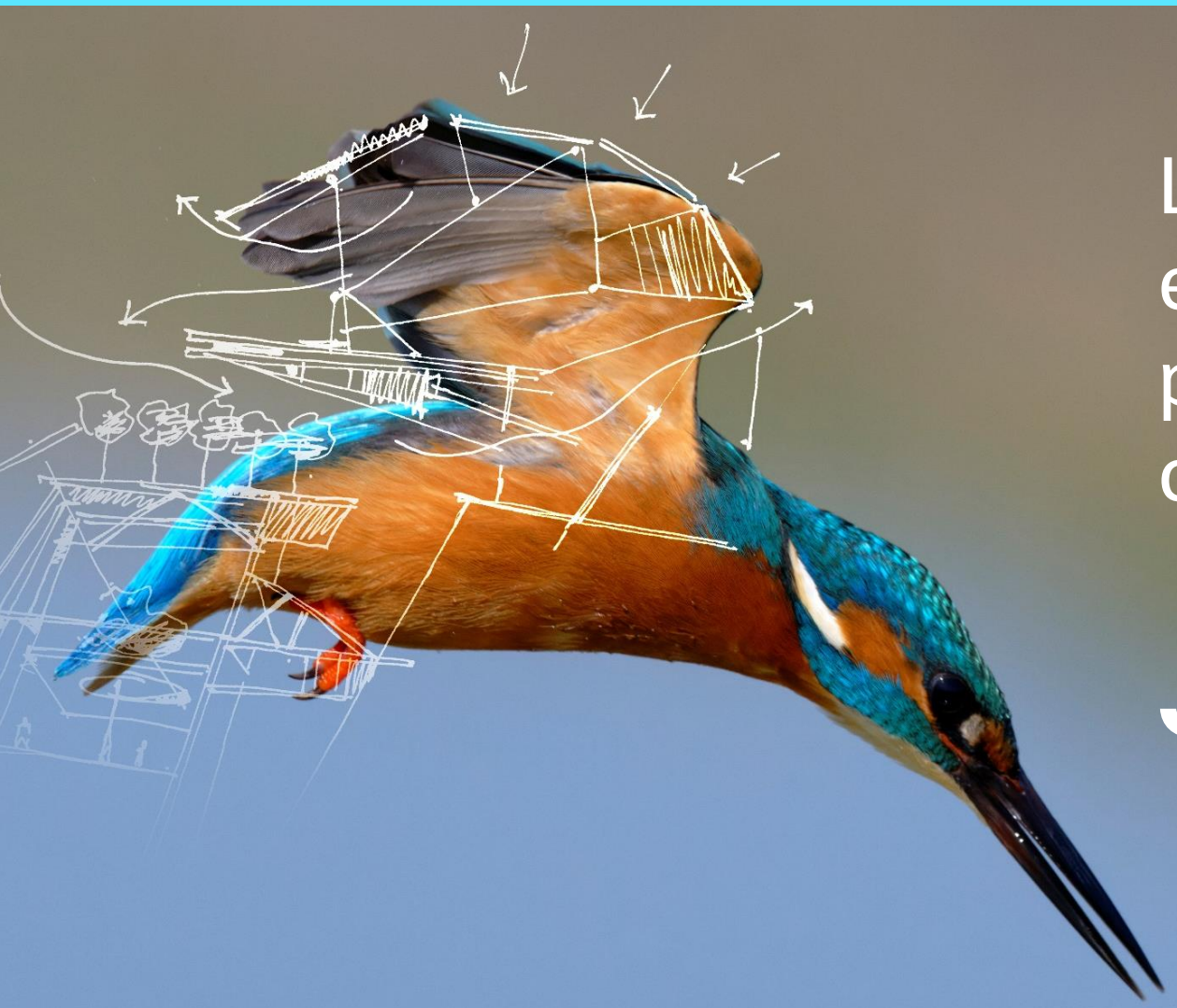
Biomimicry Overview Presentation



Learning from and then emulating nature's forms, processes, and ecosystems to create more sustainable designs.

Jacobs

BIOMIMICRY 3.8

What is Biomimicry and **who** is Biomimicry 3.8?

BIOMIMICRY

Biomimicry is a unique **innovation methodology informed by nature's 3.8 billion years of R&D** to create sustainable and regenerative designs.

BIOMIMICRY 3.8

A regenerative world is possible.

The global leader in nature-inspired innovation.

CONSULTING

Innovate with nature's genius to drive sustainable and regenerative impact.

PROFESSIONAL TRAINING

Integrate biomimicry into your career and organization.

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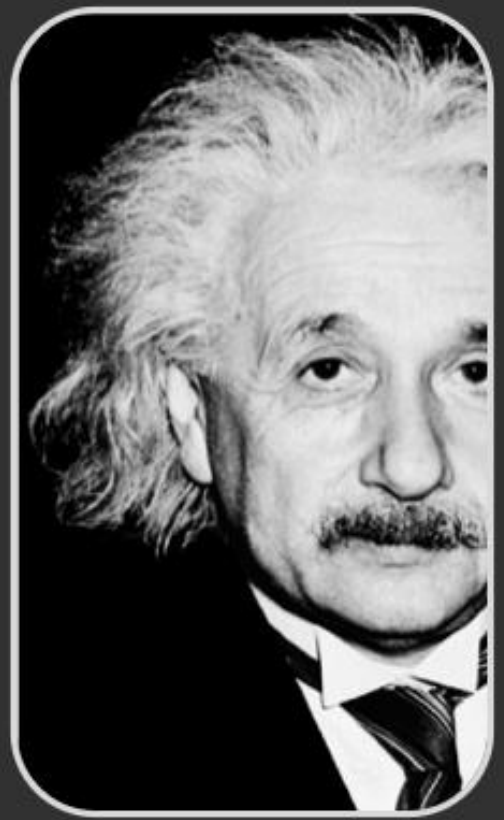
Q: Why do we humans need to connect to nature and 3.8 billion years of genius?

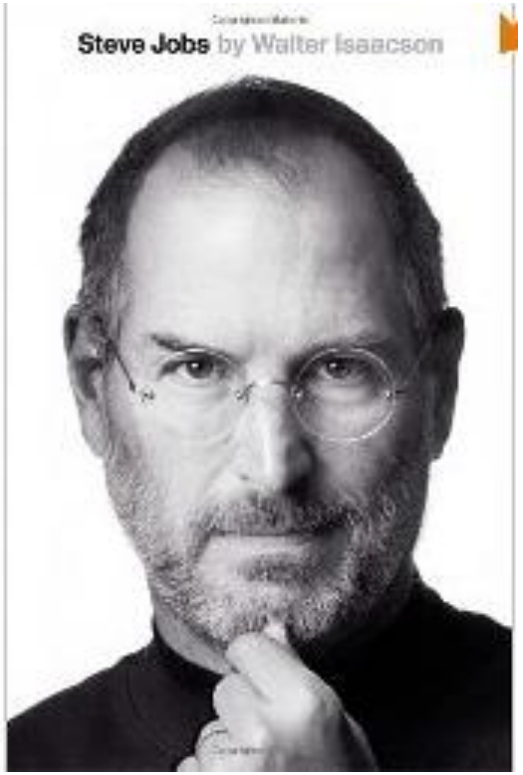
“We still do not know one thousandth of one percent of what nature has revealed to us.”

~ Albert Einstein

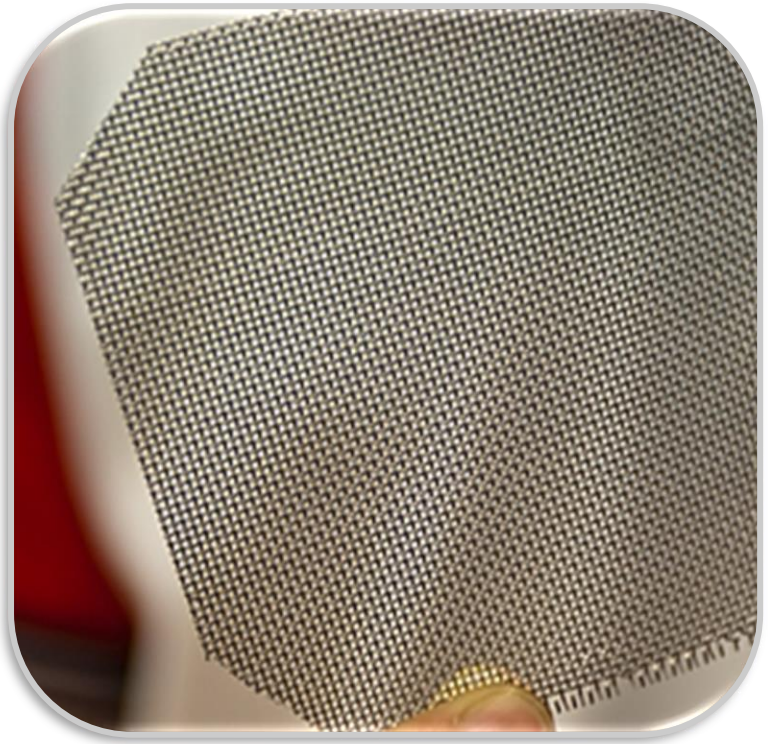


“I think the biggest innovations of the 21st century will be at the intersection of biology and technology. A new era is beginning.”

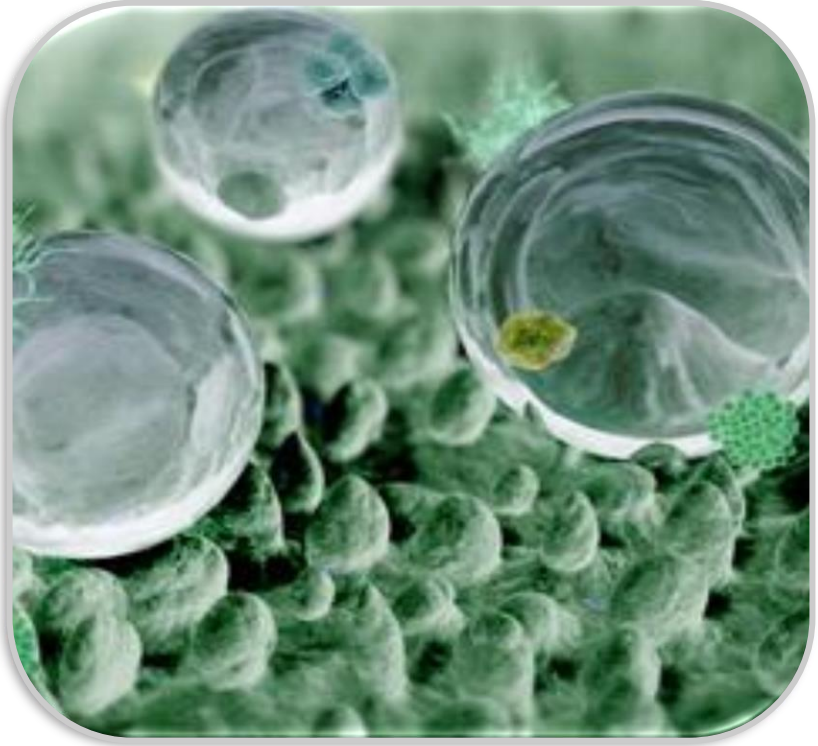
Steve Jobs



Kingfisher - Aerodynamics



Stenocara Beetle - Water Collection



Lotus Flower – Stain Resistant Coatings

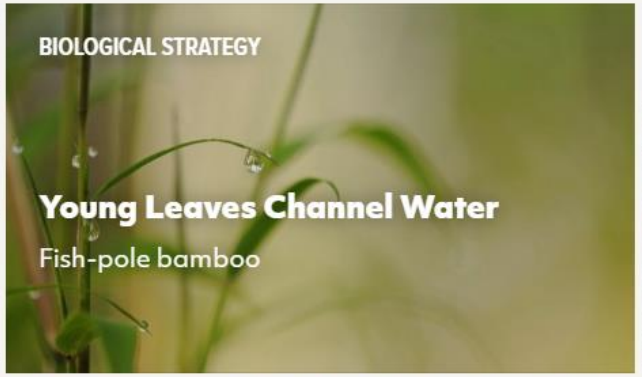
AskNature.org

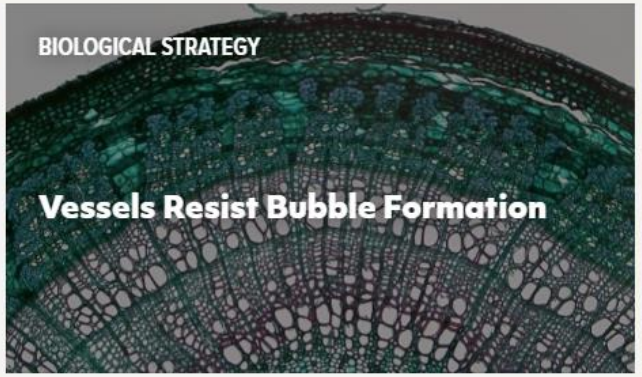
asknature COLLECTIONS BIOLOGICAL STRATEGIES INNOVATIONS FOR EDUCATORS ABOUT DONATE SEARCH

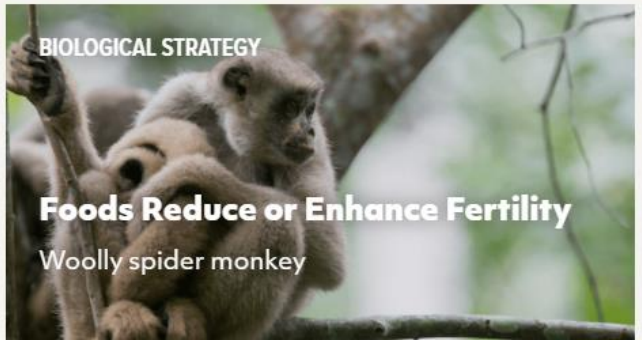
PROTECT FROM PHYSICAL HARM | BIOLOGICAL STRATEGIES × CLEAR ALL

- Break Down 85 +
- Get, Store, or Distribute Resources 419 +
- Maintain Community 213 +
- Make 137 +
- Modify 413 +
- Move or Stay Put 306 +
- Process Information 285 +
- **Protect From Physical Harm 813 ×**
  - Manage Structural Forces 212 +
  - Prevent Structural Failure 82 +
  - Protect From Living Threats 246 +
  - Protect From Non-living Threats 313 +
  - Regulate Physiological Processes 152 +
- Provide ecosystem services 1 +

Protect From Physical Harm







Contents

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The Challenge
Innovation Details
Biological Model
References

'Black swan' event prediction model from Stanford University uses data from a variety of ecosystems to mitigate disasters.

Benefits

- Increased accuracy
- Increased predictability

Applications

- Natural disasters
- Economics

UN Sustainable Development Goals Addressed

Goal 8: Decent Work and Economic Growth

Goal 11: Sustainable Cities & Communities

The Challenge

A disease outbreak or economic crisis can cause deaths, long-term suffering, widespread devastation, and environmental damage. 'Black swan' events are those that are highly unlikely but if they do occur, can have an enormous impact. An accurate prediction model could alert people to prepare for the worst before such an event happens, and potentially mitigate the damage.

Innovation Details

The prediction model uses a combination of empirical dynamic modeling and prior biological knowledge. The model uses long-term data from three ecosystems: an eight-year study of plankton from the Baltic Sea with species levels measured twice weekly; net carbon measurements from a deciduous broadleaf forest at Harvard University, gathered every 30 minutes since 1991; and measurements of barnacles, algae and mussels on the coast of New Zealand, taken monthly for over 20 years. The results indicate that fluctuations in different biological species are statistically the same across different ecosystems. This suggests there are certain underlying universal processes that can be used to forecast extreme events.

Biological Model

Various ecosystems seem to predict disaster before it occurs. The abundance and resistance of an ecosystem is consistently monitored and controlled by the individuals within. When an external force is exerted, the ecosystem responds with a series of discrete events of different magnitudes.

SEE RELATED STRATEGY

References

JOURNAL ARTICLE
Forecasting unprecedented ecological fluctuations
PLOS Computational Biology

FAST COMPANY

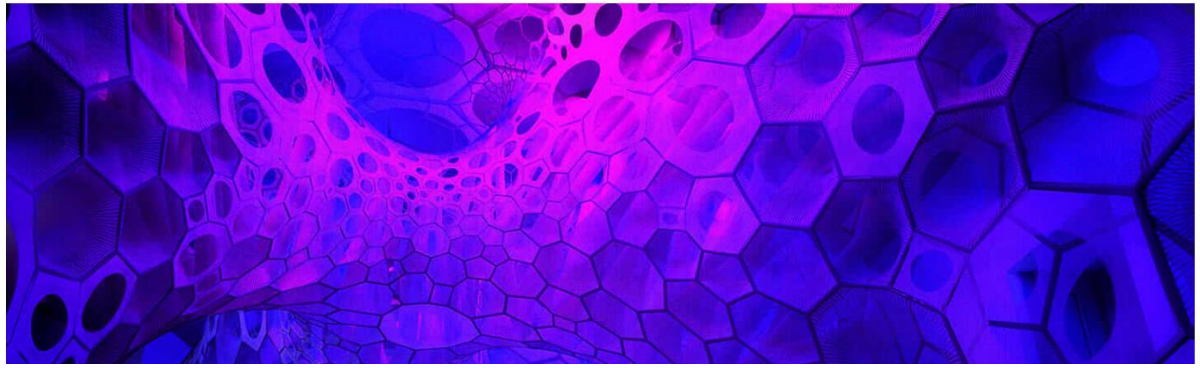
Combining The Built And Natural Environments To Create Generous Cities Of The Future

Urban growth doesn't have to destroy nature–it can work with it.

Redshift by AUTODESK

Nature Does It Better: Biomimicry in Architecture and Engineering

BY ZACH MORTICE ARCHITECTURE - JUL 11 2016 - 6 MIN READ



Founding change agents represent the following companies and institutions:

Ford AQUAFIL Interface APPSTATE Logoplaste emx Jacobs o+k Google KOHLER Microsoft

Project Positive

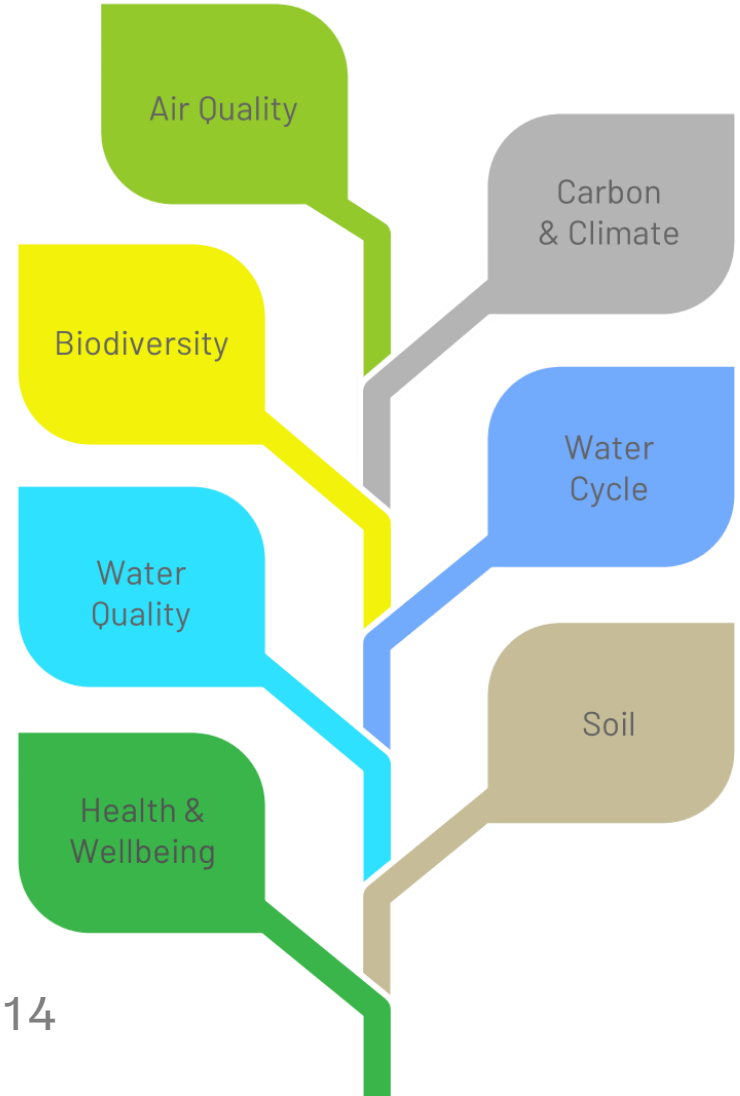
Regenerative design for a thriving world.

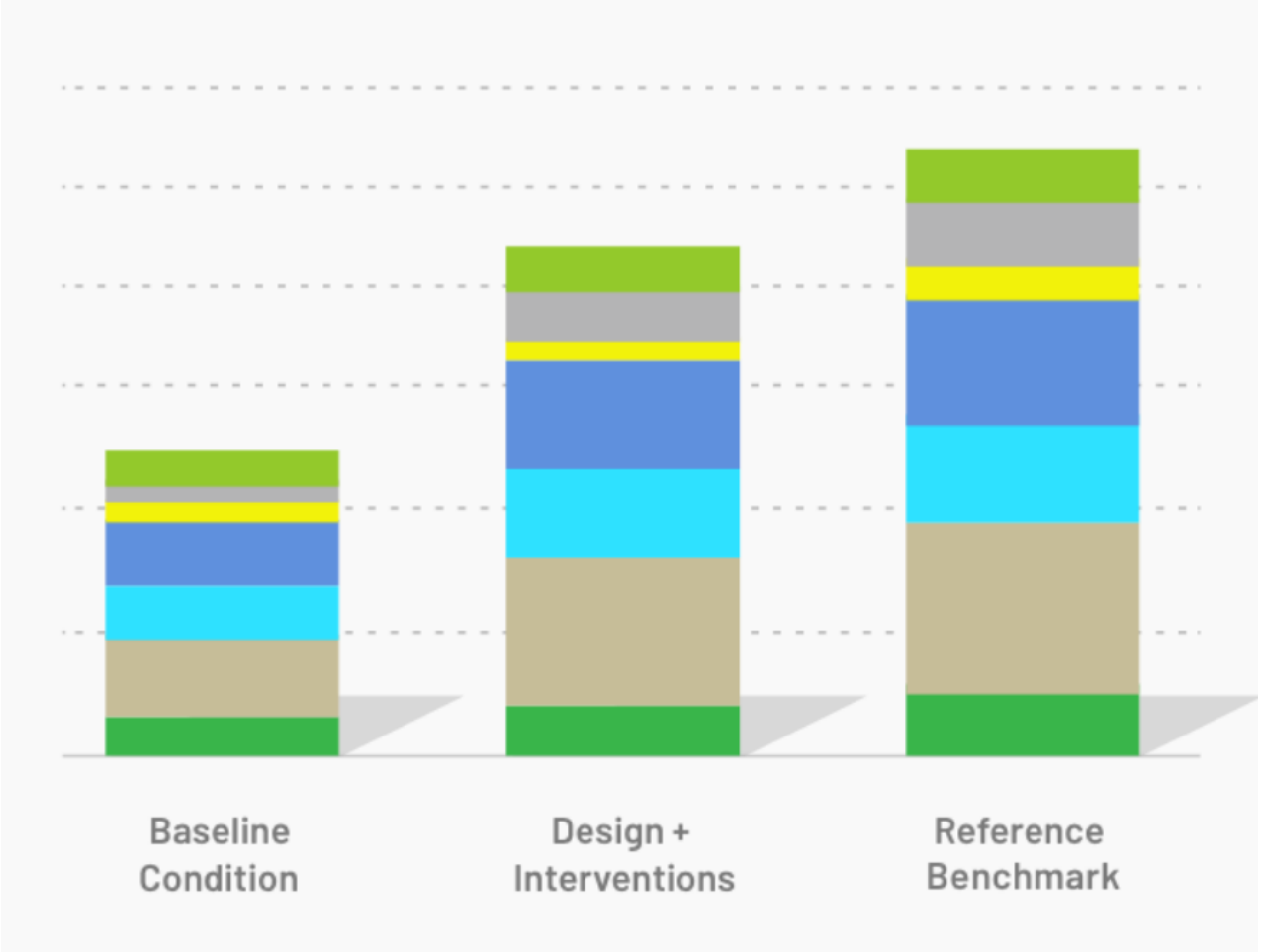
BIOMIMICRY 3.8

Quantifying Nature's Benefit

Ecosystem Intelligence Identification & Inventory Tool

ecosystem intelligence





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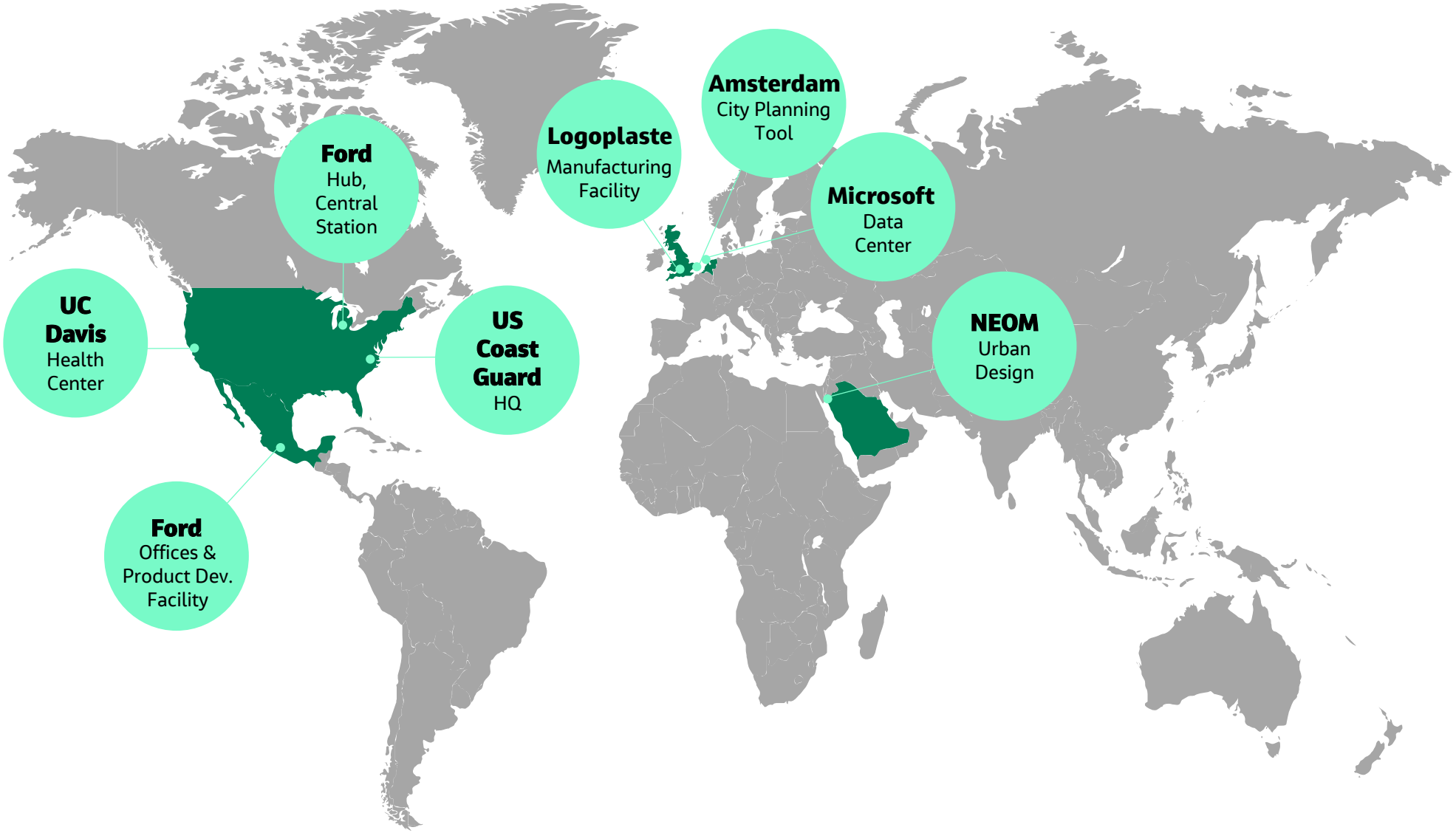
Where we've **made a difference**



Future Opportunities

Delivery of projects that would require multi-disciplinary cross-market delivery including:

- site infrastructure
- utilities
- renewables
- building design
- landscape architecture

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Where we've **made a difference**

Identifying the best design interventions for three built environment projects, including factories and office campus.

Biomimicry Differentiator

Measuring the contributions of ecosystem services

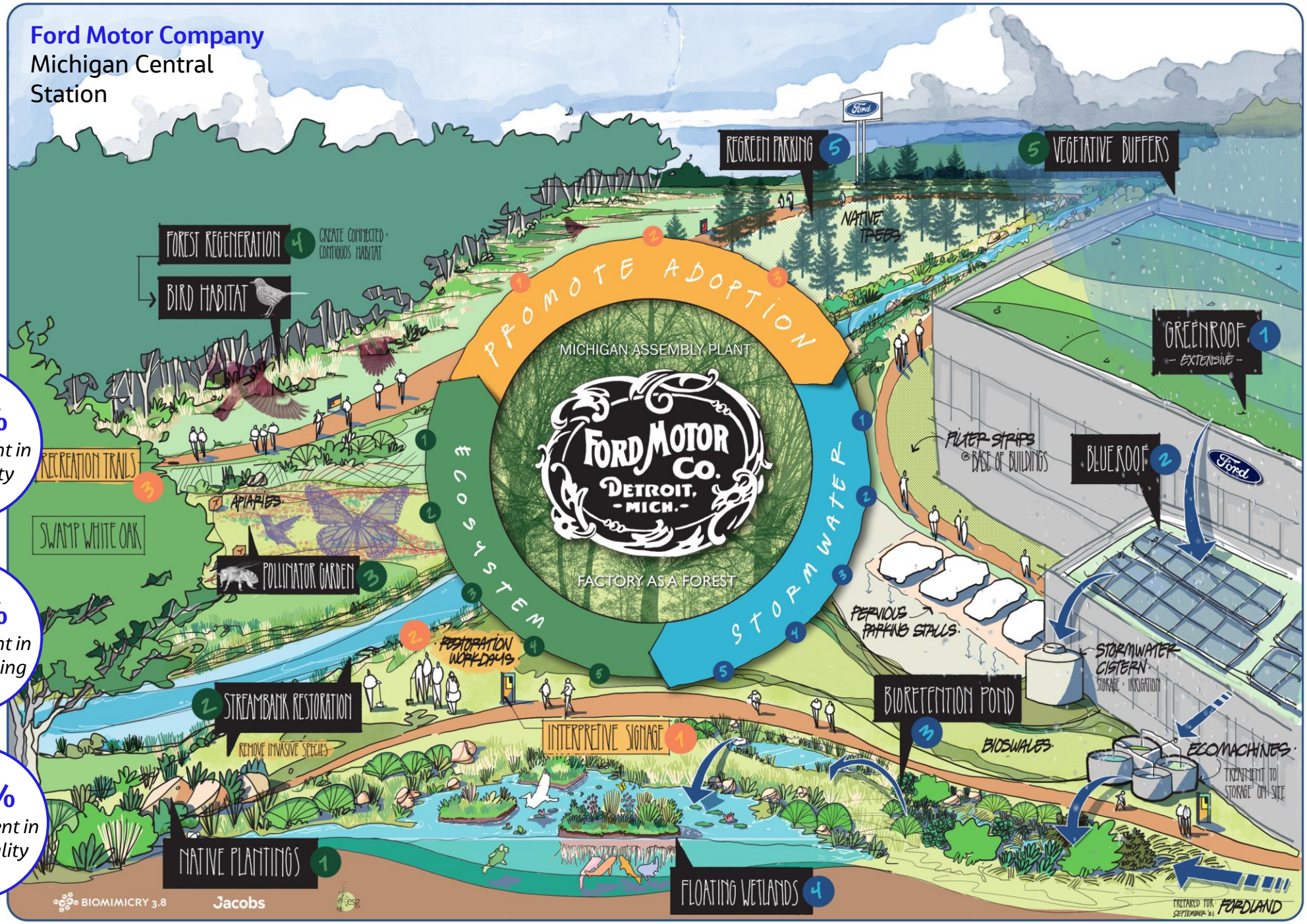
178%
Improvement in biodiversity

250%
Improvement in carbon cycling

167%
Improvement in water quality

Project delivered by Jacobs and strategic partner B3.8

Ford Motor Company
Michigan Central Station



Designing the South Placer Center for Health with Positive Performance meant expanding "care" from only humans to the whole ecosystem.

ECOLOGICAL PRIORITIES	Water regulation	Phytoremediation	Pollutant mitigation	Nutrient cycling
FUNCTIONAL NEEDS	• Stormwater management • Slowing run-off	• Erosion control • Surface-water storage	• Air nitrogen removal • Air temperature regulation	• Soil health • Slowing run-off
CHAMPION ADAPTERS	• Tadpole Shrimp • Fairy Shrimp	• Cattails • Willows	• Valley Oak • Western Sycamore	• California Ground Squirrels • Burrowing Owl

US Coast Guard DC Headquarters

Seamless water management integration

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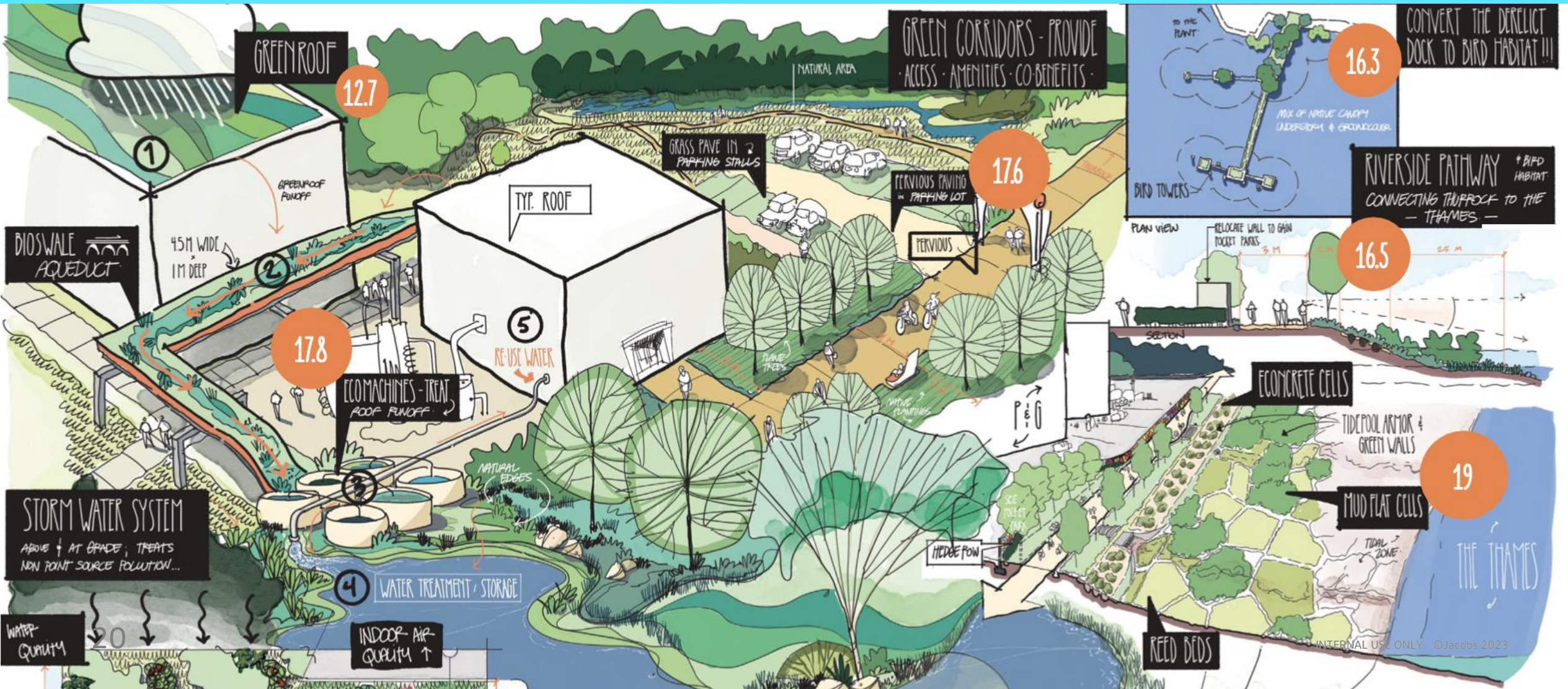
Logoplaste

Improving site performance 1.5 to 2.5x compared to existing performance



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https://www.jacobs.com/reports/infrastructure/biomimicry-sustainability-regeneration

PlanBeyond.

INFRASTRUCTURE

From Sustainability to Regeneration

The power of biomimicry in transforming the built environment

Thank you!

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www.Jacobs.com

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