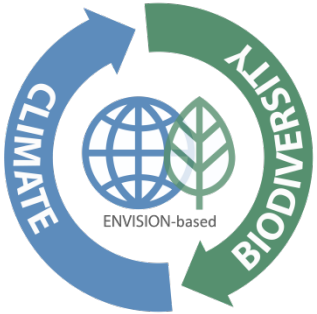
ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE

RESEARCH



INTEGRATED CLIMATE-BIODIVERSITY ACTION AT THE PROJECT LEVEL

Prof. S.N. Pollalis

June 15, 2022

2020-2021
RESEARCH

Assessment of Projects for
a. **mitigation and adaptation to climate change** and
b. attractiveness to investors

2021-2022
RESEARCH

Assessment of Projects for
a. **integrated climate-biodiversity action and**
b. attractiveness to investors

Climate change **is a global issue**

This research bridges performance criteria of global, national, sector, company, **with criteria at the project level** based on Envision®.

LITERATURE REVIEW OF CLIMATE CHANGE Global & National Trends & Commitments

GLOBAL-NATIONAL LEVEL

LITERATURE REVIEW OF ESG (Environmental, Social & Governance) SYSTEMS & TCFD (Task Force on Climate-related Financial Disclosures) & ANALYSIS of selected ESG & climate-related financial frameworks & standards

COMPANY & PROJECT PORTFOLIO LEVEL

INPUT

INPUT

ENVISION REVIEW > PRIORITY CRITERIA & ENVISION CREDITS
for identifying the "right" climate-action projects

INFRASTRUCTURE PROJECT LEVEL

The presentation structure is based on the levels relevant to climate change action

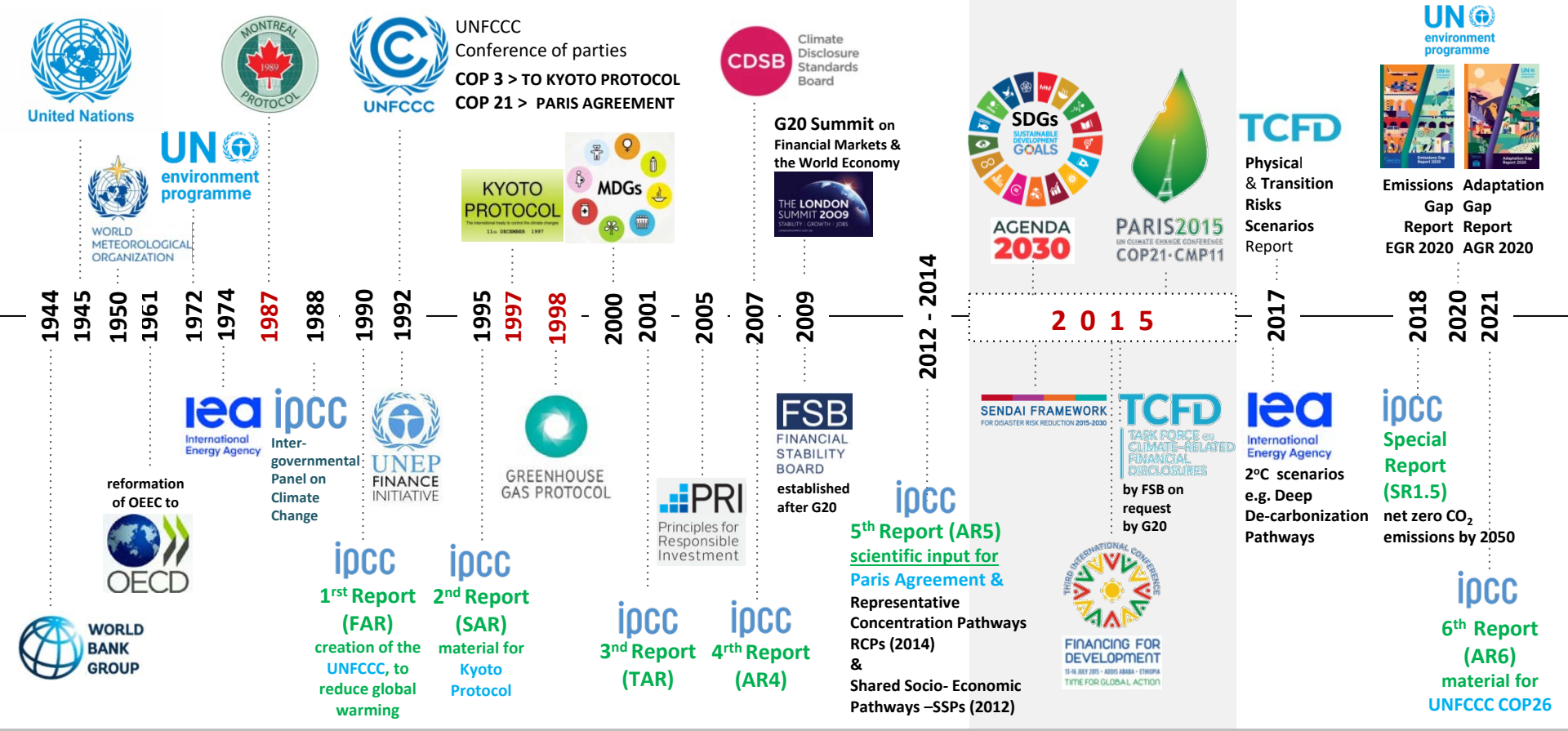
Climate change action

GLOBAL - NATIONAL LEVEL

COMPANY & PROJECT PORTFOLIO LEVEL

INFRASTRUCTURE PROJECT LEVEL BASED ON ENVISION

Timeline of setting climate change targets



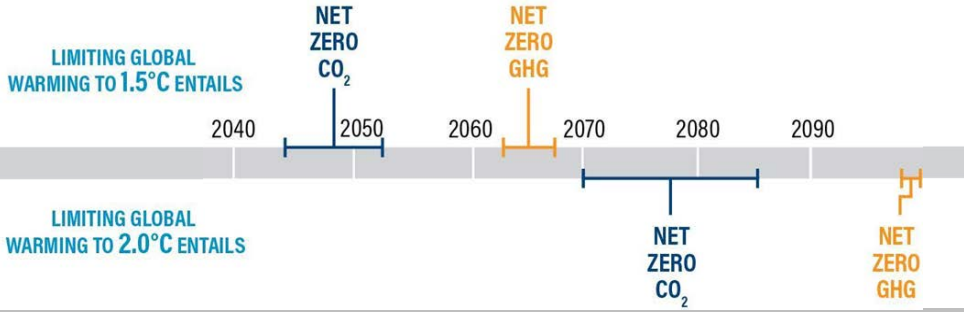
THE PARIS AGREEMENT & NET ZERO EMISSIONS BY 2050

1. Cut GHG emissions **to keep a global average temperature rise** this century **well below 2°C** above pre-industrial levels, **and preferably below 1.5°C.**

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

2. **A global goal to reach net zero emissions by 2050.**
Net-zero emissions will be achieved when all GHG emissions released by humans are counterbalanced by removing GHGs from the atmosphere in a process known as **'carbon removal'. Reaching net-zero emissions is akin to achieving "climate neutrality."**

'Net-zero CO_2 emissions are achieved when anthropogenic CO_2 emissions are balanced globally by anthropogenic CO_2 removal. **Net zero CO_2 emissions are also referred to as "carbon neutrality."**



Global timeline to reach net-zero emissions

On Urgency for Climate Action

There is now scientific consensus that global emissions must drop by 50% over the next decade for the world to have a chance of staying at 1.5°C of global warming and avoid the most catastrophic consequences of climate change. **It has clear and immediate implications for businesses.**"

EU Technical Expert Group on Sustainable Finance, Taxonomy: Final report of the Technical Expert Group on Sustainable Finance (March 2020)

Of the 17 SDGs (Sustainable Development Goals), the SDG combating climate change –SDG 13 'CLIMATE ACTION'– has been identified as the most pressing, after adopting the UN Paris Climate Change Agreement.

17 SDGs

AGENDA 2030

‘GHG accounting,’ defined by the Greenhouse Gas Protocol, is a global standardized tool for measuring progress against GHG reduction targets

Scope 1, 2 and 3 emissions

a. assist in creating inventories to estimate the GHG emissions of companies
b. monitor GHG emissions evolution in the long term
c. allow for aggregation and comparability

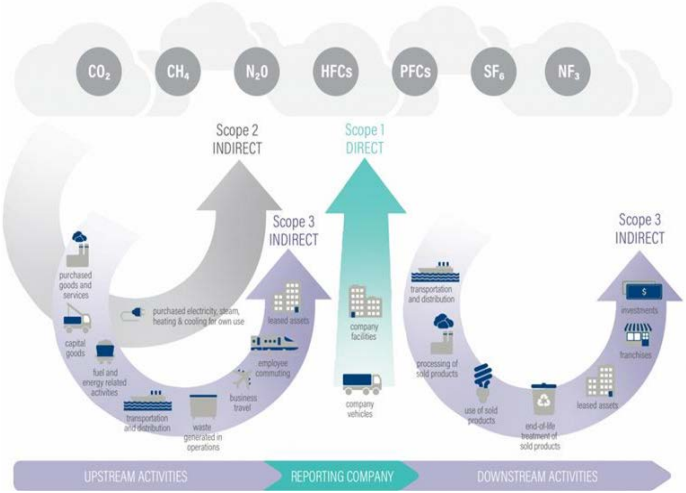


Image source: Greenhouse Gas Protocol, World Resources Institute WRI

Scope 1 emissions

- **Direct** emissions from sources the company owns or controls
- Mandatory accounting and reporting

Scope 2 emissions

- **Indirect** GHG emissions from the generation of purchased energy (electricity, steam, or heat) consumed by the facilities or equipment that the company owns or controls
- Mandatory accounting and reporting

Scope 3 emissions

- **Indirect** GHG emissions from other sources the **company does not own** or control (e.g., waste disposal, outsourced activities, or emissions related to employee commuting) that occur in a company’s value chain
- The largest source of emissions for companies and thus significant opportunities for GHG reductions
- Optional accounting

Environmental, Social, and Governance (ESG) reporting is a tool for investors to know the sustainability performance of their investments

Non-Financial reporting (or sustainability disclosure, or ESG reporting)

KEY ACTORS

CDP	CDSB	GRI	SASB	INTEGRATED REPORTING <IR>	GRESB
CARBON DISCLOSURE PROJECT	CLIMATE DISCLOSURE STANDARDS BOARD	GLOBAL REPORTING INITIATIVE	SUSTAINABILITY ACCOUNTING STANDARDS BOARD	INTERNATIONAL INTEGRATED REPORTING COUNCIL	GLOBAL REAL ESTATE SUSTAINABILITY BENCHMARK

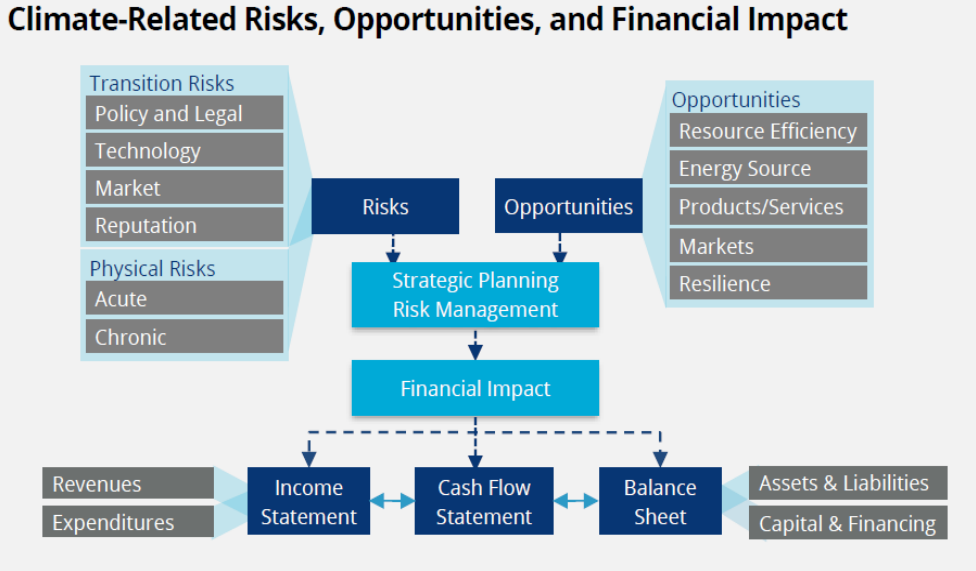
"Corporate reporting is a means by which stakeholders, **including investors**, can understand and evaluate companies' performance, in the same way companies use information internally to inform decision-making."

5ISS (Five Institutional Shareholder Services) Statement of intent to work together

The TCFD recommendations for climate-related risks and opportunities

The investor's demand for climate action has been largely driven by TCFD, a catalyst for awareness of **climate change as a financial risk**

TCFD TASK FORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES



Climate-related risks are divided in two major categories:

- **Transition risks:** related to the transition to a lower-carbon economy, which affects most economic sectors and industries.
- **Physical risks:** related to the physical impacts of climate change; event driven (acute) or longer-term shifts (chronic) in climate patterns

> Recommendations of the Task Force on Climate-related disclosures (June 2017)

ESG systems evolution reflecting investors' demand for climate action

ESG investing

ESG is about **risk-based investing.** ESG systems **evaluate, in equal measure, the potential risks and drivers of long-term enterprise value**, and assess whether those risks are priced in.

SDG investing

The shift from ESG to SDG investing showcases a trend of moving **from a company agenda to a global agenda**. The SDGs provide a common language; however, no standardized system exists for reporting progress against SDGs and their targets.

TCFD Alignment of ESG Systems

TCFD alignment is investors' explicit request for "international standard-setting bodies to incorporate the TCFD recommendations into their standards."

The Climate-first Approach

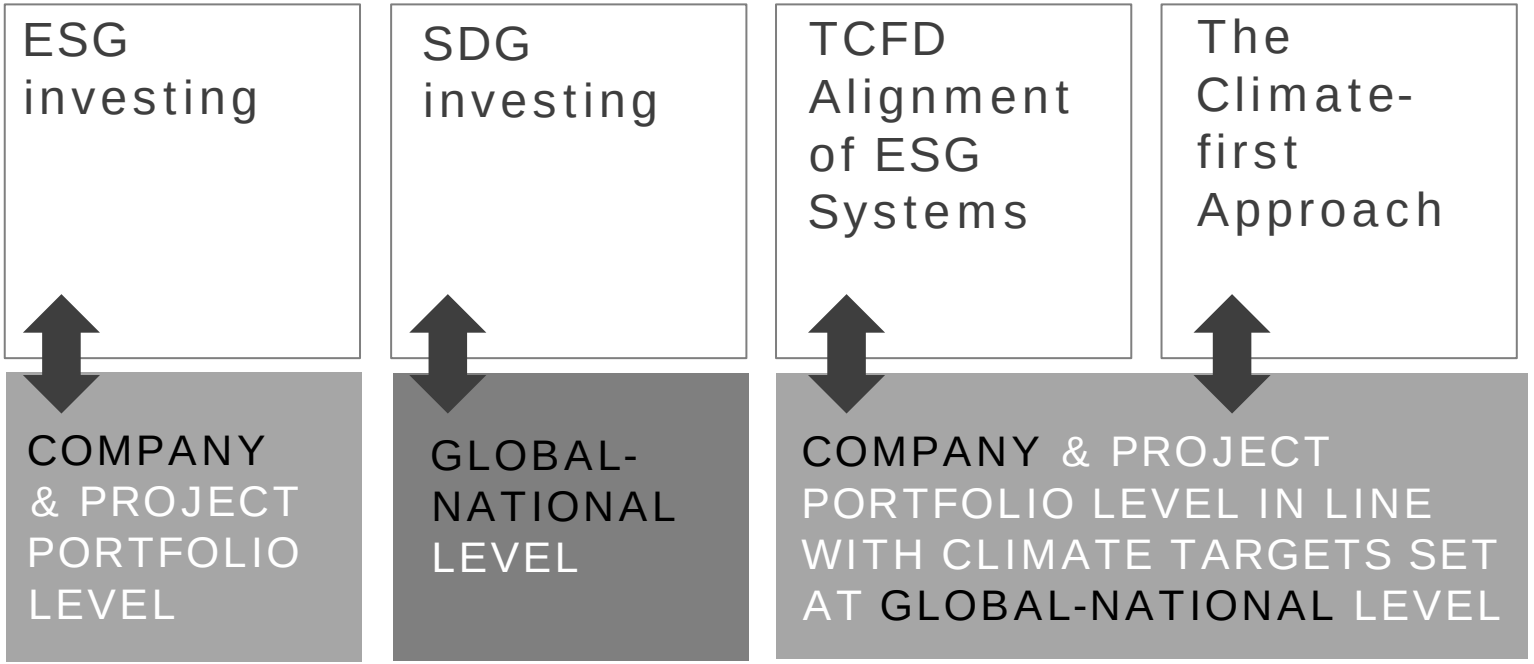
Major ESG organizations have prioritized an early consideration of climate-related information, a "climate-first" approach to respond to global action urgency.

Biodiversity crisis

Though it is a still-nascent ESG consideration for investors, the biodiversity crisis is climbing up investors' agenda as the next priority, mainly for its nexus with climate.

(studied as part of the research focus for 2021-22)

The interconnection of action at Global-National-Company levels



High-Priority Criteria for Climate Change Action

The literature review, the analysis of TCFD and selected ESG systems identified 'HIGH- PRIORITY CRITERIA' for assessing the company's performance in climate change mitigation & adaptation

1 assessment of transition risks (mitigation)

A. GHG emissions reduction targets & progress against targets (GHG accounting)

- GHG Scope 1 emissions
- GHG Scope 2 emissions
- GHG Scope 3 emissions
- GHG Scope 3 emissions (user)

B. GHG emissions reduction strategies

1. Energy efficiency
2. Electricity decarbonization using renewable energy sources
3. Electrification (replacement of use of fossil fuels with electricity)
4. Carbon capture and sequestration for the hard-to-electrify portions of systems

2 assessment of physical risks (adaptation)

C. Alignment with TCFD recommended disclosures

1. Report risk evaluation process
2. Report risk management process

D. Exposure to climate-related risks

1. service continuity risk
2. physical asset risk
3. resource availability risk
   - water
   - materials
   - land
   - workforce
4. supply chain continuity risk

FROM GLOBAL TO PROJECT LEVEL ACTION

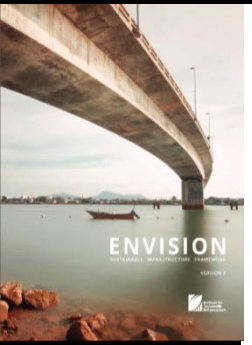
GLOBAL - NATIONAL LEVEL

COMPANY & PROJECT PORTFOLIO LEVEL

THE RESEARCH FOCUSES ON THE PROJECT LEVEL BASED ON ENVISION®

- **How do the global/national and company levels translate to the project level?**
- **Can the global and company level criteria be used to assess climate action at the project level?**

Use of the Envision Framework



Quality Of Life
14 Credits

WELLBEING
QL1.1 Improve Community Quality of Life
QL1.2 Enhance Public Health & Safety
QL1.3 Improve Construction Safety
QL1.4 Minimize Noise & Vibration
QL1.5 Minimize Light Pollution
QL1.6 Minimize Construction Impacts

MOBILITY
QL2.1 Improve Community Mobility & Access
QL2.2 Encourage Sustainable Transportation
QL2.3 Improve Access & Wayfinding

COMMUNITY
QL2.1 Advance Equity & Social Justice
QL2.2 Preserve Historic & Cultural Resources
QL2.3 Enhance Views & Local Character
QL2.4 Enhance Public Space & Amenities

QL0.0 Innovate or Exceed Credit Requirements

Leadership
12 Credits

COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Foster Collaboration & Teamwork
LD1.3 Provide for Stakeholder Involvement
LD1.4 Pursue Byproduct Synergies

PLANNING
LD2.1 Establish a Sustainability Management Plan
LD2.2 Plan for Sustainable Communities
LD2.3 Plan for Long-Term Monitoring & Maintenance
LD2.4 Plan for End-of-Life

ECONOMY
LD3.1 Stimulate Economic Prosperity & Development
LD3.2 Develop Local Skills & Capabilities
LD3.3 Conduct a Life-Cycle Economic Evaluation

LD0.0 Innovate or Exceed Credit Requirements

Resource Allocation
14 Credits

MATERIALS
RA1.1 Support Sustainable Procurement Practices
RA1.2 Use Recycled Materials
RA1.3 Reduce Operational Waste
RA1.4 Reduce Construction Waste
RA1.5 Balance Earthwork On Site

ENERGY
RA2.1 Reduce Operational Energy Consumption
RA2.2 Reduce Construction Energy Consumption
RA2.3 Use Renewable Energy
RA2.4 Commission & Monitor Energy Systems

WATER
RA3.1 Preserve Water Resources
RA3.2 Reduce Operational Water Consumption
RA3.3 Reduce Construction Water Consumption
RA3.4 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements

Natural World
14 Credits

SITING
NW1.1 Preserve Sites of High Ecological Value
NW1.2 Provide Wetland & Surface Water Buffers
NW1.3 Preserve Prime Farmland
NW1.4 Preserve Undeveloped Land

CONSERVATION
NW2.1 Reclaim Brownfields
NW2.2 Manage Stormwater
NW2.3 Reduce Pesticide & Fertilizer Impacts
NW2.4 Protect Surface & Groundwater Quality

ECOLOGY
NW3.1 Enhance Functional Habitats
NW3.2 Enhance Wetland & Surface Water Functions
NW3.3 Maintain Floodplain Functions
NW3.4 Control Invasive Species
NW3.5 Protect Soil Health

NW0.0 Innovate or Exceed Credit Requirements

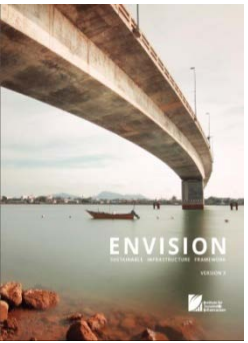
Climate and Resilience
10 Credits

EMISSIONS
CR1.1 Reduce Net Embodied Carbon
CR1.2 Reduce Greenhouse Gas Emissions
CR1.3 Reduce Air Pollutant Emissions

RESILIENCE
CR2.1 Avoid Unsuitable Development
CR2.2 Assess Climate Change Vulnerability
CR2.3 Evaluate Risk & Resilience
CR2.4 Establish Resilience Goals and Strategies
CR2.5 Maximize Resilience
CR2.6 Improve Infrastructure Integration

CR0.0 Innovate or Exceed Credit Requirements

each credit depends on criteria to calculate the points to be awarded



The Envision® framework **assesses infrastructure project performance in climate change mitigation and adaptation.**

Six Envision credits **explicitly refer and assess** climate change **mitigation strategies**

Resource Allocation	RA2.1	Reduce Operational Energy Consumption
	RA2.2	Reduce Construction Energy Consumption
	RA2.3	Use Renewable Energy
	RA2.4	Commission & Monitor Energy Systems
Climate and Resilience	CR1.1	Reduce Net Embodied Carbon
	CR1.2	Reduce Greenhouse Emissions

Six Envision credits **explicitly refer and assess** climate change **adaptation strategies**

Climate and Resilience	CR2.1	Avoid Unsuitable Development
	CR2.2	Assess Climate Change Vulnerability
	CR2.3	Evaluate Risk & Resilience
	CR2.4	Establish Resilience Goals & Strategies
	CR2.5	Maximize Resilience
	CR2.6	Improve Infrastructure Integration

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- GHG Scope 3 emissions (user)

B. GHG emissions reduction strategies

1. Energy efficiency
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2 assessment of physical risks (adaptation)

C. Alignment with TCFD recommended disclosures

1. Report risk evaluation process
2. Report risk management process

D. Exposure to climate-related risks

1. service continuity risk
2. physical asset risk
3. resource availability risk
   - water
   - materials
   - land
   - workforce
4. supply chain continuity risk

Review based on the High-Priority Criteria

1 Criteria for assessment of transition risks (mitigation)

GHG emissions reduction targets & progress against targets (GHG accounting)

36 of the 63 Envision credits contribute to GHG reductions

	CLIMATE TRANSITION RISKS (mitigation)			
ENVISION CREDITS	GHG scope 1	GHG scope 2	GHG scope 3	GHG scope 3 user
QL1.3 Improve Construction Safety				
QL1.4 Minimize Noise and Vibration				
QL1.5 Minimize Light Pollution				
QL1.6 Minimize Construction Impacts				
QL2.1 Improve Community Mobility & Access				
QL2.2. Encourage Sustainable Transportation				
QL2.3. Improve Access & Wayfinding				
QL3.4 Enhance Public Space and Amenities				
LD1.4 Pursue Byproduct Synergies				
LD2.3 Plan for Long-Term Monitoring and Maintenance				
LD2.4 Plan for end-of-life				
LD3.1 Stimulate Economic Prosperity & Development				
LD3.3 Conduct a Life-Cycle Economic Evaluation				
RA1.1 Support Sustainable Procurement Practices				
RA1.2 Use Recycled Materials				
RA1.3 Reduce Operational Waste				
RA1.4 Reduce Construction Waste				
RA1.5 Balance Earthwork On Site				
RA2.1 Reduce Operational Energy Consumption				
RA2.2 Reduce Construction Energy Consumption				
RA2.3 Use Renewable Energy				
RA2.4 Commission & Monitor Energy Systems				
RA3.2 Reduce Operational Water Consumption				
NW2.1 Reclaim Brownfields				
NW2.2 Manage Stormwater				
NW2.3 Reduce Pesticide & Fertilizer Impacts				
NW2.4 Protect Surface and Groundwater Quality				
NW3.3 Maintain Floodplain Functions				
NW3.4 Control Invasive Species				
NW3.5 Protect Soil Health				
CR1.1 Reduce Net Embodied Carbon				
CR1.2 Reduce Greenhouse Gas Emissions				
CR2.5 Maximize Resilience				
CR2.6 Improve Infrastructure Integration				

1 Criteria for assessment of transition risks (mitigation) GHG emissions reduction strategies

Four strategies for achieving net zero projects

1. *Energy efficiency*
2. *Electricity decarbonization using renewable energy sources*
3. *Electrification the process of replacing use of fossil fuels with electricity*
4. *Carbon capture and sequestration for the hard-to-electrify portions of systems*

ENVISION CREDITS	CLIMATE TRANSITION RISKS			
	energy efficiency	decarbonization	electrification	carbon capture & storage
QL1.5 Minimize Light Pollution	■			
QL2.2. Encourage Sustainable Transportation		■	■	■
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■
RA2.1 Reduce Operational Energy Consumption	■			
RA2.2 Reduce Construction Energy Consumption	■	■	■	
RA2.3 Use Renewable Energy		■	■	
RA2.4 Commission & Monitor Energy Systems	■			
RA3.2 Reduce Operational Water Consumption	■			
NW1.1 Preserve Sites of High Ecological Value				■
NW1.3 Preserve Prime Farmland				■
NW2.3 Reduce Pesticide & Fertilizer Impacts		■		
NW3.1 Enhance Functional Habitats				■
NW3.5 Protect Soil Health				■
CR1.2 Reduce Greenhouse Gas Emissions	■	■	■	■

2/13 credits QUALITY OF LIFE 2

5/13 credits RESOURCE ALLOCATION 5

1/9 credits CLIMATE & RESILIENCE 1

1/11 credits LEADERSHIP 1

5/13 credits NATURAL WORLD 5

14 of the 63 credits relate to GHG emission reduction strategies

2 Criteria for assessment of physical risks (adaptation)

Alignment with TCFD recommended disclosures for adaptation

TCFD Recommendations and Supporting Recommended Disclosures			ENVISION
STRATEGY	Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	a) Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term.	Covered by credits CR2.1-CR2.3
		b) Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning.	
		c) Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario.	Partially covered by credits CR2.4- CR2.6
RISK MANAGEMENT	Disclose how the organization identifies, assesses, and manages climate-related risks	a) Describe the organization's processes for identifying and assessing climate-related risks.	Covered by CR2.1-CR2.3
		b) Describe the organization's processes for managing climate-related risks.	Covered by CR2.4- CR2.6
		c) Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management.	Not covered

Envision is **highly aligned** with the TCFD recommendations for physical risk management, however, full alignment requires addressing identified gaps. Envision includes metrics recommended by TCFD, to assess exposure to:

- physical asset risk
- service continuity risk
- resource availability risk (water, materials, land, workforce)
- supply chain continuity risk

Gaps:

- Consideration of climate-related scenarios including a Paris-aligned scenario of 2°C or lower
- Integration of climate risks in overall risk management

Review based on the high-priority criteria

2 Criteria for assessment of physical risks (adaptation): **Exposure to climate-related risks**

1. *Service continuity risk*
2. *Physical asset risk*
3. *Resource availability risk (water, materials, land, workforce)*
4. *Supply chain continuity risk*

38 of the 63 credits relate to exposure to climate risk

8/13 credits
QUALITY OF LIFE 8

13/13 credits
RESOURCE ALLOCATION 13

8/9 credits
CLIMATE & RESILIENCE 8

6/11 credits
LEADERSHIP 6

13/13 credits
NATURAL WORLD 13

ENVISION CREDITS	CLIMATE PHYSICAL RISKS: service continuity	physical asset	resource availability: water	materials	land	workforce	supply chain continuity
QL1.3 Improve Construction Safety				■		■	
QL1.4 Minimize Noise and Vibration				■			
QL1.5 Minimize Light Pollution				■			
QL1.6 Minimize Construction Impacts				■		■	
QL2.1 Improve Community Mobility & Access	■			■	■		
QL2.2. Encourage Sustainable Transportation				■	■		
QL2.3. Improve Access & Way-finding	■	■		■			
QL3.4 Enhance Public Space and Amenities				■			
LD1.4 Pursue Byproduct Synergies			■	■	■		■
LD2.3 Plan for Long-Term Monitoring and Maintenance	■	■	■	■	■	■	■
LD2.4 Plan for end-of-life			■	■	■		■
LD3.1 Stimulate Economic Prosperity & Development						■	■
LD3.2 Develop Local Skills & Capabilities						■	■
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■	■	■	■
RA1.1 Support Sustainable Procurement Practices			■	■			■
RA1.2 Use Recycled Materials			■	■			■
RA1.3 Reduce Operational Waste			■		■		
RA1.4 Reduce Construction Waste			■		■		
RA1.5 Balance Earthwork On Site				■			■
RA2.1 Reduce Operational Energy Consumption	■						■
RA2.2 Reduce Construction Energy Consumption						■	
RA2.3 Use Renewable Energy	■						■
RA2.4 Commission & Monitor Energy Systems	■			■			
RA3.1 Preserve Water Resources			■				
RA3.2 Reduce Operational Water Consumption			■				
RA3.3 Reduce Construction Water Consumption			■				
RA3.4 Monitor Water Systems			■				
NW1.1 Preserve Sites of High Ecological Value		■					
NW1.2 Provide Wetland & Surface Water Buffers			■				
NW1.3 Preserve Prime Farmland					■		
NW1.4 Preserve Undeveloped Land					■		
NW2.1 Reclaim Brownfields				■	■		
NW2.2 Manage Stormwater		■	■				
NW2.3 Reduce Pesticide & Fertilizer Impacts			■	■	■		■
NW2.4 Protect Surface and Groundwater Quality			■				
NW3.1 Enhance Functional Habitats		■					
NW3.2 Enhance Wetland & Surface Water Functions			■				
NW3.3 Maintain Floodplain Functions	■	■	■	■			■
NW3.4 Control Invasive Species					■		
NW3.5 Protect Soil Health			■	■	■		■
CR1.1 Reduce Net Embodied Carbon				■			■
CR1.2 Reduce Greenhouse Gas Emissions						■	■
CR2.1 Avoid Unsuitable Development		■		■			
CR2.2 Assess Climate Change Vulnerability	■	■	■	■	■	■	■
CR2.3 Evaluate Risk and Resilience	■	■	■	■	■	■	■
CR2.4 Establish Resilience Goals and Strategies	■	■	■	■	■	■	■
CR2.5 Maximize Resilience	■	■	■	■	■	■	■
CR2.6 Improve Infrastructure Integration	■						

Climate opportunities at the project level

The Envision review highlighted
some additional criteria relevant to the project level that represent climate-related opportunities

Climate and Resilience

CR2.5 'Maximize Resilience' credit explores project resilience through the 7 core principles (qualities) of resilient systems," as defined by the Rockefeller Foundation's City Resilience Framework

+

Climate physical opportunities:

Core principles of resilient systems

1. **Resource efficient**
2. **Durable**
3. **Adaptable**
4. **Redundant**
5. **Integrated**
6. **Reflective**
7. **Inclusive**

Review based on the high-priority criteria

3 Criteria for assessment of climate physical opportunities

Core principles of resilient systems

1. *Resource efficient (creative use of existing resources)*
2. *Durable (robust, well constructed)*
3. *Adaptable (flexible, changeable)*
4. *Redundant (diverse, fault tolerant)*
5. *Integrated (diverse systems, institutions, people)*
6. *Reflective (learning and improving)*
7. *Inclusive (shared action and responsibilities)*

	CLIMATE PHYSICAL OPPORTUNITIES						
ENVISION CREDITS	resource efficiency	durability	adaptability	redundancy	integration	reflective capability	inclusivity
QL1.1 Improve Community Quality of Life					■	■	■
QL1.4 Minimize Noise and Vibration	■						
QL1.5 Minimize Light Pollution	■						
QL2.1 Improve Community Mobility & Access		■	■	■			
QL2.2. Encourage Sustainable Transportation		■	■	■			
QL2.3. Improve Access & Wayfinding		■					
QL3.1 Advance Equity and Social Justice							■
LD1.2 Foster Collaboration & Teamwork	▒	▒	▒	▒	▒	▒	■
LD1.3 Provide for Stakeholder Involvement	▒	▒	▒	▒	▒	▒	■
LD1.4 Pursue Byproduct Synergies	■						
LD2.1 Establish a Sustainability Management Plan	▒	▒	▒	▒	▒	■	
LD2.2 Plan for Sustainable Communities							
LD2.3 Plan for Long-Term Monitoring and Maintenance	■	■	■			■	
LD2.4 Plan for end-of-life	■	■	■	■			■
LD3.2 Develop Local Skills & Capabilities							■
LD3.3 Conduct a Life-Cycle Economic Evaluation	■	■	■	■	■	■	■
RA1.1 Support Sustainable Procurement Practices	■						
RA1.2 Use Recycled Materials	■	■					
RA1.3 Reduce Operational Waste	■						
RA1.4 Reduce Construction Waste	■						
RA1.5 Balance Earthwork On Site	■						
RA2.4 Commission & Monitor Energy Systems	▒	▒	▒	▒	▒	■	
RA3.1 Preserve Water Resources	■						
RA3.2 Reduce Operational Water Consumption	■						
RA3.3 Reduce Construction Water Consumption	■						
RA3.4 Monitor Water Systems	■	▒	▒	▒	▒	■	
NW1.1 Preserve Sites of High Ecological Value			■				
NW2.2 Manage Stormwater	■						
NW2.3 Reduce Pesticide & Fertilizer Impacts	■						
NW3.3 Maintain Floodplain Functions	■						
CR1.1 Reduce Net Embodied Carbon	■	■					
CR2.3 Evaluate Risk and Resilience	▒	▒	▒	▒	▒	▒	■
CR2.5 Maximize Resilience	■	■	■	■	■	■	■
CR2.6 Improve Infrastructure Integration	■		■	■	■		

7/13 credits QUALITY OF LIFE 7

10/13 credits RESOURCE ALLOCATION 10

4/9 credits CLIMATE & RESILIENCE 4

9/11 credits LEADERSHIP 9

4/13 credits NATURAL WORLD 4

34 of the 63 Envision credits relate to core principles of resilient systems

▒ Credits that can potentially address criteria

High-Priority Criteria for Climate Change Action

'HIGH PRIORITY CRITERIA'

1 assessment of transition risks (mitigation)

- **A. GHG emissions reduction targets & progress against targets (GHG accounting)**
- **B. GHG emissions reduction strategies**

2 assessment of physical risks (adaptation)

- **C. Alignment with TCFD recommended disclosures**
- **D. Exposure to climate-related risks**

3 Climate physical opportunities

- **E. Core principles of resilient systems**

Envision Credits & High-priority Criteria

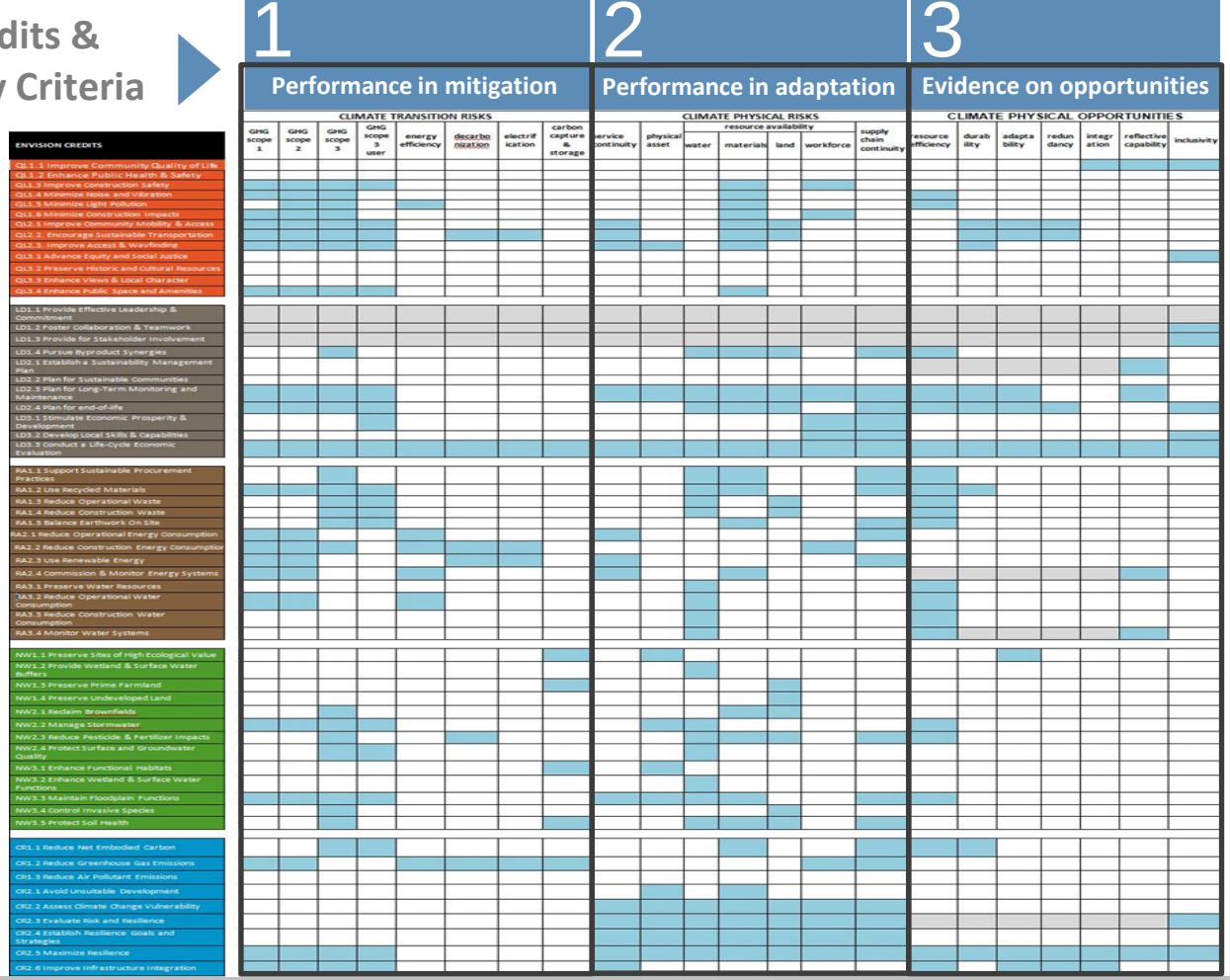
ENVISION

Envision Credits

and their relation to the

‘HIGH PRIORITY CRITERIA’

for assessing climate action.



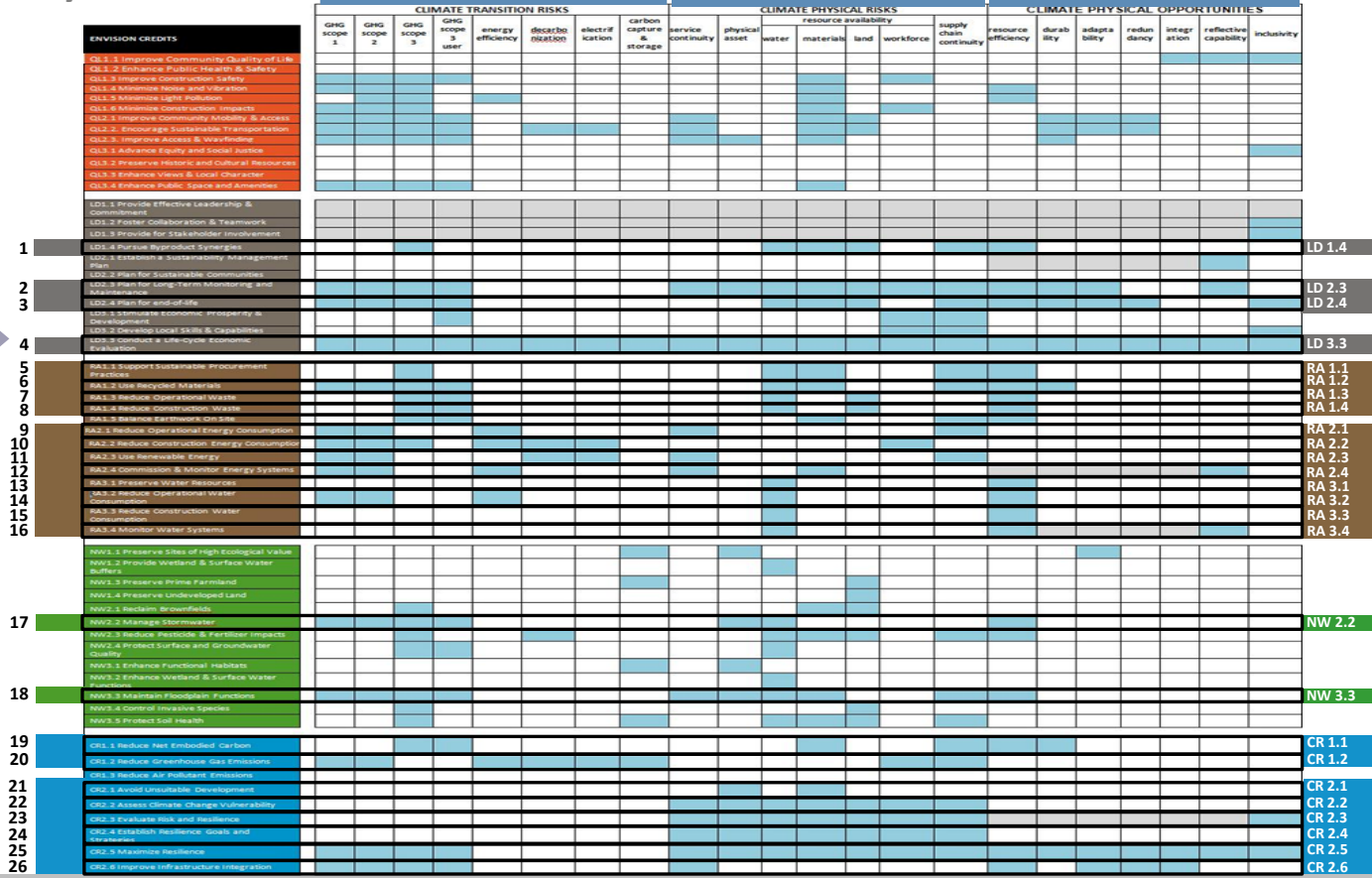
Priority Credits & High-priority Criteria

1 Performance in mitigation

2 Performance in adaptation

3 Evidence on opportunities

26 of the 63 credits were identified as ‘PRIORITY CREDITS’ because they address **multiple key criteria for climate change mitigation and adaptation** for all types of projects.



26 + 4 Priority Credits

CATEGORY	SUBCATEGORY		CREDIT
LEADERSHIP	Collaboration	1	LD1.4 Pursue Byproduct Synergies
	Planning	2	LD2.3 Plan for Long-Term Monitoring and Maintenance
		3	LD2.4 Plan for end-of-life
	Economy	4	LD3.3 Conduct a Life-Cycle Economic Evaluation
RESOURCE ALLOCATION	Materials	5	RA1.1 Support Sustainable Procurement Practices
		6	RA1.2 Use Recycled Materials
		7	RA1.3 Reduce Operational Waste
		8	RA1.4 Reduce Construction Waste
	Energy	9	RA2.1 Reduce Operational Energy Consumption
		10	RA2.2 Reduce Construction Energy Consumption
		11	RA2.3 Use Renewable Energy
		12	RA2.4 Commission & Monitor Energy Systems
	Water	13	RA3.1 Preserve Water Resources
		14	RA3.2 Reduce Operational Water Consumption
		15	RA3.3 Reduce Construction Water Consumption
		16	RA3.4 Monitor Water Systems
NATURAL WORLD	Conservation	17	NW2.2 Manage Stormwater
	Ecology	18	NW3.3 Maintain Floodplain Functions
CLIMATE & RESILIENCE	Emissions	19	CR1.1 Reduce Net Embodied Carbon
		20	CR1.2 Reduce Greenhouse Gas Emissions
	Resilience	21	CR2.1 Avoid Unsuitable Development
		22	CR2.2 Assess Climate Change Vulnerability
		23	CR2.3 Evaluate Risk and Resilience
		24	CR2.4 Establish Resilience Goals and Strategies
		25	CR2.5 Maximize Resilience
		26	CR2.6 Improve Infrastructure Integration

26 credits from
Leadership
Resource Allocation
Natural World and
Climate & Resilience
can be used for identifying the 'right climate action' projects

+

CATEGORY	SUBCATEGORY		CREDIT
QUALITY OF LIFE	Purpose	1	QL1.6 Minimize Construction Impacts
	Wellbeing	2	QL2.1 Improve Community Mobility
		3	QL2.2 Encourage Sustainable Transportation
		4	QL2.3 Improve Access & Wayfinding

4 credits from
Quality of Life
also cover multiple key criteria for climate change mitigation and adaptation and
serve as priority credits for transportation projects

Scoring of Priority Credits

- **10 of the 26 priority credits** are **among the most highly weighted credits (20-26 points)**
- Impacts during construction are less weighed than impacts during operation, due to the shorter duration of impact

10 of 26 credits

ENVISION CREDITS	SCORE PER LEVEL OF ACHIEVEMENT				
	Improved	Enhanced	Superior	Conserving	Restorative
CR2.3 Evaluate Risk and Resilience	**11**	**18**	**24**	**26**	
CR2.5 Maximize Resilience	**11**	**15**	**20**	**26**	
CR1.2 Reduce Greenhouse Gas Emissions	**8**	**13**	**18**	**22**	**26**
RA2.1 Reduce Operational Energy Consumption	**6**	**12**	**18**	**26**	
RA2.3 Use Renewable Energy	5	10	15	20	**24**
NW2.2 Manage Stormwater	2	4	9	17	**24**
RA3.2 Reduce Operational Water Consumption	4	9	13	17	**22**
CR2.2 Assess Climate Change Vulnerability	8	14	18	20	
CR1.1 Reduce Net Embodied Carbon	5	10	15	20	
CR2.4 Establish Resilience Goals and Strategies		8	14	20	
LD1.4 Pursue Byproduct Synergies	3	6	12	14	18
CR2.6 Improve Infrastructure Integration	2	5	9	13	18
RA1.4 Reduce Construction Waste	4	7	10	16	
RA1.2 Use Recycled Materials	4	6	9	16	
CR2.1 Avoid Unsuitable Development	3	6	8	12	16
LD3.3 Conduct a Life-Cycle Economic Evaluation	5	7	10	12	14
RA1.3 Reduce Operational Waste	4	7	10	14	
RA2.4 Commission & Monitor Energy Systems	3	6	12	14	
LD2.4 Plan for end-of-life	2	5	8	14	
NW3.3 Maintain Floodplain Functions	1	3	7	11	14
RA1.1 Support Sustainable Procurement Practices	3	6	9	12	
RA3.1 Preserve Water Resources	3	5	7	9	12
LD2.3 Plan for Long-Term Monitoring and Maintenance	2	5	8	12	
RA2.2 Reduce Construction Energy Consumption	1	4	8	12	
RA3.4 Monitor Water Systems	1	3	6	12	
RA3.3 Reduce Construction Water Consumption	1	3	5	8	

Envision Review

(completed)

Envision review based on identified high-priority criteria for climate action

Linked Envision credits with the criteria for climate change performance and highlighted certain credits that address multiple criteria at a time, the 'Envision Priority Credits'

Priority credits - Gaps and Recommendations

	CRITERIA	Risk type	IDENTIFIED GAPS	RECOMMENDATIONS
PERFORMANCE IN MITIGATION	A. GHG emissions reduction targets & progress against targets (GHG accounting)	Scope 1 & 2 GHG emissions	Where are construction-related scope 1 & 2 emissions reported?	For RA2.2 credit Request the overall reduction of scope 1&2 emissions during construction result of the implemented strategies
		Scope 1 & 2 GHG emissions	Where are maintenance-related scope 1 & 2 emissions reported?	For LD2.3 credit Request an estimate of the overall reduction of scope 1&2 emissions during the expected minor and major rehabilitation works over the project's estimated service life
		User-related scope 3 emissions	User-related scope 3 emissions are not accounted as part of the Envision assessment.	In credits QL2.1, QL2.2 and QL2.3 Consideration of extending Envision's boundary of assessment to account for end-user's scope 3 emissions, particularly in the case of transportation projects
			User-related scope 3 emissions are also produced during construction & maintenance stages	For Credits QL1.6 and LD2.3 Consider if requesting estimations of end-user's scope 3 emissions due to construction works -related closures, detouring, or avoided end-user's scope 3 emissions through accelerated construction duration etc.
	B. GHG emissions reduction strategies in credits	Energy efficiency	-	Revisit 'targets' in evaluation criteria in credits RA2.1 and RA2.2
		De-carbonization of electricity through use of renewable energy sources	The management of renewables production capacity risk.	RA2.3 credit could account for the risk of renewable energy production and request evidence on risk management such as provision of energy storage solutions.
		Electrification	-	-
		Carbon Capture & storage	Carbon capture & storage	Envision could refer more on carbon removal and request more information on the adopted carbon-removal approaches both for operations and construction.
PERFORMANCE IN ADAPTATION	C. Envision's alignment with TCFD disclosures	Risk Evaluation process	Reference to physical risk scenarios and associated time horizon(s) considered.	Envision should request reference to physical risk scenarios for anticipated physical impacts in the project's specific locality in higher or lower temperature limits, as part of climate-related risk evaluation.
		Risk management process	Assessment of how infrastructure companies' processes for identifying, assessing, and managing climate-related risks are integrated into their overall risk management.	guide projects teams to integrate climate change risk into their overall risk management plans, such as Safety and Security management plans or Health and Safety Plans, Risk assessments.
EVIDENCE ON CLIMATE OPPORTUNITIES	E. Core principles of resilient systems	1. Resource efficiency (materials) 2. Durability	Use of substitute materials	In the Resource Allocation category, Envision apart from suggesting recycled-content materials as alternative to the of use primary resources should assess the use of innovative resources such as substitute materials
		1. Resource efficiency (materials) 2. Durability 3. Adaptability	Credit LD1.4 'Pursue Byproduct synergies' presents the potential of resource efficiencies; however, circularity can potentially present more opportunities.	Credit LD1.4 could make reference to materials passport as an opportunity for a company to identify the value of its own excess materials and/or identify opportunities in the excess materials of other companies.
		1. Durability	Provide more examples of strategies that contribute to durability quality as guidance for project teams.	Examples of strategies that could be added for increased durability(1)**Use of materials with crack healing properties**(2)**Improved construction quality through increased use of prefabrication, modular assembly, and offsite construction**(3)**Use of intelligent construction systems** (4) **Pre-stressed concrete slab technology**
			Enhancing durability definition within credit CR2.5 'Maximize Resilience'	Durability also includes resistance to extreme heat waves, increased anti-corrosion protection due to increased flooding.(e.g. materials that withstand extreme weather conditions)

Priority credits - Gaps and Recommendations

1. Align terms (direct/indirect emissions and embodied carbon) **with the GHG protocol classification Scope 1, 2, and 3 GHG emissions**
2. Envision could request evidence on commitment to GHG emissions targets that are in line with the goals of the Paris Agreement (well below 2°C and 1.5°C) and net-zero emissions before 2050
3. Incorporate **transition risk as part of climate-related risk** assessment and management, along with physical risk
4. **Consider TCFD suggestions for use of various transition and physical scenario analysis** for an appropriate evaluation of the climate-related impacts in a project
5. **Revisit 'targets' in evaluation criteria in credits RA2.1, RA2.2 & RA2.3** for operational & construction energy consumption, percentage of renewables
6. **Update examples of potential project strategies** to reflect active areas of research, such as **on substitute materials** and technologies to optimize recycled-content material properties, etc.
7. Given the core role of innovation in achieving the aggressive GHG reduction targets –necessary for transition to a low-carbon paradigm–**should Envision incorporate innovation in its guidance and requirements within relevant credits** (in Resource Allocation and Climate & Resilience) to underline their significance and **not as 'bonus points' in innovation credits?**

Climate – Biodiversity Nexus

Climate Change

1. Literature review
2. Analysis of ESG (Environmental, Social & Governance) reporting
3. Analysis of TCFD (Task Force on Climate-related Financial Disclosures)

Climate – Biodiversity

1. Literature review
2. Analysis of Ecosystem service-based assessment and accounting frameworks and their classification systems
3. Analysis of ESG and TNFD (Taskforce on Nature-related Financial Disclosures)

High-Priority Criteria for CLIMATE ACTION*

&

High-Priority Criteria for BIODIVERSITY ACTION

are used for

applied & tested

Envision Review

The high-priority criteria for integrated climate change & biodiversity action are used for a review of Envision to identify Envision priority credits and identify gaps

Use of Case Studies

The high-priority criteria for integrated climate change & biodiversity action are applied and tested on selected Envision verified projects to assess the project performance on climate & biodiversity

* Based on the literature review, the analysis of TCFD and selected ESG systems

For a complete assessment of projects' climate change performance high priority criteria should:

- **integrate biodiversity performance**
- **enable assessment of performance of Nature-based solutions, that a growing literature supports that should be ecosystem service-based**

On Urgency for Biodiversity Action

Climate change and biodiversity loss are two interlinked crises

The impacts of extreme weather events and biodiversity loss are now second and third behind climate change **as the most severe risks** identified by global executives for the next decade.

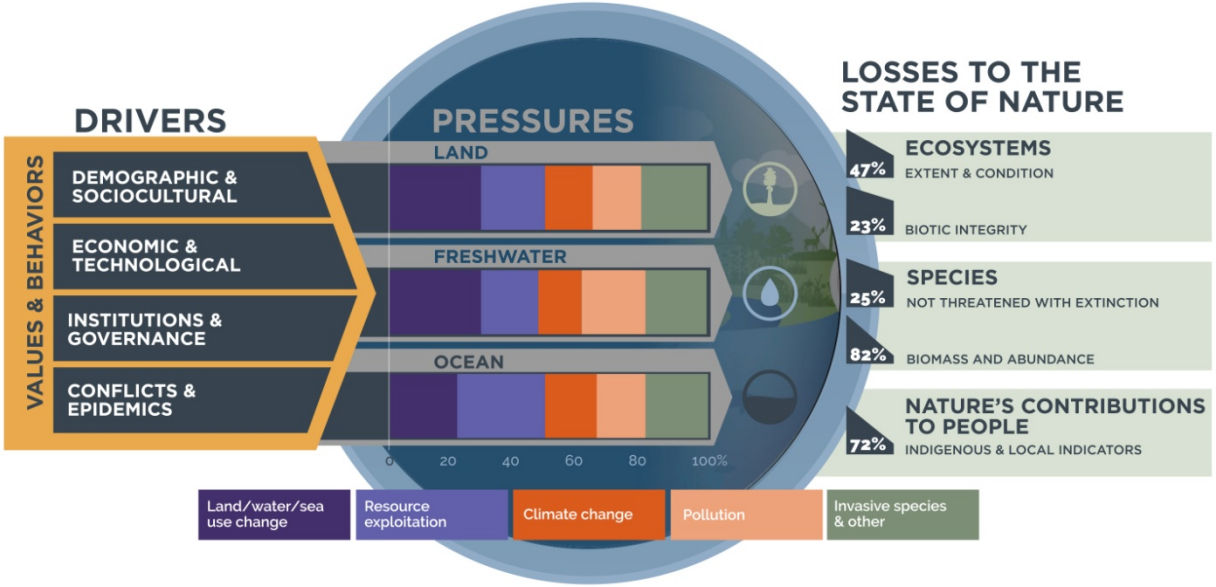
> WEF (2022) Global Risks Report 2022

"We cannot mitigate – and adapt to – the adverse impacts of climate change without investing in nature's capacity to store carbon and support resilient societies."

> Taskforce for Nature-related Financial Disclosures (TNFD)

On Urgency for Biodiversity Action

The urgency to halt and reverse biodiversity loss is gaining global momentum due to emerging evidence pointing out **unprecedented and accelerating biodiversity loss on a worldwide scale**.



Source: IPBES. (2019): Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

On Urgency for Biodiversity Action

Moreover, biodiversity and healthy ecosystems are the foundation for economies, societies and quality of life. Reversing biodiversity decline is needed for achieving the SDGs.

Source: Stockholm Resilience Centre, Stockholm University

"Without adequate measures to conserve biodiversity and sustainably use its components the 2030 Agenda for Sustainable Development will not be achievable."

CBD, UN FAO, WB, UNEP, UNDP. (2016). "Biodiversity and the 2030 Agenda for Sustainable Development: Technical Note."

Call for integrated climate-biodiversity action

"There is no climate solution without the full contribution of nature."

"Nature can provide **about one-third of the** mitigation to meet the goal of the Paris climate agreement."

Campaign for Nature. "COP26: A Chance to Address the Interconnected Crises of Climate Change and Biodiversity Loss"

"Without urgent action to halt and reverse biodiversity loss, reductions in GHG emissions to limit warming to close to 1.5°C or even 2°C will not be achieved."

IPBES and IPCC. (June 2021). "Scientific outcome of the IPBES- IPCC co-sponsored workshop on biodiversity and climate change."

The recent COP 15 for biodiversity and COP 26 for climate pursued a pairing of nature-positive targets and Paris agreement targets and recognized the need for an integrated approach for addressing climate change & biodiversity loss.

GLOBAL LEVEL

"There is no climate solution without the full contribution of nature."

PROJECT LEVEL

"Nature-based Solutions (NbS) are recognized for their significant potential to generate climate-biodiversity co-benefits."

IPBES and IPCC. (June 2021). "Scientific outcome of the IPBES- IPCC co-sponsored workshop on biodiversity and climate change."

"NbS must result in a net gain to biodiversity and ecosystem integrity."

IUCN (2020) The IUCN Global Standard for Nature-based Solutions

Definitions :

Natural climate solutions

A subset of nature-based solutions, natural-climate solutions include conservation, restoration, and improved land and sea management that increase carbon storage and/or avoid greenhouse gas emissions, enhance resilience and assist climate adaptation across global forests, wetlands, mangroves, grasslands, and agricultural lands and other habitats.

TNFD Glossary

Setting Biodiversity Targets

1988 — IPCC Inter-governmental Panel on Climate Change

1992 — United Nations Framework Convention on Climate Change (UNFCCC); CBD Convention on Biological Diversity / CBD secretariat under UNEP

2000 — Cartagena Protocol on Biosafety. CBD supplementary agreement.

2005 — Millennium Ecosystem Assessment (MA)

2010 — COP10/MOP5 AICHI-NAGOYA JAPAN 2010; 2010 International Year of Biodiversity

2011 - 2020 — UN DECADE ON BIODIVERSITY Strategic Plan for Biodiversity & the Aichi Biodiversity Targets

2012 — ipbes Inter-governmental Science-Policy Platform on Biodiversity & Ecosystem Services

2015 — PARIS2015 UN CLIMATE CHANGE CONFERENCE COP21·CMP11; SDGs SUSTAINABLE DEVELOPMENT GOALS AGENDA 2030

2018 — IPCC Special Report (SR1.5) net zero CO_2 emissions by 2050

2019 — ipbes Global Assessment report on biodiversity & ecosystem services

2020 — 5th Global Biodiversity Outlook The flagship publication of the CBD; Zero-draft Post-2020 Global Biodiversity Framework (builds on the Strategic Plan for Biodiversity 2011-2020)

2021 — IPCC workshop Biodiversity & Climate Change; PART 1; 2020 UN BIODIVERSITY CONFERENCE COP 15 - CP/MOP10 - NP/MOP4 Ecological Civilization-Building a Shared Future for All Life on Earth KUNMING·CHINA; IPCC 6th Report (AR6) material for UNFCCC COP26; UNFCCC COP26 the Paris Agreement first major test; UN CLIMATE CHANGE CONFERENCE UK 2021

2022 — PART 2; CBD Parties' second round of negotiations towards **the adoption of the new and transformative global deal to halt biodiversity loss by 2030 "the Post-2020 Global Biodiversity Framework"**

2021 - 2030 — UN DECADE ON ECOSYSTEM RESTORATION 2021-2030

The CBD Draft Post-2020 Global Biodiversity Framework comprises 21 targets and 10 milestones proposed for 2030, en route to the 'living in harmony with nature' goal by 2050.

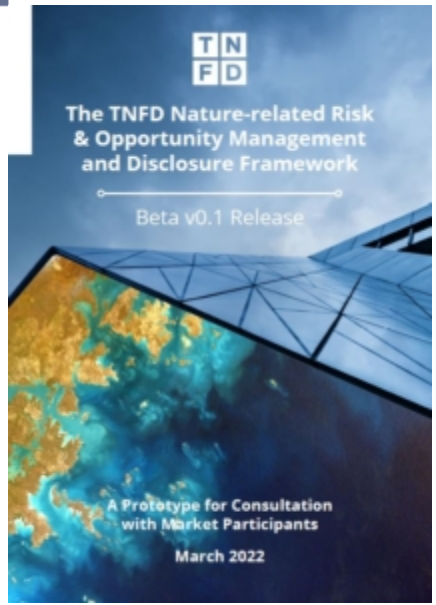
The framework includes targets for 2030 that among others call for:

- **Conserve at least 30% globally of land areas and sea areas**, especially areas of particular importance for biodiversity and its contributions to people
- Prevent or reduce the rate of introducing invasive alien species by 50% and control or eradicate such species to eliminate or minimize their impacts.
- Reduce nutrients pollution by at least half, pesticides by two-thirds, and eliminate plastic waste.
- **Use ecosystem-based approaches to mitigate and adapt to climate change**, contributing at least 10 GtCO2e per year to mitigation, and ensure that all mitigation and adaptation efforts avoid negative impacts on biodiversity

The post-2020 framework reflects emerging calls for global nature positive targets, initially to achieve 'no net loss' by 2030 **and eventually** 'net biodiversity gain' by 2050.

The TNFD recommendations for nature-related risks and opportunities

Taskforce on Nature-related Financial Disclosures



1st draft Framework was released mid- March 2022
The TNFD Recommendations are due to be published by 2023.

The Taskforce on Nature-related Financial Disclosures (TNFD) was formed in July 2020 to **streamline** the data, metrics and methodology for reporting nature-related performance.

TNFD's mission is to develop a risk management and disclosure framework for organizations to report and act on evolving nature-related risks for a shift toward **nature-positive outcomes**.

The TNFD framework seeks to align with the CBD global targets of no net nature loss by 2030 **and** net gain by 2050**.**

> TNFD. (June 2021). "Proposed Technical Scope Recommendations for the TNFD"

	Climate Change	Biodiversity
Global scale issues integral to sustainable development recognized as crises	An issue of global attention as a top global threat	Awareness of biodiversity loss as a threat is gaining global momentum; recognized as one of top global threats.
International Conventions & COPs	United Nations Framework Convention on Climate Change	Convention on Biological Diversity / CBD secretariat under UNEP
Intergovernmental panels which assesses available knowledge	**Inter-governmental Panel on Climate Change**	**Inter- governmental Science-Policy Platform on Biodiversity & Ecosystem Services**
Development of national plans under commitment to Convention agreements	Nationally Determined Contributions (NDCs) and long-term strategies (LTS)	National Biodiversity Strategies and Action Plans (NBSAPs)
Time-bound goals: 2030 a critical year	**Limit global warming to 1.5° C by 2030** **Net zero emissions by 2050** for climate action	**Nature positive by 2030** to halt and reverse biodiversity loss **'living in harmony with nature'** by 2050
Integration in ESG Reporting	Fully-integrated in all ESG standards	On-going update of ESG systems' biodiversity-related disclosures
Taskforces established to develop guidance for businesses	TCFD Task Force on Climate-Related Financial Disclosures	Taskforce on Nature-related Financial Disclosures

	Climate Change	Biodiversity
Indicators / Metrics	GHG emissions are used as a universally agreed indicator, a meaningful metric to demonstrate exposure to risks.	• standardized indicators do not exist yet. • location-specific data from corporations will be required. • difficult to select a shortlist of useful and feasible indicators to monitor everywhere.

A common comment is the challenge of measuring biodiversity as compared to climate change.

"When it comes to data, metrics and methodologies,
there are critical differences between climate and nature.
Unlike climate, it is not just your activities that matter
but also where the activities are."

Craig, D. (September 2021). "Expanding the E in ESG"

"All companies impact and depend on biodiversity."

CDSB. (2021). Application guidance for biodiversity- related disclosures. Draft for consultation.

Impacts

Changes in the state of nature, as a result of an organization's activities, which may result in changes to the capacity of nature to provide social and economic functions. Impacts can be positive or negative, direct, indirect or cumulative and can result from both direct operations and value chain activities.

Dependencies

The **ecosystem services** that an organization or other actor **relies on** to function, such as a clean and regular water supply. Dependencies are interlinked with biodiversity impacts.

TNFD. (March 2022). "The TNFD Nature-related Risk & Opportunity Management and Disclosure Framework" Beta v0.1 release.

- CDSB — CLIMATE DISCLOSURE STANDARDS BOARD
- GRI — GLOBAL REPORTING INITIATIVE
- GRESB — GLOBAL REAL ESTATE SUSTAINABILITY BENCHMARK
- SCIENCE BASED TARGETS NETWORK
- TNFD — TASKFORCE FOR NATURE-RELATED FINANCIAL DISCLOSURES
- IUCN — INTERNATIONAL UNION FOR CONSERVATION OF NATURE

The analysis of existing and recently developed ESG & nature-related frameworks & guidelines identified that Biodiversity-related reporting includes indicators for:

Pressures (impact drivers) on biodiversity

Change in state of biodiversity
- **Species**
- **Ecosystems**
- **Ecosystem Services** (available for companies)

Dependencies on biodiversity / benefits from biodiversity
(Ecosystem Services used by companies)

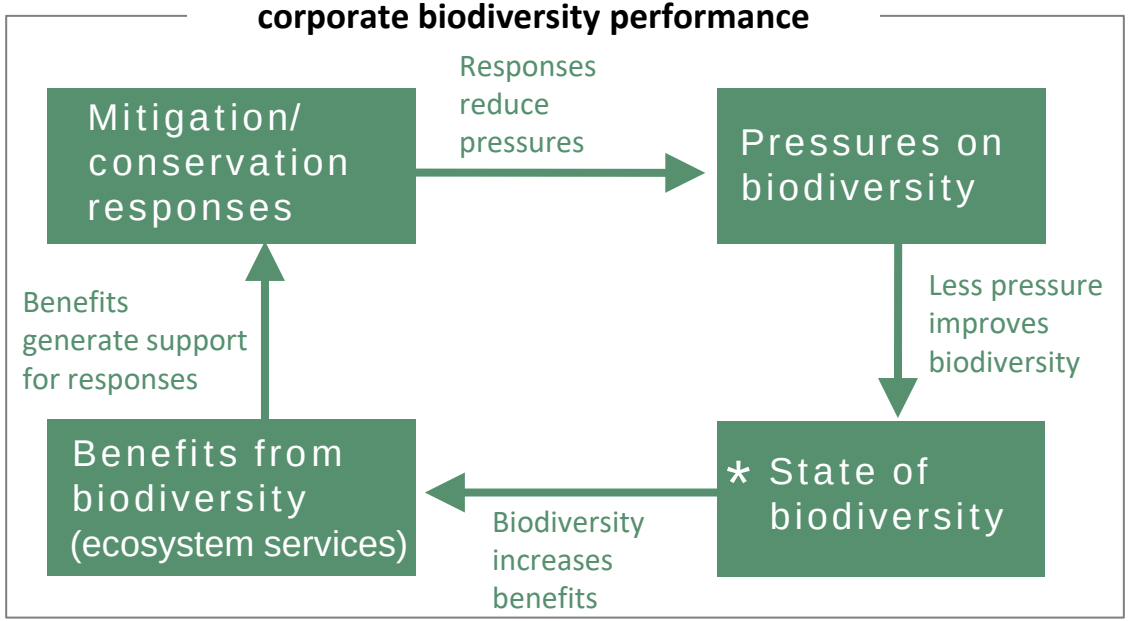
Biodiversity management responses
- **No net loss**
- **Net gain**

Recent additions of indicators

Recent addition the alignment with CBD Post-2020 Targets for 2030 & 2050

The categories of indicators are interlinked. The International Union for Conservation of Nature (IUCN) illustrates the links between pressures – state of biodiversity- benefits – responses

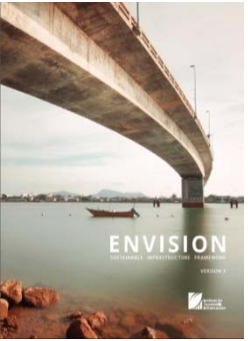
IUCN's framework of linked indicators for corporate biodiversity performance



Source: IUCN Guidelines for corporate biodiversity performance

*

According to IUCN an advantage of the linked indicator framework is that "given that **state of biodiversity indicators** generally change slowly and companies may not be able to demonstrate improvements, **pressure and response indicators can demonstrate change and progress** and can help companies verify or their selection of strategies.



The Envision® framework **assesses infrastructure project performance in biodiversity.**

Thirteen Envision credits **explicitly refer and assess <u>biodiversity-related strategies</u>**

Natural World

NW1.1	Preserve Sites of High Ecological Value
NW1.2	Provide Wetland & Surface Water Buffers
NW1.3	Preserve Prime Farmland
NW1.4	Preserve Undeveloped Land
NW2.1	Reclaim Brownfields
NW2.2	Manage Stormwater
NW2.3	Reduce Pesticide & Fertilizer Impacts
NW2.4	Protect Surface & Groundwater Quality
NW3.1	Enhance Functional Habitats
NW3.2	Enhance Wetland & Surface Water Functions
NW3.3	Maintain Floodplain Functions
NW3.4	Control Invasive Species
NW3.5	Protect Soil Health

High-Priority Criteria for Biodiversity Action

'HIGH- PRIORITY CRITERIA' for assessing the company's biodiversity (climate-relevant) performance

1 assessment of Pressures on Biodiversity

A. Land, freshwater, sea change
B. Resource exploitation
C. Pollution
- Water
- Air
- Soil
- Waste
- Noise
- Light

D. Climate change
E. Introduction of invasive species

Based on IPBES drivers of biodiversity change

2 assessment of the State of Biodiversity

A. Species
B. Ecosystems
C. Ecosystem Services (climate change-relevant services available for project and/or community)

Based on UN SEEA ecosystem services reference list

3 assessment of Dependencies on Biodiversity (benefits from biodiversity)

Ecosystem services (climate change-relevant services used by project)

Based on UN SEEA ecosystem services reference list

4 assessment of Biodiversity Management Responses

A. No net loss
- Avoid
- Minimize
- Restore
- Offset off-site

B. Net biodiversity gain
- Offset on-site (like for like or better)
- Renew

Based on the "Mitigation and Conservation Hierarchy"

All criteria apply for a project's full lifecycle and additional location- and activity-specific information is required to complete the assessment.

Review based on the high-priority criteria

1 Criteria for assessment of pressures on biodiversity

- Land, freshwater, sea change
- **Resource exploitation***
- Pollution
- **Climate change***
- Introduction of invasive species

ENVISION CREDITS	PRESSURES ON BIODIVERSITY											
	LAND, FRESHWATER, SEA CHANGE			RESOURCE EXPLOITATION	POLLUTION						CLIMATE CHANGE	INTRODUCTION OF INVASIVE SPECIES
	land	freshwater	sea		water	air	soil	waste	noise	light		
QL1.4 Minimize Noise & Vibration				■					■		■	
QL1.5 Minimize Light Pollution				■						■	■	
QL3.2 Preserve Historic & Cultural Resources	■			■							■	
QL3.4 Enhance Public Space and Amenities	■			■							■	
LD1.4 Pursue Byproduct Synergies	■			■				■			■	
LD2.1 Establish a Sustainability Management Plan	■	■	■	■	■	■	■	■	■	■	■	■
LD2.4 Plan for end-of-life	■			■				■			■	
RA1.1 Support Sustainable Procurement Practices	■	■	■	■	■	■	■	■	■	■	■	■
RA1.2 Use Recycled Materials	■			■	■		■	■			■	
RA1.3 Reduce Operational Waste	■			■	■		■	■			■	
RA1.4 Reduce Construction Waste	■			■	■		■	■			■	
RA1.5 Balance Earthwork On Site				■			■				■	■
RA2.3 Use Renewable Energy	■			■							■	
NW1.1 Preserve Sites of High Ecological Value	■			■							■	
NW1.2 Provide Wetland & Surface Water Buffers		■		■	■						■	
NW1.3 Preserve Prime Farmland	■			■							■	
NW1.4 Preserve Undeveloped Land	■			■							■	
NW2.1 Reclaim Brownfields	■	■		■	■		■				■	
NW2.2 Manage Stormwater		■		■	■		■				■	
NW2.3 Reduce Pesticide & Fertilizer Impacts				■	■		■				■	■
NW2.4 Protect Surface & Groundwater Quality		■		■	■						■	
NW3.1 Enhance Functional Habitats	■			■							■	
NW3.2 Enhance Wetland and Surface Water Functions		■		■							■	
NW3.3 Maintain Floodplain Functions	■			■							■	
NW3.4 Control Invasive Species				■							■	■
NW3.5 Protect Soil Health				■			■				■	
CR1.3 Reduce Air Pollutant Emissions				■		■					■	

4/13 credits QUALITY OF LIFE 4

6/13 credits RESOURCE ALLOCATION 6

1/9 credits CLIMATE & RESILIENCE 1

3/11 credits LEADERSHIP 3

13/13 credits NATURAL WORLD 13

***Climate change & Resource exploitation pressures have been part of the Climate Action Research**

■ Credits that can potentially address criteria

United Nations System of Environmental Economic Accounting

After the review of six established ecosystem services classification systems the UN System of Environmental Economic Accounting's (SEEA) Ecosystem Accounting (EA) was selected for the Envision review.

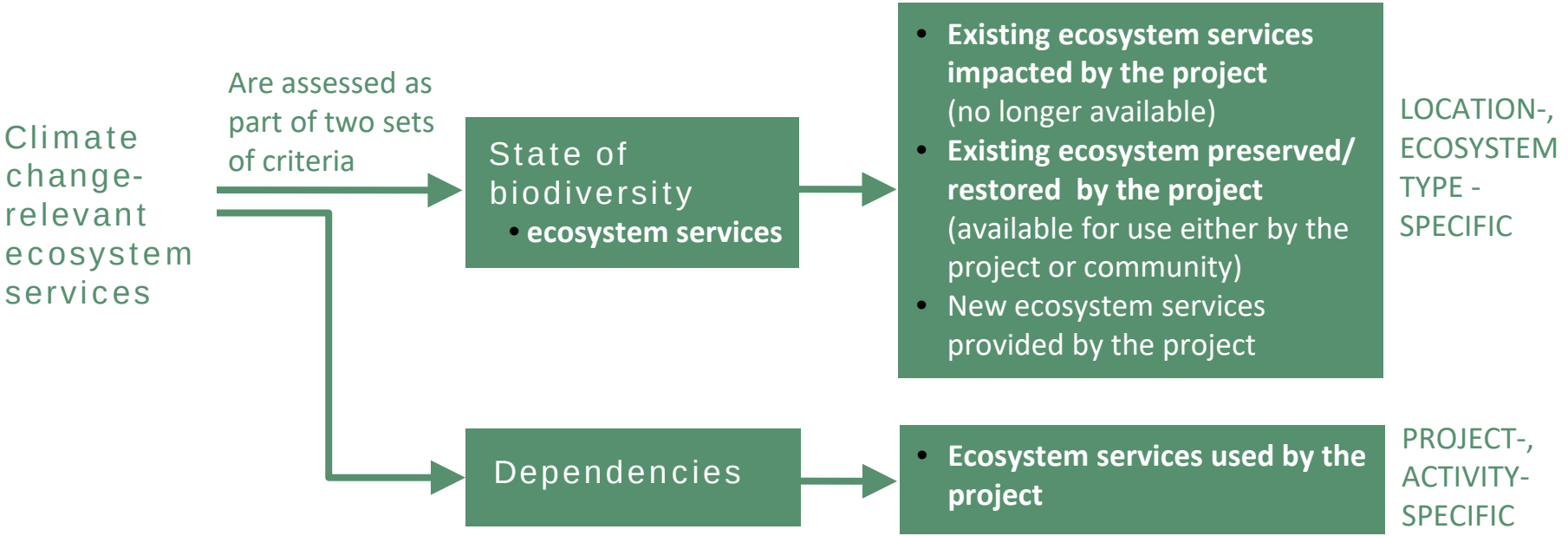
UN SEEA-EA REFERENCE LIST OF ECOSYSTEM SERVICES

(climate change-relevant services)

REGULATING AND MAINTENANCE SERVICES	Global climate regulation	
	Rainfall pattern regulation (at sub-continental scale)	
	Local (micro and meso) climate regulation	
	Air filtration	
	Soil quality regulation	
	Soil and sediment retention	Soil erosion control
		Landslide mitigation
	Solid waste remediation	
	Water purification (water quality amelioration)	Retention and breakdown of nutrients
		Retention and breakdown of other pollutants
	Water flow regulation	Baseline flow maintenance
		Peak flow mitigation
	Flood mitigation	Coastal protection
		River flood mitigation
	Storm mitigation	
	Noise attenuation	
	Pollination	
	Biological control	Pest control
		Disease control
	Nursery population and habitat maintenance	
PROVISIONING SERVICES	Biomass provisioning	Crop provisioning (energy crops)
		Wood provisioning
	Water supply	

It is worth noting that UN SEEA classification is also used by the TNFD as the reference list for ecosystem services

Ecosystem services are included and assessed through two sets of BIODIVERSITY HIGH-PRIORITY CRITERIA
This is not an overlap between the criteria as ecosystem services are distinguished as shown below:



Review of Envision based on the assessment of ecosystem services (climate- & infrastructure-project-relevant ecosystem services). Envision is examined against an established Ecosystem Services classification system to identify:

- Which ecosystem services are captured by Envision?
- Which ecosystem services are infrastructure project-relevant? And which climate-relevant?
- Which credits implicitly refer to ecosystem services as project dependencies?
- If the performance assessment of NbS could be enhanced based on ecosystem services

> **"An ecosystem services classification can operate as a checklist."**
>
> SEEA Experimental Ecosystem Accounting: Towards a definition and classification of ecosystem services for SEEA. September 2018

Review based on the high-priority criteria

2 Criteria for assessment of the state of biodiversity

- Species
- Ecosystems
- Ecosystem services (climate change-relevant services available for project and/or community)

ENVISION CREDITS	SPECIES	ECOSYSTEMS	ECOSYSTEM SERVICES (climate change related)																
			Global climate regulation	Rainfall pattern regulation	Local (micro and meso) climate regulation	Air filtration	Soil quality regulation	Soil and sediment retention	Solid waste remediation	Water purification	Water flow regulation	Flood mitigation	Storm mitigation	Noise attenuation	Pollination	Biological control	Nursery population and habitat maintenance	Biomass provisioning	Water supply
LD1.4 Pursue Byproduct Synergies									■										■
LD2.4 Plan for end-of-life																			
RA1.1 Support Sustainable Procurement Practices	■	■																	
RA1.3 Reduce Operational Water		■					■		■										
RA1.4 Reduce Construction Waste		■					■		■										
RA1.5 Balance Earthwork On Site	■	■					■	■											
RA2.3 Use Renewable Energy	■	■															■	■	
RA3.1 Preserve Water Resources										■									■
RA3.2 Reduce Operational Water Consumption																			■
RA3.3 Reduce Construction Water Consumption																			■
RA3.4 Monitor Water Systems										■									■
NW1.1 Preserve Sites of High Ecological Value	■	■																	
NW1.2 Provide Wetland & Surface Water Buffers	■	■						■	■	■	■	■		■			■		■
NW1.3 Preserve Prime Farmland		■																■	
NW1.4 Preserve Undeveloped Land		■																	
NW2.1 Reclaim Brownfields							■			■									
NW2.2 Manage Stormwater	■			■	■			■	■	■	■	■					■		■
NW2.3 Reduce Pesticide & Fertilizer Impacts	■	■				■	■		■	■						■			
NW2.4 Protect Surface & Groundwater Quality	■	■							■	■									■
NW3.1 Enhance Functional Habitats		■																	
NW3.2 Enhance Wetland and Surface Water Functions	■	■								■	■						■		■
NW3.3 Maintain Floodplain Functions		■										■							
NW3.4 Control Invasive Species	■															■			
NW3.5 Protect Soil Health			■				■	■											
NW0.0 Innovate or Exceed Credit requirements															■				
CR1.1 Reduce Net Embodied Carbon			■																
CR1.2 Reduce Greenhouse Gas Emissions			■																
CR1.3 Reduce Air Pollutant Emissions						■													
CR2.1 Avoid Unsuitable Development								■											
CR2.2 Assess Climate Change Vulnerability				■							■	■	■						■
CR2.3 Evaluate Risk and Resilience	■	■			■							■							

9/13 credits
RESOURCE ALLOCATION 9

6/9 credits
CLIMATE & RESILIENCE 6

2/11 credits
LEADERSHIP 2

13/13 credits
NATURAL WORLD 13

■ Credits that can potentially address criteria

Review based on the high-priority criteria

3 Criteria for assessment of Dependencies on biodiversity (benefits from biodiversity used by the project)

- Ecosystem services (climate- & infrastructure project-relevant services)

ENVISION CREDITS	ECOSYSTEM SERVICES (climate change related)																
	Global climate regulation	Rainfall pattern regulation	Local (micro and meso) climate regulation	Air filtration	Soil quality regulation	Soil and sediment retention	Solid waste remediation	Water purification	Water flow regulation	Flood mitigation	Storm mitigation	Noise attenuation	Pollination	Biological control	Nursery population and habitat maintenance	Biomass provisioning	Water supply
LD1.4 Pursue Byproduct Synergies							■										■
RA1.1 Support Sustainable Procurement Practices	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
RA1.3 Reduce Operational Waste					■		■										
RA1.4 Reduce Construction Waste					■		■										
RA1.5 Balance Earthwork On Site					■	■											
RA2.3 Use Renewable Energy																■	
RA3.1 Preserve Water Resources		■						■									■
RA3.2 Reduce Operational Water Consumption																	■
RA3.3 Reduce Construction Water Consumption																	■
RA3.4 Monitor Water Systems								■									■
NW1.1 Preserve Sites of High Ecological Value	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
NW1.2 Provide Wetland & Surface Water Buffers						■	■	■	■	■		■			■		■
NW1.3 Preserve Prime Farmland																■	
NW1.4 Preserve Undeveloped Land			■						■						▒		
NW2.1 Reclaim Brownfields					■			■									
NW2.2 Manage Stormwater		■	■			■	■	■	■	■					■		■
NW2.3 Reduce Pesticide & Fertilizer Impacts				■	■		■	■						■			
NW2.4 Protect Surface & Groundwater Quality							■	■									■
NW3.1 Enhance Functional Habitats																	
NW3.2 Enhance Wetland and Surface Water Functions																	
NW3.3 Maintain Floodplain Functions										■							
NW3.4 Control Invasive Species														■			
NW3.5 Protect Soil Health					■	■											
CR1.1 Reduce Net Embodied Carbon	■																
CR1.2 Reduce Greenhouse Gas Emissions	■																
CR1.3 Reduce Air Pollutant Emissions				■													
CR2.1 Avoid Unsuitable Development						■											
CR2.2 Assess Climate Change Vulnerability									■	■	■						■
CR2.3 Evaluate Risk and Resilience			■							■	■						
CR0.0 Innovate or Exceed Credit Requirements	■		■														

9/13 credits
RESOURCE ALLOCATION 9

7/9 credits
CLIMATE & RESILIENCE 7

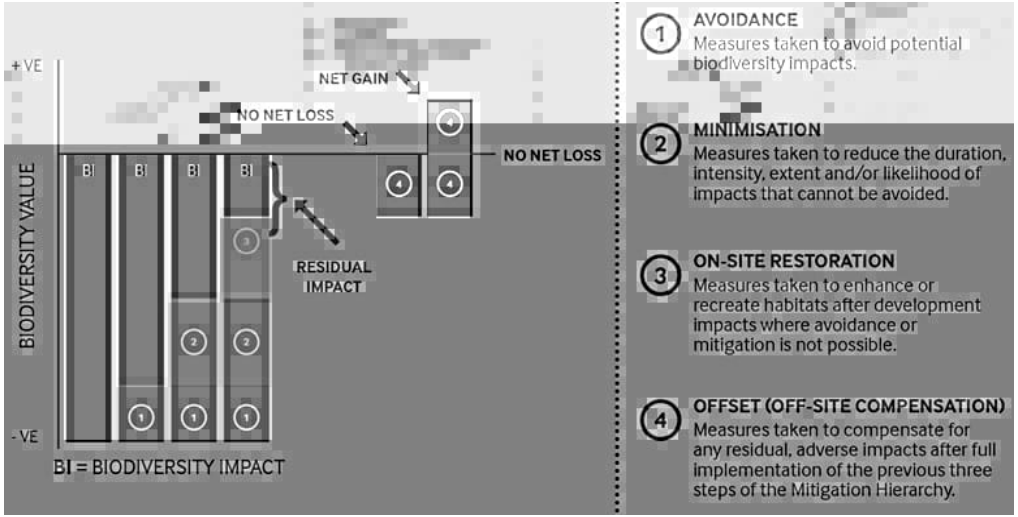
1/11 credits
LEADERSHIP 1

12/13 credits
NATURAL WORLD 13

▒ Credits that can potentially address criteria

Responses seek alignment with global nature positive targets requires initially achieving 'no net loss' of biodiversity and eventually 'net gain'.

No net loss & Net biodiversity gain targets at the project level can be achieved through → **Mitigation hierarchy**



Source: RPS group

The mitigation hierarchy is a well-established and widely used approach **at the project level**, as part of Environmental Impact Assessments (EIAs) and is at the core of the Envision approach**.**

"The new global goals on introduce the need to explore what implementing the mitigation hierarchy means at all scales: national, regional, project, and company.

Stevenson, M. Weber, C. (April 2020). "WWF Discussion paper: Mitigation hierarchies."

Review based on the high-priority criteria

4 Criteria for assessment of biodiversity management responses (no net loss/ net gain)

Based on a combination of the Mitigation and Conservation Hierarchy

ENVISION CREDITS	NO NET BIODIVERSITY LOSS					BIODIVERSITY NET GAIN
	AVOID	MINIMIZE	RESTORE	OFFSET offsite	OFFSET onsite	RENEW
QL3.2 Preserve Historic & Cultural Resources	■	■	■	■		■
QL3.3 Enhance Views and Local Character			■			■
QL3.4 Enhance Public Space and Amenities			■		■	■
LD1.4 Pursue Byproduct Synergies						■
RA1.1 Support Sustainable Procurement Practices						
RA1.2 Use Recycled Materials	■					
RA1.3 Reduce Operational Waste		■				
RA1.4 Reduce Construction Waste		■				
RA1.5 Balance Earthwork On Site	■	■				
RA3.1 Preserve Water Resources		■	■			■
RA3.2 Reduce Operational Water Consumption	■	■				■
RA3.3 Reduce Construction Water Consumption	■	■				
RA3.4 Monitor Water Systems		■	■			
NW1.1 Preserve Sites of High Ecological Value	■	■	■	■	■	■
NW1.2 Provide Wetland & Surface Water Buffers	■	■	■			
NW1.3 Preserve Prime Farmland	■	■	■	■	■	?
NW1.4 Preserve Undeveloped Land	■	■	■			■
NW2.1 Reclaim Brownfields			■			■
NW2.2 Manage Stormwater			■			■
NW2.3 Reduce Pesticide & Fertilizer Impacts	■	■	■			■
NW2.4 Protect Surface & Groundwater Quality	■	■	■			?
NW3.1 Enhance Functional Habitats	■	■	■			■
NW3.2 Enhance Wetland and Surface Water Functions			■			
NW3.3 Maintain Floodplain Functions	■	■				
NW3.4 Control Invasive Species	■					
NW3.5 Protect Soil Health		■	■			
CR1.3 Reduce Air Pollutant Emissions	■	■				■
CR2.1 Avoid Unsuitable Development	■	■				■

3/13 credits QUALITY OF LIFE 3

9/13 credits RESOURCE ALLOCATION 9

2/9 credits CLIMATE & RESILIENCE 2

1/11 credits LEADERSHIP 1

12/13 credits NATURAL WORLD 12

■ Credits that can potentially address criteria

Initial Priority Credits for Biodiversity Action

CATEGORY	SUBCATEGORY		CREDITS (ENVISION VERSION 3)
NATURAL WORLD	Siting	1	NW1.1 Preserve Sites of High Ecological Value
		2	NW1.2 Provide Wetland & Surface Water Buffers
		3	NW1.3 Preserve Prime Farmland
		4	NW1.4 Preserve Undeveloped Land
	Conservation	5	NW2.1 Reclaim Brownfields
		6	NW2.2 Manage Stormwater
		7	NW2.3 Reduce Pesticide & Fertilizer Impacts
		8	NW2.4 Protect Surface & Groundwater Quality
	Ecology	9	NW3.1 Enhance Functional Habitats
		10	NW3.2 Enhance Wetland and Surface Water Functions
		11	NW3.3 Maintain Floodplain Functions
		12	NW3.4 Control Invasive Species
		13	NW3.5 Protect Soil Health
RESOURCE ALLOCATION	materials	14	RA1.5 Balance Earthwork on site
CLIMATE & RESILIENCE	emissions	15	CR1.3 Reduce Air Pollutant Emissions

The Envision review based on the **HIGH PRIORITY FOR BIODIVERSITY ACTION** has highlighted so far 15 credits.

The process of finalizing the list of **HIGH PRIORITY CREDITS FOR BIODIVERSITY** is still in progress.

Scoring of Priority Credits

- **8 of the 15 initial priority credits** For biodiversity are **among highly weighted credits (18-26 points)**

ENVISION CREDITS	SCORE PER LEVEL OF ACHIEVEMENT				
	Improved	Enhanced	Superior	Conserving	Restorative
CR2.3 Evaluate Risk and Resilience	11	18	24	26	
CR2.5 Maximize Resilience	11	15	20	26	
CR1.2 Reduce Greenhouse Gas Emissions	8	13	18	22	26
RA2.1 Reduce Operational Energy Consumption	6	12	18	26	
QL1.1 Improve Community Quality of Life	2	5	10	20	26
RA2.3 Use Renewable Energy	5	10	15	20	24
NW2.2 Manage Stormwater	2	4	9	17	24
NW2.1 Reclaim Brownfields	11	13	16	19	22
RA3.2 Reduce Operational Water Consumption	4	9	13	17	22
NW1.1 Preserve Sites of High Ecological Value	2	6	12	16	22
CR2.2 Assess Climate Change Vulnerability	8	14	18	20	
CR1.1 Reduce Net Embodied Carbon	5	10	15	20	
CR2.4 Establish Resilience Goals and Strategies		8	14	20	
QL1.2 Enhance Public Health & Safety	2	7	12	16	20
NW1.4 Preserve Undeveloped Land	3	8	12	18	20
NW3.2 Enhance Wetland & Surface Water Functions	3	7	12	18	20
LD3.1 Stimulate Economic Prosperity & Development	3	6	12	20	
NW1.2 Provide Wetland & Surface Water Buffers	2	5	10	16	20
NW2.4 Protect Surface and Groundwater Quality	2	5	9	14	20
LD2.1 Establish a Sustainability Management Plan	4	7	12	18	
LD1.4 Pursue Byproduct Synergies	3	6	12	14	18
QL3.1 Advance Equity and Social Justice	3	6	10	14	18
LD1.3 Provide for Stakeholder Involvement	3	6	9	14	18
LD1.1 Provide Effective Leadership & Commitment	2	5	12	18	
LD1.2 Foster Collaboration & Teamwork	2	5	12	18	
NW3.1 Enhance Functional Habitats	2	5	9	15	18

Use of Case Studies

Use of Case studies

Use of Envision® verified projects as case studies

Links specific project strategies with high-priority criteria and provides examples of how these criteria can be met at a project level

Nine Envision Platinum- & Gold-award projects studied

Selected Projects for Case Studies

Nine projects are studied based on the HIGH-PRIORITY CRITERIA for climate and biodiversity action:

California High-Speed Rail Program (Phase I)
Sacramento, CA

Hyperion Wastewater Reclamation Plant's Digester Gas Utilization Project
Los Angeles, CA

Upland Prairie Wind farm
Everly, IA

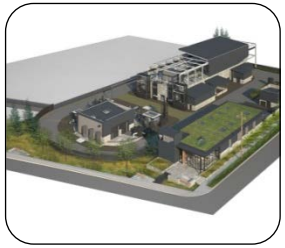
Berryessa Transit Center
San Jose, CA

Dubuque Solar farm
Dubuque, IA

Santa Monica Clean Beaches Project
Santa Monica, CA

Gordie Howe International Bridge
Detroit, MI

English Farms Wind farm
Montezuma, IA



Georgetown Wet Weather Treatment Station
Seattle, WA

Selected Projects Scores of Envision Priority Credits for Climate Change (version 3)

TRANSPORTATION PROJECTS

CATEGORY	SUBCATEGORY		PRIORITY CREDITS (ENVISION VERSION 3)	MAXIMUM CREDIT SCORE	California High Speed Rail project	Berryessa Transit Center
LEADERSHIP	Collaboration	1	LD1.4 Pursue Byproduct Synergies	18		0
	Planning	2	LD2.3 Plan for Long-Term Monitoring and Maintenance	12		12
		3	LD2.4 Plan for end-of-life	14		0
	Economy	4	LD3.3 Conduct a Life-Cycle Economic Evaluation	14		10
RESOURCE ALLOCATION	Materials	5	RA1.1 Support Sustainable Procurement Practices	12		0
		6	RA1.2 Use Recycled Materials	16		0
		7	RA1.3 Reduce Operational Waste	14		4
		8	RA1.4 Reduce Construction Waste	16		10
	Energy	9	RA2.1 Reduce Operational Energy Consumption	26		0
		10	RA2.2 Reduce Construction Energy Consumption	12		0
		11	RA2.3 Use Renewable Energy	24		0
		12	RA2.4 Commission & Monitor Energy Systems	14		3
	Water	13	RA3.1 Preserve Water Resources	12		12
		14	RA3.2 Reduce Operational Water Consumption	22		0
		15	RA3.3 Reduce Construction Water Consumption	8		1
		16	RA3.4 Monitor Water Systems	12		12
NATURAL WORLD	Conservation	17	NW2.2 Manage Stormwater	24		0
	Ecology	18	NW3.3 Maintain Floodplain Functions	14		14
CLIMATE & RESILIENCE	Emissions	19	CR1.1 Reduce Net Embodied Carbon	20	10	0
		20	CR1.2 Reduce Greenhouse Gas Emissions	26	26	0
	Resilience	21	CR2.1 Avoid Unsuitable Development	16	6	6
		22	CR2.2 Assess Climate Change Vulnerability	20	20	20
		23	CR2.3 Evaluate Risk and Resilience	26	24	0
		24	CR2.4 Establish Resilience Goals and Strategies	20	20	0
		25	CR2.5 Maximize Resilience	26	26	0
		26	CR2.6 Improve Infrastructure Integration	18	18	18
QUALITY OF LIFE	Purpose	+	QL1.6 Minimize Construction Impacts	8		8
	Wellbeing	+	QL2.1 Improve Community Mobility	14		14
		+	QL2.2 Encourage Sustainable Transportation	16		16
		+	QL2.3 Improve Access & Wayfinding	14		14
					50%.	53%

* CHSR project's scores per credit are not available to the research team for all categories

Selected Projects Scores of Envision Priority Credits for Climate Change (version 2*)

CATEGORY	SUBCATEGORY		PRIORITY CREDITS (ENVISION VERSION 2)	MAXIMUM CREDIT SCORE	WATER PROJECTS: Santa Monica Clean Beaches	WATER PROJECTS: Georgetown WWTS	ENERGY PROJECTS: Dubuque Solar Park	ENERGY PROJECTS: English Farms Wind farm	ENERGY PROJECTS: Upland Prairie Wind farm	TRANSPORTATION PROJECTS: Hyperion DGUP	TRANSPORTATION PROJECTS: Gordie Howe Bridge
LEADERSHIP	management	1	LD2.1 Pursue By-Product Synergy Opportunities	15	0	0	0	3	3	15	0
		2	LD2.2 Improve Infrastructure Integration	16	16	16	1	3	3	3	16
	planning	3	LD3.1 Plan for Long-Term Monitoring and Maintenance	10	10	4	10	10	10	10	10
		4	LD3.3 Extend Useful Life	12	3	12	3	12	12	6	12
RESOURCE ALLOCATION	materials	5	RA1.1 Reduce Net Embodied Energy	18	0	6	0	2	2	0	0
		6	RA1.2 Support Sustainable Procurement Practices	9	3	0	6	3	3	3	2
		7	RA1.3 Use Recycled Materials	14	2	2	0	5	5	0	5
		8	RA1.4 Use Regional Materials	10	10	10	10	10	10	10	3
		9	RA1.5 Divert Waste From landfills	11	8	3	N/A	0	0	N/A	N/A
		10	RA1.7 Provide for Deconstruction and Recycling	12	1	12	8	4	4	0	0
	energy	11	RA2.1 Reduce Energy Consumption	18	18	7	18	3	3	0	7
		12	RA2.2 Use Renewable Energy	20	0	16	20	20	20	16	0
		13	RA2.3 Commission & Monitor Energy Systems	11	11	11	11	11	11	11	11
	water	14	RA3.1 Protect Fresh Water Availability	21	21	21	N/A	2	2	17	N/A
		15	RA3.2 Reduce Potable Water Consumption	21	9	4	N/A	13	13	17	17
		16	RA3.3 Monitor Water Systems	11	6	1	N/A	0	0	11	N/A
NATURAL WORLD	siting	17	NW1.4 Avoid Adverse Geology	5	3	5	5	N/A	N/A	3	3
		18	NW1.5 Preserve Floodplain Functions	14	5	5	5	5	5	N/A	2
		19	NW1.6 Avoid unsuitable Development on Steep Slopes	6	N/A	4	N/A	N/A	N/A	N/A	1
	Land & water	20	NW2.1 Manage Stormwater	21	21	0	0	21	21	21	21
CLIMATE & RISK	emissions	21	CR1.1 Reduce Greenhouse Gas Emissions	25	0	7	13	21	21	0	0
	resilience	22	CR2.1 Assess Climate Threat	15	15	15	15	15	15	15	15
		23	CR2.2 Avoid traps and Vulnerabilities	20	6	2	16	6	6	16	20
		24	CR2.3 Prepare for Long-Term Adaptability	20	16	16	16	16	16	16	20
		25	CR2.4 Prepare for Short-Term Hazards	21	3	17	21	17	17	0	21
		26	CR2.5 Manage Heat Island Effects	6	0	6	0	6	6	6	0
QUALITY OF LIFE	wellbeing	+	QL2.4 Improve Community Mobility and Access	14	0	4	4	4	4	4	14
		+	QL2.5 Encourage Alternative Modes of Transportation	15	3	1	12	N/A	N/A	0	15
		+	QL2.6 Improve Site Accessibility, Safety and Wayfinding	15	0	0	6	0	0	3	15
					50%.	53%	57%	58%	58%	56%	60%

* The priority credits have been adapted for Envision V2 since many projects used as case studies have been verified with this version

Note: QL Envision priority credits are considered only for transportation projects

Selected Projects Scores of Initial Envision Priority Credits for Biodiversity (version 2*)

TRANSPORTATION PROJECTS

CATEGORY	SUBCATEGORY		CREDITS (ENVISION VERSION 3)	MAXIMUM CREDIT SCORE	California High Speed Rail project	Berryessa Transit Center
NATURAL WORLD	Siting	1	NW1.1 Preserve Sites of High Ecological Value	22		N/A
		2	NW1.2 Provide Wetland & Surface Water Buffers	20		20
		3	NW1.3 Preserve Prime Farmland	16		N/A
		4	NW1.4 Preserve Undeveloped Land	24		24
	Conservation	5	NW2.1 Reclaim Brownfields	22		N/A
		6	NW2.2 Manage Stormwater	24		0
		7	NW2.3 Reduce Pesticide & Fertilizer Impacts	12		5
		8	NW2.4 Protect Surface & Groundwater Quality	20		20
	Ecology	9	NW3.1 Enhance Functional Habitats	18		5
		10	NW3.2 Enhance Wetland and Surface Water Functions	20		20
		11	NW3.3 Maintain Floodplain Functions	14		14
		12	NW3.4 Control Invasive Species	12		12
		13	NW3.5 Protect Soil Health	8		8
RESOURCE ALLOCATION	materials	14	RA1.5 Balance Earthwork on site	8		4
CLIMATE & RESILIENCE	emissions	15	CR1.3 Reduce Air Pollutant Emissions	18	18	2

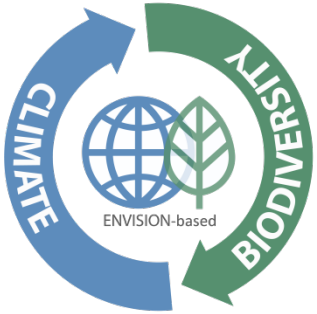
78%

* CHSR project's scores per credit are not available to the research team for all categories

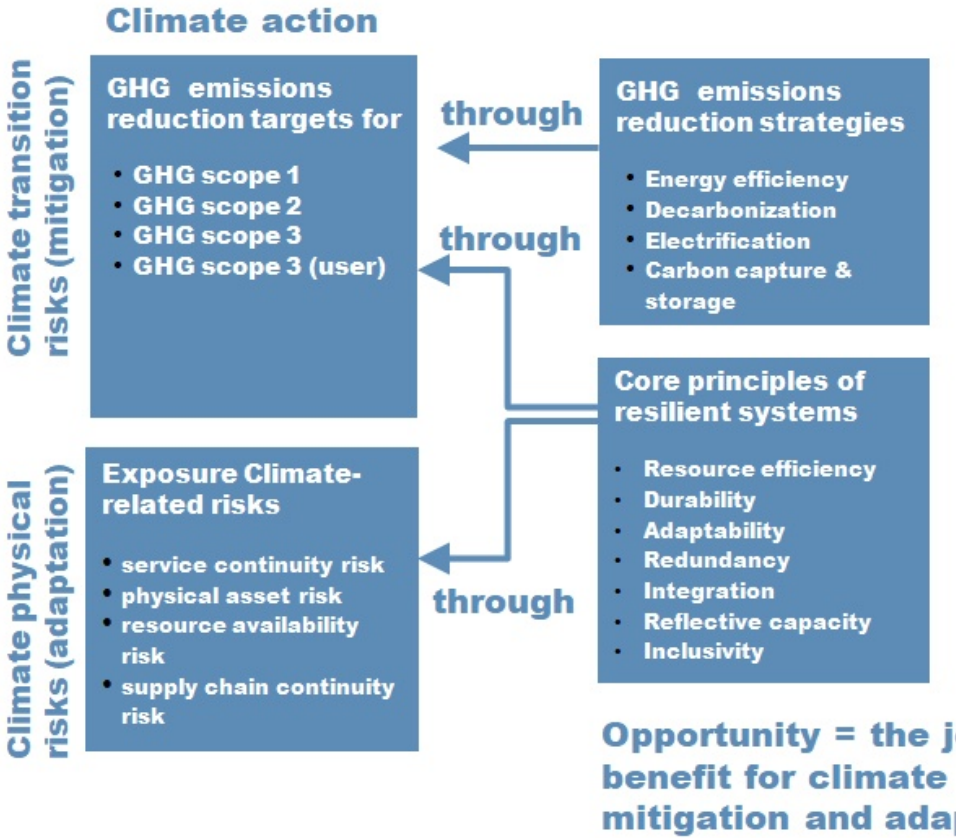
Selected Projects Scores of Initial Envision Priority Credits for Biodiversity (version 2*)

					WATER PROJECTS		ENERGY PROJECTS				TRANSPORTATION PROJECTS
CATEGORY	SUB-CATEGORY		NW CREDITS (ENVISION VERSION 2)	MAXIMUM CREDIT SCORE	Santa Monica Clean Beaches	Georgetown WWTS	Dubuque Solar Park	English Farms Wind	Upland Prairie Wind Farm	Hyperion DGUP	Gordie Howe Bridge
NATURAL WORLD	Siting	1	NW1.1 Preserve Prime Habitat	18	N/A	18	N/A	14	14	N/A	9
		2	NW1.2 Protect wetlands and surface water	18	N/A	0	0	0	0	N/A	0
		3	NW1.3 Preserve prime farmland	15	N/A	N/A	0	6	6	N/A	12
			NW1.4 Avoid Adverse Geology	5	3	5	5	N/A	N/A	3	3
			NW1.5 Preserve Floodplain Functions	14	5	5	5	5	5	N/A	2
			NW1.6 Avoid unsuitable Development on Steep Slopes	6	N/A	4	N/A	N/A	N/A	N/A	1
		4	NW1.7 Preserve greenfields	23	15	23	23	0	0	15	23
	Land & water		NW2.1 Manage Stormwater	21	21	0	0	21	21	21	21
		5	NW2.2 Reduce pesticide and fertilizer impacts	9	5	9	1	9	9	N/A	9
		6	NW2.3 Prevent surface and groundwater contamination	18	14	18	0	4	4	18	4
	Biodiversity	7	NW3.1 Preserve Species Biodiversity	16	N/A	16	16	2	2	N/A	13
		8	NW3.2 Control invasive species	11	5	9	11	5	5	N/A	11
		9	NW3.3 Restore Disturbed Soils	10	0	10	10	8	8	N/A	8
		10	NW3.4 Maintain Wetland and Surface Water Functions	19	3	6	9	15	15	N/A	3
RESOURCE ALLOCATION	Materials	11	RA1.6 Reduce Excavated Materials Taken off Site	6	4	N/A	6	6	6	5	6
CLIMATE & RISK	Emissions	12	CR1.2 Reduce Air Pollutant Emissions	18	12	-	15	12	12	2	0
					57%.	60%	50%	50%	50%	70%.	55%

* The priority credits have been adapted for Envision V2 since many projects used as case studies have been verified with this version

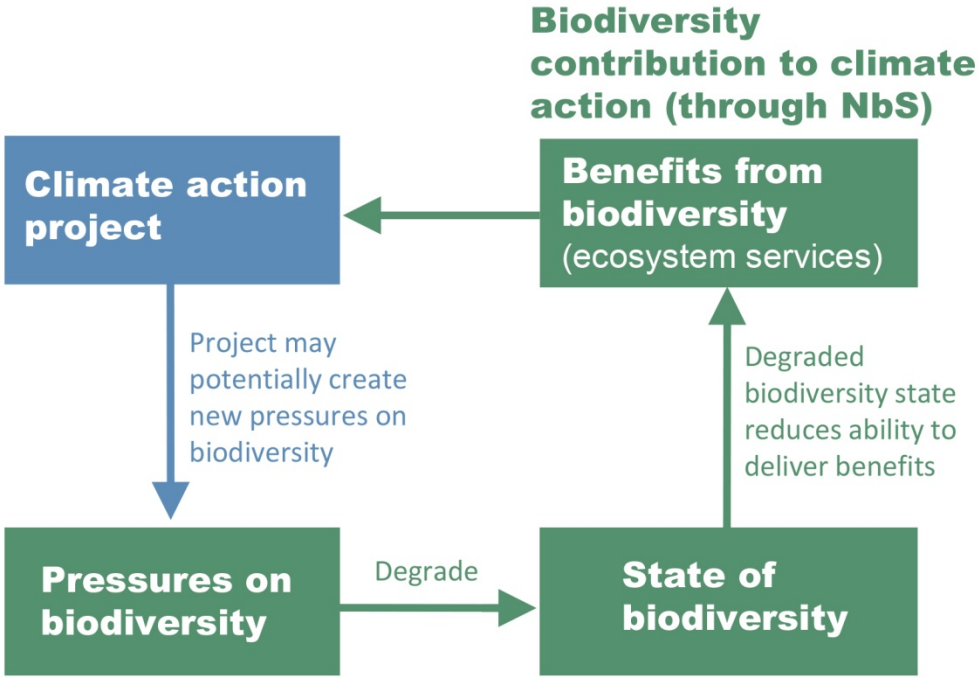


Integrated Climate-Biodiversity action



High-priority criteria for managing risks and leveraging opportunities of climate change action

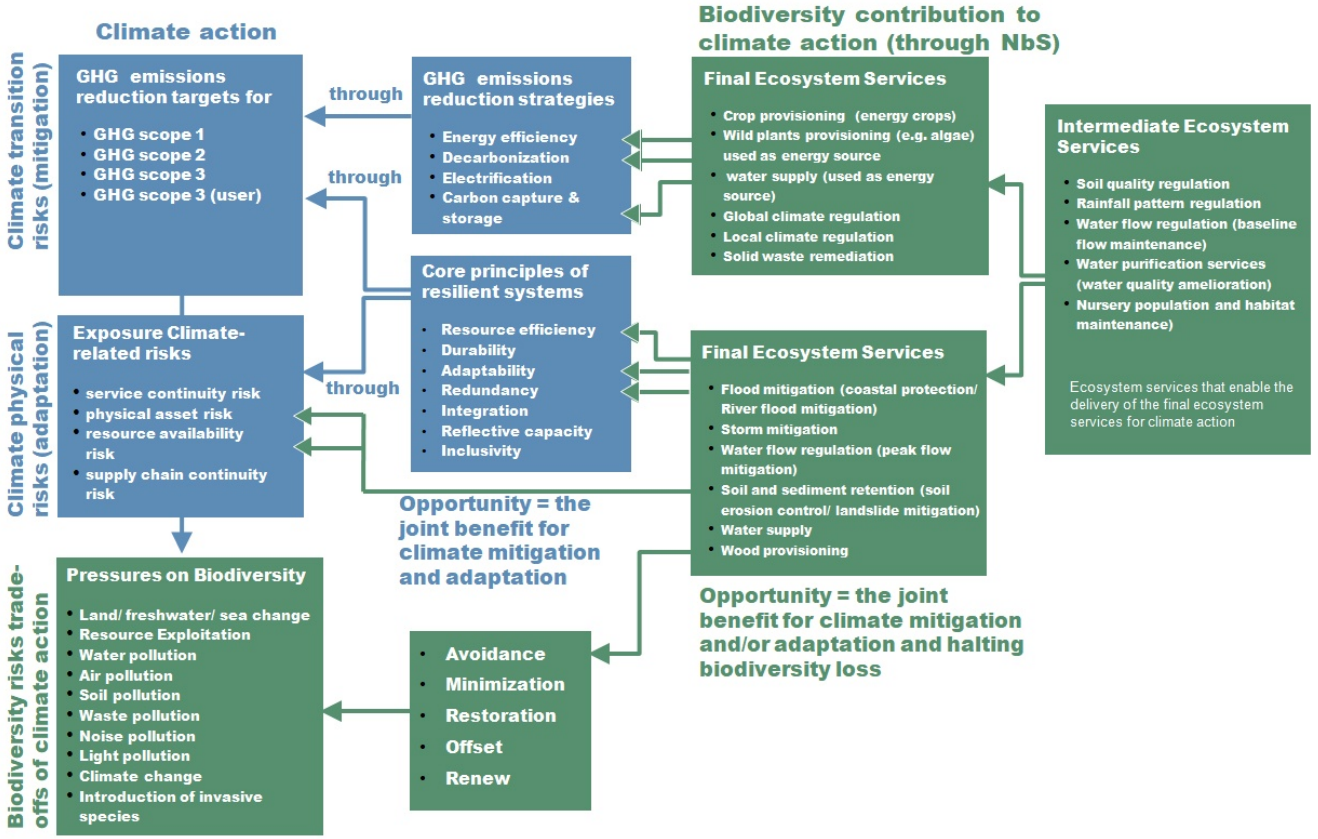
The Core principles of resilient systems are recognized as climate-related opportunities due to their joint benefit for both climate mitigation and adaptation



Reduced ability to deliver biodiversity benefits undermines biodiversity's potential contribution to climate action.

This risk is managed through the biodiversity management responses: avoidance, minimization, restoration, offset, renew.
Therefore, for demonstrating integrated climate-biodiversity action, a climate action project **should incorporate NbS and at the same time, or as a minimum manage all potential project-driven pressures** to ensure the long-term delivery of ecosystem services.

which climate change-related criteria can be addressed by biodiversity



Two types of opportunities emerge:

- The core principles of resilient systems (or climate physical opportunities)
- the NbS solutions

They are opportunities because, the former has a joint benefit for both climate change mitigation and adaptation and the latter because of its joint benefit for climate mitigation and /or adaptation and halting biodiversity loss.

OVERALL SYNTHESIS Integrated climate-biodiversity project performance

Incorporation of NbS

	GHG EMISSIONS REDUCTION TARGETS FOR:		GHG EMISSIONS REDUCTION STRATEGIES & CORE PRINCIPLES OF RESILIENT SYSTEMS	FINAL ECOSYSTEM SERVICES (FES)	INTERMEDIATE ECOSYSTEM SERVICES (that support the delivery of final ES)
CLIMATE TRANSITION RISKS (MITIGATION)	GHG scope 1 emissions		De-carbonization	Crop provisioning (energy crops)	Soil quality regulation
				Provisioning of wild plants used as source of energy	
				Water supply (used as energy source)	Rainfall pattern regulation services (at sub-continental scale)
					Water flow regulation (Baseline flow maintenance)
			Electrification		
			Carbon capture & storage	Global climate regulation	Nursery population and habitat maintenance
					Water purification services (water quality amelioration)
					Soil quality regulation
	GHG scope 2 emissions		Energy efficiency	Local climate regulation	
	GHG scope 3 emissions		Resource efficiency (materials) (reuse/ downsizing)	Solid waste remediation	
			Durability	Local climate regulation	
			Integration		
			Inclusivity		
	GHG scope 3 emissions (user)		De-carbonization		
			Energy efficiency	Local climate regulation	
CLIMATE PHYSICAL RISKS (ADAPTATION)	Service continuity risk		Adaptability		
			Redundancy		
			Reflective capacity		
	Physical asset risk		Durability	Local (micro and meso) climate regulation	
				Storm mitigation (other than water-related events)	
			Adaptability		
			Redundancy		
				Flood mitigation (Coastal protection /River flood mitigation	
				Water flow regulation (Peak flow mitigation)	
				Soil and sediment retention (Soil erosion control/Landslide mitigation)	
	Resource availability risk (for future long-term needs)	water	Resource efficiency (water)	Water supply	Rainfall pattern regulation services
					Water flow regulation (Baseline flow maintenance)
		materials	Resource efficiency (materials) (reuse/ downsizing/alternative materials)	Wood provisioning	
				Sand, rock, gravel etc.	
			Integration		
		land	Integration		
		workforce			
	Supply chain continuity risk		Redundancy		

Management of pressures on biodiversity

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PRESSURES ON BIODIVERSITY	Land, freshwater, sea change			
	Pollution	Water	Water purification (retention and breakdown of nutrients/ other pollutants)	Soil quality regulation
				Nursery population and habitat maintenance
		Air	Air filtration	
		Soil	Soil quality regulation	
			Pest control	
		Waste	Solid waste remediation	
		Noise	Noise attenuation	
		light		
	Introduction of invasive species			

OVERALL SYNTHESIS

Examples of integrated climate-biodiversity action as a minimum

Types of climate change strategies that minimize adverse impacts on biodiversity across the project lifecycle

	Climate change-related	Biodiversity -related
Project Useful Life Extension	These strategies through durability, redundancy, construction quality contribute to climate change mitigation by: - Reducing future rehabilitation works or replacement and the associated scope 1 & 2 emissions - reducing scope 3 upstream emissions associated with materials in the case of early failure of the project - reducing scope 3 downstream emissions associated with waste landfilling and hauling	These strategies reduce upstream pressures on biodiversity such as: - resource exploitation (materials) - land change for extraction, as well as downstream pressures on biodiversity such as: - waste pollution - land change for landfills, - potential water pollution from landfill
Material sourcing from sustainable practice suppliers	These strategies contribute to climate change mitigation by reducing scope 3 upstream emissions associated with materials	These strategies reduce various upstream pressures on biodiversity depending on the supplier's type of activity, sustainability management system etc.
Reduction of material input	These strategies contribute to climate change mitigation by reducing scope 3 upstream emissions associated with materials and to climate change adaptation by securing resource availability for future project needs as well as for other projects needs	These strategies reduce upstream pressures on biodiversity such as: – resource exploitation (materials) – land change for extraction
End-of-Life repurposing	These strategies contribute to climate change mitigation by reducing scope 3 downstream emissions associated with waste landfilling and hauling, as well as future upstream emissions associated with materials for other projects	these strategies reduce downstream pressures on biodiversity such as: – waste pollution – land change for landfills, – potential water pollution from landfill – resource exploitation (materials and water) for new material production for other projects
Solid waste diversion	These strategies contribute to climate change mitigation by reducing scope 3 downstream emissions associated with waste landfilling and hauling	
Reduction of potable water use	These strategies contribute to climate change adaptation by preserving water efficiency and water resource availability in the long-term	these strategies reduce water resource exploitation during project operation
Stormwater and flood control	These strategies contribute to climate change adaptation by control and capturing stormwater runoff and in the case of DGUP project treating and repurposing 100% of stormwater to eliminate potable water input needs.	Strategies that contribute to 'Avoidance of water pollution'
Purchase of carbon offsets	These strategies contribute to climate change mitigation through conservation of carbon-rich ecosystems that sequester and store carbon emissions.	

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