AGWA: ALLIANCE FOR GLOBAL WATER ADAPTATION

- 1400 global water and climate professionals, 8 years old
- Co-chaired by World Bank, SIWI
- Strong emphasis on best practices + global policy program

  alliance4water.org
  AGWAGuide.org
  ClimateReady podcast

UNECE/INBO - GENEVA • 14 FEB 2019 •
CEES VAN DE GUCHTE – AGWA/DELTARES

ADAPTATION & DISASTER RISK REDUCTION FROM THE BOTTOM UP

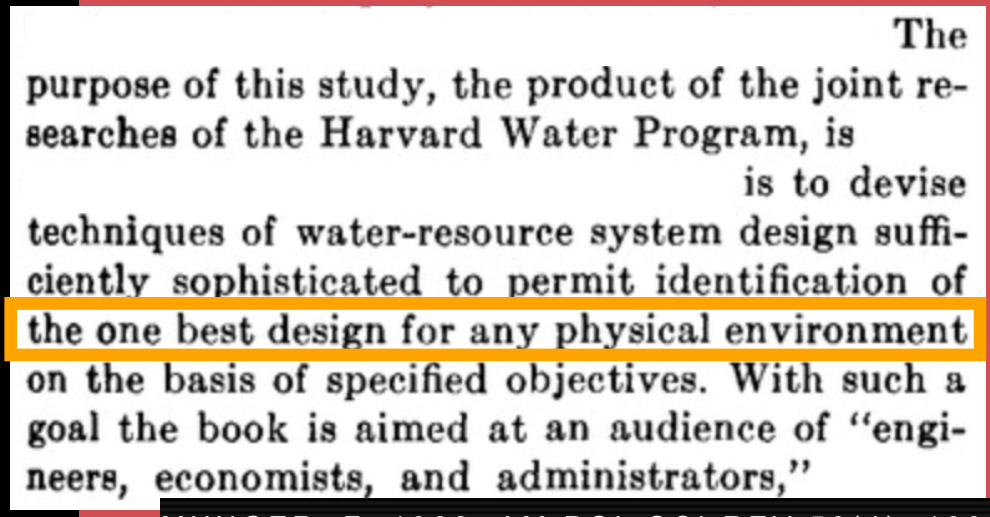
CLIMATE RISK & EXTREMES

United Nations Educational, Scientific and Cultural Organization

International Center for Integrated Water Resources Management under the auspices of UNESCO

THE MODERN SYNTHESIS

- 1958–1962: engineering, hydrology, economics; academics + government
- basic decision making framework for the optimization of water resources, based on a joint evaluation
- first major sophisticated systems analysis
- explicit assumption: climate is stationary (Milly et al. 2008)



Design of Water-Resource Systems

New Techniques for Relating Economic Objectives, Engineering Analysis, and Governmental Planning

Arthur Maass, Maynard M. Hufschmidt, Robert Dorfman, Harold A. Thomas, Jr., Stephen A. Marglin, and Gordon Maskew Fair

The purpose of this study, the product of the joint researches of the Harvard Water Program, is is to devise techniques of water-resource system design sufficiently sophisticated to permit identification of the one best design for any physical environment on the basis of specified objectives. With such a goal the book is aimed at an audience of "engineers, economists, and administrators,"

MUNGER, F. 1962. AM POL SCI REV 56(4), 1003-4.


What would we tell them to do differently?

THE PROBLEM

Water resources management is *strongly quantitative* in framing, implementation, decision making

Climate change increases uncertainties, *reducing confidence* in estimates of emerging patterns

Both ecosystems and infrastructure have low tolerance for failure

THE TOP-DOWN ERA OF OPTIMIZING WATER RESOURCES MANAGEMENT

many factors are now non-stationary:
climate
demography
urbanization
political systems

Decision maker

PROBLEM / NEED

Technical analyst

CLIMATE VULNERABILITY

SOLUTION

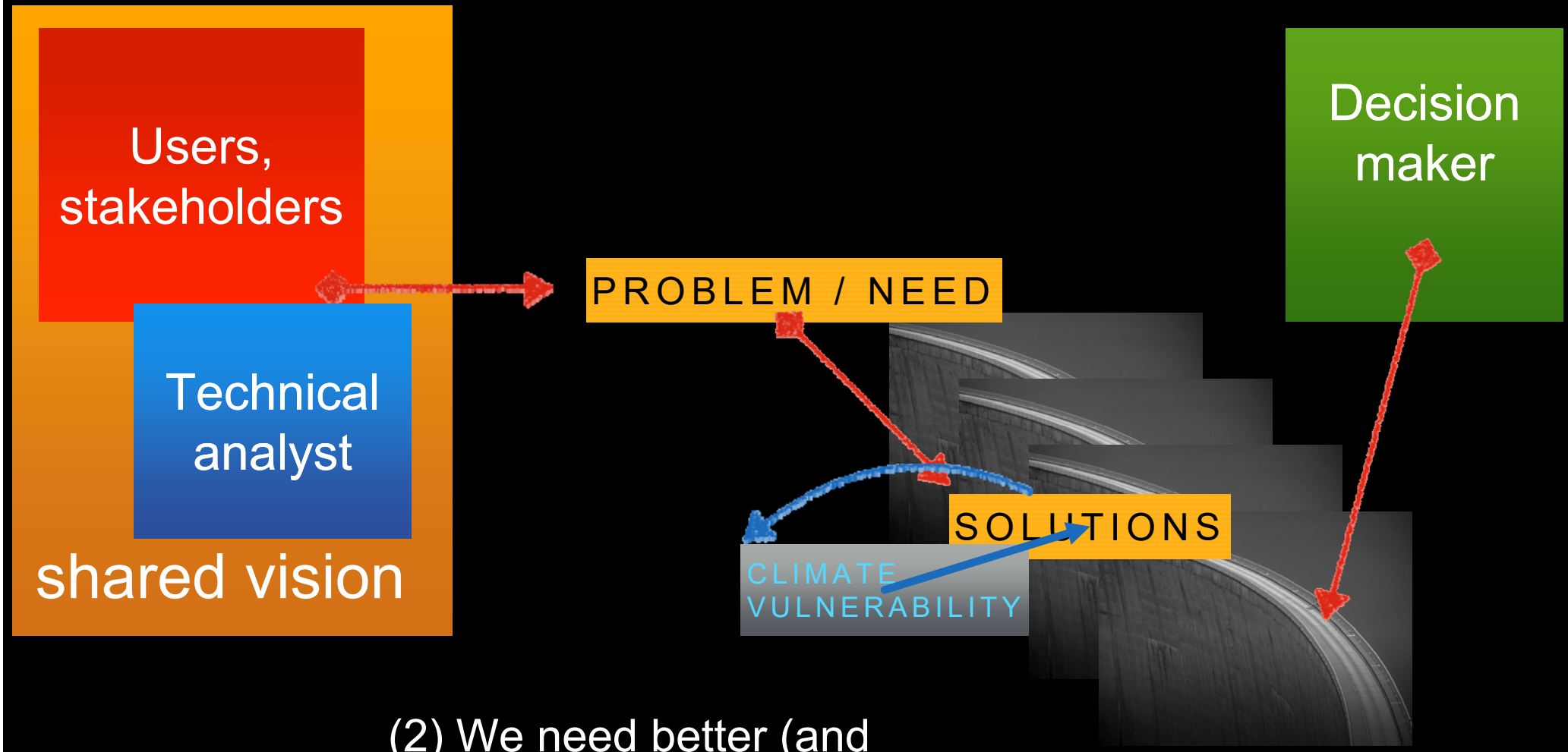
Users, stakeholders

(1) users & stakeholders need to be involved earlier.

(2) We need better (and probably multiple) solutions.

DECISION MAKING IN THE POST-OPTIMIZATION ERA

(1) users & stakeholders need to be involved earlier.



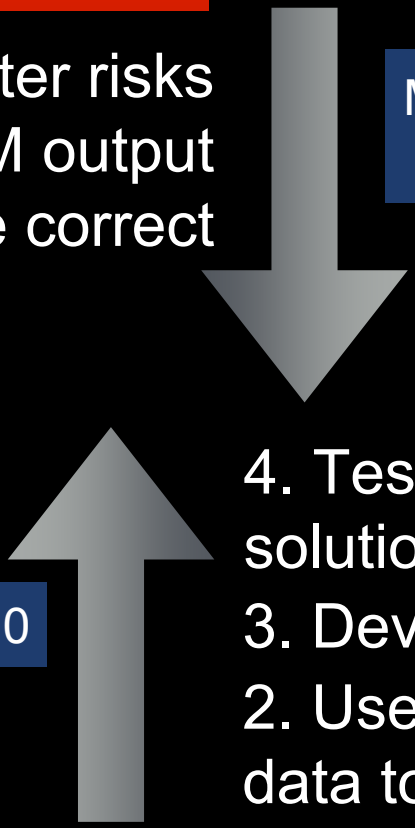
(2) We need better (and probably multiple) solutions.

HOW WE DEFINE VULNERABILITY DEFINES OUR SOLUTIONS

TOP-DOWN ASSESSMENT

1. Use GCMs to define the water risks
2. Inform stakeholders of GCM output
3. Hope the GCMs are correct

MOST ADAPTATION SINCE ~1995

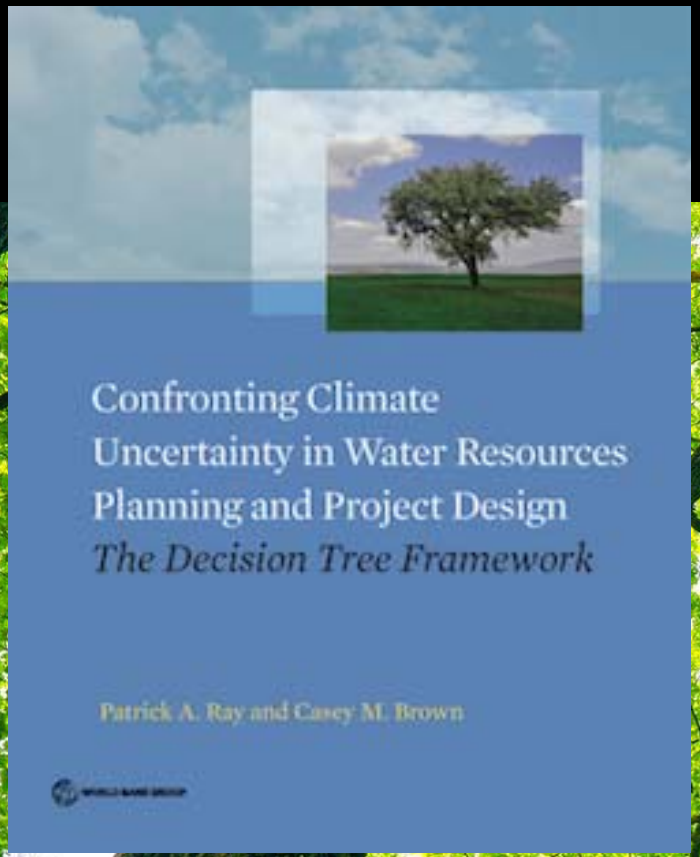


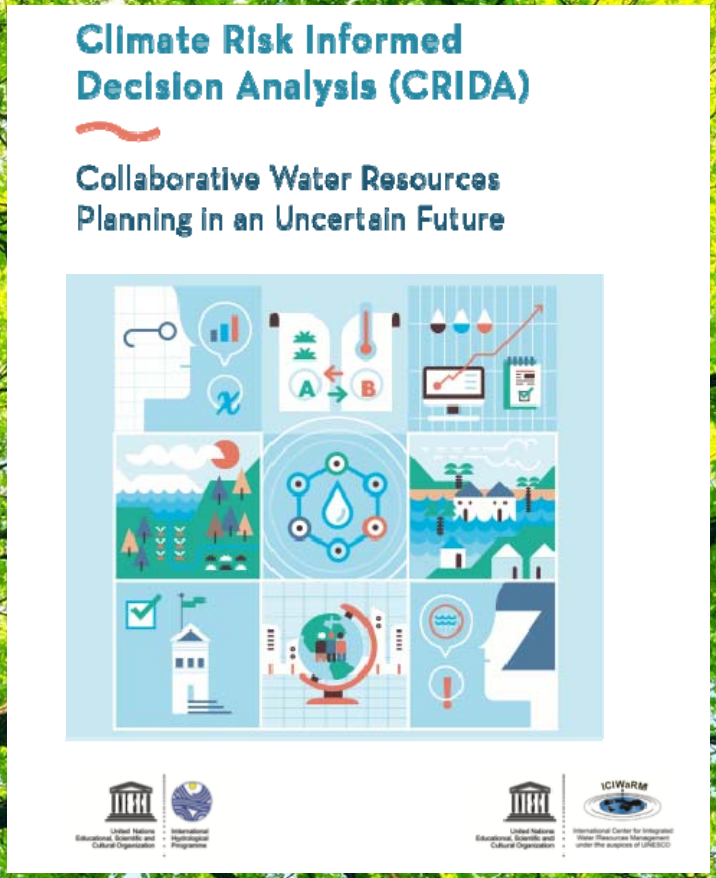
SINCE ~2010

4. Test & compare alternate solutions, pathways
3. Develop robust, flexible solutions
2. Use GCMs and other climate data to explore risk tolerance
1. Stakeholders, decision makers define problem

BOTTOM-UP ASSESSMENT

BOTTOM-UP DECISION SUPPORT





AGWAguide.org/

CRIDA: WHO, WHAT, WHY

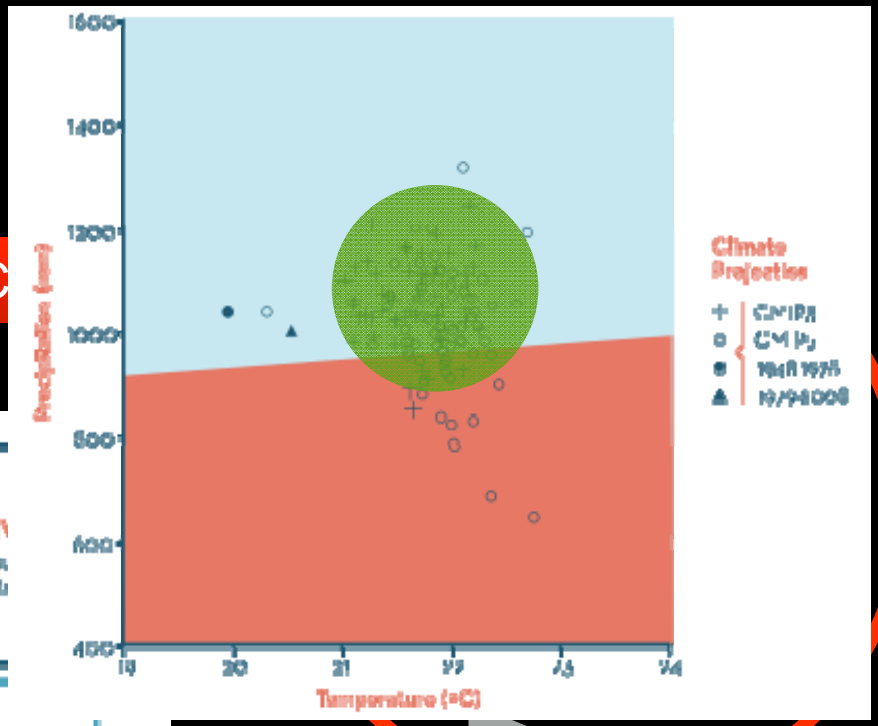
our audience	THE ANALYST	technically trained, using an engineering-economics framework for decision making
the need	LIMITED DATA, COMPUTATIONAL ACCESS	can CRIDA work in Rwanda? Nepal?
institutional limits	DECISION MAKING DISCOUNTS ADAPTATION	stepwise, modular structure linked to existing decisions
goal	INSTITUTIONALIZATION	consistently robust, flexible outcomes

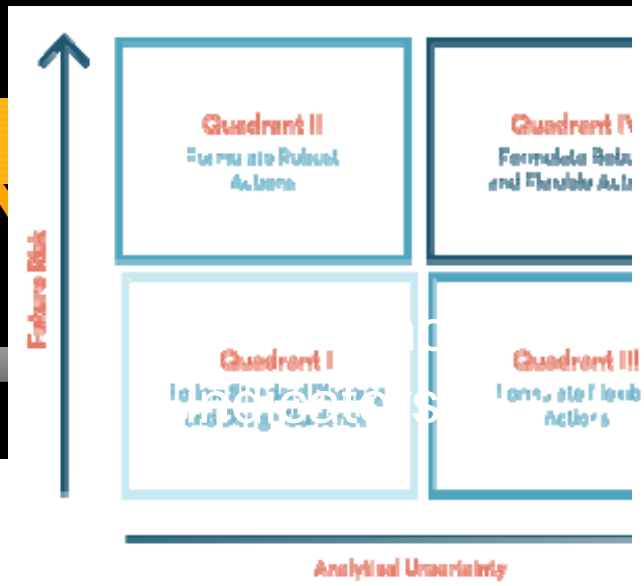
CRIDA ELEMENTS

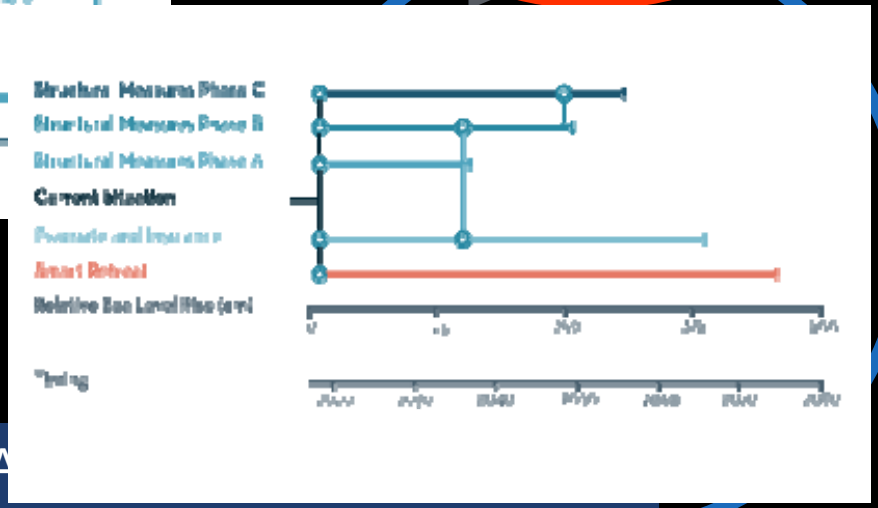
DEC

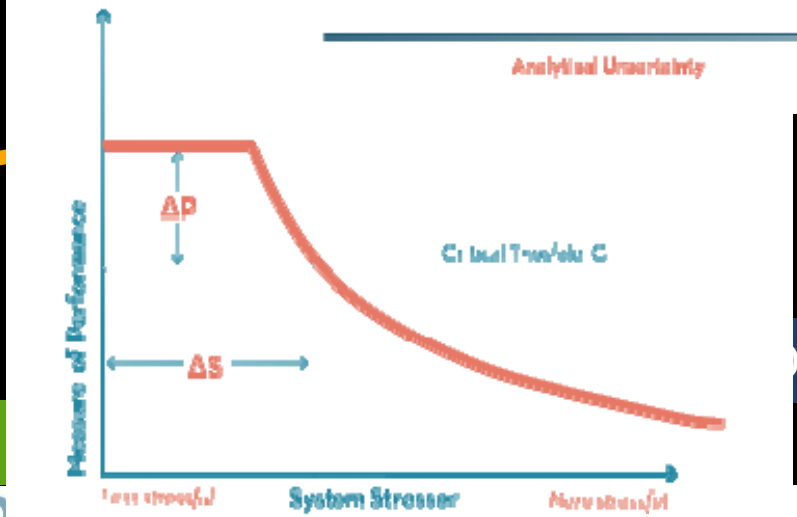
SHARED V

stakeholder, decision maker n









E

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ICIWaRM

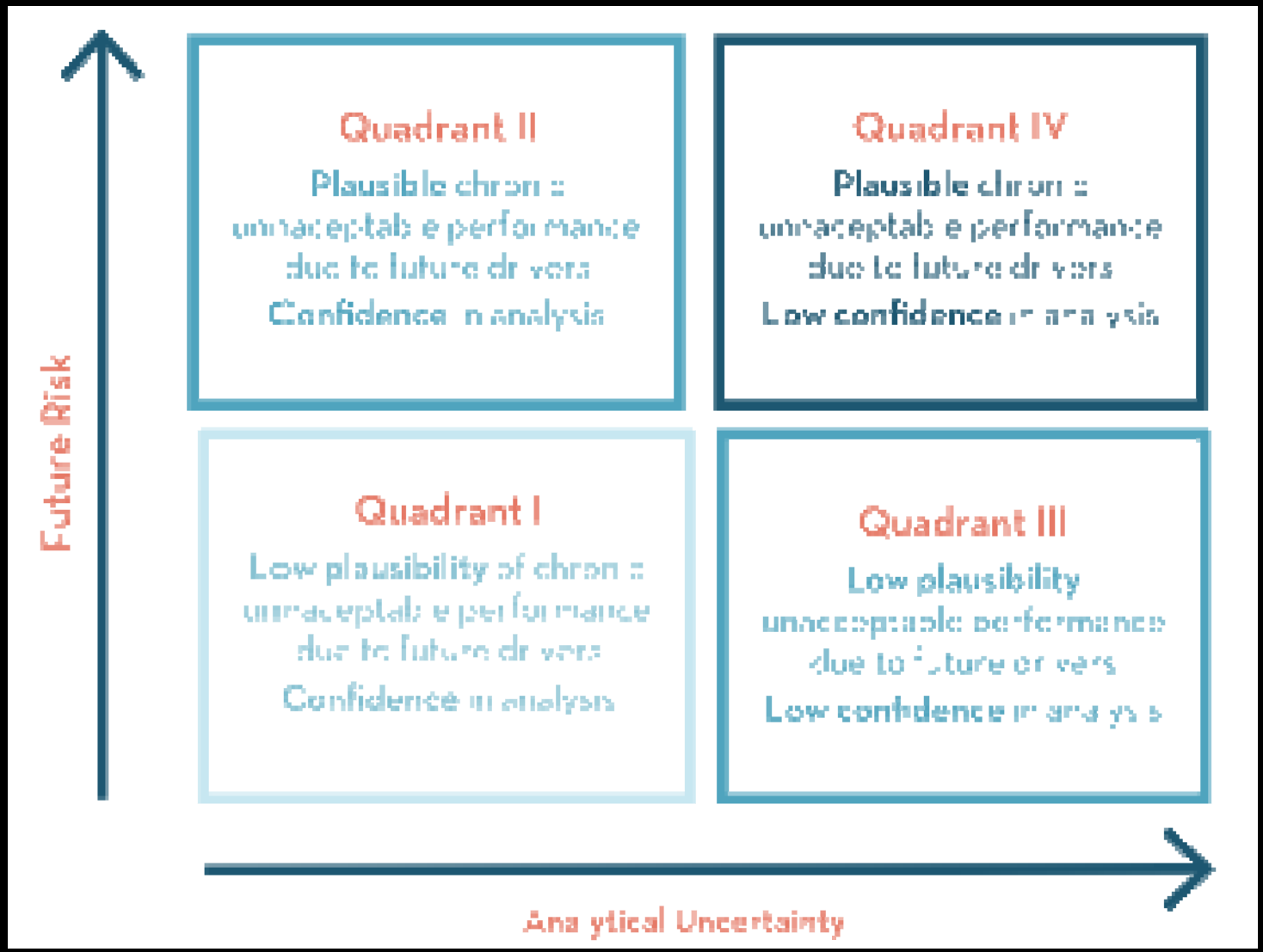
Enabling Delta Life

erstaat

Hydrosystems Research Group

A research group of the Department of Civil & Environmental Engineering

SELECTING A STRATEGY



WHICH HUMAN ACTIONS CAN EXACERBATE FLOODING?

WHAT ARE THE OBJECTIVES OF URBAN FLOOD MANAGEMENT?

WHAT ARE THE CHALLENGES?

WHICH ACTIONS CAN WE TAKE?

STRUCTURAL MEASURES

NON-STRUCTURAL MEASURES

Integrated Flood Risk Management

RISK REDUCTION

Reduce flood hazard
Restore wetlands
Build green infrastructure

Protect against floods
Build embankments and flood barriers

Regulate land use
Put setback lines, building restrictions and flood proofing in place

Raise awareness and preparedness
Early warning systems
Evacuation plans
Flood hazard maps

Mitigate residual risk
Emergency response
Insurance/Relief funds
Recovery plans

SOURCE → PATHWAY → RECEPTOR

WORLD METEOROLOGICAL ORGANIZATION

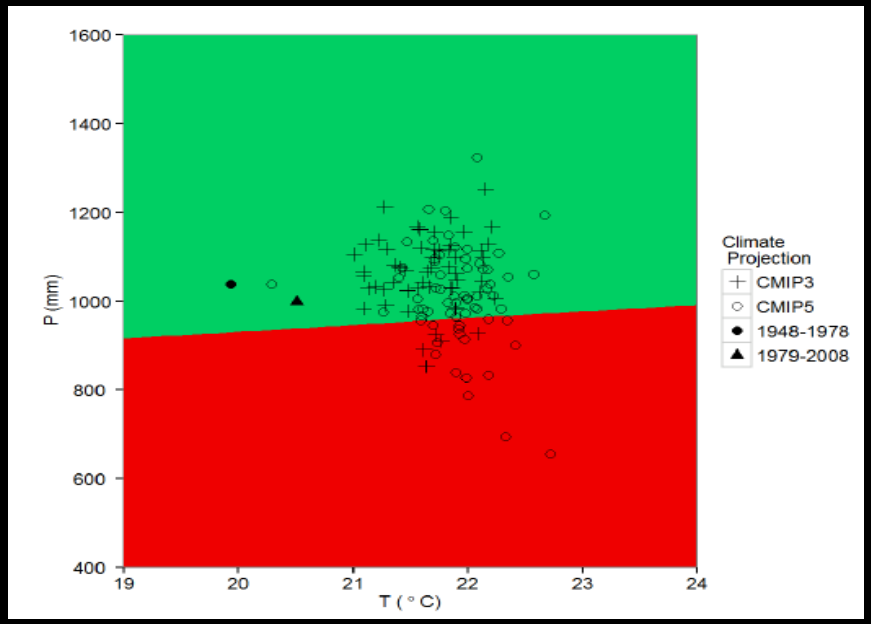
ASSOCIATED PROGRAMME ON FLOOD MANAGEMENT
www.floodmanagement.info/guidance-document

Global Water Partnership

TWO KEY ELEMENTS OF CRIDA

Decision Scaling Stress Test

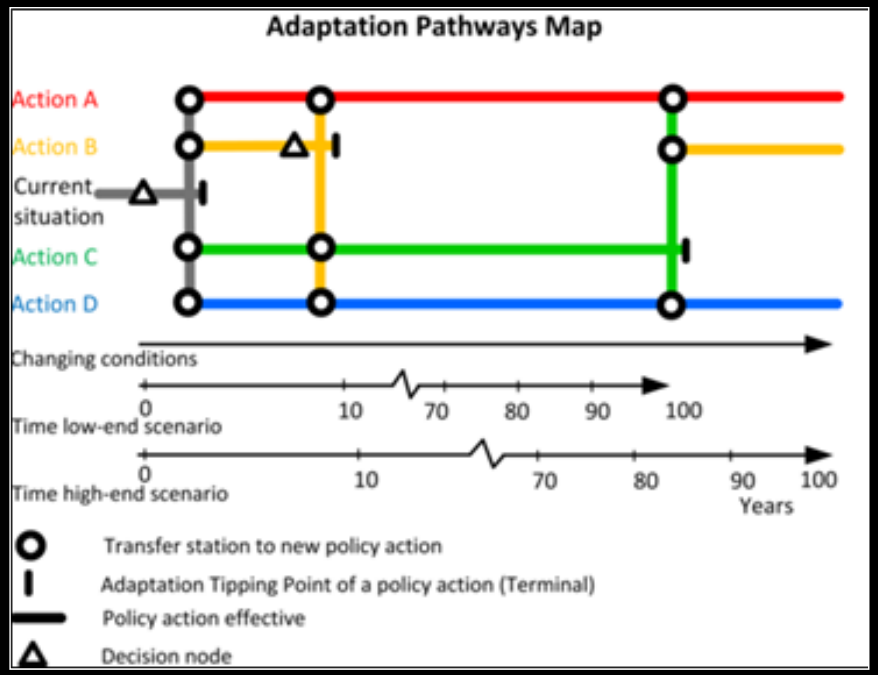
- Available climate data doesn't always meet the problem at hand: time-scale differs, models perform poorly in geographic region, observed data not available for downscaling
- Limiting analysis to GCM derived scenarios confines your decision space
- Allow stakeholders to define system failure



Climate Response Map for a Proposed Run-of-the-River Hydropower Project (Ray and Brown, 2015).

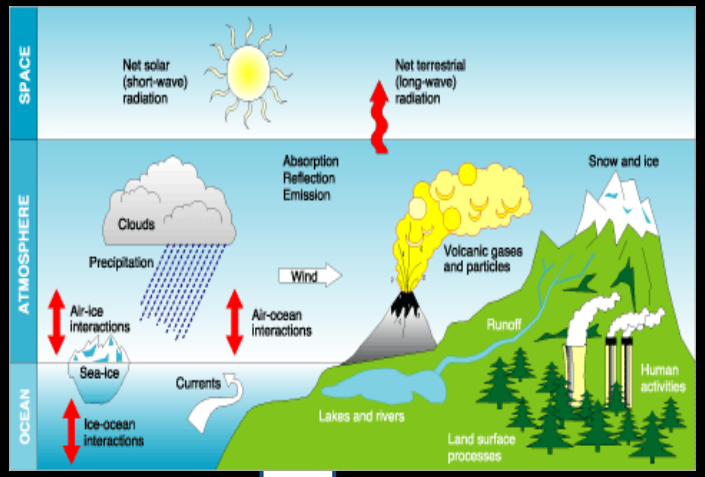
Adaptation Pathways

- With limited information, decision makers risk over- or under-designing solutions
- Adaptation pathways illustrate flexible strategies to the decision maker
- Choosing an action that has many transfer points in the future provides a low regret option as the science progresses



CRIDA IN A NUTSHELL

STAKEHOLDERS



Driver

'ANALYST'

Performance

METRICS THAT MATTER

VULNERABILITY

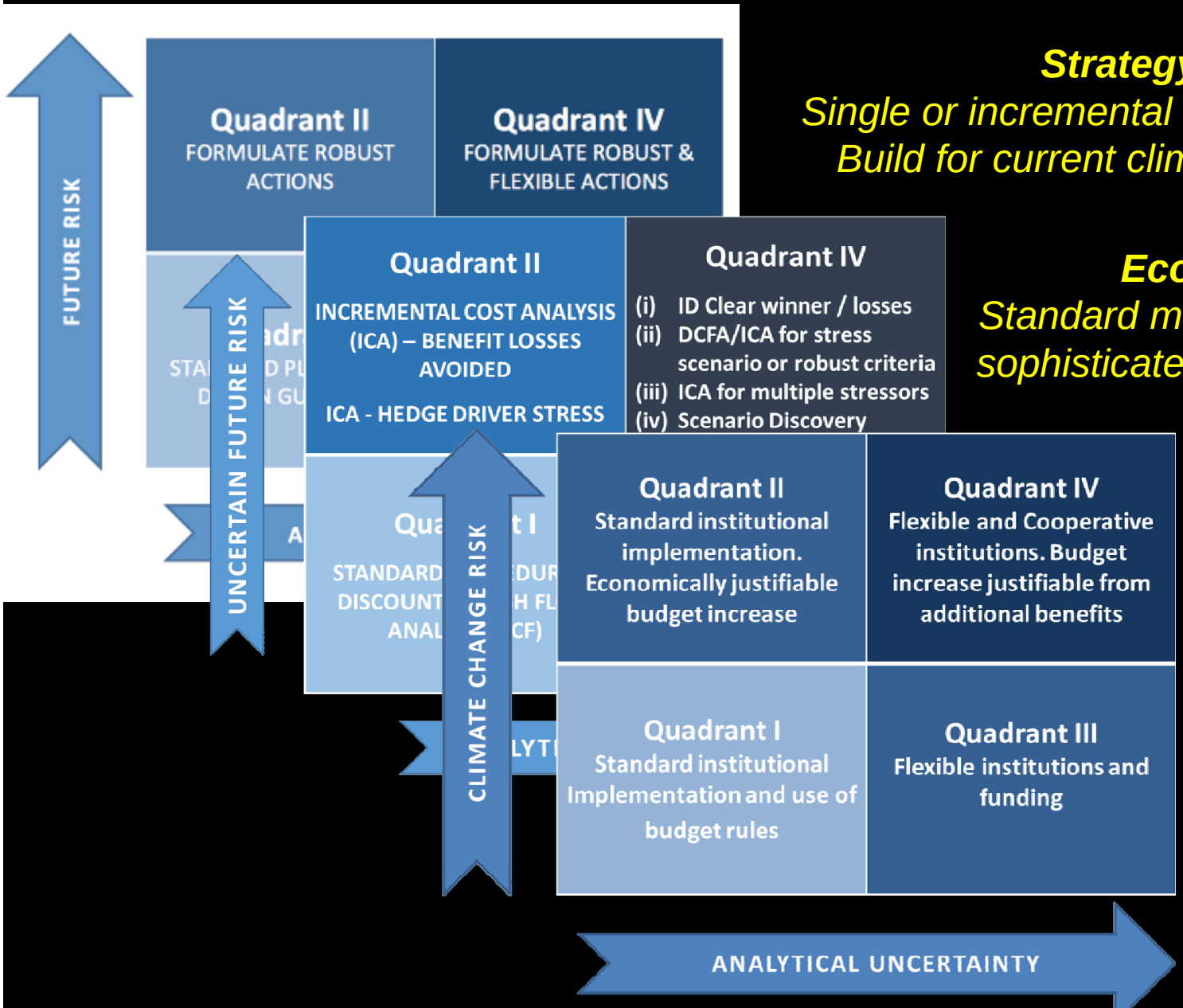
ROBUST SOLUTIONS

FLEXIBLE IMPLEMENTATION

STRESS TEST

DECISION MAKER

SCALING THE PROCESS THROUGH DECISION MATRICES



Strategy Direction:

Single or incremental investments? No regrets? Build for current climate? Or future climate?

Economic Evaluation:

Standard methods for current climate or sophisticated method for future climate?

Implementation:

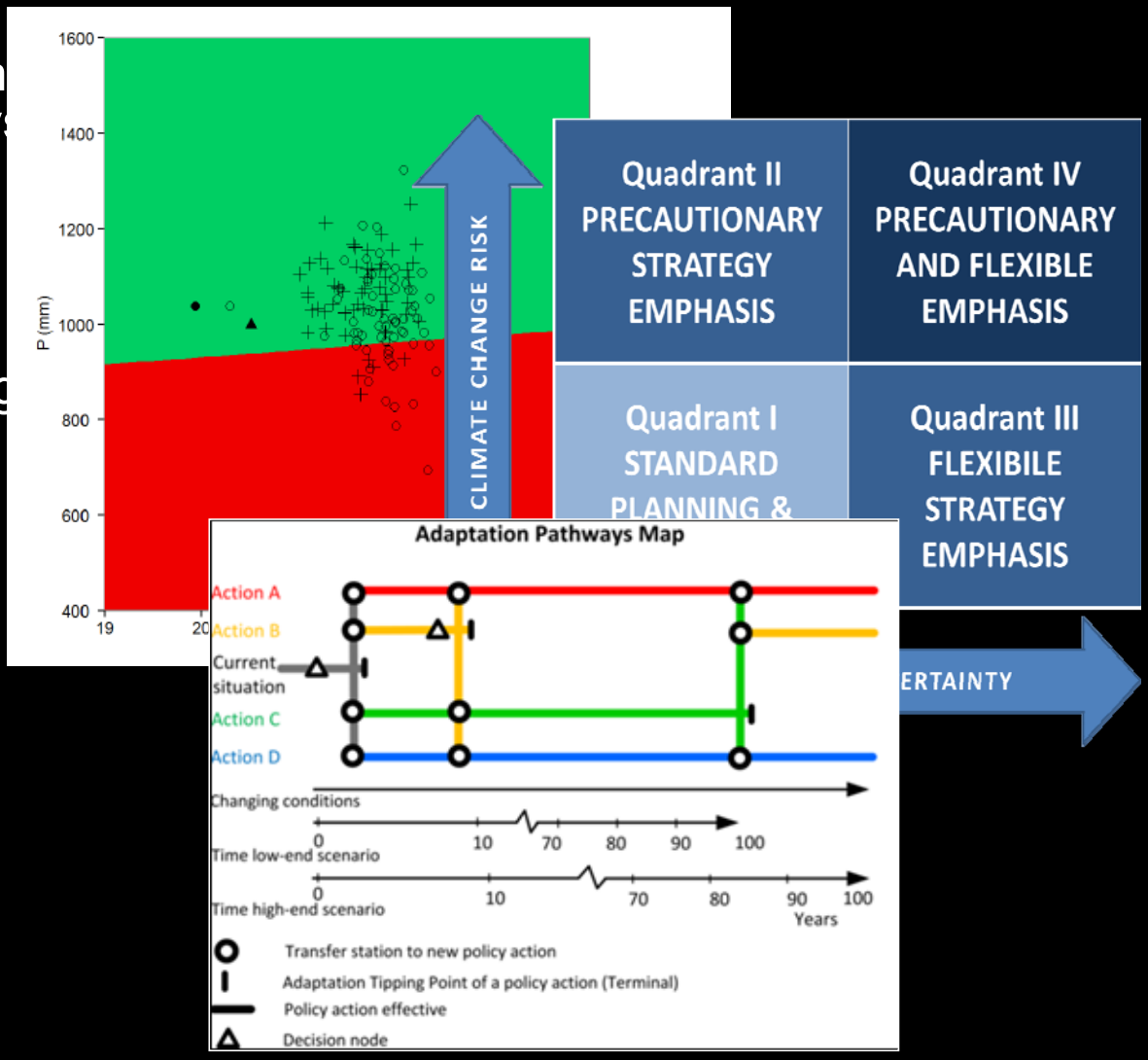
Need for justification of budget increase? Need for flexible institutions and funding?

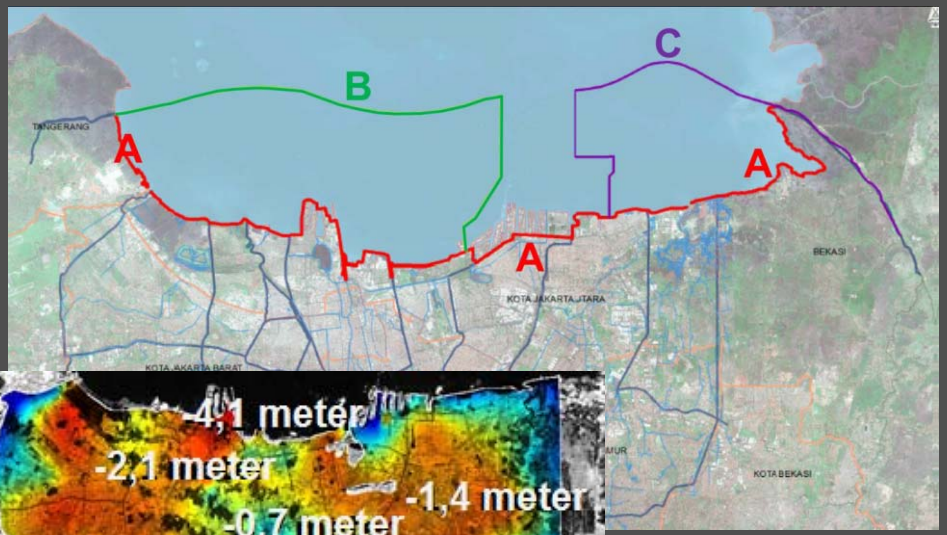
WHAT DOES CRIDA ADD TO TRADITIONAL PLANNING APPROACHES?

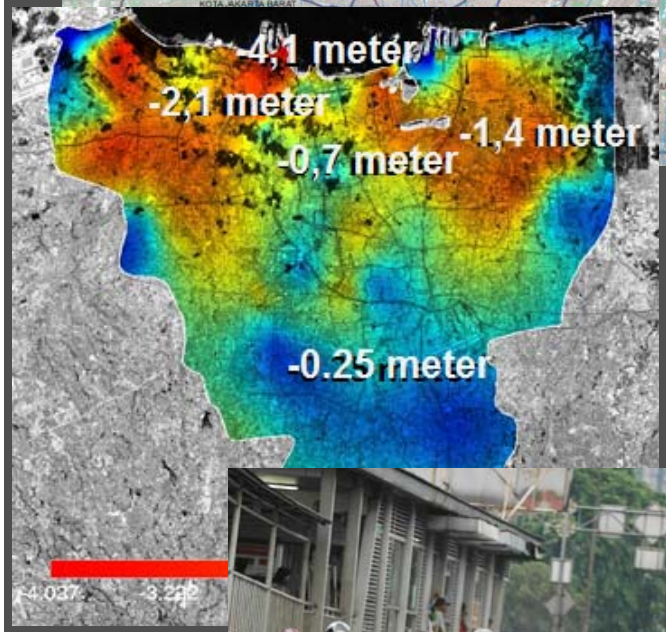
1. A broader vulnerability assessmen through stress test and LOC analys

2. Guidance on the necessary strateg direction, level of analysis, and institutional/financial needs

3. Adaptation pathways to illustrate flexibility, if recommended





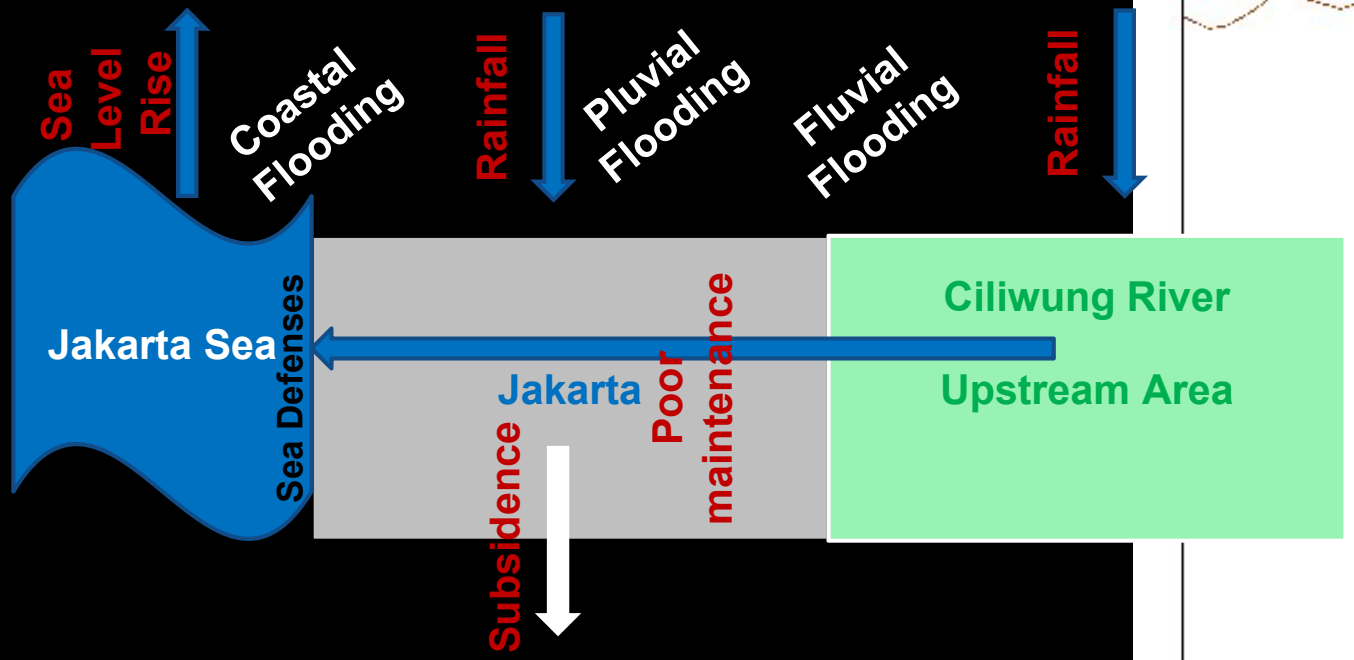


CASE STUDY III: FLOOD RISK MANAGEMENT IN JAKARTA, INDONESIA

SUPPORT TO NCICD AND UPSTREAM PLANNING PROCESSES AS WELL AS THE GREENWIN PROJECT

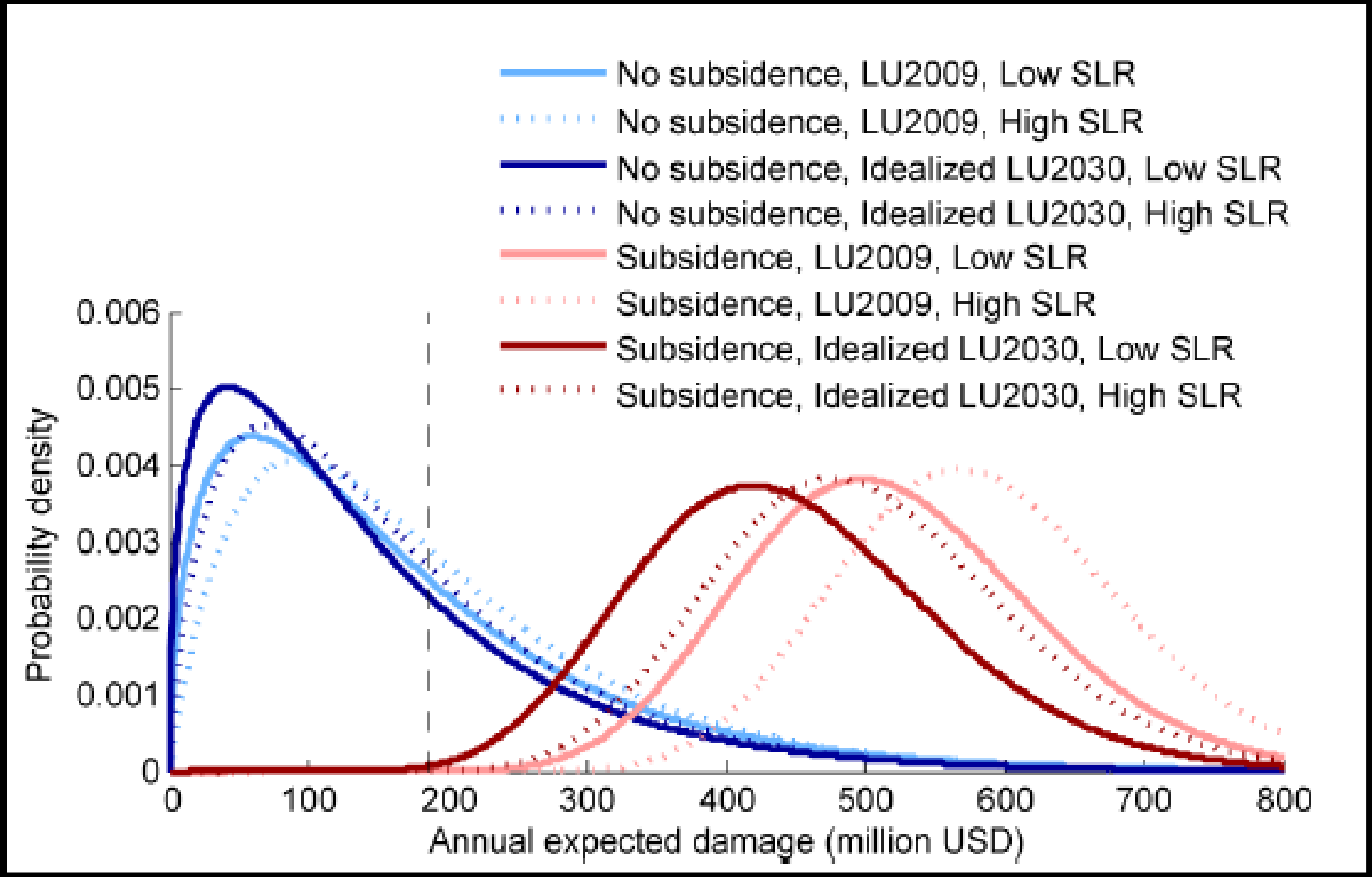
FACTORS DRIVING FLOOD RISK IN JAKARTA

1699 → 1714 → 1854 → 1918 → 1942 → 1996 → 2002 → 2007

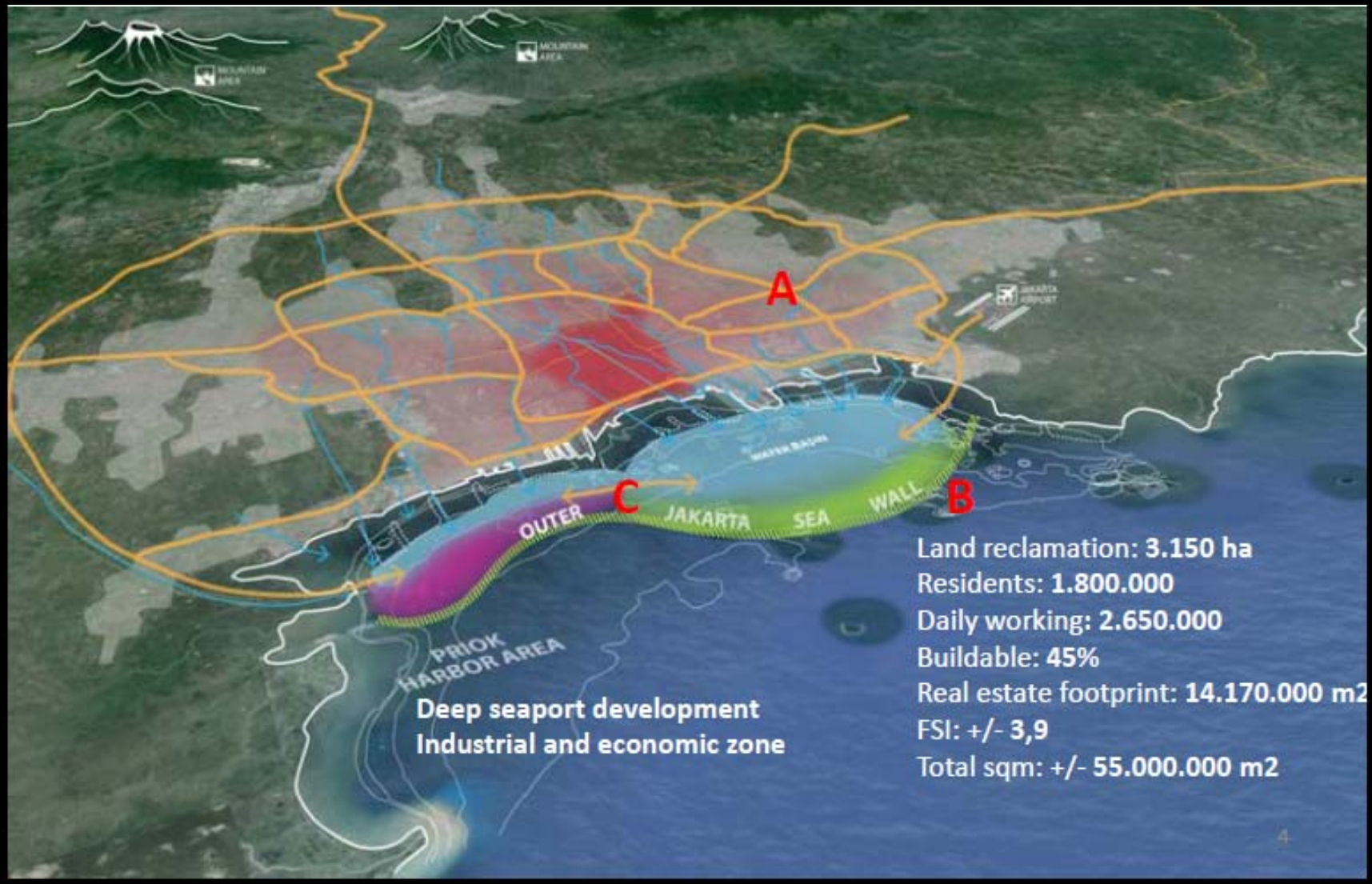


- Urbanization → limiting groundwater recharge
- Economic Growth → increasing water demands

STRESS TEST (BUDIYONO ET AL. 2016)

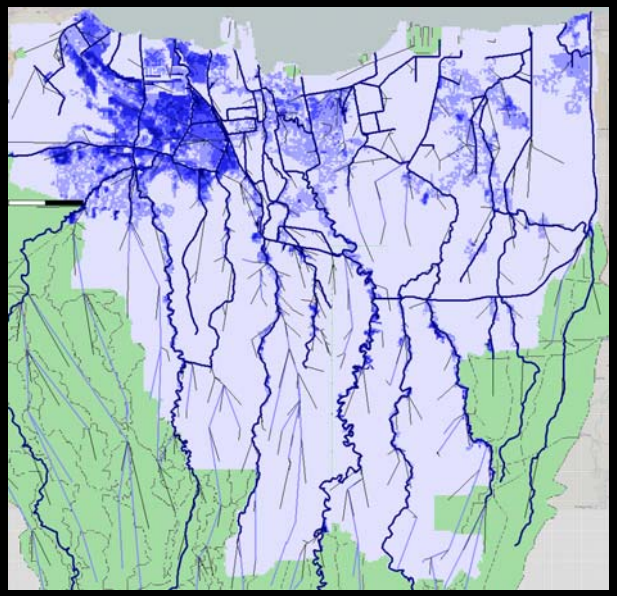


NCICD PROJECT VS. GROUNDWATER PUMPING



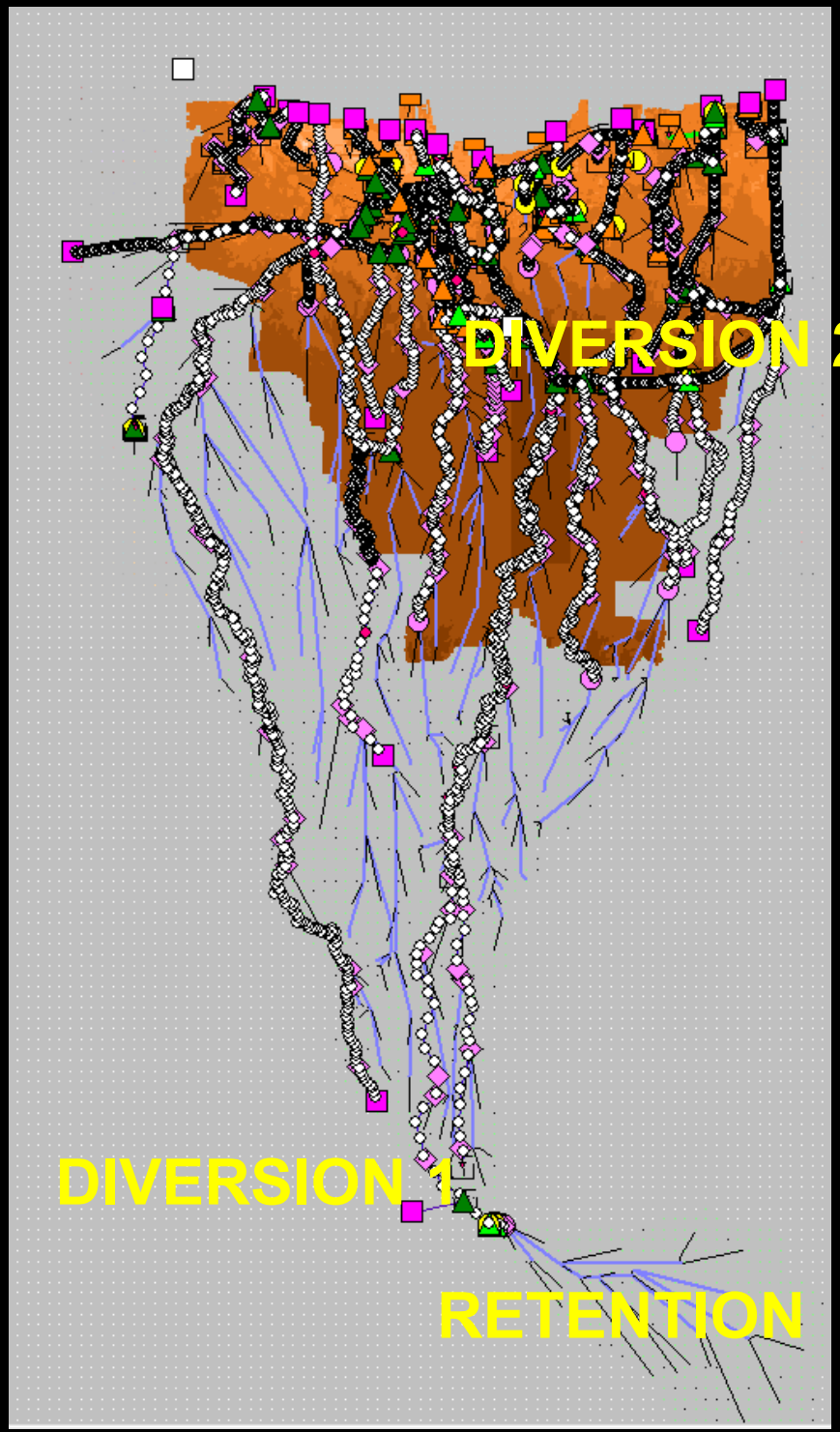
Provided by Deputy Minister for Infrastructure Affairs, State Ministry of National Development Planning (5 Nov 2013)

UPSTREAM FLOOD RISK MANAGEMENT MEASURES

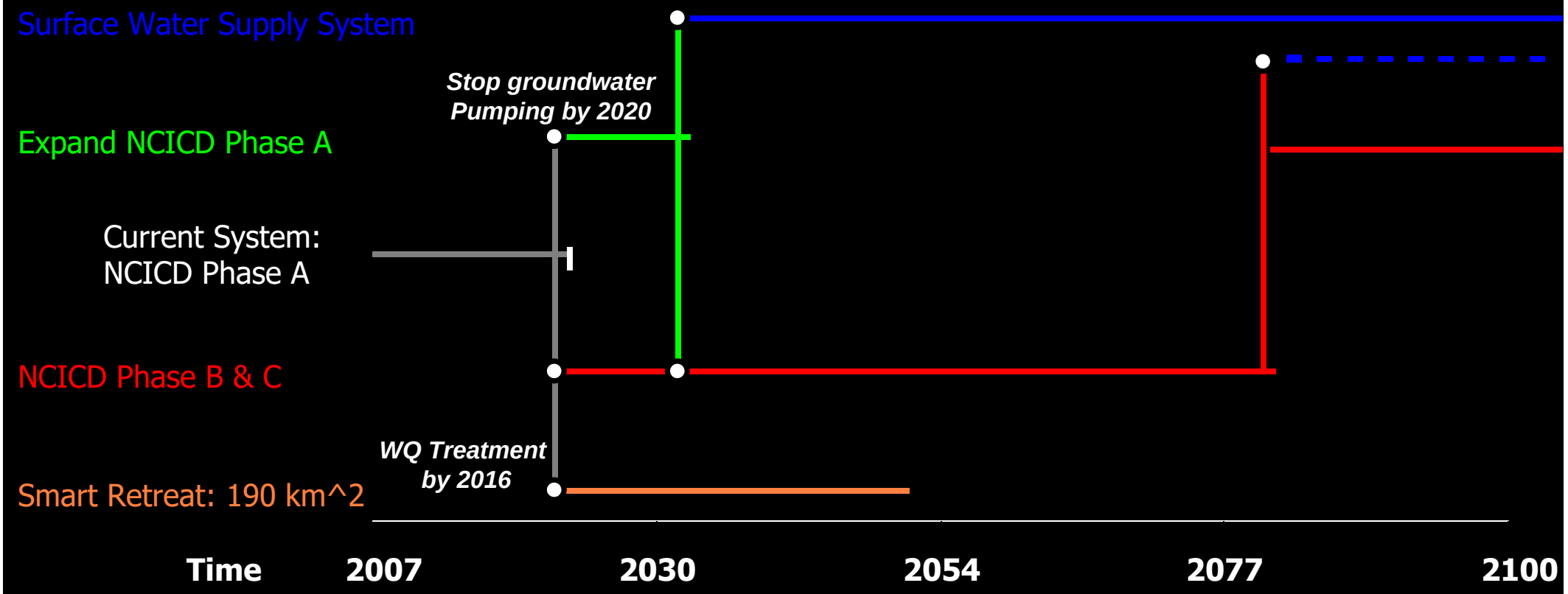


Two Dry Dams
Ciawi and Sukamahi
Total storage area= 92ha

Diversions
Diversion 1: Max 200 cms.
Diversion 2: Max 150 cms



ADAPTATION PATHWAYS: WHAT ARE JAKARTA'S OPTIONS?



- Adaptation Pathways map for Jakarta coastal flood risk master plan.
- Lifespan of NCICD Phase A, B, and C depends on subsidence levels and, therefore, groundwater pumping activity.
- Smart Retreat is no longer an option, because Phase A (seawall) has already been implemented.

IMPLEMENTING PARTNERS & PLACES

TRANSBOUNDARY

UNECE, GEF, USACE

Ukraine & Moldova

WATER UTILITIES

MCC, Deltares, USACE

Philippines, Zambia

CITIES

KTH: Sweden

USACE: Thailand, Jakarta

Deltares: Ecuador

NATIONAL POLICY

Pegasys: DWS, RSA

ECOSYSTEMS

CONAGUA, IMTA, WWF-MX: Mexico

UNESCO: Chile

“WE BUILD THINGS THAT LAST 100 YEARS AND MORE. WHY DON’T WE THINK ABOUT SUSTAINABILITY FOR THAT LONG?”

Senior manager, World Bank, February 2017

CREDITS

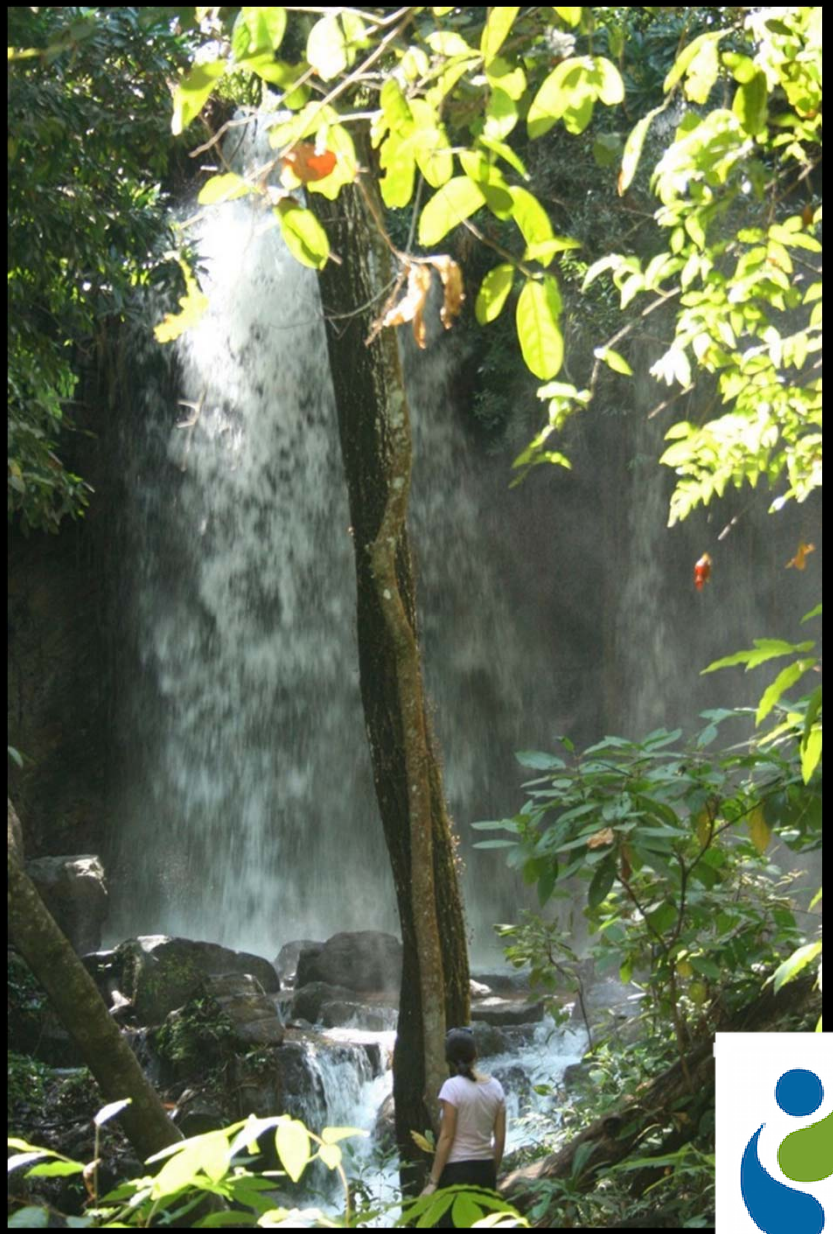
Guillermo Mendoza, USWACE IWR

Adrian Jeuken, Deltares

Alex Mauroner, AGWA

Koen Verbist, Will Logan, Anil Mishra

Casey Brown, Harm Duel, Luis Garcia, Kristin Gilroy, Marjolijn Haasnoot, John Kucharski, Jessica Lawson, Joe Manous, Rolf Olsen, Jenny Olszewski, Robert Pietrowsky, Patrick Ray, Diego Rodriguez, Gene Stakhiv, Marc Tkach, Rutger van der Brugge, Cees van de Guchte



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#ClimateIsWater

THANKS

john matthews, phd • johoma@alliance4water.org

SIWI WORLD WATER WEEK

Rijkswaterstaat
Ministry of Infrastructure and the Environment

BMZ Federal Ministry for Economic Cooperation and Development

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

UNESCO United Nations Educational, Scientific and Cultural Organization

ICIWaRM International Center for Integrated Water Resources Management under the auspices of UNESCO