CITY RESILIENCE INDEX SESSION





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AGENDA

- 1. Introduction: concept, research and framework
- 2. Applications
- 3. Case Study- Surat
- 4. Impact and Outcome
- 5. Questions and discussion







INTRODUCTION: CONCEPT, RESEARCH AND FRAMEWORK

COMPLIMENTARY URBAN AGENDAS

Acting to **avoid or** reduce the severity of something negative like pollution from the emission of greenhouse gases

Mitigation

Adaptation

Modifying current practices or assets to limit the impact of climate hazards associated with climate change Disaster Risk Reduction

Aims to reduce the damage caused by natural hazards like earthquakes, floods, droughts and cyclones, through an ethic of prevention. Sustainable development

Development that meets the needs of the present, without compromising the ability of future generations to meet their own needs.

City Resilience

Is the **capacity of cities to function**, so that the people living and working in cities – particularly the poor and vulnerable – survive and thrive in the face of shocks and stresses.

Cities rely on a complex web of institutions, infrastructure and information





Cities rely on a complex web of institutions, infrastructure and informationto function when faced with disruptive circumstances



CITY RESILIENCE INDEX





- Tangible
- Practical

CITY RESILIENCE INDEX

• Globally applicable















RESEARCH



CONCEPTUAL FRAMEWORK



HEALTH & WELL-BEING





1. Minimal human vulnerability



2. Diverse livelihoods & employment



3. Effective safeguards to human life and health

ECONOMY & SOCIETY



4. Collective identity & mutual support



5. Comprehensive security and rule of law



6. Sustainable economy

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INFRASTRUCTURE & ENVIRONMENT

decision-mak

Secure technolo

Place

Julnerability

dical cal

Local comp

Suma- 1

"the man-made and natural systems that provide critical services, protect and connect urban citizens."

duced Exposure

7. Reduced physical exposure



8. Continuity of critical services



9. Reliable communications & transport





10. Effective leadership & management



11. Empowered stakeholders



12. Integrated development planning



APPLICATION

RESILIENCE SOLUTIONS HUB

- A platform that hosts a database of crowdsourced resilience solutions
- Solutions are obtained straight from the people who worked on them - contributed by resilience professionals and city users involved in planning or implementing solution
- User interface encourages serendipitous discovery of solutions and other resilience networks
- Resilience Exchange has adopted CRI as the preferred terminology for city resilience solutions







CHILD-CENTRED URBAN RESILIENCE

• Applying resilience concepts to particular communities



Children in cities are resilient resourceful and street-smart But they also need to be supported to promote their participation in providing and protecting their rights. Cities can support this demonstrate resilience by providing the services, environments and opportunities urban children need to flourish.

"



GUIDING CONCEPTS Three key guiding concepts have

influenced the approach set out in this document:



Cities are complex systems. Many social, physical, economic and governance systems need to work and



THINKING HOLISTICALY ABOUT URBAN WATER SYSTEM

City Water Index

" Of the more than 1,000 applications for the 100 Resilient Cities Network, more than 60% indicated challenges with water – too much or too little – as critical resilience risks. There is tremendous opportunity for the cities in this cohort to provide lessons and expertise to the many cities around the world grappling with water challenges. "

investment wastewater Health & Wellbeing Lesdeship Stratech strategies services access to treated water auality of receiving regulation sanitation and hyglene governan_{Ce} ecological health of water bodies ⁿon-revenue Water Infreshucture & Environment Cost acounty Economy & Solet water utility access to frience infastructure age of citizen infrastructure engagement

Andrew Salkin, VP 100RC

PARTNERSHIP WITH SYSTEMS APPROACH

Understand the water cycle at catchment scale

The water cycle is a natural system, usually heavily modified by human socioeconomic activity, such as agriculture, urbanisation and the wider impacts of climate change. Analysis of the existing water cycle at catchment scale will identify highlevel risks and benefits associated with its protection and enhancement.

Align with other drivers and development needs

Water may not be the primary driver for all stakeholders. Water-related actions may come forward as a result of other priorities, such as delivery of green infrastructure, improved amenity or climate change adaptation. Aligning the water cycle with other drivers, community priorities and potential investment/funding programmes will help to bring forward projects that are deliverable and maximise benefits to investors, the environment and wider society.

Identify partners and understand their priorities

Having identified areas where agendas overlap, potential partners can be identified. It is important to understand the priorities of each partner. It is likely that each partner will have a partial case for action based on the direct benefits returned to their organisation. However, none are likely to be able to justify investment to deliver all of the potential benefits of a multifunctional water-related project. At this stage, predictive valuation of wider benefits using Payment for Ecosystem Services (PES), and Social Return on Investment (SROI) can help various partners to build a case.

Build a shared case for investment and action

By formulating a joint project it is possible to develop a scenario where objectives are aligned and costs are shared in proportion to the benefits returned. At this point it may be necessary to adjust the project objectives and scope and bring in other partners to bring expertise, share risk and investment costs. Through this process of collaboration and joint-working, an overall shared case for action and investment is created.

Delivery, maintenance, evaluation, feedback

It is important that whole life costs are considered when formulating projects and investment plans to ensure adequate budgets for ongoing maintenance. Delivery of projects on the ground will build an evidence base for multi-functional infrastructure projects. Predictive and post-project evaluation is important. Alongside analysis of water management benefits, post-project evaluation of wider benefits using techniques like PES and SROI can help to build an evidence base for future projects.



DESIGNING WITH WATER

- Model the urban water • system holistically beyond traditional sector and geographic silos
- By placing a re-integrated water cycle at the heart of sustainable planning, design and delivery, we ensure actions taken to protect and enhance the water cycle can deliver multiple wider benefits

Upper catchment management Raw water demand reduced as a Spatial planning and land use Understanding of the integrated water Water footprinting City centre Understanding embodied water use within Water reintegrated as a central feature result of water efficiency throughout the city to determine water footprint and of high quality public realm. New and cycle at catchment scale informs catchment. Moorland and woodland dependencies with remote water systems. rural and urban planning and landretrofitted water efficient buildings use, ensuring sustainable urban management reduces colour in raw use green roofs, green façades and Agriculture and food water, improves water quality in development is integrated with its intelligent management systems. Land management to reduce run-off and improve hinterland and wider context. rivers and reduces run-off. Hydro-Building scale harvesting and recycling. water quality. Restoration and protection of river power is a source of energy. Ground water as heat source. New edges from contamination and grazing animals. Campus/business park water and urban greening improves Localised food growing throughout the city Compatible uses encourage localised microclimate and controls run-off and edible planting throughout the green grid. recycling and sharing of water Nutrient recycling from wastewater treatment. resources. Landscape and buildings enhanced through water related interventions Protection of critical infrastructure depending on urban context. Floodcompatible uses along river. Θ \circ Sustainable urban extension Site selection and planning to avoid flood risk and work with natural water cycles. Low carbon and water efficient homes. 0.9 Community-scale water supply and treatment, including grey water recycling CHP/solar power supplemented by micro hydro. Groundwater supply and potential Inner city retrofit -Whole house retrofit including water heat source, with aquifer recharge from efficient fixtures, smart metering, Green infrastructure SuDS and treated wastewater. disconnection of downpipes and water Water plays a key role in the recycling, coupled with landscape retrofit Extended asset life for existing delivery of green infrastructure infrastructure of SuDS, creating habitat and amenity. through de-culverting and Municipal treatment works -By reducing demand for supply and Possibility of community-scale restoration of rivers and canals. treatment, better water management can Capacity and carbon footprint reduced. decentralised treatment for surface SuDS retrofit, and vegetation/tree extend the life of existing water and Energy generation from waste, water and industrial/domestic greywater. planting to reduce run-off and hydraulic recovery, wind, and, for wastewater assets avoiding disruptive and Possibility of sever mining for light manage microclimate. Green grid example, solar retrofitted to redundant carbon-intensive replacement. industry, landscape maintenance and inhabited by community orchards localised food production. settlement tanks. Spare land use as tree and edible planting, play areas, massery for urban greening/woodfuel. and allotments. Networks of Soil production from green waste used paths and cycleways. for food growing and urban greening. Reducing risk, increasing resilience Nutrients recycled locally. and making better places

Revitalised river space Re-design and re-connection of river banks using range of multifunctional flood defence options

> Water-resilient Restored and infrastructure revitalised canals and waterways

Flood-resilient Coastal defences development Protecting urban areas and

settlements and providing

integrated water cycli



Smart infrastructure Real-time smart monitoring and control in buildings. on networks, rivers and waterways saves water. energy and improves flood control and forecasting.

Dynamic natural coast Providing habitat and amouity.

WATER SENSITIVE URBAN PLANNING

In the UK, Sheffield City Council is working with the Environment Agency on an ambitious £83m investment programme to protect the city from flooding. To support this, Arup is developing business cases and project appraisals for flood protection schemes on the Upper Don and Sheaf catchments, as well as preparing high-quality consultation material for the council.

Sheffield sits at the foot of the Pennines and its fastflowing rivers make it vulnerable to flooding. Options for the flood protection schemes include creating flood storage areas in open spaces such as parks and woodland. Building new flood defences is also under consideration, as is tree planting and moorland restoration to keep rainwater in upland areas and reduce flooding downstream in the city.

The investment programme aims to protect 6,000 homes and 1,760 businesses, safeguarding 32,700 jobs and, over the lifetime of the programme, preventing £1bn of damage to the city. The programme will also play a key role in enabling growth. It aims to protect 46 hectares of riverside brownfield land for development, creating 15,000 jobs. It will enable 27,000 new homes to be built. And by regenerating 30ha of riverside land it will create new tourism and recreation opportunities – as well as enhancing biodiversity.

32,000 jobs safeguarded £ 1 Bill Preventi damage

Visit Websit f Billion Pounds Preventing £1 billion of damage to the city



LOCALISING TO CONTEXT

VUDA resilience tool

 Adapting global metrics in CRI to Vietnamspecific standards and data conventions

> **Dimensions and goals** no change

Indicators and questions review for relevance based on local context, including shocks and stresses



TOOLS & PROCESSES

Mapping Tools (excel based)







Workshop design





COMMUNICATION AND CAPACITY BUILDING



DATA, MEASUREMENT



156 variables **measure the extent** to which the resilience indicators occur in a city.

2-5 questions help observe the performance of an indicator through two types of response: qualitative and quantitative.

These two perspectives provide a **judgement-based** assessment against a best case – worst case scenario ...

... and a **performance-based assessment** against a global benchmark.



MEASURING PERFORMANCE

Utilities - Energy

1. a. To what extent is there an affordable, reliable distribution of electricity and fuels to households?

Read the two statements below and drag the slider to where you feel most represents your city.

Worst Case Scenario

The majority of households are not connected to the electricity grid and do not have ready access to affordable, alternative fuel supplies (e.g., gas, oil, wood, coal). The electricity supply is highly unreliable with frequent, long outages AND/OR An adequate supply (sufficient to undertake basic household functions) of electricity and other fuels that is not affordable for many people.

Best Case Scenario

All households are either connected to the electricity grid and have affordable access to an adequate supply of alternative fuels (e.g., gas, oil, wood, coal). The cost of electricity and fuels are affordable to all households. The electricity supply is reliable and no households experience outages on a frequent basis.

| Worst | Best |
|---|------|
| 0 | |
| Score: 4 | |
| What is your rationale for the above? | |
| All households are connected to a reliable grid (refer to maps & data | • |
| however the only major alternative | |
| fuel sources (coal/oil) are | |







INPUTS

156 questions within24 topics

OUTPUTS

Resilience Profiles



QUALITATIVE & QUANTITATIVE DATA



100 RESILIENT CITIES

RESILIENCE WORKSHOPS IN EACH CITY



100 RESILIENT CITIES

OUTPUT: RESILIENCE PROFILES



100 RESILIENT CITIES



CASE STUDY

- CASE STUDY: SURAT

ST. SAVAN

દર્દી ને જમવાનું ટીફીન આપવાનો સમય દર્દી ને જમવાનું ટીફીન આપવાનો સમય દર્દી ને મળવાનો સમય સાંજ જ શે- ૪ શે- ૦ ખાસ માટે આર, એમ, એ, ઓફીસમાં મળ પાસ ધ્યવતા સગ્રાનેવ રહી પાસે સેવોટેવામાં આર ધ્યવતા સગ્રાનેવ રહી પાસે સેવોટેવામાં કાર્મદર્દી વિભા સંગ્રાનેવ રહી પાસે સેવોટેવામાં દ્વાર શે વળતા સગ્રાનેવ રહી પાસે સેવોટેવામાં કાર્મદર્દી વિભા સંગ્રાનેવ રહી પાસે સેવોટેવામાં કાર્મદર્દી વિભા સંગ્રાનેવ રહી પાસે સેવોટેવામાં

SHC IBING

dl.201ek



RESILIENT SURAT













IMPACT & VALUE

WHAT VALUE HAS THE CRI PROVIDED TO CITIES?

Cities that have completed the CRI assessment tell us that the CRI:

- Informs / supports integrated planning and investment decisions
- Communicates knowledge about resilience concepts and actions
- Enables monitoring / measurement
- Builds credibility
- Empowers stakeholder engagement

"2017 will become the year that we say that for the first time we measured resilience in cities. This is the baseline in cities, and we will be able to compare and see the change in performance in our cities over time."



Santiago Uribe Rocha, Chief Resilience Officer, Medellin

INFORMING/SUPPORTING INTEGRATED PLANNING AND INVESTMENT DECISIONS

"We're looking at gaps in our efforts and using the CRI assessment to inform the future work that we're doing."



Marissa Aho, Chief Resilience Officer, Los Angeles "The CRI assessment was a really interesting process of reflecting on what we are measuring and what we are not, and its challenging cities to go beyond into new areas of resilience work.'



Santiago Uribe Rocha, Chief Resilience Officer, Medellin

COMMUNICATES KNOWLEDGE ABOUT RESILIENCE CONCEPTS AND ACTION

"We hope that it will help support strategic communication of resilience within the city, and make it more transparent, and help people understand what the different aspects of resilience are."



Daniela Torres, Deputy Chief Resilience Officer, Mexico City



ENABLES MONITORING/MEASUREMENT

"Before, resilience was a beautiful but too theoretical of a word.

When you measure resilience, the stakeholders said 'oh, this is helping us to understand how resilient cities are and how much we can improve' in terms of implementing programs, projects and actions, and developing the strategy. "



Santiago Uribe Rocha, Chief Resilience Officer, Medellin " It reinforces the idea that you have to measure; you really have to measure every aspect of the performance of the city.

If you don't do it, you're wasting time and money.

And this is one of the most important values of the CRI. Through the time you take to measure things, you're able to show stakeholders that the money they put in pays for the effort and achieves the delivery that they're looking for in implementation. "



Santiago Uribe Rocha, Chief Resilience Officer, Medellin

ENABLES MONITORING/MEASUREMENT

"We thought it was an excellent opportunity to have a check up on the city.

It has been one and a half years since we launched our resilience strategy and its been two or three years since we completed our original diagnostic, so the CRI helped to identify how we have evolved since that point?

It would be nice to have a baseline and to have an annual or biannual assessment. "



Johannes Gregersen, Deputy Chief Resilience Officer, Vejle



ENABLES MONITORING/MEASUREMENT

"Using the CRI was an opportunity to provide an input for the Monitoring, Reporting and Verification system that is one of the key initiatives that we're trying to push in the first year of out resilience strategy.

It also provided an opportunity for us to explore areas that were not included in the strategy. "



Daniela Torres, Deputy Chief Resilience Officer, Mexico City



EMPOWERS STAKEHOLDER ENGAGEMENT

" It s a nice way to keep the discussion on resilience going in the broader conversation with the city.

We brought together a lot of stakeholders and talked about resilience and what it meant in their domains, sectors and silos, and it was a great opportunity for a great discussion with the fire department, with the police, and so on. "



Johannes Gregersen, Deputy Chief Resilience Officer, Vejle "The conversations we've had with our own team members has been the most valuable part of this process."



Marissa Aho, Chief Resilience Officer, Los Angeles

"The value is in strengthening the stakeholder engagement process – the stakeholders feel for the first time there is something concrete to talk about resilience."



Santiago Uribe Rocha, Chief Resilience Officer, Medellin

EMPOWERS STAKEHOLDER ENGAGEMENT

"The CRI was an opportunity for us to convene new stakeholders that had not been involved in the process of creating our resilience strategy."



Daniela Torres, Deputy Chief Resilience Officer, Mexico City



COMMON TERMINOLOGY TO EMBED RESILIENCE THINKING GLOBALLY



CRI Research and Pilot cities
Cities using the CRI





WHAT NEXT?

CRI RESOURCES

To communicate about the City Resilience Index, understand the research going into it, and train Team Leaders and Team Members to carry out the Assessment, the following resources are available



Visit the <u>CRI website</u> for information on how the CRI can help your city be more resilient



Read the <u>research</u> to understand how the CRI was developed, and more information on how the Assessment was developed



Download the <u>Training Toolkit</u> and <u>Communications Toolkit</u> to access guidance, training material, tools, and templates for carrying out a CRI Assessment in your city, or to communicate about the CRI with stakeholders





- 1. Sharing CRI knowledge and tools in the public domain
- 2. Scaling up the adoption of CRI
- 3. Partnerships with city networks and individual cities
- 4. Diverse resilience-based tools and service offer





QUESTIONS AND DISCUSSION

What can a holistic systems approach to resilience do for you?



