

URBAN RISK REDUCTION PROJECTS AS CATALYST FOR SUSTAINABLE URBAN DEVELOPMENT

Second International Conference on Cities at Risk

Academia Sinica

Taipei, 11-13 April 2011

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AGENDA

BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

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BARRIERS TO URBAN RISK REDUCTION PROJECTS

Urban Adaptation to Climate Change

Pre-requisite:

- Proven necessity (due to the nature of non-revenue generated projects)
- Availability of public funding & resources
- Supports from local community

BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

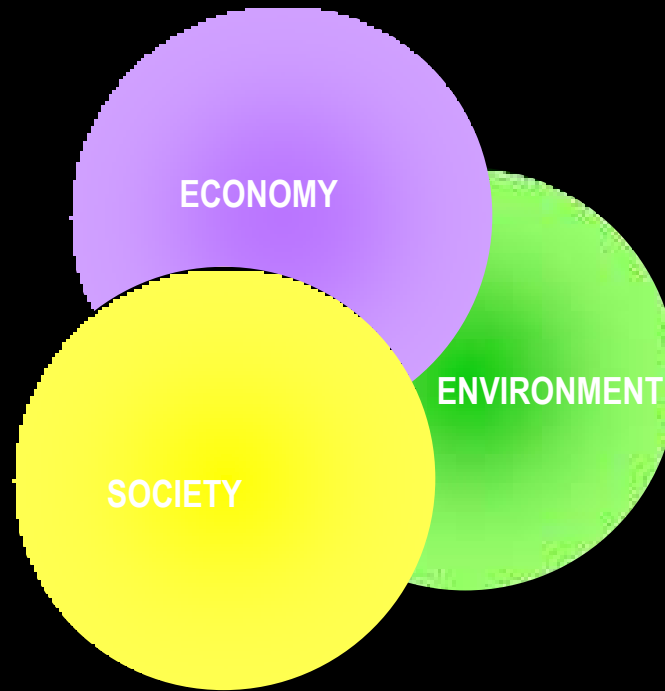
MULTIFUNCTIONAL URR – SUD PROJECTS

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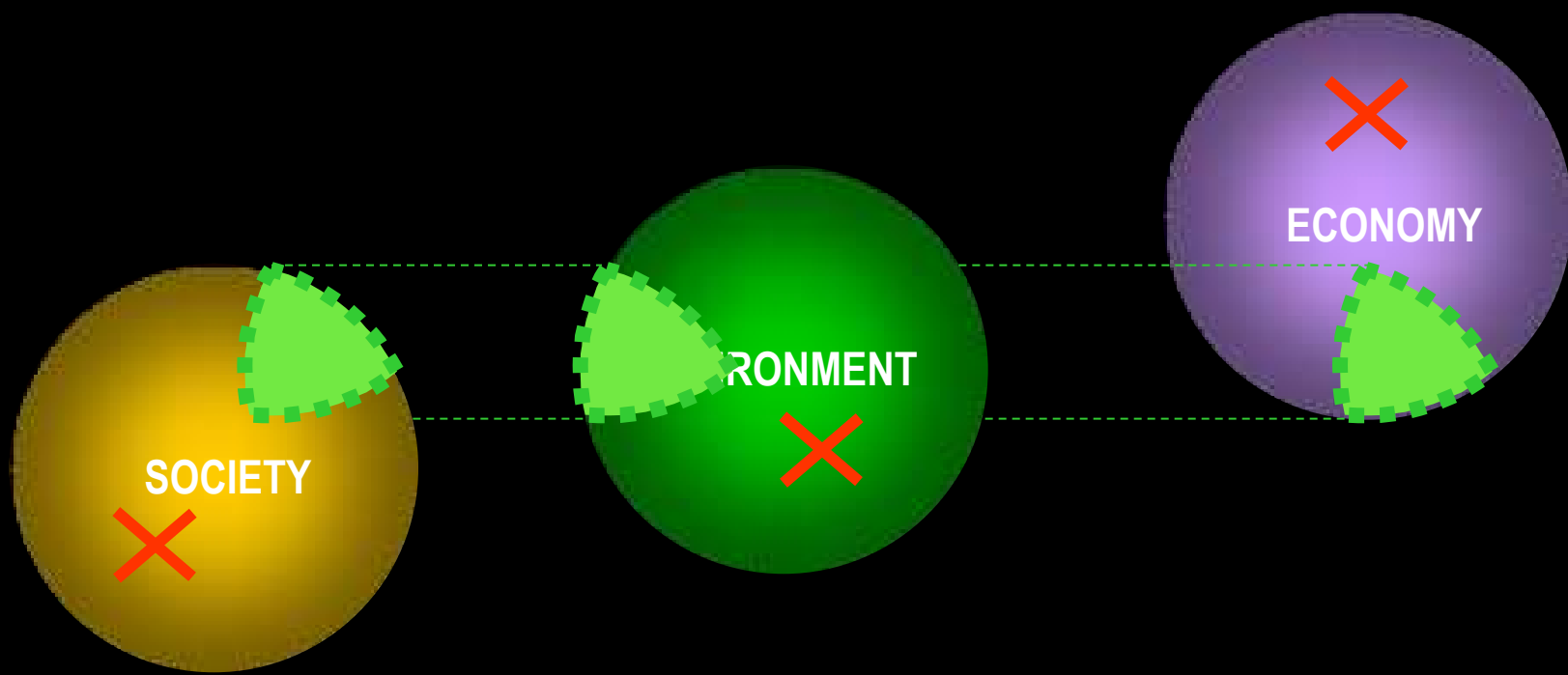
TBL RE-INTERPRETATION

The Triple Bottom Line



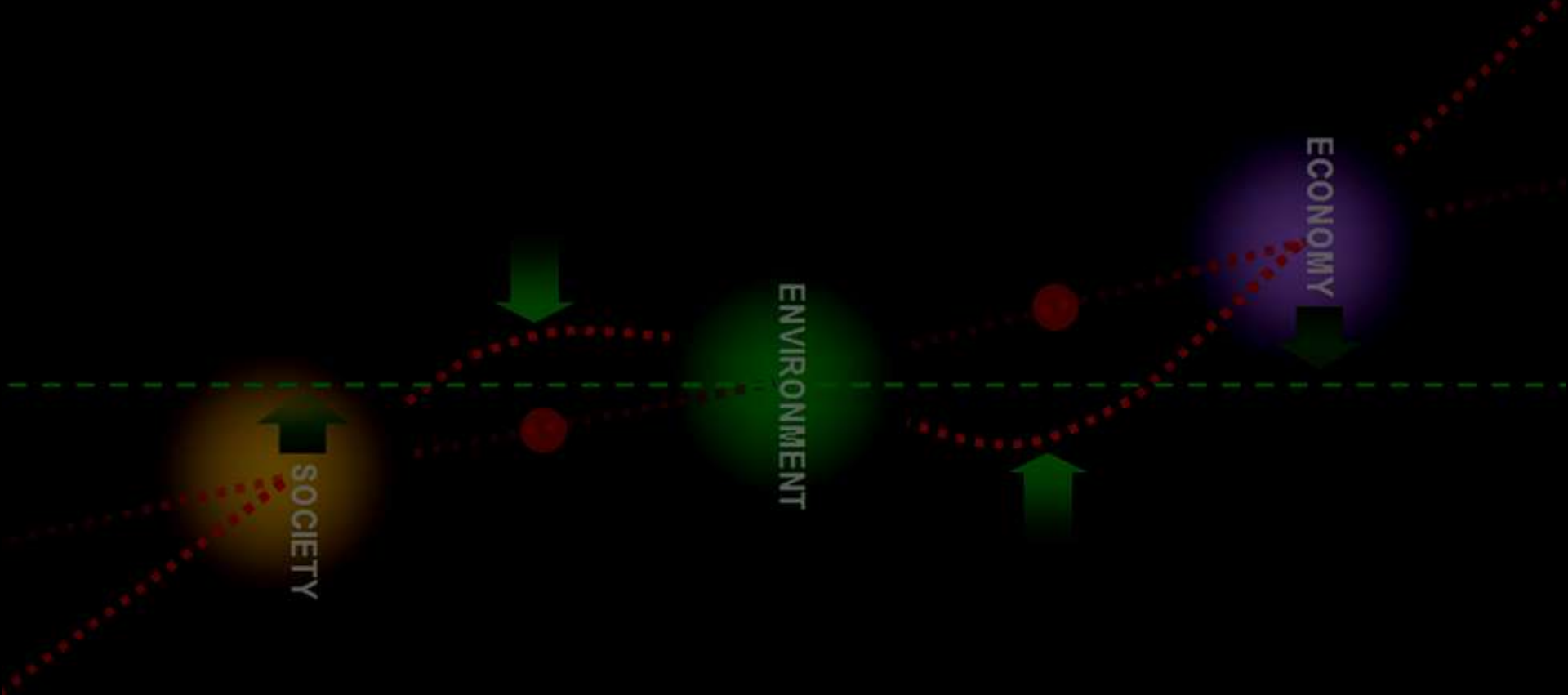
TBL RE-INTERPRETATION

Common Interpretation of TBL in 3-D View



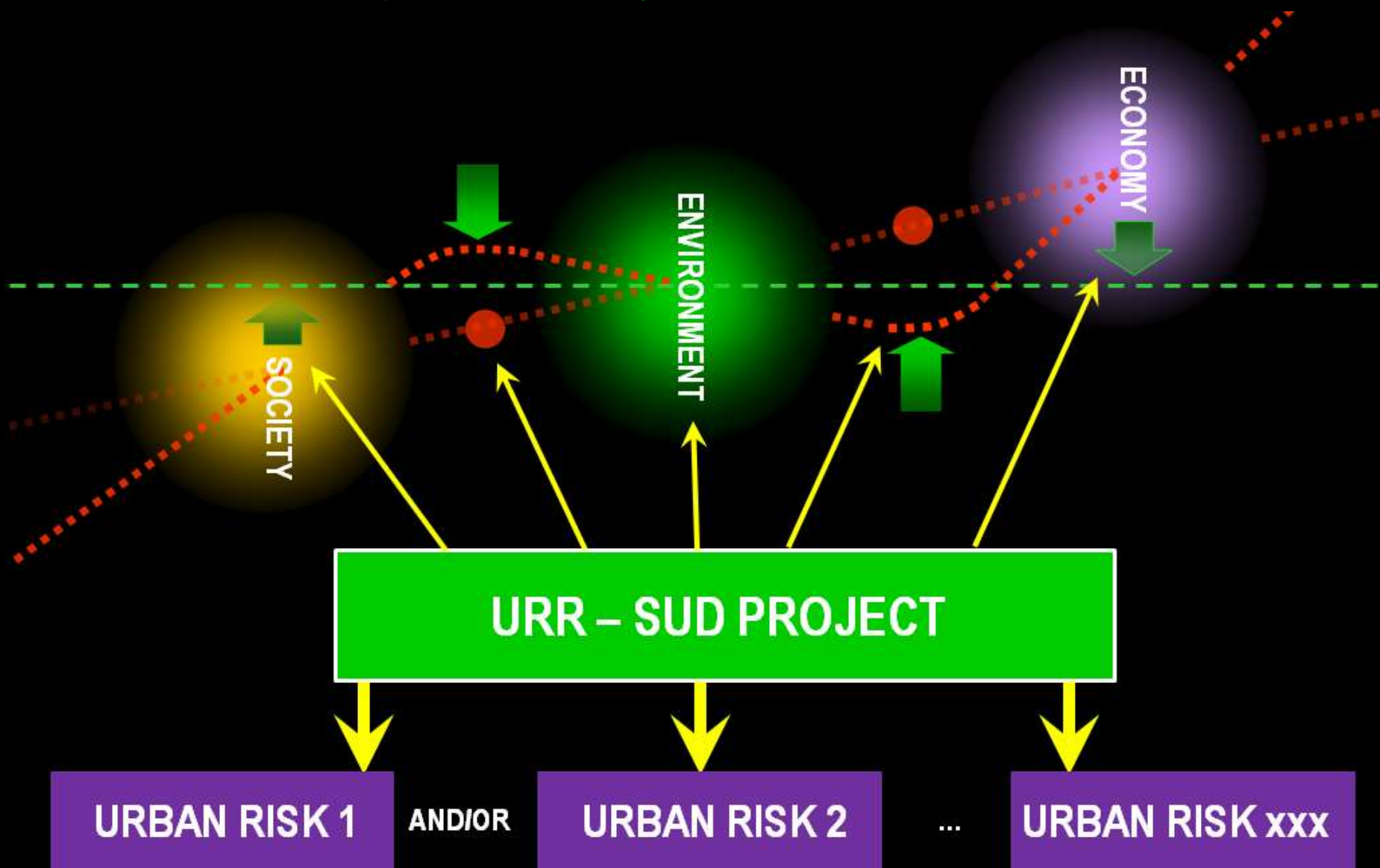
TBL RE-INTERPRETATION

Optimal Conditions for Sustainable Urban Development



TBL RE-INTERPRETATION

URR Projects as Catalyst for Sustainable Urban Development



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MULTIFUNCTIONAL URR – SUD PROJECTS

Possible Urban Risks caused by Climate Change Impacts Singapore

- Flooding
- Coastal Land Loss
- Water Resource Impact
- Public Health Impact
- Heat Stress
- Impacts on Island and Marine Biodiversity

(Source: NCCCR, 2010)

MULTIFUNCTIONAL URR – SUD PROJECTS

Beyond Flood Control

Flood Control

- . 9 x 30m steel crest gates to prevent flooding due to high tide
- . Stormwater holding during downpour
- . 7 pumps – each with a capacity of 40 m³/sec to flush excess storm water to the sea when a storm coincides with a high tide
- . Contribute to reduce flood prone area from 3178 ha in the 70s to 79 ha in 2009.

(PUB, 2009)

MULTIFUNCTIONAL URR – SUD PROJECTS

Beyond Flood Control

Fresh Water Reservoir

- . 350m dam built across the mouth of Singapore River
- . Singapore's largest freshwater reservoir
- . 10,000 ha catchment area
- . Increase total water catchment area to 2/3 of land area

(PUB, 2009)

MULTIFUNCTIONAL URR – SUD PROJECTS

Beyond Flood Control

Urban Connectivity

- . 350m long pedestrian bridge across the mouth of Singapore River

MULTIFUNCTIONAL URR – SUD PROJECTS

Beyond Flood Control

Renewable Energy

- . 70kW peak Solar Park
- . Meet over 50% of daytime electricity required for indoor lighting.

(PUB, 2009)

MULTIFUNCTIONAL URR – SUD PROJECTS

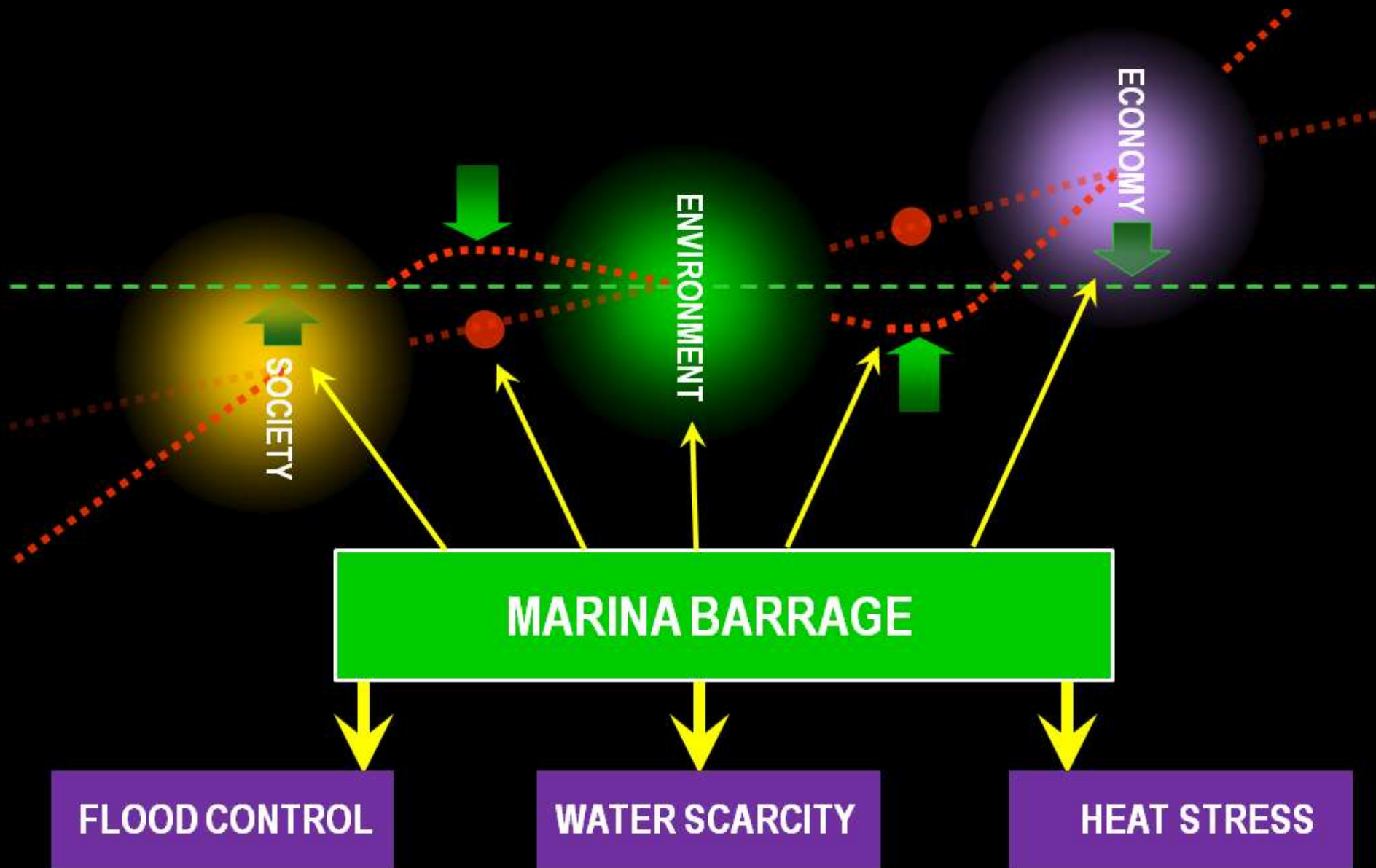
Beyond Flood Control

Urban Green Space
Venue for Public Art



MULTIFUNCTIONAL URR – SUD PROJECTS

Beyond Flood Control



MULTIFUNCTIONAL URR – SUD PROJECTS

Replenishing Water Resource

Four National Taps

- Imported Water:
 - . Nearly 40% of water demand
- Local Catchment Water:
 - . Annual rainfall of approx. 2300mm
 - . Treat harvest stormwater to potable level
 - . Meet approx. 20% of the nation's water needs
- NEWater:
 - . High-grade reclaimed water produced from treated used water
 - . To meet 40% of water demand in 2020, and 50% in 2060
- Desalination:
 - . To meet 25% of water demand by 2020, and 30% by 2060

MULTIFUNCTIONAL URR – SUD PROJECTS

Replenishing Water Resource

- . 17 reservoirs, 32 major rivers and more than 7,000 km of canals and drains
(PUB, 2009)
- . Bio-engineering treatment to filter pollutants from urban storm water
- . Nurturing biodiversity
- . Adding values to properties
- . Waterfront development
- . Facilitate waterfront activities to strengthen community development

MULTIFUNCTIONAL URR – SUD PROJECTS

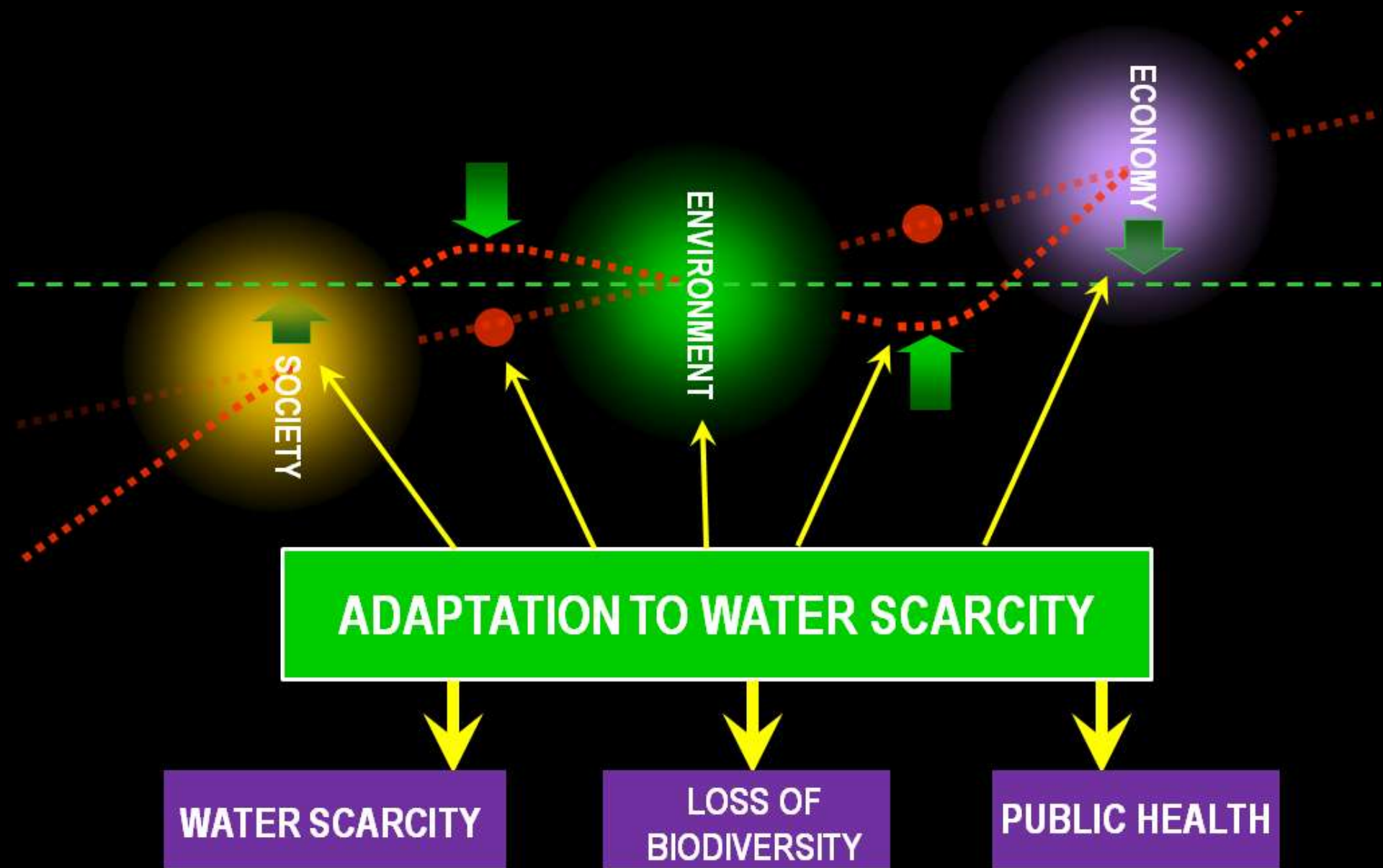
Replenishing Water Resource and Life

NEWater Plant

- . High-grade reclaimed water produced from treated used water
- . Engineering integrity
- . Public education
- . Visiting destination

MULTIFUNCTIONAL URR – SUD PROJECTS

Replenishing Water Resource and Life



MULTIFUNCTIONAL URR – SUD PROJECTS

Heat Stress Reduction and More **Rooftop Garden**

- . Mitigate Urban Heat Island Effect by shading heat-absorbing building surfaces, such as concrete, masonry, metals
- . Reduce immediate ambient air temperature by about 4⁰C in tropical regions
- . Reduce roof surface temperatures by 30⁰C (Wong et al, 2003)
- . Land Use Efficiency
- . Views, Open Space, Facilities
- . Connection, and Community Bonding
- . Nurturing and enhancing urban biodiversity
- . Tourism destination
- . Commercial value

MULTIFUNCTIONAL URR – SUD PROJECTS

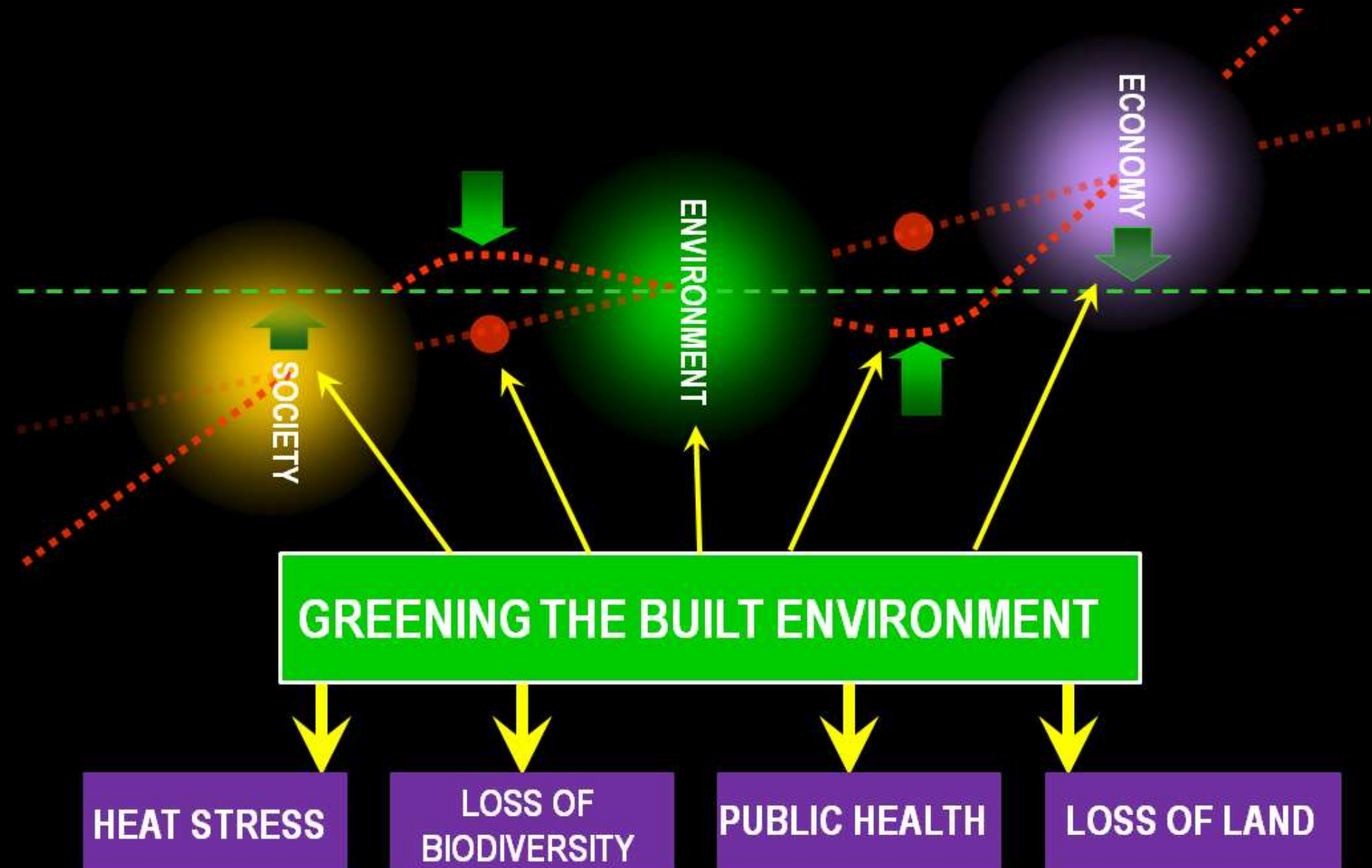
Heat Stress Reduction and More

Greening the Infrastructure

- . Plants absorb airborne particles and improve ambient air quality
- . Improving public health
- . Creating comfort environment for pedestrian movement

MULTIFUNCTIONAL URR – SUD PROJECTS

Heat Stress Reduction and More



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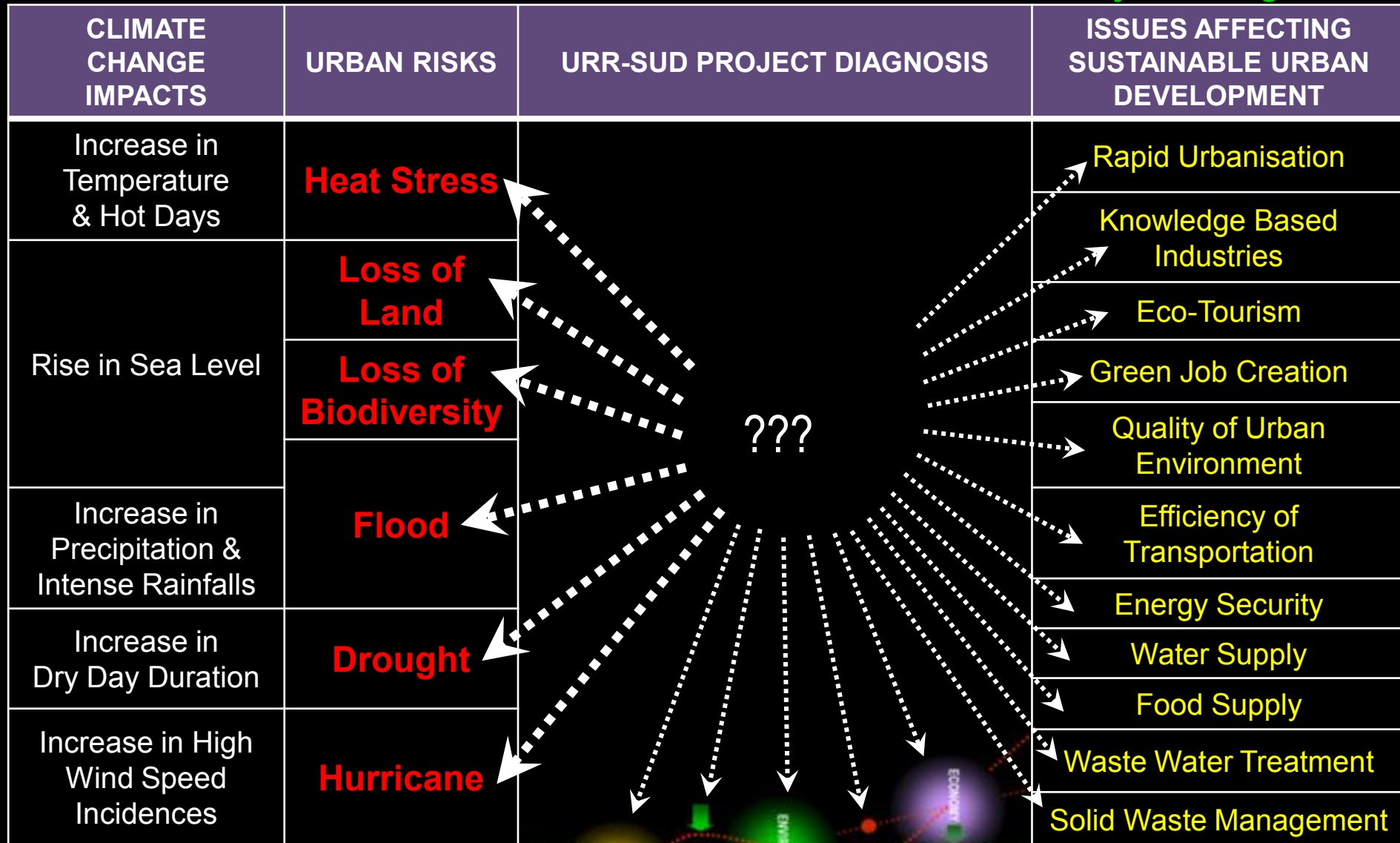
DIAGNOSIS FRAME WORK & APPLICATION IN ASIA-PACIFIC COASTAL CITIES

Rapid Urbanisation

Climate Change Impacts in Asia-Pacific Region

DIAGNOSIS FRAME WORK & APPLICATION IN ASIA-PACIFIC COASTAL CITIES

URR-SUD Project Diagnosis



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Success Factors

- Incorporate URR in Overall City Planning, e.g. **Master Plan for URR**
- Identify strategic **URR projects** as **catalyst** for sustainable urban development
- Be ambitious and **set high standards**
- Assign, and plan for, **multi-functions**

CONCLUSION

Success Factors

- Identify and optimise **reciprocal relationships**
- **Innovative collaborations** for innovative solutions
- Strong Justification to attract funding, public and private supports
- URR Projects: Be engineering **Rigorous** in its core function.
Foster sustainable development in daily operation
- All the above in **appropriate context** and **local conditions** of each cities

THANK YOU