

The African Centres for Lightning and Electromagnetics Network (ACLENet) – Ten Years of Service. What Do the Next Ten Years Hold?

Mary Ann Cooper, MD
ACLENet Managing Director,
President, and Co-Founder
Professor Emerita, Univ IL @
Chicago, River Forest, IL U.S.A.
macooper@uic.edu

Richard Tushemereirwe,
ACLENet Founder, Board of
Directors
Los Angeles, CA, U.S.A.

Dr. Chandima Gomes, ACLENet
Co-Founder, and Professor
University of Witwatersrand,
SOUTH AFRICA

Ronald L. Holle, ACLENet Ex-
ecutive Committee and Holle Me-
teorology & Photography, Oro
Valley, AZ, U.S.A.

Dr. Charles Tony Mukasa Lu-
sambu, ACLENet Board of Di-

rectors and Executive Committee,
Kampala, UGANDA

Mr. Barnabas Akantambira,
ACLENet Executive Committee
and Country Coordinator, Kam-
pala, UGANDA

Dr. Daile Zhang, ACLENet
Board of Directors, University of
Maryland, College Park, MD,
USA

Abstract

The African Centres for Lightning and Electromagnetics Network (ACLENet), founded in 2014 and dedicated to reducing deaths, injuries, and property damage from lightning across Africa, reports on its first ten years of service and previews goals and projects for the next ten years.

1 Introduction and Brief History

The Centre for Science and Technology of the Non-Aligned and Other Developing Countries (NAM S&T) is well known in the developing world for curating meetings on topics that are chosen to be of relevance to their members. At a 2011 NAM S&T conference on lightning protection in Kathmandu attended by Mary Ann Cooper and Richard Tushemereirwe, Senior Science Adviser to the President of Uganda, Tushemereirwe reported that more than 75 Ugandans had lost their lives to lightning in the preceding months.

Determined to address this issue, he returned to Uganda and, with the assistance of contacts made at the Nepal meeting, organized another NAM S&T lightning meeting in 2013 in Uganda sponsored by the Uganda Broadcasting Corporation (UBC) and Earth Networks. During this gathering, participants recognized the urgent need for a comprehensive organization to address lightning-related injuries, fatalities, and property damage in Africa. As a result, the African Centres for Lightning and Electromagnetics Network (ACLENet) was established in 2014, incorporated in both the United States (US) and Uganda in 2016, and obtained nonprofit 501(c)3 status in the United States [1]

ACLENet was originally conceived as a network of national and regional centres across Africa that would address lightning injury prevention, safety education at all

levels, and improvement of lightning protection across Africa by adoption of internationally recognized standards and training of engineers, architects, and installers. A governing council comprised of representatives from each centre was planned.

Activity began in Uganda. While linkages and inquiries have come from several other countries over the last ten years, original expectations exceeded pragmatic realities, and, to date, no centres in other countries have remained viable despite some efforts.

2 ACLENet Activities

Lightning safety and injury prevention is a laudable goal, but where to start when there are few precedents and no non-US nonprofits to model nor mentor organizations to guide ACLENet?

2.1 School Protection Program

2.1.1 Design and Installation of Lightning Protection Systems (LPS) at Schools

Due to the alarming frequency of deaths and injuries occurring at schools in our early research, ACLENet decided to begin by protecting schools from lightning [2, 3]. A challenge was issued to the international lightning community at ICLP 2014 in Shanghai to focus on the protection of school children. Responding to the call, the

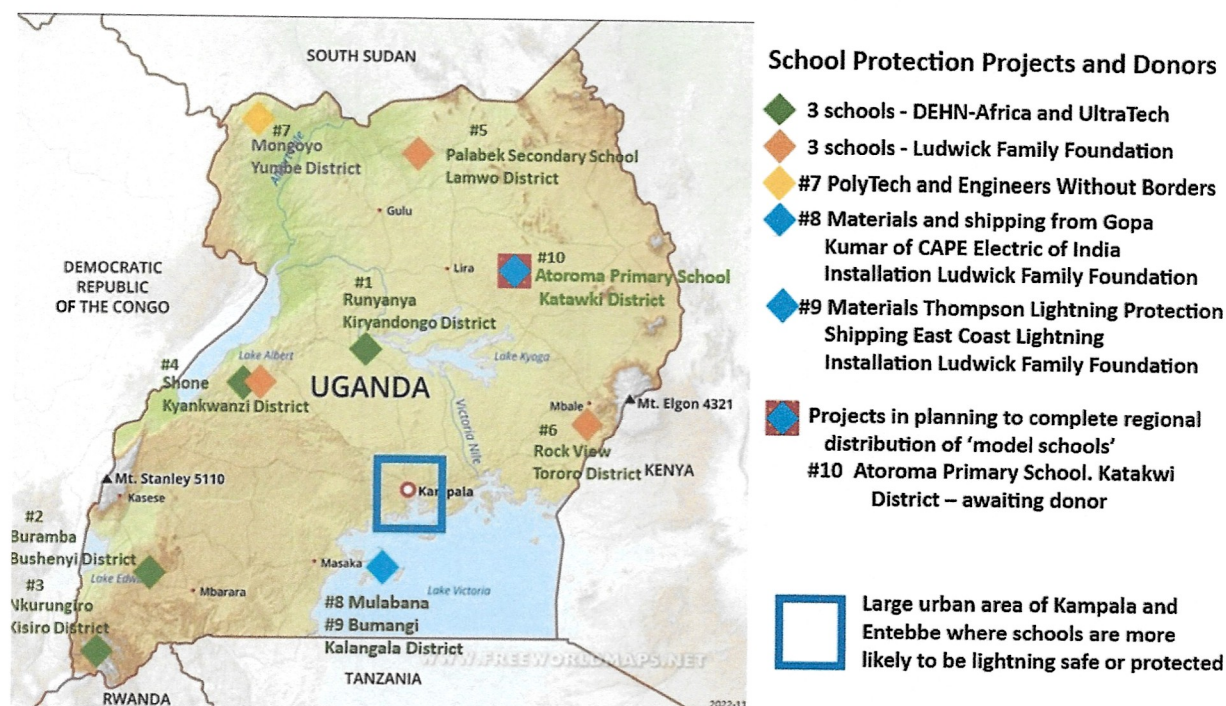


Figure 1 Schools in Uganda with lightning protection systems installed by ACLENet

German based lightning protection company DEHN, in collaboration with DEHN-Africa, took the initiative. They provided designs and materials for safeguarding three schools and also conducted training programs on lightning protection and installations in 2016-17 for our staff and other government employees (Figure 1).

Following receipt of a large grant from the Ludwick Family Foundation in 2018, the Lightning Protection Working Group (LPWG) was formed comprised of recognized lightning protection experts from South Africa, the USA, and other countries along with some of ACLENet's Ugandan staff and volunteers. The LPWG designed LPS for three more schools, installed in 2019 and 2020. A donation from Polytech and Engineers w/o Borders in The Netherlands in 2021 funded design and installation at a seventh school. Currently, donors have volunteered materials for two more schools on Lake Victoria Island with 2024 funding from the Ludwick Family Foundation to help with other LPS [4] (Figure 1).

To date, over 12,000 students, staff and their families have been protected.

ACLENet regularly receives requests from other nonprofit organizations, head teachers, and others to protect their schools. We always offer design assistance but, unfortunately, ACLENet does not have the funds to protect all of these schools.

2.1.2 Maintenance and Security of School LPS

Periodically, ACLENet travels to each of the schools to assess the integrity of the LPS and do simple repairs, parts

inventory permitting. In the 2023 surveys, the first three schools were found to have significant damage plus additions of buildings or other structural changes. The Ludwick grant will also fund some of these repairs.

Security and maintenance of the school LPS has become a significant problem. To decrease vandalism, ACLENet does not use copper on any installations, but simple weathering and playful school children can do enough damage to make the LPS ineffective.

ACLENet is combatting damage to installed LPS in two ways:

- With the more recently installed schools, ACLENet has taught designated local teachers and parents to conduct periodic visual inspections of their school LPS and report any damage to ACLENet staff. After consultation, simple repairs can be done by these persons. With subsequent visits, we will teach all schools to do inspections.
- ACLENet is working with each school district where we have installed LPS to gift the LPS to the district and form a partnership where they are responsible for the security and maintenance while ACLENet continues to provide periodic testing of the LPS integrity and advice on any needed repairs or modifications for new buildings, or other modifications.

2.2 Lightning Safety Education

Over the past ten years, a number of lightning safety education strategies have been tried including newspaper inserts, public safety announcements on television and radio, staff and volunteer training, use of social media platforms, and webinars [4]. The first two are expensive. All five suffer from inability to assess the effects on the audience.

2.2.1 Monthly Newsletter

Since 2018, The African Flash has been published and circulated by email to an international audience of nearly 2500 readers and is then posted online on ACLENet's website. This free monthly newsletter announces accomplishments and new programs, covers topics of concern or particular interest, discusses common lightning myths, and announces all of the reports of lightning incidents collected during the past month. It is currently distributed in English, French, Spanish, Portuguese, Arabic, and we are searching for translator-volunteers for Eswahili and the more frequently used tribal and heritage languages.

The newsletter educates Ugandans and other African subscribers about lightning and educates the larger international readership about lightning risks and incidents in Africa. It also serves as a fundraiser and communication to ACLENet's donors [5].

2.2.2 National Lightning Safety Advocacy Team

With the goal that local people should be equipped to run their own lightning safety programs, a growing team of lightning safety advocates and concerned citizen volunteers has been recruited in Uganda. They are eager to reach out to their home districts across Uganda to teach lightning safety, and ACLENet is currently developing educational materials and doing training webinars in lightning that are also posted on ACLENet's YouTube channel for viewing as new members are recruited.

2.2.3 Education at the District Level

As of 2024, there are 135 local governance districts in Uganda. When our teams visit the districts in Uganda where we have installed LPS to assess school maintenance needs and do repairs, we are finding the district officials fervently asking for education about lightning and lightning safety for themselves and their communities, believing that education is the key to saving the lives of their citizens. ACLENet is currently formulating plans to combine educational seminars with maintenance and other periodic visits to the districts where we have protected schools. The aim is to increase awareness, teach injury avoidance behaviors, and motivate district officials and parent organizations to lobby and work together to provide lightning safety systems at all schools.

In many parts of Africa, myths, superstitions, and misconceptions about lightning, how it is formed, and how lightning incidents happen play a large role in how people understand and react to lightning. Some of these include the color of clothing worn, witches being able to command lightning, the mineral content of the earth, and even spirits or punishment from God for sins. At nearly every meeting, ACLENet is challenged to address these with officials, parents, teachers, and the media, gradually educating and changing perceptions.

2.2.3 Education at the School Level and Development of Disaster Prevention Responsibilities

Schools and local communities are hungry for lightning safety education, and ACLENet is developing education programs with a few pilot districts.

Currently, all seven schools that ACLENet has protected are forming school disaster management teams consisting of nine members including learners, teachers, and parents. These committees will be responsible for the visual inspection of the LPS at their school, reporting to the district disaster committees. ACLENet staff will check with the districts they have been assigned to assure compliance, answer questions and report to ACLENet country coordinator at monthly staff meetings.

It is hoped that the currently nascent district disaster committees will use this impetus to become more active.

2.3 Research

2.3.1 Demographic Research on Lightning Injuries in Africa

Ron Holle, long known for his demographic research on lightning injuries, has applied his efforts to Uganda and other African countries to produce a number of papers that ACLENet has used for decision making and in our work with the government of Uganda [3, 6-14].

2.3.2 Database of Lightning Incident Reports for Africa

An international team of volunteers and citizen reporters from across Africa have helped ACLENet assemble the largest publicly available database on lightning injuries and incidents in Africa which is discussed in another ICLP2024 paper [15].

2.3.3 Investigation of Lightning Mass Casualty Incidents

When funds allow or can be raised with special appeals, ACLENet sends an investigative team to the scene of larger lightning casualty incidents in Uganda to investigate both the scene, interview witnesses, document the survivors and their injuries, and assess the effects to the community. To date, two investigations have been done and reported to the international lightning community [16, 17].

2.3.4 Reporting of Lightning Protection Challenges and Solutions Developed in Uganda

To design LPS for multiple schools in Uganda, volunteers from around the world formed ACLENet's Lightning Protection Working Group (LPWG). The LPWG has encountered many challenges but has striven to formulate creative and pragmatic solutions that are still consistent with international standards. Some of these have been reported to the international community and LPWG members will undoubtedly use their experience to help develop standards that are more pragmatic and affordable for the developing world [18, 19].

2.4 Work with the Ugandan Government

Over ACLENet's history, we have met with government sectors at many different levels to promote lightning safety and the adoption of international lightning protection standards, encouraging and arranging discounted online LP training for some, gathering advocates, and learning of different concerns. In 2022, a Memorandum of Understanding was signed between ACLENet and the Office of the Prime Minister (OPM) agreeing on a partnership to decrease lightning injuries and deaths with education, protection of schools, and other measures.

Uganda is one of forty-four signatories to the UN Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030 [20].

In fulfillment of the Sendai Framework, Uganda's Ministry of Disaster Preparedness and Refugees in the OPM has constituted Disaster Management Committees (DMC) at the district level. Currently, this is an honorific public service without a salary. Unfortunately for lightning injury prevention, a combination of lack of pay and lack of education in lightning science creates a situation where these committees remain ineffective with no impact on the communities they were appointed to serve. ACLENet hopes to alleviate this situation by delivering appropriate training packages to the local leaders who have been appointed to serve on these committees.

2.5 Consultations across Africa

Over the last decade, ACLENet has become recognized as a lightning safety and protection resource across Africa receiving requests for consultations, LP design assistance, and development of safety plans from many parties. Some of these include:

- St Paul's church, Kenya
- Maisha Mema, a medical clinic in Tanzania
- A Dutch nonprofit hospital, primary and secondary school complex in the Democratic Republic of the Congo
- A large nonprofit private school organization in Uganda
- A modern, full-service hospital in Madagascar

- The Wood Foundation for tea plantation worker safety in Rwanda

As noted in the school protection section, 2.1.1, ACLENet has received many requests for protection of schools in Uganda and other countries but does not have the funds to help.

2.6 Mentoring of Other Lightning Safety Networks

In the last four years, two organizations modelled after ACLENet have been founded and incorporated on other continents, the South Asian Lightning Network (SALNet) and the Latin American Lightning and Education Network (LALENet) [21]. Other programs in Brazil and the Caribbean have started.

3 ACLENet – the Next Ten Years

ACLENet has a track record in Uganda for lightning safety advocacy including high quality LPS at schools where there have been injuries in the past. We have signed a partnership agreement with the Office of the Prime Minister to continue to provide this work along with education and lightning injury prevention across Uganda. Over this tenth year of activity, ACLENet is taking the opportunity to review the activities that have been effective and to assess goals and priorities for the next ten years.

3.1 Building a Strong Board of Directors

Strong leadership is needed to provide management and vision for ACLENet's future. This includes not only for programmatic decisions, but for developing sustainable funding sources and a Board of Directors with diversified skills, experience with nonprofit management, and imagination. Over 2024 and 2025, ACLENet is actively seeking nominations to the Board as well as consulting with established nonprofits and other advisers for advice and to establish best practices.

3.2 Renaming and Rebranding

As an outward sign of commitment to injury prevention and education, ACLENet's name has been refreshed to The African Centres for Lightning Education Network with a new logo that more clearly shows our involvement in Africa (Figure 2).

3.3 Building a Sustainable Funding Base

For the first decade of its operation, ACLENet has been supported by faithful donors, grants from family foundations, and volunteers from around the world. However, to thrive, it must build a sustainable funding base. ACLENet is exploring corporate sponsorships and other funding strategies.

3.4 Work with Ugandan Government

ACLENet continues to work with many sectors of the



Figure 2 New ACLENet logo reflects name change and commitment to lightning injury prevention education at all levels.

Uganda government including disaster prevention, education, energy, bureau of standards, and others to improve building standards, lightning protection system designs and installations, and behavioural education to decrease lightning injuries. Additionally, we plan to build better reporting systems so that deaths and injuries can be better documented and addressed and monitored.

3.5 Adoption of Lightning Protection Standards

Uganda is an IEC Associate member country but is not a member of IEC TC 81 (Lightning Protection Technical Committee). ACLENet will continue to work towards adoption, implementation, and enforcement of IEC standards with education of LP professionals across Africa.

3.6 Education and District Involvement

ACLENet is fostering collaboration between recognized lightning safety educators, Ugandan educators, and the national lightning safety advocacy team to modify available teaching tools to the Ugandan audience and will include common myths and misconceptions about lightning [22].

The Ugandan constitution recognizes fifty-six indigenous languages. Twenty-three have established Language Boards. ACLENet hopes to form relationships with these to assist with translation to the local languages which are more commonly spoken in rural Uganda.

ACLENet plans to continue development of lightning science and safety educational materials that address the African needs and languages as well as work with the media to spread lightning safety information. With what will be learned from the pilot programs in the first districts, we plan to use the national advocacy team to reach out to other parts of Uganda including the teams' home districts.

3.7 Research

ACLENet is currently involved in several research projects with international partners. ACLENet welcomes all proposals that will contribute to knowledge of lightning injuries and help to decrease deaths and injuries from lightning across Africa.

3.8 Recruitment of Other Centres in Africa

ACLENet was founded with the aim of forming a network of national and regional centres across Africa dedicated to decreasing deaths, injuries, and property damage from lightning. We have not lost that vision but, based on our experience in Uganda, we now realize this will take much longer than originally envisioned. In 2015 another country began to be involved but soon fell into relative inactivity for lack of funding and a diverse, strong leadership team. A strong advocate in another country is eager to begin, but he lacks funding, colleagues, and available time from his regular work.

4 Conclusion

ACLENet, the first organization of its kind, has survived, even prospered in its first ten years of operation. Similar multinational lightning injury prevention and education organizations have emerged on two other continents. It has achieved a good track record in Uganda and recognition throughout Africa and much of the world.

To continue to prosper in the next decade, ACLENet requires strong leadership, stable funding, and partnerships with other nonprofits and district and national governments where it operates. To meet its original vision of changing lightning risk across Africa, it needs to find a way to nurture and encourage similar organizations in other African countries and regions.

The goal is one that will take many years, likely decades, to bring full knowledge and understanding of lightning to African residents, educators, businesses, scientific organizations, government entities and lightning protection purveyors. While this is a large task, ACLENet strives to accelerate the recognition of lightning risk and injury prevention on the African continent sooner rather than later.

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