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Extreme events & water hazard planning

Extreme weather impacts in Louisiana and Alaska

Although in very different regions of the United States, water and wastewater management in the western Alaska and southern Louisiana are similarly impacted by extreme weather events. Researchers at the University of Alaska Fairbanks and Louisiana State University surveyed 60 water and wastewater managers and support staff in Alaska and Louisiana. This handout summarizes project findings to provide water managers with useful information to build resilience to extreme climate and weather events.

	Event type	Water and wastewater impacts	Context
Western Alaska	Permafrost thaw	Ground settling shifts infrastructure damaging home and public water lines and their connections; sewage lagoons settle reducing volume and potentially compromising water sources	**Human capacity:** Few experienced staff limits capacity for monitoring, maintenance, operations, response and planning; high staff turnover reduces institutional knowledge **Built infrastructure:** Over-designed and over-engineered water systems are hard to maintain; shallow pilings are more likely to become unstable and stressed as permafrost thaws **Social-physical environment:** Costly travel for training and sharing of resources; heating infrastructure to maintain water circulation is costly; aged infrastructure; shrinking sea ice provides less protection from waves in fall storms **Financial capacity:** Limited local funding match for capital improvement grants; low grant writing capacity makes securing funding to repair and replace infrastructure difficult
	Heavy rains	Septic tanks pop out of the ground	
	High tides	Saltwater intrusion	
	Wind	Wind can damage insulation jackets and roofs of water tanks as well as the energy infrastructure needed to run systems	
	Extreme cold	Frozen water connections and pipes	
	Harmful algal bloom	Complicated water treatment	
	Rain and flooding	Destroyed utility infrastructure; reservoirs filled with silt	
	Erosion	Saltwater intrusion	
	Drought	Water shortages	
	Sea ice loss	Greater flooding	
Southern Louisiana	Freezing temperatures	Cold can slow down chemicals used to kill bacteria in water treatment; damage pumps; cracked water lines can result in loss of pressure reversing flows causing contamination	**Human capacity:** Experienced water managers **Built infrastructure:** Levees protect low-lying communities from river flooding and storm surge, but heavy rain can become trapped within and must be pumped out **Social-physical environment:** Large water system footprint can delay response time; loss of wetlands reduces buffer zones from storms and less storm water absorbed; replanting increases the chance that storms will uproot tress damaging or breaking water lines; the transition from a vibrant seafood industry to vacation homes challenges water management
	Hot temperatures	More difficult water treatment due to increased biological growth in water	
	Rain and flooding	Building and pump station damage; potential regulatory non-compliance for water clarity; inflow and infiltration; overflow	
	Wind	Broken and cracked water lines from trees falling over results in loss of water pressure, reverse flow and contamination; power failure; storm surge and large waves damage levees	
	Drought	Broken and cracked water distribution lines	

Reducing flooding risk in rural Alaska and Louisiana

Project goals

By understanding water and wastewater resilience to extreme weather events, this research aims to reduce flooding risk to small community water systems in rural coastal Louisiana and Alaska. To achieve this goal, we investigated information sources, communication, and networking surrounding water hazards. A project advisory board included the Environmental Protection Agency, Water Research Foundation, US Arctic Research Commission, and the Alaska Native Tribal Health Consortium. We examined:

1. how weather and climate extremes impact water and wastewater systems;
2. contextual factors that shape the level of risk and impact; and
3. the role of networks in supporting community planning and response.

Networks

Effective collaboration between local- to national-level networks is critical when responding to extreme events. Water and wastewater utilities use multiple networks to maintain operations as well as prepare for, respond to, and recover from extreme weather and climate events. These networks include:

- local water managers;
- regional organizations such as Alaska's regional Tribal health entities and the Louisiana Conference on Water and Sewer;
- national organizations such as the National Rural Water Association; and
- federal and state agencies such as the Federal Emergency Management Agency.

Networks support resilience by:

1. **Building technical, managerial and financial capacities.** Networks provide targeted training opportunities for managers to receive certification credits and training on treatment and distribution, disinfection, collection, leadership, asset management and emergency response.
2. **Supporting operations, emergency response and longer-term planning.** Networks share resources during crises, provide maintenance and technical assistance, help develop preventive plans and engineering feasibility analyses, share information and coordinate response during emergencies, and assist with planning for energy and power resilience.
3. **Fostering data collection and monitoring.** Networks track energy use to increase power resilience, collect remote data on temperatures, flow rates, water level, and pressure to provide automated alerts for local operators, track system performance, establish long-term operational records to identify trends, and provide baseline data that can be used in grant applications.
4. **Facilitating information sharing.** Networks provide opportunities for water managers to share best practices related to recent weather extremes and weather forecasts.

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See project materials https://tinyurl.com/5692d9sr
or send questions to accap@uaf.edu

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