

# GEOSPATIAL TECHNOLOGY APPLICATION FOR TUGI VILLAGE LAND USE PLANNING CONCEPT

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Over time, there have been landuse conflict in Tugi village as it is in any part of the world.

In order to protect and manage the environment, Tugi village has put in place a rural land use planning committee with an objective to develop a sustainable landuse plan for natural resources management.

Land use planning is the systematic assessment of land and water potential, economic and social conditions in order to select and adopt the best land use options that will best meet the needs of people today while safeguarding resources for the future generations.

Environmental Resource Trust (EReT) Cameroon, the main local NGO working with this committee is using remote sensing and Geographic Information Systems (GIS) in mapping the past and present landuse of the study area. ESRI ArcView is used for spatial analysis and the results will be a GIS based sustainable landuse plan for the village community.

**1.THE TUGI LAND USE PLANNING COMMITTEE:**The Tugi village landuse planning committee is headed by a land use Commissioner and assisted by a cross section of local and administrative authorities.

## **2.RATIONAL OF THE STUDY**

This study will provide temporal and spatial information with regards to patterns and extent of land use change and well as the bio-physical and socio-economic driving forces leading to the change. The Tugi area is selected for the study because of its importance in subsistence agriculture and commercial grazing which, however, is greatly threatening the rare, montane and riparian forest of the North West Cameroon. Tugi land use area falls in the Bamenda Highlands which is itself part of the Cameroon mountains. The cameroon mountains are of national and international priority for conservation due to the uniqueness of landscape, the rare, endemic and

threatened species of socio-economic, cultural and ecological importance that are housed in this biome .

Unsustainable exploitation of resources in this area is a threat to the landscape, the biological diversity in this area as well as the the people living there. There is thus a need to developed a land use plan for the sake of making the optimum use of the land and its resources without compromising for the coming generations. The need for information on land use change for about two decades is needed for the land use planning process to begin and that is what this research is focussed on. Tugi village is particularly selected for this study (as pilot project) because this community has already formed a landuse planning committee but no study has been made in this area from which they can have information to apply for their planning.

Moreso, the study area is relatively of very rough terrain and it will take a very long time, or could be virtually impossible to determine the extend of change in land use using the conventional survey methods and topographic maps only. Hence, Remote sensing and Geographic Information Systems most reliable and cost effective method that will allow data collection and analysis of areas that are inaccessible by conventional surveys.

**3.LAND USE IN TUGI VILLAGE:**The Tugi village present landuse is made up of the following classes:

- Agriculture (farming land)
- Grazing land
- Forest land
- Kola nut forest
- Swampy area
- Fern area
- Raphia bushes
- Settlements (quarters)
- Roads network
- Water network
- Rocky areas

#### **4.PRESENT ECONOMIC ACTIVITIES**

- Animal breeding
- Wine tapping
- Farming
- Honey harvesting
- Hunting
- Petty trading
- Transportation
- Grass cutting
- Timber exploitation

**5.LANDUSE CONFLICT:** The main land use conflict in the study area is cattle grazing versus farming in combination to bush fires that leads to land degradation.

**6.OBJECTIVES OF THE LAND USE PLAN :** Land use planning is the systematic assessment of land and water potential, economic and social conditions in order to select and

adopt the best land use options that will best meet the needs of people today while safeguarding resources for the future generations.

Considering the rapid degradation of land and its resources, Tugi village formed a land use planning committee to use expert knowledge in resolving this situation for better environmental protection. Environmental Resource Trust a local NGO was contacted and we resolved to use remote sensing, GIS and participatory rural appraisal methods to develop the land use plan.

**7.ARCVIEW GIS APPLICATION FOR THE PARTICIPATORY LAND USE PLANNING CONCEPT.** Due to the lack of satellite images and aerial photographs of the study area, a digital camera was used to snap pictures of areas which have prominent land cover types represented in the village. The study area was divided into planning zones according to population distributions as will be presented below in this paper. Each zones took into consideration areas which where all known by the local community.To limit the number of maps for this presentation, we are presenting only data on zone one. The photographs were georeferenced to the UTM coordinate system. All land cover classes were digitized and saved as shapefiles . A geospatial database was created to enable spatial queries that responds to local community needs as agreed in the land use plan.

**8.PROJECT AREA BOUNDARIES MAPPING:**The project area boundaries demarcation will use a participatory approach whereby villagers will first go around the village boundaries in a reconnaissance survey. In case of boundary conflict with neighboring villages a peaceful solution will be arrived at.

The final mapping will be done by Global Positioning System (GPS) tracking and field data will be downloaded in a Geographic Information System (GIS) and data will be georeferenced to the Universal Transvers Mercator (UTM) projection.

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#### **Present land use**

- Agriculture (farming land)
- Grazing land
- Forest land
- Swampy area
- Fern area
- Raphia bushes
- Settlements (quarters)
- Roads network
- Water network

During a landuse planning workshop, a stakeholder analysis was made and the following data was collected.

## 9.STAKEHOLDERS ANALYSIS AND WAY FORWARD

| Stakeholder            | Land use type                | Observation  | Recommendation  |
|------------------------|------------------------------|--|---|
| Local community        | Land use and land cover      | Village boundaries not entirely known                                      | Map out entire village boundaries   |
| Farmers                | Forest land Hills and swamps | Degraded, Conflict with graziers, ferns invasion,bush fires                | Afforestation ,development of prunus africana, control bush fire,develop community fish breeding pond . |
| Graziers               | Grazing land                 | Conflict with farmers, no enough fodder grass.excess fern plants,bush fire | Increase grazing land with the replacement of fern plants with fodder grass and pygeum                  |
| Hunters                | Forest land                  | Degraded and uncontrolled bush fires                                       | Village security guards and villagers trained on bush fire control                                      |
| Traders                | Markets                      | Cattle,sheep,goats ,pigs,horses  | Organize cattle market  |
| Women                  | Forest land                  | Raphia invasion  | Conserve farm land only for farming   |
| Youths                 | Forest land<br>Grass land    | Trapping<br>Cluster settlement   | Domesticate animals<br>Create resettlement layout, educational and commercial center at Buhzob and Acha |
| Prunus harvesters      | Forest land                  | Extinct  | Regeneration and community create plantations   |
| Transporters           | Road network                 | Poor   | Discuss with rural development project  |
| Tappers                | Raphia bushes                | Excess wine but no market  | Look local transformation methods and check new markets   |
| Bororos                | Forest land                  | Fuel wood  |   |
| Kolanuts harvesters    | Kola nut forest              | Grazing activites  | Avoid grazing in kolanut forest   |
| Bee farmers            | Forest,plantation            | Good quality honey   | Produce great quantity and look for marketing strategy  |
| Timber exploiters      | Forest land                  | Timber,fuel,wood shortage  | Develop timber regeneration   |
| Government departments | All                          | Participate in the planning process  | Approve the plan  |
| Local authority        | All                          | Sensitize  | Implement the plan based on agreed regulations  |

## 10. EXPERTS REQUESTED FOR THE SUCCESSFUL IMPLEMENTATION OF THE LAND USE PLAN

| Stakeholder            | Land use type                | Observation  | Experts required   |
|------------------------|------------------------------|--|--|
| Local community        | Land use and land cover      | Village boundaries not entirely known                                      | Geoinformation Expert ,GPS mapping and GIS (Peace corps)         |
| Farmers                | Forest land Hills and swamps | Degraded, Conflict with graziers, ferns invasion,bush fires                | Agronomist with expertise in crop multiplication and production. |
| Graziers               | Grazing land                 | Conflict with farmers, no enough fodder grass.excess fern plants,bush fire | Livestock expert (Peace corps)                                   |
| Hunters                | Forest land                  | Degraded and uncontrolled bush fires                                       | Experts in wildlife domestication                                |
| Traders                | Markets                      | Cattle,sheep,goats ,pigs,horses  | Marketing strategy   |
| Women                  | Forest land                  | Raphia invasion  | Conserve farm land only for farming                              |
| Youths                 | Forest land<br>Grass land    | Trapping<br>Cluster settlement   | Social forester  |
| Prunus harvesters      | Forest land                  | Extinct  | Social forester  |
| Transporters           | Road network                 | Poor   | Discuss with rural development project                           |
| Tappers                | Raphia bushes                | Excess wine but no market  | Expert in distilling   |
| Bororos                | Forest land                  | Fuel wood  | Social forester  |
| Kolanuts harvesters    | Kola nut forest              | Grazing activities   | Social forester  |
| Bee farmers            | Forest,plantation            | Good quality honey   | Bee keeping  |
| Timber exploiters      | Forest land                  | Timber,fuel,wood shortage  | Social forester  |
| Government departments | All                          | Participate in the planning process  | Coordination   |
| Local authority        | All                          | Sensitize  | Project management   |

**CONCLUSIONS:** New land use types have been introduced such as fodder grass planting, prunus Africana plantation development, fish ponds development, partial extinction of fern grass, bee keeping, clustered settlement pattern, improved grazing system, buffer zone development, reforestation and modification of the land tenure system by putting in place part of the village land for industrial grazing .

References:

landuse planning FAO

Remote sensing of the environment