# INDISCRIMINATE HOUSEHOLDS WASTE WATER DISPOSAL PRACTICE ON ENVIRONMENT IN BIDA, NIGER STATE

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## Abstract
This study assessed the indiscriminate households waste water disposal practices on environment in Bida, Niger State. The objectives are to identify the waste water disposal method and to assess the factors responsible for household waste water disposal method in an unplanned environment like the study area. Data were obtained from residents in the neighbourhood, personal observation and a structure questionnaire was produce. Equal numbers of questionnaire was distributed to each of the zone this is because of the absence of neighbourhood data in NPC 2006, simple random sampling technique was adopted to administer questionnaire within the neighbourhoods, a total of 320 questionnaires was retrieve from the respondents and furthermore, the data were analysed using SPSS. Therefore the study revealed that R=.090% of housing types and R=.083% of household size of the respondents are major contributory factor to household waste water disposal method while education level of the respondents does not have any significant on the environmental degeneration. However, the study seeks to recommend that local town planning authority should review building regulation with considerable flexibility and polluter pays principles (PPP) and other environmental laws should fully be adhered to, as other stakeholders collaborate with government to arrest the ugly effects of wastewater disposal in the study area.

**Keywords:** Characteristics, Causes and Environmental Degeneration

## 1. Introduction
Waste water is any water that has been affected by human use. Waste water is created by residential, industrial and commercial establishments and includes household waste water from toilets, baths, showers, kitchens, sinks and so forth that is disposed off via drainage, open ground or soak away. This means that wastewater is generated from industries, homes, offices, markets and institutions but disposal is often a problem (UN Water, 2013; WHO 2015; Udiba et al., 2018; Akan et al., 2009). Since the type of waste water generating activities in households and non household is similar, domestic wastewater from both sources share similar constituents but are different in composition and quantity Va et al (2018). The volume of wastewater produced by cities and towns is increasing due to high population growth, industrialization, globalization, urbanization and warfare. Many developing countries have problems in managing their household waste water, especially in big densely populated cities. Approximately 75% of domestic waste water is generated from residential buildings or households; the rest are from office buildings commercial areas, public facilities etc. (wirawan 2020).

In Nigeria, different cities use different methods of sewage disposal, while some cities have organized functional sewage system such as Abuja, Port Harcourt, Kaduna, Calabar and Lagos, other cities have no sewage disposal system (including Niger state) and as such operate disorganized and decentralized methods of waste water disposal. The unwise use of the natural environment due to ignorance, poverty, overpopulation and urbanization amongst others has led to the degeneration of the environment.

The charges (degeneration) occur as Nigerians attempt to adjust their seemingly endless wants and desires for food, shelter, recreation, infrastructural facilities, and so on (NEST, 1992). The wastewater generated from bathing, lauding toilets, industries are often freely disposed in the environment. Similarly, the lack of septic tank or sewage in houses, inadequate drainages and poor canals system all create widespread of wastewater disposal problems and environmental pollutions and gives room for water-borne diseases such as enteritis, polio, typhoid, cholera, bacterial and amoebic dysentery and infectious hepatitis (Nebegu, 2010; Akan, et al., 2018). Households within the study area dispose their waste water indiscriminately on open surface, uncovered drainage, and septic tank which are not properly manage thereby creating an unsanitary scenes that smells bad and worst of all make the environment unfriendly to live. However, it is based on this the researcher tries to assess households wastes water disposal practice on environment in Bida, Niger State.

It is imperative for this study to identify the types of waste water disposal, assess the factor responsible for household waste water disposal methods and the analysed it consequences to the environment this is because households is a basic unit and it play a major role in planning it effect on the environment in the study area. The outcome of the study will enhance formulating appropriate planning policies towards eliminating poor household wastewater disposal methods and their negative effect on the environment as it relate to the study area.

## 2. Literature Review

UNEP (2010) viewed Wastewater as any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry and/or agriculture and can encompass a wide range of potential contaminants and concentrations. Most human activities that use water produce waste water. As the overall demand for water grows, the quantity of waste water produced and its overall pollution load are continuously increasing worldwide. According to Mohaptra 2011, waste water is the water that is released after use by domestic/industrial activities into the environment, such water has altered physical or chemical parameters compared to those of the source from which the water is taking for use".

From the views of these scholars, household waste water could be referred to as all kinds of water generated as aftermath of water usage from bathing, washing and food preparation at home. The population of people in households or areas contributes to domestic wastewater generation and disposal in places with enough water supply (Kenneth, 1993). For example a household of ten persons will use more water than that of three or four persons, consequently, the generation of wastewater will be more in the household with many persons, wards and areas with high population densities also generate more wastewater than areas of less population.

This was supported by Mollison (1998) that the disposal of wastewater especially in urban areas of both developed and developing countries is a problem that continues to grow with development of nations and growth of population. The demand and uses of modern facilities increase the rate of wastewater disposal. Wastewater disposal can also be influenced by quantity or volume of water discharged by a dwelling or household.

UNEP (2010) stated that, in terms of wastewater disposal, in Africa about 80% of water consumption of those connected to the sewer ends up discharged into the municipal sewer. For

instance in semi-arid and drought prone Gaborone the return flow is 50-65% thus, if poor people are connected in great numbers, the resultant reduced sewer flows could upset the operation of the sewer system because of the little water being used to keep waste flowing. He added in Lagos, wastewater is discharged to the Lagos lagoon and even sullage (grey water) water is discharged in open drain, throughout some of the urban catchments.

In developing countries, many people still lack clean water and basic sanitation (hygienic toilet facilities) sewage disposal affects people's immediate environments and leads to water-related illnesses such as diarrhoea that kills 3-4 million children each year (According to WHO, water-related diseases could kill 135 million people by 2010). Moreover, an estimated 700 million people have no access to proper toilet and 1,000 Indian children die of diarrhoea sickness every day (The Economist, 2008). Some 90% of China's cities suffer from some degree of water pollution (Chinadaily.com, 2005) and nearly 500 million people lack access to safe drinking water (The New York Times, 2007). In addition to acute problems of water pollution in developing countries, industrialized countries continue to struggle with pollution problems as well. Most people in the developed world have flush toilets that drain sewage waste quickly and hygienically away from their homes (www.explainthatstuff.com).

Water consumption and wastewater generation depletes outer resources and has a destructive impact on the environment. Recent attention has aimed at preserving water resources and preventing pollution through several routes. Restrictions on wastewater discharge into the environment, recycling, reuse and regeneration of wastewater streams are now common practices towards achieving these objectives. UNESCO (2019) as result of adverse effects of pollution in the environment. Man through multifarious activities has contributed to the contamination, depletion, pollution, and scarcity of water and its resources which consequently leads to production of wastewater also known as sick water (Butu and Mshelia, 2017; Audrey, 2019).

Furthermore, the indiscriminate disposal of wastewater creates poor sanitary conditions and environmental pollution such as bad smell, hindrance to free movement as well as low value of property. However, there is the need to alleviate most of the pressures being placed on open drainage channel, and disposal systems by the increasing pollution in general using modern and proper drainage channels which will help households in no small measures, in disposing off their wastewater in such a way that will drastically reduce health hazards associated with domestic wastewater disposal in particular.

## 3. Study Area

Bida is the headquarter of Nupe Kingdom, it is located in the heart of low basins that forms the valley of river Niger and river Kaduna. It lies between latitude $6^{o}$ $20^{'}$ South and $9^{o}$ $50^{'}$ North of the equator and longitude $6^{O}$ $40^{'}$ and $9^{o}$ $40^{'}$ East of the Greenwich meridian and land area is 1,698$Km^{2}$ (Niger State Ministry of Land and Housing 2022). According to National Population census of 2006 the study area has 185,555persons, projected to 2022 to be 318,300 persons with the household size of 53,050 wiki 2023. It is bounded by Gbako Local Government in the North, to the South is by Lavun local government while to the West is Katcha local government as showed in Figure 1 and 2. The study area is clustered neighbourhood which accommodate both native and non native, predominantly the households who cannot afford decent housing in other part of the city centre

(see figure 1 and 2 below). The study area is subdivided into five (5) areas by this reason it has forced to grow in an unplanned manner and is faced with the problem of over-crowding resulting from massive urban influx. The study area is face with problems such as poor sanitation, environmental pollution, flooding due to inadequacy or absence of drainage facilities and rapid and unplanned urbanization which turn the area into a slum.

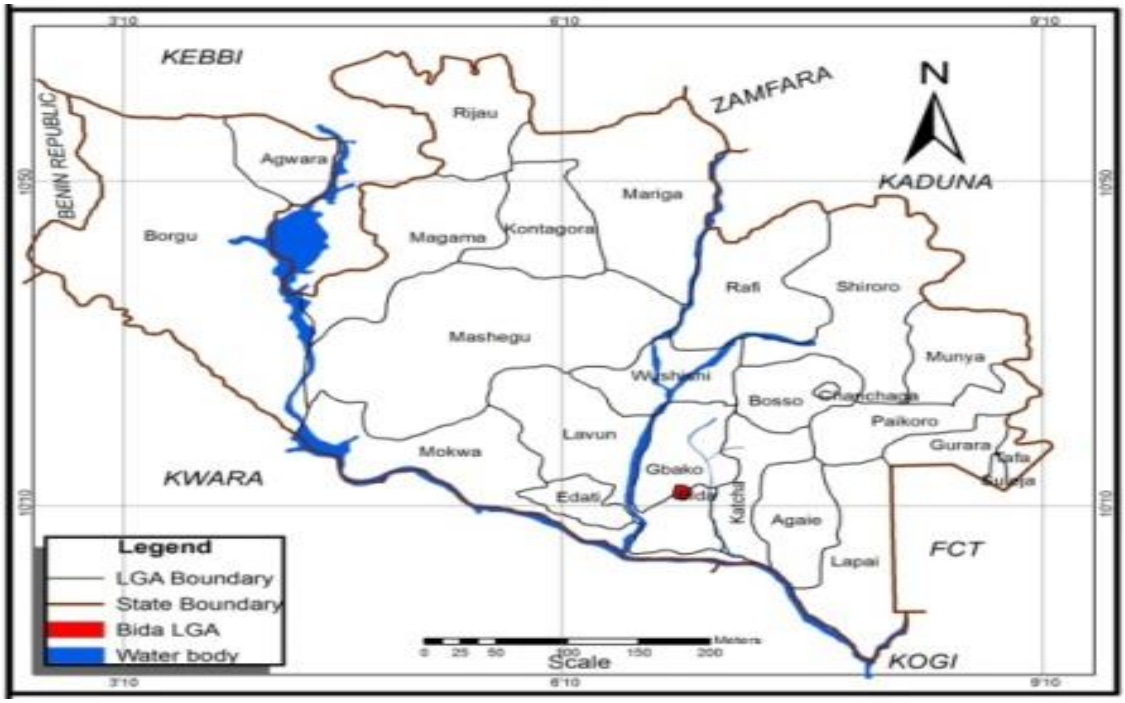



Figure 1: Niger State Showing Bida Local Government Area. Source: Niger State Ministry of Land and Housing (2023)

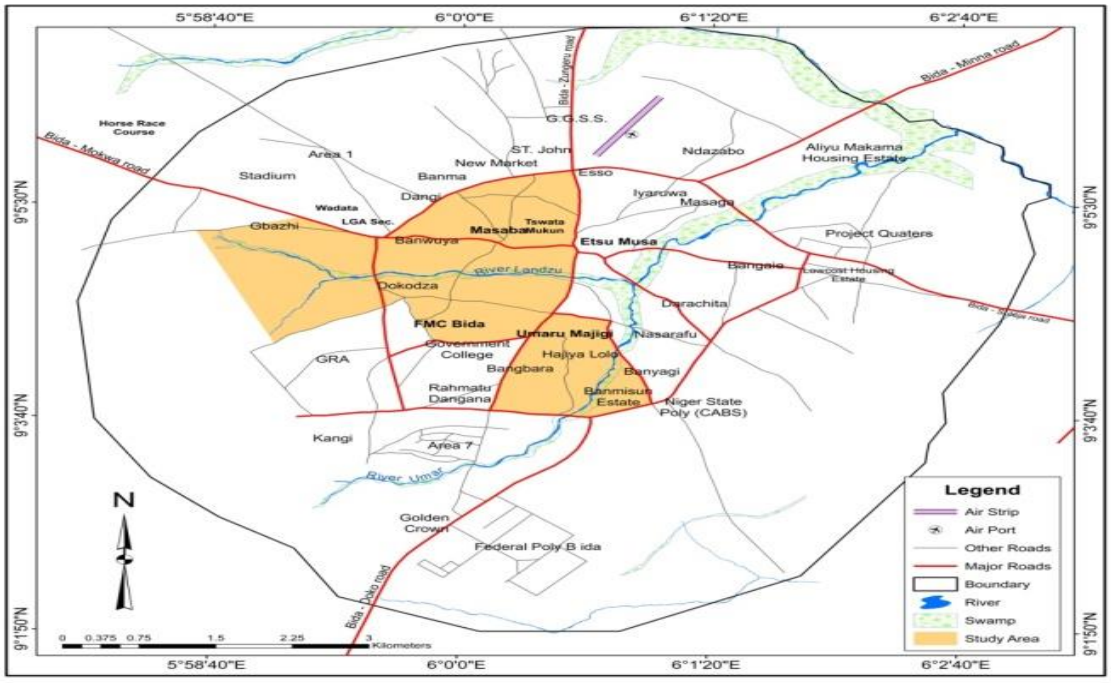



Fig.2 Map of Bida Showing the Study Area.
Source: Niger State Ministry of Land and Housing (2023)

## 4. Methodology

There are four (4) major roads connecting the neighbourhoods, for easy coverage the study area was divided into five (5) zones namely; Efu Maidami, Fogun, Efu Tori, Umaru Majigi and Gbezhi. A structure questionnaire was produce to reflect their true nature and equal number of seventy (70) questionnaire was administer to each zone, with the aid of 350 questionnaires distributed this done because of the absence of neighbourhoods data capture in the last National Population Census (NPC 2006). Simple random sampling technique was used to administered the questionnaires on the intervals of four (4) houses were the houses are on a straight line, this was done to enable the researcher have a fair representation and direct observation was considered appropriate tools because it does not only provide detailed data of households under scrutiny.

A total of 320 were retrieved from the households and for further analysis of the data through software like SPSS was employed to carry out statistical analyses and the results were presented in the forms of tables. A robust photograph of some houses was taken to ascertain the true nature of household waste water disposal methods in the study. Spearman rank equation was used to evaluate the factor responsible for household waste water disposal methods and as well linear regressions was used to determine the relationship between household's educational level of waste water disposal methods in Bida. However, it is analytical to use the spearman rank correlation coefficient formula to calculate the dependence variable which coefficient is

$$r^s = 1 - \frac{6\sum d^2}{n(n^2-1)}$$

Where $Sd^2$ = is the sum of the squared differences between the pairs of rank and

n = is the number of pair.

## 5. Result and Discussion

### Type and Nature of Wastewater

Wastewater is any water that has been affected by human use and the natures of waste water vary depending on the source. Households produce wastewater from flush toilet sink, dishwashers, washing machines, bath tabs, and showers, this has poses threat to households living within neighbourhoods in the study area. However, plate 1 is the Open Septic Tank in Umaru Magiji , 2 Open Surface waste water in Disposal Efu Madamai , 3 is Broken septic Tank in Gbezhi.and Efu Tori respectively. Below show household wastewater disposal method practices in most zone and also it was observed that most of houses are mark with X sign which is an implied that most households didn't consult town planner before setting out their building this has seriously affected living condition of the people in the study area.



**Plate1: Open Septic Tank Umaru Magiji**



**Plate 2 Open Surface Disposal Efu Madamai**



**Plate 3 Broken septic Tank**

**Table 1 Educational Qualification**

| Educational Qualification | Respondents | Percentage |
|---|---|---|
| Informal education | 59 | 18.5 |
| Primary | 88 | 27.5 |
| Secondary | 123 | 38.4 |
| Tertiary | 50 | 15 |
| Total | 320 | 100 |

**Source: Authors fieldwork 2023**

This revealed that 81.5% of the respondents in the study areas are elites and have access to vital information on the implication of poor waste water disposal methods within the neighbourhoods which adverse effect will undermine the quality of the environment.

**Table 2 Occupation**

| Occupation | Respondents | Percentage |
|---|---|---|
| Civil servant | 129 | 40.3 |
| Trader | 87 | 27.2 |
| Farmer | 12 | 3.8 |
| Artisan | 56 | 17.5 |
| Others | 36 | 11.3 |
| Total | 320 | 100 |

**Source: Authors field Survey 2023**

It was revealed that 59.7% of the respondents are self employed which reflect on the quality of housing and has cause problems resulting to the fact that they were never planned by experts but sprang from suburb.

**Table 3 Households Income**

| Income level | Respondents | Percentage |
|---|---|---|
| Less than #30,000 | 105 | 32.8 |
| #31,000- #60,000 | 94 | 29.4 |
| #61,000-#90,000 | 51 | 15.9 |
| #91,000-#120,000 | 41 | 12.8 |
| #121,000 and above | 29 | 9.1 |
| Total | 320 | 100 |

**Source: Authors field Survey 2023**

It was revealed that 62.2% of respondents are low income earned which indicate that most of the households can barely build a house without considering the basic facilities that make the environment conducive for living.

**Table 4 Household Size**

| Household size | Respondents | Percentage |
|---|---|---|
| 1-4 | 101 | 32.5 |
| 5-8 | 88 | 27.5 |
| 9 and above | 131 | 40.9 |
| Total | 320 | 100 |

**Source: Authors field Survey 2023**

Table 4 reveals that 68.4% of respondents live above the average standard of Six (6) persons per household which is the approved standard in Nigeria, this implied that more waste water will be dispose on the surface of the environment on a daily basis were there is no waste water disposal method within the houses. The implication is that it will create difficulty in movement and destroy the beauty of the environment**.**

**Table 5 Sources of Households Wastewater**

| Sources | Respondents | Percentage |
|---|---|---|
| Laundry | 213 | 66.6 |
| Dishing washing | 36 | 11.3 |
| Bathroom | 53 | 16.6 |
| Flush toilet | 18 | 5.6 |
| Total | 320 | 100 |

**Source: Authors Field Work, 2023**

The study revealed that 66.6% of the respondents of waste water source are from laundry this because most of wastewater generation depends on the number of people in the household. In most part Fogun area it is common among the residents of the poorly settled areas to disposed wastewater along the major road.

**Table 6 Housing Types**

| Type of Housing | Respondents | Percentage |
|---|---|---|
| Compound house | 219 | 68.4 |
| Bungalow | 79 | 22.5 |
| Duplex | 29 | 9.4 |
| Total | 320 | 100 |

**Source: Authors field Survey 2023**

The survey revealed that 68.4% of the respondents live in compound houses were most houses connect storm water and other domestic wastewater to open gutter which is predominant in the traditional area. However, they do not have access to modern wastewater disposal facilities in their houses. The implication is that most waste water spill on the surface which in turn causes soil erosion within neighbourhoods.

**Table 7 Method of Wastewater Disposal**

| Method of Waste water disposal | Respondents | Percentage |
|---|---|---|
| Channels to Drainage | 63 | 19.7 |
| Open space within compound | 33 | 10.3 |
| Open Space Outside the Compound/ Road | 172 | 53.8 |
| Septic tank | 52 | 16.3 |
| **Total** | **320** | **100** |

**Source: Authors Field Survey, 2023**

Tables 7 revealed that 64.1% of most households dispose their wastewater on open space within and outside their compound were some household construct outlet to drain waste water out of their houses into major roads. The most commonly used method of wastewater disposal in Fogun zone outside the building, in Gbezhi the disposal method is on street or road, this is because there are no or poorly constructed drainage systems in the area. While in umaru majigi area most of the residents particularly those in the developed areas of Efu Madami dispose their wastewater through soak away while the least developed areas of Efu Tori area dispose theirs in Dug pit, Gutters, Free flow, and on street or road respectively. However, Households using septic tank facilities more reliable and almost maintenance free in disposing waste water, whereas drainage connections were perceived to be expensive and require frequent maintenance.

**Table 8: Correlation**

| Items | Income Level | Household Size | Disposal Methods | Types of Housing | Education Level |
|---|---|---|---|---|---|
| Income Level | 1.000<br>.<br>320 | -.012<br>.413<br>320 | -.64<br>.126<br>320 | .045<br>.120<br>320 | .084<br>.066<br>320 |
| Household Size | -.012<br>.413<br>320 | 1.000<br>.320 | .091<br>.004<br>320 | .078<br>.083<br>320 | .066<br>.119<br>320 |
| Disposal Methods | -.064<br>.126<br>320 | .091<br>.004<br>320 | 1.000<br>.320 | .075<br>.090<br>320 | -128<br>.011<br>320 |
| Types of Housing | .045<br>.210<br>320 | .078<br>.083<br>320 | -.075<br>.090<br>320 | 1.000<br>.<br>320 | -.038<br>.251<br>320 |
| Educational Level | .084<br>.066<br>320 | .066<br>.119<br>320 | -.128<br>.011<br>320 | -.038<br>.251<br>320 | 1.000<br>.320 |

correlation is significant at the 0.01 level (1-tailed)

## 6. Discussion

The Spearman rank correlation analysis was used to show the mean response of the respondents in relation to the household wastewater disposal practices in the study area. Kone & Doulaye, (2010) asserted that most urban settlements lack adequate facilities for disposing of wastewater. Wastewater generated has a severe adverse effect on mankind and the environment (Eme & Izueke, 2013). The volumes of wastewater from residential areas vary depending on the type of dwelling.

The result of the findings further strengthened the spearman rank correlation coefficient which show that there were very strong significant positive association between income level as it affect the provision of wastewater disposal within the compound and educational level has effect on the non-compliance with building bye-laws and regulations as they already manifesting ($r^s$ (320)=.084 p<001 show strong positive relationship; household size and housing types determine waste water generated by households which makes places unfriendly for people to live (rs (320) = .078 p< 0.01 show strong significant relationship; household size and disposal method create the avenue for wastewater open surface spill that force household to relocate (rs (320) =.091 p< 0.01 shows there was a strong positive relationship; and is being felt in the study area.

The study revealed that R=.0641% disposal methods were open space within and outside compound, a major contributory factor to environmental degeneration. Furthermore, it also revealed that income level and education level (r2 (320) =.084 p< 0.01 explained the rate most waste water spilled along the roads in the study area as showed in table 8. Households produce an average of 200-300litres of wastewater house every day, ninety nine percent of this wastewater is water, and the other one percent is the contaminating waste. There is no relationship between education qualification and method of households waste water disposal which mean being literate is not enough criteria to getting a building plan approval by town planning authorities. This implied that there will be a wide spread of slum within the neighbourhood giving room for environmental degeneration making study area a shanty.

### Environmental Degeneration

Wastewater is one of the worst sources and carriers of diseases. According to world health organisation, more than 3.4 million people die each year from a waterborne disease. Besides the diseases wastewater carries and there is a real danger when inhale sewage gas. The most immediate effect of waste water on the environment is when it contributes toward the contamination and destruction of natural habitats that live in those habitats by exposing them to harmful chemical that would otherwise not be present over the natural course of things.

Chemical that are harmful to crops may find their way to the soil when the wastewater is not treated. These chemical will cause the soil to yield fewer crop at a slower rate. Consider also the fact that these crops will eventually be eaten which can also harm humans.

The factors responsible for outdoor waste water disposal methods in the study area include the following, poverty, inadequate basic infrastructural amenities, over-crowding and non-compliance with building bye-laws and regulations. This has become a major problem of most built environment manifesting the statue of a slums and squalid environment in this 21st century.

**7. Conclusion**

The study examine indiscriminate households waste water disposal practice on environment in the study area, data obtained were from the respondents and the results show that household's size, housing types, and disposal method are major factor responsible for environmental degeneration in the study area. It also was revealed that education level of the respondents does not have any significant in the provision of household waste water disposal facilities within building. The outcome is capable of eliminating poor household waste water disposal practice and its consequential effect on the environment.

**Recommendations**

Based on the current practices and challenge, here we propose the following recommendations for the improvement of waste water disposal method in the study area. There is low awareness of environmental health risk, ineffective enforcement of regulations and user charges. The stakeholders should create more awareness and as well be fair in their regulation with considerable flexibility in order to encourage households to produce building plans that will guide against indiscriminate disposal of waste water in the study area.

The polluter pays principles (PPP) and other environmental laws should fully be adhered to, as other stakeholders collaborate with government to arrest the ugly effects of wastewater disposal in the study area.

There is need for urban planners to always involved all stakeholders such as CBOs and NGOs in planning workshop in which sanitation problems will be discussed, this is because town planning problems does not lay so much on lack of fund but rather our attitude toward the environment.

Building proposal should include design for waste water disposal method within a plot of land and Town planners should inspect every approved building plan to the period of habitation to avoid drainage within the building.

Households should be encourage to build septic tank or underground waste water collection that connect to a major drainage system within the neighbourhoods and also avoid channelling domestic waste water from their building to major road to reduce the rate of soil erosion.

However, in built up area drainage system should be constructed in front of every house to channel waste water to the main drainage system and as well all building should have a septic tank that will collect waste water from their houses. Septic systems remain a preferred option for wastewater management in un-sewered urban area this is because waste water from household should not exposed to the natural environment.

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