



Saving Data, Saving Lives

ANNUAL REPORT | 2015

INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION (IEDRO)

901 Main St Deale, MD 20751-9609 USA | 410-867-1124 | www.iedro.org

Table of Contents

Vision.....	2
Mission Statement	2
Message from the IEDRO Executive Director.....	3
Where IEDRO Has Been.....	4
Ongoing Projects	4
Project Advisement	7
<i>Weather Wizards</i> Application.....	9
Collaborators and Partners.....	10
Planned Budgets.....	11
How You Can Help.....	12
Contacting IEDRO	13

Vision

To be a global leader in the pursuit of locating, rescuing (imaging), digitizing and sharing all historic weather data, for the purposes of analysis and prediction, before it's lost forever. To develop data rescue applications and systems that can decrease the cost and time required for digitization, while increasing accuracy of data entry. To make these systems and applications available for use in every geographic region by anyone with a vested interest - from the meteorologist and environmental science researcher to the farmer and local decision maker in a developing country.

Mission Statement

The International Environmental Data Rescue Organization (IEDRO) estimates that the world loses hundreds of thousands of critical weather records every day, particularly in developing countries, to improper storage, loss and material deterioration. These data tell the stories of past weather events such as extreme winds, precipitation and storms, and thus could have been used to better predict drought, floods, the spread of disease (i.e. malaria, Zika virus, West Nile virus, dengue fever, yellow fever), and the impacts of climate change. Without the rescue of and access to this data, regions across the globe see unnecessary loss of infrastructure, agriculture, the economy and human life.

IEDRO's mission is to locate, rescue (image), digitize, archive and share historic weather data across the globe, to support applications in agriculture, infrastructure planning, disease prevention and climate change.

By rescuing and digitizing past extreme weather events (i.e. extreme winds, precipitation, storms), IEDRO empowers local decision-makers to adapt their infrastructure and agriculture to weather phenomena while also better predicting the path of airborne disease. IEDRO believes that, when used regionally, rescued environmental data can reduce humankind's suffering and death more than any other endeavor.



Message from the IEDRO Executive Director

I'm often asked, "Why should we care about rescuing old weather data?" "Why waste time and money saving details of weather from the past? What's happening now, and in the future, is more important!"

This quote from American novelist Winston Churchill expresses my response well, "**The farther back you can look, the farther forward you are likely to see.**" The benefits of rescuing and digitizing old weather data are worth thousands of times the cost of recovering these national treasures. Better predictive models are based on continuous weather data sets and could save tens of millions of lives every year!

Weather observations have been made at thousands of sites worldwide for over 250 years. These records live on, but only as fading ink traces on deteriorating paper in less than ideal storage facilities. These millions of observations are **critical input to scientific applications that save peoples' lives**. Many years of data are needed for a subsistence farmer to accurately know the average frequency and severity of droughts in his region. Then he can save enough during his good harvest so his family doesn't starve in the bad years. These same historic records help public health officials determine the probable spread of airborne diseases. Other decision makers need this electronic data to prepare for mudslides and floods.

Scientists have perhaps the most vital need for this historic data in order **to understand and project the extent and speed of climate change**, so that effective and timely mitigation measures can be taken.

In 2015, IEDRO increased our data rescue and digitization capabilities to enable us to pursue our mission more effectively and efficiently. Progress on the new *Weather Wizards* citizen scientist digitization program greatly expands our ability to digitize data more easily, efficiently, and less expensively than ever before. IEDRO has also seen a significant increase in requests from developing countries for data rescue and digitization expertise and consultants. Both increased capacity and a greater demand for DR&D assistance require substantial funding.

"I think that the data recovery work of IEDRO is, perhaps, among the most important international activities that meteorologists are undertaking. It is an honor for me to be associated with that effort by IEDRO."

-Dr. Richard Greenfield, Senior Fellow of the Atmospheric Policy Program at American Meteorological Society

Over the past decade, IEDRO has depended on the generosity of the U.S. Government (NOAA) and international aid agencies, such as the United States Agency for International Development (USAID) and the World Meteorological Organization (WMO).

Now, however, IEDRO must more aggressively solicit funding from private individuals and organizations. As fellow inhabitants of this earth, we all have a vested interest in helping locate, rescue, digitize and share historic environmental data... before it is gone forever.

To allow us to continue, and expand, our efforts, IEDRO would greatly appreciate any suggestions the reader might have in helping us obtain the critical funding from such sources.

Dr. Richard Crouthamel, Executive Director, IEDRO



Where IEDRO Has Been



Africa:	Central/South America:	Asia:
Kenya	Bolivia	Uzbekistan
Malawi	Chile	
Mozambique	Dominican Republic	
Niger	El Salvador	
Senegal	Paraguay	
Tanzania	Uruguay	
Zambia		

Ongoing Projects

Region I – Africa

Overview: With funding from USAID, in 2013 IEDRO established the West Africa Climate Data Rescue and Digitization Facility at the African Centre of Meteorological Applications for Development (ACMAD) headquarters in Niamey, Niger. IEDRO provided equipment (i.e. scanning systems, computers, and monitors), data rescue techniques, and support. The IEDRO Implementation Team installed the data rescue equipment and provided training on the scanning systems to ACMAD personnel.

2015 Update: Throughout 2014 and the first half of 2015, IEDRO continued to work closely with ACMAD staff to assist them in inventorying and scanning microfiche. IEDRO also made recommendations to improve the speed and accuracy of the scanning process. As of June 2015, ACMAD technicians had scanned 212,111 microfiche frames. Unfortunately, ACMAD is unable to continue to fund scanning personnel to finish the imaging. Without completion of the imaging, the project cannot continue and the images on the remaining nearly 700,000 microfiche frames are in danger of becoming unreadable. This means that the data could be lost forever.

Future Activities: If funding can be found, IEDRO plans to help ACMAD continue the microfiche scanning process until all the microfiche frames are secure. At that point, IEDRO will digitize the newly scanned images and archive them in an open and unrestricted data base (with permission of the various African countries) for the use of scientists, researchers and educators worldwide. In 2016, IEDRO plans to develop *Weather Wizards* scanning formats covering the large variety of weather information forms rescued by ACMAD. These scanning formats will enable hundreds of thousands of Internet volunteers throughout the world to get the data digitized and archived quickly and efficiently.



Funding Status: New sources of funding are needed. USAID, IEDRO'S primary funder, was unable to continue participating in this important DR&D project after March 2015. IEDRO is seeking other funding organizations to help finish the work that USAID, ACMAD and IEDRO have begun.

Region II – Asia

Uzbekistan

Overview: In response to a request from the World Meteorological Organization (WMO), IEDRO agreed to assist Uzbekistan's National Meteorological Service (Uzhydromet) in preserving their historic hydrometeorological observations. The project commenced in 2015 with administration provided by the WMO and with funding provided by the Korea Meteorological Administration (KMA).

2015 Update: IEDRO and Summit Business Technologies designed the data rescue system, sourced and shipped the cameras, computers, and mass storage device necessary to conduct operations. IEDRO and Summit Business Technologies also completed the technical manual detailing the steps to be taken to categorize and image Uzhydromet's observations.

Future Activities: IEDRO expects that the Data Rescue (Imaging) facility within Uzhydromet will be completed in the first quarter of 2016, and that the equipment shipped from the U.S. will be installed and operating by the beginning of the second quarter. An expert team from IEDRO, Summit Business Technologies and a meteorologist from the Bulgarian National Meteorological Service will visit Uzhydromet to install the systems, provide initial training and technical advisement. Uzhydromet employees will then digitally photograph and save approximately 17,000,000 pages of historic hydrometeorological data dating back to the 1800s. With Uzhydromet's concurrence, IEDRO plans to establish autonomous keying workstations so that Uzhydromet personnel can digitize the imaged data when time and funds are available.

Funding Status: This program has been fully funded by the Korean Meteorological Administration through the World Meteorological Organization.

Region III – South America

Bolivia

Overview: To date, IEDRO has received synoptic observations and Summary of Day observations for 22 surface stations in Bolivia – 16,544 pages of records in total, the equivalent of at least 10 years of data.

2015 Update: In anticipation of the completion of the production version of *Weather Wizards* in 2016, IEDRO formulated an initial plan for digitizing the data images already received from Bolivia. Bolivia has many strip charts that also need to be digitized.

Future Activities: If funding is secured, IEDRO plans to visit SENAMHI, the Bolivian meteorological agency, in 2016 to ensure that the rescue of surface observations continues. IEDRO will also coordinate with



Rotary International and the Bolivian Rotary to assist in the digitization of the SENAMHI data through *Weather Wizards*.

Funding Status: Funding is required to develop digital keying formats for the dozens of different types of meteorological forms rescued from Bolivia so that IEDRO's *Weather Wizards* system can be used to digitize the data. \$15,000 in funding is needed to complete the project.

Chile

Overview: Prior to 2015, IEDRO rescued over 500,000 images of surface observation data from the city of Punta Arenas, the southernmost city in the world. The data had been collected over 100 years by Jesuit priests starting in 1870 and kept safe at the private regional museum, Museo Maggiorino Borgatello. After NOAA digitized the data, it was placed in NOAA's free and unrestricted data base where it can be accessed by the international community. The data was extremely valuable to efforts by scientists like Dr. Gil Campo of CIRES at the University of Colorado because it added insight into global weather patterns.

2015 Update: In October 2015 IEDRO's Executive Director, Dr. Crouthamel, and the Director of Training, Ms. Cuppett, attended ACRE and WMO meetings at the University of Chile in Santiago. They visited the Direccion Meteorologica de Chile (DMC) and were graciously hosted by the Director, Dr. Guillermo Navarro Schlotterbeck and his staff. Dr. Crouthamel and Ms. Cuppett were impressed with DMC's hydrometeorological data archive and DMC's willingness to share data. They provided their impressions to the U.S. Embassy. The Science Officer of the U.S. Ambassador to Chile subsequently met with Dr. Navarro Schlotterbeck in December 2015 and expressed the appreciation of the United States for the Director's philosophy of sharing historic climate data. IEDRO is continuing to maintain contact with the DMC Director in the event that Chile intends to continue the data rescue and digitization process.

EL Salvador

Overview: In recent decades, mudslides have claimed many lives in El Salvador. An IEDRO Team visited the National Meteorological Service (NMHS) of El Salvador in 2009 and discovered that the NMHS has over 330,000 analog precipitation and other strip charts that need to be scanned and digitized. Most of these charts show detailed precipitation information which is critical to discover the volume of rain and the rate which will set off mudslides. The IEDRO Team returned to the US with several thousand strip charts which have been scanned at IEDRO Headquarters and await digitization using the IEDRO *Weather Wizards* program.

2015 Update: Summit Business Technologies continued its development of the *Weather Wizards* production version based on the beta test conducted in 2014. The beta test had digitized over 3000 precipitation charts from El Salvador.

Future activities: In 2016, IEDRO plans to make *Weather Wizards* digitization system fully operational. This will allow a precipitation chart to be digitized in one minute rather than the 30 minutes required to digitize a strip chart by hand. IEDRO also plans to use *Weather Wizards* to digitize El Salvador's temperature (thermograms), barometric pressure (barograms) and other observations.



Funding Status: Funding is needed to develop digital keying formats for the different types of meteorological forms rescued from El Salvador.

Project Advisement

Region I – Africa

Africa - Gambia, Malawi, Zambia

Climate Information for Resilient Development for Africa (CIRDA)

- Strengthening Climate Information and Early Warning Systems Projects Data Rescue Assessment
- Early Warning Systems Priority Data Rescue Project

Overview: In 2015, a representative of the United Nations Development Program (UNDP) contacted IEDRO regarding the rescue of climate data in Sierra Leone, Gambia, Uganda, Tanzania, Zambia and Malawi. UNDP was hoping to gain insights on the resources that will be needed. This project may far exceed available funds. Dr. Ted Allen, representing IEDRO and the International Research Institute for Climate and Society (IRI), visited Malawi in August to conduct an initial evaluation.

These UNDP funded projects are focused on specific parameters, stations and years of record. Less than 50,000 pages of records are involved and not the millions of records that exist in the NMHS archives.

Funding Status: IEDRO has provided preliminary cost estimates to UNDP.

Region II – Asia

Bangladesh

Overview: In December 2015, Dr. Ted Allen participated on a team that visited the Bangladesh Meteorological Department (BMD) for a data rescue scoping mission. The objective was to assess the amount of work and time that would be required for the BMD to meet their data rescue goals. The team estimated the amount of un-digitized paper observations. These observations are the foundation to address the primary BMD data rescue goal to support climate change and detection analysis.

Funding Status: Uncertain. International sources are being investigated.

Cambodia

Overview: In 2015, through Dr. Fiona Williamson, IEDRO received a request to determine how to best assist the Ministry of Water Resources and Hydrology, Phnom Penh, Cambodia in climate data rescue. The Ministry has a large quantity of hard copy original observational data in storage. Currently, it is not kept in any special conditions. Data is in the format of sub-daily terrestrial meteorological registers, and pilot

balloon observations. The data is entered by hand into standard templates. Observations include temperature, pressure, & humidity. IEDRO has requested more information about the volume of records to be rescued and has provided preliminary estimates of the processes involved and the costs of equipment and services.

Funding Status: Uncertain. International sources are being investigated.

Lao People's Democratic Republic

Overview: In 2015, also through Dr. Fiona Williamson, IEDRO received a request to determine how to best assist the Department of Meteorology and Hydrology (DMH) in Vientiane in climate data rescue. DMH has hard copy original observational data in storage which has not been kept in any special conditions. It is in the format of terrestrial meteorological registers and pilot balloon observations. There are also 16 different types of precipitation charts containing five different perimeters including temperature, pressure, humidity. The data is entered by hand into standard templates in French and in the local language. IEDRO has requested more information about the volume of records to be rescued and has provided preliminary estimates of the processes involved and the costs of equipment and services.

Funding Status: Uncertain. International sources are being investigated.

Region III – South America

Honduras and Nicaragua

Overview: In 2015, representatives of the Honduran and Nicaraguan meteorological services, the World Bank and IEDRO held initial discussions regarding data rescue projects in both countries. The parties expressed interest in proceeding and decided to continue the discussions in 2016.

Region IV – North and Central America and the Caribbean

United States

Overview: Blue Hill Observatory in Massachusetts, the oldest meteorological observatory in the United States, has requested IEDRO's perspectives on methods to get many years of historic surface observations rescued and digitized.

Region V – South Pacific

Australia

Overview: Australia's Bureau of Meteorology has imaged many thousands of historical hard copy climatological surface hourly and daily data records. BoM requested information from IEDRO on the *Weather Wizards* digitization process to include in its funding request.



Weather Wizards Application

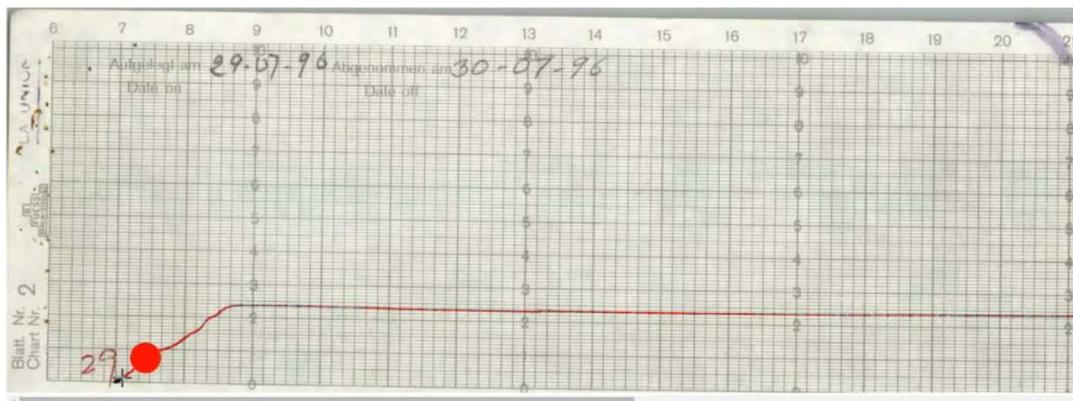
IEDRO, with the help and expertise of Summit Business Technologies, is creating a revolutionary web-based platform called *Weather Wizards*. By using the latest graphical technology and a standard web browser, *Weather Wizards* makes digitizing records much easier, more efficient and less expensive than traditional methods.

WeatherWizards
Saving Data, Saving Lives IEDRO.ORG

Users can convert analog ink lines on each strip chart by simply clicking on the rainfall trace to capture the relative data points. Wherever possible, intelligent processing is used to AUTOMATICALLY INTERPRET THE VALUES REPRESENTED BY THE LINES TO reduce the time needed to collect data. One chart, with practice, can be digitized in a fraction of the time needed in the past.

Multiple data validation techniques are also built into the platform. These accommodate collection efforts by a single trusted expert, groups of trained individuals, crowd-sourced communities, and citizen scientists from around the world.

IEDRO begins the digitization process by requesting that [National Meteorological and Hydrologic Services](#) throughout the world provide sample charts. Working together, we can ultimately get billions of detailed archived weather observations digitized and made available to the world for the benefit of all humanity. *Before they fade away, and are lost forever.*



Collaborators and Partners

IEDRO would like to thank our partners and collaborators for their continued support and dedication to data rescue and digitalization.

- *U.S. National Oceanic and Atmospheric Administration (NOAA)* has provided over \$300,000 in grants to IEDRO to establish DR&D programs in 14 developing countries, including seven in Africa.
- *U.S. Agency for International Development (USAID)*. IEDRO has received grants from USAID to develop the West Africa Climate Data Rescue and Digitization Facility within the African Centre of Meteorological Applications for Development (ACMAD) in Niamey, Niger.
- *World Meteorological Organization (WMO)* has partnered with IEDRO and currently administers IEDRO's current project to assist Uzbekistan's National Meteorological in preserving their historic hydrometeorological observations.
- *Atmospheric Circulation Reconstructions over the Earth (ACRE)*. IEDRO participates as a partner in the ACRE consortium of nine international meteorological organizations. The ACRE partners support hydro-meteorological data recovery projects around the world.
- *African Centre of Meteorological Applications for Development (ACMAD)*. ACMAD has scanned 215,000 of nearly 2,000,000 microfiche frames of hydrometeorological surface data from 48 African countries from the WMO administered DARE1 Program of the 1990s.
- *International Council for Science World Data System (ICSU-WDS)*. IEDRO is a Partner Member.
- *Climate Services Partnership (CSP)* is an informal coalition to improve the provision and development of climate services worldwide. IEDRO is one of the earliest members.
- *International Research Institute for Climate and Society at Columbia University*
- *Research Data Alliance (RDA)*. IEDRO is a partner with RDA in Research Data Sharing Without Borders.
- *World Bank (WB)* consults with IEDRO on data rescue and digitization programs.
- *United Nations Development Program (UNDP)* consults with IEDRO on data rescue and digitization.
- *Summit Business Technologies* is a significant supporter of IEDRO's work.



USAID
FROM THE AMERICAN PEOPLE



International Research Institute
for Climate and Society
EARTH INSTITUTE | COLUMBIA UNIVERSITY



Weather Wizards
Saving Data, Saving Lives IEDRO.ORG

Planned Budgets

IEDRO is a US-based, independent 501(C) (3) tax-exempt nonprofit organization and is funded primarily through projects¹ and donations.

IEDRO estimated 2016 Budget

	2014	2015	2016	2017
Income and Assets				
Assets				
Cash				
Opening Balance	25,300	4,000	22800	5000
Reserve	5,000	10,000	10000	10000
Dedicated funds	42,000	24,500	54890	
Income				
ACMAD Activities	63,000	67,406		
Donations & Misc. Income	5,500	5,646	5000	5000
Uzbekistan		119,272	60300	
Proposed Projects				65000
Total	140,800	230,823	152,990	85,000
Expenses and Costs				
Projects and Development				
Software Development	25,000	4,198	53,000	26,000
Project Activities	72,000	103,152	75,000	111,000
Scientific Application	500	2,000	7000	7000
Project Travel	3,000	1,083	25,000	21,000
	100,500	110,433	160,000	165,000
Administration				
Facilities and equipment				
Facilities and utilities	6,500	2,722	3000	7000
Equipment maintenance	1,500	150	1500	3000
General administration				
Books, Subscriptions. References	2,000	1,468	1500	2300
Postage and supplies	3,000	108	300	4500
Administrative services	9,000	10,204	10000	19000
	22,000	14,652	16,300	35,800
Outreach and Fund Raising				
Travel and meetings	6,500	965	4000	11500
Outreach services	5,500	8,092	9000	15000
	12,000	9,057	13,000	26,500
Total Expense	134,500	134,142	189,300	227,300

¹ USAID has enabled IEDRO to provide services to *African Centre of Meteorological Applications for Development*. The *World Meteorological Organization* provides funds to IEDRO for technical support to *Uzbekistan's Centre of Hydrometeorological Service*.

How You Can Help

IEDRO believes that rescued environmental data can reduce humankind's suffering and death more than any other endeavor. *To achieve our mission, we need your help...*

Build awareness... especially online

Do you have a big social network? Or a small network filled with big influencers? Help IEDRO create awareness.

- Share our website news releases, tweets, and other social media posts.
- Talk to local science educators and government officials about the importance of rescuing and digitizing old weather data.

Social media sharing tips.

- Tag VIPs in your shares & posts, such as local news agencies, television news reporters and environmental groups.
- Consider using hashtags such as *#ClimateChange #environment*.

Contribute financially

- IEDRO happily accepts **donations in any amount** at iedro.org/get-involved/donate/. You may contribute to our general fund, or you may designate that your donation go to a specific data rescue project. We are a 501 (C)(3) nonprofit corporation, so your donation will be tax deductible.
- Consider hosting a **silent auction or fundraiser** and making one larger donation in the name of your group!
- **Use the IEDRO link when you shop on Amazon.com!** This is one of our biggest sources of non-governmental funds! Here's the link you need: bit.ly/shop4iedro

Contribute your time and skills

IEDRO is a growing, yet close-knit, family of volunteers that bring widely diverse skillsets to the table. IEDRO is based out of Deale, MD but has volunteers all over the United States and across the globe who work together to rescue and digitize historic weather data before it's lost. With regular communication online and by phone, the IEDRO team works to achieve our mission, and, with many new projects upcoming, **we are welcoming new volunteers. We need help with everything from translation, communication and project management to fund raising and administrative support.** Contact IEDRO about volunteering at <http://iedro.org/get-involved/volunteer-application-form/>



Weather Wizards
Saving Data, Saving Lives IEDRO.ORG



Saving Data, Saving Lives

Contacting IEDRO

INTERNATIONAL ENVIRONMENTAL DATA RESCUE ORGANIZATION (IEDRO)

Board of Directors/Chief Scientists and Collaborators

Ms. Janet F. Sansone, Chair, Board of Directors

Dr. Geoff Love, Ph.D., Member, Board of Directors

Dr. Richard Crouthamel, D.Sc., Executive Director and Member Board of Directors

Dr. Sharon LeDuc, Ph.D. IEDRO's Chief Scientist

Dr. Teddy Allen, Ph.D. Director of Scientific Applications [affiliated with IRI]

Dr. Rob Allan, Ph.D. Member, IEDRO Advisory Council and Director, ACRE

Mr. Martin Munkhondya, Director, Malawi Centre for Climate Change and Environment Management

In addition to the above, IEDRO is supported by two dozen dedicated individuals throughout the world.

Headquarters

901 Main St Deale, MD 20751-9609 USA

Phone: 410-867-1124

Website: www.iedro.org

Director: Dr. Richard Crouthamel, IEDRO Executive Director

Email: r.crouthamel@IEDRO.org

Online

Website: www.iedro.org

Latest News & Press Releases: <http://iedro.org/news-articles/>

Twitter: <http://twitter.com/iedro>

LinkedIn: <http://www.linkedin.com/company/international-environmental-data-rescue-organization-iedro->

Amazon.Com Shopping Link: bit.ly/shop4iedro

Newsletter: <http://iedro.org/get-involved/subscribe/>

IEDRO is a US-based, independent 501(C) (3) tax-exempt nonprofit organization created in 2005



Weather Wizards
Saving Data, Saving Lives IEDRO.ORG