

LOCATION TAGGING OF GROUNDWATER SOURCES FOR IRRIGATION USING GIS
IN THE MUNICIPALITY OF SAN LORENZO, GUIMARAS

A THESIS

Presented to

The Faculty of the College of Agriculture, Resources, and Environmental Sciences
Central Philippine University
Iloilo City

In Partial Fulfillment

of the Requirements for the Degree

Bachelor of Science in Agricultural and Biosystems Engineering

By

MAE RHEIN P. GANO

May 2024



LOCATION TAGGING OF GROUNDWATER SOURCES FOR IRRIGATION USING GIS
IN THE MUNICIPALITY OF SAN LORENZO, GUIMARAS

Mae Rhein P. Gano

ABSTRACT

A Geographic Information System (GIS) was used to create a thematic map and pattern distribution analysis of groundwater sources in San Lorenzo, Guimaras. The study examined the groundwater sources used by vegetable farmers in San Lorenzo, focused on the service area, availability of groundwater sources, and crop area for cultivation within the municipality. The study found that 52 vegetable crop farmers in ten active barangays predominantly use groundwater sources for irrigation. The service area used by these farmers is 40.03 ha, with Brgy. Constancia and Cabano have the highest usage. The service areas range from 0.25 ha to 2.5 ha, with 1.1 to 2.5 ha being mostly utilized in the lowland portion of the municipality. During the dry season, groundwater sources are most abundant in lowland areas with low water tables and near rivers. High availability areas were found in Cabano, M. Chavez, Suclaran, Cabungahan, Sebario, and some upland areas like Gaban and Constancia. Upland areas had few available sources due to deep-water tables. The study classified groundwater tube wells used for irrigation: shallow tube wells were highly utilized in lowland areas and areas near watersheds with low water tables, while deep tube wells were used in upland areas with a deep-water table. The study revealed that San Lorenzo's areas are primarily used for planting fruit-bearing vegetables, with upland areas using leafy vegetables. The lowlands are most utilized for fruit-bearing vegetables and some for leafy. The study also revealed that the status and location of groundwater sources in San Lorenzo are clustered, as indicated by the pattern distribution analysis.

REFERENCES

- Arthur, M., and Saffer, D. (2019). Types of aquifers. Retrieved from Types of Aquifers | EARTH 111: Water: Science and Society (psu.edu).
- Better Evaluation Initiative. (2022). Geo-tagging. Retrieved from <https://www.betterevaluation.org/methods-approaches/methods/geo-tagging>.
- Centers for Disease Control and Prevention. (2016, October 11). Types of agricultural water use. Retrieved from <https://www.cdc.gov/healthywater/other/agricultural/types.html#:~:text=Irrigation%20is%20the%20artificial%20application,to%20the%20entire%20field%20uniformly>.
- Earle, S. (2020). Groundwater. Retrieved from Lab 10 Reading: Groundwater – Earth and Our Environment Laboratory Manual (pressbooks.pub).
- Elazegui, D., Fajardo, A., and Luyun, R. (2018). Managing groundwater resources for sustainable agriculture. CPAf Policy Brief. 3. Retrieved from https://www.ukdr.uplb.edu.ph/cpaf_policy_brief/3.
- Environmental Systems Research Institute. (n.d.). What is GIS? Retrieved from <https://www.esri.com/en-us/what-is-gis/overview>.
- Geoinfotech. (n.d.). How GIS is used in irrigation water management. Retrieved from <https://geoinfotech.ng/how-gis-is-used-in-irrigation-water-management/#:~:text=GIS%20is%20a%20significant%20instrument,irrigation%20system%20for%20a%20farm>.
- Geograma. (2022). Eight applications of GIS in agriculture. Retrieved from <https://www.geograma.com/en/blog/8-applications-of-gis-in-agriculture/>.
- Grind GIS. (2019, August 31). GIS applications in water resources. Retrieved from <https://grindgis.com/gis/gis-applications-in-water-resources/#:~:text=Through%20GIS%2C%20studies%20on%20a,as%20well%20as%20reports%20generated>.
- Greenpeace. (2007). The state of water resources in the Philippines. Retrieved from <https://www.greenpeace.org/static/planet4-philippines-stateless/2019/05/11e8551c-11e8551c-the-state-of-water-in-the-phil>.
- Hossen, H., Ibrahim, M., Mahmud, W., Negm, A., Nadaoka, K., and Saavedra, O. (2018). Forecasting future changes in Manzala Lake surface area by considering variations in land use and land cover using a remote sensing approach. *Arabian Journal of Geosciences*, 11(5), 93.
- Margat, J., and Gun, J. (n.d.). Groundwater around the world: a geographic synopsis. UN- International Groundwater Resources Assessment Centre (IGRAC)'. Retrieved from https://www.unigrac.org/sites/default/files/resources/files/Groundwater_around_world.

- Media Wiki. (2017). UTM coordinates system. Retrieved from UTM Coordinate System - XMS Wiki.
- Municipality of San Lorenzo. (n.d.). Land area and classification. Retrieved from <https://www.sanlorenzoguimaras.gov.ph/land-area-and-classification/>.
- National Irrigation Administration. (n.d.). Construction of irrigation systems. National Irrigation Administration, EDSA, Diliman, Quezon City. Retrieved from <https://www.nia.gov.ph/content/construction-irrigation-systems>.
- Philippine Agricultural Engineering Standard 613:2016. Groundwater irrigation – shallow tubewell. Agricultural Machinery Testing and Evaluation Center (AMTEC).
- Ritter, W. (2022, March 17). Sustainable agriculture water management. Retrieved from Sustainable Agriculture Water Management | SpringerLink.
- Siena, G. (2020, November 23). Geo-resistivity method for groundwater assessment and exploration. Department of Agriculture- Bureau of Soils and Water Management. Retrieved from <http://bswm.da.gov.ph/geo-resistivity-method-for-groundwater-assessment-and-exploration/>.
- Walker, M. (2023, April 26). Types of wells. Retrieved from Types of Wells | Build a Stash.
- Wang, H. (2020). Groundwater storage in confined aquifers. Retrieved from Aquifers and Groundwater | U.S. Geological Survey (usgs.gov).
- Water Science School, (June 8, 2019). Springs and the water cycle. Retrieved from Springs and the Water Cycle | U.S. Geological Survey (usgs.gov).
- Young, K. (2018, April 19). Different sources of water. Retrieved from Different Sources of Water | Sciencing.