

APPLICATION OF GEOGRAPHIC INFORMATION SYSTEM (GIS) IN INTERNAL SECURITY OPERATIONS, A CASE STUDY OF JOS METROPOLIS, PLATEAU STATE, NIGERIA

BY

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INTRODUCTION

Mankind has since time immemorial has a thirst for warfare and this continues till today. Methods have changed with technology used in warfare, which is changing rapidly with technological revolution, which has not only changed the way wars are fought but has become key factors in attaining dominance in military power.). A defending force or weaponry with sufficient intelligence can locate with accuracy where an attacker is or what will be his future course of action would be, it will be easier to defeat him by occupying position of advantage or by massing a superior force at the point of decision. This statement would amply demonstrate how important is the spatial information to field commander or his superior at command headquarters for taking appropriate decision for response to military operations. In view of the frequency of the activities of the insurgency, terrorism, and other violent crimes in Jos, efforts have been made in this paper to illustrate the use of GIS as a decision support system with emphasis on ability to be readily accessed and used for security response operations.

STATEMENT OF PROBLEM

In view of the frequency of the activities of the insurgency, terrorism, and other violent crimes in Jos metropolis, it became necessary to employ GIS tools in understanding the trend and pattern of operations, plan, strategize and, enhance response time and evacuation of victims in the event of attacks.

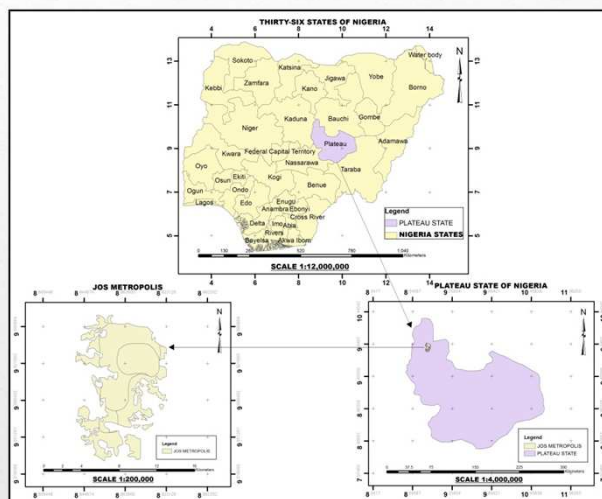
AIM OF THE STUDY

The aim of this paper is to demonstrate the use of GIS as an effective Decision Support System (DSS) for internal security operations in Jos metropolis

OBJECTIVES OF THE STUDY

1. Database Design for the study area
2. Acquisition of Geometric and Attribute data of the study area.
3. Database creation and linking attribute tables to geometric data.
4. Design a digital road network map.
5. Identify crime incident areas in the study area.
6. Performing spatial analysis

THE STUDY AREA



DATABASE DESIGN

The effective implementation of any GIS research lies on the proper planning and design of the database is known as the heart of GIS. The process of designing a database is known as data modeling, here real world entities and their relationships are analyzed and modeled to conform to the syntax of the software of choice (kufoniyi,1998) The design of database involves the following phases; **Conceptual design, Logical design, Physical design**

DATA SOURCES

The process carried out involved the collection of primary data, that is, location data of facilities through field observation using the Garmin handheld Global Position System (Garmin CP76). While the secondary data source include Google earth imagery updated in the the month of October, 2012 and documentations from International crisis group

DATABASE CREATION

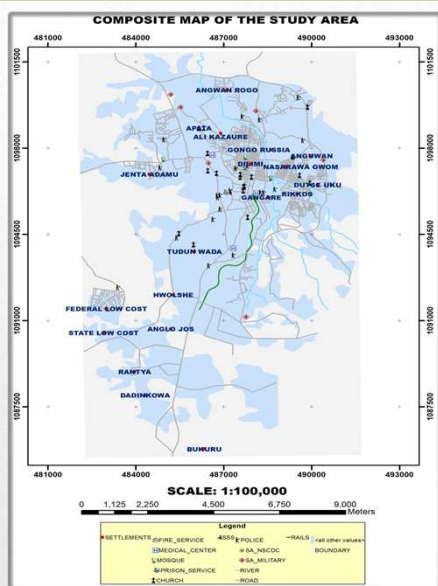
Following the design phase, the database was created and populated in ARCGIS environment. Polygon, Line and Point layers were created respectively for the identified entities. These form individual relations which were then populated with their attribute values.

Sample of the table created

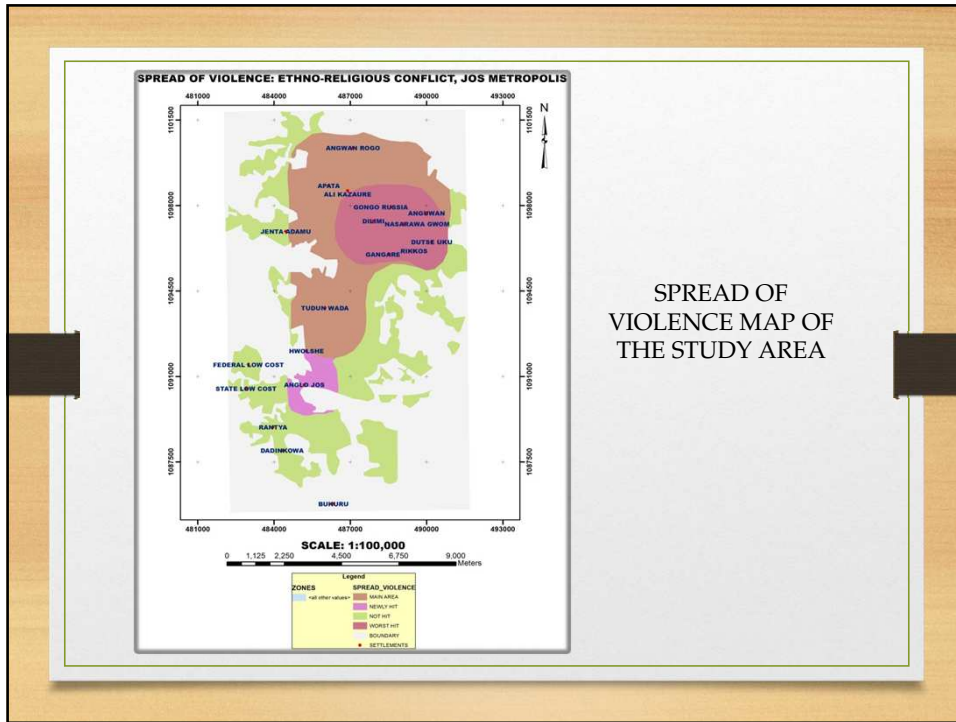
SETTLEMENTS		
OBJECTID *	SHAPE *	S_NAME
1	Point	BUKURU
2	Point	DADINKOWA
3	Point	RANTYA
4	Point	ANGLO JOS
5	Point	HWOLSHE
6	Point	TUDUN WADA
7	Point	JENTA ADAMU
8	Point	GANGARE
9	Point	RIKKOS
10	Point	DUTSE UKU
11	Point	NASARAWA GWOM
12	Point	DILIMI
13	Point	ANGUWAN
14	Point	GONGO RUSSIA
15	Point	ALI KAZAURE
16	Point	APATA
17	Point	ANGWAN ROGO
18	Point	FEDERAL LOW COST
19	Point	STATE LOW COST

SPATIAL OPERATIONS

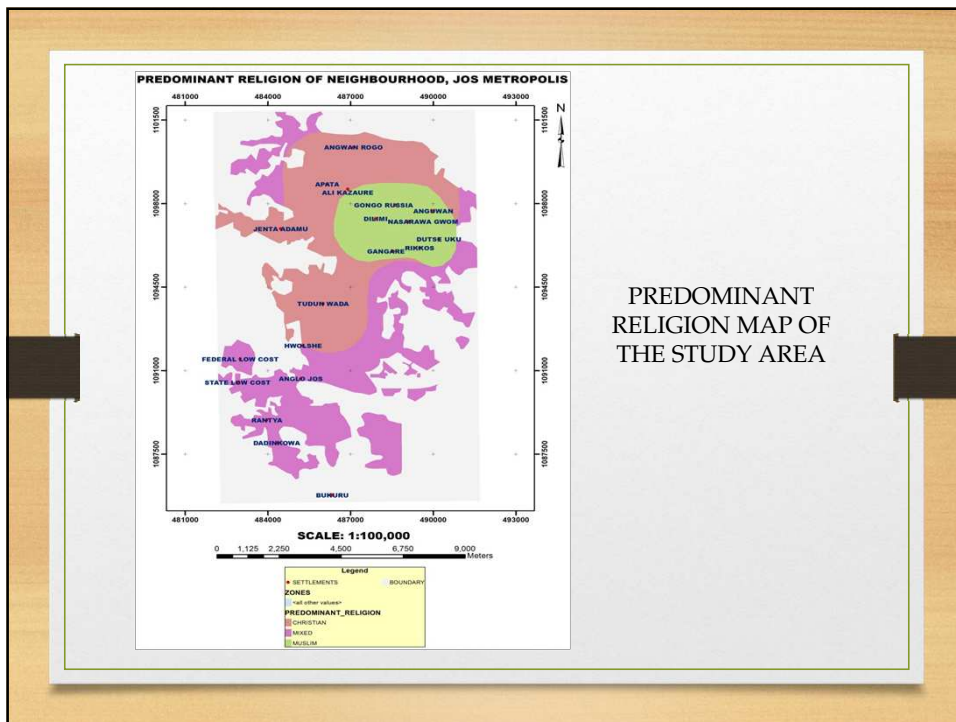
There is a wide range of function for data analysis in most GIS packages; this is what distinguishes GIS from all other information systems. These capabilities use the spatial and non-spatial data in the spatial database to answer questions and solve problems that will be used as a decision support system



COMPOSITE MAP OF THE STUDY AREA



SPREAD OF VIOLENCE MAP OF THE STUDY AREA



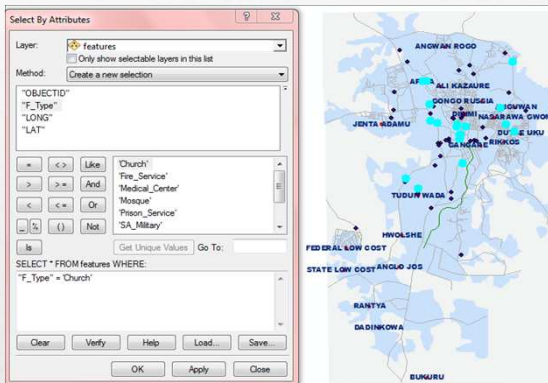
PREDOMINANT RELIGION MAP OF THE STUDY AREA

SPATIAL SEARCH

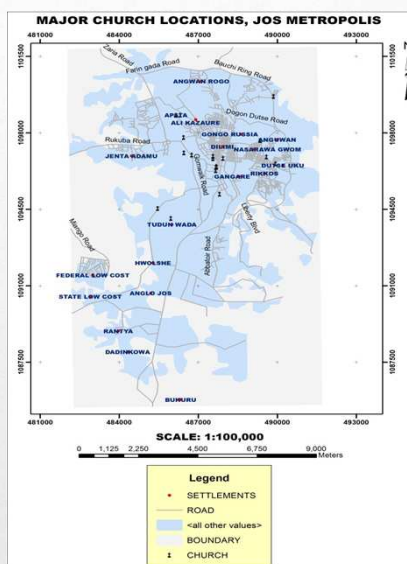
The following queries were performed in this research.

Query 1: Select churches within the study area

Syntax: "F_Type" = 'Church'



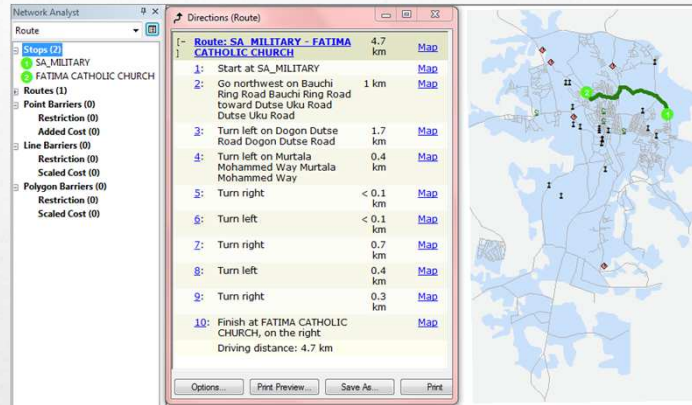
Query for major church locations within the study area



MAJOR CHURCH LOCATIONS WITHIN THE STUDY AREA

NETWORK ANALYSIS

Best route analysis from a military post to Fatima Catholic Church



Alternative route analysis from a military post to Fatima Catholic Church



Best route analysis from a military post to Central Mosque



Alternative route analysis from a military post to Central Mosque



Comparison between best and alternative route

LOCATION	BEST ROUTE	ALTERNATIVE ROUTE	DIFFERENCE
Military post to Fatima catholic church	4.7km	5.4km	39.0m
Military post to Fatima central mosque	6.4km	6.5km	

NETWORK CLOSEST FACILITY ANALYSIS

Closest facility operation to determine the closest Medical center from a bomb incident at Rukuba market

The screenshot shows the 'Directions (Closest Facility)' window with the following data:

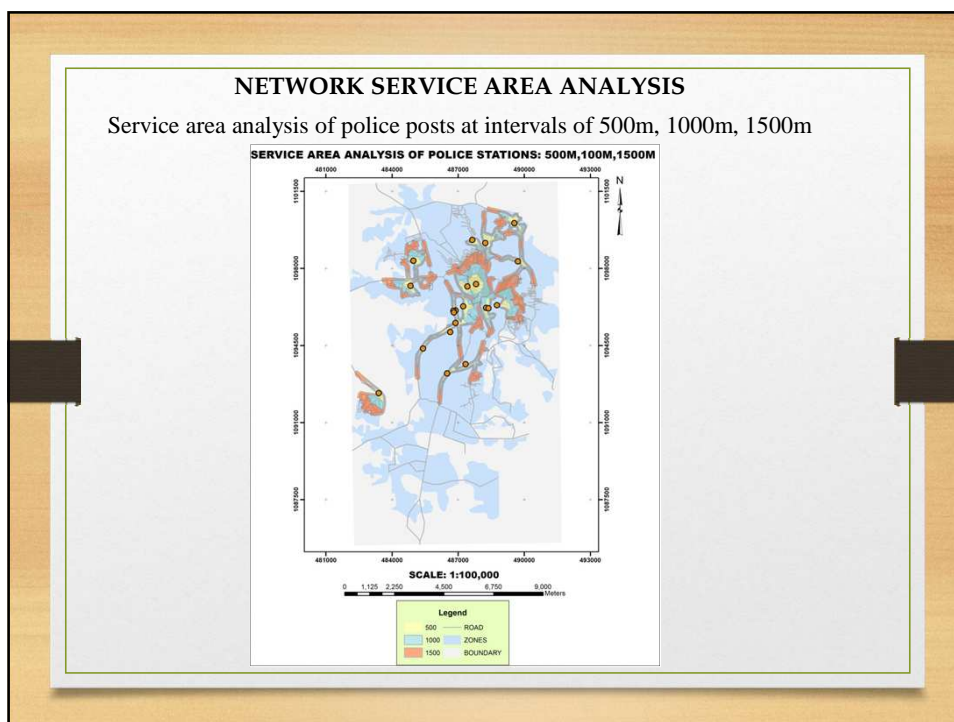
Route	Distance (km)
Route: TEACHING HOSPITAL JOS - RUKUBA MARKET	3.2
Route: HOSPITAL - RUKUBA MARKET	4.3
Route: PLATEAU SPECIALIST HOSPITAL - RUKUBA MARKET	5.8

The directions for the 3.2 km route are:

- 1: Start at TEACHING HOSPITAL JOS
- 2: Go north on Murtala Mohammed Way Murtala Mohammed Way
- 3: Turn right
- 4: Turn left
- 5: Turn right on Market St Market St
- 6: Continue on Angwan Nassarawa Road Angwan Nassarawa Road
- 7: Turn left to stay on Angwan Nassarawa Road Angwan Nassarawa Road
- 8: Finish at RUKUBA MARKET

Driving distance: 3.2 km

The closest of the medical centers is teaching hospital Jos



Service areas of the mapped police posts were also indicated at distances of 500m, 1000m and 1500m were traveled as illustrated in figure 14. Sixteen (16) churches are within 500m service areas of the Police posts

CONCLUSION

Modern security operations involve combined forces and an integrated approach for evaluating battle area for mobilizing logistics, moving various forces and setting communication network for effective operations in real time scenario are very necessary prerequisite for successful operations. In this paper, a map showing the location and spread of violence in Jos metropolis has been produced. Location of important security posts were also shown on a map. The analyses performed can be used as a support for decision making processes for security agencies

RECOMMENDATIONS

1. It is recommended that GIS should be introduced or adopted in collaboration with other forms of security management systems.
2. Effective training should also be given to security personnel on how to apply the technology successfully.

