International Data Rescue News

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Preventable Tragedies?

Hurricane Katrina

Nearly 2000 people died. Over 100,000 families lost everything. Can we stop it from happening again?

On August 29, 2005 Hurricane Katrina touched down on the gulf coast of Louisiana. Within hours, dozens of levees in and around New Orleans Parish failed, causing widespread flooding and leaving approximately three-quarters of the city underwater.

Information Failure

The majority of the drainage and pumping system in the New Orleans area was designed about thirty years ago. Using the information available at that time, a Category 3 hurricane was estimated to be a 200-300 year event.

As more accurate models were developed using better data sets and advanced algorithms that

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Empire, Louisiana after Katrina. Defense Visual Information Center photo.

A recovery dog searches for victims in a New Orleans home. Marvin Nauman/FEMA photo.

Understanding 100-Year Events

Designing structures that can withstand strong storms, rainfall, earthquakes and other natural occurrences is a constant challenge for engineers.

Inadequate designs may mean the costly repair of leaking roofs, cracked concrete or flooded intersections. When bridges, apartment buildings, levees or power stations fail, however, lives are at risk.

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Katrina's Legacy

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compensated for global climate change, the estimated return rate for a sizeable storm dropped. Experts realized the system was only safe for a 50- to 100- year event.

What Can Be Done?

A year after the devastation of Hurricane Katrina, as communities still struggled to rebuild, the American Society of Civil Engineers (ASCE) released a statement detailing suggestions to help safeguard from future public system failures.

One of the underlying tenants for the ASCE's ten action statements is *understand risk and embrace safety*. The second action point, following *keep safety at the forefront of public priorities*, is to *quantify the risks*.

"Quantify the Risks"

Risk analyses are only as accurate as the information and methods used to calculate them. Hurricane Katrina showed how flawed models could have deadly results.

Natural disasters can happen anywhere. Through efforts to collect, digitize and make available historical climatic data, IEDRO is helping researchers better study natural hazards and engineers better prepare for them.

Lessons from Katrina

One of the legacies of the devastation after Hurricane Katrina is the realization that understanding natural hazards is more than just interesting science. Accurate modeling and calculation of return rates are at the core of providing safe structures that can withstand hurricanes, earthquakes and tidal events.

Providing scientists and engineers with the best possible environmental data is vital in preparing for the next "worst case scenario".

Rescue workers search for survivors in New Orleans. Defense Visual Information Center photo.

A home is knocked off its foundation by the hurricane in Mississippi. Leif Skoogfors/FEMA photo.

Ship owners, FEMA and the Army Corps of Engineers working to remove debris and rebuild the levee at the 9th

Understanding 100-Year Events

Trees bent to the ground after Hurricane Andrew. NOAA photo.

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Defining "100-Year Events"

Engineering specifications are often written to assure that structures withstand a *100-year event*.

A 100-year event is a seismic or environmental occurrence of such a magnitude that, statistically, it is likely to recur within a century.

By definition, a 100-year event has a 1% chance of occurring in any given year, regardless of how recently the last disaster happened.

There is a five percent chance that the event will recur within five years and a ten percent chance within the next decade. At twenty years, the probability jumps to 18%.

Vague Approximations

The magnitude required to be called a "100-year event" depends on location. The amount of rainfall that causes a 100-year flood in one area, for instance, might be well within the handling capability of a nearby watershed.

To estimate event magnitudes for a site, researchers often have to use a very limited collection of hydrologic and environmental records.

100-year and even 500-year events are routinely defined by curves extrapolated from only fifteen to fifty years of data. The records used may not even include a sizeable event, forcing engineers to design with only vague approximations of what environmental challenges the finished structures will face.

Instead of being absolute measures of a structure's integrity or the suitability of a design, return periods are estimates. Their usefulness and accuracy are only as good as the data set and analysis techniques used to calculate them.

Better Engineering, Safer Construction

Because environmental and geologic computer programs are used to dictate the engineering design parameters of public works, private homes and industrial facilities, making them as accurate as possible is vitally important.

The failure of structures that are not designed to withstand severe weather conditions can have catastrophic consequences, as witnessed by the levee and flood wall breaches following Hurricane Katrina.

Improving the data used to extrapolate return period and serious event magnitudes is a proven way to develop more accurate forecasting models. Including more historical data can improve the accuracy and meaningfulness of 100-year event definitions.

Looking further back at the seismic, hydrologic or meteorological history of an area will give scientists more power to track future trends. Armed with a clearer picture of the occurrence rate and severity of winds, rain, earthquakes and other dangers, engineers will be able to design safer and more durable levees, bridges, buildings and roads.

Irreplaceable Data, Going to Waste

Unfortunately, a staggering amount of historical environmental data is still not being used to estimate 100-year and 500-year events. This information is recorded physical media such as paper, glass or microfiche, and cannot be added to

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IEDRO News

Strip Chart Digitization

IEDRO is continuing to make progress toward perfecting a system to digitally interpret and catalog strip chart readings.

Strip charts are created by passing a long roll or "strip" of paper past one or more pens connected by arms to a measuring device. Changes in readings signal the pens to deflect, and this movement is recorded on the paper.

Often used to record continuous activity such as temperature, precipitation and barometric readings, strip charts are currently read and recorded into the database by hand.

Automating the process will allow data collectors to retrieve and save more information in significantly less time with less of a chance for human error.

Comprised of paper and ink, strip charts are fragile and at high risk for water, fire and UV damage. Digitizing the data they hold will help assure that scientists will be able to access the irreplaceable information.

Volunteers Needed

IEDRO is looking for several volunteers with technical and communication skills.

If you or your organization is interested in becoming involved with data rescue or helping to fund IEDRO's efforts, please email r.crouthamel@iedro.org.

Understanding 100-Year Events

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databases or incorporated in computer models until it is digitized.

Decades of invaluable, potentially lifesaving, information is at risk of being destroyed by water, sunlight, mold, and pests. Until the data is digitized and recorded, there is the constant risk of losing it forever.

IEDRO is committed to saving as many environmental records as possible, digitizing them and making them available to the international scientific community. A project with long term and long reaching benefits, the recovery of historical data can help engineers better understand and design for weather extremes and seismic conditions, which means safer construction and less rebuilding expenses in the future.

There are many practical applications that rely on accurate data modeling. With your expertise and financial help, IEDRO can save even more historical records. Please visit www.iedro.org for more information.

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About IEDRO

The mission of the International Environmental Data Rescue Organization is to assist the scientific and educational communities of mainly developing countries locate, rescue and digitize all environmental data currently at risk on perishable media, and to make those digitized data freely and openly available to the world scientific and educational communities before it is too late.

IEDRO is a registered 501(c)(3) organization.

About IDRN

The *International Data Rescue News* is published monthly by IEDRO.