



# **Participant Workbook**

Name:

Table #:



## **Stakeholders**



Farmer

- Concerned that drought could leave her without water for her crops
- Water-saving irrigation systems would stress her budget
- Wants the community to have access to local food



- Worried that a drought could impact the real estate market
- Wants to invest in water-efficient homes, but is concerned that they won't be as competitive

**Construction Company Owner** 



- Concerned about higher utility bills
- Worried that a severe drought could mean removing grass from his yard
- Worried about the future of water for his kids

#### Suburban Resident

## **Stakeholders**



#### **Outdoor Enthusiast**



#### **Manufacturing Plant Manager**

- Fishes, hunts, and hikes on the lands that feed water to the city
- Concerned that drought could affect plant and animal populations

- Plant is one of the largest water users in the city
- Worried about the costs of more efficient manufacturing equipment
- Wants to see a reclaimed water system for industrial users



- Concerned that drought and groundwater pumping would lower flows in the river
- Worried that dams upstream will affect plant and animal populations

**Environmental Group Director** 

## Resilience



Conserve & Protect involves saving water and cleaning up existing ground and surface water sources. Efforts to save water include new water efficiency standards for old and new buildings, changing water prices, drought tolerant landscaping, and water-saving irrigation technology for farms.

#### ECONOMIC $\star \star \star$

Ground and surface water clean-up can be very expensive depending on the level of contamination. Changing fixtures in old buildings can require costly construction but water-saving fixtures are very inexpensive to install in new buildings. Increases in water pricing affect businesses that use a lot of water, such as farms and factories.



#### NEW SUPPLIES & STORAGE

New Supplies & Storage involves solutions to increase the amount of water available to a community. New supplies include desalination, drilling new groundwater wells, treated and reclaimed wastewater, or captured stormwater. Strategies for storage include expanding reservoirs and storage in underground aquifers.



#### PREPARE THE PUBLIC

Prepare the Public involves safeguarding people from the impacts of severe droughts, including water shortages and wildfires. Solutions include grass and forest management to control wildfires, increasing access to municipal water supply systems, and drought insurance to protect people financially impacted by drought.

### ECONOMIC $\star \star \star \star$

Expanding the city's water supply ensures that businesses and people can continue to function into the future. However most of these strategies are expensive and require a lot of new infrastructure. Desalination, for example requires a lot of energy and pipes or canals to move water to where it is needed.

#### ECONOMIC \*\*\*

Grass and forest management for wildfires, expanding municipal water systems, and drought insurance and relocation efforts are expensive, however, these strategies also reduce potential harm to businesses and commerce.

## **Strategies**

#### ENVIRONMENTAL $\star \star \star \star$

In general, saving water has environmental benefits only if that saved water is used for environmental purposes, like maintaining flows in a river. Cleaning surface waters can improve the environment by reducing contamination that harms plants, animals, and ecosystems.

### SOCIAL ★★★

Increasing the price of water can impact the price of some goods and can impact residents' utility bills. Construction for new landscaping or replacing fixtures can be disruptive to residents and businesses. If saved water can be stored, conservation can increase the amount of water available to the community for the future.

#### ENVIRONMENTAL ★ 🛧

Desalination creates very salty water that can harm marine ecosystems. Desalination is also very energy intensive. Pumping groundwater can lower water levels in streams and wetlands, which can damage those ecosystems and affect water quality. Conversely, recharing aquifers helps to maintain water levels. Stormwater capture using plants and basins improves water quality.

### SOCIAL ★★★≯

In general, increasing water supply reduces the risk of water shortages, which can quickly threaten the health and well-being of a community. Pumping groundwater, however, can lower water levels and endanger the water supply of people who depend on individual private wells.

#### ENVIRONMENTAL \*\*

Forest management for wildfires improves environmental quality by reducing the risk of catastrophic wildfires. Other Prepare the Public strategies have little to no environmental impact.

### SOCIAL \*\*\*\*

Preparation for wildfires reduces losses of life and property. Expanding municipal water systems ensures that those dependent on groundwater have access to a more diverse water supply. Insurance and relocation funds provide a safety net for those whose livelihoods are threatened by drought.

# **Resilience Plans**

## **CONSERVE & PROTECT**

### Plan A

- A new plant that cleans polluted groundwater will increase the amount of water available for municipal use.
- The city will provide \$1,000-\$5,000 for new fixtures and leak repair in older residential and commercial buildings.
- New efficiency requirements for indoor fixtures will reduce water use in new buildings.
- The city will provide grants for drought-tolerant landscaping and for farmers to use water-efficient irrigation technologies.
- Incentive program will provide farmers up to \$10,000 to install irrigation systems that reduce water use.

### Plan B

- A large education campaign will encourage conservation across the city.
- A small grant program will encourage homeowners to replace old fixtures and use drought tolerant landscaping.
- A new water pricing system will raise water rates for large water users to encourage conservation.
- The city will use public buildings and parks to demonstrate water conservation practices. This includes replacing landscaping at city parks with drought tolerant plants and replacing faucets and toilets in city buildings.

# **Resilience Plans**

## **NEW SUPPLIES & STORAGE**

### Plan A

- The city will build a desalination plant on the coast. With pipes, pumps, and canals moving the water into the city, the plant will require a lot of energy to operate
- Water from this new system will not be available until 10-15 years from the start of construction.
- Extra water from the desalination plant will be stored underground and in existing reservoirs using newly built pumps and pipes.

### Plan B

- The city will focus on using reclaimed wastewater, expanding storage, and building new wells to provide groundwater in the event of a drought.
- To protect against falling groundwater levels, the city will invest in new codes that require retention basins on commercial lots, a grant program for residential stormwater capture, and passive recharge basins.
- The city will build a distribution network for reclaimed water and use excess reclaimed water for groundwater recharge.

# **Resilience Plans**

## **PREPARE THE PUBLIC**

### Plan A

- To protect against wildfires, the city will manage grass and forests near the edge of town and restore already burned areas to limit erosion and increase water retention.
- An expanded municipal water system will connect residents who depend on individual private wells. This system will protect them from falling groundwater levels.
- Funding for drought insurance and relocation will help residents, farmers, and ranchers most impacted by drought.

### Plan B

- The city will invest in emergency water supplies and water delivery trucks for use during water shortages.
- An outreach and grant program will encourage residents to prepare for wildfires and clear grass and trees away from structures.
- The city will increase investment in emergency preparedness to provide food, shelter, and water in the event of a severe drought, and encourage residents to prepare by stocking up on bottled water and limiting use in water shortage.

# My Resilience Plan 1



What resilience plan would you make for Ottawatta? Why did you choose this plan?

Mark the empty coin spaces to choose a plan. Remember you only have three coins and can't use all three on one strategy!

# My Resilience Plan 2



What resilience plan would you make for Ottawatta? Why did you choose this plan?

Mark the empty coin spaces to choose a plan. Remember you only have three coins and can't use all three on one strategy!

What would you change about this plan? Are there specific resilience actions you would like to add or remove?







Northeastern University





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