

Urban Ecosystem-based Adaptation to Climate Change

城市基于生态系统的气候变化适应

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International Ecosystem Management Partnership
国际生态系统管理伙伴计划



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Climate Change Facts in Cities

城市气候变化事实

- Sea level rise 海平面上升
- Increased temperatures 气温升高
- Increase in extreme weather events
极端气候事件的增加
 - Floods & Storms 洪水和风暴
 - Heat wave & Drought 热浪和干旱



Climate Change Impacts in Cities

气候变化对城市的影响

- Coastal erosion and land loss
海岸带侵蚀、土地流失
- Increased salinity in estuaries and coastal aquifers
河口和滨海含水层盐度上升
- Rising coastal water tables and impeded drainage
沿海水域地下水位抬升、排水不良
- Increased storm flooding and damage
洪水风暴增加造成的损失
- Energy demand (heating and cooling) 能源需求
- Water demand, availability and quality
用水需求、水量和水质
- Human health 人类健康
- Migration to cities 城市移民
- Urban biodiversity 城市生物多样性
- Recreational opportunities 休闲机会



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Ecosystem-based Adaptation (EbA)?

基于生态系统的适应 (EbA)?

Definition 定义

- The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels.
- 在总体适应战略中，利用生物多样性和生态系统服务，在地方、国家、区域和全球尺度上，帮助人类适应气候变化的不利影响。

Rationale 原理

- *EbA uses sustainable management, conservation and restoration of ecosystems, taking into account anticipated climate change impact trends, to reduce vulnerability and improve the resilience of ecosystems and people to climate change impacts.*
- 在考虑气候变化影响趋势的情况下，利用可持续发展管理、生态系统保护和恢复的原理，降低生态系统和人类对气候变化影响的脆弱性、增加其顺应力。

Ecosystem-based Adaptation? (Cont.)

基于生态系统的适应？（续）

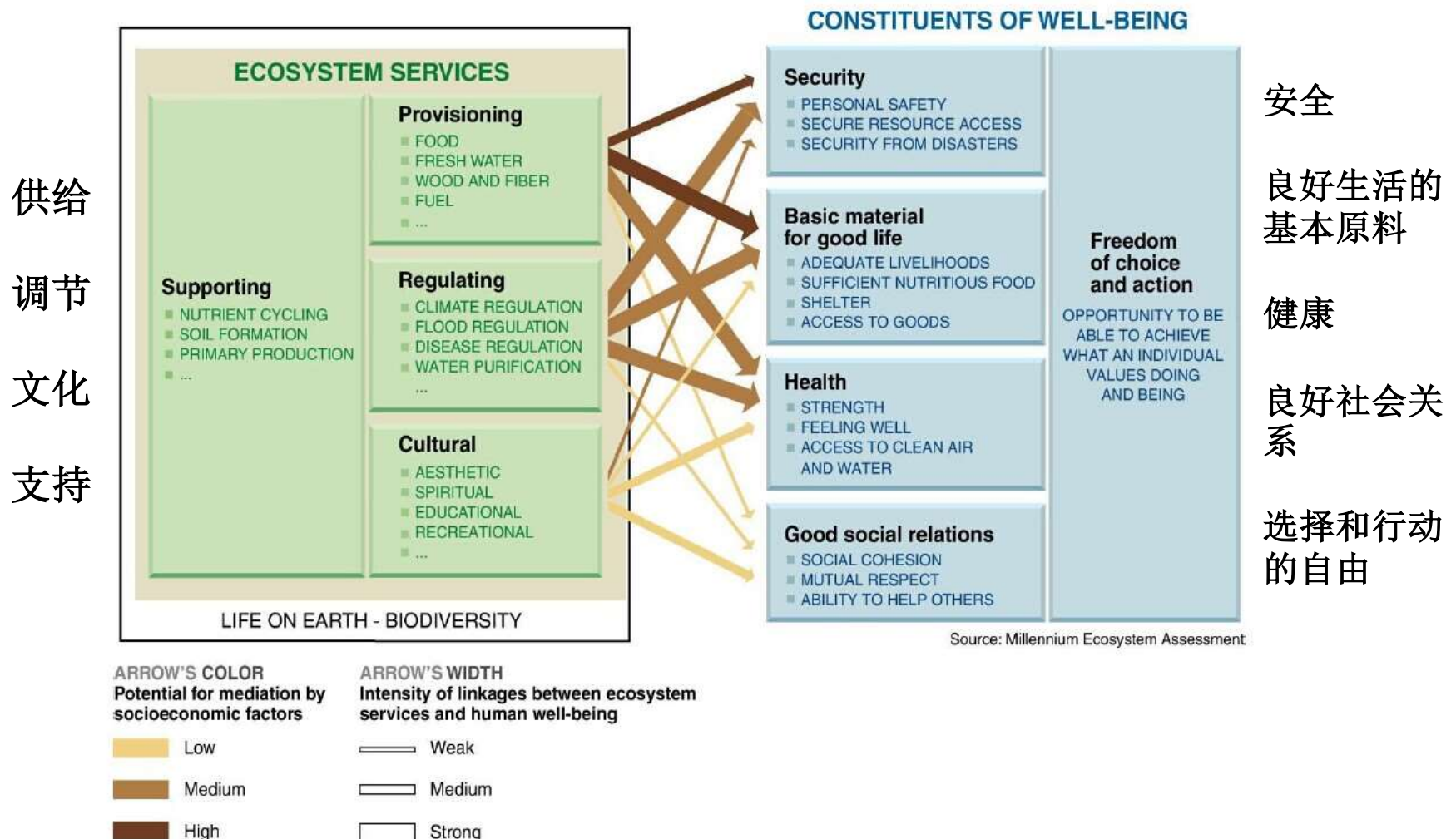
Characteristics 特征

- Ecosystem can replace or complement expensive ‘hard’ infrastructure (e.g. sea-walls).
生态系统可取代或作为昂贵的“硬质”基础设施的补充（如：滨海堤）
- EbA values and uses of biodiversity and ecosystem services as part of an overall adaptation strategy.
重视和使用生物多样性和生态系统服务



Ecosystem Services and Human Well-being

生态系统服务与人类福祉



Source: Millennium Ecosystem Assessment



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Ecosystem Services for urban environments that emanate from EbA

EbA可为城市环境提供的生态系统服务

Municipal Agencies

河流

Rivers and
canals

森林

Forest

红树林

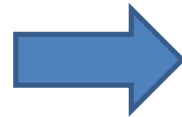
Mangroves

绿地

Green space

湿地

Wetland



Ecosystem Services for urban environments that emanate from EbA

- Natural water supply 自然水源供给
- Storm water drainage 雨水疏排
- Sewage treatment 废水处理
- Air filtering 空气净化
- Micro-climate regulation 调节小气候
- Natural hazard risk reduction 降低自然灾害风险
 - ✓ Impacts of wind storm 风暴影响
 - ✓ Impacts of sand storm 沙暴影响
 - ✓ Impacts of coastal wave action 海浪作用影响
 - ✓ Slope stabilization 稳固边坡
- Noise reduction 降低噪声
- Carbon sequestration 固碳
- Food, timber... 食物、木材...
- Tourism and recreation 旅游休闲
- Provision of habitat 提供生境
- Disease control 疾病控制
- ...

A city is dependent on ecosystem services provided in and out of its political boundaries.

城市依赖于来自其行政区域之内以及之外的生态系统服务。

Why EbA?

为什么用EbA?

- Cost effective
- Many other co-benefits from ecosystem services
- Sustainable
- Engage local communities
- 性价比高
- 协同效益
- 可持续
- 地方社区的参与



Examples of Urban EbA interventions

城市EbA举例

- *Urban reforestation* 城市造林

通过种植一系列对气候变化影响有顺应力的树种，减缓城市热岛效应、城市内涝，增加地下水补给。

- *Wetland restoration* 湿地修复

通过维护鱼类和其他水生生物的繁衍栖息地，帮助当地居民适应气候变化带来的威胁，如：水源供给减少、水质降低、洪水和侵蚀、粮食安全。

- *Urban agriculture* 城市农业

通过在城市区域开展牧业生产和多用途植物种植，为当地低收入人群提供多样化的食物和收入，建立其气候顺应力。



Case Study I: EbA in Cape Town, South Africa

案例1：南非开普敦

Background

- 307 km of coastline, its greatest socioeconomic asset.
- Supports a wide range of species and ecosystem services.
- Sea level rise & increased storms

EbA interventions

- Protection and rehabilitation of Ramsar-designated wetlands — absorb large volumes of advancing water and dissipate wave energy.
- Protection and rehabilitation of sand dunes from physical construction and sand mining — dunes restored & dune grass established
- Protection of kelp beds — dissipate wave energy during storms.

背景：

- 开普敦最大的社会经济资产：
307公里海岸线
- 支持各种各样的物种生存 & 提供生态系统服务
- 威胁：海平面上升、风暴增加

EbA干预：

- 湿地保护和复原
- 沙丘保护和恢复
- 海藻床保护
——吸收大量水流
驱散波浪能



Case Study I: EbA in Cape Town, South Africa (Cont.)

案例1：南非开普敦（续）

Why EbA cost effective?

Sea-wall — the most common form of protection:

- Have to be regularly repaired following high tides and storm surges.
- The challenge of estimated necessary heights to ensure safety.
- The challenge of efficiency in the long run.



为什么EbA具有高性价比？

最常见的防护措施——海岸堤：

- 高浪潮和风暴后必须定期修理
- 安全坝高评估
- 长期的效率问题



Case Study II: EbA in Vietnam

案例2：越南

Background

- Red River Delta. Typhoon-stricken. Densely populated.
- Mangroves traditionally protect agriculture. Destroyed for fuel and during war.
- Erosion and flooding.

EbA Intervention

- 12,000 hectares of mangroves restored by Red Cross

背景：

- 红河三角洲，台风侵袭，高人口密度
- 红树林保护当地农业，由于战争和燃料使用而遭到破坏
- 侵蚀和洪水

EbA干预：

- 恢复12,000公顷红树林

| Traditional adaptation solutions 传统适应措施 | EbA solutions EbA措施 |
|--|---|
| Maintain dykes 维持堤坝 7.3 million per year 每年730万美元 | Plant mangroves: 1.1 million 种植红树林：110万美元 Also provide alternative livelihoods. 提供其他生计。 |



The need of urban EbA in developing countries

发展中国家城市发展EbA的需求

- Rapid urbanization & expanding urban populations
 - Detrimental to ecosystem services, because the construction of urban infrastructure:
 - replaces natural ecosystems
 - leads to increased pollution
 - decreases biodiversity
 - Environmental degradation associated with urbanization increases vulnerability of poor urban communities who are particularly reliant on ecosystem services.
 - Climate variability and change further exacerbate the environmental stresses and associated vulnerabilities.
 - Lack of knowledge, technology and funding.
- 快速城市化 & 人口增长
 - 城市基础设施建设对生态系统服务的损害：
 - 取代了自然生态系统
 - 增加污染
 - 降低生物多样性
 - 与城市化有关的环境退化增加了城市低收入人群的脆弱性
 - 气候变化加剧环境压力，增加脆弱性
 - 缺乏知识、技术和资金支持



The way forward...

前方的路.....

Mainstreaming EbA in Urban Adaptation portfolio!

- Perceived trade-offs between ecosystem and development need is inevitable in cities. Cities can incorporate EbA into the city development planning & budgeting process to minimize conflicts.
- Local communities should be involved at all stage.
- EbA is not the only solution, but can be used in conjunction with other adaptation measures.
- Mainstreaming EbA into different planning levels: local, regional, national.

让EbA成为城市气候变化适应方案的主流！

- 平衡城市生态保护和发
展需求不可避免，将
EbA纳入城市发展规划
的预算中来，可降低二
者的冲突
- 当地社区需全程参与
- EbA不是唯一的途径，
可与其他适应手段联合
使用
- 需将EbA整合入不同尺
度的规划中（地方、区
域、国家）



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Thanks for your attention!
谢谢!



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