# Historic Hydrometeorological Data Most Useful to a User May Not Yet Be Available

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## **Data-Driven Climate Services**

- Before we can proceed with soliciting ideas from the user community as to how our climate services/applications can best benefit them, the user community must be educated:
  - in the data and applications that are <u>currently available</u>
  - in the data and applications that will soon be available
- Educating the user community is an <u>on-going dynamic</u> <u>process</u> that necessitates <u>constant dialogue</u> with the user community and the organizations with which they have regular contact.



Tanzania:

**PIBAL upper-air observations** 





## **IEDRO: Our Mission**

 Not only to locate, image and digitize historical environmental data from throughout the world...



...but also to educate the user communities on the uses of these data and the value-added products that can be derived from them.





#### Data Rescue & Digitization: Why It's So Critically Important

- National hydrometeorological services of many developing countries have millions of climate observations in their archives.
- Most are on deteriorating paper in poor storage areas.
- This data is critical for research in weather, climate change, water resources, public health and dozens of other areas; <u>but it is useless in its</u> <u>present undigitized format.</u>



Mozambique: Paper historic hydrometeorological records archive





## What the User Community Doesn't Know...

- What data are now available in digital format?
- What data are now available in paper format, awaiting digitization?
- What data may become available in the not too distant future?

- What can the users do with the current digitized data?
- What could the users do with additional digitized data?





#### **Historic Rainfall Data**

- In the mid 1980s, I visited Chitagong in Southeast Bangladesh and met a rice farmer and his family, wife, two teenage sons, father-in-law and twin girls about 10.
- He prepared for periodic droughts by saving 10% of each year's crop for the drought year. At the time of my visit, he had 50% of his annual need, saved.
- He expected a drought coming every 10 years.
- "Based on what?", asked I?
- "Based on my10 years farming in the Chitagong area." said he. "We have had one drought!"







#### **Historic Rainfall Data**

- I returned to Dhaka, the capital and spent two days going through about 45 years of paper rainfall data for the Chitagong area at the local NMHS.
- Based on <u>45 years</u> of rainfall data, major droughts occurred on average, every 7 years...not every 10. He had just been lucky.
- Statistically, to be reasonably certain of a return frequency of an event that occurs every 10 years, one needs 100 years of record. His family's future was based on 1/10 of the length of record needed.





#### **Historic Rainfall Data**

- Two years later, with only 70% of his annual rice need saved, another drought occurred wiping out his crop.
- Bangladesh had, at that time, no food bank, welfare, or any aid organizations that could have helped him.
- In my opinion, based on the culture of the society, the two twin 10 year old girls and probably the father-inlaw starved to death... all because he didn't know the true frequency of drought!







#### Historic Rainfall Data The Power of Data

- IF we imaged and digitized all the historic hydrometeorological data in the world and provided every one of the 1.8 BILLION subsistence farmers the true frequency of drought in their area...
- IF only one farmer in a thousand changed his/her planting or saving practices based on that data,,,
- 3,000,000 to 4,000,000 lives could be saved from starvation every year!







 A complete record Historic is formed when historic climate Data data and remote sensing data work together. and

For example...

- Rescued precipitation data from Niger for 1930 - 1979 was added to existing data.
- A significant trend was uncovered.

Remote Sensing

> The time series to the right shows monthly 50 40 precipitation from Niger (12.9, 18.7E) 30 from 1930-2010. The recent gridded estimates from the NASA GPCP product are highlighted in blue with historic station data in red. The significance of a complete historical record becomes apparent after only a few short seconds of

examination. Without the addition of the historical data (1930-1979), various trends and extremes are hidden. IFDR《

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1940 1950 1960 1970 Vear



#### Historic Temperature and Humidity Data Disease vectorization

- Yellow Fever, Dengue Fever, West Nile Virus, Malaria are carried by mosquitos.
- Records describing these epidemics extend back to the 1600's showing outbreaks and the speed and direction of the spread.
- It was thought that meteorological conditions played a significant role in the spread (vectorization) of these killers.
- Until recently those historic weather data were not available.







#### Historic Temperature and Humidity Data Disease vectorization

- With newly imaged and digitized historic weather data from developing countries dating back to the periods affected by these killer diseases, researchers can...
- Determine the most favorable weather conditions for the mosquito carriers.
- Public health officials, working with the local national meteorological services, can forecast where these ideal weather conditions will exist over the next several days.





#### Historic Temperature and Humidity Data Disease vectorization

- The mosquitos and the diseases they carry will head toward these ideal weather conditions.
- The public health officials, doctors and nurses and spraying equipment can arrive before the mosquitos.
- The spread of the disease will be stopped.
- Many people will not die!



(IRI)



## Detailed Rainfall Data Flash Floods and Mud Slides

- Floods kill more people world wide than the rest of all natural disasters combined.
- Many of the deaths are caused by flash floods and mud slides generated by intensive rainfall.
- Until the mid 1980s, most precipitation data was provided by weather observers who recorded amounts at synoptic times (every six hours).
- **Precipitation strip charts** provided <u>continuous</u> rainfall readings but were never digitized and just stored.



(IRI)



## Detailed Rainfall Data Flash Floods and Mud Slides



- These strip charts will soon provide the most comprehensive historic hydrometeorological data available.
- We estimate **between 100 and 150 million** of these charts throughout the world provide continuous readings of precipitation, temperature (thermograms), barometric pressure (barograms), relative humidity, sunshine, wind speed/direction, stream flow, tides, and other parameters.





### Detailed Rainfall Data Flash Floods and Mud Slides

- Until now, these strip charts required a data technician to manually examine each chart and copy down the parameter reading at 15 minute intervals...96 separate values...a 30 minute task.
- Since we estimate between 100 and 150 million charts exist, it would take 1000 technicians over 150 years to perform the digitization...an unrealistic situation.



IEDR Saving Data Saving Lives





# **Digitization: IEDRO's New Weather Wizards**



- IEDRO is creating a web application that allows anyone with a computer, an internet connection, and an interest in making a difference, to facilitate the rapid digitization of the data.
  - It's as simple as clicking the visual data points on the images.
- Keyers have easy access to data in need of digitization through IEDRO's cloudhosted solution.
- Quality control of data input is assured through multiple keyers.



#### WeatherWizards Saving Data, Saving Lives IEDRO.ORG

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#### **IEDRO: History**



<u>Uzbekistan</u>: from left to right: Salamat Erejepov (Uzhydromet) Teddy Allen (IEDRO) Dr. Tania Marinova (Bulgaria NMHS) Peer Hechler (World Meteorological Org.)

- Founded in 2005 as a U.S. based 501(c)(3), nonprofit
- Funded by contributions, grants and government awards
- 24 Active Volunteers in the US and Canada
- Data Rescue Projects over the past decade in:
  - <u>Africa:</u> (Kenya, Malawi, Mozambique, Niger, Senegal, Tanzania and Zambia)
  - <u>Central and South America and the Caribbean</u>: (Bolivia, Chile, Dominican Republic, El Salvador, Paraguay, Uruguay)
  - <u>Asia</u>: (Uzbekistan) New Project





#### **IEDRO: Partners**

- World Meteorological Organization (WMO)
- National Oceanic and Atmospheric Administration (NOAA)
- U.S. Agency for International Development (USAID)
- African Centre of Meteorological Applications for Development (ACMAD)
- Atmospheric Circulation Reconstructions over the Earth (ACRE)
- Climate Services Partnership (CSP)
- Columbia University's International Research Institute for Climate and Society (IRI)







# Questions?







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