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Current Appointment: Teaching Assistant - University of Ghana

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### ***Area of Research/Teaching***

Hydrogeology with specialization in groundwater modeling and hydrochemical analysis

### ***Biography***

Ghanaian.

First born with five siblings.

Went to Yaa Asantewaa girls' secondary school for secondary education and later went to University of Ghana where I had both my undergraduate and graduate studies. I majored in geology for my undergraduate studies and specialized in hydrogeology for my graduate studies. My study area is one of the sub-basins of the White Volta basin in Ghana. It is considered as a stressed basin because of the cyclic floods and severe droughts during the raining and dry season respectively. These conditions are exacerbated by the fact that most of the people in these areas are mainly farmers who depend solely on rain-fed agriculture. I used monitored transient groundwater level, hydrochemical, and surface hydrological data for the conceptualization of the hydrogeological systems of the Nasia sub- Basin in Northern Ghana .The objective was to holistically asses the groundwater resources potential of the basin for better characterization of the aquifer systems in the study area. The results would also be useful in assisting in the development of a decision support system for appropriate management of the resources and effective buffer against the impacts of climate change/variability and its attendant impacts on water availability in the area. The general groundwater flow pattern in the area suggests a NE-SW direction of preferred flow. The study finds that the hydraulic conductivity values range between 4.86 m/day in the middle and upper section of the area to about 72.69 m/day in southern section. The transient model suggests aquifer specific storage values ranging between 0.000029 and 0.000549 m<sup>-1</sup>. The estimated recharge rates using the chloride mass balance method that was used as initial input into the modeling ranges from 24mm/year (2%) to 130mm/year (10%) with an average of 94mm/year (7.21%). Groundwater recharge generally increased from 8% of the precipitation in 2006 to 10% in 2007 and then reduced to 8% in 2008. The rates then remained constant until the end of the calibration period in 2011. This variability in groundwater recharge is in keeping with the pattern of variability in rainfall patterns in the area over the period. These findings suggest good prospects for the development of groundwater resources in the basin for commercial activities such as large-scale irrigation projects. It is however

advised that groundwater extraction should not exceed the rate of recharge. The scenario analysis suggests that the system can sustain increased abstraction up to about 20% of current abstraction rates. This indicates high fortunes in terms of groundwater delivery in the area.

I am interested in current issues of climate change/variability and its effect on rainfall patterns. Love to read, cook, visit friends and go on field trips to bring in data. My philosophy in life is everything can be learnt.

I have been able to co-author some articles and below are the titles, journal names and year of publication.

1. Yidana, S. M., Essel, S.K., **Addai, M. O.**, Fynn, O. F. (2015): Preliminary analysis of the hydrogeological conditions and groundwater flow in some parts of a crystalline aquifer system: Afigya Sekyere South District, Ghana. Journal of African Earth Science, <http://dx.doi.org/10.1016/j.jafrearsci.2014.12.011>

2. Yidana, S.M., Fynn, O.F., Chegbeleh, L. P., Loh, Y., **Addai, M. O.** (2014): Analysis of recharge and groundwater flow in parts of a weathered aquifer system in Northern Ghana, Journal of Applied Water Engineering and Research <http://dx.doi.org/10.1080/23249676.2014.954009>

3. Yidana, S.M., Alfa, B., Banoeng-Yakubo, B., **Addai, M.O.** (2012). Simulation of groundwater flow in a crystalline rock aquifer system in southern Ghana – an evaluation of the effects of increased groundwater abstraction on the aquifers using a transient groundwater flow model. Hydrological Processes, doi: 10.1002/hyp.9644

4. Yidana, S. M., **Addai, M. O.**, Alo, C., Fynn, O.F., Essel, S. K. (2014) : Numerical Analysis of groundwater flow and potential in parts of a crystalline aquifer system in Northern Ghana, Journal of Environment Science and Technology (Springer-Verlag)

#### ACCEPTED ARTICLES WITH MINOR CORRECTIONS

5. **Addai, M. O.**, Yidana, S. M., Chegbeleh, L. P., Adomako, D., Banoeng-Yakubo, B. (2015): Groundwater recharge processes in the Nasia sub-catchment of the White Volta basin: Analysis of pore water characteristics in the unsaturated zone. Journal of African Earth Science (Special Publication for the YES Congress, 2014).