

# The Three Points Sponge City approach; towards an enhanced multi-level resilience strategy

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# Challenges

## What we want is a Water-Smart Society:

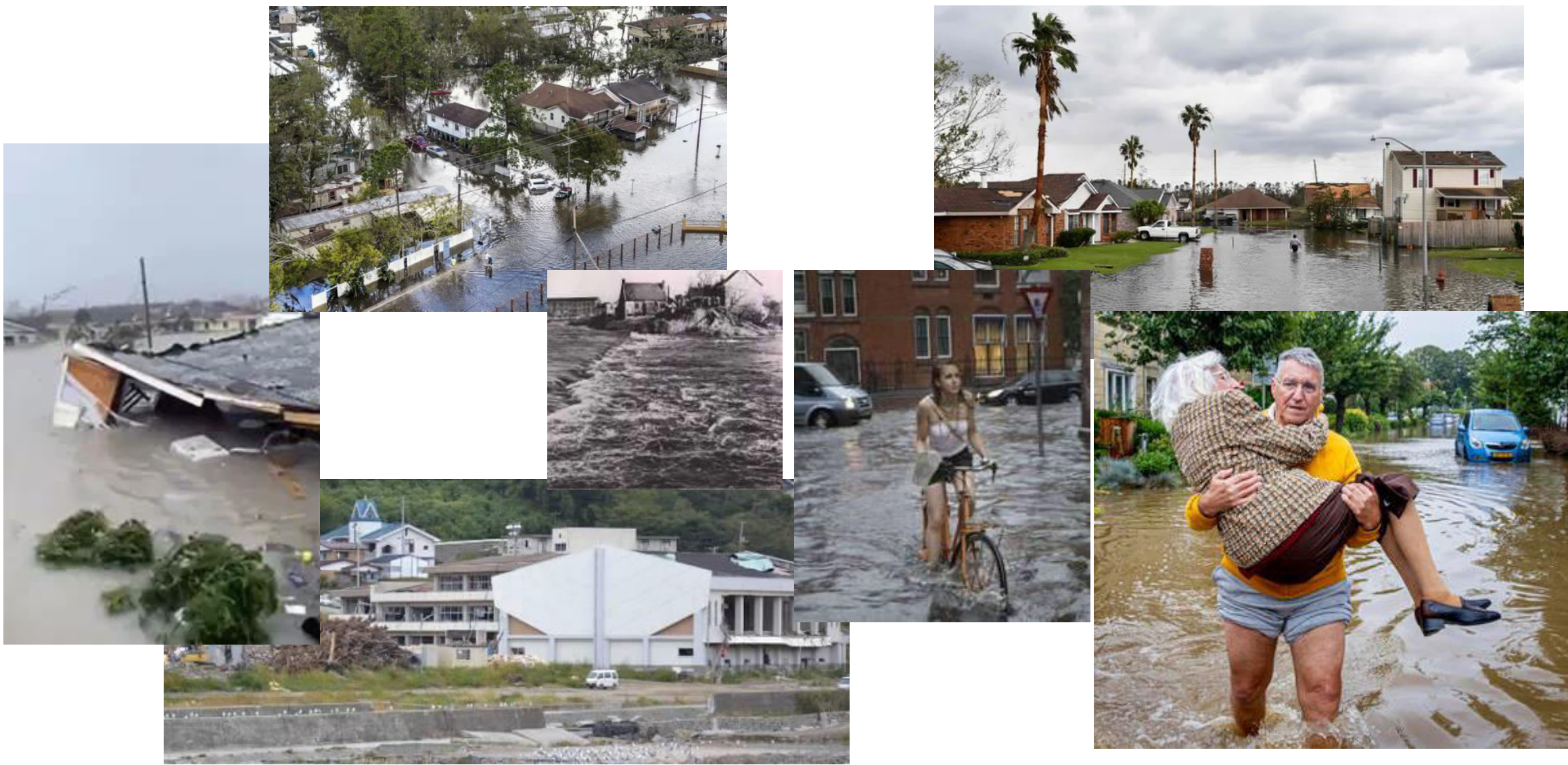
- a society in which the **true value of water** is recognised and realised;
- the water system is **resilient** against the impact of climate change events.
- all available water sources are managed in such a way that **water scarcity and pollution of water resources** are avoided;
- water and resource loops are largely closed to foster a **circular economy** and optimal resource efficiency,
- a society in which **all relevant stakeholders** are involved in the governance of our water system.

[https://watereurope.eu/wp-content/uploads/2020/04/WE-Water-Vision-english\\_online.pdf](https://watereurope.eu/wp-content/uploads/2020/04/WE-Water-Vision-english_online.pdf)

However, **reality is different**



# Flooding (... , 2021, 2023, ...)





# Drought



**CHINA**  
**EUROPE**  
Water Platform





# Heat stress



**CHINA**  
**EUROPE**  
Water Platform



Andrea Smith/Associated Press



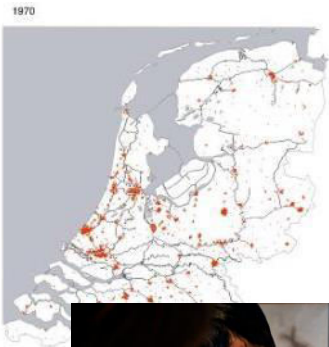


# Climate and society are changing

1900



1970



2005



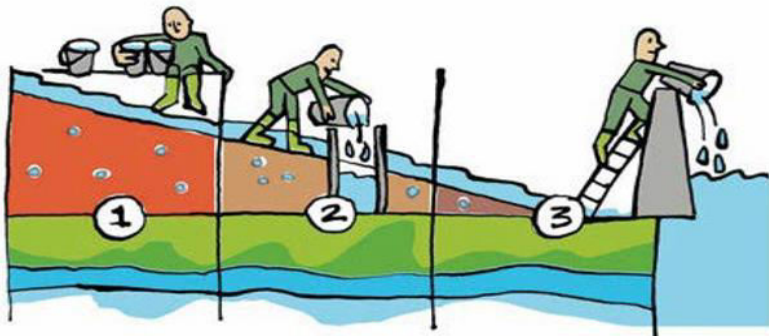
# Shared challenges

- Water problems are similar all around the world
- Problems are already catastrophic now
- Climate change, sea level rise, socio-economic developments will aggravate the problems
- Action is urgently required

# Different approaches to Urban Water Mngmt

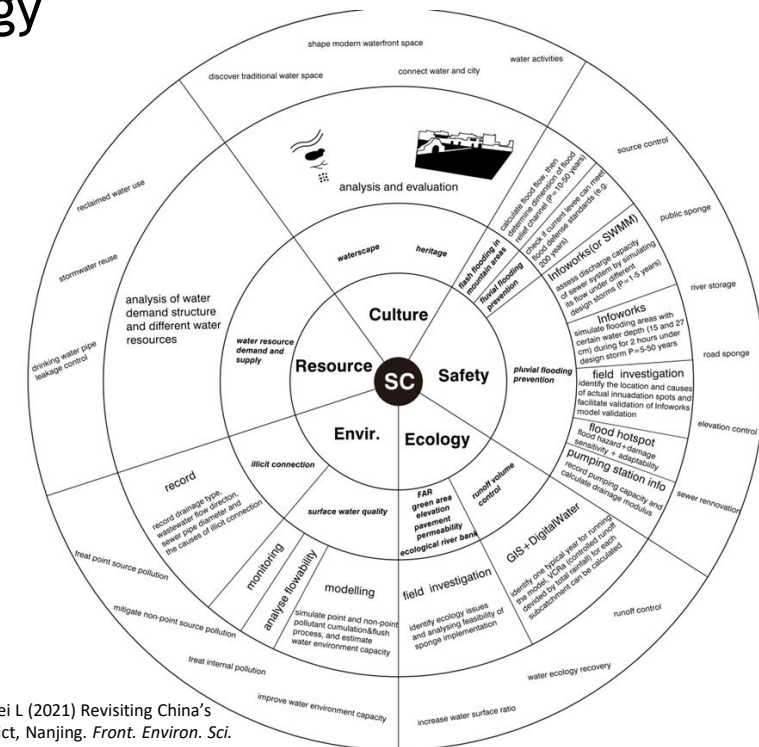
## Europa / USA / Australia

- SUDS, BMPs, LID, WSUD
- Discharge-oriented, rapidly ‘greening’
- Retain - Store - Drain
- Design storms, flood risk approach
- Climate resilience
- Nature-based solutions / Blue-Green Infrastructure for social & ecological benefits
- Pollution control at source or by end-of-pipe treatment



## China

- Sponge City approach (2014)
- Comprehensive
- Flood security (return time)
- Drought / Ecology
- Water resources management
- Culture



Planning content of Nanjing Sponge City practice

Chen S, van de Ven FHM, Zevenbergen C, Verbeek S, Ye Q, Zhang W and Wei L (2021) Revisiting China's Sponge City Planning Approach: Lessons from a Case Study on Qinhuai District, Nanjing. *Front. Environ. Sci.* 9:748231

Figure 9 The summary of water themes, assessment approach, and solutions in SC planning of Nanjing



# How to improve?

Despite these approaches and actions, we see **substantial damage of floods and droughts**, both in Europe and China

## Needed:

- Comprehensive planning and design of water infrastructure
- Adaptability / flexibility for changing conditions

## Three Points Approach (3PA)

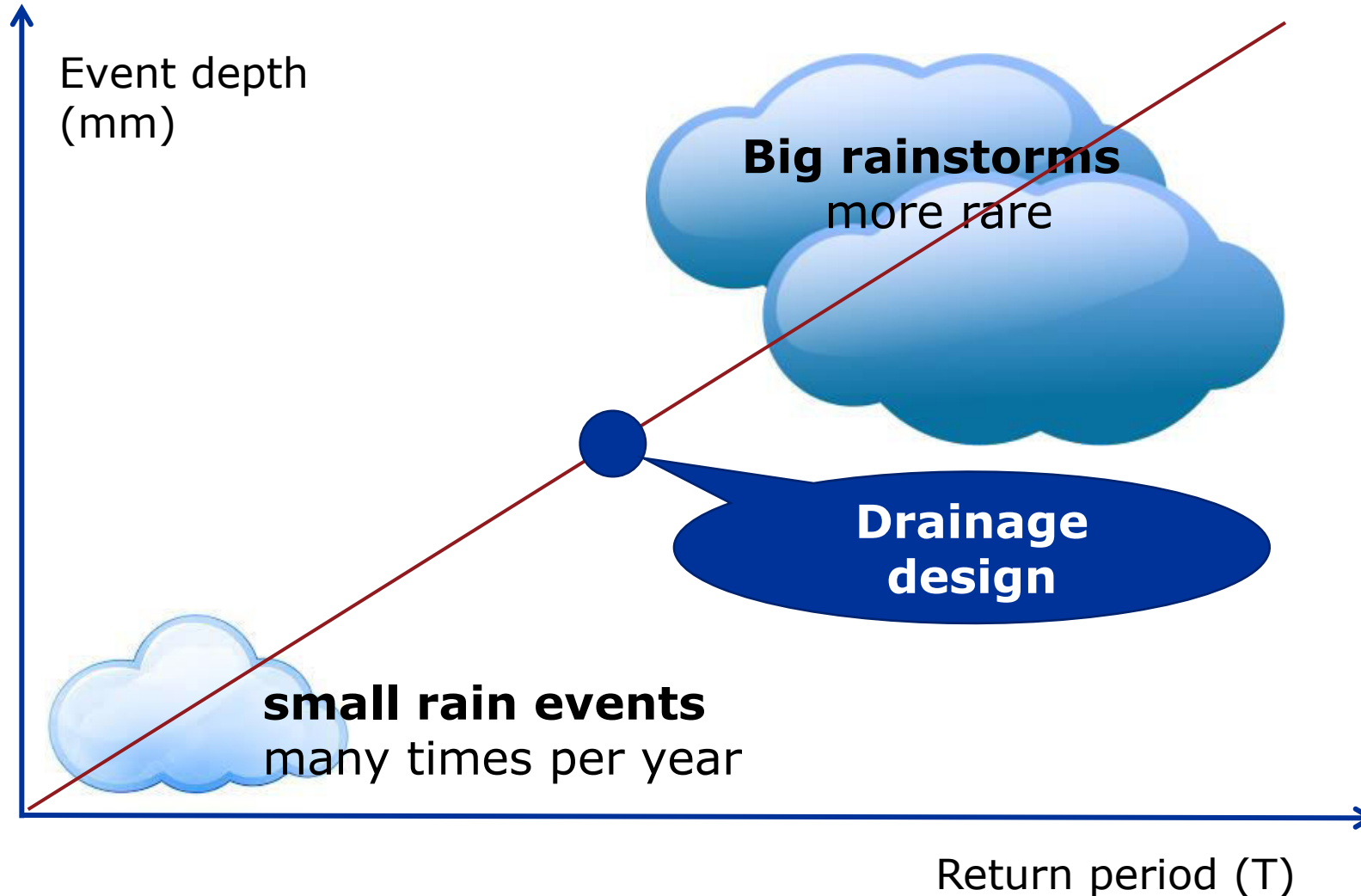
as conceptual basis  
for comprehensive planning

and to seize benefits and opportunities!

## Blue-Green Infrastructure (BGI)

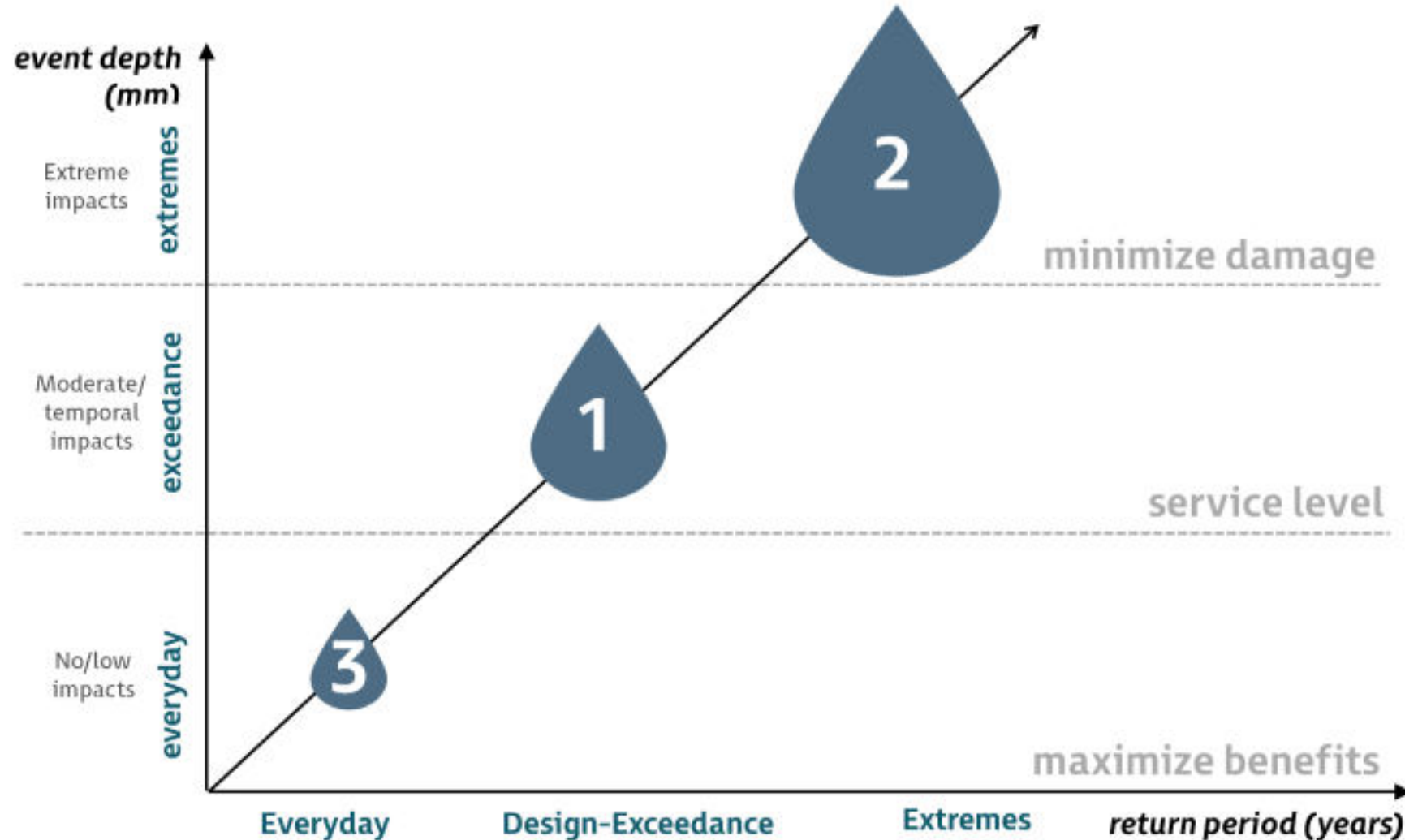


# What is the 3 Points Approach (3PA)?





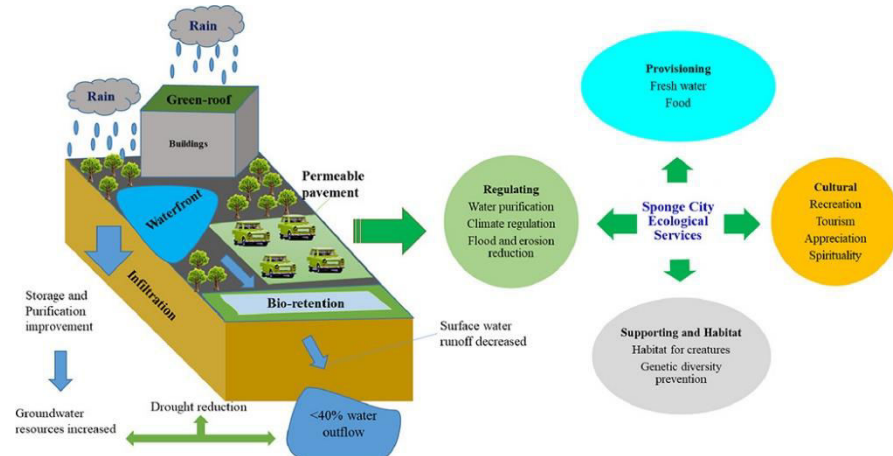
# What is the 3 Points Approach (3PA)?



# 1. Design domain

drainage service level

## 3. Everyday domain



## Maximize water benefits

- Water harvesting,
  - Ecosystem services
  - Landscaping; water sensitive urban design
- => **Blue-Green Infrastructure**

## 2. Extreme domain



## Minimize damage of floods and droughts

- Spatial planning
- Building design
- Vital infrastructure protection
- Vulnerable people and animals protection

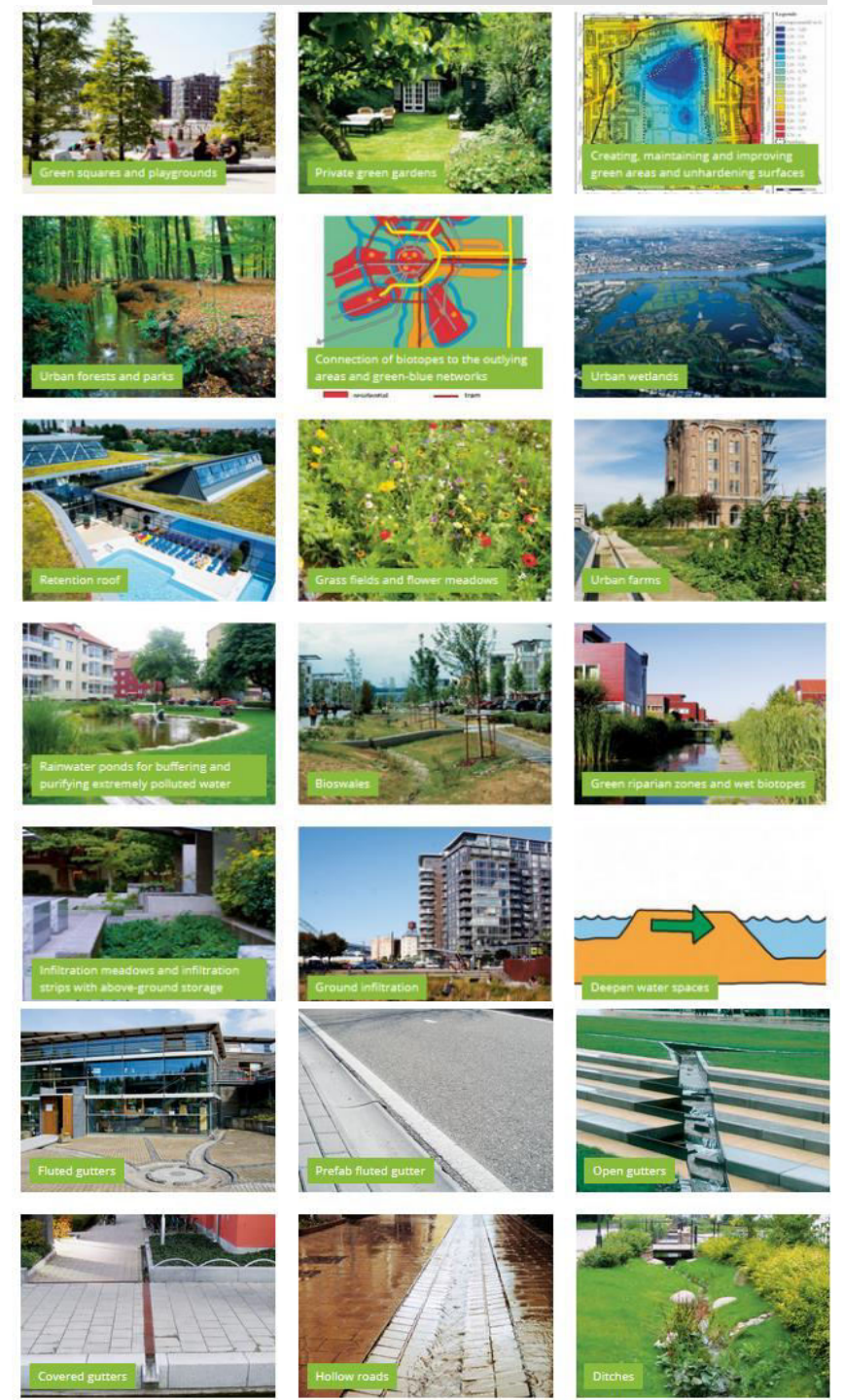


# Why is the 3PA an interesting addition to SC

- Comprehensive design to
  - Minimize damage extreme events beyond design standard
  - Maximum benefits for society and ecology every day
- Technical optimization, spatial planning and everyday value creation integrated
- Multifunctional solutions
- Platform for
  - Communication between professionals in different disciplines
  - Transdisciplinary co-creation

# Selection of Blue-Green Infra to MAXIMIZE benefits ...

- Many options => hard to make choices
- Local, institutional and personal preferences
- Multidisciplinary planning problem





# Issues of 3PA and BGI implementation

- Spatial scales
- Timescales
- Grey to Blue-Green to Green-Grey transition
- Asset management, data and monitoring
- Multidisciplinary communication
- Governance

## 3PA and spatial scales

Coherent set of interventions for:

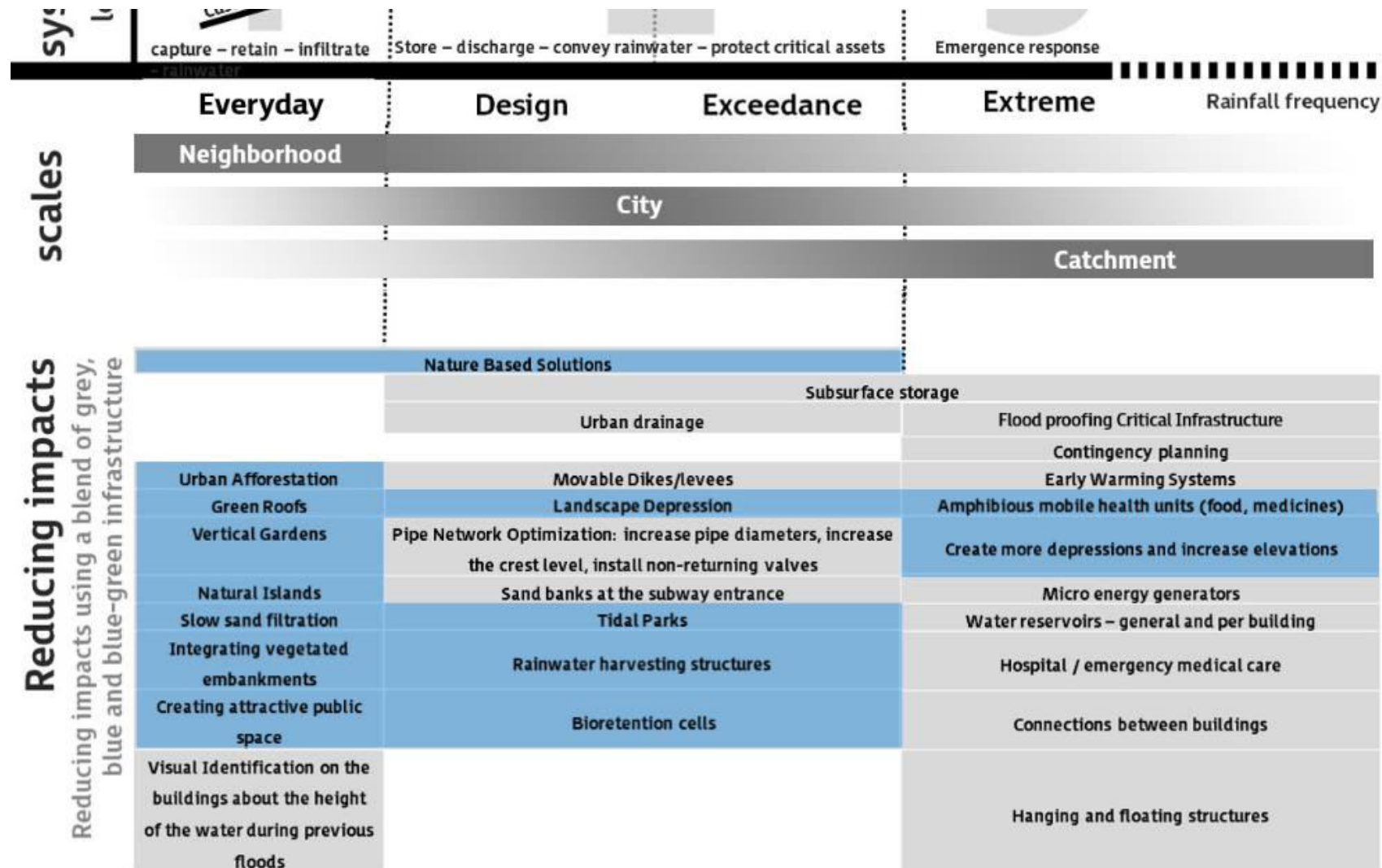
- Local level: Building - street - neighborhood / precinct
- City level: District - sub-urb - city
- Catchment: valley and regional river - main river - delta - coast

Leading for these interventions:

- Local water system, local soil and subsurface conditions
- Never shift problems
  - Not in space
  - Not in time
  - Not from private to public land



# 3PA and spatial scales



## 3PA and timescales

### Short time window

- Forecasts => preparedness; anticipatory control actions
- Avoiding staggering of peak runoff

### Long time window

- Urbanization, land use change, climate change
- Adaptation & transition management
- Adaptability / flexibility <= uncertain future conditions



# Grey to Blue-Green transition

Blue-Green infrastructure can produce many benefits and ecosystem services

IF AND ONLY IF

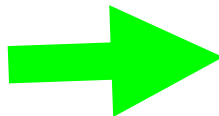
- well-planned, designed, constructed, operated and maintained
  - environmental conditions are in a narrow range



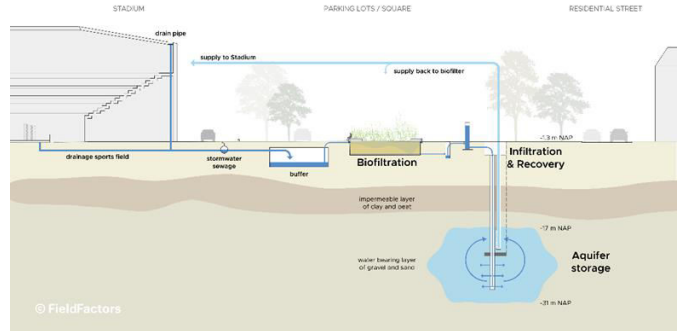
Integration of Blue-Green, Grey and Smart infrastructure is needed for more robust solutions

# Blue-Green Infra => Green-Grey Infra (GGI)

## Blue-Green Infrastructure



**NEW:**  
**Green-Grey**  
**infrastructure**





# Asset management, data requirements and monitoring

Green-Grey Infrastructure requires other asset management as compared with traditional grey infrastructure

- Design, construction, maintenance and operation are different
- Other data is required for this
- Other data => other monitoring systems
- Other data => other data registers
- This data to be shared with other stakeholders

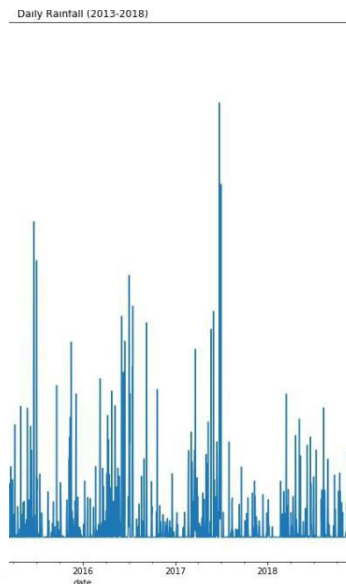
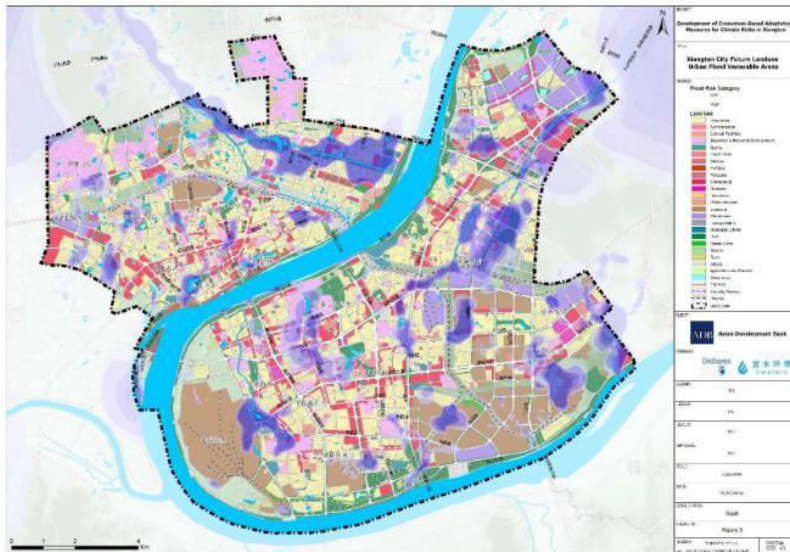
# Asset management, data requirements and monitoring

Detailed and reliable data is needed on

- Land use
- Soil & subsurface
- Rainfall and ET
- Ownership
- Green, biodiversity
- Assets, infrastructure
- Socio-economic situation
- Demographic situation
- Legal & institutional situation
- Planning process structure
- ...

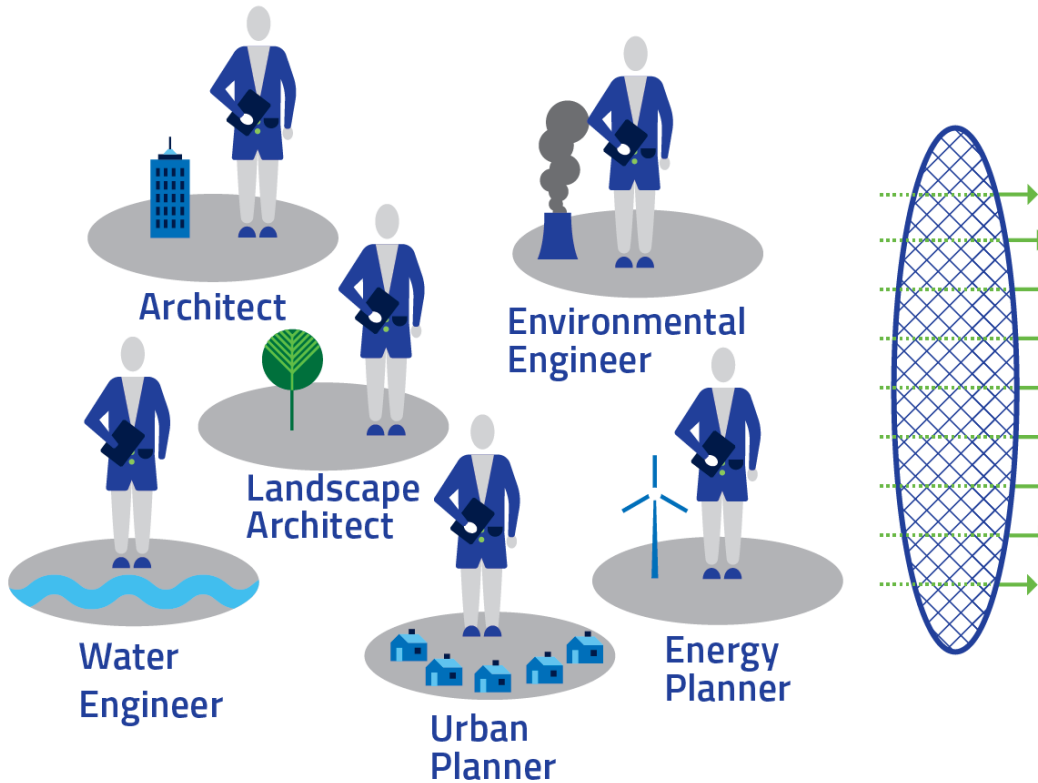


**Citizen science can help collecting the data**



# Multidisciplinary communication

Different experts => different languages => miscommunication





# Governance arrangements

Improve the Governance chain for 3PA and GGI implementation



# Implementing 3PA and GGI

Is challenging



Is it worth the efforts?

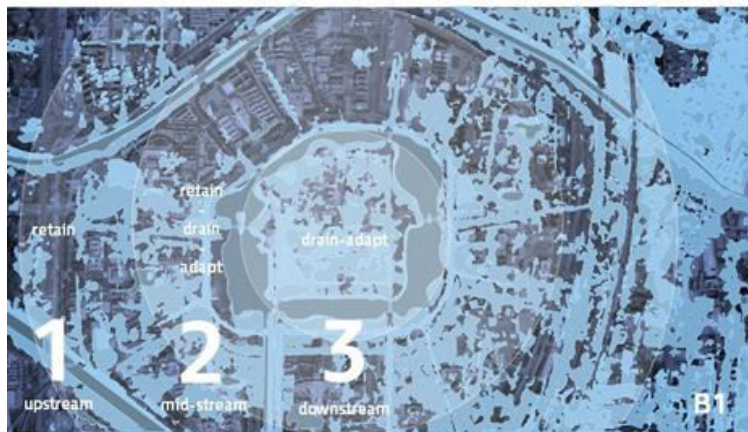
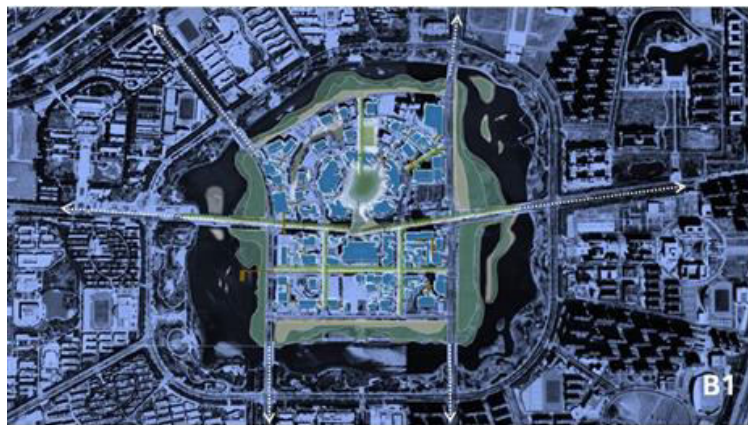


Pilot-testing the concept in Zhengzhou (Henan Province)



Two pilot areas





Longzi Lake Smart Island



Shangdu Historical and Cultural District



# Intervention options were designed

At street scale:



# Conclusion

The 3 Points Approach and Green-Grey Infrastructure can provide valuable additions to the Sponge City approach

Complex planning and design challenge due to principles and considerations:

- Never shift problems => Sponge (retention) capacity for flooding and drought
- Integrated solutions for flooding, drought, water quality, spatial quality, etc.
- Ecosystem-based adaptation for maximizing benefits
- Design *for, with* and *by* extremes to minimize damage
- Local water, soil, subsurface conditions leading
- Design for all types of floods
- Design to adapt over time
- Wide variety of data for all experts and stakeholders

# Conclusion

Water infrastructure planning is to become intertwined with spatial planning (at all scales)

For comprehensive planning, water managers need to know the priorities in other sectors (housing, energy, health, economy, ...)

Multidisciplinary collaboration is required for comprehensive planning and design

Such a collaborative planning process is a collaborative learning experience. All parties will learn.

The result is a trusted, widely supported plan

**WE ALL HAVE TO LEARN HOW TO DO THIS**



# Recommendation

Europe and China share common challenges in developing a REAL Integrated Water Management

New technological, nature-based, spatial and building solutions are needed, as well as new regulations and governance arrangements to plan, design, implement and maintain these

Continue the Sponge City cooperation between China and Europe with pilot studies on the implementation of the Three Points Sponge City approach in practice, at the scale of cities and catchments in both China and Europe

# Closing



## Thank you for your attention!

### Acknowledgements:

Our partners in the CECoS-team

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- Jasmin Schous
- Natalie Oonk



Rijkswaterstaat

# 中欧水资源平台（CEWP）--海绵城市及其他：应用“三点法”建设具有气候韧性的城市地区

## China-Europe Water Platform (CEWP) - Sponge Cities and beyond: Climate Resilient Urban Areas by application of the Three Points Approach



Time	Topic	Name
15:00 - 15:30	与会者入场、登记和就座 Walk in	登记、设施和翻译方面的组织援助
15:30 - 15:40 15:40 - 15:50	Welcome words 开幕致辞、欢迎辞和今天的目的 China Europe Water Platform (CEWP) Partnership Initiative介绍和视频	Mrs Jasmin Schous 女士 荷兰 Mrs Diana Carlos 女士 葡萄牙
15:50 - 16:00	对CEWP China Europe Cooperation on Sponge Cities (CECoSC) 合作的思考 成果、政策、指导与3PA白皮书的衔接	Mrs Natalie Oonk-Abrahams 女士 荷兰
16:00 - 16:30	Introduction White Paper Three Points Approach (3PA) emerged from CEWP CECoSC Policy Guidance: A proposal for EU/CN Future cooperation 导言 白皮书 3PA 由 CEWP CECoS 政策指导演变而来 欧盟/中国 未来的合作建议	Mr Frans van de Ven 先生 荷兰
16:30 - 16:40	休息	
16:40 - 17:10	Reflection on the White Paper & Proposed future water cooperation between EU and China for Water and Urbanization under 3PA 10 分钟 PPT 回应白皮书及 3PA 提议下欧盟与中国未来在水与城市化方面的水合作建议 • NHRI • HRC • UU	Mr Wang Leizhi 博士 中国 Mr Zhi Yang 博士 中国 Mrs Dai Liping 博士 荷兰
17:10 - 17:30	Wrap-up and conclusions 总结与结论	Mr Klaas Groen 先生 荷兰