

Resilience by Design for Mexico City

2017 Stockholm World Water Week

Session: “Building Freshwater Resilience for All”

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IDENTIFYING AND MANAGING CLIMATE RISKS

THE CLIMATE CHANGE DECISION TREE

- A scientifically defensible, flexible, cost-efficient tool on climate risks
- A bottom-up approach taking into account local realities and climate sensitivity

PHASE 4 CLIMATE RISK MANAGEMENT

**CLIMATE RISK
MANAGEMENT PLAN
& CLIMATE RISK REPORT**
Measures needed to ensure the project's robustness are documented

YES

Can the project cope with potential climate changes in the system ('robustness')?

NO

If project robustness is not achievable, the project is adjusted and put through phase 3 again, or a redesigned project starts at phase 1.

HIGH

What is the plausible climate risk?

LOW

Climate Risk Report

YES

Is climate a dominant factor?

NO

Climate Risk Statement

YES

Is the proposed project climate sensitive?

NO

Climate Screening Worksheet

Exhaustive climate risks analysis:
Combining historic data, global climate model projections, a hydrologic-economic water system model, etc.

PHASE 3 CLIMATE STRESS TEST

A rapid project scoping exercise, using a (simplified) water resources system model, compares climate impacts with others such as existing variability, population growth, etc.

PHASE 2 DESKTOP ANALYSIS

Climate sensitivity screening for all Bank projects:
Is climate a factor to take into account?

PHASE 1 PROJECT SCREENING



worldbank.org/water



WATER
PARTNERSHIP
PROGRAM

water.worldbank.org/wpp

Mexico City, Parched and Sinking, Faces a Water Crisis

(NY Times, 7 Feb 2017)



Mexico City, Parched and Sinking, Faces a Water Crisis

(NY Times, 7 Feb 2017)

percent of the 22M population receiving acceptable quality of water services will be decrease from 82% to 28% by 2025

Overexploitation of the aquifer is currently estimated at **double** the recharge rate

Subsidence in the city ranges from **4 to 26 cm** per year, depending on part of city

Losses in the distribution system are estimated to be **42%** of the total water supplied to the city (this includes water not accounted for, illegal capture and leakages).

Equity and inclusivity are major issues; water scarcity and shortages are borne **disproportionately by the poor.**

Urban flooding and storm water management are a **chronic** problem.

Continued **deforestation** and expansion of the agricultural frontier with **unsustainable management practices** in the watershed compromise the ecosystem services which sustain the city's demand.



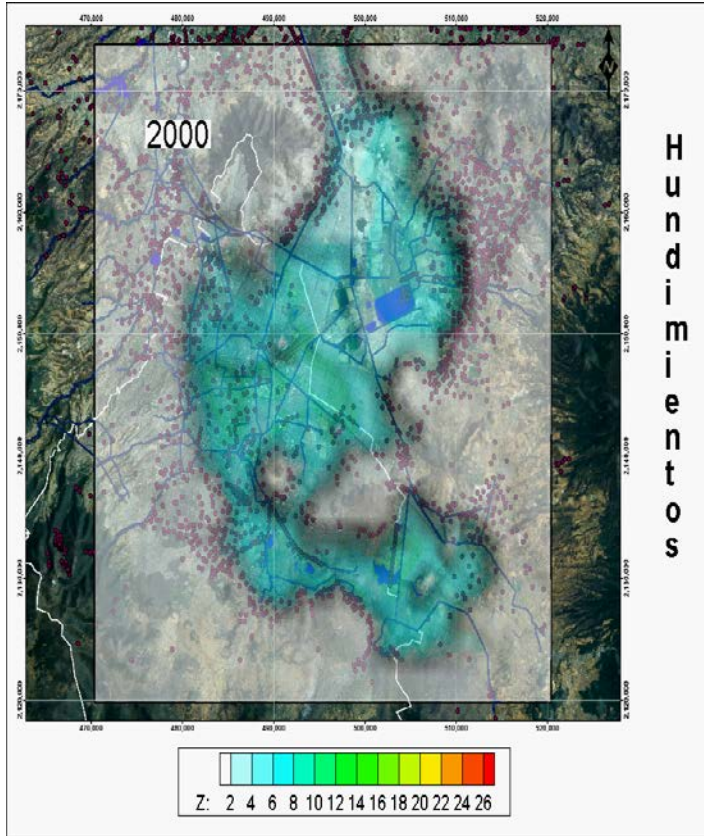
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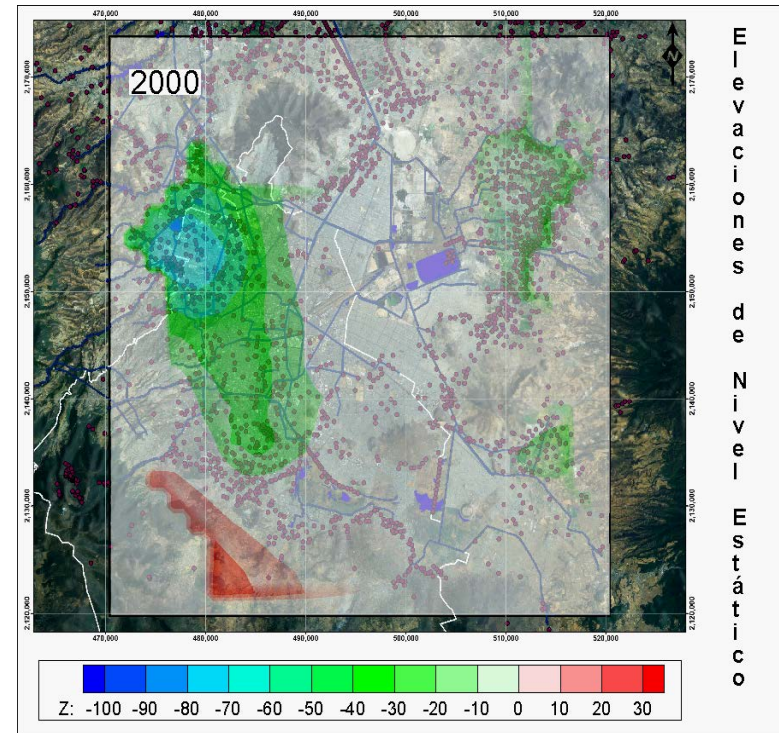
Algo de comida en el Mercado de San Juan de los Rios



IF pumping was stopped now, 32 years to recover

In 50 years the groundwater may drop 50 to 70 m

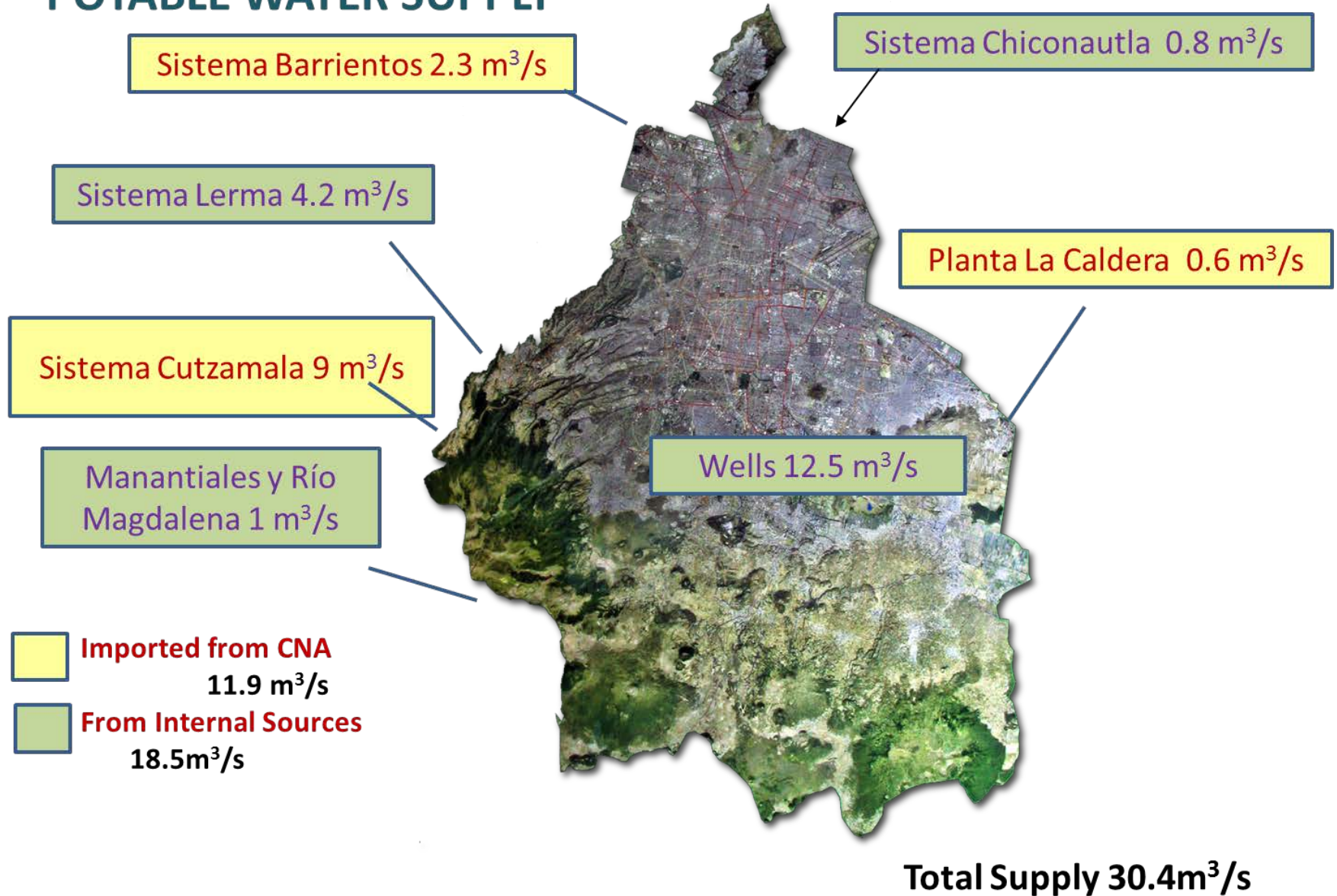
Remaining life of the aquifer is 50-60 years



However, investments possible to capture stormwater, wastewater and recharge

MEXICO CITY WATER SUPPLY

POTABLE WATER SUPPLY



Lerma Basin Council, Toluca, Mexico



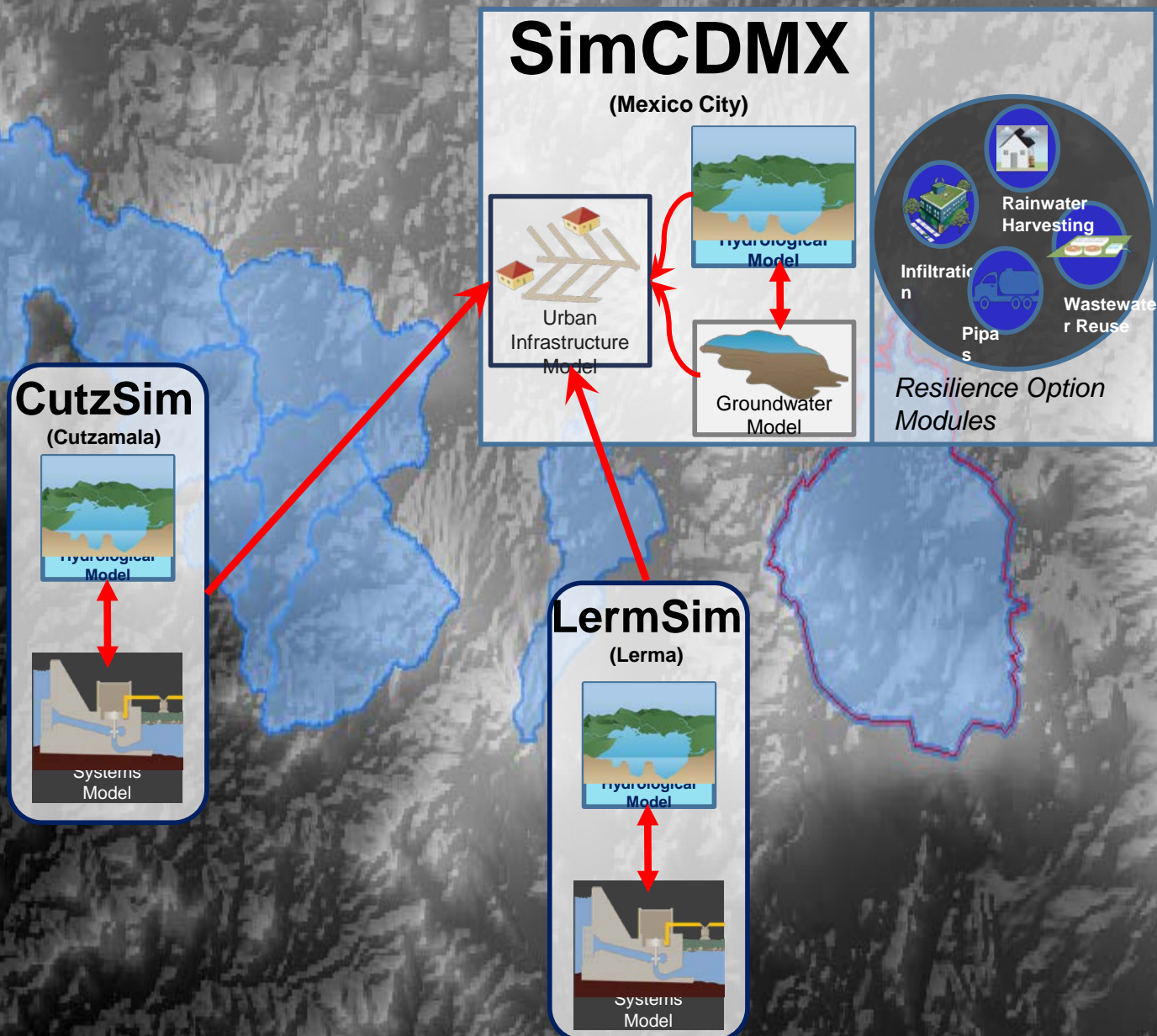
Cutzamala: Local Agriculture



When not farming ... protesting new dams

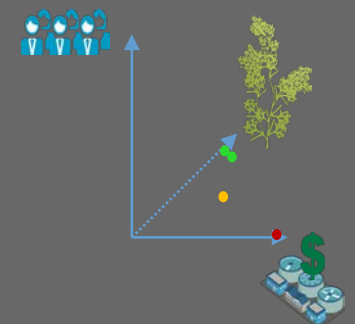


OpenAGUA – Cloud, Collaborative, decision system



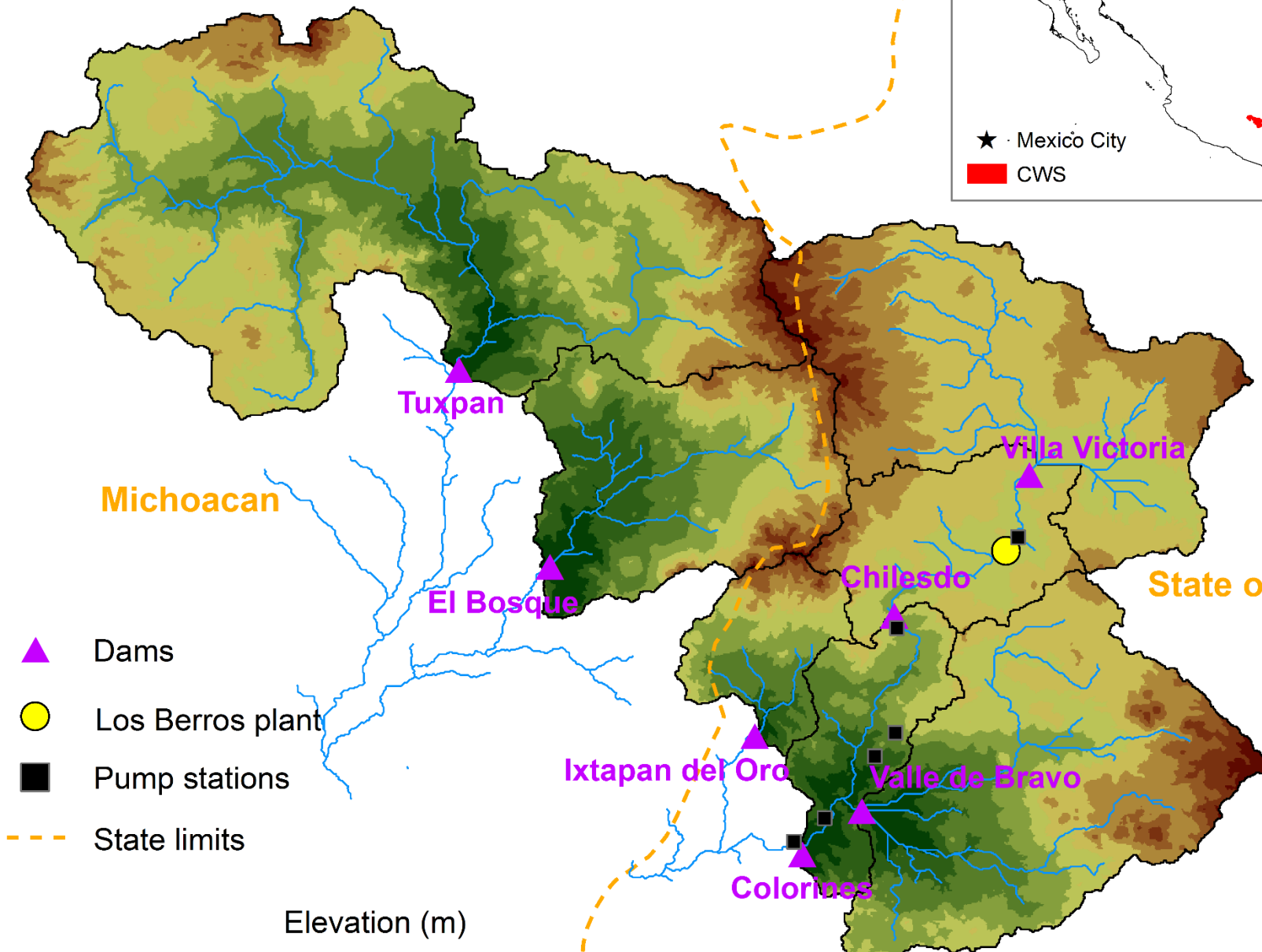
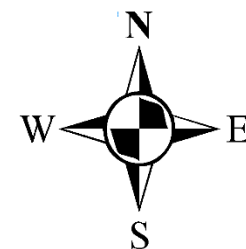
Optimization Model

INVESTMENT PORTFOLIOS:
for ecological, social (equity), and economic resilience of water in VdMX



Lerma, Cutzamala, and CDMX

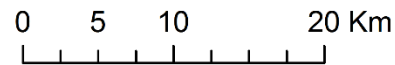
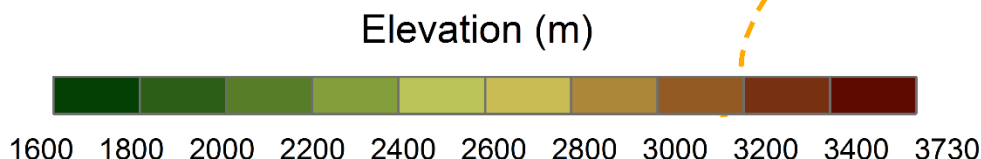
Cutzmala Water System



Michoacán

State of Mexico

- ▲ Dams
- Los Berros plant
- Pump stations
- - - State limits



performance-based resilience

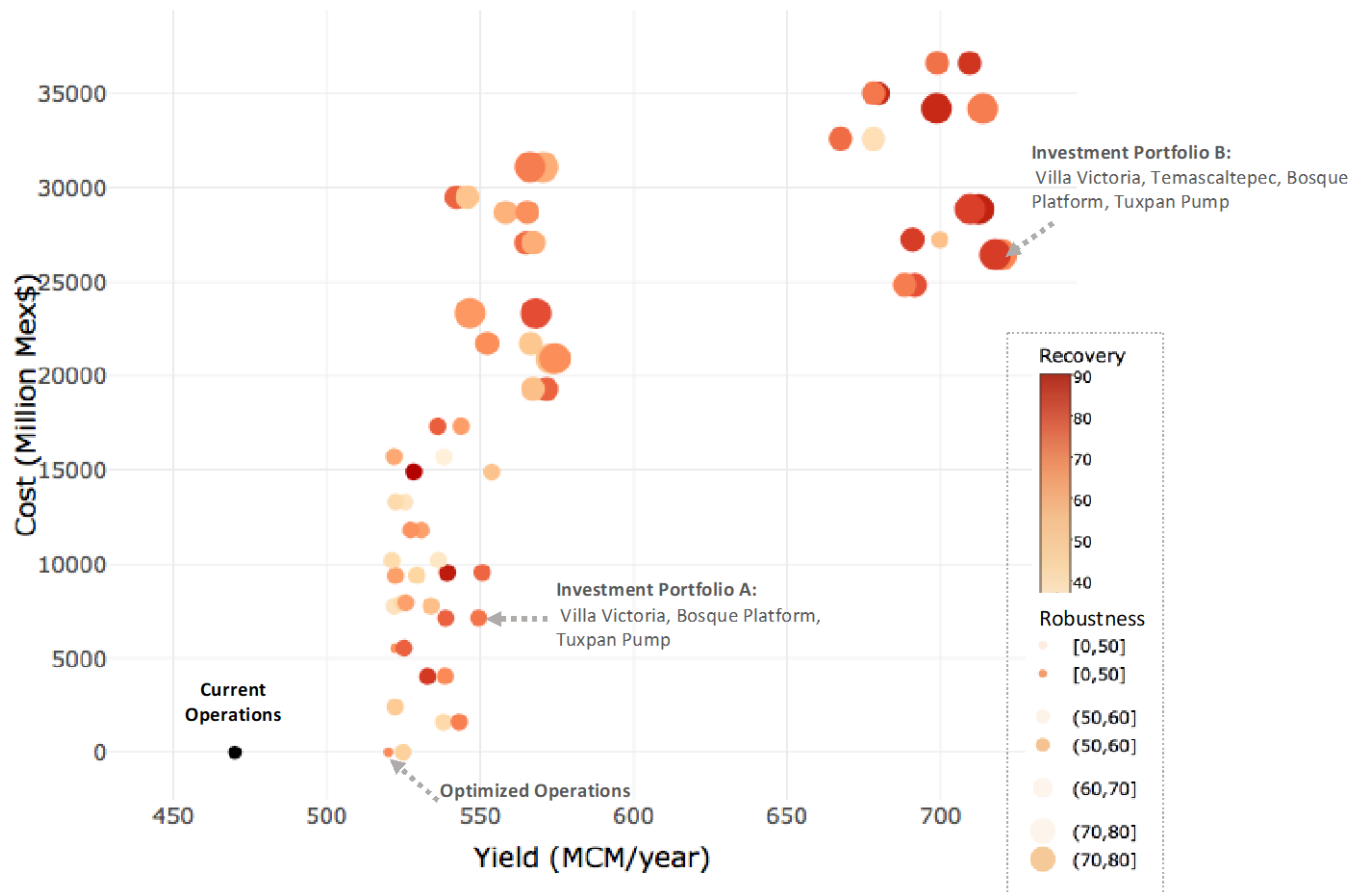
- ❖ Perform well over a wide range of futures
- ❖ Recover after failure
- ❖ Transform to new configuration if needed

Resilience of:

- Economic/Service objectives
- Social/Equity objectives
- Environmental objectives

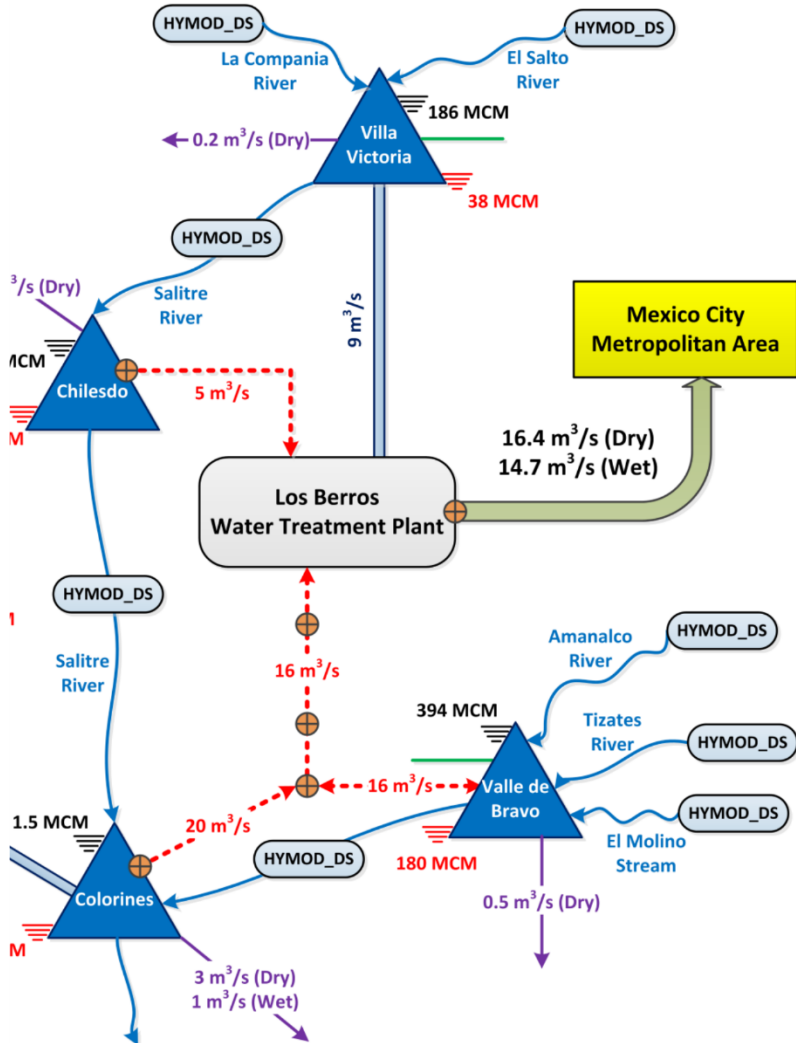
http://people.umass.edu/swi/CWS_InvestPortfolio.html

Evaluation: More than Cost!

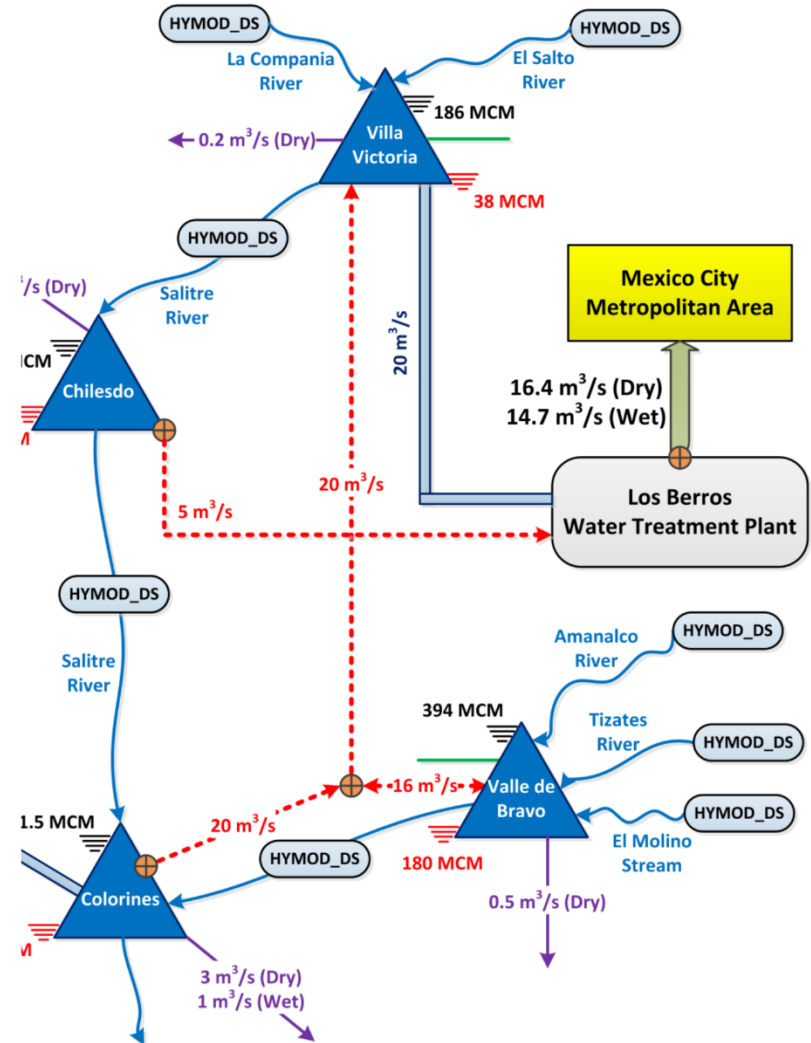


Resilience through Connectivity

Current CWS Structure



CWS Structure with Option7



Conclusion

- Mexico City requires major water investments to avoid permanent crisis
- Opportunity for transformative change for the city and for the water sector generally
- Resilience of water services, ecological flows and equitable distribution are specific design objectives
- We're already learning new sources of resilience

Thank You

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