Decisions for the Decade: A “Serious Game” for Water Planners

Robert Lempert, RAND
Decisions for the Decade
How do we make smart long-term decisions?

All Participate
(...expect confusion...)

Special thanks to Pablo Suarez and Janot Mendler de Suarez (Red Cross / Red Crescent Climate Centre)
You: Principle Planner...of a large city

within a region like this one
Your objective.... prepare your community for the future

- What will the future bring?
- Will it be different from the past? In what way?
- What investment decisions should we make?
- Will we be prepared?
The Set Up

Region 1

Region 2

Cities

Region 3
Making Decisions

*City* decisions are *independent*
  - Use individual *City* boards and brown beans

*Regional* decisions require *teamwork*
  - Use single *Region* board and white beans
### CITY BOARD

#### FLOOD PROTECTION
- If you roll a flood: lose 1 bean

#### INVESTMENT & DEVELOPMENT
- Earn 1 Prosperity Point per bean,
  - But only if no crisis

#### DROUGHT PROTECTION
- If you roll a drought: lose 1 bean

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### How to Win

**Winning City**
- **Fewest Crises within a city**
- **Only 1 city winner per region**
- **Tiebreaker within region: city with most prosperity**

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### 2. INVESTMENT DECISIONS

<table>
<thead>
<tr>
<th>Decade</th>
<th>FLOOD Protection (0 - 9)</th>
<th>INVESTMENT &amp; DEVELOPMENT (1 - 10)</th>
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### 3. OBSERVATIONS

- Annual Precipitation

### 4. RESULTS

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**TOTAL:**

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### CITY BOARD

- Fewest Crises within a city
- Only 1 city winner per region
- Tiebreaker within region: city with most prosperity
How to Win

1 Winning Region:
- **Most Prosperity**
- **Tiebreaker: Region with fewest crises**

### REGION BOARD

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**TOTAL:**
Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
1. Scientific Information

Annual Precipitation Cheesman Reservoir (1903-2016)

Typical Information
The game’s source of information

= Flood

= Drought
Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
2. Make Decisions

- Allocate resources for each decade
- Drought protection
- Flood protection
- New investments, operations, maintenance, infrastructure upgrades, roads
DROUGHT PROTECTION
If you roll a drought: lose 1 bean

FLOOD PROTECTION
If you roll a flood: lose 1 bean
## Investments & Development

- **Earn 1 Prosperity Point per bean,** but only if no crisis.

### Drought Protection
- If you roll a drought: lose 1 bean.

### Flood Protection
- If you roll a flood: lose 1 bean.

#### 2. Investment Decisions

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Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
3. Record Observations

Ten years of precipitation occur
### 2. INVESTMENT DECISIONS

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</table>

### 4. RESULTS

**One Drought**

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3. Record Observations

Ten years of precipitation occur
Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
4. Tally Results

We protected against 1 drought...
Since one drought occurs, we use one protection bean...
We protected against 1 drought…
Since one drought occurs, we use one protection bean…

…we get 9 Prosperity Points!
4. Tally Results

INVESTMENT & DEVELOPMENT
Earn 1 Prosperity Point per bean, but only if no crisis.

But what if we had a second drought?

Not enough protection…
...means a social and environmental crisis...
...and 0 Prosperity Points!

Each shortage of protection is a new crisis!
4. Tally Results

If one drought occurs:

<table>
<thead>
<tr>
<th>City 1</th>
<th>City 2</th>
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<tbody>
<tr>
<td><img src="image1.png" alt="Image of City 1" /></td>
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<table>
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City 1: 0 Crises, 9 Prosperity Points
City 2: 1 Crises, 0 Prosperity Points
Repeat Steps of the Game

1. Receive Scientific Information

2. Make Decisions

3. Record Observations

4. Tally Results
Key Rules

Simplification of reality
No challenging the rules!

Decisions are individual
No consulting on City Decisions
Do collaborate on Regional Decisions

We will play 4 decades of decision making
Each round is 10 years
Winning The Game

Winning City:
- Cities with fewest crises for each Region
- Only 1 City winner per Region
- Tiebreaker within Region: City with the most Prosperity points

1 Winning Region:
- Most Prosperity Points
- Tiebreaker: Region with fewest crises

There Are Prizes!!!
Let’s Play!!!
Round 1
(years 1-10)
1. SCIENTIFIC INFORMATION

Historical Precipitation

= Flood

= Drought
2. DECISIONS

Make investments for the coming decade

- Allocate the beans
- Record your investments
3. Observations

*Use one die for the entire table—applies to City and Region

Ten years of precipitation occur

\[ \times 10 \]
### 4. Results

**Record results**

<table>
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**TOTAL:**

**Any Crises?**

**How much prosperity?**
Round 2
(years 11-20)
1. SCIENTIFIC INFORMATION

Historical Precipitation

= Flood

= Drought
2. DECISIONS
New Investment Option: Robustness

Robust Option

- You are guaranteed a fixed number of prosperity beans, no matter how many floods or droughts occur
- But, you must give all beans above that fixed number to the bank
- How many beans would you accept for this robust option?
2. DECISIONS

Make investments for the coming decade

• Allocate the beans, or choose robust option
• Record your investments
3. Observations

Two years of precipitation

x 2 only
Have you heard about...

CLIMATE CHANGE?

1 2 3 = Drought

6 = Flood

 Umbrella
3. Observations

*Eight more years of precipitation*
4. Results

Record results

Any Crises?

How much prosperity?

4. RESULTS

Annual Precipitation

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TOTAL:

1 = Flood

2 = Drought
Round 3
(years 31-40)
1. SCIENTIFIC INFORMATION
Precipitation Under Climate Change

1, 2, 3 = Drought
6 = Flood

Umbrella Bucket
2. DECISIONS
Robust Option Again Available

Robust Option

• You are guaranteed a fixed number of prosperity beans, no matter how many floods or droughts occur
• But, you must give all beans above that fixed number to the bank
• How many beans would you accept for this robust option?
2. DECISIONS
Make investments for the coming decade

- Allocate the beans, or choose robust option
- Record your investments
3. Observations

*Ten years of precipitation occur*
3. Observations

*Ten years of precipitation occur*
### 4. Results

**= Flood**

**= Drought**

**Record results**

**Any Crises?**

**How much prosperity?**

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**TOTAL:**

3
Round 4
(years 41-50)
1. SCIENTIFIC INFORMATION

We have a NEW MODEL for climate change...
2. DECISIONS
Robust Option Again Available

Robust Option

• You are guaranteed a fixed number of prosperity beans, no matter how many floods or droughts occur
• But, you must give all beans above that fixed number to the bank
• How many beans would you accept for this robust option?
2. DECISIONS
Make investments for the coming decade

- Allocate the beans, or choose robust option
- Record your investments
3. Observations

Ten years of precipitation

Climate will remain deeply uncertain...
## Final Results: Decades 1-3 ONLY

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**TOTAL:**

- Fewest Crises = City winner!
- Most Prosperity Points = Region winner!
Thank you for playing Decisions for the Decade!