The Nature Of Disasters And Implications For Amateur Radio

By Tom Cox VE6TOX
Presented at Communications Academy 2006, April 1, 2006, Burien WA

DISASTERS AND EMERGENCIES

Disasters are not simply big emergencies. They are unique and distinct. In trying to learn how to prepare for disasters, we make the mistake of looking at the disaster in retrospect. This leads to the same mistakes being made almost every time and the same "lessons learned" being written for almost every disaster report.

Emergencies are what the emergency services train for and respond to every day. A disaster is something that they rarely train for and may only happen once or twice in a lifetime.

Dictionary definitions for emergencies usually include "a sudden, unforeseen happening which requires action to correct or to protect lives and/or property."

Dictionary definitions for disasters are very similar. For example "A disaster is a tragic event that disrupts the normal routine of life, causing loss of property and life and suffering". There may also be a statement "overwhelming local resources."

The legal definition might humorously be stated as "It isn't an emergency until the government says it is" (Declaration of a state of emergency).

A declaration of a state of emergency is usually done for disasters - not emergencies.

To show the unique character of a disaster, try throwing more police, fire or ambulance personnel and see if that would make any difference. If not, you are looking at a disaster.

Fast developing local disasters are caused by explosions and tornadoes. Slow developing local disasters are caused by sink holes and water main breaks.

Fast developing regional disasters are caused by earthquakes and tsunamis. Slow developing regional disasters are caused by hurricanes, wildfires and pandemic.

CHARACTERISTICS OF DISASTERS

While the characteristics below are almost invariably found with all disasters, an important caveat must be added that it is possible that some of these things will not occur with any particular disaster.

It is an unusual event. Society learns quickly to cope with usual events and it becomes either routine or an emergency. Disasters, by their nature, are distinct from emergencies because they do not happen all the time. [Unusual, but not unexpected. It is common knowledge that California has frequent earthquakes and Florida has hurricanes.]

Communications fail. This is one of the defining characteristics that separate an emergency (communications still work) and a disaster. The problem is that there are over 40 different ways that communications fail - many of which Amateur Radio cannot solve or is only of limited assistance. For example:

- Equipment failure - repeater off the air, tower destroyed, dispatch center collapse.
- Frequency overuse - listening to dozens of firemen calling "Mayday! Mayday! Mayday!" all at once during 9/11/2001 clearly illustrates that nobody's Mayday were being understood. Very little information aside from "Mayday! Mayday! Mayday!" got over the radios.
- Battery failure - batteries get used up at an incredibly fast rate during disasters.
- Inability to reach specific organizations, individuals or sites.
- Radios for agencies are not frequency agile and couldn't talk to one another.
- Passing of incorrect or partially correct information.
- Misunderstanding the information presented or not acting properly upon it.

Phones work. They may not work 100%, but they work. If they don't work, they will be fixed soon. If they do work, people won't use Amateur Radio.

The scope or extent is uncertain. With unusual events occurring compounded by communications failure, it is no surprise that disasters invariably result in nobody knowing the full extent of how bad things are.

The worst hit areas are the last to be responded to. Areas slightly affected scream the loudest because they still have phones working or alternate forms of communications. The worst hit areas lose all forms of communications and are simply forgotten do to the noise from elsewhere.

Lack of information - due to the widespread scope of a disaster, EVERYTHING is affected. As a result, there is a tremendous need to find out what roads are out and what roads are intact, what vital services are destroyed and which ones can easily be repaired, where the greatest number of casualties and evacuees are to be found and what buildings are intact for recovery use or have been destroyed.

You basically need information on every single aspect of government and business and homes in an instant. Combined with communications failures, you are not going to get the information you need. [What ever you can see, it is never the whole picture.]

Misinformation - it is very, very easy for information to be misconstrued, rumors to be stated as facts and honest mistakes to become absolute facts when dealing with a disaster. When massive amounts of information are required, it is easy for wrong information to slip in. Disasters are full

of examples of "Wrong Information".

People die. While the emergency services deal with death on a daily or weekly basis, the sheer number of deaths can have a profound and traumatic effect on both responders and those affected. Emergency responders have trouble "switching gears" when faced with body parts and dozens or hundreds of casualties and the public is shocked to see bodies lying on the streets for days.

Emergency services and government will be equally affected. Fire halls are destroyed by tornados. City halls are flooded out. 911 centers collapse. While cases of emergency workers abandoning their posts are extremely rare, it is hard to respond to a disaster when your fire truck is crushed and all the water mains have been broken.

Hospitals will be amongst the most affected. Hospitals are almost invariably affected by the disaster. Whether the disaster damages the building itself, the contents of the buildings are disrupted (few hospitals are earthquake proofed), or staff is unable to get to or from the hospital, the hospitals are the first to feel the effects. Hospitals are expensive to build and many are kept longer than the average building because they are just too expensive to replace. As a result, they can be more fragile.

Things get worse. In emergencies, the arrival of the emergency services usually results in things getting better fairly rapidly. Casualties are taken to hospital, fires put out, bad people are arrested. In disasters, the limited resources of the emergency services and the fact that they have been affected as well usually results in a continuation of things deteriorating. When the fire truck is crushed and the water mains are broken, the arrival of the firefighters has no effect on the disaster and the situation continues to deteriorate.

Things get better or they get worse. Disasters never stay exactly the same. This means your response environment will constantly be changing and the situation you were in an hour ago may be completely different now.

Things will last much, much, much longer than you expect. There is a tendency for everyone to think that after an earthquake or a hurricane or any disaster that things will be cleaned up in a week or two. Months later, as society continues to struggle with rebuilding, they realize that the recovery will be years in the making.

CHARACTERISTICS OF DISASTER RESPONSE

Emergencies are taken care of on a local level - it is what emergency services are staffed and trained to do. By definition, anything that is beyond the capabilities of the local services or severely impacts the local emergency services requires outside help.

As well, disasters often cross local jurisdictional boundaries. This means that you will have multiple organizations responding. You have no idea what that means until you see it! [In a

Detroit plane crash, there were 69 fire departments and a total of 288 different organizations which eventually responded.]

Convergence of Responders. Everyone and their (Search and Rescue) dog comes. This includes off-duty, retired, probationary, volunteer, fired and wanna-be personnel.

Convergence of Organizations - Red Cross, Salvation Army, church groups, Disaster Child Services, SPCA, ARES, RACES, CERT.... Dozens or hundreds of organizations will arrive.

Convergence of Media - local outlets are augmented by regional, national and international media looking for unique stories.

Convergence of Relatives - especially if children are affected, every relative will come looking for missing family members.

Convergence of Volunteers - emergency services will be overwhelmed with something they rarely allow otherwise with the addition of volunteers.

Convergence of Equipment and Supplies - because the exact needs are unknown, supplies will be ordered approximately three times more or three times less than what is actually required. The lack of information on the scope of the disaster, the numbers of people affected and the most severely affected areas means that supplies will be poorly allocated.

Convergence of Spectators. They will interfere with the responders trying to reach the scene.

"Who is in charge" becomes a major issue. Legal requirements, multi-jurisdictional devastation, multiple agencies, conflicting priorities mean much time is spent initially picking the top person or much more time will be spent debating and working against one-another.

Situation Reports (SITREP's) are given infrequently and are not updated. Emergency organizations may know that their situation has changed, but they rarely advise outside organizations, agencies or the public because they never do it on a regular basis.

Rumors start in the absence of reliable government or response agency information. Spontaneous sources of information will spring up in the absence of a widespread, easily accessible official source of information. Emergency services will turn to these ad-hoc sources because they too are not getting all the information they need.

Logistics issues become huge. Not only does the over-or under-supply of scarce resources cause problems, but the transportation issues become huge. Which roads are blocked? What bridges are out? What streets are gridlocked by fleeing evacuees and responding agencies and relatives?

Logistics issues become huge with the allocation of scarce resources. Who gets the ten generators when there are thousands of needs? The hospitals? The reception centers? The fire

halls? The water supply? The gas stations to supply fuel for the fire trucks? The utility companies? The Red Cross? The Amateur Radio operators?

Financial issues are ignored until later. There is an attitude in the disaster response of "someone will pay for this." At the end of the day, the government says "Let's see the purchase order. Let's see the receipts. Let's see the authorization." Issues like "If everyone else is donating meals for the responders, why should McDonald's be the only one to get paid?" or "Why are urban firefighters being paid seven times the amount of forest fire fighters for doing the same job side-by-side?"

With fire trucks destroyed, roads blocked, water mains broken, emergency response becomes very, very creative. This creates unusual responses and unusual locations. Whatever works!

Unusual responses include things like:

- Firefighters using bulldozers or helicopters rather than ladders and hoses.
- Inmates being used to cook for the first responders.
- Garbage dumpsters used to transport essential supplies.
- Naval vessels being used to power reception centers.
- Trains being run down streets with no rails in order to supply power to reception centers and government buildings.
- Firefighters using heavy dump trucks to reach flood victims.

Unusual responses result in unusual locations being used, for example:

- Airport terminals used as hospitals.
- Burger joints being used as police headquarters
- Breweries used to supply water for hundreds of thousands of people.
- Highways and roads used as landing pads and jails.

Incident Command will be used to organize the response. It is the best system in the world at this time for disaster response and deals directly with many of the most critical management, safety and logistical issues that arise in every disaster.

There will be confusion because different agencies use different versions of incident command, agencies take only the parts of incident command that they like and disregard the rest, and new positions and titles are added to keep people happy or reflect their normal organizational structure.

If there is one phone left in the entire country, responders will attempt to make communications by phone because that is what they know and that is what they are comfortable with. In a disaster, there is no time to learn how to use a satellite phone, a radio or any other type of communications system.

At the end of the day, there will be a huge effort to list the "lessons learned". This will be given to the people who have just learned the lessons of this once-in-a-lifetime experience and will be ignored by those who are about to go through a disaster.

NATURE OF AMATEUR RADIO

Amateur Radio has a nature that makes it extremely useful in disasters. It also has a nature that makes it extremely un-useful in disasters.

Nobody knows what Amateur Radio is or does.

When communications fail, Amateur Radio comes on.

Amateur Radio never has to physically converge - if you have one ham "on the inside" everyone else can monitor and stay out of the way until needed.

Amateur Radio is dispersed, which helps with the damage assessment and defining the exact boundaries or scope of a disaster.

Amateur Radio is less likely to be forced off the air because it has equipment redundancy (every ham seems to have 10 radios), alternate power supplies and is willing to take as many car batteries as required to keep communications going.

Amateur Radio is not tied to the specific locations, agencies, types of disaster and can be flexibly used for multiple types of disaster.

Amateur Radio is a scarce resource - despite having thousands of hams, many are too old to respond, many are physically unfit to respond, many only want to do CW or contesting or DXing and have never participated in any emergency training. If you expect 100 hams, you will get 10.

Amateur Radio is one of the worst at giving situation reports despite the fact that everyone can hear them and would be informed.

Amateur Radio doesn't make itself user-friendly - nobody knows who you can talk to, how to use an NTS form, or where you are to use you.

Messages sent by Amateur Radio have a much lower chance of getting responded to. This is because there may be no answer available, the message got to the wrong person, the person who got the message has much higher priorities, because the message is tied up in the Amateur Radio paperwork pile or because the sending and receiving operators never followed up to see why an answer hadn't come through. The end result is that people are appreciative of any messages that do get responded to but the majority of messages never get an answer.

IMPLICATIONS FOR AMATEUR RADIO

If Incident Command is the best management system in the world, use it to structure your Amateur Radio response.

Don't wait to be called. Even if you are told not to respond, you can still prepare your group and monitor the situation. It is better to ramp up fast and then stand down rather than to wait until being called and working from a catch-up position. [Every post disaster lessons learned review includes emergency services saying they should have ramped up earlier, instead of trying to play catch up.]

Send one person to the EOC or calling agency. This requires you to have a working relationship with the government and served agencies. If they tell you they will call you only if they need you, it is time to do a presentation on "If all communications have failed, why do you suddenly think you will be able to contact Amateur Radio?"

Amateur Radio is a scarce resource. You will not be able to cover all locations requiring communications.

Avoid being sent to useless locations - use your expertise to make suggestions on where amateur communications can be of greatest use.

If the disaster is widespread and Amateur Radio is dispersed, use Amateur Radio to assemble a systematic and thorough report on what areas are affected.

Look for black holes. Areas with no amateur to give a good or bad damage assessment must be ruled out by having someone take a look. If the area is not affected, the emergency services need to know. If it has been devastated, the emergency services need to know.

If the disaster is widespread and Amateur Radio is dispersed, expect that Amateur Radio will be unable to move easily due to blocked roads, traffic congestion or damaged bridges.

Just like the emergency services may be equally affected as the general population, so will Amateur Radio. Repeaters may be working or out-of-service. Be prepared to use both simplex and repeater and not train on just one or the other.

People will insist on using phones and phones will be a huge priority for the response - the faster the phone system is repaired, the faster the response will be able to work. Anyone who has taken the time to compile a list of cell phone numbers for key people will become the stars of emergency communications.

When phones come back on, start to stand your members down rather than burning them out.

Use your system to give constant and regular situation reports. In the absence of official reports,

talk only about your Amateur Radio response.

Don't expect people to know who you can talk to or how to send messages. You are going to have to put up big signs that are welcoming, let people know who you can talk to (where are your stations?) and help them through the messaging process.

Spend as much time as possible following up on messages and trying to close the loop.

Get into digital communications. The more you can do here, the more useful you will be in a disaster. If volumes of traffic are an issue for all disaster response, then voice messaging no longer cuts it. [An average of just 6 NTS type messages can be sent each hour by voice.]

STRUCTURING YOUR RESPONSE

Use a formal and complete lncident Command response including organization, objectives, terminology and operational periods. [Use it to manage the Amateur Radio response outside of the incident area. Within the incident area, you fall under the existing Incident Command.]

Have a set of SOP's to help each person [in the ICS structure] to do their job.

Send regular situation reports over the air and post them on the internet as well. Assign one person to ensure the nets get the latest and read the latest situation reports on the air - a minimum once an hour on operations frequencies and once every 15 minutes on check-in frequencies.

On an individual basis, make a cup of coffee. [This gives you time to mentally get prepared to go.]

Grab & Go bags should be one bag for personal gear (waterproof) and one for a single station set-up. If one person can't carry it, it is too much.

Use spares. It is a requirement of lncident Command and gives huge operational flexibility to your group. Spares give you flexibility. Who takes over if you cannot?

Station spares at the hospitals first. If the hospitals can be ruled out because this is not a mass-casualty incident, then look for unusual locations. [The peak of hospital use is post-disaster.]

Reception centers may not be used or may have enough phones depending on the nature of the emergency. Don't tie yourself up there if you aren't needed.

Inform surrounding clubs. Don't be an example of why Amateur Radio operators are often the worst communicators. [Notify them early in your response.]

Omit things from your lncident Command System and Standard Operating Procedures by conscious and methodical intent rather than simply forgetting to do it. If you don't need a safety

officer, don't assign one, but don't forget it!

Use non-hams to assist. They can do member callout, logging of net traffic, writing situation reports, updating other clubs, covering for bathroom breaks, providing logistics support, timing situation reports, taking pictures.

Take pictures. It makes your "Lessons Learned" much more interesting even if nobody learns your lessons.

Be flexible! Disasters are never what you thought they were going to be.

OTHER GENERAL COMMENTS ABOUT DISASTERS - FOR THE FUN OF IT

Things happen faster than you can react or think about.

Things don't work and things go wrong.

There are no right answers, especially when information is unavailable or incorrect.

Any decision you make will be determined by others, who were not there, to be the wrong decision.

Evacuating a city is like moving it over 10 miles and then having everyone say, "Okay, we moved. Now you must supply everything to us and take care of every single problem we have."

Lessons learned are "lessons listed" rather than anything people learn.

Donations are a nightmare and are often called "the second disaster". Amateur Radio can be a big help at donation warehouses.

Backup generators fail. Over half of them fail in the first 24-48 hours.

Some problems are not solvable.

Rumors start in the absence of reliable official information.

It takes a while to get organized.

Key people will be missing - out of touch, out of region, or dead.

If you don't know the key people, you won't be allowed in to the emergency response. If they know you, they will let you in.

Most people don't learn from disasters. People in tornado alley don't all have tornado cellars and

people rebuild in flood plains.

People don't have 72-hours of supplies and expect the government to provide everything in that period that might be required.

People are unrealistic in what they expect the responders to do.

Reception centers or evacuation centers are the last place people want to stay and will be completely empty unless it is the only available place to stay (at which point it becomes full to overflowing).

No matter how many frequencies you have, you can only listen to one or two at the most. Emergency organizations wanting more frequencies will still experience communications failures.

No matter how much interoperability you have, you can only listen to one frequency and one person at a time. Adding more people onto a single frequency only clogs the frequency to a greater degree.

The media may be the only source of reliable information because the municipal information representatives are spending too much time massaging and spinning the limited information they have.

Nobody has the total picture or will ever know exactly what happened. All decisions made in this situation risk being the wrong decisions.

If you wait to be called, you will likely never be called because they have too many other issues or can't find your number when they finally do want to call you.