TOO MUCH OR TOO LITTLE WATER

A Development Dilemma for a Coastal City like Iloilo

What is science telling us we can — and cannot — do?

Presented by: Rosa T. Perez
Fellow, Manila Observatory
and National Resilience Council

The Development Dilemma

Iloilo City must grow and prosper while managing two opposing water risks that climate change is intensifying at the same time.

TOO MUCH WATER

Flooding from intense rainfall, river overflow, and storm surge.

- Low elevation + dense settlement along Iloilo River and coast
- Up to ~40% of barangays with high/very high flood susceptibility
- Stronger typhoons (Cat 4–5) raise peak winds and surge risk
- Even modest rain can overwhelm clogged drainage and degraded upland catchments

TOO LITTLE WATER

Drought, dry spells, and water scarcity.

- El Niño-linked crises in 2007, 2009, 2015
- Increasing Consecutive Dry Days (CDD)
- SPI drought events projected to rise
- Groundwater dependence + competing urban/agricultural demand
- Heat intensifies evaporative demand and water stress

What Science Tells Us About “Too Much” Water

Mean rainfall

Iloilo City: little robust change in annual totals (~5% decrease signal). Flood risk is not driven primarily by mean rainfall change.

Extremes

Heavy rainfall intensity can increase. Max 1-day rainfall +20–25% projected in parts of Visayas by late century under high emissions. Fewer but stronger typhoons.

Local amplifiers

Clogged drainage, river siltation, upland deforestation, and unplanned riverside/coastal development turn moderate rain into damaging floods.

Sea level & surge

Relative sea-level rise compounds storm-surge and high-tide flooding in a low-lying coastal city—independent of rainfall trends.

What Science Tells Us About “Too Little” Water

Projected drought events (Iloilo City CDRA)

SPI = Standardized Precipitation Index
SPI3 ≈ agricultural drought
SPI12 ≈ groundwater stress

Period	SPI3	SPI12
Baseline 1986–2005	2	2
RCP4.5 late century	4	4
RCP8.5 late century	4	5

What this means

- CDD ↑ and CWD ↓
- More frequent agricultural drought
- Greater risk of groundwater deficit
- Heat raises evaporative demand
- Urban growth + groundwater extraction amplify scarcity even without large rainfall declines

The Core Scientific Insight

Climate change is increasing the intensity of both wet and dry extremes — often in the same place. Mean annual rainfall may change little, but the distribution of water in time becomes more hostile to development.

01 Flood risk is driven more by extremes + exposure than by mean rainfall change.

02 Drought risk is driven by longer dry spells, higher demand, and storage limits.

03 Development choices (where we build, how we drain, how we store) determine whether climate signals become disasters.

What Science Says We Can Do

Reduce exposure

Keep critical assets out of highest-risk flood and surge zones. Enforce setbacks along rivers and coasts. Avoid locking in new vulnerability through riverside/coastal expansion.

Manage extremes, not just averages

Design drainage and flood infrastructure for higher design rainfall (not historical averages alone). Plan water supply for longer dry spells and multi-year El Niño sequences.

Nature-based & hybrid solutions

Restore upland forests and wetlands (natural sponge). Protect and expand green–blue corridors in the city. Combine with engineered drainage and storage.

Demand & storage management

Reduce non-revenue water. Expand storage and conjunctive use of surface + groundwater. Diversify sources; protect recharge areas.

Heat & health co-benefits

Cooling strategies (shade, reflective surfaces, green space) reduce heat stress and peak water demand for cooling.

Use the best available data

Apply CliMap, CLIRAM, CDRA risk maps, and ensemble projections in local climate action and land-use plans. Update as CMIP6/CORDEX products mature.

What Science Says We Cannot (Yet) Do

Honest limits matter as much as options. Over-promising erodes trust and leads to maladaptation.

Eliminate flood or drought risk

We cannot engineer away all extremes. Residual risk will remain, especially under high-end warming and stronger typhoons.

Predict exact year-to-year water balance

Climate projections are not forecasts. They describe long-term statistical changes and ranges, not next year's rainfall or next El Niño's severity.

Rely on a single model or number

Rainfall projections still show large model spread. Decisions based on one simulation or a single "best" estimate are fragile.

Ignore socio-economic drivers

Science cannot fix governance, land-use enforcement, or equity. Exposure and vulnerability are shaped by policy and investment choices as much as by climate.

Assume past relationships hold forever

Statistical downscaling and historical design standards can break under novel extremes. Continuous updating and safety margins are required.

Solve everything with hard infrastructure alone

Pumps, walls, and reservoirs have limits and can create false security. Soft measures, land-use rules, and early warning remain essential.

Science-Informed Decision Principles

1	**Plan for ranges, not points**	Use multi-model ensembles and both medium and high emission pathways. Stress-test plans against the upper end of extremes.
2	**Prioritize no-regret & low-regret actions**	Drainage rehabilitation, water-loss reduction, recharge protection, and early-warning systems pay off under almost all futures.
3	**Keep options open**	Avoid irreversible high-exposure development. Prefer flexible, modular, and nature-based measures that can be scaled.
4	**Integrate climate into land-use & investment**	Climate information only matters if it changes where and how the city grows, builds, and allocates water.
5	**Monitor and update**	Revisit projections and risk maps as CMIP6/CORDEX products and local observations improve. Treat adaptation as iterative.
6	**Address equity explicitly**	The urban poor, Level-1 water users, and outdoor workers face the highest residual risk. Design measures that protect them first.

What This Means for Iloilo City

1

Accept dual risk

The city will face both more intense wet extremes and more severe dry spells. Planning that addresses only one side will fail.

2

Fix the amplifiers

Many flood and scarcity impacts are made worse by drainage failure, deforestation, over-extraction, and settlement patterns — factors the city can influence now.

3

Invest in flexibility

Storage, diversified water sources, adaptive land-use rules, and early warning buy time and reduce residual risk under deep uncertainty.

Key Messages

1. Iloilo faces a genuine dual water dilemma: intensifying flood extremes and intensifying drought signals at the same time.
2. Science is clearer on temperature and extremes than on mean rainfall. Plan for variability and intensity, not just annual averages.
3. We can reduce risk through exposure control, better design standards, nature-based solutions, storage, and demand management.
4. We cannot eliminate residual risk, forecast next year’s water balance, or compensate for weak land-use and water governance.
5. The highest-return path is iterative, equity-aware adaptation that uses ensemble climate information and keeps options open.

Science does not remove the dilemma.
It clarifies the trade-offs and the room to act.

Too much or too little water will remain a defining challenge for coastal Iloilo.
How the city develops — where it builds, how it stores and drains, whom it protects — will decide how costly that challenge becomes.

Sources: PAGASA CliMap & Climate Extremes Report · Iloilo City CDRA · CORDEX-SEA · Villafuerte et al. (2020) · PHILCCA 2024