From Grey to Green: Municipal Strategies for Urban Climate Resilience

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ClimAct2Adapt conference

ACTING TOGETHER FOR CLIMATE RESILIENCE

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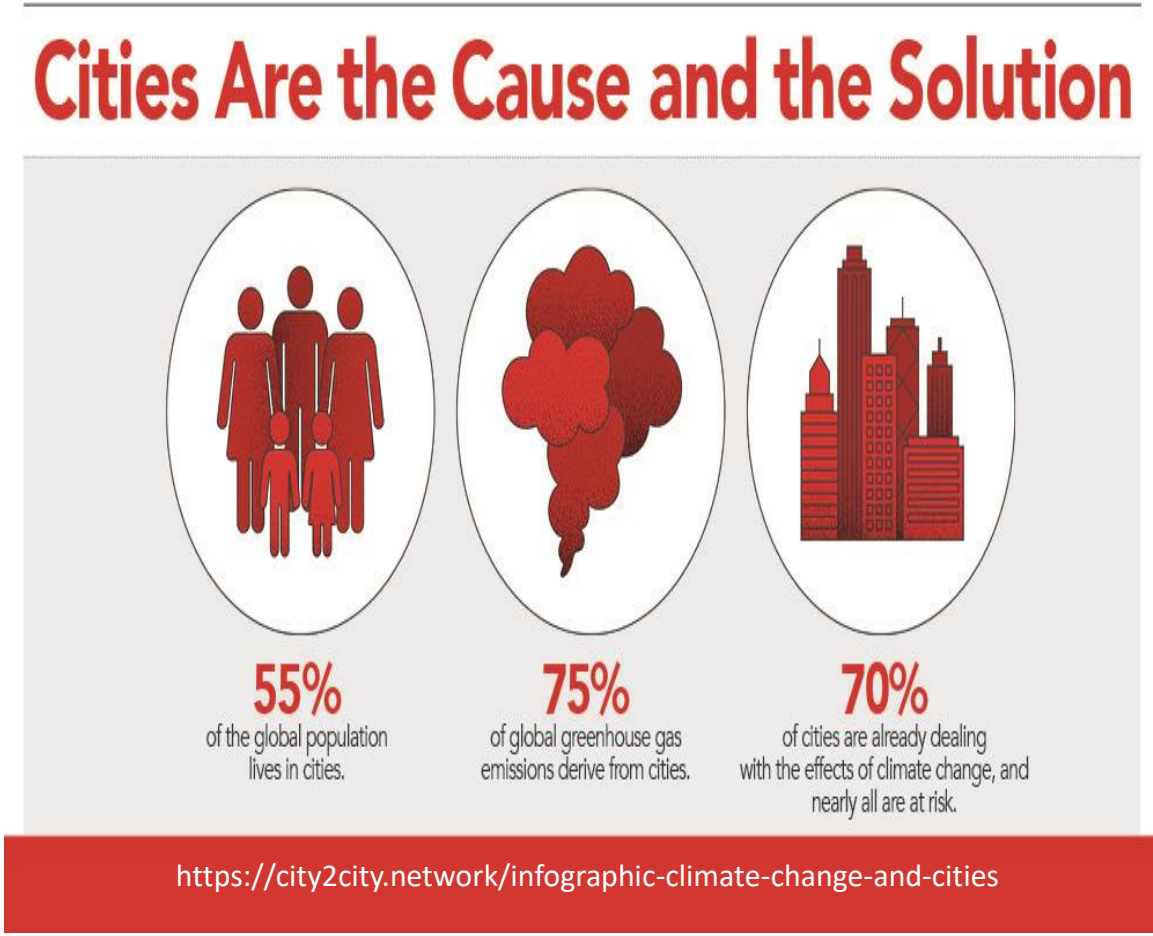
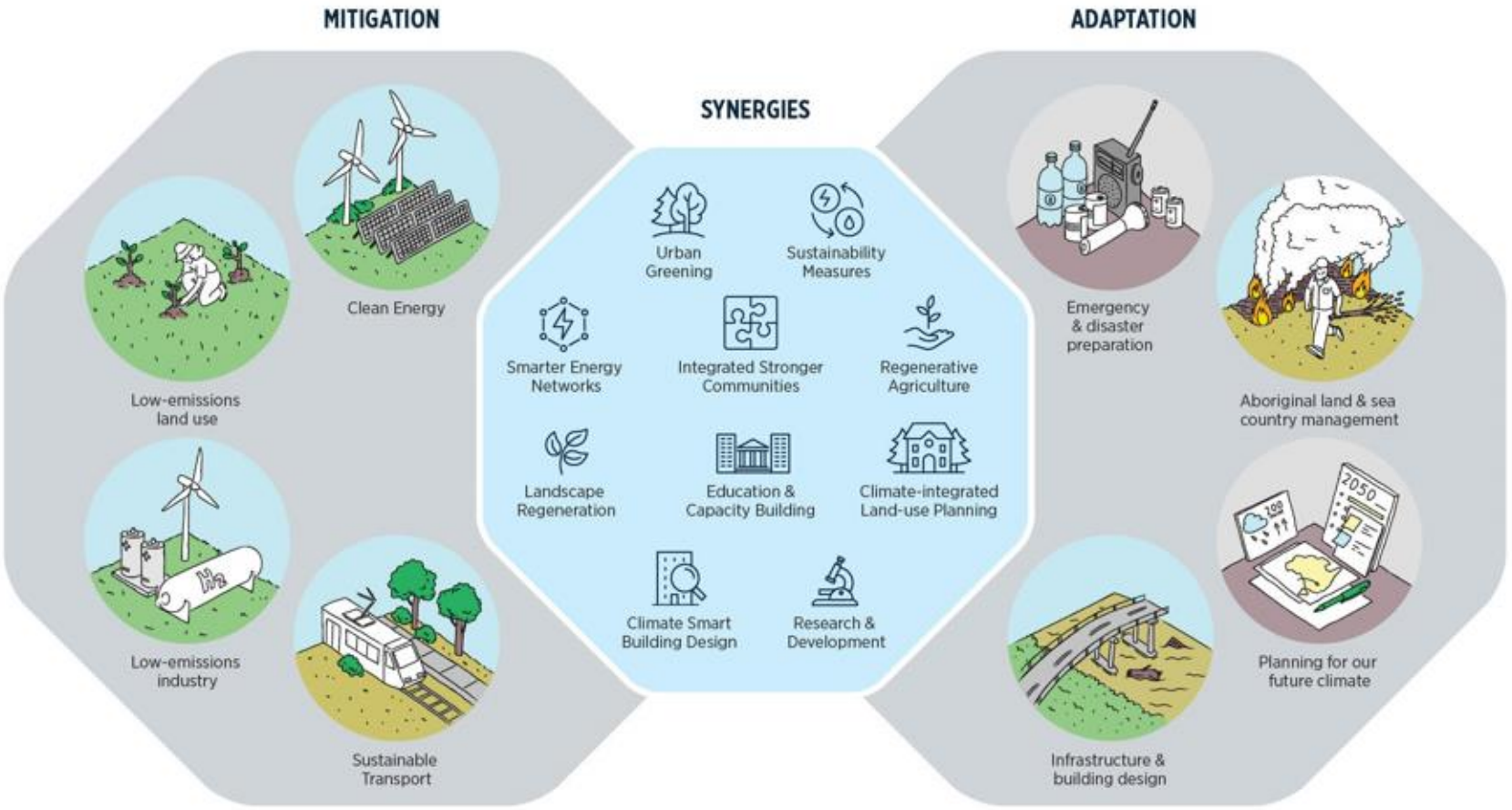
Research Overview

- Urban areas are especially susceptible to climate change impacts
- Cities serve as essential actors in mitigation and adaptation strategies
- Focus on local political leadership and urban planning
- Emphasis on institutional practices for resilient cities
- Integration of ecological urbanism and green infrastructure
- Multilevel governance approach



Research Focus



The synergies between Mitigation and Adaptation
https://www.climatechange.environment.nsw.gov.au/why-adapt

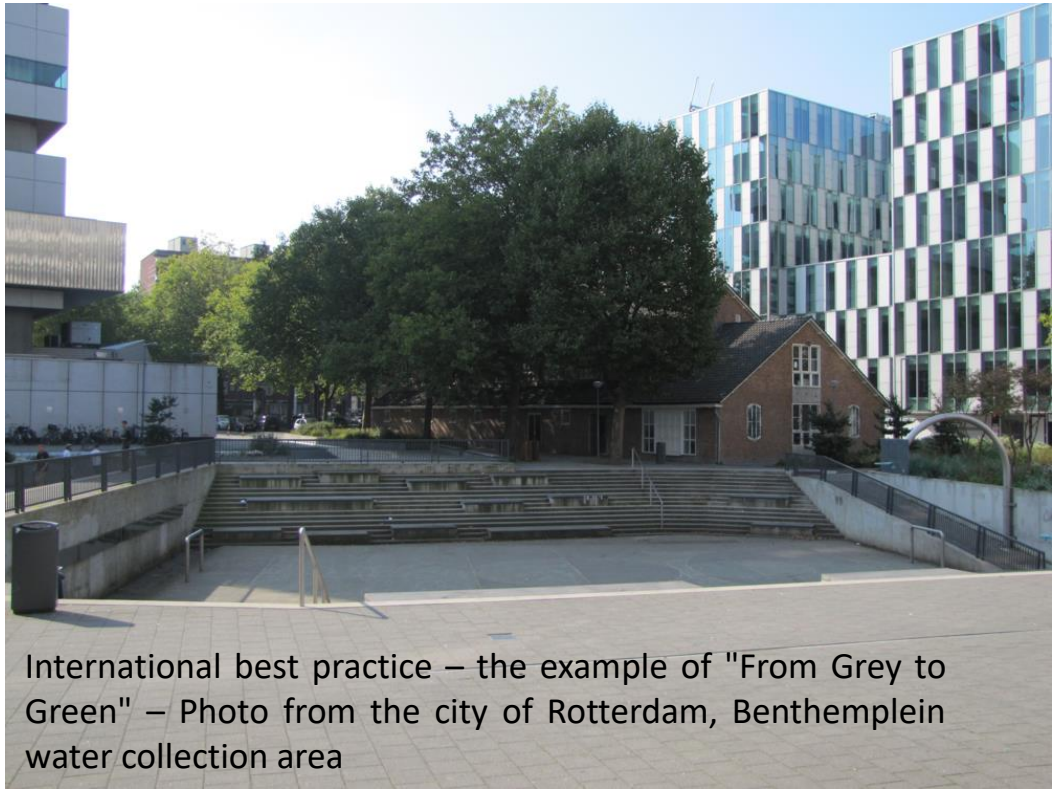
Research Methodology

Approach:

- Qualitative comparative case study methodology
- International examples analysis
- Focus on urban climate policy development

Conceptual Framework:

- Dual approach to mitigation and adaptation
- Ecological urbanism principles
- Green infrastructure (GI) theory
- Multilevel governance theory



International best practice – the example of "From Grey to Green" – Photo from the city of Rotterdam, Benthemplein water collection area

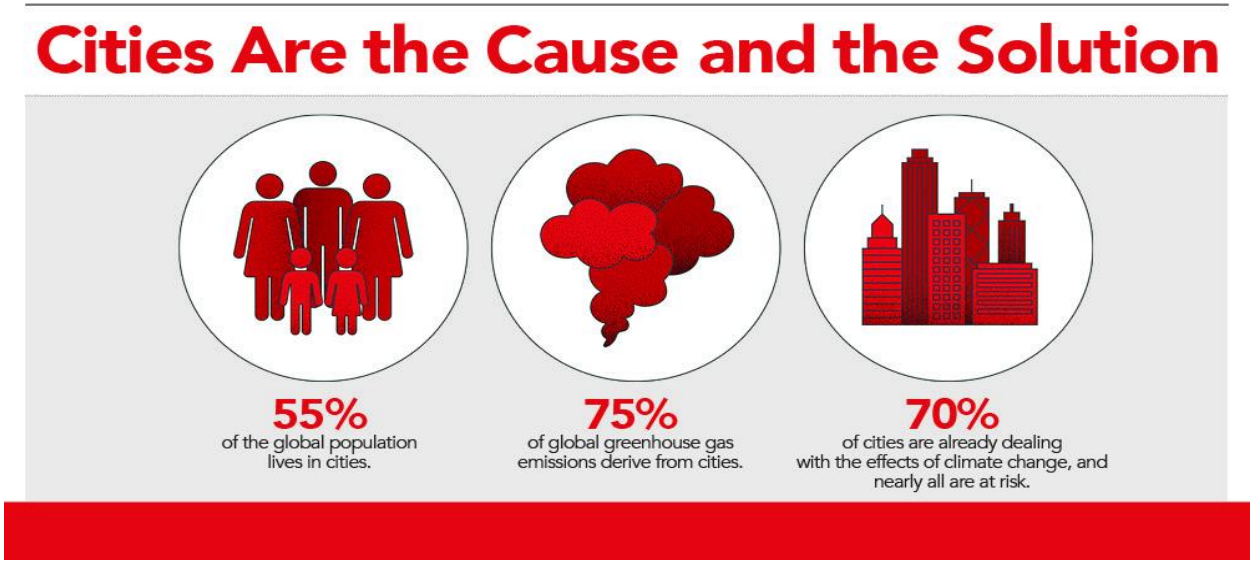
Urban Climate Challenges

Global Context:

- Cities house over 50% of the world's population
- Urban areas contribute ~70% of global greenhouse gas emissions
- Heightened exposure to climate-related risks

Specific Challenges:

- Extreme weather events (droughts, floods, heatwaves)
- Increased frequency and severity of climate impacts
- Unpredictable water availability
- Heat stress in urban environments
- Threats to public health and economic stability



Critical Role of Local Government

Unique Position:

- Implementation of national and international climate goals at the local level
- Tailoring strategies to specific sociocultural contexts
- Direct connection to local communities

Key Responsibilities:

- Developing comprehensive climate action plans
- Engaging multiple stakeholders
- Coordinating between governmental bodies, the private sector, and communities
- Leading by example in sustainability practices

Checklist for Municipal Decision-Makers – Climate Response and Water Management Recommendations *(author's own edit)*)

Priority	Essence in Brief	Key Question for Decision-Makers
1. Long-term Strategic Planning	Development of integrated 20–30-year water and climate strategies	Does the municipality have a climate adaptation and stormwater management strategy?
2. Cross-sectoral Cooperation	Coordinated work between municipalities, water authorities, utilities, civil society, and economic actors	Who sits at the table when water-related decisions are made?
3. Knowledge Sharing and Training	Exchange of experiences with other municipalities, continuous professional training, public awareness	How do we learn from others' best practices?
4. Preference for Nature-based Solutions	Green infrastructure: rain gardens, green roofs, permeable pavements, urban tree planting	Do we consciously prefer nature-based over grey infrastructure solutions?
5. Community Involvement	Citizen programs, support for civil initiatives, community-based monitoring	How do we involve local communities in water management?
6. Monitoring and Evaluation	Data collection, continuous feedback, evaluation based on indicators	Do we regularly measure the effectiveness of our strategies?

From Grey to Green Infrastructure

Traditional Grey Infrastructure:

- Concrete-based solutions
- Single-purpose systems
- High maintenance costs
- Limited environmental benefits

Green Infrastructure Benefits:

- Nature-based solutions (NbS)
- Multi-functional systems
- Cost-effective long-term solutions
- Enhanced biodiversity and ecosystem services
- Improved air and water quality
- Urban heat island reduction

Cheonggyecheon Stream in downtown Seoul

Key Research Findings

Critical Success Factors:

- Local leadership is fundamental
- Strong institutional capacities are essential
- National and EU policy frameworks provide crucial support
- Integrated strategies are most effective

Successful Municipal Approaches Include:

- Sustainable urban design principles
- Nature-based solutions (NbS)
- Active community engagement
- Cross-sectoral collaboration

Community participation in strengthening resilience

Green Infrastructure Solutions

Nature-Based Solutions (NbS):

- Green roofs and living walls
- Urban forests and tree canopy expansion
- Constructed wetlands for stormwater management
- Permeable pavements and surfaces
- Rain gardens and bioswales
- Urban parks and green corridors

Benefits:

- Climate regulation and carbon sequestration
- Stormwater management and flood control
- Air quality improvement
- Biodiversity conservation
- Social and recreational value

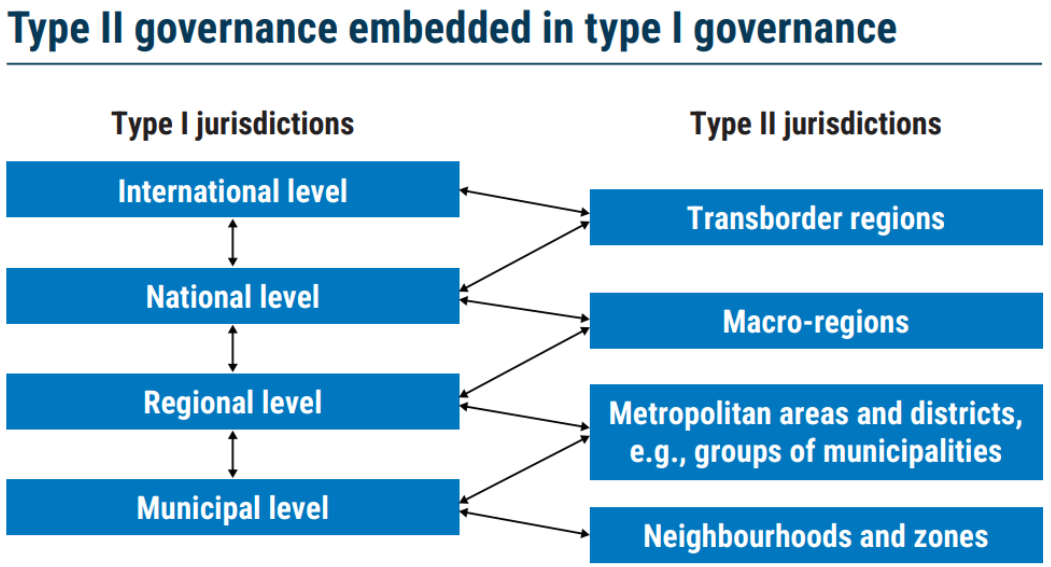
Multilevel Governance Approach

Governance Levels:

- International: Global climate agreements and frameworks
- National: Climate policies and regulations
- Regional: Coordination and resource allocation
- Local: Implementation and community engagement

Key Principles:

- Vertical integration across governance levels
- Horizontal coordination between sectors
- Participatory decision-making processes
- Knowledge sharing and learning networks
- Adaptive management approaches



Source: Dobravec, V., Matak, N., Sakulin, C., & Krajačić, G. (2021) as cited in *UN CEPA strategy guidance note on Multi-level governance*

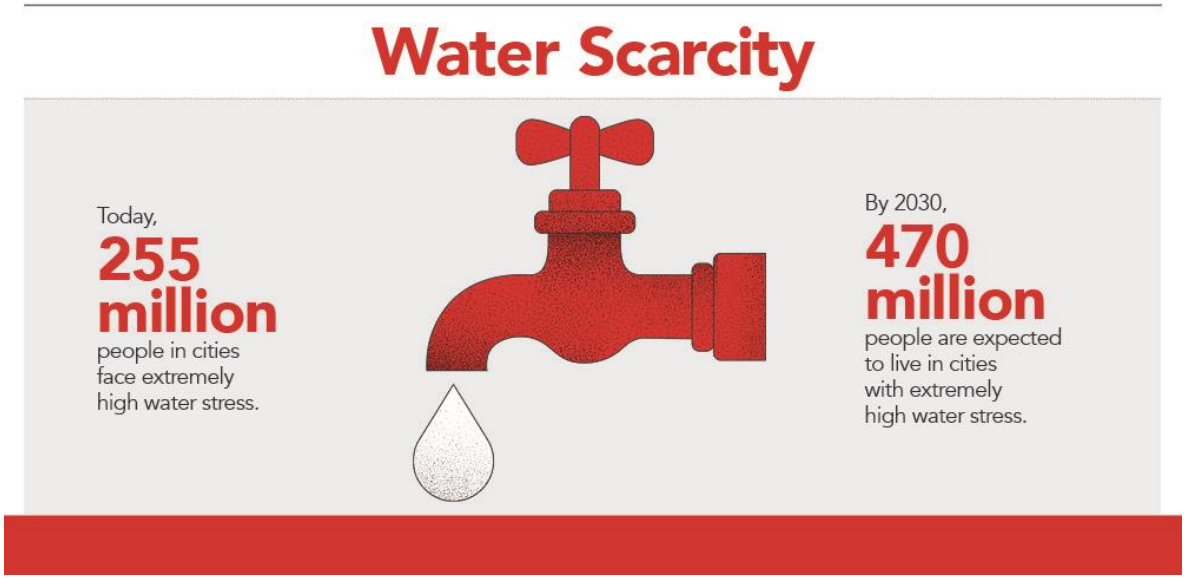
Implementation Strategies

Strategic Planning:

- Long-term vision development
- Climate risk assessments
- Vulnerability mapping
- Scenario planning and modelling

Implementation Tools:

- Policy integration mechanisms
- Financial instruments and incentives
- Public-private partnerships
- Community engagement programs
- Monitoring and evaluation systems



Recommendations for Decision-Makers

Strategic Priorities:

- Enhance climate-aware local governance
- Invest in long-term strategic planning
- Foster cross-sectoral collaboration
- Promote knowledge exchange and learning

Implementation Focus:

- Integrate mitigation and adaptation strategies
- Prioritize nature-based solutions
- Strengthen institutional capacities
- Engage communities in decision-making
- Establish monitoring and evaluation systems

Priority	Description
Long-term strategic planning	Development and urban plans that integrate climate risk considerations.
Cross-sector collaboration	Coordination between utilities, transport, water management, energy, and disaster management.
Knowledge sharing	Dissemination of best practices, research results, and local experiences; organizing training.
Nature-based solutions (NbS)	Prioritizing green infrastructure (rain gardens, green roofs, permeable pavements).
Community engagement	Involving residents and civil organizations in planning and implementation.
Monitoring and evaluation	Applying indicators and metrics, continuous follow-up and feedback to improve plans.

Benefits of Green Transition

Environmental Benefits:

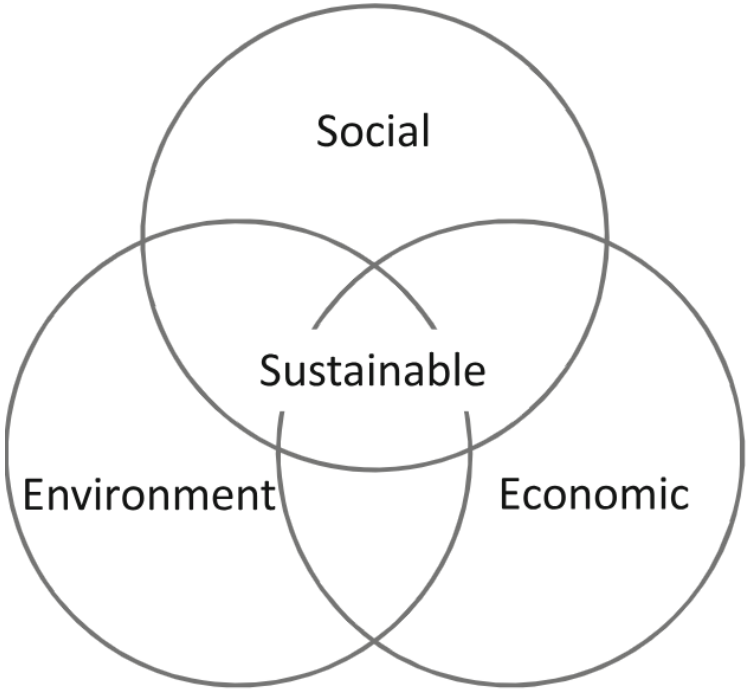
- Reduced greenhouse gas emissions
- Improved air and water quality
- Enhanced biodiversity conservation
- Climate regulation services

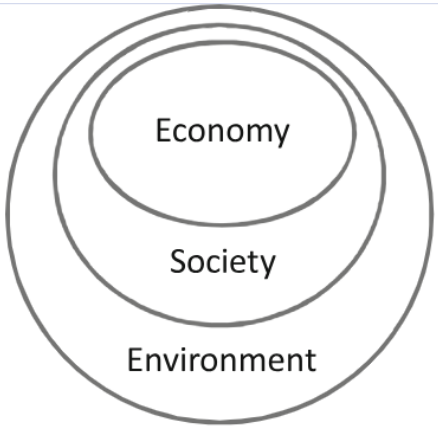
Social Benefits:

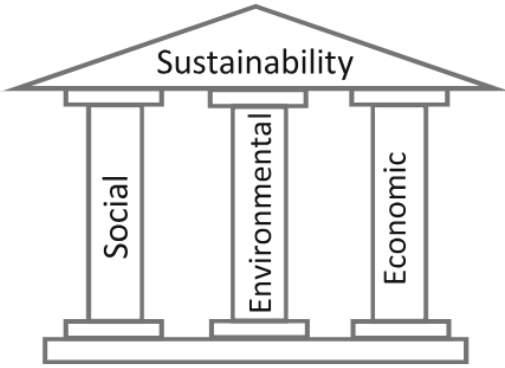
- Improved public health outcomes
- Enhanced quality of life
- Increased recreational opportunities
- Stronger community cohesion

Economic Benefits:

- Job creation in green sectors
- Reduced infrastructure costs
- Increased property values
- Enhanced economic resilience







https://commons.wikimedia.org/wiki/File:Visualization_of_pillars_of_sustainability.svg#:~:text=This%20file%20is%20licensed%20under,Share%20Alike%204.0%20International%20license

Future Research Directions

Research Opportunities:

- Comparative analysis of regional approaches
- Long-term effectiveness studies
- Cost-benefit analysis of green infrastructure
- Community engagement best practices
- Technology integration in green solutions

Policy Development:

- Standardized assessment frameworks
- Financing mechanisms for green infrastructure
- Inter-municipal cooperation models
- Capacity building programs

Conclusion

Key Takeaways:

- Municipal leadership is crucial for climate resilience
- Green infrastructure offers sustainable solutions
- Integrated approaches are most effective
- Community engagement drives success
- Multilevel governance enables coordination

The Path Forward:

- From grey to green infrastructure transition
- Evidence-based policy development
- Collaborative governance approaches
- Continuous learning and adaptation

Bosco Verticale, Milan, Italy

Thank You

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