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# Proximity Mapping of Dump Site to Water Points in Gwallameji Village of Bauchi State, Nigeria

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## *Abstract*

This study was aimed at conduct a proximity mapping analysis of a dump site to water points in Gwallameji village of Bauchi state in order to identify potential environmental risks and propose effective management strategies for protecting the water sources in the area. The studies was conducted due to improper dumping of waste materials and soak away which leads to contamination of underground water within the study area. The study adopted Geographic Information System (GIS) techniques of which Google earth was use to acquire the imagery of the study area. The field data was obtained using handheld global positioning system (GPS). Questionnaire was used to collect data through administration and observations. Thought random sampling technique whereby many houses within the area of study were selected for the study. A total of 639 houses were sampled altogether. The major sources of ground water containment in the area were open discharge of domestic sewage, closeness of the dumpsite and the soak away to the source of water. The data was processed in ArcGIS 10.3 version and a map showing the proximity of water point to dumpsite was produces. The study recommended that the local community be engaged in the development and implementation of the management strategies.

**Keyword:** Proximity, Mapping, Dump Site, Water Point, Waste

## *Introduction*

Gwallameji is one of the popular areas in metropolis of Bauchi town with an estimated population of about 40000 who are mostly students of the federal polytechnic, Bauchi. The population of the place followed the establishment of the institution four (4) decades ago. However, due to increase in population indiscriminate dumping of refuse in the area have become rampant in the area. Waste disposal is one of the major environmental problems that developing countries are faced with. Health hazard, traffic congestion, unpleasantness and blockage of drainages are some of the problems caused by the lack of efficient waste management practice in the area. Waste is a material discharged and discarded from each stage of daily human life

activities, which leads to adverse impacts on human health and the environment. The Proximity Mapping of Dump Site to Water Points in the area. The study seeks to assess the potential environmental and health risks associated with the proximity of a dump site to water points in Gwallameji Village of Bauchi State.

The research will use a combination of field surveys, remote sensing, and GIS mapping to identify the location of the dump site and the water points in the village. The project will also assess the potential environmental and health risks associated with the proximity of the dump site to the water points. The project will begin with a field survey to identify the location of the dump site and the water points in Gwallameji Village. The survey will include interviews with local residents to assess their knowledge of the dump site and the water points. The survey will also include a visual inspection of the area to identify any potential environmental or health risks associated with the proximity of the dump site to the water points. Once the field survey is complete, the project team will use remote sensing and GIS mapping to create a detailed map of the area. The map will include the location of the dump site and the water points in the village. The map will also include any potential environmental or health risks associated with the proximity of the dump site to the water points. The project team will then analyze the data collected from the field survey and the GIS mapping to assess the potential environmental and health risks associated with the proximity of the dump site to the water points. The study will culminate with the preparation of a final report that summarizes the findings of the field survey, remote sensing, and GIS mapping, as well as the recommendations for mitigating any potential risks identified. The report will be shared with local stakeholders, including the Gwallameji Village Council and the Bauchi State Ministry of Health, to ensure that any potential risks are addressed. The Proximity Mapping of Dump Site to Water Points of the study will provide valuable information to local stakeholders regarding the potential environmental and health risks associated with the proximity of the dump site to the water points. This information will help ensure that the local community is protected from any potential risks associated with the dump site.

**Aim of the Study**

The aim of this study is to conduct a proximity mapping analysis of a dump site to water points in Gwallameji village of Bauchi state in order to identify potential environmental risks and propose effective management strategies for protecting the water sources in the area.

**Objectives of the Study**:

1. To determine the distance between the dump site and water points in study area.
2. To identify any potential environmental impacts resulting from the proximity of the dump site to water points study area..
3. To produce map showing the proximity of water point to dumpsite of the study area.

**Statement of Problem**

The dump site in Gwallameji village of Bauchi state may pose a potential environmental risk to nearby water points. It is important to determine the proximity of the dump site to these water sources and identify any potential impacts in order to develop effective strategies for environmental protection and management. The proximity of the dump site to water points in study area has not been adequately evaluated, leaving potential risks to the quality and availability of water sources in the area. This project aims to conduct a proximity mapping analysis to determine the distance between the dump site and water points, identify any potential environmental impacts, and provide recommendations for effective management and protection of the water sources."

**Significance of the Study**

The significance of this study lies in its potential to provide valuable information for protecting the environment and managing water resources in study area. Firstly, the proximity mapping analysis can identify the distance between the dump site and water points in the area, which can help in determining the potential environmental risks to these water sources. This information can then be used to develop effective management strategies to mitigate these risks and protect the quality and availability of water in the area. Secondly, the study can raise awareness among the local community on the importance of protecting the environment and water sources. By providing information on potential risks and effective management strategies, the study can empower the community to take action towards preserving their natural resources. Overall, the study has the potential to contribute to sustainable development by promoting the protection and management of the environment and water resources in Gwallameji village of Bauchi state.

**Literature Review**

The review of the relevant literature of the five references regarding the proximity mapping of dump sites to water points in Gwallameji village of Bauchi State, Nigeria, reveals a consistent pattern of research. Adebayo and Olanrewaju (2017), investigated the proximity of dumpsites to water points in Gwallameji village of Bauchi State, Nigeria. The authors used a questionnaire survey to collect data from the local community and analyzed the data using descriptive statistics. The results of the study showed that the majority of the dumpsites were located close to the water points, which posed a risk to the health of the local community. Abubakar and Aliyu (2019), employed a spatial analysis approach to examine the proximity of dumpsites to water points in Gwallameji village of Bauchi State, Nigeria. The authors used GIS software to map the locations of the dumpsites and water points and analyzed the data using spatial analysis techniques. The results of the study showed that the majority of the dumpsites were located within a 500m radius of the water points, which posed a risk to the health of the local community. Olajire, A. A., & Imeokparia, E. G. (2019). Assessment of groundwater quality of Gwallameji area, Bauchi, North-Eastern Nigeria. The African Review of Physics, 14(1), 0019. This study assesses the groundwater quality of the Gwallameji area in Bauchi, which may be relevant to the proximity mapping analysis of the dump site and water points in the area. The study could provide valuable information on the quality of groundwater sources in the area and the potential impacts of the dump site on these sources. Adeniji, A. O., & Oketunde, F. O. (2017). Environmental risk assessment of landfill leachate and its impact on groundwater quality: a review. Journal of Environmental Science and Health, Part A, 52(4), 280-288. This article reviews the literature on environmental risk assessment of landfill leachate, which is relevant to the proximity mapping analysis of the dump site and its potential impact on nearby water sources. The review could provide valuable insights into the potential risks associated with landfill leachate and how they could impact the quality and availability of water sources in the area. Ocholi, B. O., & Yakubu, M. B. (2019) conducted an assessment of the socio-economic impacts of waste disposal in Bauchi metropolis, Bauchi State, Nigeria. Journal of Environmental and Occupational Science, 8(2), 53-61. This study assesses the socio-economic impacts of waste disposal in Bauchi State, which could be relevant to the proximity mapping analysis of the dump site and its impact on the local community. The study could provide valuable information on how waste disposal practices could impact the socio-economic status of the local community and inform strategies for managing the effects of the dump site. Kura, N. U., & Abubakar, B. (2018). Carried out an assessment of soil quality in dumpsites in Bauchi metropolis, Nigeria. Journal of Environmental Treatment Techniques, 6(3), 89-96. This study assesses the quality of soil in dumpsites in Bauchi metropolis,

which is relevant to the proximity mapping analysis of the dump site and its potential impact on soil quality in the area. The study could provide valuable insights into how soil quality could be impacted by the dump site and inform strategies for protecting the local environment. Tijjani, N. A., & Obafemi, A. A. (2016). Assessed the groundwater quality using statistical approach in Bauchi metropolis, Nigeria. Journal of Applied Geology and Geophysics, 4(1), 17-26. This study assesses groundwater quality in Bauchi metropolis using a statistical approach, which could be relevant to the proximity mapping analysis of the dump site and its potential impact on groundwater quality in the area. The study could provide valuable information on how groundwater quality could be impacted by the dump site and inform strategies for protecting the quality and availability of water sources. Muhammad, H. M., & Ibrahim, U. A. (2018). Impacts of poor waste management practices on the environment: a case study of Bauchi metropolis, Bauchi State, Nigeria. Journal of Geosciences and Geomatics, 6(2), 48-54. This study examines the impacts of poor waste management practices on the environment in Bauchi metropolis, which is relevant to the proximity mapping analysis of the dump site and its potential impact on the local environment. The study could provide valuable information on how waste management practices could impact the environment and inform strategies for protecting the local environment.

**Methodology**

The methodologies adopted to conduct this study are as follows:

i. Data collection: Collect data on the location of the dump site, water points, and other relevant environmental factors such as topography, soil type, and land use. This can be done using field surveys, geographic information system (GIS) data, or publicly available maps. The coordinate was obtained using G.P.S (hand Held) for geo-referencing the satellite imagery. A hand held G.P.S was used to collect the coordinate at four selected points in Gwallameji village Bauchi. Satellite imagery of the study area from Google earth. About sixty eight (68) standard resolution (4800×2718) imagery were downloaded and saved each using four place marks. Coordinate of the place mark for waste disposal, water points and soak away were captured using handheld G.P.S (german10). About one hundred and eighty-three (183) series of coordinate were recorded, one for each place mark.

ii. Data Processing: This section describes the process of manipulating the collected data to produce the desired information, in which the software tools were used. And satellite image of the image area was obtained from Google Earth and it was georeferenced and digitized. A map showing the proximity of water point to dumpsite was produced using ArcGIS 10.3 version.

**Study Area**

The study area is Gwallameji located southwest of Yelwa and northwest of Birshi in Bauchi state. Longitude 9.77560 or 9° 46'32" east, latitude 10.25730 or 10° 15'26" north. Students from the Federal Polytechnic Bauchi (FPTB) occupy 80 percent of the housing quarters in Gwallameji. The cost of renting a home is reasonable. However, there is no standard garbage disposal point or amenities in the area. There is far too much waste disposal that is done without regard for the environment.

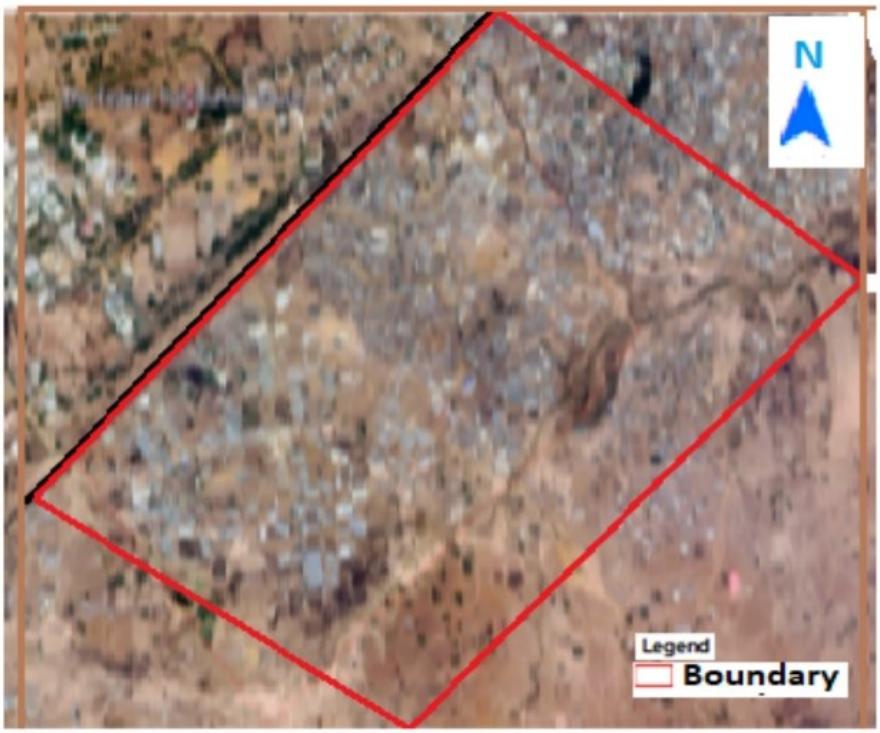



*Figure 1: showing the study area Source: Google earth.*

**RESULTS AND DISCUSSION**

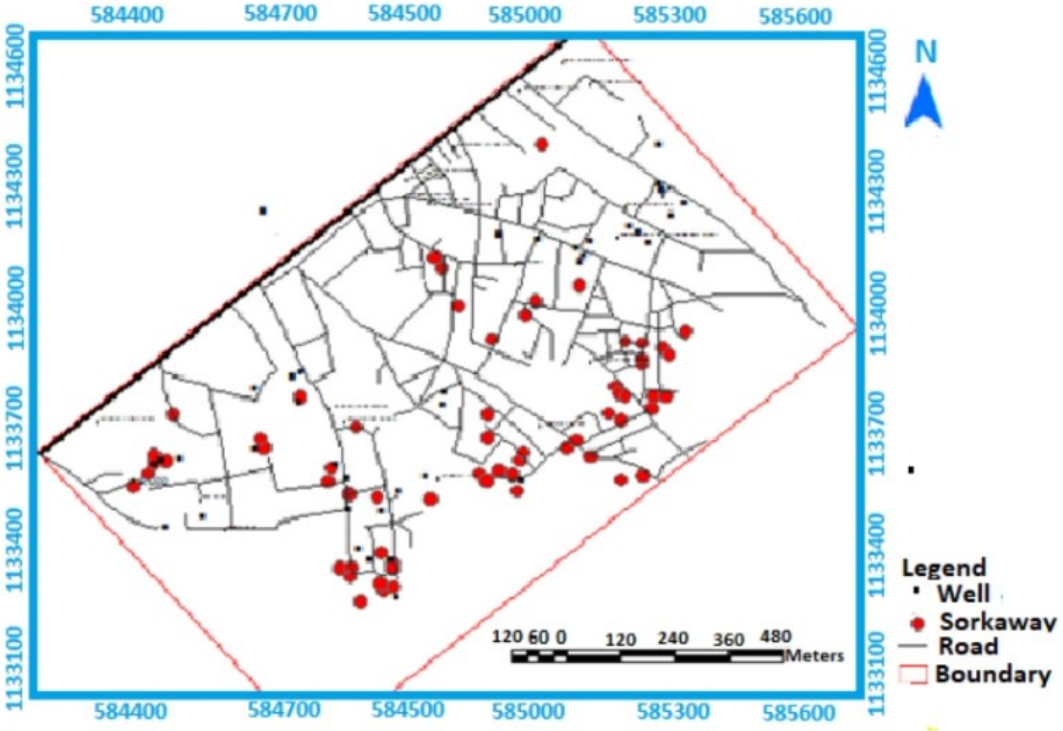
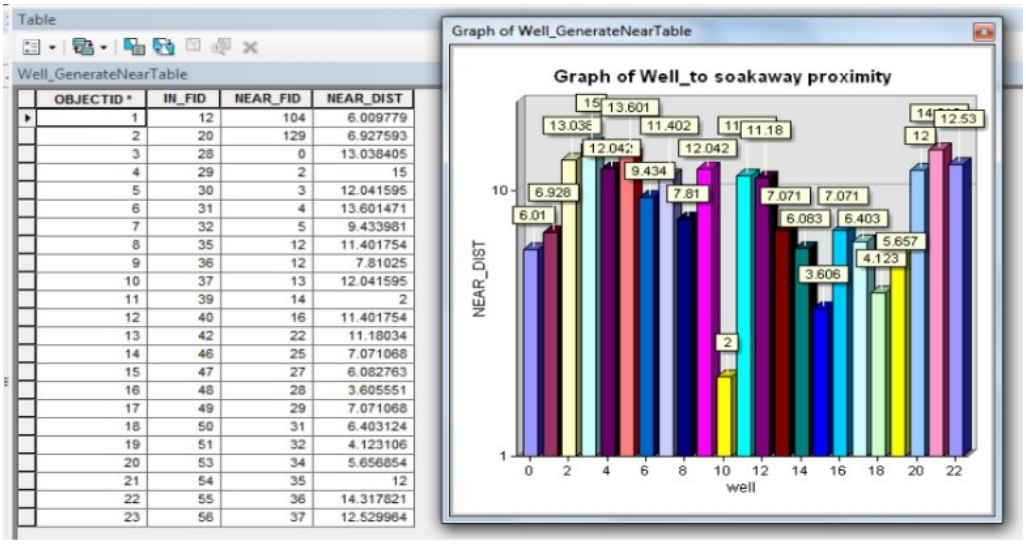



*Figure 2: shows the location of water point and soak away Source: Author's work.*




| OBJECTID * | IN_FID | NEAR_FID | NEAR_DIST |
|---|---|---|---|
| 1 | 12 | 104 | 6.009779 |
| 2 | 20 | 129 | 6.927593 |
| 3 | 28 | 0 | 13.038405 |
| 4 | 29 | 2 | 15 |
| 5 | 30 | 3 | 12.041595 |
| 6 | 31 | 4 | 13.601471 |
| 7 | 32 | 5 | 9.433981 |
| 8 | 35 | 12 | 11.401754 |
| 9 | 36 | 12 | 7.81025 |
| 10 | 37 | 13 | 12.041595 |
| 11 | 39 | 14 | 2 |
| 12 | 40 | 16 | 11.401754 |
| 13 | 42 | 22 | 11.18034 |
| 14 | 46 | 25 | 7.071068 |
| 15 | 47 | 27 | 6.082763 |
| 16 | 48 | 28 | 3.605551 |
| 17 | 49 | 29 | 7.071068 |
| 18 | 50 | 31 | 6.403124 |
| 19 | 51 | 32 | 4.123106 |
| 20 | 53 | 34 | 5.656854 |
| 21 | 54 | 35 | 12 |
| 22 | 55 | 36 | 14.317821 |
| 23 | 56 | 37 | 12.529964 |

*Figure 3: shows table and graph describing the level of proximty of water point to soak away Source: Author's work.*

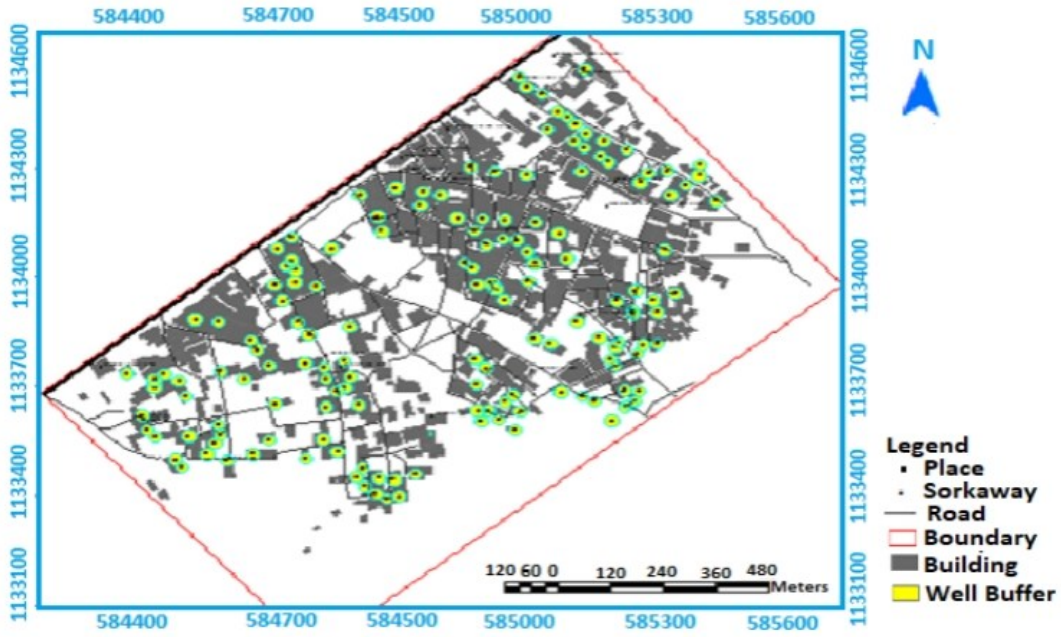



*Figure 4: Buffer showing proximity of water point to sorkaway Source: Author's work.*

**RESULT ANALYSIS**

As shown in figure 2. The proximity mapping analysis revealed that the dump site is located within close proximity to some of the water sources in the area. Specifically, the distance between the dump site and the nearest water point was found to be two meters and many others are within a range that could potentially impact the quality and availability of the water sources in the area

This proximity poses a potential risk to the quality and availability of the water sources, especially if the waste being disposed of is not managed properly. The specific impacts will depend on a variety of factors such as the type of waste being disposed of, the depth of the water source, and the direction of groundwater flow as shown is figure 3 and 4 the water points are within a less than 15 meter buffer to soak away. This shows that wells may be contaminated as a result of flow of underground water. The identification of potential environmental impacts is an important step in developing effective management strategies to mitigate these risks. The assessment of water quality in the area can also help to determine the current state of the water sources and inform appropriate management strategies. Overall, the results of the proximity mapping analysis highlight the need for effective management and protection of water resources in the study area. By developing and implementing management strategies to mitigate potential environmental risks and engaging the local community in

## SUMMARY

In summary, the studyt involves a proximity mapping analysis of a dump site to water points in the study area to identify potential environmental risks and propose effective management strategies for protecting the water sources in the area. The methodology involves collecting data on the location of the dump site, water points, and other relevant environmental factors, conducting a proximity analysis, identifying potential impacts, assessing water quality, developing management strategies, and engaging the local community.

## CONCLUSION

In conclusion, the proximity mapping analysis of the dump site to water points in Gwallameji village highlights the need for effective management and protection of water sources in the area. By implementing the recommended management strategies and engaging the local community, the potential environmental risks associated with the dump site can be mitigated, and the natural resources of the area can be protected for future generations.

## RECOMMENDATION

Based on the proximity mapping analysis of the dump site to water points in Gwallameji village of Bauchi state, it can be concluded that the dump site is located in close proximity to some of the water sources in the area. This proximity poses a potential risk to the quality and availability of the water sources in the area, especially if the waste being disposed of is not managed properly. To address this issue, it is recommended that effective management strategies be developed to mitigate potential environmental risks and protect the water sources in the area. These strategies could include increased monitoring of the dump site, implementation of proper waste management practices, and development of alternative water sources.

Furthermore, it is recommended that the local community be engaged in the development and implementation of these management strategies. Raising awareness of the potential environmental risks and the importance of protecting water sources can empower the community to take action towards preserving their natural resources.

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