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Trees, Cities, and a Green Future

Connecting Urban Forestry Policymakers, Practitioners,
and Experts across Central Asia and the Globe
for Landscape Restoration and Climate Resilience

Knowledge Exchange Series
A Compendium of Proceedings
2023

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A Compendium of Proceedings**

December 2023

Contents

Acknowledgments	ii
Acronyms and Abbreviations.....	iv
Foreword.....	v
Executive Summary.....	1
1. Crafting the Future: A Master Plan for Barcelona’s Trees 2017–2037	4
2. Engaging the Private Sector: A Case of Milan, Italy	7
3. Korea’s Green Corridors: A Scientific Approach to Greening Cities.....	12
4. Mountains and Trees: Nature-Based Solutions for Landslide Risk Management	15
5. Connecting Communities and Conserving Nature: Linear Parks of Campinas, Brazil	19
6. Diverse by Design: Urban Tree Selection in Melbourne, Australia	22
A Way Forward	25

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The World Bank team was led by **Paola Agostini**, Lead Natural Resources Management Specialist and **Larissa Duma**, Senior Urban Ecology and Resilience Specialist. The core team included **Ellen Hamilton**, Lead Urban Specialist; **Chiyun Huang**, Senior Urban Development and Disaster Risk Management Specialist; **Kirtan Sahoo**, Senior Climate Change Specialist at the Europe and Central Asia Region; **Rosanna Nitti**, Senior Urban Specialist; **Brenden Jongman**, Program Lead, Global Program on Nature-Based Solutions for Climate Resilience, Global Facility for Disaster Reduction and Recovery (GFDRR); **Elena Strukova Golub**, Senior Economist; **Saltanat Zhakenova**, Consultant; **Nigara Abate**, Senior Knowledge Management and Communications Specialist; **Xueman Wang**, Coordinator of Cities and Climate Change; **Anna Gorbacheva**, Consultant; and **Juliana van Helmerick**, Consultant.

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supported by [CAWEP](#), [GEF](#), [GFDRR](#), [KGGTF](#) and [KWPF](#), [PACT](#), and [PROGREEN](#).

Finally, the team would like to thank all the participants of the webinar series without whom the series would not have been possible. Their interest in and commitment to urban forestry and greening best practices are crucial for advancing urban land restoration and climate resilience in cities and for regional development projects across Central Asia and the world.

This compendium is a testament to the power of collaboration and knowledge sharing in addressing the pressing challenges of our time. We hope that it will prove to be a great resource in advancing urban forestry and greening practices and in supporting sustainable development and climate resilience across urban landscapes.

This work was supported by [PROGREEN](#) and the Program for Asia Connectivity and Trade ([PACT](#)) funded by the UK Government. This material was funded by UK International Development from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

Acronyms and Abbreviations

CAWEP	Central Asia Water-Energy Program
GEF	Global Environment Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GIS	Geographical Information System(s)
KGTF	Korea Green Growth Trust Fund
KWPF	Korea-World Bank Partnership Facility
NBS	Nature-Based Solution
NGO	Nongovernmental Organization
PACT	Program for Asia Connectivity and Trade
PPP	Public-Private Partnership
TMP	Tree Management Plan

Foreword

Urban forestry has evolved into a multifaceted discipline, encompassing far more than aesthetic landscaping. As a cornerstone of environmental stewardship, it includes strategic planning and comprehensive management to optimize the environmental, social, and economic benefits of trees. This involves the conservation of various green spaces—parks, riverbanks, vacant lots—to enhance urban life. It adds economic and property value, creates jobs, and offers cost-saving benefits such as reduced infrastructure needs and lower energy costs by providing shade. Social advantages include improved public health through recreational spaces, stress reduction, air pollution reduction, and promotion of physical activity. Additionally, the environmental impacts of urban forestry are profound: mitigating climate change, enhancing air and water quality, reducing erosion, and promoting biodiversity.

Central Asia's cities face distinct challenges ranging from desertification to extreme weather. Here, trees function not just as aesthetic elements but as essential tools for combating these challenges. They serve as green barriers against desert expansion and sand and dust storms; provide shade in hot summers; and, by absorbing carbon dioxide, they align with the broader climate goals of Central Asian countries. Yet, there exists a knowledge gap and a need for targeted strategies.

The World Bank's series of webinars 'Trees, Cities, and a Green Future' were held from January through July 2023 to address the pressing need for awareness, education, and collaborative action in the field of urban tree management; especially considering its multifaceted importance in modern cities and unique relevance in Central Asia. It was cohosted by the World Bank's Environment, Natural Resources, and Blue Economy and Urban, Resilience, and Land global practices. The series represented a thematic set of learning events curated as an online knowledge exchange platform that aimed to connect policy makers, practitioners, and experts across Central

Asia and the globe, all focused on advancing urban forestry and greening best practices for urban land restoration and climate resilience in cities and regional development projects.

The series was organized as part of the World Bank's flagship RESILAND CA+ Regional Landscape Restoration Program in [Kazakhstan](#), the [Kyrgyz Republic](#), [Tajikistan](#), and [Uzbekistan](#). RESILAND CA+ addresses land degradation and resilience in urban centers and rural communities across Central Asia by developing analytics, providing advisory services, and supporting investment projects to heal the region's degraded landscapes and enhance productivity.

Understanding that nature, landscapes, and ecosystems transcend international boundaries, RESILAND CA+ fosters regional collaboration across Central Asia's shared borders and ecosystems. This contributes to improved connectivity of natural resources and increased greenhouse gas mitigation and resilience against land degradation. The program also contributes to establishing protected areas to preserve biodiversity across transboundary corridors and strengthening resilience of critical regional infrastructure. RESILAND CA+ is supported by [CAWEP](#), [GEF](#), [GFDRR](#), [KGGTF](#) and [KWPF](#), [PACT](#), and [PROGREEN](#).

RESILAND CA+ takes an integrated approach to sustainable land management, addressing common challenges across various land uses, including restoring degraded forests, pastures, and cropland. Specific interventions in Kazakhstan, Tajikistan, and Uzbekistan include piloting community- and farmer-centered landscape restoration using drought - resistant species of trees and shrubs, promoting ecotourism, engaging communities in afforestation efforts, and rehabilitating degraded natural habitats.

Aimed at fostering collaborative dialogue, the webinar series served as a stepping-stone for enhanced resilience and productivity in urban ecosystems. Building on this dialogue, this compendium extends the conversation to

encompass not only tree management but also broader strategies for land restoration and climate resilience. It is intended to be a useful tool for urban forestry, disaster risk management, and environmental conservation practitioners and

stakeholders. The compendium is a comprehensive guide that catalyzes fresh perspectives tailored to the region's unique challenges, inviting readers to seamlessly integrate knowledge, policy, and action for a more sustainable and resilient Central Asia.

Executive Summary

Central Asia is confronting complex challenges in forestry, which extend to forest degradation, governance and technological gaps; and heightened vulnerability to climate change. These challenges carry wide-reaching ramifications for biodiversity, economic resilience, and the delivery of essential ecosystem services. A holistic, multi-sectoral strategy engaging diverse stakeholders is vital to navigate these multifaceted issues.

Central Asian countries are rolling out distinct but synergistic strategies. For example, Kazakhstan has set an ambitious goal to plant 2 billion trees by 2025. The Kyrgyz Republic is channeling its efforts into urban forestry and forest revitalization. Tajikistan is forging collaborations between governmental and nongovernmental entities to roll out educational programs and tree-planting drives. Similarly, Turkmenistan and Uzbekistan are ramping up their afforestation initiatives while deepening community involvement.

In drawing from global best practices, the webinar series ‘Trees, Cities, and a Green Future’ featured detailed insights from progressive planning processes in cities like Barcelona, Campinas, Melbourne, Milan, and Seoul. The topics included master planning for urban trees, innovative financing mechanisms, and foundational policy and technical frameworks to ensure project sustainability. Targeting Central Asia, the series served as a catalyst for new ideas and solutions tailored to the region’s unique urban challenges. This aligned with the region’s efforts, as it involved a deep understanding of local environmental conditions and optimized greenery placement for maximum socioeconomic and environmental benefits, including air purification, better health, and biodiversity.

The session ‘[Crafting the Future: a Master Plan for Barcelona’s Trees 2017-2037](#)’ outlined Barcelona’s long-term strategic vision for enhancing its urban forests. It provided a unique opportunity to explore the success story of Barcelona’s visionary approach to urban forestry which combined scientific rigor, community

engagement, and environmental sustainability. The Tree Master Plan stands as a testament to the transformative power of long-term vision, adaptability, and scientific rigor in urban planning.

A central theme of the webinar was the significance of trees in urban environments. The Tree Master Plan demonstrated how increasing tree canopy cover could offer a wide array of environmental and economic benefits. Trees contribute to climate resilience by mitigating heat island effects and enhancing air quality. The economic opportunities presented by urban trees, including green infrastructure development and tourism, highlighted how tree management could create jobs and drive economic growth.

Community participation was another critical aspect explored in the webinar. Barcelona’s emphasis on involving citizens in tree planting and care programs not only fostered a sense of ownership but also strengthened social bonds and contributed to overall well-being. Additionally, the Tree Master Plan’s commitment to environmental justice ensured that tree benefits were distributed equitably, regardless of the socioeconomic status, and promoted inclusivity.

The session ‘[Business Meets Nature: Engaging the Private Sector Forestami Experience](#)’ – the project aiming to plant 3 million trees in Milan by 2030—emphasized the complex relationships among climate conditions, urbanization, and geographic factors in addressing Milan’s air quality challenges. The session’s central theme was the importance of public-private partnerships (PPPs) in urban tree management. It explored how private entities can actively contribute to urban greenery, exemplified by Milan’s Forestami project. The financial aspect of the Forestami project was a vital focus, with the establishment of a fund to raise private donations, alongside financial support from firms and foundations. The successful fundraising efforts and allocation of funds for tree planting, maintenance, and general expenses highlighted the commitment to long-term sustainability.

The session also highlighted Forestami's role in educating the public and raising awareness about urban reforestation. The establishment of the Forestami Academy exemplified how private sector engagement can amplify educational efforts and promote public understanding and support.

The discussion explored Forestami's detailed planning and execution, including priority mapping and innovative technology such as satellite studies. The project's collaboration with a wide network of public and private entities demonstrated its holistic approach to urban reforestation.

The session '[The Green Pathway: Korea's Green Corridors](#)' explored the Korean experience in implementing green infrastructure, with a particular focus on wind corridor forests and green corridors as an integrated nature-based solution (NBS). The session delved into the Republic of Korea's transformative green initiatives that prioritize both aesthetics and functionality and emphasized the importance of harnessing a scientific approach to greening cities. Korea's success in these endeavors is rooted in rigorous research and planning, driven by a comprehensive understanding of local ecological conditions. Data-driven models are used to optimize greenery placement, accounting for factors like soil quality, native species, and climate. This comprehensive approach ensures maximum environmental benefits, such as optimal air purification, temperature regulation, and biodiversity enhancement.

A striking aspect of the Korean case study is the coordination among various stakeholders, including urban planners, environmental scientists, and local communities. This collaboration aligns green infrastructure with broader city development goals and fosters a sense of community ownership. It was emphasized that the success of such initiatives goes beyond environmental gains and extends to public health, climate resilience, and increased real estate values.

Financial sustainability was another highlight. Korea's approach involves PPPs, grants, and climate-smart financing to make green initiatives

economically viable. This could serve as an essential lesson for Central Asian nations with limited resources.

Moreover, the session showcased Korea's adaptability and scalability and examined how the principles used in sprawling cities like Seoul were tailored to suit smaller urban centers across the country, illustrating the model's flexibility.

The session '[Mountains and Trees: Nature-Based Solutions for Urban Landslide Management](#)' addressed the role of trees in stabilizing mountainous terrains, crucial for regions that are prone to landslides. It focused on the critical topic of utilizing NBSs, in particular green NBS, for management of landslides, in response to a direct request for this information from previous webinar attendants. The discussion delved into the multifaceted challenges and opportunities inherent in employing NBS as a viable approach to reduce landslide risks in Central Asia.

One of the key points emphasized was the importance of a holistic approach in addressing the risk of landslides. Understanding the underlying drivers, including geological, hydrological, and human factors, is pivotal in risk reduction. While NBS can be effective in stabilizing slopes, there are limitations, particularly in the case of deep-seated landslides. The presentation emphasized that NBS is particularly effective in preventing shallow landslides, offering vegetation as a stabilizing factor.

Beyond mitigating landslide risks, NBS can also reduce urban runoff, improve water quality, enhance biodiversity, and provide multiple ecosystem services. This aspect underscores the broader advantages of employing NBS in landslide-prone areas in Central Asia.

The participants discussed the intricacies of NBS and its compatibility with various types of landslides, emphasizing the importance of choosing appropriate tree species. These nuances revealed the complexity of NBS implementation and the necessity for tailored solutions.

The session '[Connecting Communities and Conserving Nature: Linear Parks of Campinas, Brazil](#)' focused on Brazil's innovative approach to urban parks that serve both social and

ecological goals. The urban planning experts and environmental enthusiasts examined the remarkable urban transformation in Campinas, Brazil. The discussion delved into the city's innovative approach to linear parks, emphasizing their positive economic, environmental, and social implications.

Increased foot traffic in the vicinity of these linear parks was found to invigorate nearby businesses, from cafes to bustling restaurants, ultimately breathing a new life into the local economy. The parks were designed with a twofold objective: first, to promote pedestrian and cycling mobility, thus contributing to a reduction in the use of motorized vehicles in support of environmental sustainability and climate mitigation; and second, to provide green and open spaces for public recreation. Moreover, these linear parks play a crucial role in reducing air pollution by absorbing pollutants and in conserving biodiversity by providing habitats for various species. The parks' vegetation acts as a natural filter, improving air quality and creating a healthier environment for the surrounding communities. By offering a network of green corridors, linear parks facilitate the movement and survival of flora and fauna, enhancing the overall ecological value of the urban landscape.

One of the challenges faced by the city was fragmented green space distribution. This led to the proposal of 900 hectares of linear parks, significantly increasing accessible green area per inhabitant. Furthermore, the upswing in property values adjacent to these parks not only rewarded property owners but also generated additional tax revenue for local governments.

The webinar also explored the environmental advantages of linear parks, particularly their role as NBSs. By managing stormwater, improving habitat connectivity and therefore urban biodiversity, and countering the effects of urban heat islands, linear parks are becoming vital tools in the fight against climate change and environmental degradation. The webinar participants also emphasized the social benefits of these parks, particularly their contribution to public health through recreational spaces and the nurturing of community bonds by

fostering social interactions.

The session '[Diverse by Design: Urban Tree Selection in Melbourne, Australia](#)' examined how the Australian city selects tree species to create an adaptive and resilient urban forest. It underscored Melbourne as a global leader and pioneering city in urban forestry best practices by featuring its successful Urban Forest Strategy and Urban Forestry Diversity Guidelines. The session highlighted several key facets of Melbourne's comprehensive approach toward improving forest planning and management, which have broad applications in urban planning. Specific examples illustrated the importance of balancing heritage conservation with environmental sustainability. In this context, digital heritage tree registries and civic engagement were highlighted as tools for maintaining this delicate equilibrium. The strategy and guidelines are underpinned by universal principles, emphasizing adaptability to climate change, improved well-being, and resilience. These principles offer a versatile framework that is applicable worldwide, particularly in Central Asia.

A central theme throughout the webinar was the holistic view of urban forests as ecosystems encompassing people, soil, and water. Melbourne recognized the urgency of urban forest assessments, as many of its trees were nearing the end of their life cycle, signaling a need for prompt action for urban forest regeneration. A foundational component was diversification, with guidelines restricting the overconcentration of specific tree species as well as specific tree ages, to bolster resistance to pests, diseases, and climate extremes.

Strong governance structures, legislative frameworks, transparent policies, and inter-agency working groups also underpin the success of Melbourne's urban greening endeavors. Community buy-in was recognized as vital, with a focus on education, communication, and public awareness campaigns, in particular, capacity building and knowledge transfer initiatives, such as digital knowledge platforms, online courses, and symposiums.

1. Crafting the Future: A Master Plan for Barcelona's Trees 2017–2037

JANUARY 25, 2023

The urban forest master plan is a roadmap that helps a community work together to keep, protect, grow, nurture, and enhance its trees for the well-being of the environment, people, and economy. The plan addresses important issues such as equity, climate change, and learning opportunities.¹ It aims to leverage the city's trees to reduce air and water pollution, use less energy, and make life better for everyone in the city. The plan calls for financial support from various sources and provides for extensive citizen engagement.

The urban forest master plan provides a vision of how the city and its residents want their existing trees to grow and new trees to be planted. The plan is based on inputs from a wide range of stakeholders—from citizens to businesses—on how land, whether public or private, is managed.

The Master Plan for Barcelona's Trees 2017–2037 outlines a comprehensive strategy for managing and enhancing the urban forests in Barcelona, aiming to achieve a range of environmental, social, and economic benefits through 10 strategic lines, 50 actions, and 150 projects. These initiatives are designed to conserve arboreal heritage, advance knowledge, enhance communication and participation, improve planning and connectivity, ensure preservation and protection, maintain trees' health, manage vegetable material and plantation, optimize pruning and safety, improve soil conditions, and sustainably manage water to support the city's urban green infrastructure.

Its aim is to

- Ensure dynamic, healthy, and diverse urban tree cover in Barcelona;
- Increase the city's tree cover by 5 percent by 2037;

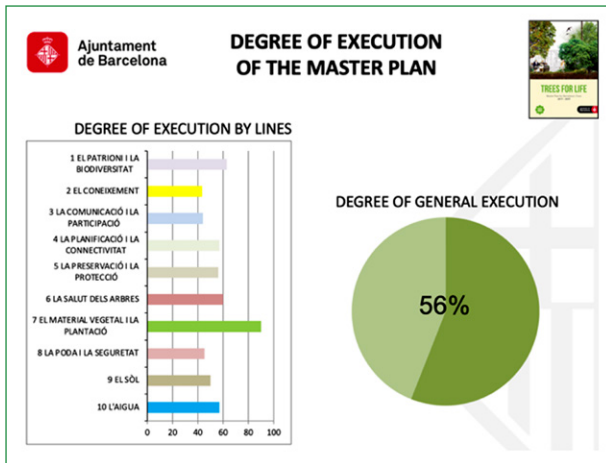
¹ <https://greenblue.com/gb/what-is-an-urban-forest-master-plan/>.



Source: Oriol Bonilla Claramunt, 2023, Master Plan for Barcelona's Trees 2017–2037.

- Maximize environmental, social, and economic benefits from Barcelona's trees, with a tree population that is biodiverse, healthy, and well-distributed throughout the city;
- Promote citizen participation in tree planting and care through community programs and initiatives;
- Leverage trees to mitigate climate change impacts by reducing the urban heat island effect and improving air quality,
- Promote the use of trees for urban agriculture and food production; and
- Create a functional network of trees that helps connect the city's green areas with the forest and river ecosystems surrounding Barcelona, creating a more sustainable and resilient urban environment.

The plan was developed following broad public engagement through consultations, workshops, and surveys. Input from citizens, community groups, and experts in urban forestry and green infrastructure contributed to its effective



Source: Oriol Bonilla Claramunt, 2023, Master Plan for Barcelona's Trees 2017–2037.

implementation and ensured community involvement.

Barcelona's sustainable urban development milestones include adoption of the Irrigation Tons App revolutionizing tree monitoring and management. Strategies for sustainable pest control, specifically for pine processionary, were effectively demonstrated. The city has also released a Biodiversity Atlas that serves as a critical resource for biodiversity conservation.² Updated technical specifications align urban green spaces with modern standards, and a risk plan ensures the safety and preservation of the iconic palm trees. A comprehensive tree species catalog has been created for effective urban planning, and the Green Axis Project aims to transform streets into greener, more comfortable spaces, targeting a tenfold increase in permeable green surfaces.

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

Cities worldwide are adopting urban forest master plans, with initiatives like the Trees in Cities Challenge³ facilitating international knowledge sharing. Global trends in urban forest master plans are critical for Central Asia. Such plans can help mitigate the negative impacts of

climate change in several ways. First, they can provide a comprehensive strategy for managing and enhancing the urban forests in Central Asian cities to achieve a range of environmental, social, and economic benefits. These include improving air and water quality, reducing energy consumption, and enhancing the overall quality of life for residents. Second, they can help reduce desertification and deforestation in the region. Third, they can protect and restore the region's valuable tree and forest resources, including fruit and nut tree species that are globally valued and now confined to small remnant populations. Fourth, they can help coordinate and guide afforestation campaigns, such as Uzbekistan's 'Yashil Makon' initiative,⁴ which aims to plant 1 billion trees and shrubs across the country over the next five years, increasing green spaces in cities from the current 8 percent to 30 percent. Fifth, it can help urban forest managers allocate resources to trees that are more effective at mitigating greenhouse gas emissions, such as large-stature species with dense wood that tend to store the most carbon.⁵

A Tree Management Plan (TMP) is another important tool for managing and enhancing urban forests. It is a document that outlines the systematic planning, planting, protecting, conservation, storm damage mitigation, and/or maintenance of community trees.⁶ It establishes a clear set of priorities and objectives for maintaining and creating a healthy resource for all people to enjoy.

Central Asian cities urgently need to adapt TMPs, focusing on both urban and rural greening, resilience, and forest systems. Persistent challenges for urban forests in Central Asia highlight the importance of developing and implementing effective TMPs in the region.⁷ The Almaty TMP, currently under development with support from the World Bank's RESILAND Program,⁸ stands as a comprehensive blueprint aimed at bolstering the city's environmental

² <https://ajuntament.barcelona.cat/atlesbiodiversitat/en/>

³ <https://treesincities.unece.org/#sthash.hJieXNh6.dpbs>

⁴ <https://sdgs.un.org/partnerships/yashil-makon-green-nation-nationwide-afforestation-program>

⁵ <https://www.fs.usda.gov/ccrc/topics/urban-forests-and-climate-change>

⁶ https://ncforests.service.gov/Urban/urban_management_plans.htm

⁷ <https://unece.org/environment/news/building-urban-und-peri-urban-tree-and-forest-resilience-centra-asia>

⁸ <https://www.worldbank.org/en/topic/environment/brief/climate-and-environment-program-in-central-asia#Pillar%201>

and social benefits, ranging from enhanced air quality to cooler urban temperatures, crucial for fostering a healthier and more pleasant urban atmosphere. At its core, the plan features a strategic roadmap with recommended actions, guidance elements, and performance standards, serving as a guiding framework for specialists in effective tree management for the community's long-term benefits. It is organized into seven clusters, and encompasses political and legal support, governance, financing, assessment, best management practices, pest management, and community involvement. Additionally, a monitoring plan aligned with urban forest sustainability criteria aids in achieving set target indicators.

Central Asian countries face limitations in dedicating resources to develop and implement tree master plans. This may be due to a range of reasons, from competing priorities to budget constraints. Moreover, Central Asia is not particularly abundant in forests, which might lead to less focus on forest management and planning. These factors can pose challenges in initiating and carrying out TMPs for urban areas.

One ongoing challenge for urban forests in Central Asia is the need to bridge the gap between efforts in rural and urban greening, which hinder the establishment of robust tree and forest systems that seamlessly connect urban and rural areas.⁹

The long-term maintenance and monitoring of urban trees can be challenging in Central Asia because developing and maintaining urban forests requires investments into adequate infrastructure, such as irrigation systems and transportation networks, as well as a

technical expertise in urban forestry, landscape architecture, and horticulture management.

Barcelona's Tree Master Plan serves as an instructive model, offering strategic approaches for tackling climate effects and biodiversity loss while enhancing urban resilience.

Barcelona's experience also points to economic benefits, demonstrating that urban green spaces can serve multiple functions—from green infrastructure to tourism—thus generating employment and increasing property values. These urban forestry initiatives offer avenues for sustainable economic growth for Central Asian nations.

Community engagement, a cornerstone of Barcelona's approach, underscores the importance of public involvement in tree planting and care. This model fosters social cohesion and well-being, and its replication in Central Asia could lead to more harmonious local environments.

Barcelona's focus on equity, environmental justice, and long-term planning offers further lessons for Central Asia. The plan encourages inclusive strategies that benefit diverse communities and emphasizes long-term adaptability to changing conditions.

This illustrates the value of global knowledge exchange, offering comprehensive, long-sighted, and adaptable urban planning models that are highly relevant for Central Asia. Critical elements for success include scientific rigor, adaptability, collaboration, and effective communication. By leveraging Barcelona's strategies, Central Asia can pave the way for a more resilient and sustainable urban future.

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⁹ <https://unece.org/environment/news/building-urban-and-peri-urban-tree-and-forest-resilience-centra-asia>.

2. Engaging the Private Sector: A Case of Milan, Italy

FEBRUARY 16, 2022

Private sector engagement is vital in urban tree management, fostering innovative PPPs like those highlighted by the C40 Cities.¹⁰

These partnerships fund tree planting, maintenance, and the development of new tree management technologies. Community involvement ensures that local residents' preferences are considered in urban tree decisions, as evidenced by the Bristol Tree Forum case study.¹¹

Urban forestry management plans may include equity considerations, such as Vancouver's focus on collaborating with underserved communities in tree programs. Encouraging private property owners to contribute to the tree canopy integrates private spaces into urban forest strategies, enhancing the overall green landscape.¹²

Private sector engagement in urban tree management is multifaceted. Community engagement, equity considerations, and encouragement of private property owners are key. This investment leads to environmental benefits like carbon sequestration, air pollution reduction, and stormwater management. It also offers economic and social advantages, such as increased property values, reduced energy costs, improved public health, and enhanced social cohesion.

[Forestami](#) is a project of the City of Milan, the Municipality of Milan, the Regional Council of Lombardy, Parco Nord Milano, Parco Agricolo Sud Milano, Regional Agency for Agricultural and Forestry and Fondazione di Comunità Milano. The project involves **planting 3 million trees by 2030** to clean the air, improve living conditions in the Milan metropolitan area, and counter the effects of climate change. The project is the outcome of research carried out by the Polytechnic



Source: Maria Chiara Pastore, 2023, Forestami: Urban forests for future-proof cities.

University of Milan, with support from Falck Foundation and FS Sistemi Urban. Forestami aims to engage all residents of the Metropolitan City of Milan to mitigate the effects of climate change. Individuals, public entities, associations, and private companies unite in their actions to bring about a positive impact on our future and the future of new generations. Milan's Forestami project emphasizes five core objectives: expanding green spaces, improving air quality, mitigating climate change effects, and fostering public and private collaboration.¹³ Strategies for success include educational initiatives like the Forestami Academy, which amplifies public awareness, and a wide network of partners to ensure financial sustainability.

This project demonstrates a successful blend of collaboration, education, PPPs, and investment.

¹⁰ <https://www.c40.org/news/nature-conservancy-urban-trees/>.

¹¹ https://www.researchgate.net/publication/332782619_Community_engagement_in_urban_tree_management_decisions_the_Bristol_case_study

¹² <https://mrsc.org/stay-informed/mrsc-insight/march-2023/trees-for-equitable-and-livable-cities>.

¹³ <https://forestami.org/en/obiettivo-2030/>.

- Forestami’s collaboration with public entities and private companies creates a cooperative environment that leverages resources, expertise, and knowledge.
- The partnership with the Prada Group to establish the Forestami Academy illustrates how private sector engagement can amplify awareness and education efforts, conveying the importance of urban reforestation to a wider audience.¹⁴
- Forestami’s focus on PPPs emphasizes the key role private entities can play in supporting critical environmental initiatives, contributing financially and driving innovation.
- A wide network of public and private entities engaged to attract investment ensures the long-term sustainability of the project, recognizing that private sector investment is crucial for funding ongoing maintenance and expansion.

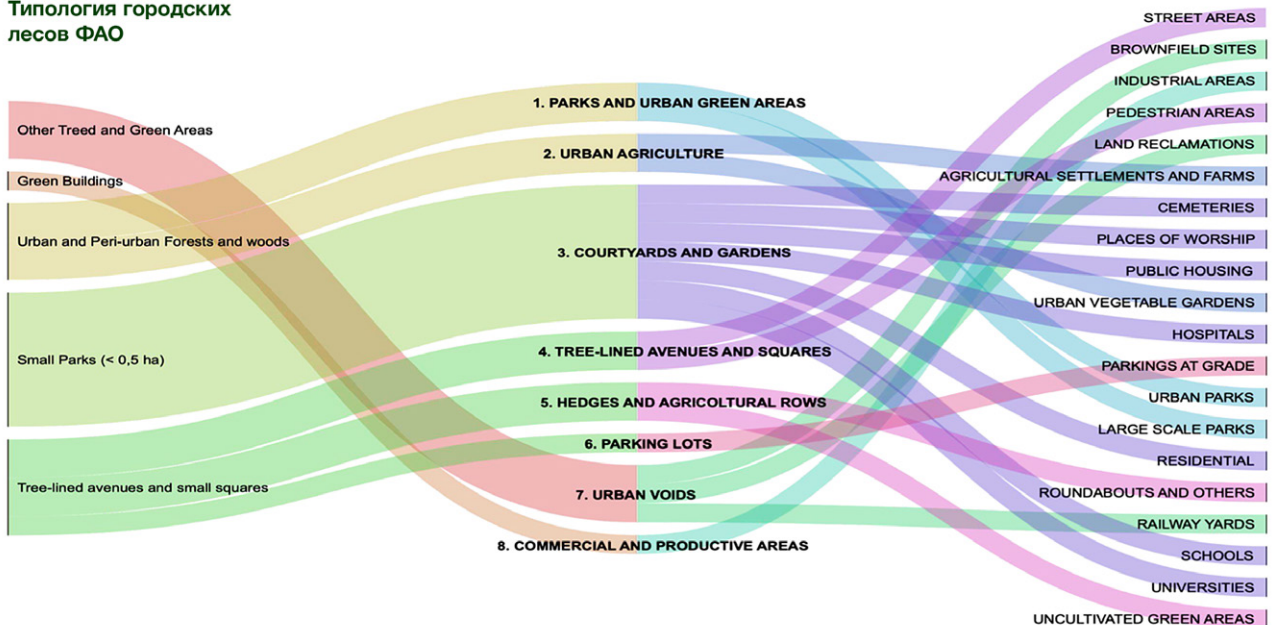
¹⁴ <https://www.pradagroup.com/en/news-media/news-section/23-03-20-prada-group-forestami.html>.



FAO Urban forestry typologies
Типология городских лесов ФАО

Forestami Focus
Фокус Forestami

Areas of interest
Территория интереса



Source: Maria Chiara Pastore, 2023, Forestami: Urban forests for future-proof cities.

Community engagement is integral to Forestami’s approach. Over 64 local municipalities have signed up, and citizen involvement is encouraged through various avenues, from social media

campaigns to educational programs targeted at younger generations. This public participation ensures that community preferences are included in urban tree management decisions. The project



Source: Maria Chiara Pastore, 2023, Forestami: Urban forests for future-proof cities.

has been strategically phased, beginning with priority mapping to identify potential areas for tree planting. It focuses on actively transforming both green and gray urban spaces.

Milan's Forestami project has made notable progress in sustainable urban development and biodiversity conservation. Key achievements include the following:

- Around 300,000 trees were planted as part of a larger goal to plant 3 million trees by 2030.¹⁵
- The project gained support from Fondazione Falck, highlighted at the World Forum of Urban Forests.¹⁶
- Currently, 427,475 trees have been planted, with techniques tailored for urban settings and with biodiversity in mind.¹⁷
- The Forestami Academy was launched, in collaboration with the Prada Group, to educate the public on urban reforestation.¹⁸

By leveraging collaboration, education, and investment, Forestami serves as a model for other cities aiming to combine public and private efforts for urban environmental improvements.

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

The evolution of private sector engagement in urban tree management features increasing

complexity and innovation. Businesses are extending their financial commitments beyond direct funding to include green bonds and corporate social responsibility budgets. PPPs have become more intricate, adding elements like technological innovation and long-term contracts, essential for advancing tree planting techniques and urban forestry management. Technology plays a growing role, with Internet-of-Things devices for tree health monitoring, geographical information systems (GIS) for planning, and data analytics for predictive insights.

Private sector community engagement varies from crowdfunding to corporate volunteer programs, often incorporating environmental, social, and governance (ESG) metrics. Market-based mechanisms like carbon credits and impact investing are also gaining traction. Specialized urban forestry consultancies reflect the sector's growing complexity and the need for expertise.

Forestami serves as a vital case study. Its innovative approaches such as drone planting, GIS-based site selection, and robust PPPs make it an adaptable model for countries facing challenges like forest degradation, climate vulnerability, and weak governance systems. Forestami's emphasis on native species, community engagement, and transparent traceability systems are sustainable practices that can be adopted elsewhere.

Central Asian countries, grappling with forest degradation could particularly benefit from Forestami's approaches. Forestami's initiatives, like community stewardship and transparent systems, offer a dual advantage: they are not only environmentally sustainable but also foster community ownership, increasing the likelihood of long-term success. Nationwide tree planting campaigns are under way in Central Asian countries (Table 1), and Forestami's proven methods of public and private sector mobilization offer a blueprint for success.

¹⁵ <https://alumni.polimi.it/en/2021/07/21/milano-tre-milioni-di-piante-per-abbracciare-la-citta/>

¹⁶ <https://twitter.com/falckrenewables/status/1197558798975733760>

¹⁷ <https://forestami.org/en/>

¹⁸ <https://www.pradagroup.com/en/news-media/news-section/23-03-20-prada-group-forestami.html>

Table 1. Tree planting programs and initiatives in Central Asia

Kazakhstan	
State program to plant trees in forests and cities	Kazakhstan launched a state program to plant 2 billion trees in forests and 15 million trees in cities by 2025. ¹⁹ This ambitious program aims to increase the country's tree cover and contribute to environmental sustainability.
Nationwide campaign to plant trees: 'Taza Tabigat' (Clean Nature)	Kazakhstan has launched a nationwide campaign to plant trees, with the goal of increasing the area of the green belt by 3,000 hectares. ²⁰ This campaign involves planting millions of different tree seedlings and aims to enhance green spaces and promote environmental conservation.
Forest protection and restoration	The World Bank has supported Kazakhstan in protecting its vital forests and promoting reforestation efforts. ²¹ These initiatives focused on combating illegal logging, detecting lightning strikes, and restoring forest ecosystems.
The 'Green Belt' of Astana	The creation of a 'green belt' around the capital of Kazakhstan ²² aims to improve the environmental situation in the city by reducing wind load and air pollution and creating recreational spaces for residents and visitors.
Lake Aral Afforestation Project	The project focuses on reclaiming and restoring the dried banks of the Aral Sea through saxaul planting. ²³ This initiative aims to stabilize the soil, improve air quality, and mitigate environmental challenges, thereby indirectly benefiting urban areas by addressing broader environmental issues.
The Kyrgyz Republic	
World Bank's Urban Greening Initiative	The World Bank has approved financing for projects that include urban greening components. For instance, the Kyrgyz Republic Air Quality Improvement Project includes a pilot green belt specifically designed to reduce air pollution and investments in the urban irrigation system. ²⁴
Tree passports	To combat urban deforestation, Bishkek—the capital city of the Kyrgyz Republic—has implemented a unique initiative of issuing passports to trees. This measure aims to protect the trees from unplanned development and ensure their preservation. ²⁵
Forest restoration National 'Zhashyl Muras: Green Heritage' Initiative	The Kyrgyz Republic, along with other countries in the South Caucasus region and Central Asia, has committed to restoring over 3 million hectares of degraded forests. ²⁶ This initiative aims to rehabilitate and restore forest ecosystems that have been affected by degradation.
Tajikistan	
National Green Country Program	The Government of Tajikistan has adopted an ambitious program that includes planting of 65 million trees and shrubs in 2023–2027. ²⁷
Tree planting initiatives	The Aga Khan Foundation supports tree planting initiatives to promote afforestation and environmental conservation, undertaking afforestation as a risk reduction measure to mitigate natural disasters in Tajikistan. ²⁸
Tajikistan Trees initiative	The project was initiated by the Dasht Foundation and focuses on reforesting Tajikistan by planting fast-growing trees such as poplar, willow, and tree of heaven, which help reduce soil erosion and offer additional benefits including carbon storage, wind protection, flood risk reduction, air quality improvement, increased biodiversity, and sustainable timber production. ²⁹

¹⁹ <https://www.gov.kz/memleket/entities/forest/press/article/details/96650?lang=ru>.

²⁰ <https://astanatimes.com/2021/03/kazakhstan-launches-nationwide-campaign-to-plant-trees/>.

²¹ <https://www.worldbank.org/en/results/2014/10/17/protecting-kazakhstans-vital-forests>.

²² <https://www.gov.kz/memleket/entities/ecogeo/documents/details/487827?lang=ru>.

²³ <https://kazaral.org/start-of-transplantation-of-saxaul-seedlings-on-the-dried-seabed-of-the-aral-sea/>.

²⁴ <https://www.worldbank.org/en/news/press-release/2023/11/29/world-bank-supports-air-quality-improvement-in-the-kyrgyz-republic>.

²⁵ <https://eurasianet.org/to-fight-urban-deforestation-kyrgyzstan-issues-passports-to-trees>.

²⁶ <https://unece.org/forestry/news/turning-commitments-reality-restoring-forests-kyrgyzstan-support-national-zhashyl>.

²⁷ https://online.zakon.kz/document/?doc_id=32773137&pos=3:-70#pos=3:-70.

²⁸ <https://the.akdn/en/resources-media/whats-new/spotlights/planting-trees-reduce-disasters-tajikistan>.

²⁹ <https://tajikistantrees.org>.

‘900 Days of Improvement’ Dushanbe Initiative	The initiative focuses on enhancing the city’s ecology through tree planting efforts, which involve planting over 190,000 trees and 10 million flowering plants. 2024 has been declared as the Year of Environmental Education in Dushanbe, aiming to raise awareness, promote cleanliness, protect ecological values, and ensure environmental safety. ³⁰
Turkmenistan	
The National Forestry Program of Turkmenistan for 2021–2025 ³¹	In 2023–2024, Turkmenistan has undertaken significant urban forestry initiatives as part of its environmental and urban development strategy. The focus in 2024 is on planting 3 million trees nationwide, with particular emphasis on enhancing greenery within urban areas. National tree planting events occur twice a year, during spring and autumn. In 2024, the spring planting event took place on March 16.
Uzbekistan	
‘Yashil Makon’ (Green Nation) Initiative	The initiative aims to increase the country’s green areas from 8% to 30%. It focuses on enhancing tree management systems, including research, expanding nurseries, and establishing ‘green public parks,’ while emphasizing a digital ‘Register of Trees’ for effective management. ³²
Master Landscaping Plan for Tashkent	A master landscaping plan for Tashkent for 2023–2027 has been adopted. It includes a planting plan listing various types of trees and shrubs. ³³
Greening and Restoring the Ecosystem of the Aral Sea Region	The Multi-Partner Trust Fund for the Aral Sea region attracts donor funds. The initiative includes the ‘My Garden in the Aral Sea’ project, launched by the International Innovation Center of the Aral Sea region under the President of Uzbekistan, which established a crowdfunding platform to raise funds for tree planting. ³⁴
Yashil Zamin Project	The Yashil Zamin project aims to support sustained greening efforts in Uzbekistan by digitally monitoring planted trees and providing gardening and landscaping extension services. The project focuses on addressing major environmental issues such as deforestation and wind and water erosion, which result in biodiversity loss, and aims to protect the surrounding land, combat desertification, and prevent erosion. ³⁵

Lastly, the climate change mitigation aspects of Forestami are particularly relevant. Trees serve as natural carbon sinks and provide shade, reducing the urban heat island effect. Both the benefits are increasingly crucial for Central Asian cities, which are grappling with climate-related challenges.

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³⁰ <https://khovar.tj/rus/2024/02/2024-god-v-dushanbe-obyavlen-godom-ekologicheskogo-prosveshheniya/>
³¹ <https://turkmenistan.gov.tm/en/post/70633/nationwide-tree-planting-campaign-will-be-held-turkmenistan>
³² <https://lex.uz/docs/6673810>
³³ <https://www.gazeta.uz/ru/2022/09/19/greening-master-plan/>
³⁴ <https://iic-aralsea.uz/my-garden-in-the-aral-sea/>
³⁵ <https://zaminfoundation.ngo/en/project-info/3eb55c2c-ecb3-44eb-a8e9-a8f4ef27b597>

3. Korea's Green Corridors: A Scientific Approach to Greening Cities

MARCH 16, 2023

In Korea, urban forests are implemented and managed for public health, recreation, and physical and mental well-being. Urban forests play a crucial role in environmental health, reducing temperatures, noise, and air pollution, and contributing to overall well-being.

Since 2008, Korea has been a leader in urban greening, implementing the Basic Plan for the Urban Forest. This includes a variety of projects like rooftop gardens, school forests, and urban regeneration. Two standout initiatives in Seoul are the Sejongdaero Green Corridor³⁶ and the Cheonggyecheon River Corridor.³⁷

The former is an elevated pedestrian park linking historic and commercial areas in Seoul, whereas the latter transformed a freeway into a greenway with 22 bridges, improving air quality and fostering sustainability.

Wind Ventilation Forests offer an innovative approach to urban greening by harnessing the cooling properties of cold air to create a ventilation network in cities.³⁸ These forests are primarily aimed at improving air quality,³⁹ reducing urban heat island effect,⁴⁰ and enhancing the living conditions for residents, by facilitating the flow of clean, cold air through a linear green corridor.⁴¹ Seoul and Busan have been early adopters, and this concept is now expanding to 17 additional Korean cities.

Implementing wind corridor forests in urban settings presents several hurdles. Key challenges include constrained urban space, which limits



Source: Dr. Hong-Duck Sou, Korea Forest Service, National Institute of Forest Science, 2023, Green Corridors and Urban Forests to Enhance Livability: Korea Case Study.

potential locations and scale; high costs for land, construction, and upkeep; and the need for consistent maintenance, like pruning and pest control. Additionally, effective implementation demands a coordinated effort among varied stakeholders—government agencies, private landowners, and community groups. Often these entities have differing agendas, which complicates the planning process. Finally, public support is crucial; therefore, education and engagement are essential for the long-term viability of these eco-projects.⁴² Addressing these challenges will be essential to ensure the success of these projects and to create more sustainable and livable urban areas.

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

Global trends in urban planning increasingly

³⁶ <https://m-j-z.com/project/seoulgreencorridor>.

³⁷ <https://knowledge-hub.circle-lab.com/gonewiththewaste/article/8463>.

³⁸ <https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0288774>.

³⁹ <https://journals.plos.org/plosone/article/file?id=10.1371%2Fjournal.pone.0288774&type=printable>.

⁴⁰ <https://www.sciencedirect.com/science/article/abs/pii/S0198971516300138>.

⁴¹ https://mdpi-res.com/d_attachment/land/land-10-00607/article_deploy/land-10-00607.pdf?version=1623057674.

⁴² <https://cities-today.com/seoul-to-create-wind-path-forests-to-direct-clean-air-into-the-city/>.

emphasize the role of NBSs such as wind corridor forests and green corridors, in addressing complex challenges such as climate change, air pollution, and urban heat islands. Both wind corridor forests and green corridors share common objectives but offer unique benefits that are shaping urban landscapes worldwide.

Meticulous planning strategies for wind corridor forests are becoming more prevalent. These strategies focus on the properties of cold air and involve classifying different types of urban greenery to identify the most suitable locations for wind corridors. The goal is to harness the cooling effects of these forests to mitigate the urban heat island effect. Additionally, wind corridor forests contribute to air pollution mitigation by circulating clean air and absorbing particulate matter.⁴³

In the case of green corridors, the emphasis is on urban connectivity.⁴⁴ These corridors establish linear green pathways connecting different parts of cities. They enhance accessibility and provide pedestrian-friendly routes. Beyond improving mobility, green corridors offer substantial environmental benefits, including the enhancement of biodiversity and the provision of wildlife habitats. They contribute to the conservation and restoration of natural ecosystems within urban areas. Additionally, green corridors are increasingly designed with recreational opportunities in mind, offering spaces for walking, jogging, cycling, and other outdoor activities, thus fostering a healthier, more active lifestyle among residents.⁴⁵

Korea serves as a compelling model for Central Asia in implementing these green infrastructures. The country's strategic, data-driven planning is rooted in extensive research on ecological parameters like airflow and temperature, ensuring effective use of limited resources. Korea's inclusive approach involves various stakeholders—government bodies,

private landowners, and local communities—in planning and implementation, enhancing of public awareness, and project sustainability. Through financial strategies such as PPPs and grants, Korea has made these projects economically viable, offering critical financial planning insights for Central Asia.

The Korean model is adaptable and scalable, addressing challenges likely to be encountered in Central Asia, such as limited urban space and the need for stakeholder coordination. Moreover, both regions share environmental challenges like air pollution and urban heat islands, making Korea's solutions especially relevant. Korea's robust monitoring and evaluation mechanisms could serve as a blueprint for Central Asian countries. Effective monitoring not only measures success but also allows for course corrections, making the projects more effective over time.

The green corridor forests in Central Asia could function as linear stretches of forested areas that connect various green spaces, enhancing environmental connectivity and biodiversity. These forests could incorporate forest types specific to the region, such as montane coniferous forests and tugai forests.⁴⁶ Green corridor forests provide enhanced amenities and recreational opportunities such as walking, running, cycling, and other sports; improved air quality; and climate regulation.⁴⁷

There is limited information available on the current state of the green and wind corridor forests in Central Asia. Existing studies suggest presence of windbreaks and shelterbelts in the area, indicating that wind corridor forests could be feasible.⁴⁸ The region's geography, with its open expanses and natural wind corridors, may be conducive to projects that use cold air to improve air quality.

'The Greenway to Konaev' stands as a pioneering initiative, forming a pilot project within the

⁴³ <https://journals.plos.org/plosone/article?id=10.1371%2Fjournal.pone.0288774>.

⁴⁴ <https://cities-today.com/seoul-to-create-wind-path-forests-to-direct-clean-air-into-the-city/>.

⁴⁵ <https://www.mdpi.com/2073-445X/10/6/607>.

⁴⁶ https://www.iucn.org/sites/default/files/import/downloads/central_asia.pdf.

⁴⁷ <https://naturalwalkingcities.com/green-corridors-essential-urban-walking-and-natural-infrastructure/>.

⁴⁸ <https://unece.org/DAM/timber/publications/sp-47-soccaf-en.pdf>.
<https://www.adb.org/sites/default/files/publication/27508/central-asia-atlas.pdf>.

broader endeavor to establish an Urban Green Corridor in the Almaty Agglomeration.

This initiative was developed with support of the World Bank's RESILAND CA+ Regional Program. The initiative aims to develop an action plan targeted to integrate environmental connectivity, recreational pathways, and protective plantations along the Almaty-Konaev highway, aligning with broader aspirations for an environmentally sustainable and socially enriching urban landscape in the Almaty Agglomeration.⁴⁹

The Greenway to Konaev Action Plan aims to

- Revitalize protective landscaping to enhance air quality, mitigate the heat island effect, and promote regional carbon neutrality;

- Establish an inviting recreational route to Kapchagai Reservoir, offering scenic vistas accessible by motor vehicle or bicycle; and
- Create an ecological corridor between the Kaskelen River and Konaev's forested area, bolstering urban forest vitality and safeguarding local biodiversity.

This initiative adheres to sustainable design principles, incorporating local drought-resistant species, multitier planting for noise reduction and wind protection, varied vegetation for aesthetics, and terrain modifications for water conservation. The Almaty Oblast Akimat selected this project as the inaugural endeavor to revive protective plantings along the highway.

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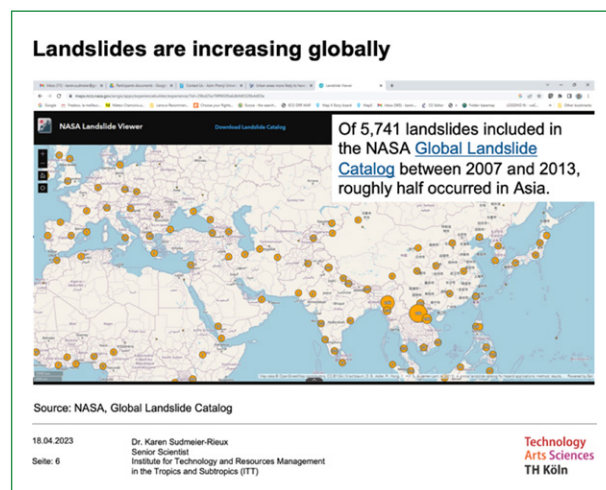
⁴⁹ <https://crs.dku.kz/en/osnovnye-napravleniya/programma-po-zemlepolzovaniyu/razrabotka-plana-upravleniya-zelenymi-nasazhdeniyami/>.

4. Mountains and Trees: Nature-Based Solutions for Landslide Risk Management

APRIL 20, 2023

Trees are increasingly recognized as effective, cost-efficient, and environmentally friendly way to mitigate landslide risks by stabilizing slopes with root networks, and managing excess water.⁵⁰ Gaining momentum globally, particularly in Asia, trees as NBSs are supported by high-level policy frameworks such as the Sendai Framework for Disaster Risk Reduction, which acknowledge the potential of NBS and encourage their adoption across various regions.⁵¹ NBSs are defined as adaptive interventions that manage or restore natural systems for multiple sustainable development goals, including climate and disaster-risk resilience. They are cost-effective and environmentally friendly alternatives to traditional infrastructure solutions.⁵² The growing endorsement of NBSs is accompanied by efforts to enhance awareness and disseminate knowledge about NBSs, especially their role in addressing shallow landslides through the strategic use of protection forests.⁵³ All these trends underline a broadening recognition and application of NBS as viable tools for landslide risk mitigation.

Landslides have severe social and economic consequences. The immediate impact includes loss of life and injury to people, infrastructure, and livestock, which is particularly devastating for rural communities relying on livestock for sustenance and income. Extensive damage to infrastructure, agricultural lands, and residential housing creates both immediate hardship



Source: Dr. Karen Sudmeier-Rieux, 2023, Nature-based Solutions for landslide management in Urban areas.

and long-term challenges. Landslides often lead to the evacuation and displacement of entire communities, resulting in overcrowding in temporary shelters, hindered access to essential services, and long-lasting mental health impacts.⁵⁴

Economically, the destruction caused by landslides results in significant income loss, especially for communities that are heavily reliant on natural resources.⁵⁵ The costs associated with disaster response and reconstruction can be financially draining, while the risk of landslides can deter investment and development, contributing to long-term economic instability and ongoing poverty.⁵⁶

The effectiveness of NBS for landslide risk reduction depends on local conditions, requiring site-

⁵⁰ https://www.researchgate.net/publication/335935916_NATURE-BASED_SOLUTIONS_-_Landslide_safety_measures.

⁵¹ <https://www.naturebasedsolutionsinitiative.org/publications/nature-based-solutions-nbs-for-reducing-the-risk-of-shallow-landslides-where-do-we-stand-2/>.

⁵² <https://www.gfdrr.org/en/nbs>.

⁵³ <https://www.sciencedirect.com/science/article/abs/pii/S221242091930442X>.

⁵⁴ <https://www.gfdrr.org/en/program/SFRARR-Central-Asia>.

⁵⁵ <https://geoenvironmental-disasters.springeropen.com/articles/10.1186/s40677-018-0104-6>.

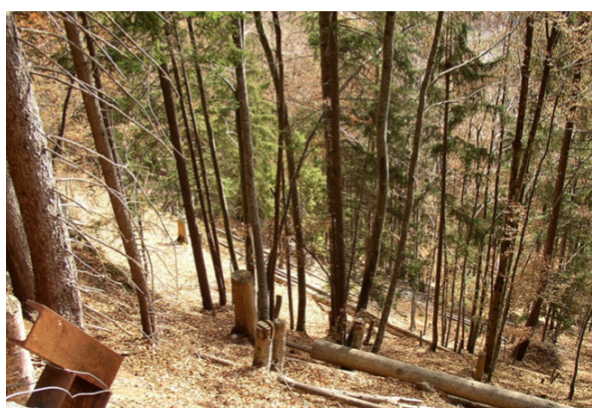
⁵⁶ <https://www.gfdrr.org/en/program/SFRARR-Central-Asia>.

specific assessments and expert consultations. NBSs offer multiple co-benefits, including soil stabilization through vegetation, afforestation, and soil bioengineering; slope angle reduction via terracing; strategic planting of protection forests; and the use of riparian buffers. These solutions can be integrated with structural measures and early warning systems as part of a comprehensive landslide risk management strategy. Water management is crucial for comprehensive landslide risk strategies and can be integrated with NBS. Poor water management exacerbates risks, while effective planning mitigates impacts. Slope strengthening, drainage management, sediment-capturing rocks, and constructed drainage systems contribute to landslide prevention. An ecosystem service-based approach assesses soil stability, vegetation cover, and water regulation as key services mitigating risks, making ecosystem maintenance vital for landslide mitigation.

Organizations like the World Bank are bolstering the implementation of NBSs for boosting climate resilience and disaster risk management. The World Bank, along with the Global Facility for Disaster Reduction and Recovery (GFDRR), is scaling up the integration of NBSs to help countries build resilience against climate challenges, including landslides.⁵⁷ As NBS projects grow in number, the lessons learned are helping to mainstream NBS into development decision-making, thereby enhancing their effectiveness in reducing landslide risks.⁵⁸

Overall, the focus is on combining ecosystem service indicators with NBS to create a holistic, cost-effective approach to landslide risk management.⁵⁹ By using natural systems to provide critical services such as wetlands for flood mitigation or mangroves for coastal protection, NBS can reduce the reliance on traditional ‘gray’ or ‘hard’ infrastructure solutions.

Ecosystem services and hazards		
Hazards: Extensive Intensive	Natural Infrastructure	Ecosystem Services & co-benefits
<ul style="list-style-type: none"> • Drought • Flooding • Wind storms • Coastal storms • Landslides • Sea-level rise (Modified from IUCN-ORMA)	<ul style="list-style-type: none"> • Lakes & upland soils • Floodplains • Wetlands, coral reefs • Groundwater • Vegetation on steep slopes • Mangroves • Sand dunes 	<ul style="list-style-type: none"> • Flood control • Coastal defence • Slope stabilization • Avalanche stabilization • Co-benefits • Clean water, air, food • Biodiversity and much more



Source: Dr. Karen Sudmeier-Rieux, 2023, Nature-based Solutions for landslide management in urban areas.

⁵⁷ <https://www.gfdr.org/en/publication/nature-based-solutions-climate-resilience-world-bank-portfolio>.

⁵⁸ <https://documents1.worldbank.org/curated/en/253401551126252092/pdf/Booklet.pdf>.

⁵⁹ <https://www.worldbank.org/en/topic/disasterriskmanagement/brief/nature-based-solutions-cost-effective-approach-for-disaster-risk-and-water-resource-management>

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

Central Asia, specifically in the Tien Shan and Pamir-Alai mountain ranges, has experienced a greater frequency of landslides in the past two decades.⁶⁰ The Kyrgyz Republic and Tajikistan are particularly vulnerable to landslides that are often caused by stormwater runoff and earthquakes. The portion of the population exposed to landslides exceeds 10 percent in Tajikistan and 20 percent in the Kyrgyz Republic. The total expected losses in Central Asia amount to approximately US\$3.59 billion, with an average risk value of US\$0.6 million per km².⁶¹ International experience on NBS for landslide risk management is invaluable for these countries, as they grapple with a series of complex and interconnected challenges. NBSs are crucial, not just for their efficacy in soil reinforcement and erosion prevention but also for their multifaceted benefits—such as improved water management, biodiversity enhancement, and alignment with climate change adaptation strategies. In urban areas, NBS can particularly benefit vulnerable communities by mitigating the socioeconomic impacts of landslides.

Landslides have far-reaching social and economic impacts, from the loss of life and community displacement to infrastructure damage and significant financial burden. In July 2021, a landslide in the Sughd region of Tajikistan resulted in the death of at least nine people, injuring many more, and causing extensive damage to residential buildings and community infrastructure. This event led to economic setbacks for the affected communities.⁶² Similarly, in 2017, a landslide in the Kyrgyz Republic's Osh region had a tragic effect, killing at least 24 people and displacing over a thousand. The destruction of homes and other critical infrastructure led to economic hardships for the community.⁶³ Another landslide in Tajikistan's Pamir Mountains in May 2015 led to

the loss of at least six lives and inflicted significant damage on community infrastructure, particularly affecting the agricultural sector.⁶⁴

Central Asia has a unique combination of complex factors interacting with each other that can lead to landslides.

- Rainfall is a dominant factor in triggering landslides. Heavy or prolonged rainfall can cause the soil to become saturated, leading to increased pore water pressure that reduces soil cohesion and stability.⁶⁵
- The region is also seismically active, with earthquakes that have the potential to induce landslides by shaking loose soil and rocks. Earthquakes can cause both immediate and delayed landslides by weakening the structural integrity of slopes and contributing to soil saturation, adding another layer of risk.⁶⁶ Geological factors such as a diverse array of soil types and rock formations are particularly relevant. This variability means that some areas might be more susceptible to landslides due to inherent weaknesses in geological materials. The proximity to geological fault lines adds another dimension of risk. Faults can create zones of fractured or weakened rock and soil, making the adjacent slopes more prone to landslides. The stress and strain around fault lines can also contribute to soil and rock displacement, further increasing susceptibility to landslides.⁶⁷
- Slope characteristics, including the angle, aspect, and overall shape, are also pivotal in determining the risk of landslide. Steeper slopes are more susceptible to failure as the gravitational forces acting on the slope material are higher. The shape of the slope can either channel water, exacerbating risks, or help distribute it more evenly. Higher elevations, such as those found in the Tien Shan and Pamir-Alai mountain ranges,

⁶⁰ <https://blogs.agu.org/landslideblog/2023/06/23/a-new-landslide-susceptibility-map-for-central-asia/>,

⁶¹ <https://nhess.copernicus.org/articles/23/2229/2023/nhess-23-2229-2023.pdf>.

⁶² <https://www.gfdrr.org/en/program/SFRARR-Central-Asia>.

⁶³ <https://nhess.copernicus.org/articles/23/2229/2023/>.

⁶⁴ <https://www.adb.org/sites/default/files/linked-documents/53022-001-sd-02.pdf>.

⁶⁵ <https://link.springer.com/article/10.1007/s12665-021-09910-1>.

⁶⁶ <https://nhess.copernicus.org/articles/23/2229/2023/>.

⁶⁷ https://www.researchgate.net/publication/281662685_The_contribution_of_EMCA_to_landslide_susceptibility_mapping_in_Central_Asia

present additional challenges. These areas are characterized by steep terrains filled with loose or weathered materials, making them hotspots for landslide activity. The elevation also means that these areas may be subject to rapidly melting snow or glacier melt, which can trigger landslides.⁶⁸

Central Asia can greatly benefit from leveraging global expertise and best practices in NBSs for landslide management. Successful examples of NBS, such as reforestation and soil stabilization, offer cost-effective and adaptable methods that save time and resources. In contrast to traditional engineering solutions with high maintenance costs, NBSs provide more resilient and self-sustaining options, which are particularly advantageous for resource-constrained regions.

International collaboration can strengthen local institutions and build capacity in Central Asia, where weak institutional capacity is a challenge. This collaboration enables better planning, execution, and monitoring of landslide risk management programs. Moreover, the endorsement of NBSs in international frameworks,

such as the Sendai Framework, gives Central Asian countries leverage to secure domestic and international funding for climate and disaster risk reduction.

Partnerships with international organizations can bring both financial resources and technical expertise needed for effective NBS implementation. International organizations are more inclined to support projects aligned with best practices. Furthermore, collaboration with these organizations enhances data collection and monitoring capabilities, which is essential for accurate risk assessment and evaluation of interventions, thus filling a critical gap.

Many of the region's environmental challenges, including landslides, are transboundary in nature. Therefore, an internationally informed, regional approach can be more effective than isolated national efforts, contributing to overall regional stability. By adopting international best practices, Central Asia stands to gain not only in effective landslide risk management but also in long-term sustainability, institutional capacity, and regional stability.

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⁶⁸ <https://www.mdpi.com/2076-3417/11/9/3768>.

5. Connecting Communities and Conserving Nature: Linear Parks of Campinas, Brazil

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A linear park is a type of park that is significantly longer than it is wide. Linear parks are strips of public land running along canals, rivers, streams, defensive walls, electrical lines, highways, shorelines, or disused railway lines. They can be categorized as greenways or foreshoreways and their changing scenery makes recreational activities like walking, jogging, and cycling adventurous and contributes to enhanced emotional connections of visitors with nature.⁶⁹

The elongated shape of linear parks makes them accessible across diverse neighborhoods, democratizing green space especially in traditionally underserved areas.⁷⁰ Linear parks are cultural corridors that connect landmarks and boost local businesses, acting as vibrant veins that invigorate the communities that they traverse. They bridge neighborhoods, fostering social vitality and shared stewardship of the urban landscape.

Environmentally, linear parks are instrumental in combating urban challenges. They mitigate floods, absorb rainwater, and filter pollutants—acting as green sponges against the concrete backdrop. They improve neighborhood ambiance and well-being acting as buffers against noise and air pollution and increase property values.⁷¹

The linear parks in Campinas, Brazil, are more than just parks; they are part of a grand vision. They stand as a robust model for effectively integrating NBS in urban settings. Addressing pressing urban issues such as biodiversity loss, rainwater management, and heat stress, these parks are meticulously designed to be resilient against environmental challenges.

They are developed in collaboration with multiple stakeholders, including academic institutions and government bodies, and also serve as social hubs that enhance community life and engagement. With a municipal plan to roll out 49 such parks in the city, the initiative offers a comprehensive, scalable approach for environmental and social well-being, funded through both public and private avenues.

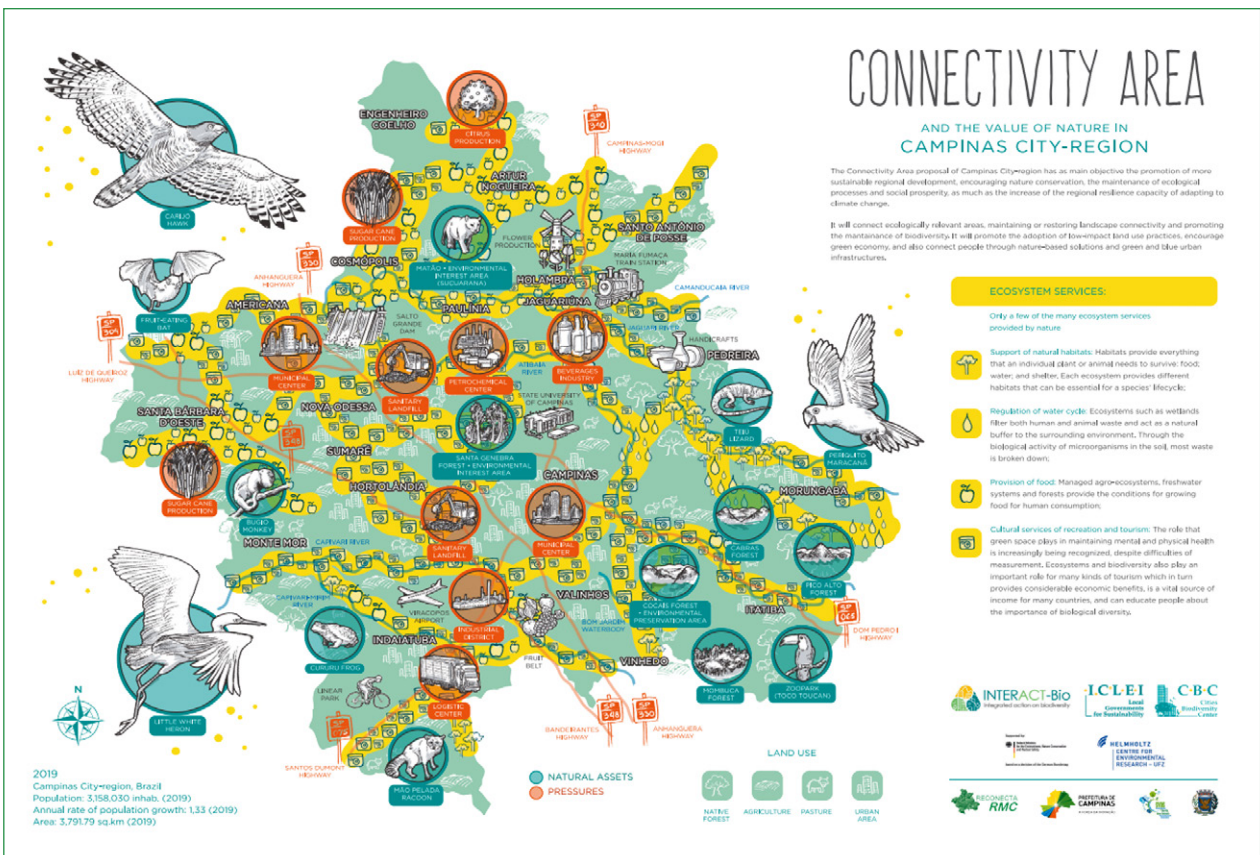
These parks are not just green spaces; they are threads that weave the social fabric of communities more tightly together and are educational and social hubs that foster environmental stewardship and enhance community bonds, and landmarks that instill civic pride.⁷² Campinas' linear parks show that well-designed green spaces are multidimensional assets that contribute to social cohesion, achieved through community consultation, discussions, and visits of political representatives.

⁶⁹ <https://houstoun.wordpress.com/public-spaces/chapter-5urban-linear-parks-from-urban-land-magazine/>.

⁷⁰ <https://productiveparks.com/linear-parks-their-importance-and-maintenance-considerations>.

⁷¹ <https://www.sciencedirect.com/science/article/abs/pii/S0169204618310570>.

⁷² <https://www.connective-cities.net/en/news/linear-parks-in-campinas-brazil>.



Source: Gabriel Dias Mangolini Neves, 2023, Campinas experience in environmental planning and local territorial transformation through NBSs - linear parks program as a means to reduce the deficit of green areas with social function.

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

Global trends in linear parks indicate a growing shift toward multifunctional public spaces that offer a variety of benefits. Economically, they can attract more foot traffic, benefiting local businesses like cafes, restaurants, and shops.⁷³ This increased activity can lead to rising

property values, generating more tax revenue and potentially attracting more investment to the area.⁷⁴ Linear parks also create jobs in maintenance, landscaping, and hospitality, further contributing to economic vitality.

Cities with limited space are finding creative ways to integrate linear parks into existing infrastructure, such as disused rail lines or

⁷³ <https://www.sciencedirect.com/science/article/abs/pii/S0169204618310570>.

⁷⁴ <https://www.sciencedirect.com/science/article/pii/S0169204618310570>.

riversides, and into broader urban planning and sustainability strategies, signifying recognized value of the linear parks at the policy level.

The Campinas Linear Parks in Brazil offer a compelling model for Central Asia for several reasons. First, they are designed to enhance climate resilience through effective rainwater management and ecosystem integration, which aligns with the climate-induced water management challenges faced by several Central Asian countries, such as Kazakhstan and Uzbekistan. Second, the Campinas parks emphasize community engagement in their development, aligning well with the focus on capacity building and stakeholder engagement in Central Asia. These parks serve multiple purposes, from offering recreational spaces to acting as flood mitigation zones, providing a versatile approach for urban planners negotiating the delicate balance between development and environmental sustainability.

Moreover, these parks have led to economic progress, benefitted local businesses and increased property values, making a compelling

case for private sector engagement in climate change policy — a crucial aspect for national economies. The adaptability of the Campinas model to address specific local challenges like heavy rain and heat suggests that it can be tailored to meet the unique environmental conditions of Central Asian countries. The scalability of the Campinas approach, demonstrated through a network of 49 parks, offers valuable insights for expansive territories like those in Kazakhstan and Turkmenistan. Additionally, the focus on using local materials and native vegetation can be emulated to encourage biodiversity and boost local industries.

In Central Asia, linear parks can provide not only environmental but also significant social benefits. They can become hubs for community life and social integration, aspects that are crucial for countries aiming for greater civil society engagement and social cohesion. Overall, the multifaceted success of the Campinas Linear Parks provides a holistic and adaptable framework that could be incredibly relevant to the socioeconomic and environmental landscape in Central Asia.

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6. Diverse by Design: Urban Tree Selection in Melbourne, Australia

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Selecting the right trees for urban areas is crucial for climate adaptation, public health, social cohesion, and economic development. Some trees are better suited for extreme weather, while others excel at air pollution reduction. Well-chosen trees also offer shaded spaces that enhance community interaction. Economically, mature trees raise property values and tax revenue. They also support local biodiversity and offer benefits like energy conservation and stormwater management. Some tree species are particularly effective at carbon sequestration and further provide climate mitigation benefits. Moreover, trees can hold cultural or historical significance, contributing to a city's unique identity and well-being.

The urban forest strategy for Melbourne, Australia, is an excellent model that promotes diversity, reduces vulnerability to pests and diseases, and enhances ecological resilience. The strategy sets targets to limit the prevalence of any single species, genus, or family and employs urban forest diversity guidelines for selecting tree species. It is adaptive, using technologies like the Internet of Things sensors and satellite imaging for real-time data gathering and proactive management.⁷⁵

Balancing heritage and sustainability is essential when older, traditional tree species may not be as resilient against current environmental pressures. Collaboration between heritage commissions and environmental agencies can yield comprehensive guidelines that satisfy both concerns.

A robust governance framework, engaging multiple stakeholders and aligning with international standards like the Sustainable Development Goals



Source: Dr. Ian Shears, 2023, Melbourne's Experience in Species Selection and Guidelines for Choosing and Placing Trees.

(SDGs), is crucial for the strategy's effectiveness. Community engagement through transparency, educational events, citizen-led initiatives, and interactive apps is also vital.

Data-driven tools can help visualize the impact of green spaces on existing urban structures, and collaboration with the private sector can integrate green spaces into current and future buildings. Machine learning and predictive analytics guide planning, and collaboration across sectors enriches data-driven models. Capacity building

⁷⁵ [https://www.melbourne.vic.gov.au/about-council/committees-meetings/meeting-archive/meetingagendaitemattachments/579/9971/5.1%20Urban%20forest%20strategy%20\(pages%2072%20to%20253\).pdf](https://www.melbourne.vic.gov.au/about-council/committees-meetings/meeting-archive/meetingagendaitemattachments/579/9971/5.1%20Urban%20forest%20strategy%20(pages%2072%20to%20253).pdf).

and knowledge transfer through a centralized digital repository, specialized courses, periodic gatherings, and online forums can facilitate global sharing of best practices and experiences.

Melbourne's experience in urban tree species selection offers valuable lessons for other cities, including those in Central Asia, which are grappling with the complexities of urban greening. By balancing science, community involvement, and a focus on long-term sustainability, Melbourne has created a robust framework that adapts to changing circumstances, serving as a guidepost for effective ways to build resilient and healthy urban ecosystems.

GLOBAL TRENDS AND INSIGHTS FOR CENTRAL ASIA

Global trends in tree species selection have evolved to reflect various considerations, including local site conditions, tree function, climate change projections, and horticultural priorities. These factors help ensure that the right species are chosen for the right environments. For example, trees in warm climates are more likely to experience strong biotic interactions, affecting their traits and competitive abilities, while single-tree selection practices can lead to a decline in tree species' diversity.⁷⁶

A study involving 1.3 million sample plots and 55 million trees underscored the importance of landforms, soil, and human impact in species richness.⁷⁷ Trees are selected for their functional roles, such as providing shade or attracting wildlife, and their horticultural traits such as stress tolerance and growth habits. Climate change adds further complexity to species selection with projections informing choices for reforestation and future habitat suitability.⁷⁸

Open-source information on tree species selection in Central Asia is limited. 'The Red List of Trees of Central Asia' serves as a foundational document for understanding which species are at risk and need prioritized conservation efforts.⁷⁹

In Central Asia, where climatic zones and altitudes vary widely, adaptable species like the Saxaul tree (*Haloxylon spp.*) are used for soil conservation and desertification control. However, the region faces challenges due to a lack of comprehensive ecological studies and limited availability of native seeds and saplings. Land tenure issues and the tension between agricultural expansion and reforestation also pose socioeconomic challenges.

Incorporating climate projections into reforestation planning is essential, as changing conditions may affect the resilience of tree species.⁸⁰ Although global models offer some insights, localized climate models are crucial for identifying how conditions might change within the region's varied landscapes. These models can help in pinpointing which tree species are likely to be more resilient against increased temperatures, erratic precipitation patterns, and potential pests and diseases associated with climate change.

Central Asian countries, not traditionally forest-rich,⁸¹ may prioritize other environmental issues. However, the importance of forests for biodiversity and carbon sequestration and in acting as buffers against climate change is likely to bring more focus on this area.

The experience of Melbourne, with its successful selection of tree species in the face of environmental challenges like soil contaminants and harsh weather, offers valuable insights for Central Asia. The strategies include setting localized strategic targets, researching and climate projections, developing native seed and sapling supply chains, resolving land tenure issues, selecting species for their ecological benefits, promoting biodiversity, engaging stakeholders, raising public awareness, and seeking international collaboration. Integrating reforestation with broader land use and climate adaptation plans can create a synergistic approach for Central Asia's environmental efforts.

⁷⁶ <https://academic.oup.com/forestry/article/80/3/293/542433>.

⁷⁷ <https://www.nature.com/articles/s41559-022-01831-x>.

⁷⁸ <https://forestadaptation.org/sites/default/files/Baltimore-Tree%20Habitat%20Suitability-NIACS%20Climate%20Change%20Response%20Framework.pdf>.

⁷⁹ <https://portals.iucn.org/library/sites/library/files/documents/RL-2009-006.pdf>.

⁸⁰ <https://www.sciencedirect.com/science/article/abs/pii/S0378112720314742>.

⁸¹ <https://portals.iucn.org/library/sites/library/files/documents/RL-2009-006.pdf>.

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A Way Forward

The international experiences and best practices on urban greening and forestry presented in the knowledge-sharing series ‘Trees, Cities and a Green Future’ showcase a potential blueprint for Central Asia’s journey toward greener, more sustainable, and resilient cities. They offer invaluable insights for the region’s decisionmakers and policy makers, experts, civil society members, and communities. As Central Asian countries face distinct climatic and environmental challenges—ranging from desertification to extreme weather events—implementing innovative urban greening solutions could contribute to the region’s sustainable development and bolster climate resilience, social inclusivity, and economic growth.

The success stories from Barcelona, Campinas, Milan, Melbourne, and Seoul showcase the positive impacts of urban forestry initiatives and green infrastructure. They emphasize the economic, environmental, and social benefits that can be achieved through strategic urban greening, tree management planning, and collaborative efforts.

These experiences underscore the important role scientific rigor and adaptability can play in urban planning. Central Asian countries can benefit from prioritizing comprehensive research and planning to optimize green spaces for maximum environmental benefits.

Sustainability and climate resilience are the key goals that Central Asian countries can consider in their urban planning and tree management interventions in the mid- and long-term. The emphasis on understanding local environmental conditions aligns with the need to mitigate climate change by sequestering greenhouse gases, combating desertification, reducing the urban heat island effect, and managing other climate-related risks.

The shared international experiences show how urbanization patterns can exacerbate

environmental impacts and targeted urban greening and regeneration strategies can reverse them. Central Asian countries stand to benefit from adopting green infrastructure and NBS practices to improve their urban environments. Integrating nature into urban planning by focusing on biodiversity, air and water pollution reduction, and other ecosystem services aligns with the broader climate and livability goals of the region.

Lessons from international experiences highlight the importance of building collaborative partnerships and harnessing citizen engagement to achieve effective and sustainable urban greening projects. Engaging with various stakeholders, including communities and government agencies, particularly through harnessing multisectoral methods, as well as promoting PPPs, and novel financial sustainability approaches, offer valuable lessons for Central Asian countries. By leveraging these strategies, the region can potentially mobilize the private sector to actively contribute to urban greening initiatives and ensure long-term project sustainability.

Central Asia stands to gain enormously by transforming its urban centers into more sustainable, greener, and resilient hubs. The international experiences shared here provide a snapshot of valuable lessons and good practices that can guide Central Asian countries in their pursuit of improved urban greening and forestry initiatives. By adapting, adopting, and embracing these solutions according to their unique challenges, Central Asian countries can advance immediate and long-term sustainable development with enhanced climate and environmental resilience, social inclusivity, and economic growth. The international experiences showcased in this webinar series can be a source of inspiration and guidance for Central Asia’s journey toward a greener and more prosperous future.

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