



FIG Working Week 2024

19-24 May

Accra, Ghana

Your World, Our World:
Resilient Environment
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Study on nature-based solutions to enhance resilience of urban land space in ecological restoration planning

Hongbin Wei

Land Consolidation and Rehabilitation Center ,
Ministry of Natural Resources of the People's Republic of China

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Background

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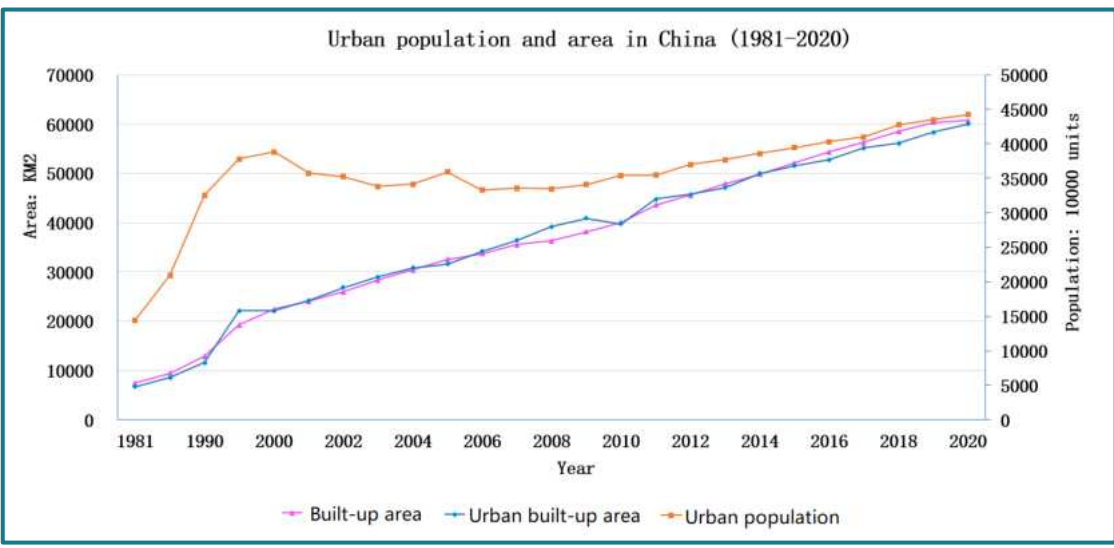
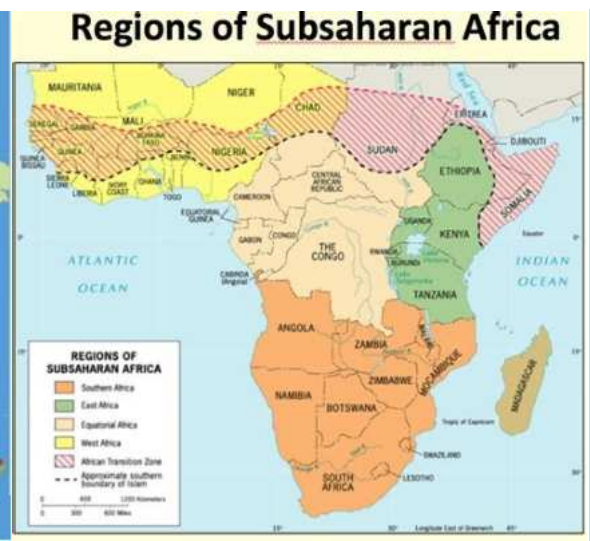
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More than half of the world's population lives in cities, and that number is rising every day.



Global problems of urban population growth

Urban Population and Urban Area in China, 1981-2020
(China Urban Statistical Yearbook)



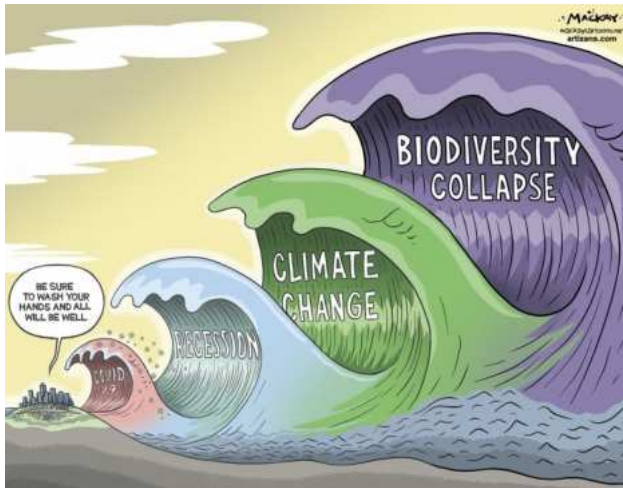
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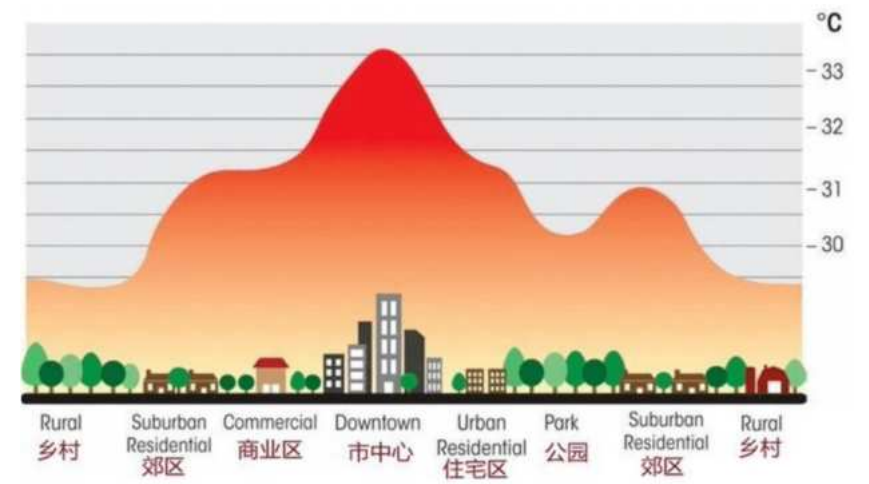
□ Rapid urbanization and land cover/material changes result in urban problems.



urban risks



urban waterlogging



Urban heat island

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- ◆ A new round of urbanization pose notable challenges to the sustainable development of human society. Such as environmental pollution, resource shortages, climate change, public health...
- ◆ There has been a broad consensus worldwide to promote green and sustainable development to maintain the balance of the urban "society-economy-nature" system.
- ◆ Traditional engineering/Grey infrastructures are commonly, but costly and may break regional ecological...
- ◆ How to solve the urban development problem through effective and adaptive means based on nature?

Urbanization

MEETING THE CHALLENGES & OPPORTUNITIES OF AN URBAN FUTURE

By 2030,
60% of the world's
population will live in
urban areas, up from
30% in 1950.

Urbanization around
the world

The Americas are the most
urbanized regions in
the world today.

World Urbanization Prospects: The 2018 Revision
Access the report: bit.ly/wup2018 • #UNPopulation

UN DESA



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Urban Resilience Challenges and Nature-based Solutions

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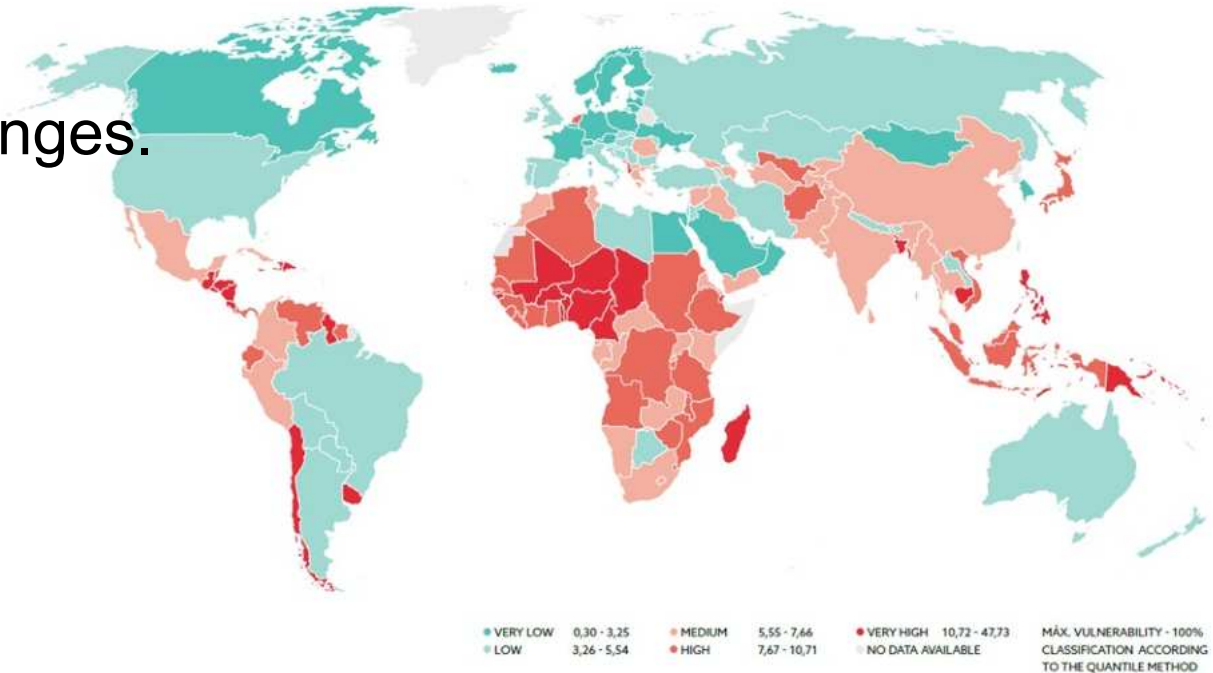
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Urban Resilience Challenges

Cities worldwide are facing resilience challenges.

- Climate risks interact with urbanization;
- Loss of biodiversity and ecosystem services;
- Poverty, and rising socioeconomic inequality.



World Risk Index map . Source: World Risk Report 2021

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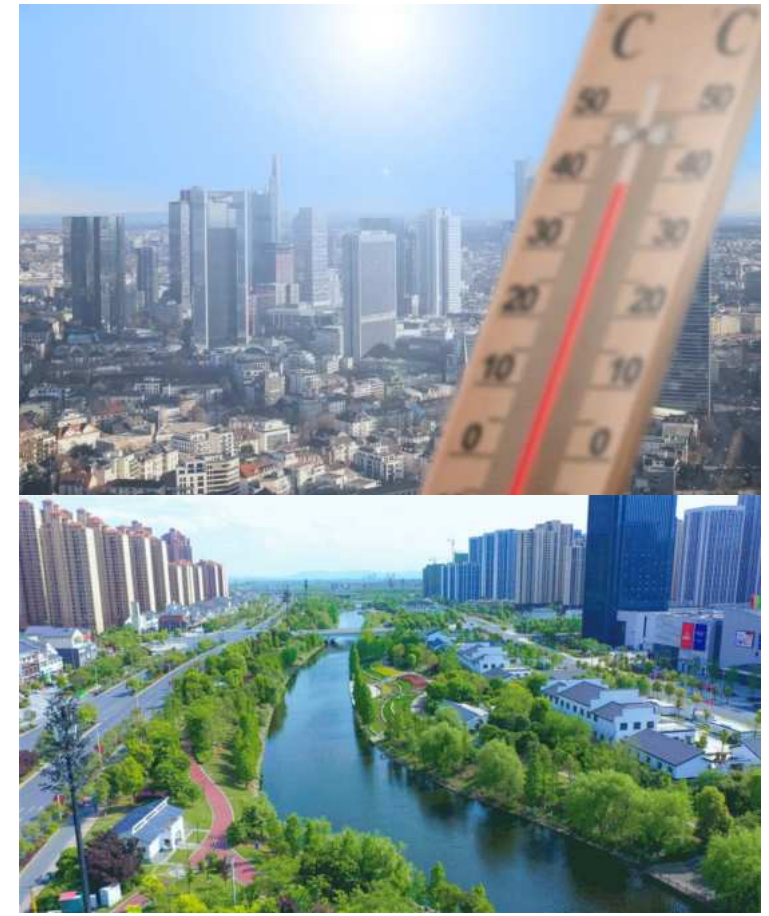
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- Lack of interaction between cities and ecology ;
- Increased risk of urban ecological security ;
- Neglect of urban ecological values ;
- Decentralized urban ecological restoration system.

➡ *Gray infrastructure refers to built structures and mechanical equipment, such as reservoirs, embankments, pipes, pumps, water treatment plants, and canals. These engineered solutions are embedded within watersheds or coastal ecosystems whose hydrological and environmental attributes profoundly affect the performance of the gray infrastructure. (World Bank and World Resources Institute. 2019.)*



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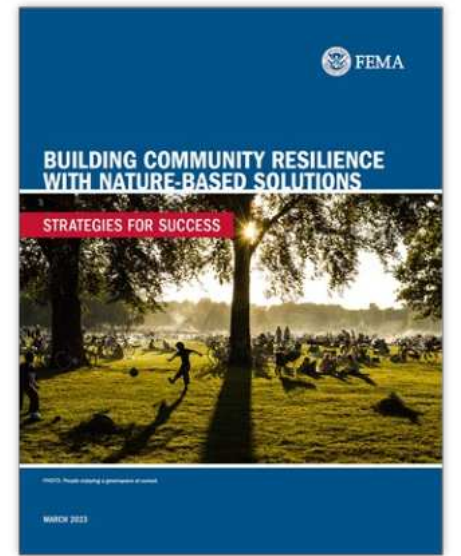
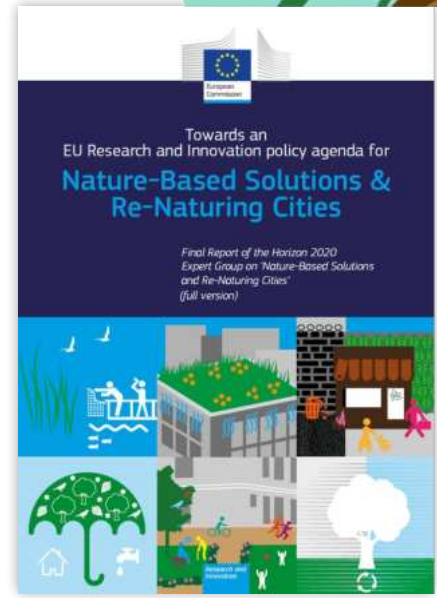
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NbS in the globe



SUSTAINABLE DEVELOPMENT GOALS



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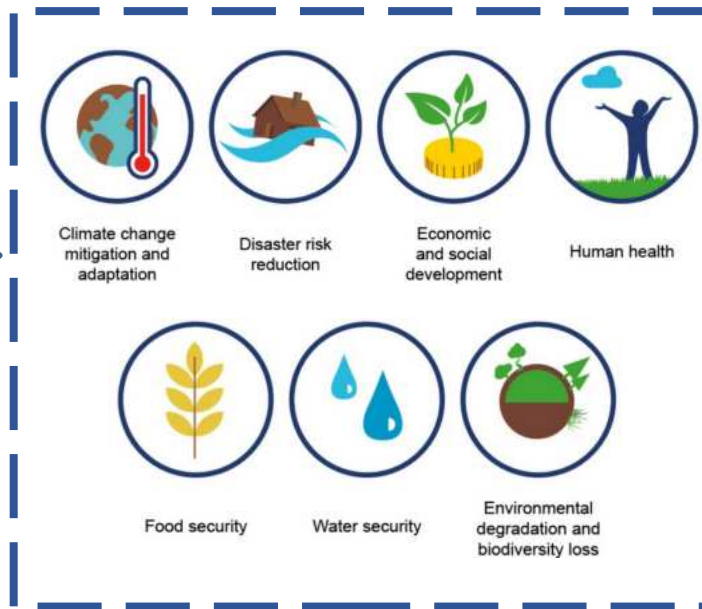
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Nature-based solutions (NBS)-IUCN 2016: Actions to protect, sustainably manage, and restore natural and modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.

Nature-based Solutions (Nbs)



Societal Challenges



Ecological restoration Measures

1. Ecosystem restoration approaches
 - ER
 - EE
 - FLR
2. Issue-specific ecosystem-related
 - EbA
 - EbM
 - Eco-DRR
 - CAS
3. Infrastructure-related approaches
 - GI
 - NI
4. Ecosystem-based management
 - EbMgt
5. Ecosystem protection approaches
 - AbC

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需要开展生态修复增强城市韧性

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Diversity of nature-based solutions for urban application



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Integrating Nature-based Solutions into the Ecological Restoration Planning for Urban Resilience ——Theory and Practice

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Five important principles for the integration of NBS in cities:

1. Assess the functions, benefits, costs, and suitability considerations of NBS
2. Apply an integrated systems approach to NBS for resilience in urban landscapes
3. Consider the principles of ecosystem conservation by adopting a hierarchy of ecosystem-based approaches
4. Consider the integration of NBS across a range of spatial scales
5. Adopt a multistakeholder and interdisciplinary approach

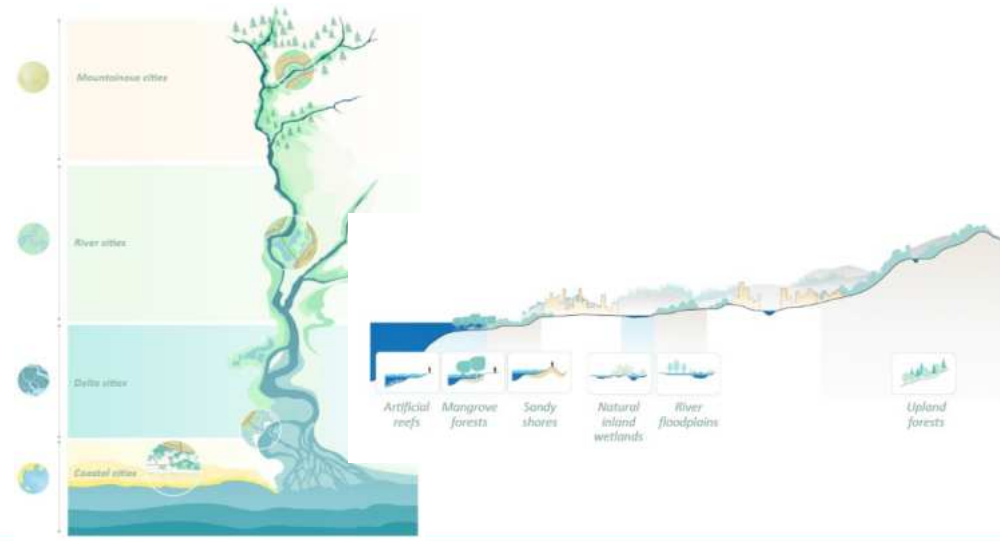
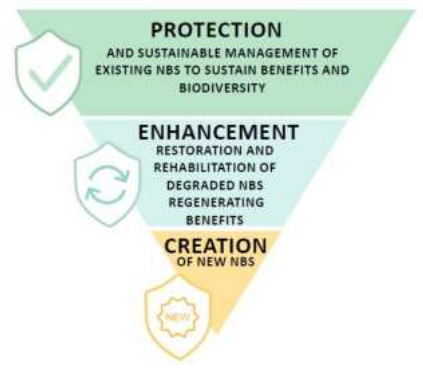
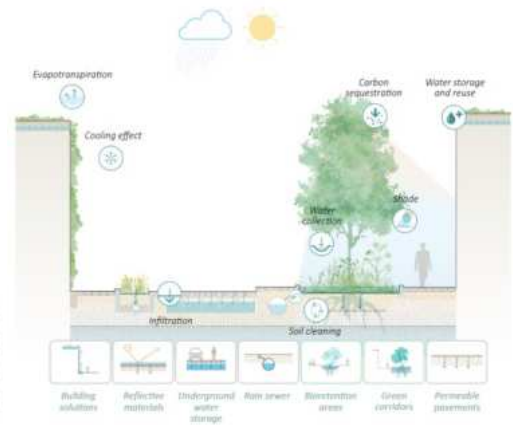
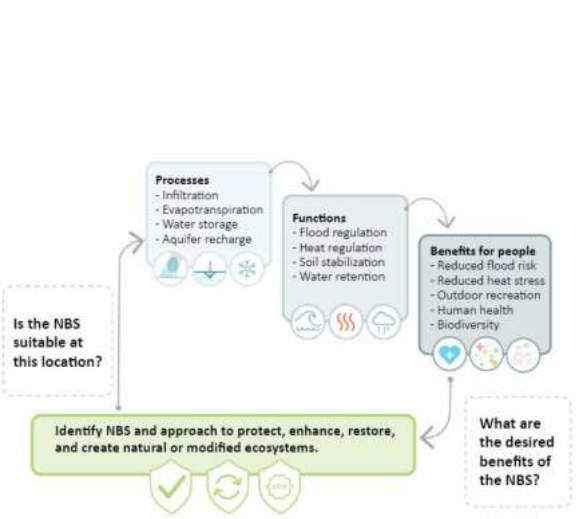




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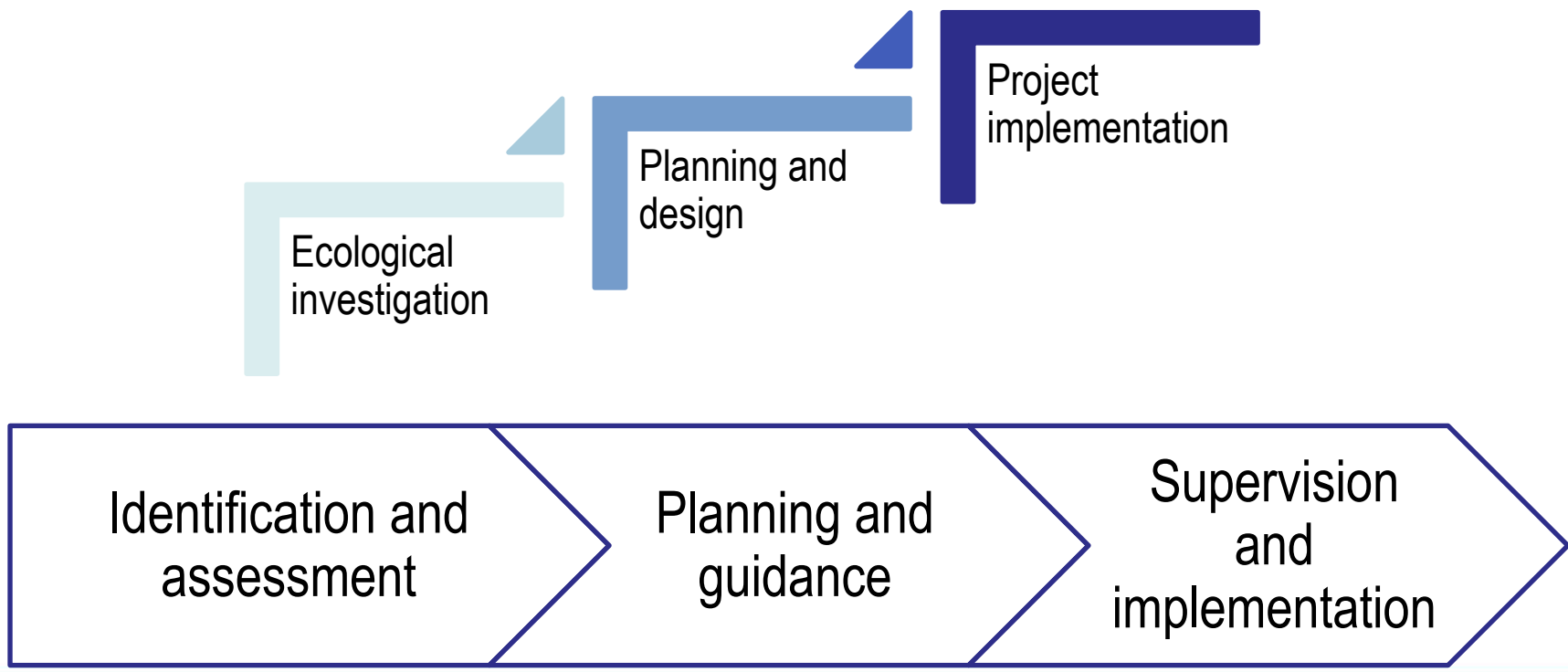
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STRATEGY OF NBS FOR TERRITORIAL SPACE ECOLOGICAL RESTORATION PLANNING IN URBAN AREAS

Ecological restoration planning approach



Nature-based Solutions

Nature-based Solutions are locally appropriate, adaptive actions to protect, sustainably manage or restore natural or modified ecosystems in order to address targeted societal challenge(s) - such as climate change mitigation -, while simultaneously enhancing human well-being and providing biodiversity benefits.

- ALIGNMENT WITH NATURAL ECOSYSTEM PROCESSES**
Build on natural ecosystem processes and capacity for self-restoration.
DO NOT REQUIRE INTENSE HUMAN INTERVENTION
- BENEFIT BIODIVERSITY**
Protect or enhance biodiversity and ecosystem functions.
DO NOT REQUIRE ONGOING PROVISION OF ENERGY
- ADAPTABILITY**
Increase adaptive capacity and resilience of ecosystems.
DO NOT HARM SENSITIVE AND SPECIES
- LOCALLY APPROPRIATE ACTIONS**
Aligned with local social, ecologic and economic conditions as well as tradition and culture.
DO NOT USE NON-NATIVE SPECIES
- MULTI-FUNCTIONALITY**
Provide multiple co-benefits for people and the environment.
DO NOT HAVE NEGATIVE SOCIAL EFFECTS
- SOCIETAL CHALLENGES AND HUMAN WELL-BEING**
For example mental and physical health, social cohesion or urban regeneration.

Umwelt Bundesamt

This graphic has been developed by the Health and Ecology Institute on behalf of the German Environment Agency. It is based on Böhm et al. (2023): Nature-based Solutions and global climate protection. Climate Change 01/2023, Deutscher Wetterdienst. Download at: <https://www.umweltbundesamt.de/de/dokumente/nature-based-solutions-01-2023-01>. Credit: graphics: Design: G&H, T&B, and H&E.



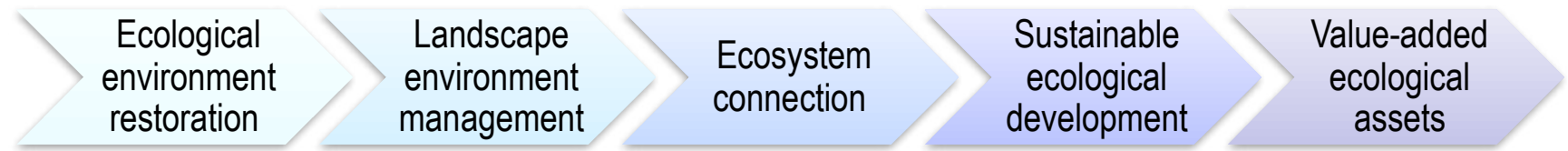
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Ecological restoration planning objective



living space | Production space living space | Production space living space | Production space



ecology - city - human settlements



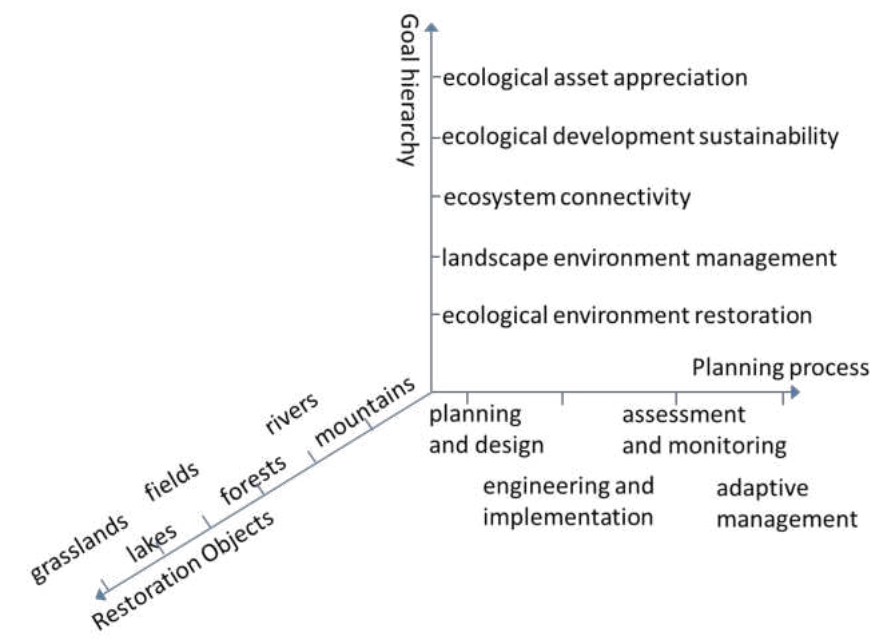
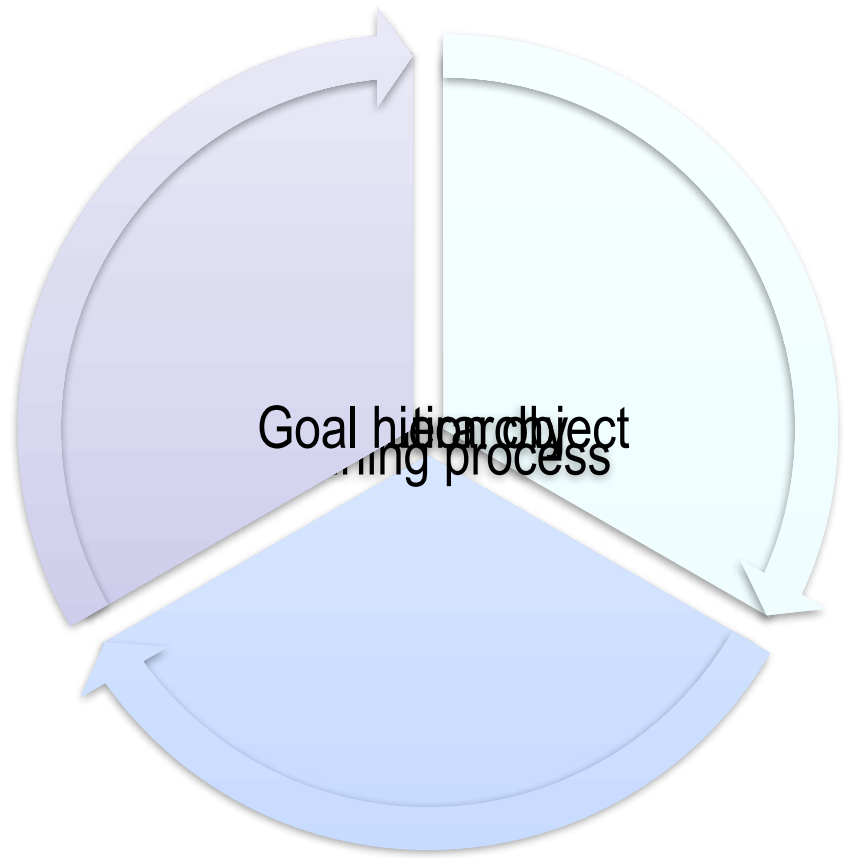
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Ecological restoration Planning System



NbS framework of urban territorial space ecological restoration standard system



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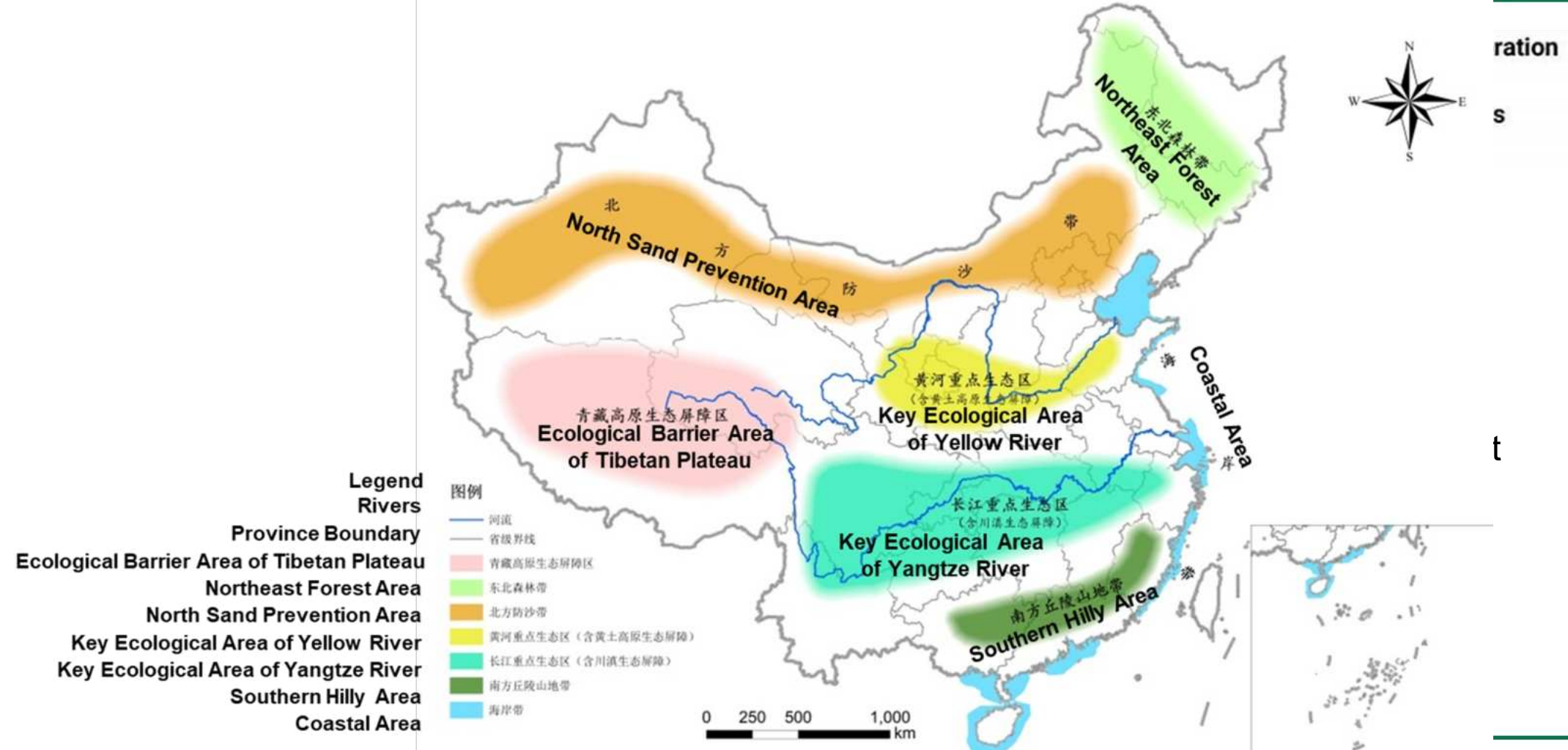




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Nature-based Solutions Practice in China

Chinese President Xi Jinping noted : mountains, waters, forests, farmlands, lakes and grasslands are part of a community of life, all elements of the natural ecology should be considered in an integrated manner in accordance with the integrity and systemic nature of the ecosystem and its inherent laws, and that holistic protection, systematic restoration and comprehensive management should be carried out. Adhere to the policy of giving priority to conservation, protection and natural restoration, Living in harmony with nature 。 These are the fundamental principles and guidelines for China 's Shan-Shui Initiative 。

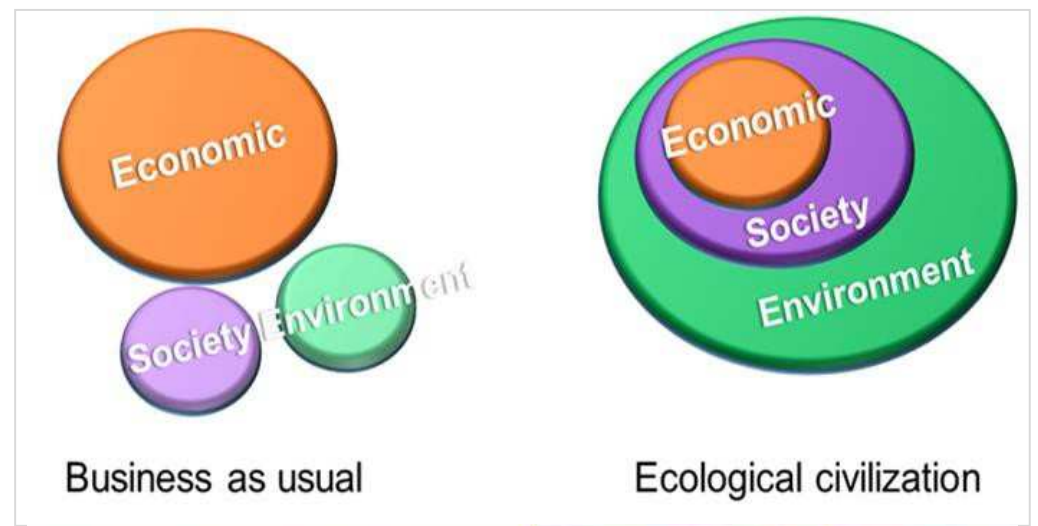




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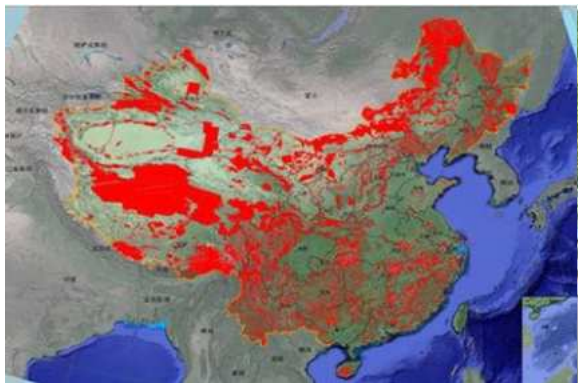
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NBS integrated into the spatial planning system

As NBS can simultaneously contribute to the realization of biodiversity, climate and human welfare goals, and is highly compatible with China's traditional culture of the unity of nature and man, it is easy to adopt and accept in policy and practice. China has adopted spatial planning to delineate permanent basic agricultural land, ecological protection red lines and urban development boundaries. The ecological protection red line strictly protects important biodiversity and carbon sink areas, promotes agricultural NBS such as rice-fish systems in agricultural land management, and builds sponge cities in urban space. These innovative measures are implemented through the Shan-Shui Initiative.



the ecological conservation red line Protect

Rice Fish System- Ag NbS Manage

the sponge city Restore or Create

World Restoration Flagship





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Principles of Forest landscape restoration





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Practice - Urban regeneration

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• Conclusion

NbS provides a new mode and way of governance for solving social, economic and environmental problems by values the health and well-being of human beings as well as the social and ecological awareness.

The introduction of NbS into the research and practice of territorial spatial ecological restoration is conducive to changing the situation of restoration after ecological damage in the past, providing effective and sustainable technical methods for the damaged ecology.

Integrate the planning system of land space ecological restoration in urban areas with NbS, and inject new vitality into the upgrading and transformation of land space ecological restoration and practical actions in the new era.

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International Federation of Surveyors supports the Sustainable Development Goals

Commission 8

Hanns Seidel Foundation, NUST, GLTN

Serving Society for the Benefit of People and Planet



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Thank you!

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