An aerial photograph of a city skyline, likely Hong Kong, featuring a dense cluster of skyscrapers on the left and a large green park area with a river and a multi-lane highway bridge in the foreground. The sky is clear and blue.

Re-greening urban riverscape: shared goal and joint effort in the Greater Bay Area

重塑城市河流景观：粤港澳大湾区的协同发展

**Speakers: Dr Wendy Y CHEN
Professor WANG Cheng
Dr Zhiqi LI
Dr Hui DONG**

Outline 大纲

- **China's commitments to urban forest development and urban forests in the GBA**
中国城市森林发展与粤港澳大湾区城市森林建设
- **Three cases: re-greening urban riverscapes in the GBA**
重塑大湾区城市河流景观
- **Joint effort towards a resilient and sustainable GBA**
大湾区协同发展展望

**CHINA'S COMMITMENTS TO URBAN FOREST
DEVELOPMENT AND URBAN FORESTS IN THE GBA**
中国城市森林发展与粤港澳大湾区城市森林建设

- 1. Forest City as a national strategy** 森林城市作为国家战略
- 2. Standards for Forest City development : Indicators for National Forest City** 森林城市规划建设标准——《森林城市评价指标》
- 3. Forest City and Forest City Cluster development** 森林城市和森林城市群持续推进
- 4. Sino-EU Strategic Collaboration** 中欧城市森林战略合作
- 5. Shared goals and opportunities of collaboration in the GBA** 大湾区城市森林发展的协同目标和机会

1. Forest City as a national strategy 森林城市作为国家战略

- **Urban forest is the visualization of sustainable urban development and ecological civilisation** 城市森林是可持续城市发展和生态文明的具象体现
- **National Forest City Development Plan 2018-2025** 《全国森林城市发展规划2018-2025》
 - Intra-city greening 搞好**城市内**绿化，使城市适宜绿化的地方都绿起来
 - Peri-urban greening 搞好**城市周边**绿化，充分利用不适宜耕作的土地开展绿化造林
 - Inter-city greening 搞好**城市群**绿化，扩大城市之间的生态空间

2. Indicators for National Forest City (INFC) 森林城市规划建设标准——《森林城市评价指标》

Main focuses of INFC 《国家森林城市评价指标》GB/T 37342-2019

- Holistic policy for the whole municipal area 市域一体：空间范围涵盖整个城市的行政区
- Adequate forest coverage 总量适宜：林木覆盖
- Integration of blue and green spaces 蓝绿结合
- Balanced distribution 布局均衡
- Ecologically-sound structure 合理的生态结构
- Biodiversity and ecological habitats 生物多样性和栖息地建设
- Urban forest naturalisation 近自然林为主
- Human health and well-being 居民福祉
- Rural forest landscape 乡村景观



Indicators for National Forest City

3. Forest City and Forest City Cluster development 森林城市和森林城市群持续推进

A total of 194 national forest cities have been authorised; Ongoing Forest City and Forest City Cluster developments are all over the country 截止目前，全国有194个城市被授予国家森林城市称号，有22个省（区、市）开展了省级森林城市创建，有17个省（区、市）开展了森林城市群建设

The 1st national Forest City Cluster has been established in the Pearl River Delta 珠三角率先建成国家级森林城市群

4. Sino-EU Strategic Collaboration 中欧城市森林战略合作

- **CLEARING HOUSE: Urban Forest as Nature-based Solution (UF-NBS) 中欧城市森林应对方案**
- **Five paired Sino-EU comparative studies focusing on different geographical and climatological situations of UF-NBS, including the comparison of the GBA (China) vs. Leipzig & Halle (German) 五项中欧配对城市（群）比较研究，包括粤港澳大湾区（中国）和莱比锡-哈雷城市群（德国）**



CLEARINGHOUSE
中欧城市森林应对方案

5. Shared goals and opportunities of collaboration in the GBA

大湾区城市森林发展的协同目标和机会

- **Integrated green and blue spaces as accessible social-cum-natural assets** 整合蓝绿空间成为社会-自然资产
- **Climate change mitigation** 减缓气候变化
- **Ecological resilience** 生态韧性
- **Water security** 水安全
- **Public health and social wellbeing** 公共卫生和健康

THREE CASES: RE-GREENING URBAN RIVERSCAPES IN THE GBA

重塑大湾区城市河流景观

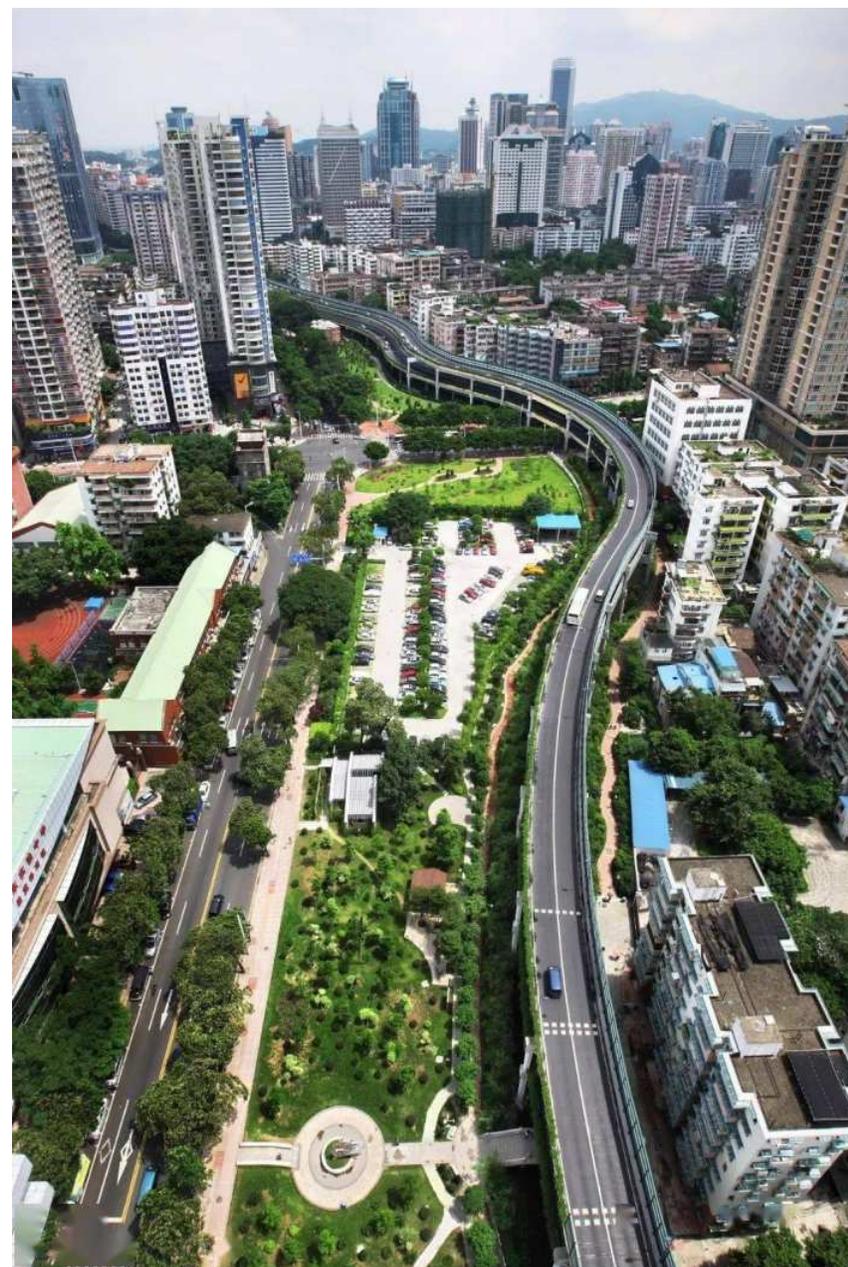
- **Integrating urban forests with rivers to bring these social-cum-natural assets back to the urban society** 基于城市植被-水体一体化的解决方案重构粤港澳大湾区：增强生态韧性、减缓气候变化
 - **Donghao Chong (Guangzhou)** 东濠涌（广州）
 - **Dasha River Ecological Corridor (Shenzhen)** 大沙河生态长廊（深圳）
 - **Kai Tak River (Hong Kong)** 启德河（香港）

DONGHAO CHONG 东濠涌

- **Location: Guangzhou**
地点：广州市越秀区
- **Construction period:
2007-2010**
建造年份：2007-2010
- **Length: 4.5km**
长度：4.5公里



Donghao Chong before restoration 修复前的东濠涌



Aerial view of Donghao Chong after restoration
东濠涌鸟瞰

DONGHAO CHONG 东濠涌

- **Location: Guangzhou**

地点：广州市越秀区

- **Construction period:
2007-2010**

建造年份：2007-2010

- **Length: 4.5km**

长度：4.5公里

Strategies for re-greening Donghao Chong 东濠涌修复策略

- **Restoring ecological and hydrological processes** 生态和水文过程修复：清淤疏浚、联通珠江水道
- **Enhancing landscape amenity** 景观提升：滨河树木、滨水公共空间



- **Restoring ecological and hydrological processes** 生态和水文过程修复

Application of aquatic plants helps naturalise the embankments and restore the ecological and hydrological processes

强调集中绿地地段堤岸改造的自然形态，以软底化的方式种植亲水植物，构筑绿文化与原生态的有机联系



DONGHAO CHONG 东濠涌

- **Location: Guangzhou**
地点：广州市越秀区
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- **Enhancing landscape amenity** 景观提升：滨河树木

Recreational trails and riverine plazas are shadowed by large and old trees, which help regulate micro-climate. Old trees along the river are documented and conserved.

在滨水休闲场地，保留及种植能有效调节地区小气候的高大乔木。沿河的古树进行调查、建档并专门管理。



Conserved old trees 保留古树

DONGHAO CHONG 东濠涌

- **Location: Guangzhou**

地点：广州市越秀区

- **Construction period:
2007-2010**

建造年份：2007-2010

- **Length: 4.5km**

长度：4.5公里

- **Enhancing landscape amenity 景观提升：滨水城市公共空间**

Ornamental plants and flowers are integrated into the riverine green belts

水体堤岸的线性景观绿化带中配置具有鲜明岭南特色的植物及花卉



DONGHAO CHONG 东濠涌

- **Location: Guangzhou**

地点：广州市越秀区

- **Construction period:
2007-2010**

建造年份：2007-2010

- **Length: 4.5km**

长度：4.5公里

Diverse plants are used to purify the water body, regulate micro-climate, naturalise the hardened riverbanks, and create cultural landscape
植物能净化水体、调节微气候、绿化硬质堤岸，塑造特色文化空间

Indigenous plants add a touch of Lingnan culture to the riverscape
沿岸的植物配植多选用乡土植物来用强调东濠涌的流域特点，充分展现广州的地域风貌

Vertical vegetation caters to the riverside space and reproduces the waterfront community
通过乔木、灌木、花草、地被的立体种植，形成符合水滨自然植被群落的结构

Plants used in Donghao Chong 东濠涌修复植物应用

Trees 乔木

白兰 *Michelia x alba*

红花羊蹄甲 *Bauhinia purpurea*

红棉 *Bombax ceiba*

细叶榕 *Ficus microcarpa*

垂叶榕 *Ficus benjamina*

Shrubs 灌木地被

桂花 *Osmanthus fragrans*

鸡蛋花 *Plumeria*

扶桑 *Hibiscus rosa-sinensis*

黄槐 *Senna surattensis*

细叶紫薇 *Lagerstroemia indica*

假连翘 *Duranta erecta*

美人蕉 *Canna indica*

Riverine and aquatic species 河岸及水生植物

垂柳 *Salix babylonica*

水生美人蕉 *Canna generalis*

紫芋 *Colocasia tonoiimo*

蜘蛛兰 *Hymenocallis speciosa (L. f. ex Salisb.) Salisb.*

肾蕨 *Nephrolepis auriculata*

绿萝 *Epipremnum aureum*

簕杜鹃 *Bougainvillea*

DASHA RIVER ECOLOGICAL CORRIDOR 大沙河生态长廊

- **Location: Shenzhen**
地点：深圳市南山区
- **Construction period:
2017-2020**
建造年份：2017-2020
- **Length: 13.7km**
长度：13.7公里

Strategies for Dasha River Restoration 大沙河修复策略

- **Ecosystem rehabilitation** 生态修复：水资源管理、生态栖息地营造、构建系统生态格局
- **Reconnecting people and nature – Reconstructing nostalgia** 重构人与自然的联系 - 重塑“乡愁”



DASHA RIVER ECOLOGICAL CORRIDOR 大沙河生态长廊

- **Location: Shenzhen**
地点：深圳市南山区
- **Construction period:
2017-2020**
建造年份：2017-2020
- **Length: 13.7km**
长度：13.7公里

- **Ecosystem rehabilitation 生态系统修复**

Water flow was adjusted, and water quality was improved by introducing special plants which can remove pollutants in the waterbody. Forests and wetlands were conserved and expanded to create natural habitats for the local flora and fauna.

通过引进具有吸收、存储和净化水资源，尤其是过滤污染物功能的物种以及其它措施，将雨水管理与提高吸收、存储和污水净化等功能结合起来。现有的森林和湿地得以保留，并得到扩展，以吸引乡土植物在此落地生根，使这片区域成为更多野生动物的栖息地。



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DASHA RIVER ECOLOGICAL CORRIDOR 大沙河生态长廊

- **Location: Shenzhen**
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- **Reconnecting people and nature – Reconstructing nostalgia** 重构人与自然的联系 - 重塑“乡愁”

Spaces where people can be close to the nature were carefully designed using indigenous species

本土动植物被重新引入，塑造本土生态风貌，促进人与自然的互动



**DASHA
RIVER
ECOLOGICAL
CORRIDOR**
大沙河生态长廊

- **Location: Shenzhen**
地点：深圳市南山区
- **Construction period:
2017-2020**
建造年份：2017-2020
- **Length: 13.7km**
长度：13.7公里

Plants are used to purify the water body, restore ecological habitats, reconstruct ecological patterns, and recreate the sense of belonging
植物被用来净化水体、营造栖息地、构建生态格局，以及重塑“乡愁”

The restored Dasha River reconnects northern forests and southern coastal ecosystem, enhancing the biodiversity in the area and reducing the vulnerability to climate change

经修复的河道生态系统连通北部山林和南部海湾生态系统，提升当地生物多样性，削减了气候变化影响

The broadened riverine forests provide various culture services to the citizens

拓宽后的城市绿廊给市民提供了多样化的游憩空间和体验



DASHA RIVER ECOLOGICAL CORRIDOR 大沙河生态长廊

- **Location: Shenzhen**
地点：深圳市南山区
- **Construction period: 2017-2020**
建造年份：2017-2020
- **Length: 13.7km**
长度：13.7公里

Plants used in the Dasha River 大沙河生态长廊特色植物

Trees 乔木	Shrubs and herbs 灌木及草本	Aquatic plants 水生植物
乌桕 <i>Sapium sebiferum (L.) Roxb.</i>	肾蕨 <i>Nephrolepis auriculata</i>	水生美人蕉 <i>Canna generalis</i>
朴树 <i>Celtis sinensis Pers.</i>	簕杜鹃 <i>Bougainvillea</i>	水生鸢尾 <i>Iris Hexag</i>
大腹木棉 <i>Ceiba speciosa</i>	矮蒲苇 <i>Cortaderia selloana 'Pumila'</i>	千屈菜 <i>Salisb. Lythrum salicaria L.</i>
紫花风铃木 <i>Handroanthus impetiginosus (Mart. Ex DC.) Mattos</i>	花叶芒 <i>Miscanthus sinensis 'Variegatus'</i>	旱伞草 <i>Cyperus alternifolius</i>
凤凰木 <i>Delonix regia</i>	蓝雪花 <i>Ceratoostigma plumbaginoides</i>	黄花鸢尾 <i>Iris wilsonii C. H. Wright</i>
火焰木 <i>Spathodea campanulata Beauv.</i>	五色梅 <i>Lantana camara L.</i>	花叶芦竹 <i>Arundo doonax 'Versicolor'</i>
红花紫荆 <i>Bauhinia blakeana</i>		
无忧树 <i>Saraca dives Pierre</i>		
香樟 <i>Cinnamomum camphora (L.) Presl.</i>		
桂花 <i>Osmanthus sp.</i>		
蓝花楹 <i>Jacaranda mimosifolia D.Don</i>		

KAI TAK RIVER 启德河

- **Location: Hong Kong (Wong Tai Sin Section)**

地点：香港黄大仙

- **Construction period: 2011-2018**

建造年份：2011-2018

- **Length: around 1.1km**

长度：约1.1公里



Revitalisation of Kai Tak River 启德河修复重点

- **Flood management**
防洪
- **River beautification**
河道美化
- **Recreational function**
游憩功能

- **River beautification**
河道美化

Riverside planters and submerged planters were installed into the riverine space. Plants such as *Bougainvillea spectabilis* were used to beautify the riverbanks. Other plants with higher tolerance to draught, salt, and fast flow of water were chosen to regreen the riverscape

不同的绿化及生态元素加入启德河，河边花槽种植簕杜鹃美化河岸景观，河床的种植槽内种植抗逆性高且能够适应河道水流的植物

KAI TAK RIVER 启德河

- **Location: Hong Kong (Wong Tai Sin Section)**

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- **Length: around 1.1km**

长度：约1.1公里



- **River beautification 河道美化**

Ancient existing trees inhabiting in masonry walls along the river are conserved, providing shelter for other species and forming a unique green-blue space

河岸边的石墙树得到保留，提供荫蔽和庇护的同时成为场地内独具一格的景观

- **Recreational function 游憩功能**

The waterfront has been revitalised into a more accessible and comfortable recreational space

修复后的启德河畔成为市民通勤、远眺、交谈、聚会的宜人场所

KAI TAK RIVER

启德河

- **Location: Hong Kong (Wong Tai Sin Section)**

地点：香港黄大仙

- **Construction period: 2011-2018**

建造年份：2011-2018

- **Length: around 1.1km**

长度：约1.1公里

Plants with salient features were applied to beautify the space. Old masonry trees were preserved. High-tolerance indigenous species were selected to re-green the riverbed.

具有当地特色的植物用以美化河岸空间及保育当地文化。对耐受性高、适应性强的植物用来绿化河床、改善水质、调节水流。

Selected plants used in Kai Tak River Revitalization 活化启德河植物应用

Masonry trees 石墙树	Riverside species 河岸植物	Submerged species 河床植物
细叶榕 <i>Ficus microcarpa</i>	簕杜鹃 <i>Bougainvillea</i>	厚藤 <i>Ipomoea pes-caprae</i> (L.) R. Br.
	锡兰叶下珠 <i>Phyllanthus myrtifolius</i>	文殊兰 <i>Crinum asiaticum</i> L. var. <i>sinicum</i> (Roxb. ex Herb.) Baker
	异叶爬山虎 <i>Parthenocissus dalzielii</i>	苦郎树 <i>Clerodendrum inerme</i>
	马樱丹 <i>Lantana Camara</i>	草海桐 <i>Scaevola taccada</i>
	粉叶马蹄甲 <i>Bauhinia glauca</i>	桐花树 <i>Aegiceras corniculatum</i>
		木榄 <i>Bruguiera gymnorhiza</i>
		老鼠簕 <i>Acanthus ilicifolius</i>
		长春花 <i>C. roseus</i>
		水葱 <i>Schoenoplectus tabernaemontan</i>

COMPARATIVE STUDY OF RE-GREENING AND REVITALISING URBAN RIVERSCAPES

重塑城市河岸景观的比较研究

- **CLEARING HOUSE - Comparative study: the GBA (China) vs. Leipzig & Halle (German)** 中欧城市森林应对方案中的比较研究：粤港澳大湾区（中国）和莱比锡-哈雷城市群（德国）
 - **Urban forests' contributions to urban river restoration** 城市树木在城市河流修复中的重要性
 - **Regional effects of afforesting riverine areas on climate change mitigation** 区域尺度城市河流景观的再绿化对气候变化的减缓效果
 - **Social engagement in urban river restoration and management: App development and promotion** 城市蓝绿空间管理的社会参与：应用程序的开发和推广

URBAN FOREST DEVELOPMENT IN THE GBA

大湾区城市林业发展

Joint efforts of the GBA in identifying problems and developing plans with shared goals and collaborative responsibilities 粤港澳多方协作开展大湾区城市森林问题诊断，制定目标一致、责任分工明确的发展规划

(1) Enhance urban forests and urban rivers as the backbone of ecological infrastructure of the GBA city cluster 加强大湾区城市森林和城市河流作为重要生态基础设施的森林城市群规划

(2) Protect/restore urban forests between the cities to control urban sprawl 保护恢复城市之间的森林湿地等绿色空间，避免城市过度连片发展

(3) Build regionally-connected forest patterns as ecologically sound corridors 建设成片森林和恢复区域性生态廊道，减少生态系统结构和功能破碎



URBAN FOREST DEVELOPMENT IN THE GBA

大湾区城市林业发展

- (4) **Re-naturalise urban forests** 培育近自然林为主的地带性森林景观，提高生物多样性
- (5) **Integrate recreational functions of regional forests** 提高区域生态休闲空间的共享服务水平
- (6) **Restore urban forests to reflect Lingnan culture** 保护和营造具有岭南地域特色的森林生态景观
- (7) **Restore interconnected inland and coastal wetland systems** 保护恢复互联互通的湿地系统，延续桑基鱼塘和滨海红树林湿地景观
- (8) **Re-greening and revitalising urban riverscapes** 保护与恢复河岸森林植被，建设有生命的河流生态景观



JOINT EFFORTS TOWARDS A RESILIENT AND SUSTAINABLE GBA

大湾区协同发展展望

- **Re-greening and revitalising urban riverscapes as nature-cum-social assets 使河流景观再生成为社会-自然资产**
 - **Build a resilient and sustainable GBA 加强大湾区生态安全**
 - **Integration of forest ecosystem, river ecosystem, wetland ecosystem, and urban ecosystem 整合森林生态系统、河流生态系统、湿地生态系统以及城市生态系统**
 - **Mitigating climate change, enhancing adaptative capacity, and strengthening resilience 减缓气候变化，提高适应能力，增强区域韧性**
 - **Foster a liveable and inclusive GBA 促进大湾区宜居共融**
 - **Recreational spaces provision 满足市民游憩需求**
 - **Inheritance of Lingnan culture 传承岭南文化**



THANK YOU!
谢谢聆听！