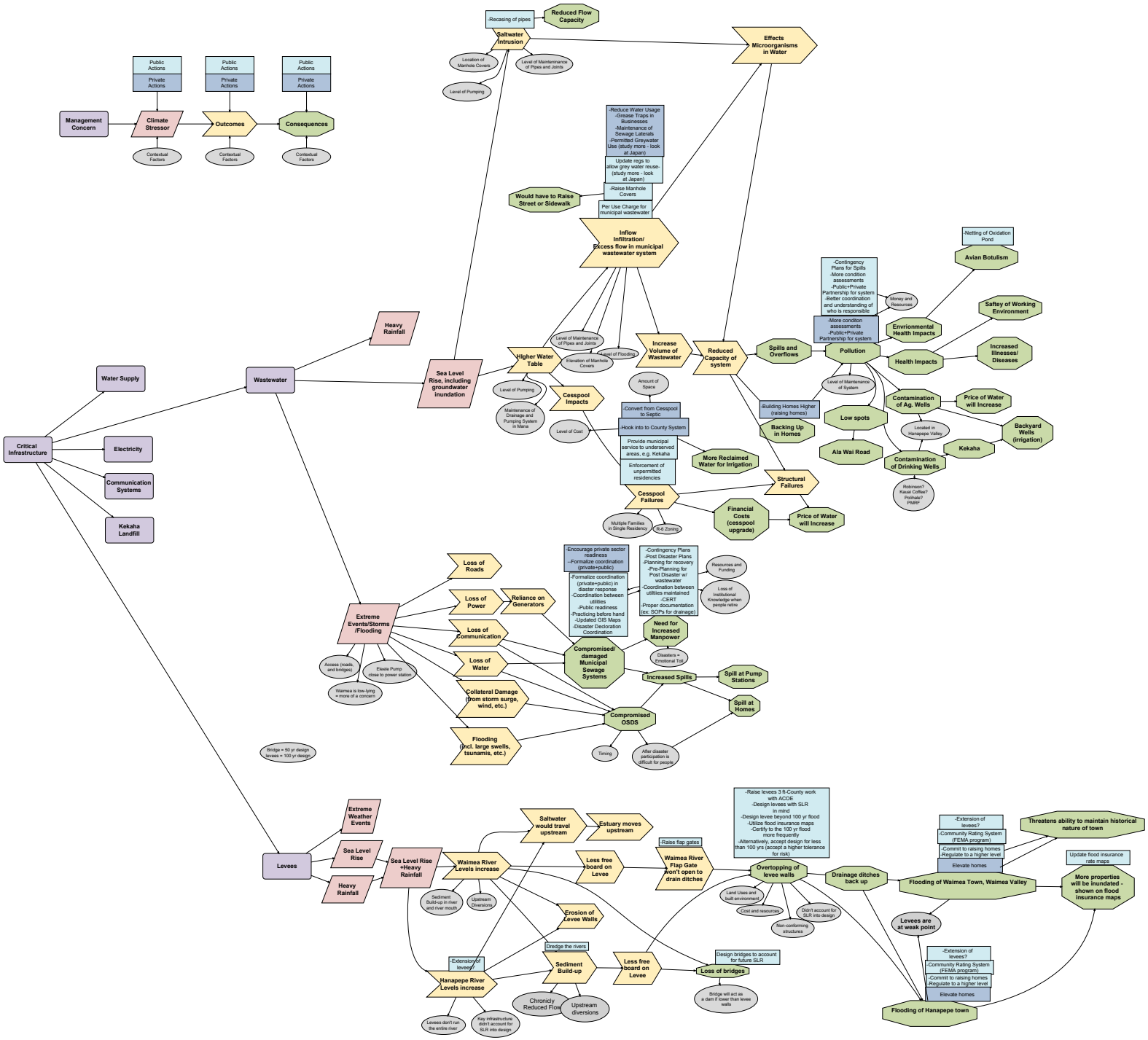
Management Concern
Climate Stressor
Public Actions
Private Actions
Contextual Factors
Outcomes
Consequences
Critical Infrastructure
Water Supply
Electricity
Communication Systems
Kekaha Landfill
Wastewater
Heavy Rainfall
Sea Level Rise, including groundwater inundation
Saltwater intrusion
-Recasing of pipes
Reduced Flow Capacity
Location of Manhole Covers
Level of Maintenance of Pipes and Joints
Level of Pumping
Effects Microorganisms in Water
-Reduce Water Usage
-Grease Traps in Businesses
-Maintenance of Sewage Laterals
-Permitted Greywater Use (study more - look at Japan)
Update regs to allow grey water reuse- (study more - look at Japan)
-Raise Manhole Covers
Per Use Charge for municipal wastewater
Would have to Raise Street or Sidewalk
Inflow Infiltration/ Excess flow in municipal wastewater system
Higher Water Table
Level of Maintenance of Pipes and Joints
Elevation of Manhole Covers
Level of Flooding
Level of Pumping
Maintenance of Drainage and Pumping System in Manoa
Increase Volume of Wastewater
Amount of Space
Cesspool Impacts
Level of Cost
-Convert from Cesspool to Septic
-Hook into to County System
Provide municipal service to underserved areas, e.g. Kekaha
Enforcement of unpermitted residencies
More Reclaimed Water for Irrigation
Cesspool Failures
Multiple Families in Single Residency
R-6 Zoning
Financial Costs (cesspool upgrade)
Price of Water will Increase
Reduced Capacity of system
Spills and Overflows
-Building Homes Higher (raising homes)
Backing Up in Homes
Structural Failures
Pollution
-Contingency Plans for Spills
-More condition assessments
-Public+Private Partnership for system
-Better coordination and understanding of who is responsible
Money and Resources
-More conditon assessments
-Public+Private Partnership for system
Level of Maintenance of System
Low spots
Ala Wai Road
Contamination of Ag. Wells
Contamination of Drinking Wells
Located in Hanapepe Valley
Kekaha
Backyard Wells (irrigation)
Price of Water will Increase
Robinson? Kauai Coffee? Pollhale? PMRF
Health Impacts
-Netting of Oxidation Pond
Avian Botulism
Envrionmental Health Impacts
Saftey of Working Environment
Increased Illnesses/ Diseases
Extreme Events/Storms /Flooding
Loss of Roads
Loss of Power
Reliance on Generators
Loss of Communication
Loss of Water
Collateral Damage (from storm surge, wind, etc.)
Flooding (incl. large swells, tsunamis, etc.)
Access (roads and bridges)
Ekeele Pump close to power station
Waimea is low-lying = more of a concern
Bridge = 50 yr design Arrows = 100 yr design
Compromised/ damaged Municipal Sewage Systems
-Encourage private sector readiness
--Formalize coordination (private+public)
-Formalize coordination (private+public) in disster response
-Coordination between utilities
-Public readiness
-Practicing before hand
-Updated GIS Maps
-Disaster Declaration Coordination
-Contingency Plans
-Post Disaster Plans
-Planning for recovery
-Pre-Planning for Post Disaster w/ wastewater
-Coordination between utilities maintained
-CERT
-Proper documentation (ex: SOPs for drainage)
Resources and Funding
Loss of Institutional Knowledge when people retire
Need for Increased Manpower
Disasters = Emotional Toll
Increased Spills
Spill at Pump Stations
Spill at Homes
Compromised OSDS
Timing
After disaster participation is difficult for people
Levees
Extreme Weather Events
Sea Level Rise
Heavy Rainfall
Sea Level Rise +Heavy Rainfall
Waimea River Levels increase
Saltwater would travel upstream
Estuary moves upstream
Less free board on Levee
Sediment Build-up in river and river mouth
Upstream Diversions
Erosion of Levee Walls
Dredge the rivers
Sediment Build-up
Chronicly Reduced Flow
Upstream diversions
Hanapepe River Levels increase
Extensions of levees?
Levees don't run the entire river
Key infrastructure didn't account for SLR into design
-Raise flap gates
Waimea River Flap Gate won't open to drain ditches
-Raise levees 3 ft-County work with ACOE
-Design levees with SLR in mind
-Design levee beyond 100 yr flood
-Utilize flood insurance maps
-Certify to the 100 yr flood more frequently
-Alternatively, accept design for less than 100 yrs (accept a higher tolerance for risk)
Overtopping of levee walls
Land Uses and built environment
Cost and resources
Non-conforming structures
Didn't account for SLR into design
Loss of bridges
Design bridges to account for future SLR
Bridge will act as a dam if lower than levee walls
Drainage ditches back up
Flooding of Waimea Town, Waimea Valley
-Extension of levees?
-Community Rating System (FEMA program)
-Commit to raising homes
-Regulate to a higher level
Elevate homes
Threatens ability to maintain historical nature of town
Update flood insurance rate maps
More properties will be inundated - shown on flood insurance maps
Levees are at weak point
Flooding of Hanapepe town
-Extension of levees?
-Community Rating System (FEMA program)
-Commit to raising homes
-Regulate to a higher level
Elevate homes