Navigating Paths: A Geophysicist's Journey with the TWAS-CSIR Fellowship

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Becoming an expert in the siting of a nuclear power plant was an unexpected journey facilitated by the prestigious Council for Scientific and Industrial Research (CSIR) India and The World Academy for Sciences (TWAS) Italy fellowship awarded in 2013. This PhD fellowship provided me with the opportunity to pursue advanced research in India for four years.

Embarking on the TWAS-CSIR PhD Fellowship marked a transformative chapter in my professional odyssey, unveiling avenues for skill acquisition, network expansion, and breakthrough discoveries. Reflecting on my trajectory, I am compelled to recount the serendipitous moments and formidable challenges that shaped my journey.

The fellowship provided a platform for the exchange of knowledge, expertise, and resources, leading to significant breakthroughs in uncovering the potential and adaptability of a geophysicist within the Center for Energy Research and Development (CERD) and, by extension, the activities of the International Atomic Energy Agency (IAEA). My understanding of the roles and capabilities of a geophysicist within my home institution in Nigeria was serendipitously revealed during the experimentation processes of my PhD research project (Figure 1). This exploration illuminated the profound impact geophysicists can have on the fundamentals of nuclear power plant siting and their role as earthquake seismologists/geophysicists in the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) mandate.

A  B 

Figure 1. Experimental studies with the research team in India (A), while the instructor demonstrates using Multichannel Analysis of Surface Wave equipment (B)

Having had the privilege of benefiting from one of the esteemed TWAS fellowships, it is incumbent upon me to delineate how the CSIR-TWAS PhD Fellowship programme contributed to my professional growth and development, facilitating the exchange of knowledge, expertise and resources.

My professional journey commenced at the CERD. Initially employed as a geochemist, I spent six years in laboratory tasks, progressing from sample preparation for pellet making to conducting X-ray fluorescence analysis of samples for heavy metals percentage compositions. However, a pivotal moment occurred in 2014 when I joined the CSIR-North East Institute of Science and Technology (NEIST) and enrolled in the PhD program at the Academy of Scientific and Innovative Research (AcSIR), India. For the first three months, I was heavily concerned with the kind of research to undertake that would be relevant to my home organisation.

One fateful day in August 2014, while at the Geoscience and Technology division of CSIR-NEIST, discussions surrounding the Fukushima Nuclear Power Plant disaster sparked a moment of clarity. Inspired by the need for geophysical investigations to identify potential sites for Nuclear Power Plants devoid of seismic or related natural hazards in Nigeria, I formulated the topic: "*Seismic Hazard Assessment through Integrated Approach on Seismotectonics, Geophysical, and Remote Sensing Studies to Identify Suitable Site for Major Constructions in Nigeria*," which eventually became my PhD research title.

However, sourcing earthquake data posed significant challenges due to the following reasons:

(i) Nigeria is not regarded as one of the world's most earthquake- and seismic-prone countries,

(ii) There is no functional seismological station in Nigeria,

(iii) the logistical challenge of going back to Nigeria, if necessary, to gather data on-site,

(iv) Since such a study is regionally based, securing the funds to achieve the stated objectives and goal of the research.



Figure 2. Snapshots from the invited lecture on suitable Nuclear Power Plant sites in Nigeria

However, brainstorming with my supervisor exposed me to the global earthquake seismological data archives of the International Seismological Center (ISC), alleviating a significant obstacle. Yet, proficiency in Geoinformatics was crucial for progress, prompting my enrollment in a two-month certificate course at the Indian Institute of Remote Sensing (IIRS), Dehradun. The rigorous training at IIRS enhanced my expertise in Geoinformatics, enabling me to manoeuvre earthquake seismological data, determine seismogenic sources, assess peak-ground acceleration, and conduct GIS suitability studies. Consequently, I emerged as an expert in nuclear power plant siting.

Upon returning to Nigeria, my newfound expertise garnered recognition, leading to an invitation from the Chairman and the Chief Executive Officer of the Nigeria Atomic Energy Commission (NAEC) to deliver a public lecture on suitable sites for constructing nuclear power plants in Nigeria (Figure 2). This experience epitomised the culmination of my professional journey, underscored by the transformative impact of the CSIR-TWAS PhD Fellowship on my career trajectory.

Yet, amidst the triumphs lay challenges, particularly for married fellows like me. The TWAS-CSIR PhD Fellowship program is exclusively for candidates from developing countries. Therefore, one significant hurdle often faced by recipients of this esteemed fellowship is the separation from their families during their tenure in India.

During the initial eight months of my PhD program in India, I grappled with instability and distractions due to the absence of my wife and two young daughters back in Nigeria. The frequent calls from home compounded the challenge, hindering the progress of my research. Thanks to my supervisor, Dr. Saurabh Baruah (Chief scientist, CSIR-NEIST), for demonstrating remarkable understanding and empathy towards my predicament. Acknowledging the importance of family support, my supervisor advocated for my family to join me in India, which proved instrumental in restoring stability and mental balance. Having my family by my side, I fully immersed myself in my research program. Indeed, the provision for married scientists to access fellowship with their families would undeniably enhance the performance and well-being of awardees. By fostering a supportive environment that values family unity, the TWAS-CSIR Fellowship program can empower scientists to excel in their endeavours, ultimately contributing to greater scientific advancements and societal impact.

In conclusion, international fellowships like the TWAS-CSIR PhD Fellowship present a significant opportunity for scientists from the developing world. By offering access to an optimal research environment, state-of-the-art equipment, and invaluable exposure, this fellowship empowers scholars from the global south to cultivate their scientific acumen. These resources serve as fundamental tools necessary for addressing the complex economic and societal challenges prevalent in the global south. Moreover, the TWAS-CSIR PhD Fellowship not only nurtures individual talent but also fosters collaboration and knowledge exchange among scholars from diverse backgrounds. This collaborative spirit enhances the collective capacity to tackle multifaceted challenges, promoting sustainable development and progress in the global south, ultimately contributing to a brighter future for societies worldwide.