



Information for Primary Investigators

Natural Environment Research Council (NERC) Future Climate for Africa (FCFA) Research Programme

- IEDRO offers to partner with organizations applying to become Primary Investigators (PI) in NERC's FCFA Research Programme
 - IEDRO's role would be as a Sub-Contractor supporting the Primary Investigator by providing Data Rescue and Digitization (DR&D) services
 - The following information is:
 - offered as a resource to aid in the development of proposals
 - based on sections of the **Announcement of Opportunity (AoO) Future Climate for Africa**
 - For further information, please contact Dr. Richard Crouthamel, IEDRO Executive Director, at r.crouthamel@IEDRO.org or by phone at 1.410.867.1124. Website: www.iedro.org
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AoO Section 3.2.2: **Proposals with sub-Saharan African participation** are encouraged

Relevant information about IEDRO:

IEDRO has instituted data rescue and digitization (DR&D) programs in Kenya, Malawi, Mozambique, Niger, Senegal, Tanzania and Zambia. IEDRO currently partners with the African Centre of Meteorological Application for Development (ACMAD) in data rescue and digitization for forty-eight African countries. ACMAD's mission is the provision of weather and climate information and for the promotion of sustainable development of Africa (notably within the context of national strategies for poverty eradication), in the fields of agriculture, water resources, health, public safety and renewable energy. ACMAD was created in 1987 by the Conference of Ministers of the United Nations Economic Commission for Africa (UNECA) and the World Meteorological Organisation (WMO).

IEDRO through USAID funding is currently rescuing approx. 2 million pages of historic hydrometeorological data from 48 African countries through its partnership with ACMAD. The data is placed in an open and unrestricted database at the National Climatic Data Center (NCDC) at the U.S. National Oceanic and Atmospheric Administration (NOAA).

AoO Section 5.5.2: **Track Record** - This section should include a **brief outline of the organisations** involved in the consortium, as named on the component applications

Relevant information about IEDRO:

IEDRO's mission is to locate, rescue, image, digitize and share historic climate data enabling developing countries to adapt and mitigate the effects of climate change. IEDRO recovers and digitizes historical environmental data that are at risk of disintegrating or being discarded, particularly in developing countries. These data provide an opportunity to predict long-range weather patterns more accurately, and can be used by tools of meteorological professionals and others to:

- Better understand the nature and extent of global warming and climate change.
- Alleviate famine and starvation by improving planning.
- Provide data to support more accurate lifesaving forecasts of floods and mud slides.
- Understand effects of weather and climate on the spread of airborne and insect-borne disease.
- Improve design parameters for construction and reinforcement of buildings, bridges, and other public services to withstand severe weather.

AoO Section 5.5.21: **Track Record**. This section "should include **details on the nature of the organisations**

named (i.e. university, research institute, NGO, etc).”

Relevant information about IEDRO:

IEDRO's efforts are supported and endorsed by:

- 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 a \$100,000 grant with 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). IEDRO has a memorandum of understanding with WMO and participates in WMO conferences and workshops. WMO has provided grants to IEDRO totaling \$50,000 and provides funds for IEDRO DR&D experts to participate in those conferences and workshops.
- 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 is currently scanning precipitation data from Malawi. It is being sent to IEDRO for digitization
- International Council for Science (ICSU) has a letter of agreement with IEDRO
- 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.
- Florida State University's Department of Earth, Ocean, and Atmospheric Science.
- Columbia University's International Research Institute for Climate and Society

AoO Section 5.5.2: **Track Record - For non-UK organisations** or UK organisations not normally eligible for Research Council funding (see <http://www.rcuk.ac.uk/funding/eligibilityforrcs/> for guidance), the track record should also include brief information and assurances of the organisational and fiduciary competencies of the organisation.

Relevant information about IEDRO:

IEDRO has been in existence for ten years with an average revenue base of \$100K. IEDRO's fiduciary competency may be attested to by NOAA, WMO, and USAID

AoO Section 5.5.2: **Track Record** - Indicate where your **previous work** has contributed to progressing the field of research, and/or providing impact, evidenced by including the top 3 – 5 relevant publications per PI, Co-PI and Co-I.

Relevant information about IEDRO:

Examples of IEDRO's contribution to progressing the field of research include:

- The Twentieth Century Reanalysis Project. Quarterly J. Roy. Meteorol. Soc., 137, 1-28. DOI: 10.1002/qj.776. Compo, G.P., ... Crouthamel, R.I. (IEDRO Executive Director), ... et al
- The onset of the Caribbean early rainfall season and its mid-summer cessation: dynamics, prediction, and applications. Doctoral dissertation. T. Allen (IEDRO Director of Scientific Applications).
- Dryland Climatology, S. Nicolson, Cambridge University Press, October 2011

AoO Section 5.5.3: **Description of Proposed Research - Underlying rationale**, scientific, technological, social and developmental issues to be addressed. This should cover the research question and objectives.

Relevant information about IEDRO:

IEDRO's mission is to locate, rescue, image, digitize and share historic climate data enabling developing countries to adapt and mitigate the effects of climate change. IEDRO recovers and digitizes historical environmental data that are at risk of disintegrating or being discarded, particularly in developing countries. The historic hydrometeorological data rescued and digitized by IEDRO is the foundation of upon which research may be created and by which technological, social and developmental issues can be addressed. The data obtained by IEDRO can be placed on open and unrestricted databases for use by all researchers. The data also may be applied to various purposes including climate change, disease vector control, agriculture, water management, flood and mudslide prediction, and disaster preparedness.

AoO Section 5.5.3: **Methodology and approach**; this should include methods and location of data collection (as appropriate), and details on the use and manipulation of data... Any associated collaborations, partnerships

or co-funding (either proposed or secured) that may be used in the project... For proposals requiring access to data from elsewhere applicants are asked to provide evidence in their proposal of agreed access.

Relevant information about IEDRO:

IEDRO's methodology

1. Negotiation: In consultation with IEDRO, the Primary Investigator conducts initial negotiations with the directors of the National Meteorological and Hydrologic Services (NMHSs) for the African countries chosen for the research programme. Agreement to be reached on the following points with the NMHS regarding DR&D: estimate of the volume of records to be rescued and imaged; number of NMHS personnel to be hired for DR&D processes; salaries of the DR&D personnel; and the timeframe in which the data rescue and scanning work is to be completed.
2. IEDRO sends a team of two or more people experienced in DR&D to the NMHSs to assist them to begin to locate, organize, inventory, and safely store climate data for imaging and to train NMHS personnel in data rescue processes.
3. IEDRO sends one DR&D expert, if necessary, to check on progress in the data rescue phase.
4. When rescued data are compiled in one location, sorted, inventoried, and boxed, the IEDRO DR&D team of two returns on a second visit with computers, digital cameras, camera stands, and/or scanners to train NMHS personnel to scan analog strip charts (precipitation charts, barograms, thermograms, etc.) and to photograph hydrometeorological alphanumeric records.
5. IEDRO sends one person, if necessary, to check on progress in the scanning phase.
6. Photographed and scanned images are sent to IEDRO via the Internet. The digitization process takes place using crowd-sourcing software developed by IEDRO to digitize historic analog strip charts and alphanumeric hydrometeorological data.
 - a. Volunteers are recruited in the host country, in the United States, and in other countries to conduct the digitization using the crowd-sourcing software over the internet. This is similar to the interactive projects run by galaxyzoo.org and oldweather.org.
7. The digitized data are sent to the Primary Investigator, to the host country and to scientific databases for free and unrestricted use by the world scientists. Current candidate databases include: the National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC); and the Maprooms at the International Research Institute for Climate and Society (IRI) of Columbia University.

Major Assumption: With training from IEDRO, the NMHSs of each country will complete both the data rescue and data imaging phases of the project within the negotiated timeframe.

AoO Section 5.6.1: **Data Management Plan – Metadata** - will you document discovery (what, where, when, why, who) and descriptive (how collected, how processed, how stored, how linked) metadata?

Relevant information about IEDRO:

All rescued data is documented for location of observation site, station number and/or latitude, longitude, elevation (if available), time of imaging, and data owner.

AoO Section 5.6.1: **Data Management Plan – Data storage** – have you access to enough storage and backup? Will you need specialist help with database design?

Relevant information about IEDRO:

Data that is digitized will be stored at the facility designated by the Primary Investigator, at NCDC or another world data center, and at IEDRO for back-up storage.

AoO Section 5.6.1: **Data Management Plan – Data quality** - will there be an earmarked data manager within the team, what data quality checks will be used, will student data be integrated in the data plan?

Relevant information about IEDRO:

A data manager will be earmarked within the IEDRO team. Data quality is based on multiple keyed entries for each data stream using crowd sourcing techniques. Student data is not applicable to the IEDRO portion of this effort.

AoO Section 5.6.1: **Data Management Plan – Ethical and access issues** – are there special data security or licensing issues and how will you address these?

Relevant information about IEDRO:

It is anticipated that the Primary Investigator will obtain the country's permission for open access to data for the programme's researchers. It is desirable, but not necessary, from the IEDRO point of view for the country to provide permission for free and open access to data for all researchers beyond the programme.

AoO Section 5.6.3: **Data Management Plan – Existing datasets** to be used by the project (comment on any restrictions on reuse)

Relevant information about IEDRO:

IEDRO will assist in locating existing datasets. All datasets that IEDRO provides will be made available in free and open access databases unless restricted by agreement between the Primary Investigator and the country.

AoO Section 5.6.4: **Data Management Plan – Planned release dates** of the data (data should normally be deposited within a data centre within 2 years of creation), and identification of the possible user types who may want to use the data you produce.

Relevant information about IEDRO:

For the DR&D portion of the programme, the timeframe depends on the volume of data to be rescued and imaged. It is estimated that, in general, 6 months are needed for the timeframe beginning after initial negotiations until all images have been sent to IEDRO for digitization. The timeframe needed for digitization (with crowd-sourcing) depends on volume and could take 1 to 2 months or more. Multiple teams could be provided depending on the requirements of the Primary Investigator. Existing datasets are another variable to consider operationally and financially.

AoO Section 5.7: **Justification of Resources** – This should state the full cost of the project and explain why the requested resources are needed, including identifying why the proposal presents value for money. It should include justification for all Directly Incurred Costs, Investigator effort, use of pool staff resources and any access to shared facilities and equipment being sought... In short, you must demonstrate why you are requesting the funds you are, and how they will be used to deliver the cutting edge research with impact that you are proposing.

Relevant information about IEDRO:

All costs are approximations. Estimates of cost will be finalized when the countries have been selected and the DR&D needs have been specified. The state of the country's inventory will be a major factor in determining the costs involved in setting up the DR&D project. In IEDRO's experience, the following are average costs.

- Average cost for a team of two people conducting a trip to an African country for one week: approximately £6,500 to £8,000, depending up on the country.
 - Cost would be adjusted for trips of longer duration
 - Two trips would be required
 - The objective of the first trip is to initiate the data rescue process. Equipment costs include acid-free boxes and inventory supplies.
 - The objective of the second trip is to set up equipment and initiate the imaging process. Equipment costs include laptops and/or stand-alone computers purchased in-country, digital cameras, scanning equipment and camera stands.
 - It is anticipated that no equipment items will exceed £10,000 (including VAT).
- Average cost for one person for one trip for a duration of one week: £3,500.
 - Two trips will be necessary
 - The objective of first trip, if necessary as a follow-up, is to check on progress of data rescue effort.
 - The objective of the second trip, if necessary as a follow-up, is to check on progress of the imaging effort.
- Cost anticipated for the digitization phase would be staff time to administer the crowd-sourcing effort in support of this proposal: £18,000
- Cost, on average, to develop digitization format for each hydro-meteorological form is £300 per format. It is anticipated there may be between 10 and 20 forms per country

AoO Section 5.8.3: **Demonstrating the Pathways to Impact** – Who are the intended **beneficiaries** of the research? These should include at least a description of the intended ultimate beneficiaries of poor people in Low and Lower-Middle Income Countries as well as the intermediate direct users of research and models (including, for example, the FCFA Regional Consortia)

Relevant information about IEDRO:

The initial beneficiaries of the data that IEDRO rescues and digitizes are scientists. The data is made available to them in free and unrestricted databases in a comma-delimited format, easily ingested into scientific applications. They, in turn, use the data in environmental and human health applications addressing

climate change, disease vector control, agriculture, water management, flood and mudslide prediction, and disaster preparedness. It is important to note that all data located, imaged, digitized, and made available to scientists, educators and researchers worldwide has far-reaching positive impact to all humanity well beyond the scope of any individual research proposal and well in excess of the funding required to obtain, digitize and distribute these data.

AoO Section 5.8.5: **Demonstrating the Pathways to Impact** – It is important that applicants also consider tracking of their impacts and outcomes with the appropriate **metrics** as part of the Pathways to Impact plan.

Relevant information about IEDRO:

IEDRO develops metrics suitable to each project. Examples:

- Rescued data from each country will be judged to be accurate, complete, and ready for imaging by at least 2 scientists prominent in climate services.
- Imaged data from each country will be considered as accurately scanned or photographed and ready for digitization by at least 2 scientists prominent in climate services

AoO Section 5.9.1: **CVs** – CVs for all named research staff: PIs, Co-Is, Researcher Co-Is, named Researchers and Visiting Researchers (up to 2 sides A4 for each CV, and should include current and previous positions, key publications and research funding obtained).

Relevant information about IEDRO:

As a candidate to be a Sub-Contractor, IEDRO is providing these CVs for informational purposes:

Richard I. Crouthamel, D.Sc.

- Founder and Executive Director of IEDRO
- 32 years NOAA/National Weather Service scientist (meteorologist) and international program/project manager for government and private industry
- Professional work in over 75 countries
- Experienced in bilateral negotiations with foreign national meteorological and hydrologic services (NMHS)
- Member American Meteorological Society
- Liaison with the World Meteorological Organization
- D.Sc. Environmental Management
- International Programs Leader – local Rotary International

Teddy L. Allen

- 10 years using climate applications; lab and field
- Active with regional climate research
- Proficient in remote sensing, computational data analysis and GIS
- 5 years managing employment teams
- Published in a wide array of scientific journals
- Received award from Center for Latin American Studies for Graduate Student Field Research
- Ph.D., Meteorology, The University of Miami, expected 2013
- Multi-lingual

Sharon LeDuc, Ph.D.

- 36 years with U.S. National Oceanic & Atmospheric Administration (NOAA)
- 14 years as manager/supervisor – former Deputy Director – NOAA's National Climatic Data Center
- College adjunct at six universities
- Research in climate, applied meteorology and air quality
- Experience rescuing weather data in Sahelian Africa
- Speaking experience in academic, civic, government, international and tutorial settings
- Experience and understanding of use of satellite information
- Ph.D., Statistics, University of Missouri, Columbia, MO, 1971