

# URBAN RISK REDUCTION PROJECTS AS CATALYST FOR SUSTAINABLE URBAN DEVELOPMENT

**Second International Conference on Cities at Risk**

Academia Sinica

Taipei, 11-13 April 2011

---

Dr. Wynn Chi-Nguyen CAM

[cncam@alumni.nus.edu.sg](mailto:cncam@alumni.nus.edu.sg)

# AGENDA

BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

# BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

# 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

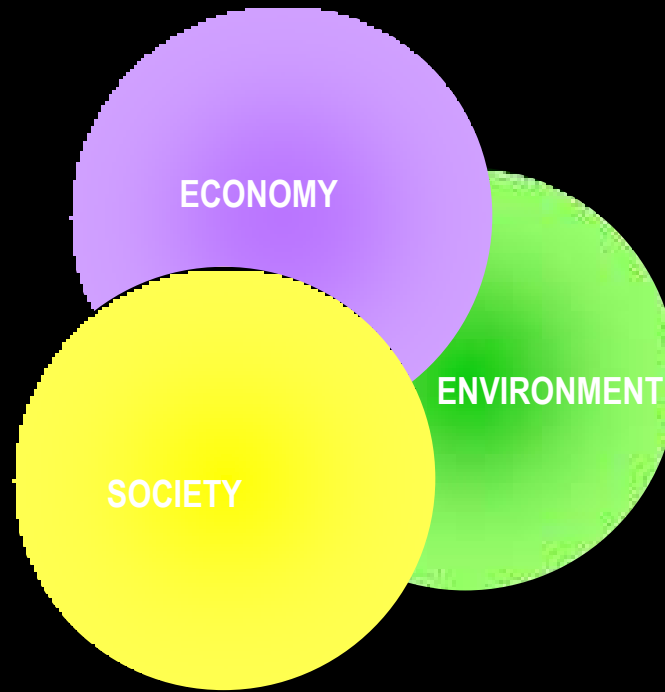
MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

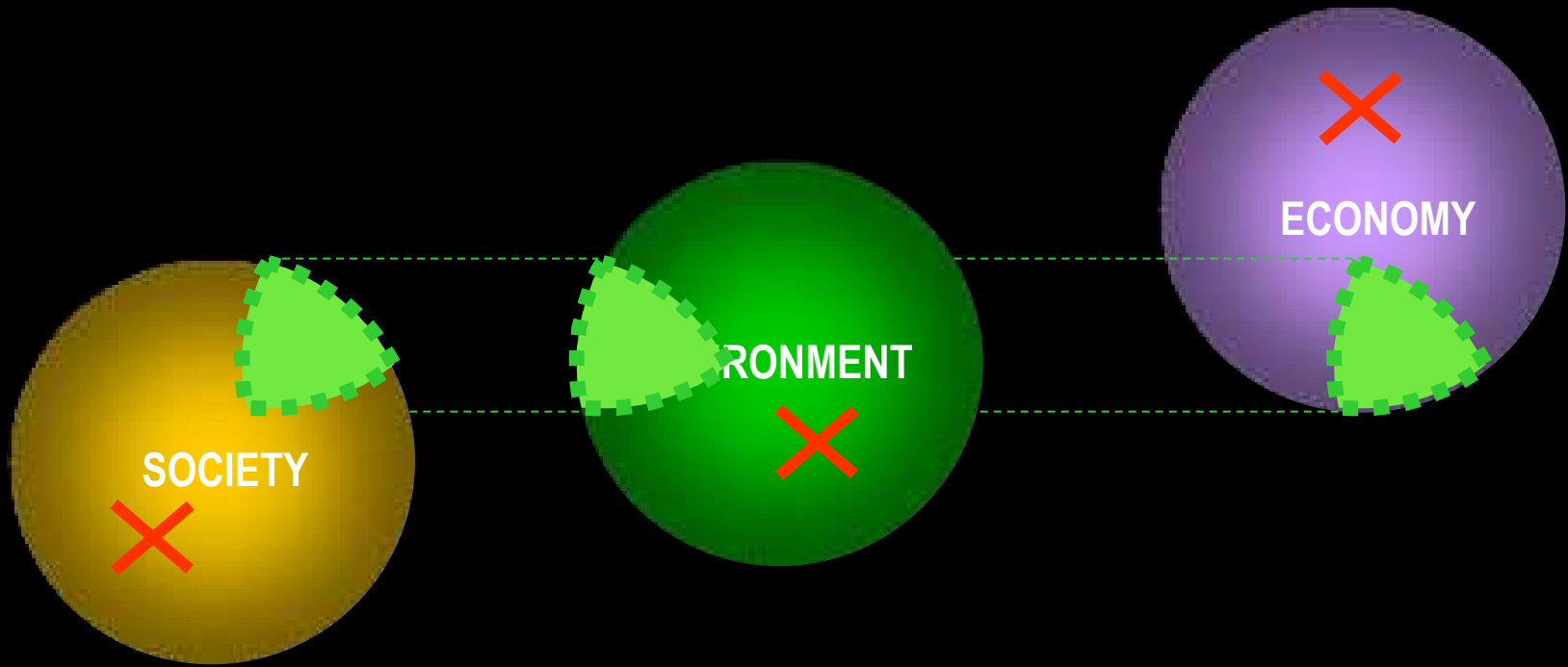
# TBL RE-INTERPRETATION

*The Triple Bottom Line*



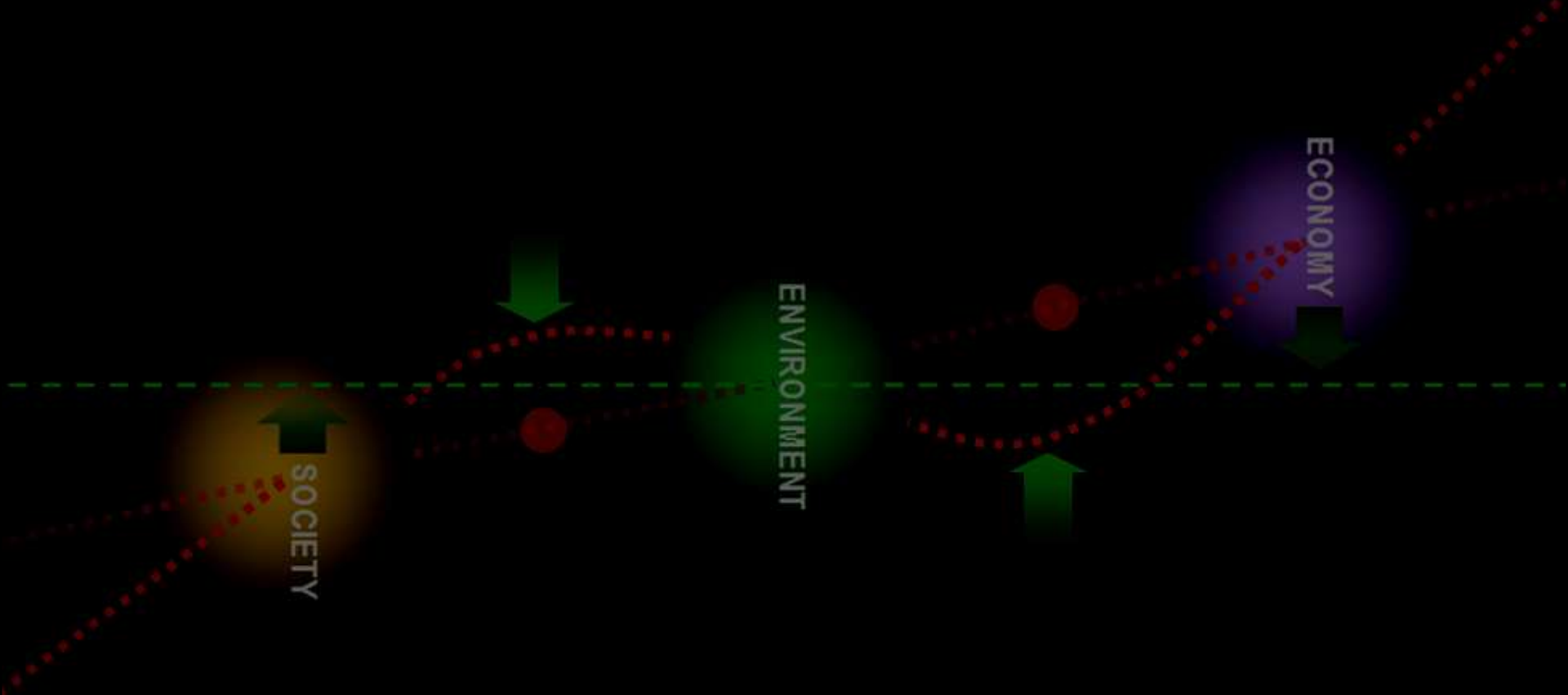
# TBL RE-INTERPRETATION

*Common Interpretation of TBL in 3-D View*



# TBL RE-INTERPRETATION

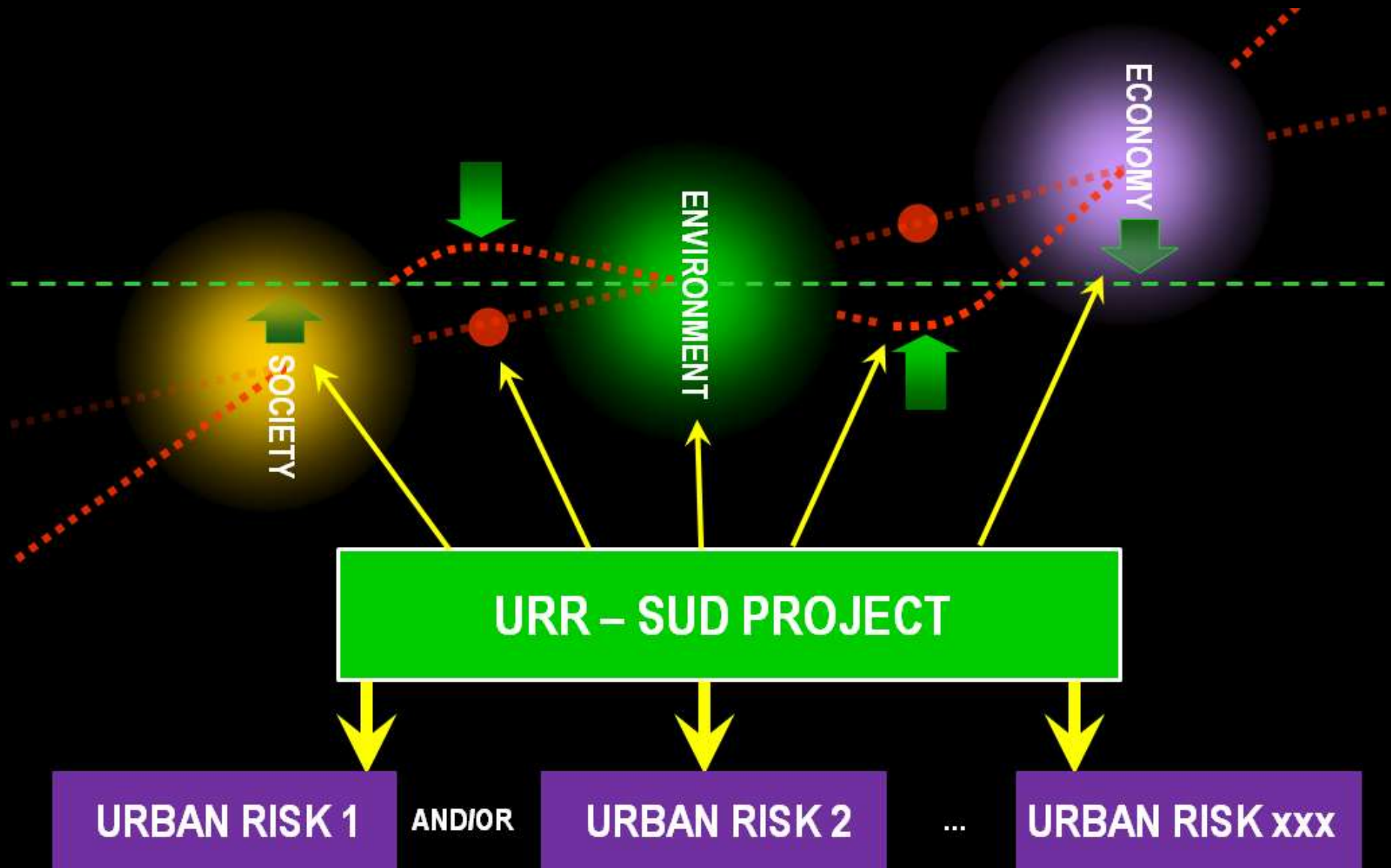
*Optimal Conditions for Sustainable Urban Development*





# TBL RE-INTERPRETATION

## *URR Projects as Catalyst for Sustainable Urban Development*



BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

# 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 m<sup>3</sup>/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*

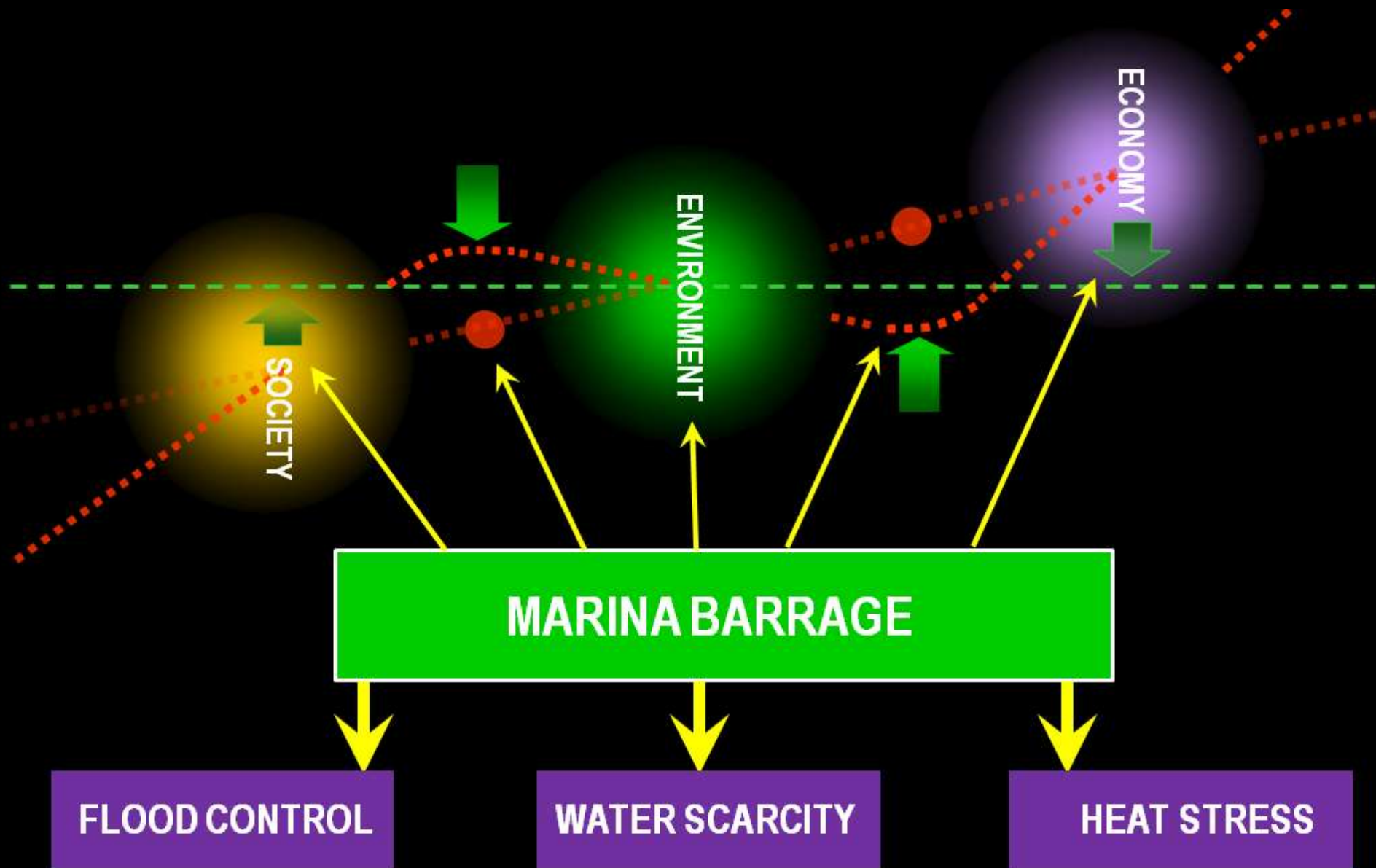
Urban Green Space  
Venue for Public Art





# 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

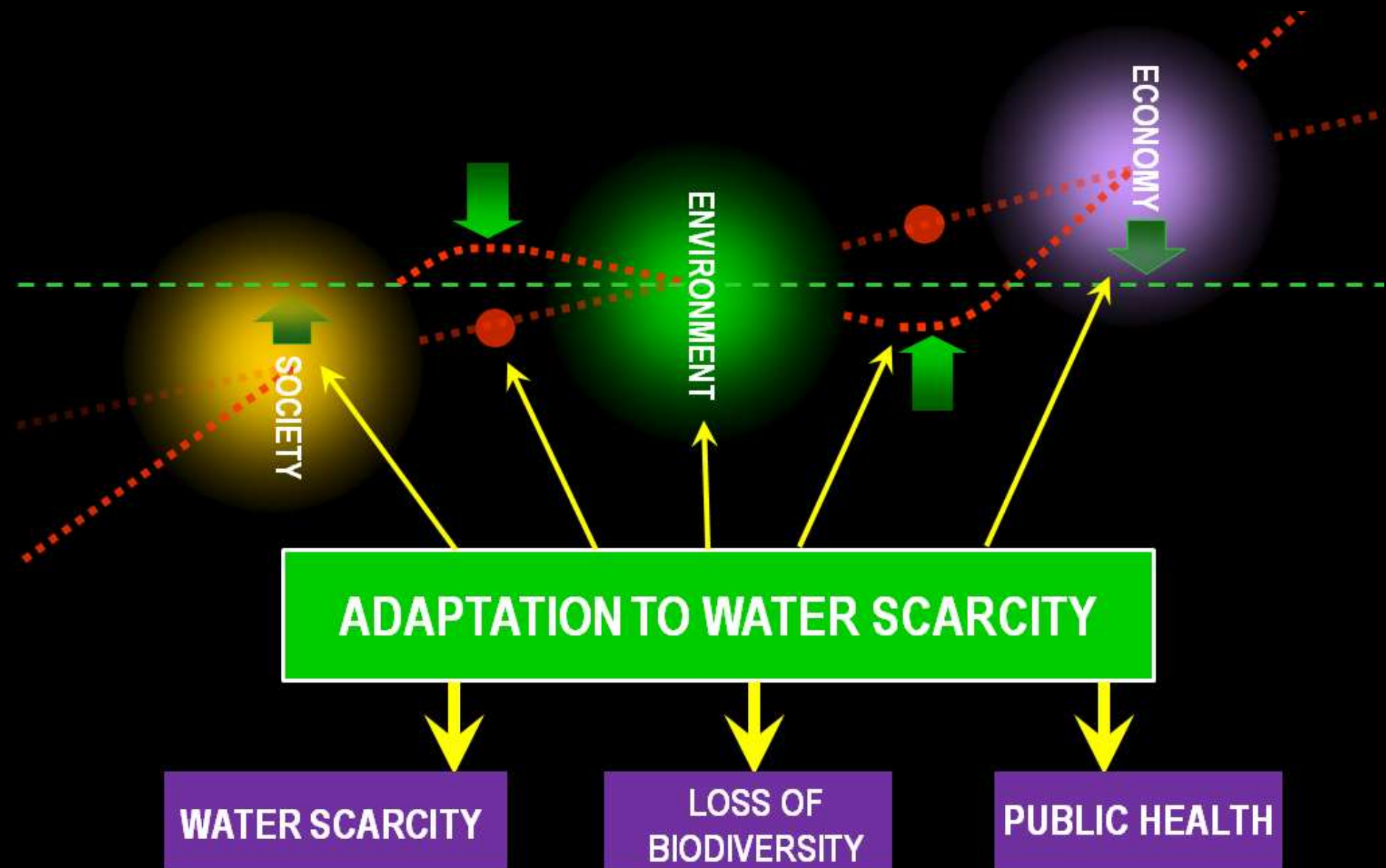
*Replenishing Water Resource and Life*

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 4<sup>0</sup>C in tropical regions
- . Reduce roof surface temperatures by 30<sup>0</sup>C (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

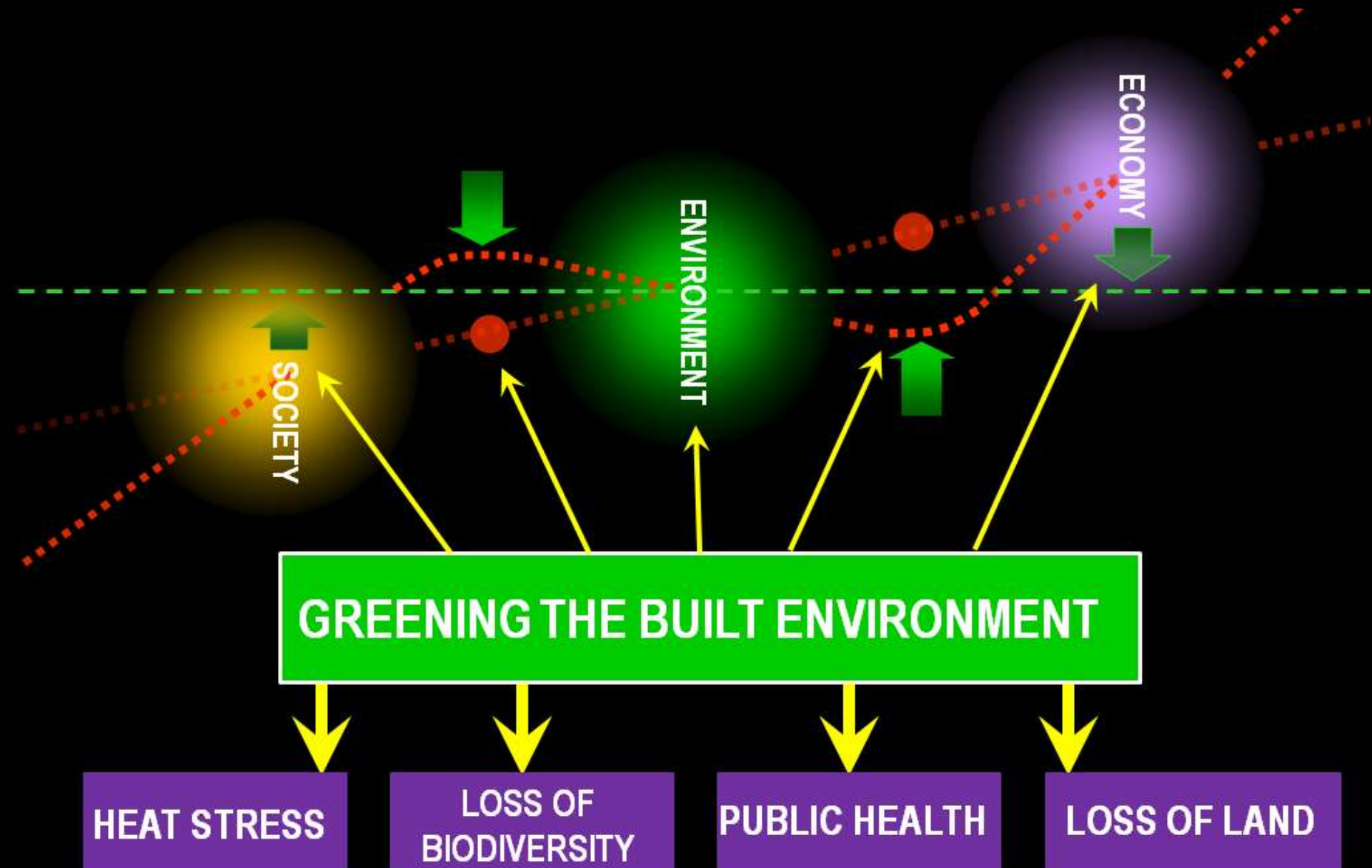
*Heat Stress Reduction and More*

**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*





BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

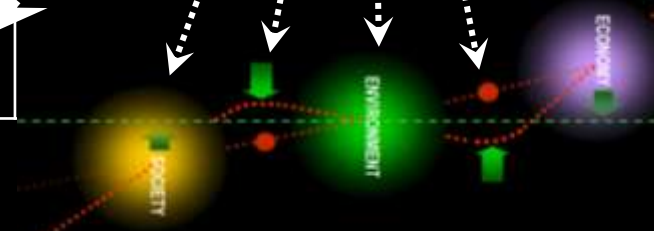
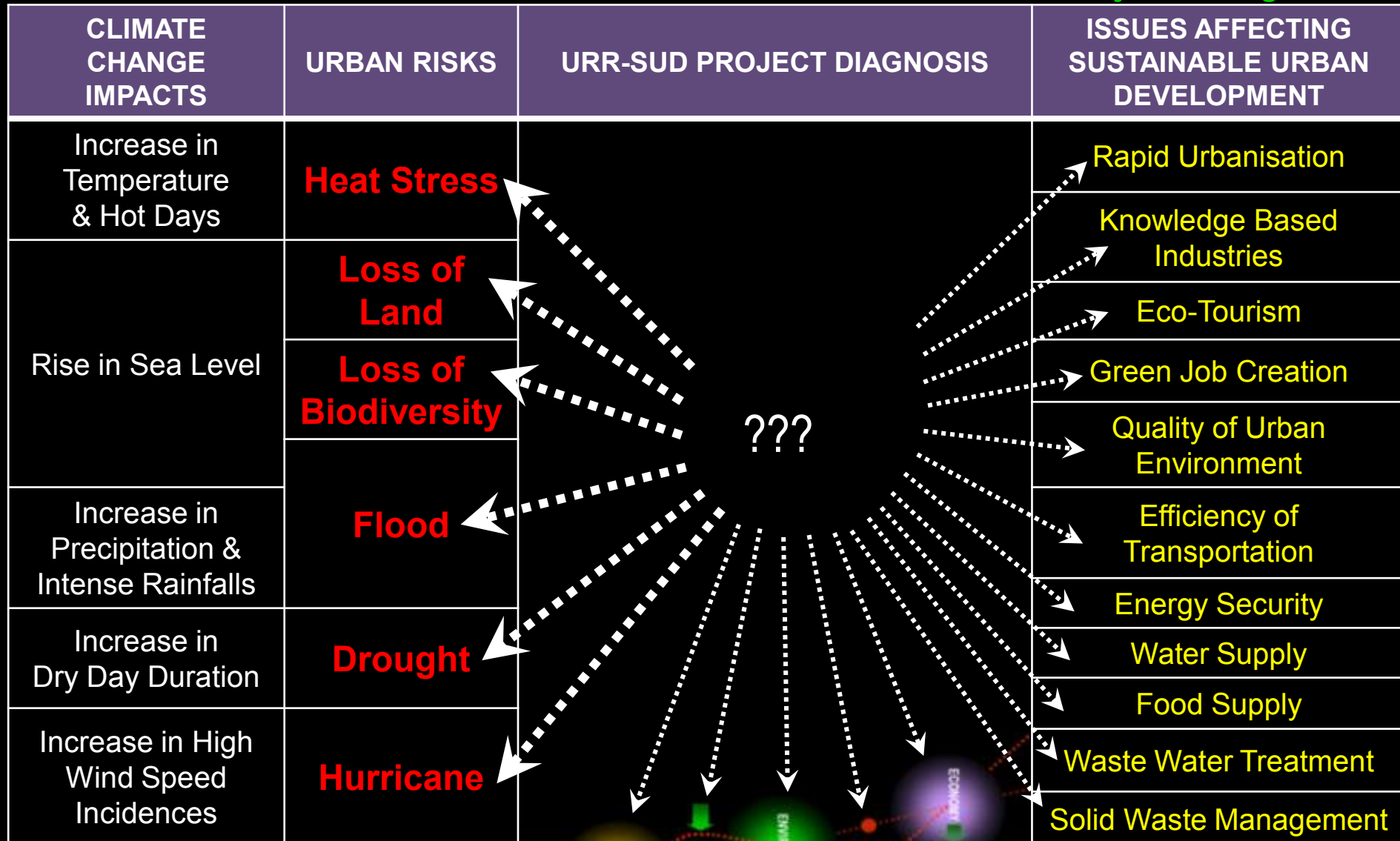
# DIAGNOSIS FRAME WORK & APPLICATION IN ASIA-PACIFIC COASTAL CITIES

*Rapid Urbanisation*

*Climate Change Impacts in Asia-Pacific Region*

# DIAGNOSIS FRAME WORK & APPLICATION IN ASIA-PACIFIC COASTAL CITIES

## URR-SUD Project Diagnosis



BARRIERS TO URBAN RISK REDUCTION PROJECTS

TRIPLE BOTTOM LINE RE-INTERPRETATION

MULTIFUNCTIONAL URR – SUD PROJECTS

DIAGNOSIS FRAMEWORK

CONCLUSION

## CONCLUSION

### *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