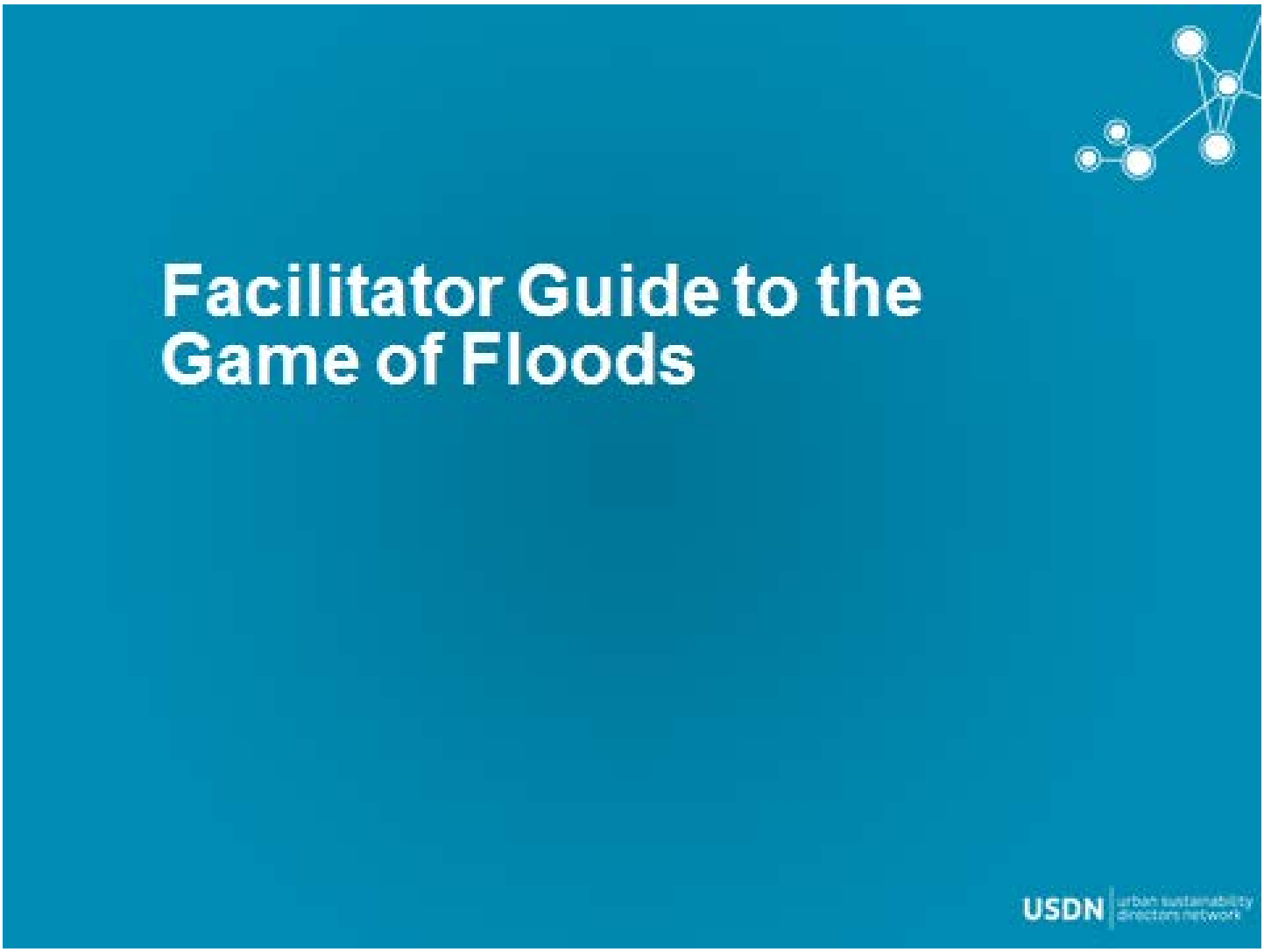
Climate Preparedness Training Toolkit Template



October 2016

Facilitator Guide to Workshop Exercise: Game of Floods

Suggested tools needed for activity:

- Game materials (one set for each group): game board, game cards (scenarios, assets, roles, and climate scenarios), and cost of adaptation solutions; participant workbooks
- Writing utensils for each team
- Tape for role card name tags for each player (optional)

Facilitators should use this guide to assist their team in completing the Game of Floods[1]. Each team will have a defined climate scenario and a set funding limit, but the rest of the planning is up to the team.

The Facilitator should use the Workbook Pages attached to this guide to record all team decisions and to report on how the teams developed their respective adaptation plans at the end of the game.

SLIDE: CLIMATE SCIENCE EXERCISE

Facilitator Actions:

1) Hand out Game of Floods Game Board, budget, and climate scenario to each team.
2) Assign "role cards" to each participant that defines whether team members will be representing elected officials, utilities, or the community. It may be helpful for participants to tape the role card to their clothing to display and remind everyone of respective roles throughout the game.
3) Introduce the game with the following background information:

   - **<u>Introduction</u>**:
     Resilience Harbor is a low-lying coastal town originally settled by longline fishermen in the 1980s. It was heavily farmed in the 1930s and transitioned to a resort community during the economic boom of the 1980s. The town's economy is now based on a mix of technology-related industry, tourism, and fishing. Historically the town's waterfront has been damaged by large coastal storms and hurricanes. The Abundance River, originating from the headwaters of the Resilience Mountains, also poses a flood hazard and during large precipitation events, it has been known to overwhelm its river bank and flood nearby areas.
   - **<u>Purpose</u>**:
     The Game of Floods is an interactive game-based exercise to help participants understand the process of conducting a vulnerability and risk assessment and think about strategies to protect city assets from existing and future flooding. The

[1] The Game of Floods was originally developed for Marin County, California as a planning tool to allow stakeholders to better understand and prioritize adaptation strategies for responding to sea level rise and coastal flood hazards. This interactive tool was leveraged and expanded by Kris May and Rebecca Verity at AECOM with permission from Marin County. Additional refinements were made in support of the USDN toolkit development.

game is played in a series of steps and integrated into the Toolkit presentation. We will progress through the steps from climate science, to asset inventory, to vulnerability, risk, and adaptation planning.

4) Familiarize participants with the board using the following key points:
    - Note the flood sources (riverine and coastal) and various asset types
    - Assume that affected assets within sea level rise hazard zones are permanently inundated, or damaged, unless otherwise protected. Assume that affected assets within the riverine floodplain are exposed to temporary flooding during fluvial flood events.
    - The location of the graphic, not the text, determines whether or not an asset is within the hazard zone.
    - Ask team members to introduce themselves to their group, state their assigned role, and share if they have any experience incorporating sea level rise or increased precipitation into planning efforts

SLIDE – ASSET INVENTORY EXERCISE 2 OF 2

Before a climate adaptation strategy can be developed, we need to understand which assets are at risk.

Facilitator Actions:

1) Distribute all asset condition cards to the teams.
2) Guide the team to work together to develop a list of 9 assets they agree are important when considering comprehensive climate adaptation planning for the town. The team should select up to 9 assets (out of the provided 24 cards).
    - Keep conversation on task.
    - Maintain master list of prioritized assets on the Asset Inventory worksheet.
    - Encourage team members to advocate for assets consistent with their respective roles.

SLIDE – VULNERABILITY EXERCISE 2 OF 2

Vulnerability for each asset is calculated based on exposure, sensitivity, and adaptive capacity. The exposure of an asset is determined by what climate change scenario it is subject to and where it is located. The sensitivity of an asset may primarily rely on its uses and physical characteristics. For example, what an asset is made of and its physical condition strongly relates to how it will respond to temporary impacts. For simplicity of the game, adaptive capacity is not considered and the climate change assessment is limited to exposure and sensitivity to sea level rise and increased precipitation.

Facilitator Actions:

1) Ask the teams to assign rankings based on the exposure and sensitivity of each asset.
    - Each team should define how to assign the appropriate number of points for each asset on a 3 point scale: Low (1 point), Medium (2 points), and High (3 points) for both Exposure and Sensitivity. For example, assets that are highly exposed would receive a High (3 point) rating, and somewhat sensitive assets

would receive a Medium (2 point) rating. Each team needs to define their rating criteria.

2) Once an asset is rated for exposure and sensitivity, an overall vulnerability score can be assigned and a priority list developed.
    - If your team gets stuck on creating their own definitions/ratings for Exposure and Sensitivity, use the example definitions below to encourage conversation. Example Vulnerability Assessment characteristics for sea level rise scenario 2100, most likely:

Exposure Definition:	**Sensitivity Definition:**
High (3): Already floods OR floods at 12 inches	High (3): Poor Condition (or old)
Med (2): Floods at 24 inches	Med (2): Good Condition
Low (1): Floods at 36 inches	Low (1): Excellent Condition

    - Utilize asset description cards to review asset condition information.
    - Help team to define vulnerability assessment criteria.
    - Keep conversation on task.
    - Maintain master list of prioritized assets.
3) Ask the team to prioritize asset list based on vulnerability score.

SLIDE- RISK EXERCISE (OPTIONAL) – 2 OF 2

If your team completes the vulnerability assessment and has extra time, encourage them to complete the Optional Risk Assessment. Risk is typically assessed by evaluating the probability (or *likelihood*) that climate impacts would occur and the *consequence* of these impacts. Since likelihood can be difficult to quantify when considering future climate related impacts, potential consequence is often the primary consideration. Consequence considers the magnitude of the impact that would occur under the selected climate change scenario. Information about the asset, such as its age, condition, and materials are often informative when considering the consequences.

Facilitator Actions:

Ask the teams to describe the consequences of climate change impacts on each asset in terms of damage, disruption, and overall relative cost.

The questions below can be useful in framing the consequence of sea level rise related impacts.

- Damage:
    - What is the level of damage to the asset?
    - Can the asset be repaired, or would the asset require complete replacement?
- Disruption:
    - Is there a disruption in service?
    - What is the length of disruption, i.e., hours, days, weeks? Does the disruption threaten public health and safety?
    - Will disruption at this asset have cumulative effects throughout an

interconnected system (e.g. failure of a pump station will cause wastewater backups upstream)?

- Cost:
  - What is the cost to repair or replace the asset?
  - What are the economic (or health and safety) costs associated with the disruption?
  - Are there secondary impacts that need to be considered (i.e., potential impacts to human health and safety, or costs to other sectors, such as the environment and public recreation)?

SLIDE - ADAPTATION PLAN EXERCISE – 2 OF 2

Based on available funding, adaptation strategies can be implemented to protect the vulnerable assets or develop studies that will aid in future adaptation planning efforts.

Facilitator Actions:

1) Provide each team with a list of potential Adaptation Options and associated costs
2) Ask teams to strategize on how best to protect assets based on their allotted funding (or brainstorm governance adaptation strategies that have no direct cost).
   - Instruct team to implement a range of options for the near-term and long-term, if desired.
   - Keep conversation on task.
   - Maintain master list of adaptation strategies implemented and their associated cost.
3) Prompt the team to think about the three additional questions presented in the work book:
   - Think about outreach and engaging the community, what activities would you need to complete as you implement your Plan?
   - Are there long-term maintenance costs that have not been considered?
   - If there is one more thing you wanted to do to increase the resiliency of the town to climate change, but could not afford, what would it be and why?
4) Report out final results.

GAME OF FLOODS – RESILIENCE HARBOR

Asset Inventory

Step 1. Facilitators will provide each team with a brief history of the town, the sea level rise and precipitation scenario your group will be using for the Game of Floods, the amount of funding your team has available for adaption projects, and each team member's role for the game. Record your climate change scenario and funding limit:

Climate Change Scenario: _____

Funding Limit: _____

Step 2. Review your game board and the assets. Select a subset of the infrastructure and community assets for further evaluation in the game. The team should assemble a list of assets that will be considered in the development of a climate change adaptation plan for the town. Each team member should consider their assigned role when selecting assets – make the case for your assets! Facilitators will provide the team with Asset Cards describing the assets shown on the game board. Complete the Asset Inventory Table below using information from the Game Board and the Asset Cards.

Asset Inventory Table

	Asset	Year Built	Condition (Poor, Moderate, Good)	Prior Damage History (Y/N)	Sea Level Rise Inundation Zone (12", 24", or 36")	Riverine Flooding Zone (Y/N)
1						
2						
3						
4						
5						
6						
7						
8						
9						

GAME OF FLOODS – RESILIENCE HARBOR

Vulnerability Assessment

Facilitators will review Asset Cards for the assets selected in Part 1. If needed, the team can review additional Asset Cards for assets not selected in Part 1. The Asset Inventory Table provides information about each asset that is useful in completing the vulnerability assessment. Each team should use the Asset Inventory Table, and the Game Board, to complete the Vulnerability Assessment Table for their selected assets. The Total Vulnerability Score can be used to prioritize adaptation strategy selection.

Hint: Each team should define how to assign the appropriate number of points for each asset, on a 3 point scale: Low (1 point), Medium (2 points), and High (3 points), for both Exposure and Sensitivity. For example, assets that are highly exposed would receive a High (3 point) rating, and highly sensitive would receive a High (3 point) rating. Record your definitions.

Exposure Definition:

High (3): _____

Med (2): _____

Low (1): _____

Sensitivity Definition:

High (3): _____

Med (2): _____

Low (1): _____

Vulnerability Assessment Table

	Asset	Exposure Score (E)	Sensitivity Score (S)	Total Vulnerability Score (V = E + S)	Asset Ranking (1 to 9)
1					
2					
3					
4					
5					
6					
7					
8					
9					

GAME OF FLOODS – RESILIENCE HARBOR

Optional Risk Assessment

Risk Assessment Table

	Asset	Potential Consequence of Flooding
-	Example: Cross Street	Temporary closure of Cross Street due to ponding on roadway; delayed emergency services from senior center and school to hospital; higher long-term maintenance costs
1		
2		
3		
4		
5		

GAME OF FLOODS – RESILIENCE HARBOR

Adaptation Planning

Step 1. Facilitators will provide each team with a list of potential Adaptation Options and their associated costs. Review the completed Asset Inventory Table and the Vulnerability Assessment Table and identify a range of adaptation strategies that can protect the selected infrastructure and community assets. The total cost of the adaptation strategies selected must not exceed your team's allocated funding limit. Think of innovative ways to achieve your adaptation and resilience goals without using your allocated funding!

Step 2. Each team will report out on their completed Adaptation Plan and the associated cost of implementation. Each team should also consider the following two questions as part of their overall wrap-up and reporting to the group:

- Think about outreach and engaging the community, what activities would you need to complete as you implement your Plan?
- If there is one more thing you wanted to do to increase the resiliency of the town, but you could not afford, what would it be and why?

Near-Term Adaptation Plan

	Adaptation Strategy	Asset(s) Protected	Quantity	Cost/Quantify (from List)	Cost
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
				Total Near-Term Cost	

Long-Term Adaptation Plan

	Adaptation Strategy	Asset(s) Protected	Quantity	Cost/Quantify (from List)	Cost
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
				Total Long-Term Cost	