BEIJING PLAIN AREA AFFORESTATION PROGRAMME (BPAP) - BEIJING, CHINA

Section	
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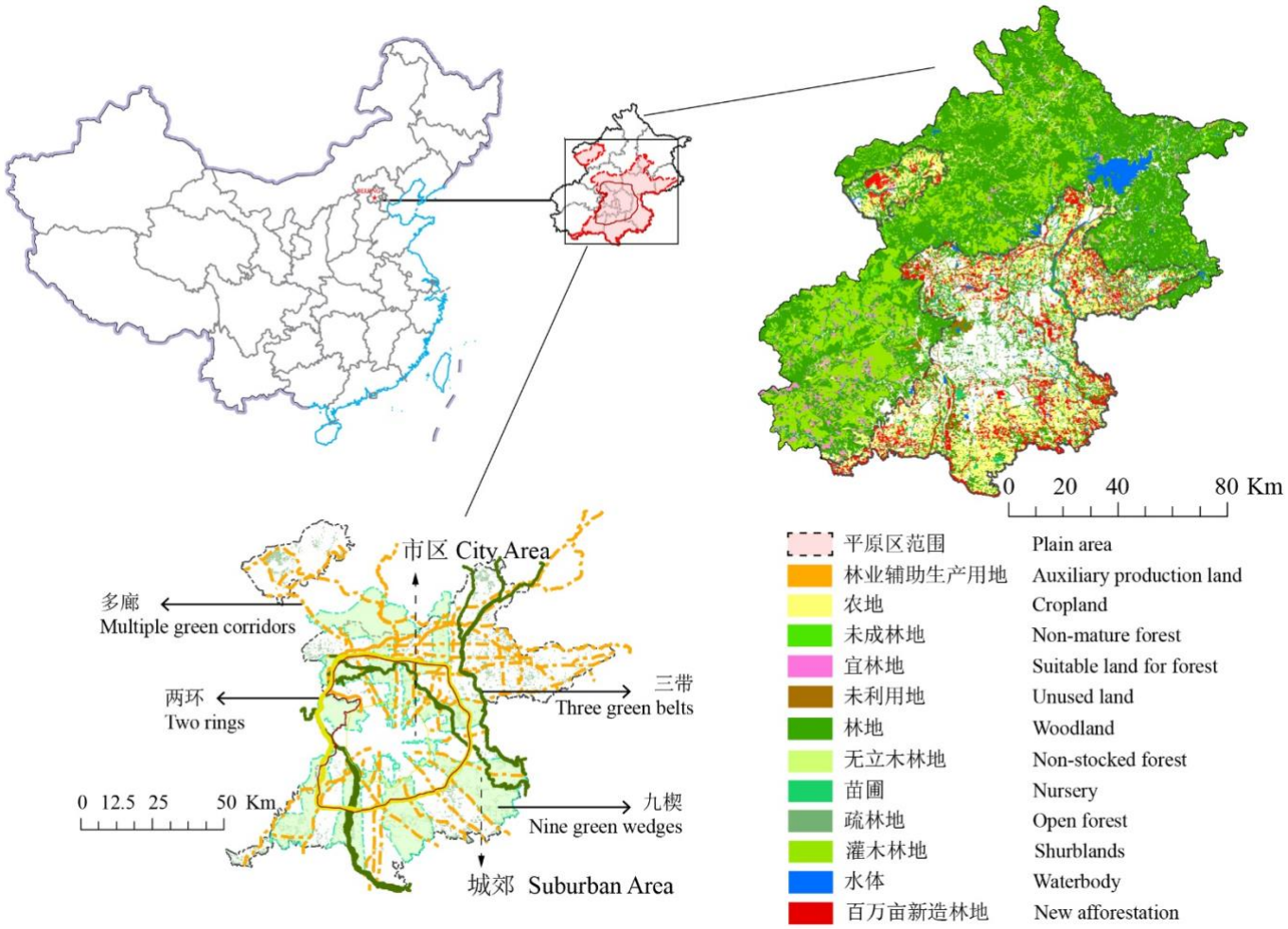
1	**TITLE OF CASE STUDY AREA: Beijing Plain Area Afforestation Programme (BPAP) - Beijing, China**
2	**INTRODUCTION** Beijing is located in the north of China and has a metropolitan area of 16,410 km^2. With a size of 6338 km^2, the plain area is the most developed and densely populated area within the city. However, the forest coverage in the plain area was only 14.85% in 2011, far behind the mountainous average of 37%. Most of Beijing's forests are located in the mountainous areas in the northwest while small and fragmented forest patches are dominated in the plain area (Wang *et al.*, 2013). Thus, the urban forests failed to meet the demands of residents since citizens have to drive 40–50 km if they want to visit a forest. Beijing also faces air pollution, the urban heat island effect and other environmental issues. To mitigate these environmental pressures and improve urban resilience, the municipal government in Beijing has launched the largest afforestation Programme in its history in 2012, which is called Beijing Plain Area Afforestation Programme (BPAP). With the aim to create huge forest patches, develop urban forest park clusters and optimise the large-scale forest patterns, BPAP has proposed green strategies with nine green wedges, multiple greenbelts, and green corridors around the old city centre in Beijing. BPAP has planned to plant 66,674 hectares of new trees by converting vacant lots, croplands, sand excavation pits and wastelands to forests, parks and wetlands from 2012 to 2015. By the end of 2015, BPAP has increased the forest coverage from 14.8% (2011) to 25% (2015) in the plain area, more than 70,000 hectares of forest (more than 54 million trees) have been planted and the survival rate has exceeded 95% (Food and Agriculture Organization of the United Nations, 2018). BPAP has been considered as the most ambitious project for a high-density urbanised area.
3	**KEY FACTS AND FIGURES OF THE CASE STUDY AREA** **Biogeographic region**[1]**:** Humid Continental/North China Plain **Surface area:** 6338 km^2 (633,800 ha) **Country:** China **Region/Province:** Beijing, China (code of Administrative boundary: 110000)

[1] https://www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-3

4	**LOCATION MAP(S)**  Location of the study area – Beijing Plain Area Afforestation Programme, China (Jin, Wang and Jia, 2018)
5	**NAME OF MUNICIPALITY AND WEBSITE ADDRESS** Capital Greening office: http://yllhj.beijing.gov.cn/sdlh/zlgcdtxx/
6	**LEAD ORGANISATIONS:** • Metropolitan City of Beijing • Beijing Gardening and Greening Bureau (Capital Greening Office)
7	**LOCAL CONTACT(S)** Beijing Municipal Forestry and Parks Bureau (Office of Beijing Greening Commission) Beijing, China Tel: + 86 (10) 84273060 bjyl@yllhj.beijing.gov.cn
8	**PRINCIPLE UF-NBS (Urban Forests as Nature-Based Solutions) ACTION(S)** **Provision of new infrastructure/facilities:** • Forest plantations • Restoration of sand excavation pits, wastelands and some urban-built up area (e.g. impervious surface) in cities • Improvement of urban forest landscape connectivities, e.g. planting trees along roads and rivers to create ecological corridors • Construction of multiple scale urban parks • Annual afforestation and reforestation

9	**OTHER PRINCIPLE NBS ACTION(S) – non-UF** • Recycling of construction waste/garbage (e.g. using concrete from removed buildings in landscape architecture such as park paths, garden ornaments) • Recreational and environmental educational activities (e.g., workshops for urban birds, bees or butterfly biodiversity) • Provide the field site for urban field station
10	**LOCAL STAKEHOLDERS LIST ONLY** 1. **Governing authorities**: Beijing City - Capital Greening Office, Beijing Gardening and Greening Bureau, 2. **Associations:** Beijing Municipal Commission of Planning and Natural Resources; Sciences and technology associations (e.g. education and cultural), cultural, and sports, non-government actors (e.g. project contractors, seedling nursery developers, NGO/volunteers, farmers, previous land contractors, scholars and social media) 3. **Citizens:** Park wardens (mostly not volunteer, usually the government pays for them), citizens for maintain and cleaning gardens (not volunteer, e.g. gardeners), farmers, citizens who are related association members, 4. **Municipalities:** Municipalities of districts (Haidian, Fengtai, Chaoyang, Mengtougou, Miyun, Yanqing, Huairou, Tongzhou, Shunyi, Fangshan, Changping, Pinggu) 5. **Public/private institutions**: Public institutions: Office of Planning and Development, Office of Voluntary Tree Planting (under the framework of Capital Greening Office); Municipalities of local districts (e.g District Gardening and Greening Bureaus); Research institutes or universities that have be involved in this project (e.g. Beijing Forestry University, Research Institute of Forestry Chinese Academy of Forestry); no private institutions since this project was mainly funded by municipal and district government revenues 6. **Park planner and authorities**: Planner: Beijing Beilin Landscape Architecture institute co. (private company); Authorities and administrative Division: Beijing Gardening and Greening Bureau 7. **Technicians for park maintenance/monitoring and to educate and support citizens:** Office of Park Management (technicians, administrative personnel, and workers); Environmental Education Department
11	**UF-NBS FRAMEWORK**

a.	**UF-NBS typology**	[redacted]	• Forest plantation; • Community parks, green urban areas, pocket parks, historical gardens or country parks with trees (i.e., large urban public park, amenity green spaces, local areas for play [LUP]; • Woodland play area (e.g. urban forest parks); • Tree rows; • Wooded riverbank green and wooded banks of ponds and lakes, natural and semi-natural water bodies and hydrographic networks (i.e., river corridor, lake banks, pond); • Ornamental trees; • Arboretum; • Bioswales with trees and constructed wetlands; • Choice of plants (i.e., native tree species, non-indigenous ornamental tree and plant species), selected tree species that could avoid the plant source pollutions (e.g. willow, pollen pollutions)
b.	**Integration**		Water management system (e.g., restoration of wetlands); Built-up structure (e.g., environmental education bases); Transport infrastructure (e.g., parking lots, above-ground roads connecting to the park are planned)
c.	**Network/connectivity**		The connectivity of urban forests system is one of the most important goals in BPAP. BPAP aims to connect the old urban forests patches with old vegetated areas (e.g. urban parks, urban woodland), and link the fragmented forests patches by planting more tree rows along rivers, roads or highways. Connectivity is ensured by identifying transition

			zones between built-up urban and peri-urban areas. BPAP is under the framework of Beijing Urban Greenspace Planning.
d.	**Multifunctionality**		Multiple ecological functions of urban forest and trees are combined such air and water quality purification, biodiversity conservation (Pei *et al.*, 2018), urban heat island mitigation. BPAP also meet the needs of the community (recreation, social activities, environmental education, areas for dogs)
e.	**Multi-scale**		BPAP was planned and implemented at different levels: local (community or blocks), municipal/district and regional. It also covers the urban and suburban area in Beijing City.
f.	**Strategic planning processes**		The Beijing Plain Area Afforestation Programme (BPAP) has been characterized by a strong government intervention in terms of planning and implementation. The government launch BPAP based on the demands of urban residents, which aims to create a more livable urban environment (e.g. create more recreation spaces for citizens). Multiple level government agencies (e.g. municipal office, district gardening and greening bureaus), non-government (private project contractors, seedling/nursery companies, NGOs/volunteers, universities/research institutes or groups) and individual citizens (including raising citizen awareness) are the main actors enabling the strategic approach (Yao *et al*., 2019). BPAP planning, implementation and management were funded by government revenues.
g.	**Inter- and transdisciplinary**		BPAP brings together, in a synergistic participatory process, a variety of actors and their knowledge from different disciplines (e.g. ecology, urban planning, urban forestry, forest management, social sciences), which include administrative authorities, landscape planners, scholars/professional experts, farmers, individual citizens and technicians who educate and support citizens/groups who help maintain the initiatives as well as undertake monitoring activities.
h.	**Social cohesion and biocultural diversity**		A survey conducted by the National Forestry and Grassland Administration Urban Forest Research Centre showed that the BPAP has a very high degree of public recognition: public satisfaction with the project was determined to be 72.3 percent, and public support was at 94 percent. Today, social cohesion occurs by sharing the services in urban parks, urban woodland play area and new afforestation sites (e.g., popular and family events, environmental education workshops, volunteer tree planting and sports).
i.	**Governance arrangements**	I. Project management structure.	Project coordinator – Capital Greening Office (Beijing Gardening and Greening Bureau) Altogether 14 sub-district Bureau of Landscape and Forestry Project coordinators usually confirm other project

				collaborator by opening tenders. Project Planner: Beijing Beilin Landscape Architecture institute co. (private company) Project implementation (plating trees and manage new afforestation site): Other forestry related private companies/contractors Project evaluation: Chinese Academy of Forestry, Beijing Forestry University
			II. Local community engagement and the nature of their engagement.	Several communities were involved during the project cycle of BPAP. Experts (e.g. researchers, professionals) community: experts who study urban planning, forestry, landscape ecology, biodiversity, landscape architecture, arboriculture, urban forestry were engaged in BPAP seminar of BPAP planning. Their engagement was to review the draft master planning of BPAP and to give their comments/suggestions. Usually, the project coordinator and planner organized several seminars during the process of developing the draft BPAP planning scheme. Local stakeholders (e.g. citizen): The planner revised the master planning of BPAP after the expert seminars. When the final BPAP planning scheme was ready, it was posted on the official website of local government. The open online version was welcome for citizen's comments or feedback. Usually, the publicity period lasts 7-15 weekdays. Of course, all stakeholders can give their suggestions for UF planning and management.
			III. City-scale and/or region-wide governance for the project and/or UF-NBS (city and regional stakeholders and character of their engagement)	The Capital Greening Office (Beijing Gardening and Greening Bureau) is the project coordinator, working with other UF in 14 sub-districts under the City Bureau for Landscape and Forestry. Beijing Beilin Landscape Architecture institute co. do the planning of urban forests. City is financially supporting the planning, implementation and management of BPAP.
			IV. National and international governance context (national and international stakeholders and character of their engagement)	First level control on the city level that monitors the project implementation. Beijing Afforestation Evaluation Programme (conducted by several research institutes/universities) monitors project implementation at the project level.
			V. Other (specify)	All costs during the whole cycle of BPAP (including planning, implementation and management) were funded by the government revenues; safety management of green areas, organisation of environmentally sustainable activities are organized or supported by the municipal or

				local community/block offices.
	j.	**Institutional frameworks**	I. Project staff responsibilities.	**Capital Greening Office (Beijing Gardening and Greening Bureau) staff:** Department of Ecological Conservation and Restoration staff: project manager, including project communication. • Planning and organisation of project's activities • Quality control • Planning, organisation, and implementation of project's communication activities • Informing project manager about progress and problems with communication activities • Budget planning Accounting Office staff: financial manager. • Review and confirm the budget • Supervision of project's funding **Beijing Beilin Landscape Architecture institute co. staff:** 9 persons • Project background analysis • Spatial analysis and planning • Future benefits analysis • Advices on constructions of UF • Other UF planning and design related work
			II. Project Management Committee (Y/N) if Y.	Y. Consists of representative of project partners (project managers of project coordinator's organisations)
			III. Frameworks above the project that exert influence on the project and/or UF-NBS e.g. Municipality, National Forestry Department.	Beijing Municipal Government approves the plain afforestation plans. Capital Greening Office (Beijing Gardening and Greening Bureau) gives guidelines for plain afforestation and BPAP planner needs to get approval for their UF afforestation scheme from this ministry who checks that all the rules and principles from the guidelines are included in these plans.
			IV. Private companies that work on behalf of/or are embedded within the project.	Project planner: Beijing Beilin Landscape Architecture institute co. Construction contractors: Companies that plant trees.
			V. Trade representative organisations that are involved in the project	n/a
			VI. Regulatory frameworks that the project operates within (i.e. bylaws, municipal laws, national laws, licences and leases, partnership agreements etc)	Urban and Rural Planning Law of the People's Republic of China Forestry Law of the People's Republic of China Beijing's overall planning (2004-2020) Beijing Greenspace system Planning (2007-2020) Rules for construction of plain afforestation
			VII. Other (specify)	For the implementation of BPAP: each contractor (private companies) which is planting trees, will manage the new plantation in the first three years. The survival rate of trees

				is required to reach 98-100% when handing the afforestation sites to the corresponding project coordinator (Beijing Gardening and Greening Bureau and sub-districts Bureau of Landscape and Forestry)
	k.	**Economic frameworks**	I. Community fundraising	n/a
			II. Project delivered services and monies raised by project	Assessment of new afforestation ecosystem services was conducted by CAF-RIF.
			III. City, regional general funds	This project was mainly funded by municipal and district government revenues. Total expense of the BPAP reached $5.0 billion USD from 2012 to 2015.
			IV. Special funds e.g. National Lottery, Challenge funds	n/a
			V. National government funds	n/a
			VI. Private sector investment	Very few non-government investment also exists, for various economical purposes such as tourism.
			VII. International funds e.g. European Union structural funds, LIFE + etc.	n/a
			VIII. Other (specify)	n/a
	l.	**Sino/European comparative relevance**		n/c
	m.	**UF-NBS valorisation**		BPAP is a government-dominated (human) interventions that promoting the sustainability and resilience of Beijing city. Increased forests or trees (e.g. woodland, urban parks or other greenspace) can maintain and improve the animal and plant biodiversity in high urbanised area. BPAP also can contribute to purify the air and water quality, mitigate the urban heat island by absorbing carbon dioxide and the shading and transpiration of plants, which can benefit human health and wellbeing. Besides, BPAP provide more job opportunities for social society (e.g. need more workers or staff to manage the new afforestation sites, develop eco-tourism).
	n.	**Procurement of UF-NBS**		BPAP was organized by four-level hierarchical system, which include municipal level project office (Capital Greening Office-Bejing Gardening and Greening Bureau), 16 district gardening and greening bureaus, 162 community or town forestry agencies and project contractors. The municipal office controlled the whole project by framing the public discourses on it, making rules, appropriating funds and lands, organizing public bidding for project supervision, and evaluating performances of each district. The district gardening and greening bureaus made annual afforestation plans in corresponding district and organized public bidding for site

			survey, planting design, forest construction and management, as well as providing technical and regulations training for project contractors and workers. Community or town forestry agencies coordinated labour division among local forestry stations (under Gardening and Greening Bureau), Rural Cooperative Economy Management Stations (under Agriculture Bureau) and project contracts (Yao *et al.*, 2019). Overall, the BPAP applied a Top-Down administrative system.
p.	**Ecosystem services (list the three most important services being provided in no more than 50 words)**		• Improving the forest coverage and urban greenspace connectivity in urbanised area by planting more than 54 million trees, which is good for biodiversity; • the health and wellbeing benefits gained through the use of the recreation facilities; • the provision of educational facilities for local residents and visitors.
q.	**Renaturing**		Reforestation and environmental redevelopment of areas that were once low-industrial area, uncultivated lands, wastes sand pits and vacant lots.

12 LESSONS AND TRANSFERABILITY

The strong administrative capacity in BPAP has improved the efficiency and effectiveness of the project in a highly urbanised area. Despite the ecosystem services provided by increased urban greenspace areas, BPAP contributes to improve the citizens' awareness of environmental protection. Through the BPAP, citizens realise that the urban forests and trees can improve the quality of their life, and play important roles in urban ecosystems. BPAP is a good example of Top-Down UF-NBS (Urban Forests as Nature-Based Solutions) planning that can be applied to rapidly urbanising cities with limited lands for urban greenspace. However, citizens' participation was insufficient during the planning and implementation of this project.

13 REFERENCES (Harvard style)

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