THE MULTI-HAZARD TOURNAMENT (MHT) FRAMEWORK & POTENTIAL APPLICATIONS

Andrea Carson

Collaboration and Public Participation Center of Expertise

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LEAR BULICHEADS CAN BE CKS & DAM By the end of this presentation, you will know the following: -What is the MHT?

- -Why is USACE using the MHT?
- -How is USACE using the MHT?

How could your organization use the MHT?

What is a Multi-Hazard Tournament (MHT)?

- A condensed, accelerated version of Shared Vision Planning that couples serious gaming with collaborative decision-making for planning for multiple hazards (e.g. flood, drought, water quality, sea level rise, etc.)
- Involves participants from wide variety of fields
- Assists regulators, planning authorities, and communities with developing effective hazard plans using stakeholder input



Relationship Building – Social Learning – Planning – Decision Making

What objectives can the MHT achieve?

- Identifying (and educating participants on) the costs and tradeoffs among various strategies for solving problems – and the values that inform those tradeoffs.
- Identifying (and educating participants on) strengths and weaknesses in various strategies to reduce risk.
- Creating new collaborations to address common problems
- Improving communication among stakeholders

Why is USACE hosting MHTs?

- 1. USACE cannot do it alone
 - We need to work with knowledgeable partners
- 2. Regional focus on actual problems
- 3. Shared Vision Planning and Stakeholder Engagement opportunities
- 4. Test and Utilized Developed Tools
- 5. Exploration for Future Investments & Operations

AND...there are many other potential applications.

Shared Vision Planning...

...Integrates tried-and-true:

- Collaboration
- Systems Modeling, &
- Planning

into a practical forum for water resource management **decisions**;





ALWAYS ask:

"How is the model going to be used? "Who is going to use the model"?

SVP means involving stakeholders in the technical analysis – in the data & technical relationships

Shared Visioning Planning: Multi-Hazard Tournaments

Traditional SVP

- Coarse level, trade-off analysis
- Iterative nature
- Collaborate with Stakeholders



New MHT Concept

- Serious Gaming; Competitive Element
- Adult Learning, Experiential
- Team-based Approach
- Utilize model as decision support tool
- <u>Allows for failure in order to learn what</u> works best and why

Building the Multi-Hazard Tournament: An IWRM planning process

- Stakeholder engagement using <u>6-step planning process</u>
 - Problems
 - Opportunities
 - Existing Conditions
 - Formulate Alternatives
 - Evaluate Alternatives
 - and Visualize/Select Alternatives
- Allows stakeholders to embrace their competitive and creative nature to recommend plans <u>allowing for failure in</u> <u>order to learn</u> what works best and why.



Overview: Translating Information into the Game

Data Inputs

Action

Simulation

Analysis

Game



- Climate (Precipitation)
- Physical
 - Elevation
 - Land Cover
- Human Geography
 - Property Values
 - Demographics
- Geopolitical
 - Parks and Recreation
 - Infrastructure



Watershed Master Plans

- Problem Areas
 Identified
- Adaptations
 Options
- Costs





- Hydrology
- Hydraulics
- Water Quality



- Floodplain Areas
- Infiltration
- Habitat Changes
 - Riparian Forest
 - Wetlands
- Water Quality Loading
 - TSS
 - E.coli
- Recreation
- Property
 - Damage
 - Value



Decisions

- Damage
 Center
- Adaptation Options
 Metrics
- Flood Impacts
- Water Quality
- Water Resources
- Riparian
 Corridors
- Recreation

Overview: Multi-Hazard Tournament





Fig. 2. The IDT Process. The IDT is an iterative process that uses a game format to arrive at an informed decision on next steps for proactive drought management and research.

There are 3 foundational pieces that are required to carry out every tournament: 1) Problems or risks to be addressed (aka "hazards") 2) Adaptation Options (Management Measures) to be explored, and 3) Impacts that can be measured

Conditions in which MHT can be applied:

- 1. The system is vulnerable to a set of hazards,
- 2. Actions exist that can reduce the impact of such hazards,
- 3. The system contains competing interests,
- 4. The system is constrained which means there is no single or set of actions that can be applied to reduce the risk in the system without some tradeoffs across competing interests, and
- 5. The competing interests are willing to explore possible mutually beneficial solutions.

Resourced Required

		 Ample Resources can achie Objectives of Limited & Highly quantified risks, options, costs, constrain feedbacks. Planning & Decision-Ma Web-based interface (web-based interface) 	eve: Medium Resources, and impacts, and risk mitigation nts, tradeoffs and aking level of analysis v/ more geographic info)
Limited Resources can achieve: • Sensitization	 Medium Resources can Objectives of Limited Quantified risks, impoptions, costs, const feedbacks (w/only page) Excel-based interface 	achieve: d Resources, and bacts, and risk mitigation traints, tradeoffs and artially quantified synergies) e (w/ basic geographic info)	
 Systems Thinking Relationship-Building Identification of Problems and/or Priorities Qualitative understanding of risks, impacts, tradeoffs, and mitigation options Paper-based interface 			

Costa Rica Drought Tournament

- Emphasized community priorities under different resource availability levels, did not evaluate alternatives.
- Participants were members of the farming community and from small scale producers to International, Govt., NGO, and private sector institutions
- Concept of 'building'



San Antonio Multi-Hazard Tournament



Cibolo Creek Watershed Leon Creek Watershed Lower San Antonio River Watershed Medina River Watershed Salado Creek Watershed Upper San Antonio River Watershed 5 10 20 30 San Antonio River

Guadalupe River





Adaptation Options	(What are these?)		
Stream Restoration and NCD for Urban			
Low Water Crossings, Channeliz	ation, Widening, and Hardening		
Zoning			
Buy Outs			
Additional Wells			
Conservation			
Increased Reuse			
Stronger Enforcement and Rules	for SWPPP		
Load Reduction Zones (Sand Filter)			
Wildlife Exclusion			
Feral Hog Management			
Tillage and Fertilizer Best Practi	ces		
Urban Forestry			
LID BMPs			
Riparian Buffers			
Wetland Preservation and Resto	oration		
Coastal Revegetation			

Metrics	(What are these?)
Flood Impa	icts
Protect	tion of Property
Flow R	ate
Stabili	ty of Floodplain
Water Qua	ılity
E.c (12	6 MPN/dL)
TN (5 n	ng/L)
Aquati	c Communities
Water Ava	ilability
Rechar	rge
Capaci	ity
Quality of	Life
Ag Pro	ductivity
Recrea	tion
Busine	ss Improvement

Case Study: San Antonio, TX – Bexar County / Southern Counties – Wilson, Karnes & Goliad



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Texas Tournament (Upper)



Case Study: Lower Virginia Peninsula Coastal Resilience Tournament

Lower Virginia Peninsula Coastal Resilience Tournament



Outcomes

- Supports a more systematic understanding of the constraints, potential solutions, and priorities of decision-makers within a watershed.
- Plans and decision points are brought to life
- Raise awareness of flood, drought and water quality threats and adaptation options; best approaches are identified
- Relationship-building and fostering partnerships with the Corps

Discussion – How could your organization use the MHT?

Questions?





US Army Corps of Engineers PLANNING SMART BUILDING STRONG_®



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Questions to start planning an MHT?

Logistics

- What would you like to achieve through your tournament? (Relationshipbuilding/Educating/Planning/Decision-making)
- How much time and money do you have to spend?
- Who are you trying to reach?

Content

- What are the problems (aka hazards) you're having in the Basin?
- What solutions would you like to analyze to mitigate these hazards?
- What scenarios would you like to test your problems against (climate, budget, etc.)?
- Where do you want the MHT to focus on? Whole basin, specific locations?

Case Study: NDMC Drought Tournament

North Platte Drought Tournament

The tournament consisted of three rounds (Figure 4), each of which began with a scenario consisting of climate and water supply information, drought impact information, and climate outlooks (Table1).



Figure 4: North Platte Natural Resources District drought tournament round description.



Case Study: Cedar Rapids, IA

Cedar Rapids Regional Multi-Hazard Tournament





Case Study: San Antonio, TX – Bexar County / Southern Counties – Wilson, Karnes & Goliad



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Round 1

Buyout

Budget

474

476

471

Castroville

astroville gional Park 4711

0

5720 572 5722

33 574

4514

E Mar

Total Budget

Expended Budget

476

Remaining Budget \$51,657,817

438

4713

579 5713

471 5714

5715 6710

Pearson

483

DC1 - Medio Creek

Infiltration Policy

Freeboard Policy

Traditional Infrastructure

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Texas Tournament (Upper)

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Texas Tournament (Upper)



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Would you make different decisions after being involved in the tournament?



Understanding of differences between upstream and downstream users' priorities?



Likeliness to use information learned from the tournament



Have you increased your knowledge of risk to various hazards and their impacts?



Why SVP for a Watershed Study?

- Non-traditional objectives frequently poorly formed.
- High degree of collaboration across multiple agencies, each with technical expertise and own missions.
- Need for consideration of inter-relationships through systems modeling

Top 4 Uses of the Multi-Hazard Tournament:

- Identifying the costs and tradeoffs among various strategies for solving problems
- Identifying strengths and weaknesses in various strategies to reduce risk.
- Creating new collaborations to address common problems
- Improving communication among stakeholders



Participant Takeaways





Gamification for Flood Risk Awareness: this is SERIOUS!

Hunter Merritt, Water Resources Planner U.S. Army Corps of Engineers, Sacramento District

WEBINAR: Urban Waters Learning Forum Wednesday, November 14, 2018





Nevada floods. Are you prepared?

Our goal is to create flood resilient communities in Nevada that encourage protection of life, property, water quality, environmental values and the preservation of natural floodplain functions.

SANDBAG INFORMATION



Before we get started... do you want to play a game?

Download here (Mac, Linux, PC): www.nevadafloods.org

Watch the tutorial video https://youtu.be/GgoYBNhNHzY



Systems are complex



San Francisco Bay Model, Sausalito, CA

KULB



A brief history of the U.S. Army Corps of Engineers...

- Founded 2 days after the Continental Army (1775)
- Polish and French influence (Corps = "Body")
- Cartographers, Engineers Civil & Military
- Primary Missions: Navigation, Flood Control Risk Reduction
- Since National Environmental Policy Act (1969) Ecosystem Restoration, Regulatory Missions (Nation's "Environmental Engineers")
- RECENT HISTORY:

Disaster Response, Infrastructure Assessment, "Mega-Projects", Watershed Studies, Technical Assistance,

And...Non-Structural Flood Risk Reduction (what's that?)

Silver Jackets & Floodplain Management Services (FPMS)



The initial goal in the project increase is awareness and young is adults, enabling them to prepare is for and take is action in case of a flood is for a flood is flood is

emergency.

(USACE) Sacramento District has been working with the educational community to reduce flood risk in a novel way by bringing science teachers into the conversation on water management and developing games that help them teach complex subjects and promote critical thinking among their students. Essentially, the approach is to help teachers "play" with flood risk as the topic. The concept is not new, and it is used widely in adult learning, but the name might be counterintuitive: Serious Gaming.

The U.S. Army Corps of Engineers

The district's efforts at promoting flood risk through connections in the field of education started in 2014 by way of a Silver Jackets Interagency Nonstructural Flood Risk Management project called the California Educator Project. The initial goal of the project was to increase awareness among children and young adults, enabling them to prepare for and take action in case of a flood emergency. For the younger children, this resulted in a coloring book that has been widely distributed and even translated into Spanish. However, for the older students, a more nuanced approach was necessary.

Teachers Promote Flood Risk Critical Thinking Through Serious Gaming While Meeting Science Standards By Hunter Merritt, USACE Sacramento District



What kind of thinking does it take to manage a dam? U.S. Army Corps of Engineers Planner Patricia Fontanet speaks to Advanced Placement (AP) Physics students from Folsom High School in Folsom, California, on the genesis of the Flood Fighter: Nevada game and on her work as a planner in the Corps. The free, educational video game provides a unique and engaging platform for teachers and presenters to introduce complex subjects and system-based solutions for water resource challenges.

The team quickly focused on teachers' needs and asked what USACE could do to help these teachers educate the next generation of scientific thinkers. Phil Romig, a science curriculum specialist in Sacramento County, offered that computer modeling was likely to be a

Continued on page 9.

The **BUZZ**... Spring 2018



http://www.spk.usace.army.mil/Missions/Flood-Risk-Awareness/Education-Resources/

2015 CA Educator: Simulated Water Management Model



The California STEM Symposium brings together thousands of teachers, administrators, students, higher education representatives, program providers, philanthropic representatives and industry representatives to engage them in STEM education by providing strategies and resources for program implementation. The Symposium has a special focus on increasing and supporting the participation of women and girls—as well as other underrepresented groups—in STEM fields. It also highlights leaders in classroom innovation from across the state and attract student teams to showcase critical thinking, problem solving, and teamwork.

Learn more about the 2015 California STEM Symposium at www.STEMCalifornia.org!

Pre-registration is closed. You can still register for the Symposium at the Anaheim Convention Center starting at 4 p.m. on Wednesday, October 28. Full payment is required at the time of registration.



Who remembers this?





¹ LifeCourse online survey of 1,227 U.S. persons ages 13-64. March 12-30, 2014.

WE are the Gamers!

Source: Lifecourse Associates. (2014). The new face of gamers. http://blog.twitch.tv/wp-content/uploads/2014/06/TheNewFaceofGamers.pdf

Gamification:

"...the application of game-design elements and game principles in non-game contexts."

..it is <u>not</u> the same as

Game theory

"...the study of mathematical models of strategic interaction between rational decision-makers."

(or is it?)



Gamification of Flood Risk?

FLOOD FIGHTER

VEN

What could be <u>Next</u>?



UI & Graphical Improvements: Improvement of Flood Fighter user interface as well as graphical enhancements.



Development of Flood Fighter on iOS and Android smart phones. Once developed, mobile app would be available for download on iOS and Android stores.



Virtual Reality:

Development of Flood Fighter for Virtual Reality simulation on the Oculus Rift platform.



Additional Scenarios (including multi-player): Development of new levels/scenarios for single or multi-player.



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SANDBAG INFORMATION



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Were you able to download it?

Let's play!

Download here (Mac, Linux, PC): www.nevadafloods.org

Watch the tutorial video https://youtu.be/GgoYBNhNHzY

Thank you!





hunter.merritt@usace.army.mil // 916-557-5119