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Climate Resilient Infrastructure Services (CRIS) Program

An initiative under USAID's Climate Change Resilient Development (CCRD) Program

Infrastructure services are critical to development

- Infrastructure services are critical inputs for successful development. Infrastructure supports:
  - Strong economic development
  - Clean water and sanitation
  - Reduction of malnutrition and poverty
  - Energy supplies
  - Access to education and public services
  - Physical protection and safety of populations
  - Preservation of cultural heritage
- Unless it is climate resilient, infrastructure may fail to support development objectives

Kazakhstan, Source: USAID

Infrastructure is often a critical adaptation option

- Infrastructure is frequently built to address climate and weather risks. Infrastructure supports:
  - Flood management
  - Erosion control
  - Storm surge protection
  - Emergency response
  - Shelter
- Unless it is climate resilient, infrastructure may fail to provide intended services, or to protect lives and livelihoods

Flood protection wall near Port-au-Prince, Haiti.
Source: USAID

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Ensuring reliable infrastructure services is a major challenge in developing countries

- Rapid growth is driving rapid infrastructure expansion
- Building new infrastructure and maintaining existing infrastructure is expensive
- Most infrastructure lasts for decades
- Climate change threatens infrastructure investments and the reliability of infrastructure services
- Designing to historical standards won't be enough under future climate conditions
- The climate is already changing; a lot of infrastructure is maladaptive

The **CRIS goal** is to ensure that developing countries can provide reliable and sustainable infrastructure services that support smart and lasting development, even in a changing climate.

The **CRIS program** will develop, test, and share methods to increase the climate resilience of infrastructure assets – and the services they provide – through a mainstreaming approach.

Why Cities?

- Cities provide a critical opportunity to pilot CRIS activities because they:
  - Are rapidly building infrastructure to respond to population growth without considering future climate conditions
  - Have a high density and diverse types of infrastructure
  - Confront a large demand for and reliance on infrastructure services
  - Face financing deficits (e.g., disaster payouts and international adaptation financing typically go to national rather than city governments)
  - Lack capacity to use innovative risk management tools (which are more important under future climate scenarios)
- USAID's mainstreaming adaptation framework hasn't been tested in cities but has been tested in many other contexts (national, community, mission, and regional-levels)

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CRIS Hypotheses

- **Climate resilient infrastructure services** are a key component of successful development
- Climate resilient infrastructure services **can be achieved more rapidly and effectively by mainstreaming climate risk management** into new and existing development objectives and planning -- including those undertaken by host governments, city governments, the private sector, and USAID missions
- Areas experiencing rapid growth and significant climate risks provide a **critical testing ground for mainstreaming climate resilience**
- **New and innovative methods are needed** to rapidly increase the climate resilience of diverse infrastructure services
- **A modern peer learning approach will help** to overcome the barriers of traditional information exchange, knowledge networks, and communities of practice

Leveraging Development and Adaptation Experience

CRIS will apply knowledge and lessons learned from diverse contexts to address the mounting challenges of infrastructure adaptation by:

- Applying the infrastructure fact sheets and other USAID resources
- Drawing on the technical expertise of the CCRD team re: mainstreaming adaptation, development planning, infrastructure, financing, and disaster risk response
- Capitalizing on the growing body of good practices in developing country cities, particularly efforts in Asia
- Taking advantage of USAID's other partnerships (e.g. Swiss Re)
- Accessing existing sources of data, information, and analysis tools (e.g. flood risk mapping, weather data)

Source: USAID

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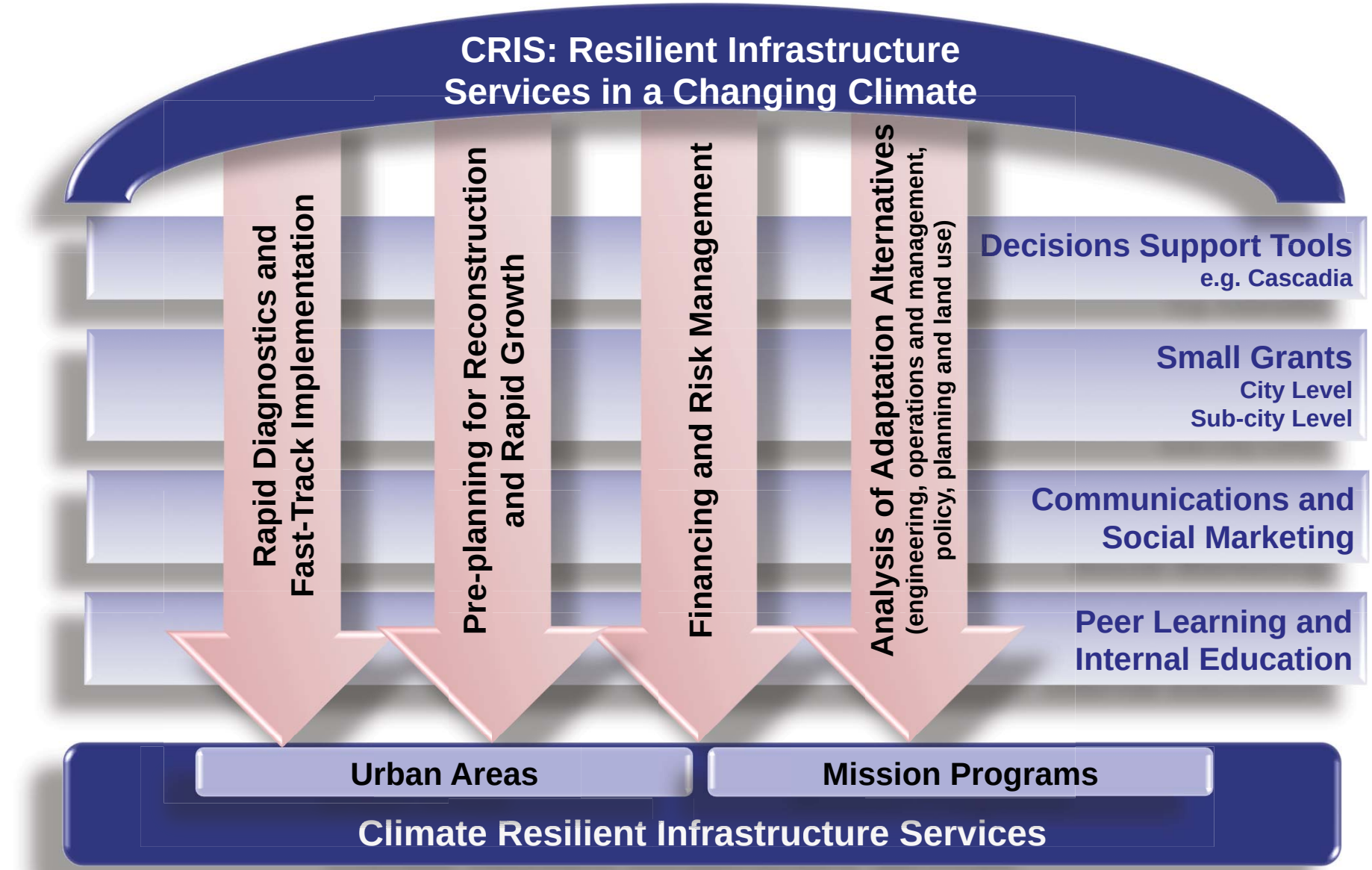

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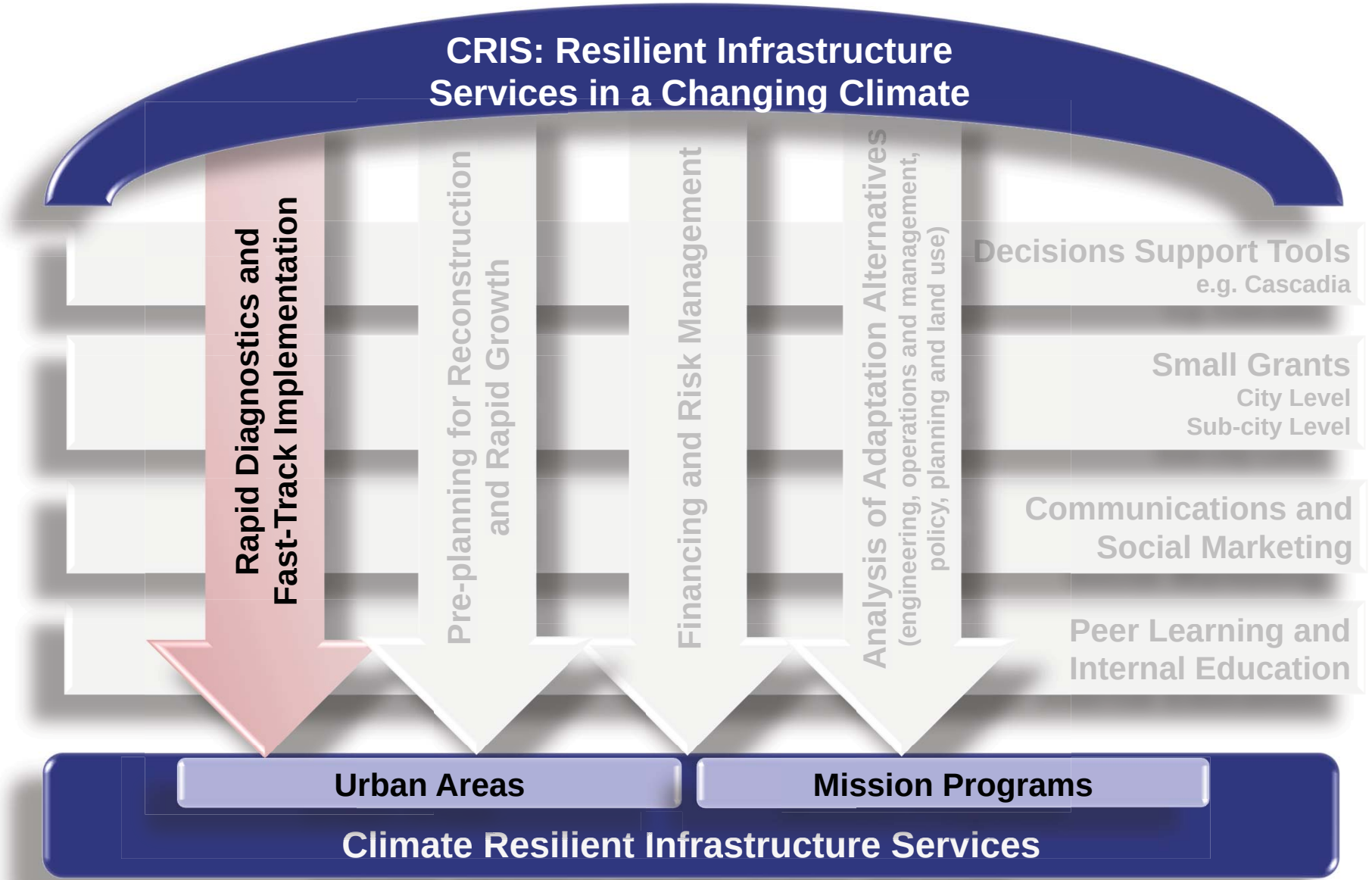

Rapid Diagnostics and Fast Track Implementation

Streamline diagnosis and enable faster implementation of adaptation measures to address high priority / high risk needs

- Identify high-risk infrastructure based on historic performance
- Work with local stakeholders to quickly assess vulnerability in charette-style working sessions
- Incorporate existing climate data and projections
- Focus on key indicators and most critical climate sensitivity thresholds
- Prioritize no/low-regret and cost-effective adaptation actions

Source: USACE Public Affairs

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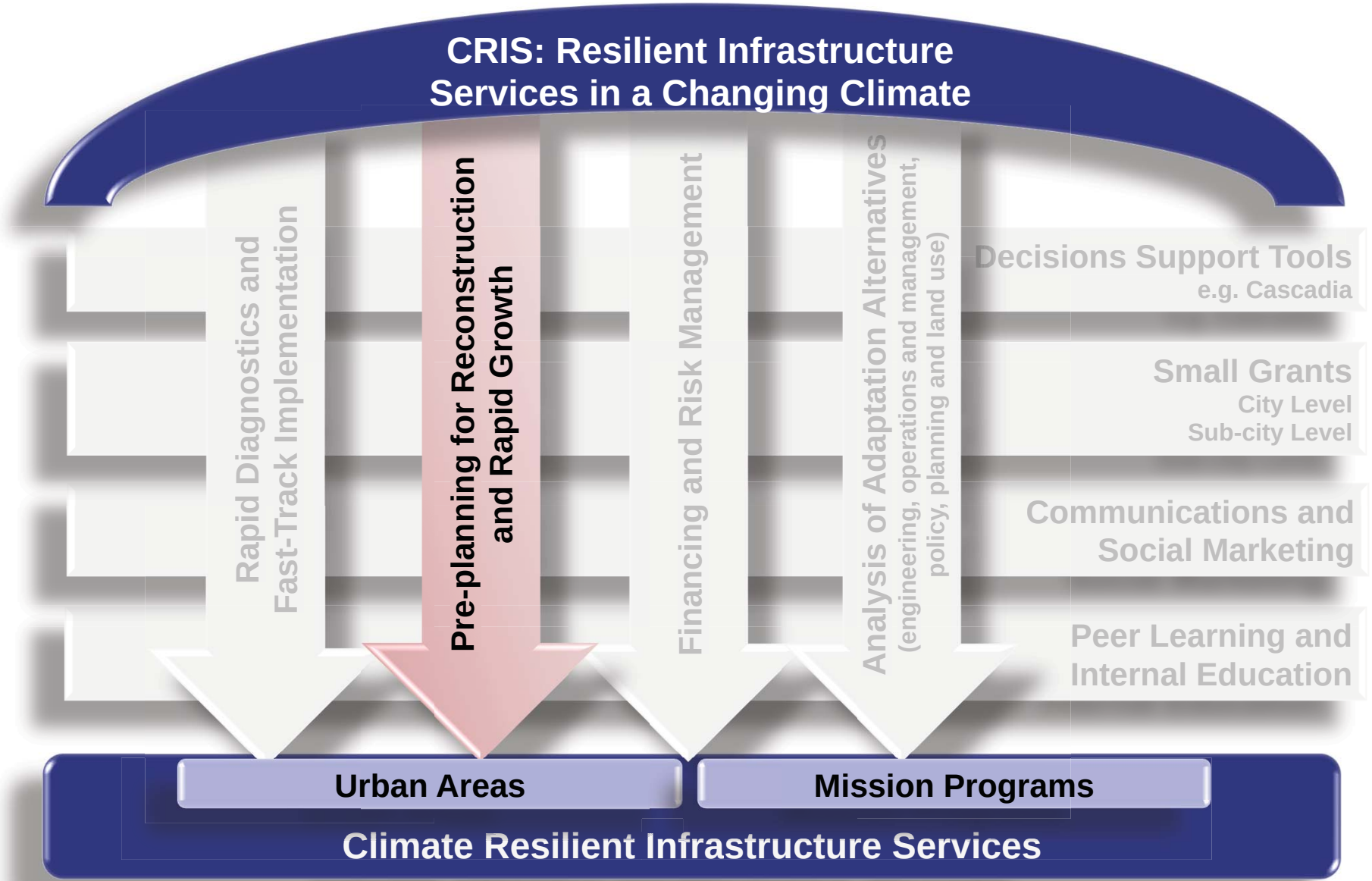

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Pre-planning for Reconstruction and Rapid Growth

Enables cities to quickly increase infrastructure resilience, take advantage of rapid infusions of resources (including after major disasters), and avoid maladaptive development

- Develop resources, starting with a white paper on the importance of pre-planning, its components, and methods
- Gather stakeholder feedback through partner networks (e.g., ICLEI Bonn Workshop)
- Demonstrate and pilot the concept by incorporating pre-planning assistance into city-level technical support

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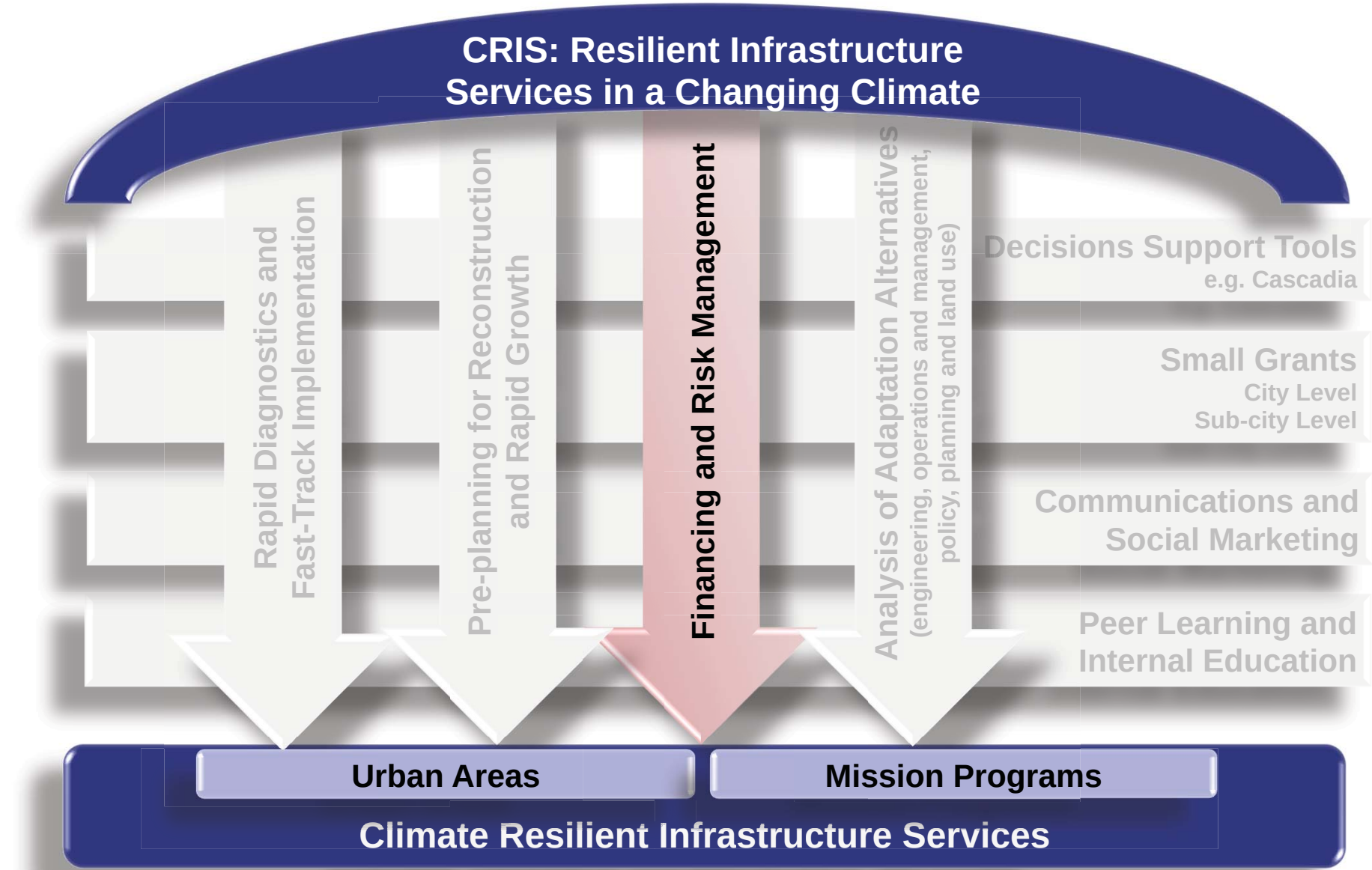

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Risk Management and Financing

Emerging **risk management tools** can help cities use limited funds to cost-effectively cope with climate impacts on infrastructure services

- Provide a menu of options to reduce and distribute risk, such as insurance or contingency funds
- Help select strategies that fit cities' resources and needs

Strategies to expand funding can assist cities in capturing needed financing to increase infrastructure climate resilience

- Identify investors for different types of adaptation options
- Design funding strategies, develop partnership agreements
- Develop public-private partnerships to promote climate resilience

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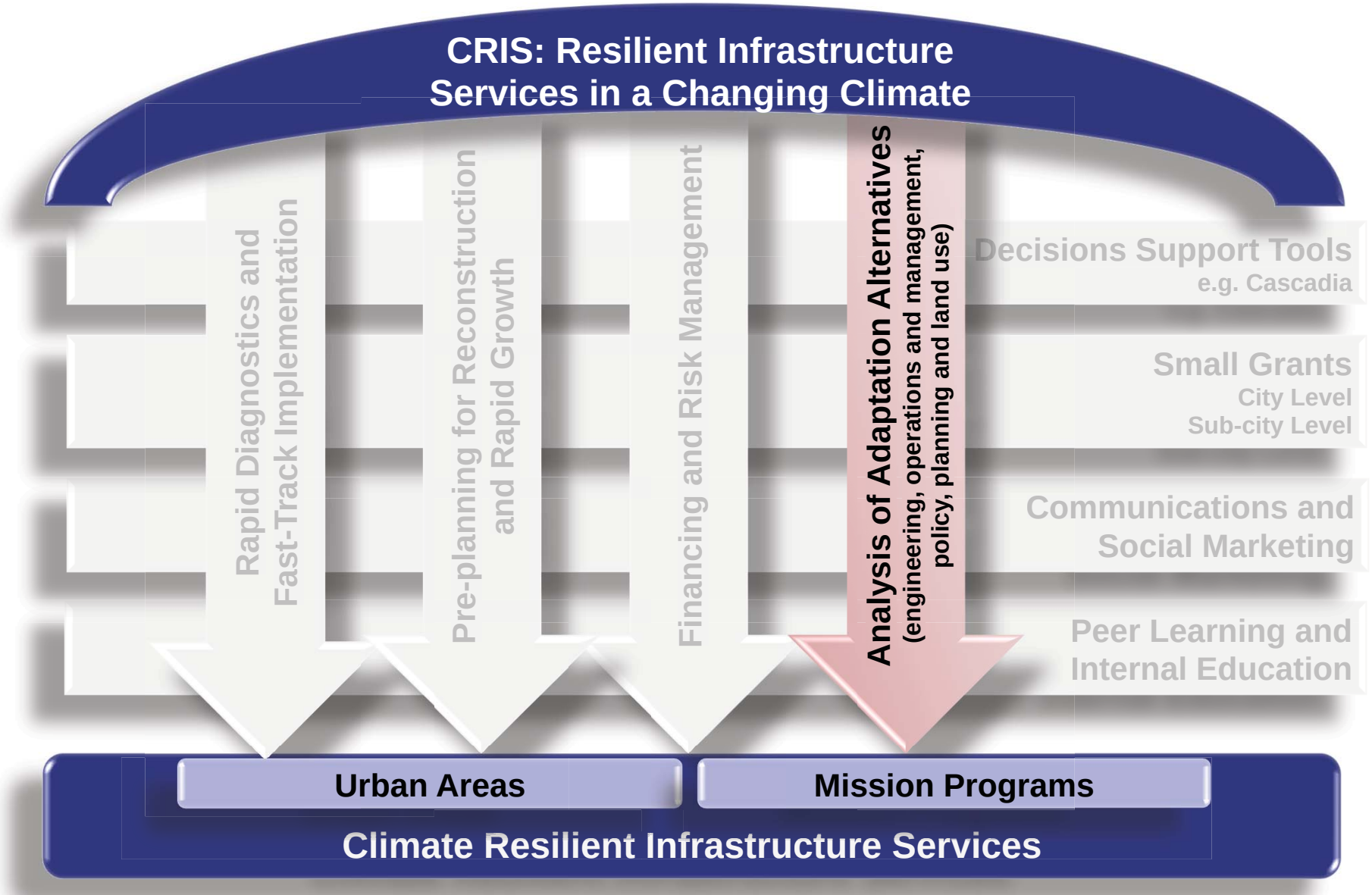

Analysis of Adaptation Alternatives

Move from planning to implementation by identifying high-priority adaptation options and understanding necessary critical action steps

- Assess adaptation alternatives to identify most effective and feasible options:
  - Engineering
  - Operations and management
  - Policy
  - Planning and land use
- Apply climate resilient design standards
- Scope needs for implementation of adaptation options
- Develop preliminary scopes of work, designs, and schedules

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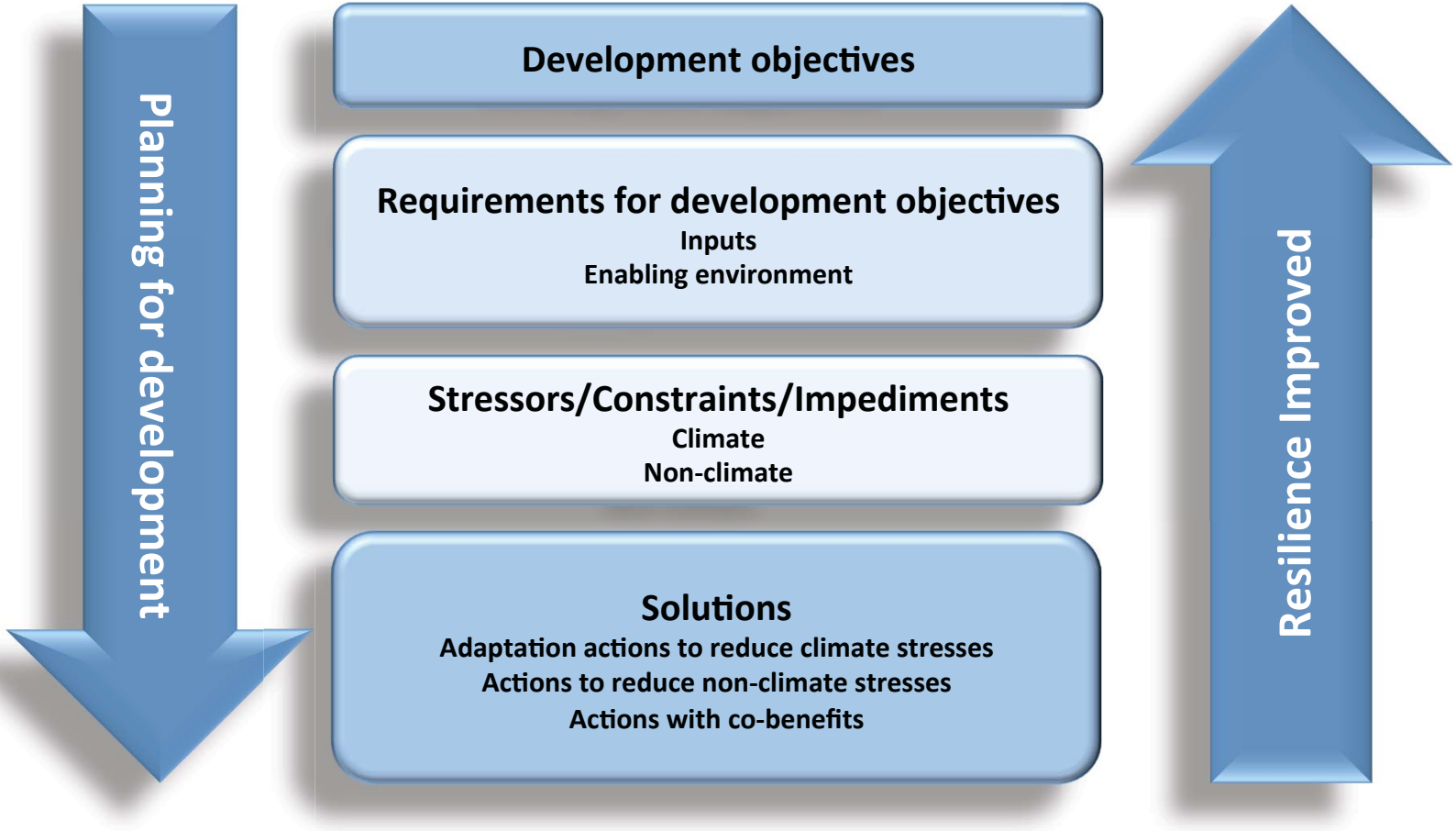
CCRD's Mainstreaming Approach



Applying CCRD's Mainstreaming Approach to Infrastructure

Planning for Development

- Fast track diagnosis
- Advanced, ready-to-implement, multi-purpose, plans (e.g., pre-planning for post-disaster reconstruction)
- Collaborative approaches to tap investor demand
- Leap-frogging standard urban planning
- Local champions

Development objectives
Reliable water and sanitation **infrastructure services**

Requirements for development objectives

Inputs –Water source, delivery system, treatment system (water, sanitation, energy, transport, communication), medical services, education, financing
Enabling environment - Effective governance, stable society, social norms

Stressors/Constraints/Impediments

Climate – Extreme rainfall events, more heat waves, sea level rise, storm surge
Non-climate – Poor sanitation and living conditions, rapid population growth, infectious disease, crime, corruption, funding constraints, etc.

Solutions

Adaptation actions to reduce climate stresses – e.g., siting, design, and standards to increase infrastructure resilience, flood protection, risk management financing strategy, enhanced maintenance and repair, emergency response protocols, cooling centers, energy and water management protocols, etc.
Actions to reduce non-climate stresses – Expanded infrastructure, medical services, public health education, support to access financing

Improving Resilience

- Fast track implementation
- Climate resilient reconstruction with rapid resource infusion
- Climate resilient design and engineering standards
- Innovative risk management methods (e.g. insurance, bonds)
- Climate decision support tools

Pilot Testing Infrastructure Climate Resilience Methods in Urban Areas

- **City support** – Work with city decision makers to identify and act on most critical climate risks to priority infrastructure
- **Sub-city level support –** Work with sub-city organizations and at-risk neighborhoods to rapidly identify, implement, and demonstrate high priority actions
- **Small grants –** Implement a small grants program (2 solicitations) to enable fast and effective resilience building action
- **Peer learning –** Facilitate targeted, demand-driven peer learning to help achieve scale and sustainability
- **Pilots include:**
  - Hue, Vietnam (Cascadia tool)
  - Latin America City Pilot
  - Africa City Pilot

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Potential Pilot Cities

City	Country	Population
Beira	**Mozambique**	530,604
Quelimane	**Mozambique**	192,876
Matola	**Mozambique**	793,000
Sekondi-Takoradi	Ghana	559,548
Tema	Ghana	160,939
Cartagena	Colombia	952,024
Santa Marta	Colombia	431,781
Callao	**Peru**	813,264
Chimbote	**Peru**	334,568
Coatzacoalcos	Mexico	235,983
Ensenada	Mexico	279,765
Mazatlan	Mexico	438,434
Tampico	Mexico	859,419
Georgetown	Guyana	239,227
La Romana	**Dominican Republic**	214,109
San Pedro de Macoris	**Dominican Republic**	195,000
Santo Domingo	**Dominican Republic**	2,154,000
Santiago	**Dominican Republic**	691,262
Las Terrenas	**Dominican Republic**	39,221
Boca Chica	**Dominican Republic**	123,510
La Ceiba	Honduras	174,006
Bridgetown	Barbados	112,000

Other cities could participate in the peer network, apply for small grants, or act as advisor cities.

Why USAID Missions?

1. They are the primary investors of USAID resources
2. They seek to ensure the long-term safeguarding and sustainability of investments
3. The Agency Adaptation Plan highlighted vulnerabilities of mission programs, including infrastructure investments
4. Support to missions is a priority of USAID's Climate Change and Development Strategy

Water Plant Project in Mozambique; Source: USAID

Pilots with USAID Missions

CRIS will work with pilot USAID Missions to mainstream climate resilience into USAID programs and operational decisions through:

- **Technical assistance** and hands-on support to Missions
  - Screen infrastructure investments for climate-related risks
  - Integrate climate risk-reduction and adaptation strategies into project design, funding, and Mission operations
  - Develop procurement protocols such as sample SOW language for ensuring climate resilience of projects involving infrastructure
- **Education and peer learning** to help Mission staff understand impacts, assess vulnerability, and build infrastructure resilience
  - Infrastructure workshop
  - Game to help Mission staff understand impacts of climate change on infrastructure

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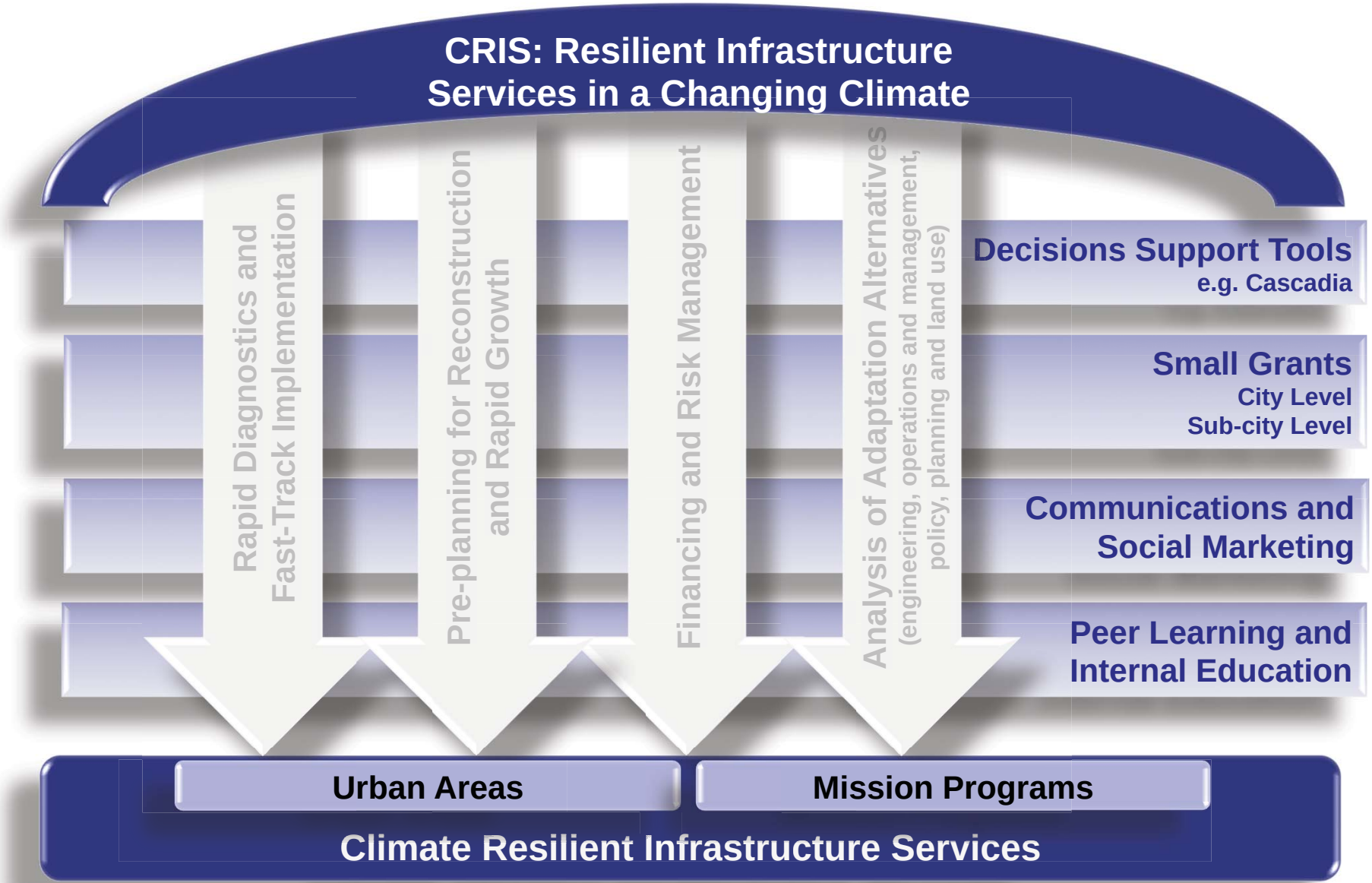
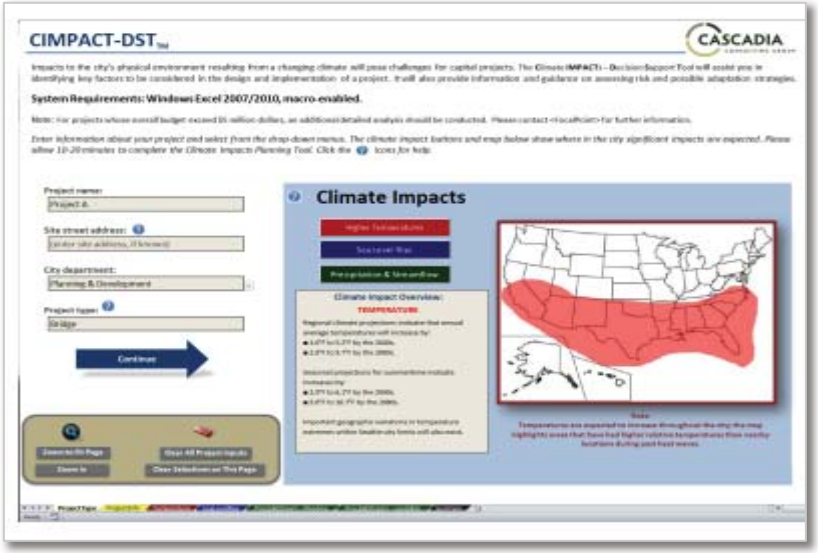


Decision Support Tools

- Collaboration with Cascadia's Climate IMPACT – Decision Support Tool and existing work in Hue, Vietnam
- Integration of infrastructure vulnerability screening tools developed by ICF for U.S. Department of Transportation's Gulf Coast Study and World Bank
- Collaboration with other CCRD partners such as Stratus and IRI



Cascadia's CIMPACT-DST

Asset Categories		Temperature		Precipitation		
Mode	Sub-Mode	Incremental changes	Change in extremes	Incremental changes	Change in extremes	
Bridges	Superstructure		✓		✓	
	Substructure, abutment, and approach		✓		✓	
	Operator houses (movable bridges) and		✓		✓	
Roads and Highways	Paved roads		✓		✓	
	Unpaved roads		✓	✓	✓	
	Stormwater drainage		✓	✓	✓	
	Street signs and traffic lights				✓	
	Road maintenance, driver safety, traffic service	✓	✓	✓		
Railroads	Electrical equipment	✓	✓		✓	

U.S. DOT Sensitivity Matrix, supported by ICF

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Small Grants

Address unmet needs to enhance infrastructure resilience, and support engagement in CRIS global city-to-city peer learning

- Develop approaches for incorporating information on infrastructure assets into climate resilient planning
- Demonstrate a rapid vulnerability assessment approach for infrastructure services
- Establish public-private partnerships to promote climate resilient infrastructure services

City-level

- Demonstrate a fast-track approach for implementing adaptation options
- Establish partnerships between private sector and sub-city level organizations
- Propose financing options to support implementation of practical adaptation options at sub-city level

Sub-city level

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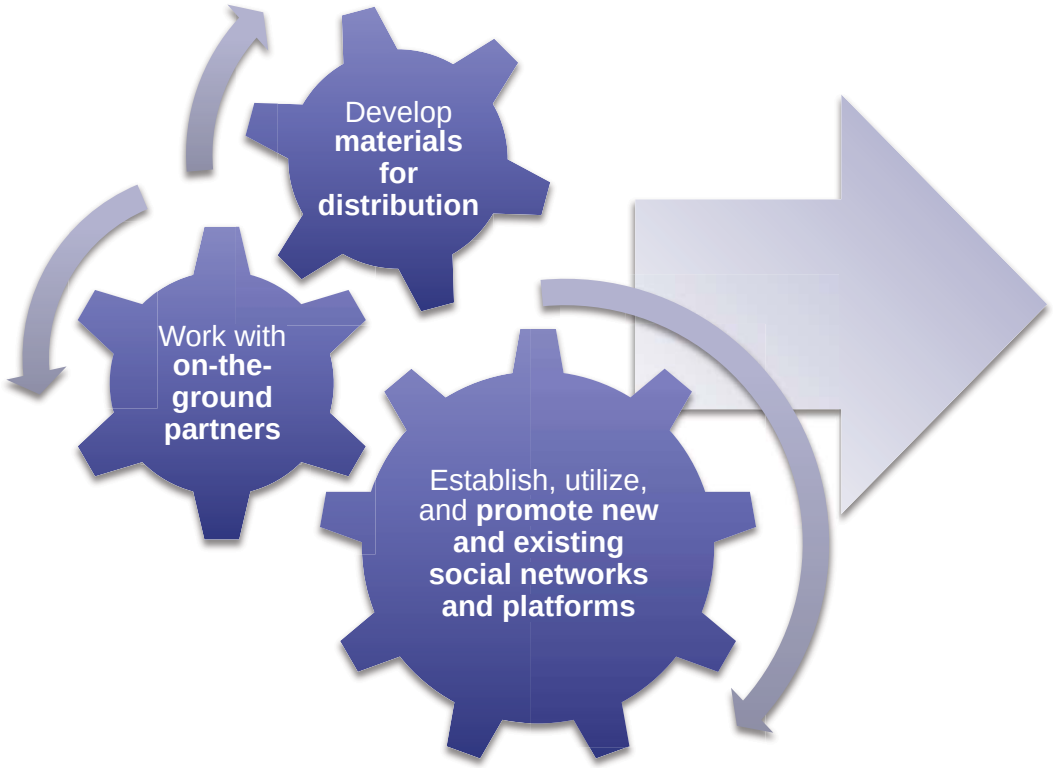
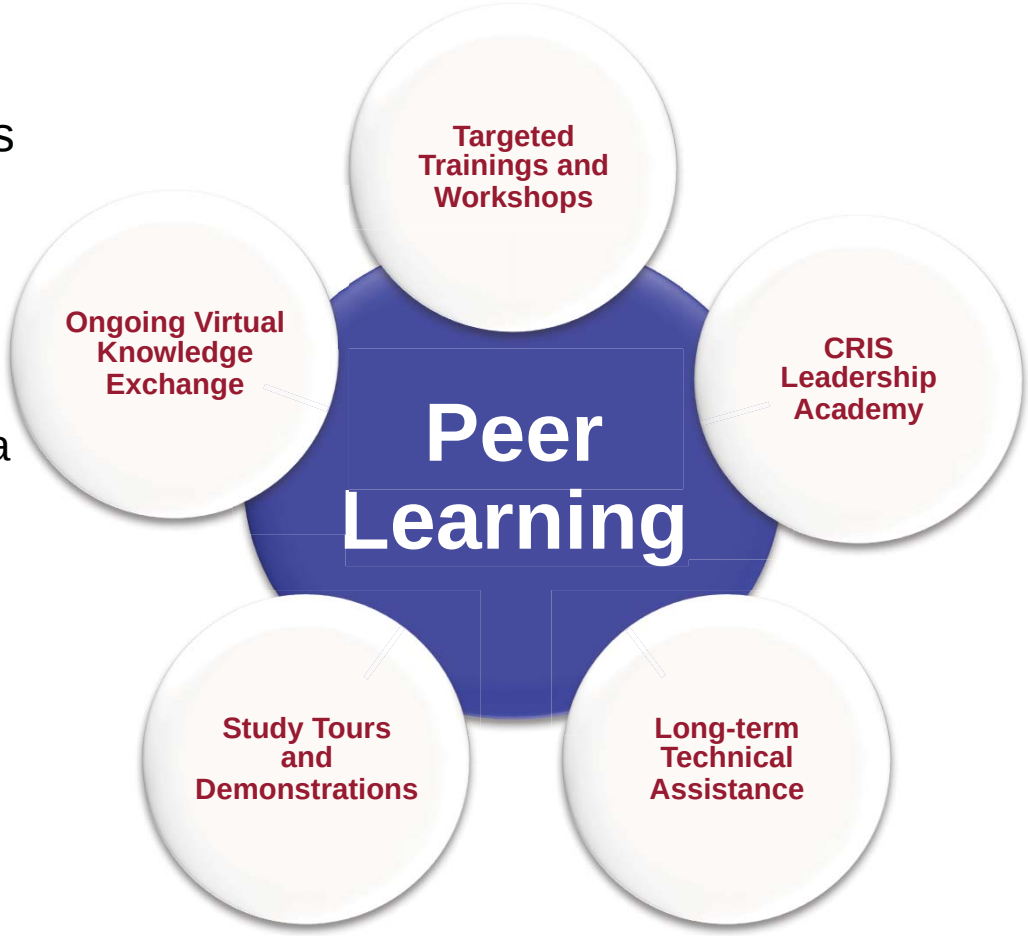
Communications and Social Marketing



- Individual action and behavior change that increases infrastructure climate resilience, e.g.:
  - Disaster preparedness
  - Energy efficiency / demand management
- Increased awareness of climate risks among general public and other stakeholders
- Build support among local champions

Peer Learning: Scaling Up Successful Actions

- Collaboration with Institute for Sustainable Communities (ISC)
- Possible peer learning events towards the end of the first year:
  - Two regional events: Africa and Latin America
  - One global event, leveraging experience in Asia and other countries
- Leveraging lessons learned from M-BRACE, ACCCRN, Durban Adaptation Charter



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CRIS innovations will transform current processes

Traditional Approach

Lengthy vulnerability assessment → delays adaptation action even when urgent needs are evident

CRIS Innovation

Rapid diagnostics → identify and address highest needs for near-term action

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CRIS innovations will transform current processes

Traditional Approach

Separate consideration of climate risks →

stove-piping and maladaptive BAU decisions

CRIS Innovation

Integration of climate risks into existing decision processes →

more optimal use of investment funds

Source: Ambrosia Pictures

CRIS innovations will transform current processes

Traditional Approach

Failure to budget ahead of time → increased financial stress on cities during times of disaster

CRIS Innovation

Use of financial risk management tools → cushions the impact of extreme events and enables cities to respond more quickly and flexibly

Rebuilding after the December 2004 tsunami.
Source: USAID

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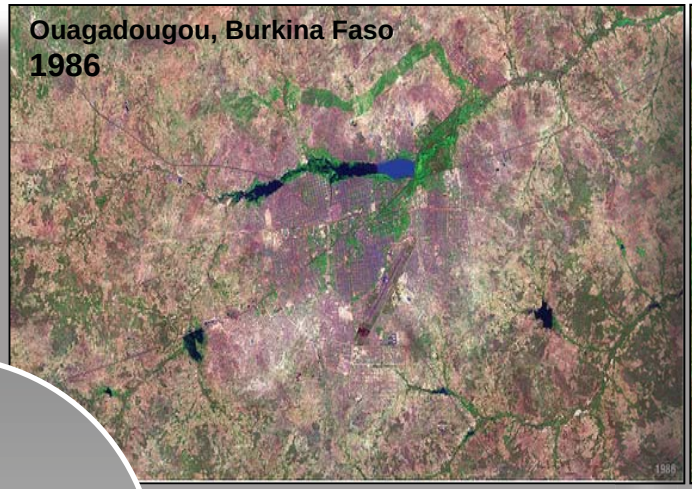
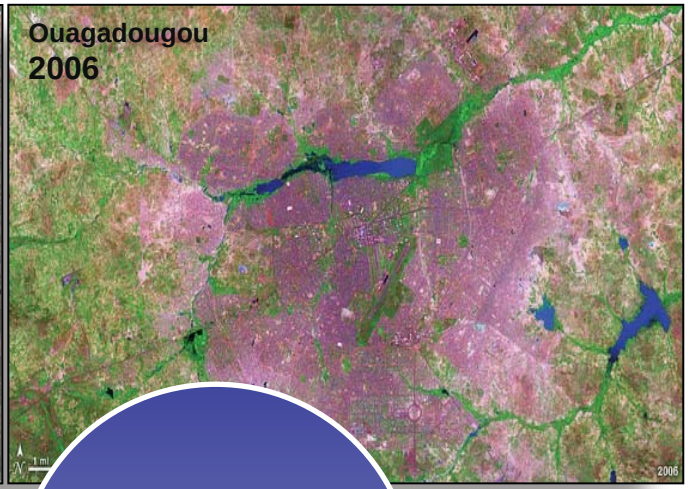
CRIS innovations will transform current processes





Traditional Approach

Comprehensive master planning lags behind pace of growth on the ground

CRIS Innovation

Integration of adaptation into ongoing development →

infrastructure resilience improved in real-time

Source: NASA Landsat

CRIS innovations will transform current processes

Traditional Approach

Crisis-based redevelopment in post-disaster contexts → rebuilds the status quo

CRIS Innovation

Preplanning →

more optimal use of disaster-response resources to “build back better” and reduce future risk

Source: USAID

CRIS innovations will transform current processes

Traditional Approach

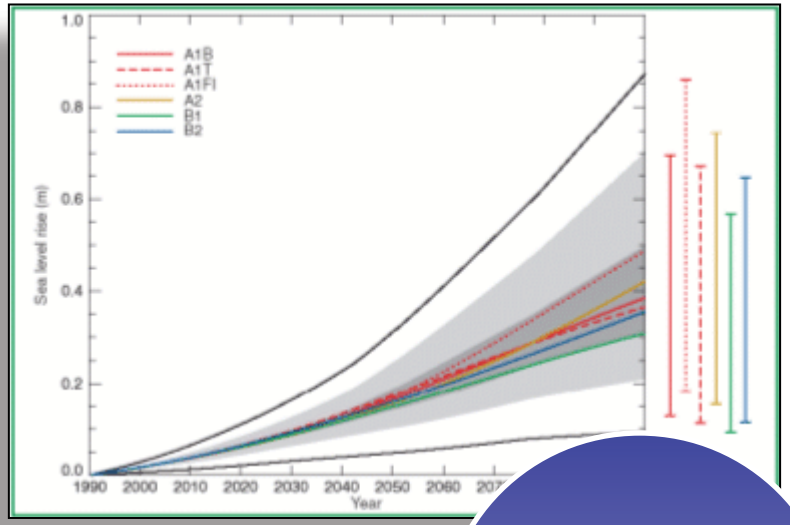
Ad hoc development driven by individual investors → exacerbates vulnerability to climate stresses

CRIS Innovation

Collaboration with private sector and at-risk communities → helps shape climate resilient and sustainable growth

Source: dhante, Morguefile

CRIS innovations will transform current processes



Models used in IPCC assessment of sea level rise.
Source: IPCC, 2001

Traditional Approach

Design criteria based on historic climate trends → inadequate structures given climate change

CRIS Innovation

Updated design criteria → structures are resilient under future climate conditions

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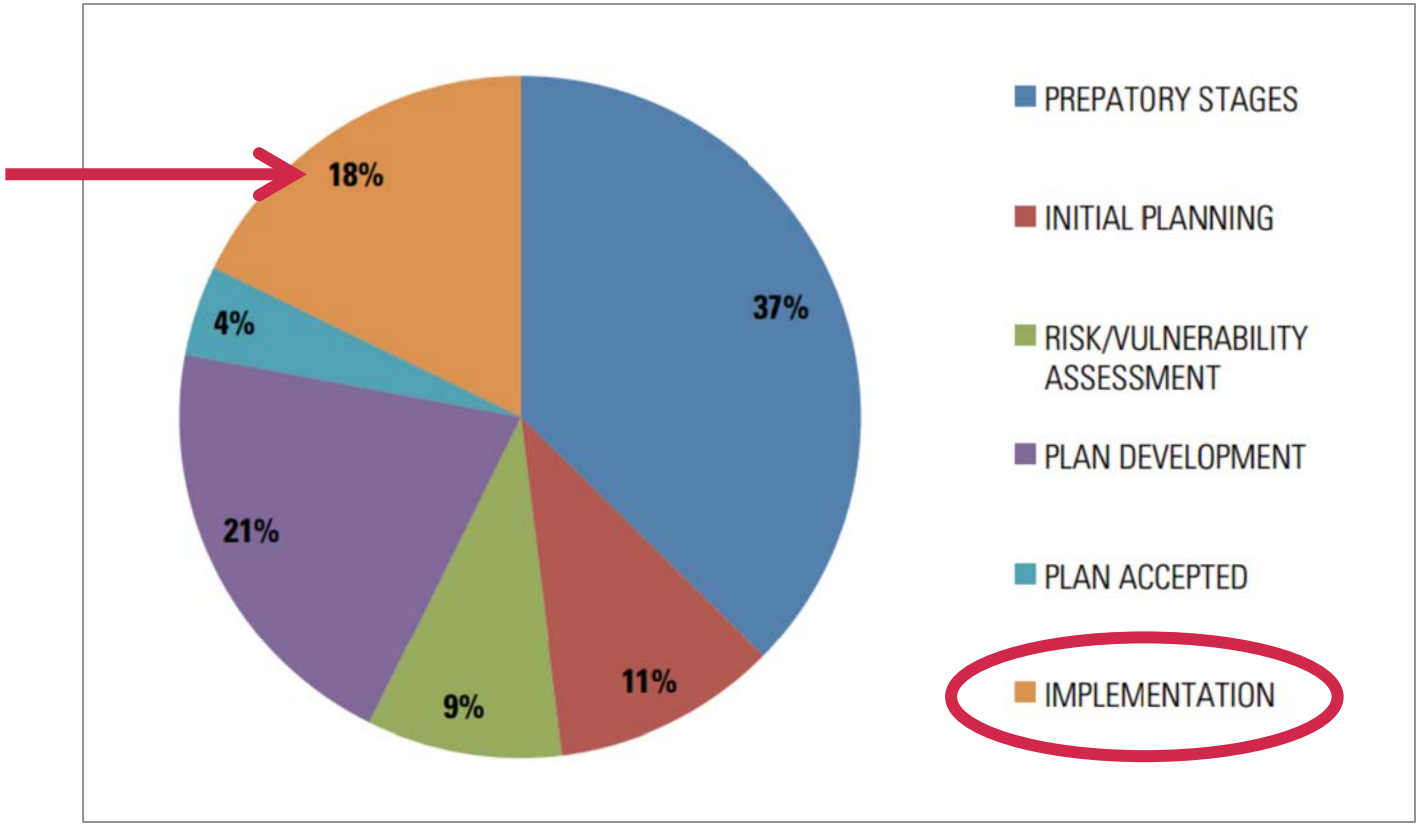
BACK-UP SLIDES

Status of Adaptation Planning



Carmin, JoAnn, Nikhil Nadkami, and Christopher Rhie. 2012. Progress and Challenges in Urban Climate Adaptation Planning: Results of a Global Survey. Cambridge, MA: MIT.

Criteria for Pilot Cities / City Cluster Selection

- Interest and capacity
- Small-to-mid size
- Rapid development / past or future
- High vulnerability to extreme coastal events
- Portfolio of infrastructure
  - Diversity, age and condition, timing for replacement / expansion
- Replicability of lessons learned
- Similar and different points of decision-making