



Resilience, Emergency Preparedness, Adaptation: How IPM Ties In

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What do these words mean?

In a general human context...

- Emergency preparedness
 - Adaptation

Some images may be disturbing





ARE YOU PREPARED?

What do these words mean?

Resilience

 Ability to adapt to difficult situations, or to recover quickly from difficulties

Emergency preparedness

 The steps taken to make sure people are safe before, during and after an emergency or natural disaster

Adaptation

• The process of adapting to environmental conditions

What are the differences?

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 - Humans are highly adaptable. Having a plan helps further.
 - Emergency preparedness is to have plans in place for communities to prepare for and respond to when a disaster or emergency happens.
 - Resilience planning goes beyond traditional emergency preparedness. It explores and addresses the <u>underlying</u> <u>causes</u> to hazards and vulnerabilities.

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- Community resilience links the environmental, social, and economic sectors to improve communities by being adaptable to changing conditions.
 - Partnership
 - Engagement
 - Education
 - Self-sufficiency



Source: Chandra et al, 2011, RAND. https://www.laresilience.org/

Natural Disasters and Severe Weather



Disasters caused by geological hazards



Credit: Galeria del Ministerio de Defensa del Perú -







Photos: Wikipedia

Disasters caused by water hazards

New Orleans after Katrina 2005

Landslides in 1958 Lituya Bay, Alaska





Lake Nyos, the site of a limnic eruption in 1986



Photos: Wikipedia

Disasters caused by extreme weather hazards











A microburst storm above Phoenix



Climate and weather-related events

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 - □ Global temperature increased ~2°F from 1901-2020
- Sea level rise, glaciers shrink, carbon dioxide rise, changes in weather and climate patterns, food challenges, human health impacts, & much more
 - <u>Increasing</u> extreme heat, drought, insect outbreaks, wildfires, flooding and erosion in coastal areas
 - Significant <u>negative health impacts</u> in human and livestock
 - Declining water supplies
 - <u>Reducing</u> agricultural yields



https://www.noaa.gov/education/resourcecollections/climate/climate-change-impacts







Not all hazards are climate-related!



























MICE PLAGUE HOUSE FIRE





RODENTS LIKELY TO BLAME FOR VEHICLE FIRE NEAR POJOAQUE, FIREFIGHTERS SAY



What do these words mean?



Considering pests and pest management...

Resilience

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Emergency preparedness









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- Resilience means different things to different people, communities and regions.
- What may be a large hazard or threat in one area e.g., the potential for earthquakes in San Francisco may not even be a thought for Phoenix.
- Pest threats differ in different regions.
- This makes the concept of resilience even more difficult to define and measure.

How should we prepare? - Developing a resilience plan

CLIMATE-CHANGE RELATED

Includes planning for pest outbreaks following natural disasters

NON-CLIMATE CHANGE RELATED

Includes planning for pest outbreaks in normal weather conditions



How should we prepare?

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Integrated pest management (IPM)

- IPM Components
 - Proper identification
 - Regular monitoring and Inspection
 - Take actions (sanitation, exclusion, trapping, baiting, implementation of multiple tactics at the client level)
 - Education and communication
 - Plan of action
 - Evaluation and record keeping





IPM approach addressing common pests

- Focuses on the fundamental reason why pests are a problem in the first place
- IPM is proactive monitoring and inspecting is constant
- Promotes environmental health
- Works indoors and outdoors
- Pesticides are used only when necessary





How should we prepare?

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 - IPM focuses on exclusion, maintenance, and sanitation as methods to control pest populations, using chemical treatments as a last resort.
 - Implementing these strategies can help keep pests out before, during and after a natural disaster.
 - Adjust your IPM program based on your location throughout the year, and as the seasons change.



Locality and Seasonality

- Some extreme-weather events are seasonal in some localities. E.g., hurricanes, tornados, floods and fires.
- Connect with local weather information to keep yourself and your community alert.



- Seasons play an important role in preparedness practices
 - Summer = wildfires and floods
 - Winter = blizzards and cold temperatures
 - Spring to late summer = Tornado season, depending on where you live



Developing a resilience plan

Climate related

- Pests hate extreme weather too!
- In the southeast, hurricanes and floods lead to rising water levels and pests seek dry ground to escape flooding.
- For Western states, wildfires are a frequent threat, so pests seek cooler spots to escape the heat.
- In Northern states, snow and freezing temperatures drive pests indoors as they try to keep warm.

Developing a resilience plan

Climate related

Identifying the pests

Once you have a calendar of possible extreme weather events, here are a few pests to watch out for, and tips on how to avoid them:

Guideline to pest activity. Always monitor.



PEST ACTIVITY LEVELS:

Identifying the pests

- □ Ants can move their entire colony when disturbed.
- Fire ants are survivalists during floods. They seek higher ground to escape the rising waters. They can also create a floating "raft" to survive the water.
- Fire ant stings are extremely painful, so preventing ant piles from growing around a facility should be a top priority.



Identifying the pests

🗆 Tip

Routinely check facility grounds for ant mounds. If one is spotted, use safe measures to eliminate a potential encounter.



Identifying the pests

- Cockroaches are attracted to the trash and litter left behind after a disaster.
- Roaches love warm, damp, and dark conditions. They are also expert hiders — so seeing one during the day can mean many more are hidden in the walls.



Identifying the pests

🗆 Tip

- Daily sanitization of a building can help prevent cockroach populations from building up before a disaster happens.
- Drains are a hot spot for roaches, so take measures to prevent food and residue from building up in the kitchen and bathrooms.



Identifying the pests

- Mosquitoes love standing water and only need a small amount breed.
- In addition to being annoying, mosquitoes can spread harmful diseases like Zika and West Nile viruses.



Identifying the pests

🗆 Tip

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- Promptly remove standing water or small puddles around a building.
- Overturn any containers that could fill with water and be sure to clean materials to prevent standing water from accumulating.



Identifying the pests

- Rodents will search for higher ground and dry land.
- Damage to a building opens a variety of locations for displaced rodents to call home.
- They can worsen damage to a building and even start fires by chewing on electrical wires.



Identifying the pests

🗆 Tip

- Clear debris in and around a facility immediately. Cardboard boxes, broken sheetrock, old equipment, and any other damaged materials offer harbors.
- Seal holes and cracks in both interior and exterior walls to keep rats and mice out.
- Clear and trim any overgrowth or damaged vegetation outside of your facility to limit easy shelter for rodents.

OPPORTUNISTIC INVADERS: Flies and rodents

- Important pests that flourish after an extreme weather event, especially involving flooding.
- Many factors affect these pests, some of which are attractive to both flies and rodents.
- Population can grow rapidly, which drastically increases the human exposure to the diseases that they transmit.

Receding flood waters often they leave behind many pools of stagnant water and organic debris. These are prime breeding sites for adult mosquitoes and nutrient rich larval habitats.

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SAFETY FIRST!

- Increased emphasis on inspection is crucial to identifying pests, habitats and conducive conditions.
- Wildlife (animals other than rats/mice) are stressed and scared too. If present, do not immediately approach them or try to trap/remove them.



- During a disaster and recovery, pest management is often the last thing on your mind.
- Keep focused on stressing the basic principles of IPM.
 - Encourage sanitation and pest habitat reduction.
 - Use all the mechanical control tools available.
 - Combine chemical control with all the other methods.
- Remember to stay hydrated to avoid heat stress.

Developing a resilience plan

Non-climate related

Example : German cockroach infestation













Kitchen

- > Check range, lifting up burner coils and looking under the pans.
- > Check inside oven for food remains or debris





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Kitchen

> Check under sink for leaks or cracks



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Kitchen

- > Open and check kitchen cabinets for fecal stains inside and around doors
- Check pantry or other food storage area for open or leaking containers



Cockroach allergy

Symptoms

- Chronic stuffy nose
- Frequent ear and sinus infections
- Itchy eyes and nose
- Persistent cough
- Shortness of breath
- Wheezing
- Chest tightness
- Rash





German cockroach population increase



German cockroach management plan

- Know the cockroach species and its biology
- Ensure cleanliness, good sanitation
- Don't provide food, water and shelter
- Act promptly, monitor regularly
- Use least toxic materials



Intensive cockroach management

- Thorough cleaning
- Wherever possible, sealing cracks, gaps
- Using compressed air to flush cockroaches out (set up sticky trap perimeter and vacuum them as they emerge)
- When reasonable non-chemical measures fail, use baits.
- Use bait stations or placement devices.



Intensive cockroach management

Chemical methods:



- Baits work best.
- Spray applied liquids are usually less effective for cockroaches, plus they cause unnecessary exposure, and repeated sprays cause residue buildup.
- Sprays also interfere with baits by repelling cockroaches from treated areas!

Intensive cockroach management

- Avoid resistance!
- Use a variety of baits with different active ingredients & formulations
- Incorporate IGR's & boric acid products
- Rotate different baits every 3 4 months
- If the problem persists don't keep doing the same thing: It Isn't Working!



Intensive or emergency plans for other pests

- Similar intensive plans can be built for other pests bed bugs, filth flies, rodents, mosquitoes
- Having a plan in place is the first step
- Providing staff with necessary training and support to implement the plan is next



Concluding thoughts

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- Resilience is the ability to adapt to, withstand, or **rapidly** recover from a disaster or catastrophic event.
- Communities with capabilities in developing, acquiring or exchanging resources are more likely to be resilient.





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□ Resilience and vulnerability – two sides of a coin!

- Vulnerable populations are often left behind in disaster planning (children, the disabled, the frail elderly, and others
- Special emphasis needed on resources that will support them in a disaster, by increasing their access to healthcare, social services, education and other resources.



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Some commonly reported challenges

- Developing resilience-specific goals and objectives
- Engaging the public in resilience efforts
- Accessing and combining preexisting data systems
- Connecting experts from public and private sectors
- □ Effective communication strategies



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 - Be aware that resilience is a dynamic phenomenon and not an end by itself.
 - It's always changing. As environmental or economic conditions change, we have the capacity to adapt.



Arizona is ranked the 10th most at-risk state due to natural disaster

Thunderstorms, flash floods, wildfire, drought and dust storms

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Tucson and Phoenix the 3rd and 4th fastest warming cities in the U.S.



Thank you!

Drs. Dawn H. Gouge & Shaku Nair, University of Arizona Dr. Fang Zhu, Penn State University





United States Department of Agriculture

National Institute of Food and Agriculture



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