Floods, Humidity, and Mold in Libraries – Transcript of audio

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Good afternoon. Welcome to today's webinar, "Floods, Humidity, and Mold in Libraries ." Our speaker today is David Walls, the preservation library for the Federal Depository Library Program at U.S. Government Publishing Office, where he is responsible for developing and managing strategic initiatives for the preservation of the national collection of U.S. government information. In both tangible and digital formats, David has been with GPO since 2010. And David, it's all yours.

Okay. All right. Thank you or joining me this afternoon, everyone. The impetus for putting together this webinar came from the fact that the last couple of years has been showing tremendous increase in the amount of, you know, mold in Federal depository libraries, and so it seems like with the 2020 COVID pandemic many libraries were closed as the cities and campuses closed around them. Heating and cooling were reduced or turned off since, of course, the buildings weren't occupied, and as the worst of the pandemic passed in the buildings reopens, many libraries have discovered ongoing mold blooms on collections. Also, it seems like the last couple of years have been very wet with a lot of rainstorms that have overwhelmed systems in buildings, causing flash floods outside and the ingress of water into the building inside. All this is is occurring when there's a time there's economic stress, reduced budgets, and the buildings we work in are not getting younger, and the mechanical systems are getting older and seem to be feeling more frequently, which leaves us to deal with the floods, the humidity, and mold in our libraries. Next slide, please?

The buildings that house our collections were designed to be functional spaces where our users can interact with the collections they need for a variety of the information channel needs. They were also designed with comfort in mind with heating, insulation, hot and cold water for lavatories and break rooms, and all these collections fit inside what the building engineers call the envelope that protects the collections and the people inside from the elements, but also, the location of the library itself can impact the forces of nature that play upon it and the age of the mechanical systems inside the building can also pose a threat to the elections as they age, depending how well they are maintained. Next slide, please?

In the U.S., we are blessed with a truly diverse climate. We have deserts and mountains and snow. We have snowy conditions in the mountains and flash floods, all kinds of different climates here are very diverse the climate seems to be changing, and regardless of what the cause may be, the data shows the heat is rising and the earth is warming, at least in the United States, especially where we are concerned, and this seems to be causing increased storms here just looking at the data, next slide, please?

We're getting warmer and wetter . The chart on the left shows the percent of change in precipitation since the earliest 20th century in the U.S. to the division as defined by National Oceanic and Atmospheric Administration, and it shows in the 48 states where a much greater the normal portion of total annual precipitation has come from extreme single day events, meaning that not only does it rain, but it rains in Torrance over a really short period of time. The bars on the graph on the right represent individual years, and the way the line is drawn is that nine-year weighted average. The precipitation has come in the form of intense single day rainstorms. 9 of the top 10 years towards one-day events have occurred since 1996. Over the entire period that the data shows from 1910 to 2020, a portion of the country experiencing extreme single day rain events increased at a rate of about half a percentage point

per decade. So, what this really shows is that what we have typically called the 100 year rainfall events where rain comes down so hard that it causes flash flooding in a rainstorm of this kind of proportion, what we used to refer to an event that would only likely occur once every 100 years is occurring once every 25 years now, and the rainfall itself is 2 to 3 inches greater than previously and have previous data shows. What does that mean for what we do in our libraries? Next slide, please?

Unless your building is brand-new, the building that you live and work in was designed for a climate that no longer exists. Rain guttering systems and systems designed to remove water from roofs were designed for certain amount of water. Warmer weather has increased this rainfall and puts extra pressure on buildings, building training systems not only for the roof, but the perimeter of the building, the grounds, things like that can become overwhelmed, and the building systems themselves in a hotter weather world are forced to deal with the climate they were never designed for. Next slide, please?

Typical commercial building has a membrane type roof, which is shown on the picture on the left to the tiny rectangle on the surface way, way off in the distance is the actual downspout or group drain, if you would, for the whole section of the group. The complex construction diagram on the right, all it's meant to show is the amount of potential points of failure, should a caulk or seal or anything sort of not function the way it was intended to, and roof membrane systems typically have a lifespan of , say, 20 years, 25 years, and then they can no longer guarantee that it is waterproof. You would be surprised how many systems are allowed to go well beyond the expected life of the material just simply because of budgets and the need to kind of, perhaps the money is not there, but the effort to try to monitor the condition of the roof and monitor the condition inside the building is what we have to do while other people argue for a new roof. Next slide, please?

What about air handlers? Unlike what we have in our house, commercial libraries, buildings typically use a variety of different air handler systems to provide heating and air-conditioning and dehumidification or humidification, depending on what is called for, and the only thing you really have to pay attention to in this complex diagram is the fact that air from the building, from the room is going to enter and go through a series of filters, then in a process, chilled water going to the radiator system in the middle if it is summer calling for air-conditioning. The chilled water is going to circulate in that coil, and as the air passes through it, it's going to cool off, then come back into the building is air-conditioning. But the problem rises in the form of the condensation. Condensation results when warm, moist air hits something really cold, which is why you need a coaster for your glass of iced tea in the summer, because the water running down it will get on the table. That cold condensate water is typically removed in a drain, or it collects in the bottom of the system, and it is pumped to a drain in some other location. These systems are complex in the fact that they require monitoring for set points to make sure it is the right temperature and humidity inside the building, but also to ensure they are maintained because the failure of the condensate pump or the rusting out of the pan where the condensate water collects, any one of these things is a source of surprising leaks in library buildings that sometimes don't show up because these things are buried in the ceiling or other places, and the water trickles out over time in such a slow way that it can start growing mold and increasing the humidity in the area before anybody really notices it. Or, you can have catastrophic situation where the pump stops working, and the pen overflows, and water goes everywhere, what happened in the library I worked at once. In terms of the humidity? Humidification and dehumidification, there is usually moist air put in the air if a system deems it is too dry, say, in the winter, and additional chiller water put in to remove additional humidity if it's hot in the summer for air-conditioning. And again, these are areas where water can move into stacks areas or areas above collections and potentially cause floods or slow leaks where mold can develop. Next slide, please?

So there's a lot of water systems in libraries, and these are just a few I could think of. We tend to walk around them, so that elaborate site fire suppression, the fire suppression system piping in the corner there? That is the building I used to work in. I used to walk by that almost every day and as stairwell tucked in the corner, and never gave it thought until one day, one of us noticed there was a bit of rust ends Gail developing on a line, and sure enough, it was starting to corrode at a joint, and we reported it, and they had to be replaced because it could potentially burst and create a flood. As you walk by these things and noticed these pipes and systems in the building, it's good to be vigilant and notice changes, and if you think it's, you're not quite sure whether that rust is worse than the last time you saw it, take a picture and let a few weeks go by and then compare, but don't be afraid to report these things if they don't seem like that they are normal. Next slide, please?

Haven't we all worked in places that looked like this? Where there is something going on in the ceiling above us, but we're not exactly sure what. Frequently, we may not know who to report it to or how it should make it up through the reporting lines to the person who can investigate and make sure things are okay, but it needs to be done because the inevitable that is happening is you've got water trapped in places where, again, mold can start to bloom, and you are raising the humidity in the environment, and if left unchecked and unrepaired, this will inevitably get work and potentially cause a flood. Next slide, please?

So, this is sort of of slight interest, I guess, just to explain relative humidity. Why do we say its relative. Well, because the Rh of the air is the amount of water vapor that is in the air expressed as a percentage you will see the data logger screen indicating 40% humidity in whatever space that photo was taken, so that's the amount of humidity or water in the air that can be held at a certain temperature. That usually how it is expressed, so that's if you are curious because it's relative based on the amount of water that can be held in the air at a temperature, and that's a good example of the data logger that we'll talk about in a minute, and in terms of the ideal or maximum for collections? The humidity in a building where collections are should never go past 50% and we'll talk about that in a moment. Next slide, please?

So here is showing another data logger, and these are devices that can be set, purchased, calibrated to turn them on and set it it essentially reads the temperature and humidity in space, records it, and you can download the information onto a computer, and ideal temperatures were collection areas are between 70 and 80 Fahrenheit, and ideally somewhere between 30 and 50%. It's better overall for collections if a temperature and humidity are more stable. There could be a possible Essene 70 and 30 as an ideal, but it has difficulty achieving that, so when it's running, you can get close to 70, but when it cycles off, it climbs back up. It's probably better to choose a midpoint that reduces the amount of cycling so that your temperature and humidity remained more stable over a 24 hour period. That also goes to say there is a tendency for energy conservation to choose temperatures higher than 80 cents on most systems the dehumidification is related to the amount of cooling going on, raising the temperature higher than 80 it will inevitably raise the level of humidity in the space, and warmer temperatures and higher humidity encourage the growth of mold. Next slide, please?

So what happens when the inevitable happens? So, you come to the library and discover water all over the floor, water has been pouring out of her burst pipe in the ceiling, so much for that it's not the books off the top shelf onto the floor, and everything is a mess, and there is soaked books. The first thing to do is don't delay. Stop the water, and deal with the situation as fast as possible because delaying the response only makes everything worse. Because of the amount of water in the floor and the humidity is

only going to increase in that area as the water evaluates, you want to remove the standing water as fast as possible. Ideally, with a wet/dry vac, mops, rings like that to get water out of the area, and you would begin to look at the books and to get them out of the affected area to dry the shelving here this is going to take some work and some people power to make it work. What you want to do is to be aware of what those collection items are that are damaged and to respond as quickly as possible. And in the situation where this happened very late at night, if water lines had been installed in this location, that would have audibly or sometimes through an email connection warned someone monitoring the building that there was a problem. Then the response could've happened even faster. The critical thing to remember about mold is that once things are wet, paper is essentially an organic polysaccharide compound. It's food for mold and the mold spores will begin growing on the wet paper with enough warmth between 48 to 72 hours after the material gets wet, so the material needs to be isolated and dried as quickly as possible or isolated and froze in to stop the mold growth and spoilage. We'll talk more about that in a minute. Next slide, please?

But the important thing is to report any kind of disaster that impacts the collections in your ability to deliver those collections in a serviceable way to GPO as soon as possible. You can go to ask GPO and fill out one of the ask GPO forms, indicate a disaster has occurred. You can contact one of the FDS as folks or me or all of us. You can contact as many of us as possible, but it needs to be reported, and we will reach out to you and learn more about the situation because every situation is different, then work with you to see what kind of response we can help you with to ensure that the collection is preserved and is usable for your users and that the impact on the overall library services are minimal. Next slide, please?

What you can't do is delay because the problem will simply not go away. This is a collection storage area in a library where there was a leaking air handler that raised the humidity level in this enclosed room here because it was a storage area, the lights were designed to only come on when somebody was in the room, and because it was a closed secure storage area because these books were somewhat more valuable or works in process and these collections were sort of being worked with, as a backlog of cataloging and a number of different things, few people came in here except when they needed to work with the material, and so the room was closed up in the dark, high humidity, with stagnant air. All of those are the absolute most ideal conditions for mold to begin blooming. And one day when someone came into the room, they saw the horror show on the shelves, and that's just an example of what some of it looks like here there are 26 species of common molds. They are all around us all the time, and what you have to realize is the mold is floating in the air all around us microscopically. Those tiny, tiny little spores. And they are on the books and papers that we work with at work here they are on the things that we use at home. It's just only in the ideal range of humidity and temperature that that mold, which is on those objects, that organic material, will begin to bloom, and molds does not like fast-moving air. He doesn't like fresh air. It doesn't like sunshine. It doesn't like light. Storage humidity where high humidity areas andcan increase, and 50% and keeping things in the dark and not being aware of malfunctioning air handlers, plumbing leaks, other things, groundwater coming up through the foundation because of heavy rain here these are all issues that can create what you are seeing there. The beauty of it is that prevention is the key because if somebody had recognized that the air handler in that room was malfunctioning and there were leaks, that could happen quickly dealt with, or the books could've been removed or covered with plastic sheeting, additional dehumidification could have been brought in. The point is prevention is always cheaper and easier than cleaning mold from books like this. Next slide, please? Because you have to be aware that mold is something that has -- the medical profession has learned more and more about it. It is the source of allergens and other health issues, and so the mold with people pressing is also in the air. As it grows along the surfaces of the patient's, the mold level of the anesthesia around is also going to increase. This can cause people with immune

deficiency issues, all sorts of health problems. It can cause allergic reactions in the form of sneezing, watery eyes, coughing, things like that . usually with a mold outbreak, the first place to go is something we can also help you with, but just showing you what typically happens is that it is swab tested. This is where a Q-tip, a sterilized Q-tip is wiped over the mold, and different samples are taken, visually different molds and different areas of the room or collection areas, and the mold is then cultured scientifically, then the species that grow from the swamp are analyzed to determine the level of toxicity and the amount of mold potential in the environment. If the amount of mold on the swab test is very, very high, and the concentration is very large. It also would mean it would be impossible to do an air test kit that would reduce the amount flooding in the air. I would also indicate of the potential of issues were people being in space with material. All this needs to be taken seriously, but this is also done to determine how difficult it might be and the level of safety that people brought in to clean the material might be facing and might be more aware of what the potential issues are.

I know this is really small, but I was trying to show some somewhat of a quantitative, physical, fungal report. This is basically the result of the swab test, and it is much bigger than the screen can possibly show, but it basically shows the kind of data that would come back from a swab test. There is the amount of cultured, culture viable samples. All different species identified, and this has been used to determine the next step of training material. In working with libraries, the books that were wet need to get dry isolated and in cases iCohere secondary dehumidification is to be brought and with a large green object, conceived of the size of a 30 year trash can next to it. This is an industrial grade dehumidifier provided by defense recovery service, and this is far beyond what you typically have at home from Walmart or Home Depot. This is a machine that can move gallons and gallons of water to the air in a 24 hour period, were household fires are only able to remove pints at the same time and as a check on the humidity level, you will see the humidity rather, in the areas of having 40%, far out rates the rain where you would have multiple. Next slide, please?

In preparing for something like this and any sort of preservation plans in general and dealing the potential issues that may occur from a storm that causes flood in the building or mechanical system failure one of the first rule of preservation is knowing what you have. I know a lot of collections are not catalogued, but if you have item inventory of four special collections or older material because they would be the most difficult to replace if you have those Aveda questions I document to know what you have if it was compromised. We can help you try to find material and replace it. If it is valuable, we can help mitigate the effects of this disaster and then the event of a total loss. That is to help you replace those items if possible with the help of book collections across the country. Next slide, please

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this is the simplest thing you can do to keep mold ongoing from collections in areas where there may be storage because we all have basic storage if we have a basement because they Spencer Ware places like to go when they don't seem to have much place by itself. If there was going to be a flash flood, and the drainage system around the perimeter of the library could not handle the water, and water comes in. Which do you think the pile and jumble on the floor were neatly arranged on the pallet with the extra protection of a nice little rain hat of plastic sheeting over the top. I think the answer is clear. The one on the left would have to get removed from the boxes, be dry, be replaced. It's much easier to go ahead and do what it looks like on the right and not worry about what if with what's on the left. So, you can develop a risk checklist. Do you know if your building is on a floodplain because if it was on a floodplain, if it is on a floodplain, the day that sheds only are getting worse. You know how old some of the building systems are, how they function is the rain coming down more, and as a number of libraries have told me, work at getting water in the basement and places we've never had an issue with before. If you have collection areas, is a good die idea to make sure if you have water alarms installed, collections up off the

floor, headed dehumidification. Better airflow. Sunday monitoring the condition and those in the area. Do you have collections next to large windows where it may be some sort of freak leakage. Perhaps a rainstorm comes with a lot of pressure and wind in a second area, and do you have physical some items that are difficult to replace, at least inventoried or catalogued, and do you monitor the building systems. Make sure to do a walk-through of the docs area where the wire pledges are, where the ceiling tiles don't look like it did a month ago, just be aware of where this mechanical so systems are in terms of collections. Next slide, please. Build it yourself to a response checklist . Is can be part of a disaster plan or telephone trees in response that's way, and I would encourage you to do that, and that is something I have been asked to do later this fall, webinar on developing a disaster specifically a disaster plan, but these are some good things to think of when developing that if you don't have one of those already., and of course, supplies. Plastic sheeting and duct tape is absolutely one of the most wonderful things you can have on hand because if somebody comes to the desk and says their water is trickling on the third floor, grabbed the plastic sheeting and get over the collection books that are on the shelves and get out the ones that are damp. Now, I wonder where the water is coming from. The faster you can protect things of getting wet, but likely the chance of that to come back and disaster supplies so soon. I you worried about that. Would occur until from 5:00 to 9:00. That's why the emergency fund has ability to replace those if it this is Sunday, when things get wet. Next slide, please?

These are three examples of plastic sheeting in use to guard against a wet spot that is mysteriously. In the ceiling and in my experience, physical plant folks can be surprisingly relaxed about some issues like that to them, a drip is a drip come private collection on your materials, there is a problem. A plastic sheeting a few times to show that there is an issue there, and it is something that is protected. And its relatively chief. There's nothing special about it, and it solves our worry of problems of what books. Next slide, please? I mentioned a lot of these earlier. There is this lots of different models, and I'm not really up on it enough to know to recommend one brand over the other you want something that creates a quick visual readout and some don't have a visual report, and any of the plug it into a computer. To provide you with hard data you need to talk to Riverside. There is something not right with the conditions in this area because, you know, going some of the insane. It seems warm in here, or it seems humid. This is what the gifty day to show BIX experience the actual temperature and humidity is, and you can move it around, simply record where it is, how long it has been in a certain area, and it also will tend to show through the sampling that it does that the test cycle, and how much training salt somewhere back and forth situation with temperature and humidity. Next slide, please and what dry vacuums are absolutely ultra for feeling top spills and cleaning up the floor and the paying on your operation, you can hopefully have custodial services have one so you can whenever you have something to respond to anything of, and make sure it's mops. Mops don't quite do it as it was as you think they should next slide, please?

Thinking back to the picture earlier where the books were all over the floor and there was water in the floor , so removing the standing water, improving the back shelves, you have to realize that

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it is so tough water from the air

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even if you've got the late sob, the area where the books are drying in the camp, you're going to need to increase as the collation to hear the air moving because I will also cut down on the ability for mold to start grooming. These are just some commercial air fans to illustrate the point.. If you have a book that is, having a set of paper towels to leave and enter the book is a good way to with water out. They need to be changed frequently of course as they get damp, but the beauty of it is to get put the paper towels to dry somewhere and you can sort of keep recycling, and now the books, but again, should be dry

enough that they are going to dry anything that is wetter than that that is actually soaked with water running out of it. Should ideally it it it is a rare island, a special collection item, frozen in Canada if you've got a situation like that, taking more time for questions that I can talk to about that would we talk about disaster planning. Next slide .

Some warping will be an inevitable result. The books are never going to look exactly like they did before, and if you have clay coated paper, that is the glossy paper that illustrations and highly illustrated books are on. That is the most critical to get dry because the clay coding will get sticky and blocks together and patients will be stuck together, and they won't be able to be separated. Next slide, please? The biggest thing about response to the mold or whatever it to motivate us, talk us about a message to find the water situation, and hopefully, it's not a horrible mode situation. Even though it's just an inquiry, we had this leak in the library, we had a situation ongoing. The basement, where kids keep running in and what do we do? That's what we are here for. We would rather help you sort of deal with it that level and plan for it becomes a major situation, and everybody's situation is different financially. Some libraries are part of campuses. Some libraries are part of city governments. That governing structure above you also governs how you're going to be able to respond to a disaster of any kind, but the important thing is known your own limits and your own safety of safety, and don't try to tackle that is too large. Recovery services, recovery that can perform these families returning to the scale of disaster can be beyond our limits. Even though it is five amount find it. You may be surprised there may be catastrophic insurance policies or sources of funding that could be developed in advanced and paid for these kind of services to have them contractually ready for the disaster here to give you an indication of the scale of something like this, the large blue object you see on the trailer is actually a dehumidifier of an industrial size because the roof of this building has been compromised, and a tornado and conference inside got soaking wet, and the scale of the problem is far beyond even the letter that I showed you that the service company provided with the trash cans, and that picture is a level of the humidification with the everything that can be soaked to keep mold from blooming. It just goes to show the scale of the response can be quiet. Next slide, please?

Plan appropriately. Work with us to develop a disaster plan, and to follow it through, establishments to document your recovery effort, and to adjust that plan in time as needed. We'll talk more about that in the following webinar. So here is some sources . looking at some of the statistics for greater rainfall, there is even some floodplain maps for your location could you can put it in your library's address, and you can find exactly the climate you're building is potentially facing, and I would want to share those with you as things. You can look at your own time and learn from and my contact information? I know some hesitate to have them contact us, and I do answer a lot of questions, and I don't mind answering those questions because I want to give you the confidence to do your job well and to work with us to help preserve your collections, and an area it seems like Rose is on the rise due to the reasons I talked to, are the ability to work together to make sure leaks don't turn into, floods don't turn into huge mold blooms, is something necessary now more than ever hear a thank you very much, and I'll take any questions.

We already have questions in. First, what are the best techniques to drive hooks that are just above that water. I think this is referring to the slide with the water on the floor.

If a book is truly so and it is a small number that ended up on the floor with some damp on the shelves, I would say the fastest thing to do is try to get the water out of it by putting the toweling on it and soak it up here they keep changing that. And, in standing it up to dry and fanning the pages, and having it in an area, of course, where the humidity is not so great in there, and that is probably on an individual by

individual basis, the best way to do it . What I mentioned there is there is a huge number of books that are completely soaked. The typical response that a lot of folks like that Northeast conservation Center and others recommend is wrapping the books in freezer paper as if it is at stake P apparently them into boxes, and then contracting but he probably would've had done before the disaster, but finding freezer, commercial freezer storage so the books would be rushed off to be frozen, and the purpose of this is it buys you time. If you have thousands of books that are completely soaked, you want to recover them. Being able to take a few boxes out at a time from the freezer is easier than dealing with the entire multitude of them.

Okay. The next question is should the samples be collected, cultured, and analyzed before remediation?

Yes. If you're going to do sampling at all, we typically recommended the sampling because, you know, the FDLP is a community, and the books that you have in your collection, you may decide that, you know, that somebody else could be a better steward of some of those materials, and if you wanted to give them away after cleaning, we want to do the sampling to be sure we know exactly what's on those books if they were passed on to somebody else, and also for the folks cleaning the books, cleaning them and there are different set of people, that would tell us the mold that was on them.

Okay. I just chatted out that to submit any more questions.

Okay.

And just FYI, David is going to be back in two weeks to talk about preservation.

We're developing some -- we have some services already to the FDLP, some of which I talked about today , things available for coordinators to take advantage of, and we're developing some further ones, and we've got some things currently in the works like preservation pilots that you have seen announcements about, and I just wanted to talk about sort of those collectively as some strategies for preserving the national collection.

Okay. We have another question. How do you encourage leadership to take proactive steps?

That is the hardest thing because we're not enormously high in the pecking order of things, and all you can do is report up, and frequently, the other side looking down says, there is no money to fix that. The problem is, I think, to create clear documentation , and, you know, it's much different if you can say in the report that data loggers consistently in the stocks area show a consistent humidity above 50%, you know? Take photos of mold that's beginning to bloom on things, and all you can do is create as clear of the case as you can and keep pushing it up and making people aware of it and do what you can in the meantime to try to protect and identify those critical collection items that you can't do without. If the situation is ignored, what is the way that you can mitigate the impact of the worst-case situation from the things that you value the most? Does that make sense?

Okay, all right. We had a few more questions come in. On the subject of funding for preparation recovering, we are struggling with a 50% state budget cut, meaning some pockets products are out-of-pocket. Is there some way we could prepare our recover?

Not that I'm aware of, but that is something I will say because it's something I want to educate myself about. Is a webinar writing on the 22nd where folks from FEMA are talking. I know, Kathy, you are up on that webinar or not?

I'm not moderating that one, but, yet. It is on the calendar, and you can find how to register on FDLP.gov . Project that is some of my questions. FEMA tends to be about people, naturally, but are there any state resources and local resources? Because that is something I'm honestly not aware of.

Okay, let's see. What is the best way to reduce moisture within a building other than dehumidifiers?

Other than dehumidifiers? That's very difficult without bringing in a lot of and I would say that is very difficult because of what tends to happen with air conditioning is things are sort of trapped in the building. In other words, it's not like we have all the windows open and fresh air going in and out the one and everything and that's if you don't have the ability that you know is about 50% humidity and the answer would be dehumidification. This sounds odd, but it seems to work. Putting fans to keep the air stirring, and making sure that the lights stay on get a lot of stacks areas have lighting for energy efficiency that goes off when people are gone or the lights are turned off at night or that kind of thing. Mold does not like light. Mold does not like fresh air that is moving.

Okay. Would freezing the books for the short term worsen the looks' conditions in the long run?

As long as the freezing happens relatively adequate temperature, the answer would be no. If a book is completely soaked and it's going to take -- it is a humid summer day, they've lost power, AC, and through some sort of situation where the AC unit and the air handler in that area has soaked the books, it's going to be very difficult to drive that book within 48 hours to a humidity level just within that book that's going to make it impossible for mold to not bloom. Freezing it, it's only compromised. It's already swelled up here to Binding is probably spread out a little bit as the boards got wet. We are talking a book that is truly, truly soaked. And it has already been compromised, but to keep it from turning into food for microorganisms, freezing it stops that mold growth, and at that point, there's a number of treatment things you can do here there is things like vacuum freeze-drying and things like that to sublimate the water out and evaporate it, but again, this is why I mentioned special collection items. Those tend to be because of the cost, things that are reserved, things you can't replace an things you can't do without.

Okay. And we've got another question. Actually, it's a multipart question, it looks like. What is the best way to show, shelve rare or valuable items, top shelf, bottom shelf, cabinet, draped with a plastic rain hat? It's difficult to know the right thing to do. For example, a closed cabinet might keep water out, but it could also encourage mold because the air inside the cabinet would be stagnant.

Right. Actually, probably if they are going to be -- I'm assuming they are not in the open stacks, but they are in some kind of metal shelving. Actually, you don't want to put things close to the floor because humidity is always higher on the floor level. That's not to say, you know, I've seen rare book collections, which of course, they use the bottom rung of the shelving, but to answer your question, probably the safest place is in the middle. It is not up high where it's going to get rained on immediately. It's not lower down where humidity is going to affect it as much, so if you had a choice, and it's either or, which it rarely is, but if it's either or, I would say.

What about the part where she asked about inside a cabinet?

Thank you, yes, I forgot that. Cabinets can be fine here the problem with glass fronted cabinets tent to be not so much the humidity as the temperature. Glass fronted display cabinets very much are susceptible to the greenhouse effect, and even overhead lighting, even if it's an in area where, you know, you don't have sunlight coming in through windows and things like that, even overhead lighting can create warmth inside behind the glass that is warmer than you really want to store the materials at.

Okay. And two air purifiers help with mold in the air?

They do if they are truly HEPA, high-efficiency particulate air filters, and the filters are changed frequently. Because that removal of dust and mold spores and things like that does keep the environment cleaner and fresher. And if you have a huge amount of dust, which is usually organic particulate fall out on books, on maps and other materials, it is in the sense creating a moister bed for the mold to attach itself to more easily on the item.

Okay. All right. We still have a couple of minutes left if anybody has some last questions, and in the meantime, I'm going to ask -- there it is. Ashley has posted a link to the survey. We would really appreciate it if you would take a few minutes to complete the survey, and the result will be shared with David. Thank you.

Anything else I have not covered? Any questions about what its? Any situations where you had a similar situation occur to you or anything like that? What did work and what didn't work?

Okay. I'll give it just another minute. Oh, you will get an email of the copy of the presentation, Concepcion. Let's see. Okay. This is a comment. Lisa says, we have an active mole problem and have not had building services agreed to pay for remediation. Here is another question. Where is a place to find industrial sized dehumidifiers?

There are industrial catalogs of things, different companies that make them if you simply search industrial standalone or portable dehumidifiers. You can find them. They can also be rented from companies like service pro and others. That is just one company that comes to mind that provides them at a per day cost basis and a number to put into an area that might have a high humidity problem to try to keep the humidity down until you can figure out what's going on with that stacks area space and deal with it in a permanent way.

Okay. Okay, it looks like people are starting to log off, so I'm going to go ahead and close out this webinar, and I would like to thank everyone who joined us today, and a very special thanks to David Walls for a very special presentation.

All right, thank you very much.

[Event Concluded]