# Liberia Meteorological Service

## Criteria for selecting location for synoptic stations

**Background**

Liberia is divided into political subdivisions with 15 counties which are also subdivided into districts, clans and towns. Among the 15 counties, there are four counties with large population density, social, and economic viability with a significant agriculture activities that are normally considered the food basket counties based on their food security significance.

These counties are Lofa, Nimba, Bong, and Grand Gedeh followed by Montserrado which is a commercial county. There are coastal counties for which the Atlantic Ocean has a major influence on their weather and climate system. These coastal counties are: Grand Cape Mount, Grand Bassa, Sinoe, Maryland, Rivercess, Grand Kru, Margibi and Bomi County. There are also other counties that have major Agro-Plantations, mining activities, research institutions and national forest reserved that are uninhabited and therefore have limited human activities in these areas making them unsuitable for placing stations.

The proposed Station sites selection is based on the Global Basic Observing Network (GBON) station distancing requirement per station 100 or 200 kilometer apart to ensure acceptable density for purposes of national development.

Hence the project will focus on the significance of the counties as mentioned.

- The larger counties with population and economic viability and food security significance for spatial courage based on the 200 Km requirement from the matrix
- Coastal counties
- major Agro-Plantations, Mining, and Research institutions and Reserved National Park (Forest)

However, there will be some gaps in station distancing between some places due to the following:

- uninhabited forested land
- National forest reserves

**Criteria for selection of location for synoptic station include the following**

- **County Preference**
  The size and population density of the various counties

- **Security and Accessibility**
  Station location in a town with local government presence
  The presence of national securities in the area

- **Nearness To Public Institution**
  The presence of a secondary school, local community college.

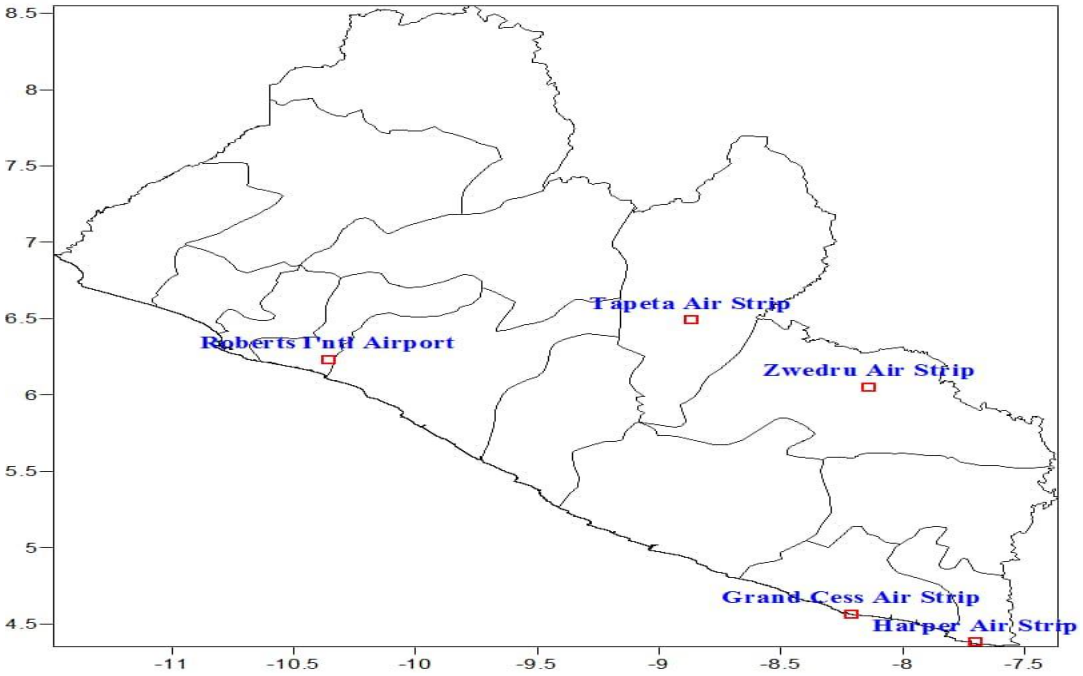
- **Social and economic viability of the area.**
  The presence of economic activities such as trade, commerce, plantation as well as research institutions and population density can induce commercial and other social economic viability in an area. Hence these factors should be considered.

- **placement of stations at least 100Km or 200km apart is to ensure acceptable density for the purpose of national development**
  A selected group of counties will be considered into stages until the entire country is completely covered.
  Hence, the first five counties mentioned above will be considered for the first stage.

**Table 1: Existing Synoptic Stations**

| No. | Station Name | Latitude | Longitude | Elevation |
|---|---|---|---|---|
| 1. | SYNOPTIC Roberts I'ntl. Airport | 6.233547 | -10.360229 | 16m |
| 2. | SYNOPTIC Zwedru Air Strip | 6.053333 | -8.1380560 | 213m |
| 3. | SYNOPTIC Tapeta Air Strip | 6.494167 | -8.8686110 | 272m |
| 4. | SYNOPTIC Harper Air Strip | 4.383335 | -7.7000010 | 9m |
| 5. | SYNOPTIC Grand Cess Air Strip | 4.566389 | -8.209444 | 21m |

**Note:** The elevation in the above table was obtained from google earth and therefore requires authenticating/validating.



**Map 1: Existing Synoptic Stations**

- All the existing synoptic stations started operating on February 2019
- The Parameters being measured by the existing synoptic stations include: barometric pressure, global radiation, precipitation, relative humidity, wind speed, wind direction and temperature
- The data are stored on a server at the Ministry of Transport and on the stations themselves
- The data are not transmitted on GTS due to limited capacity
- All of the synoptic stations are placed at air strips that were used for domestic travel activities

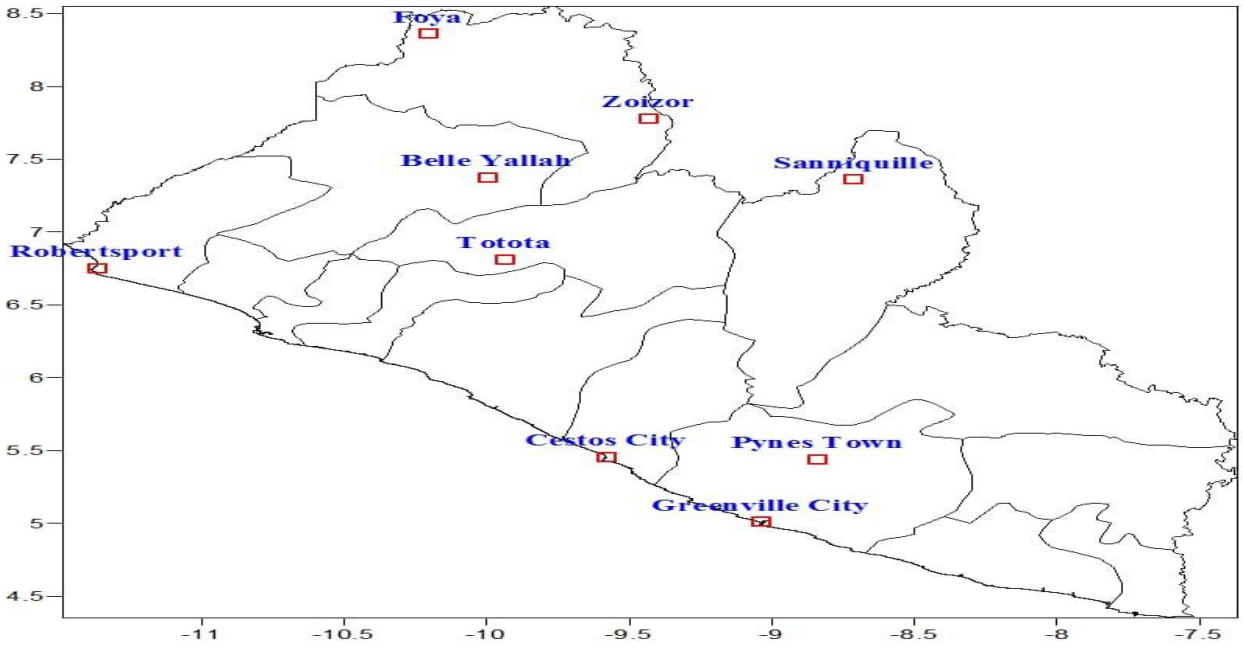
**Technical Challenges**

- Lack of internet data to transmit data from station to office network
- Lack of maintenance (grass cleaning, cleaning of solar panel, pyranometer, leaf wetness sensor, etc)
- lack of logistics (transportation/vehicle, DSA) for station maintenance
- lack of office internet to monitor station performance
- unable to perform QA/QC on data from existing stations
- Unable to provide station name base on WMO Standards
- unable to meet WIGOS, GBON, OSCAR, etc. requirements
- unable to transmit data on GTS

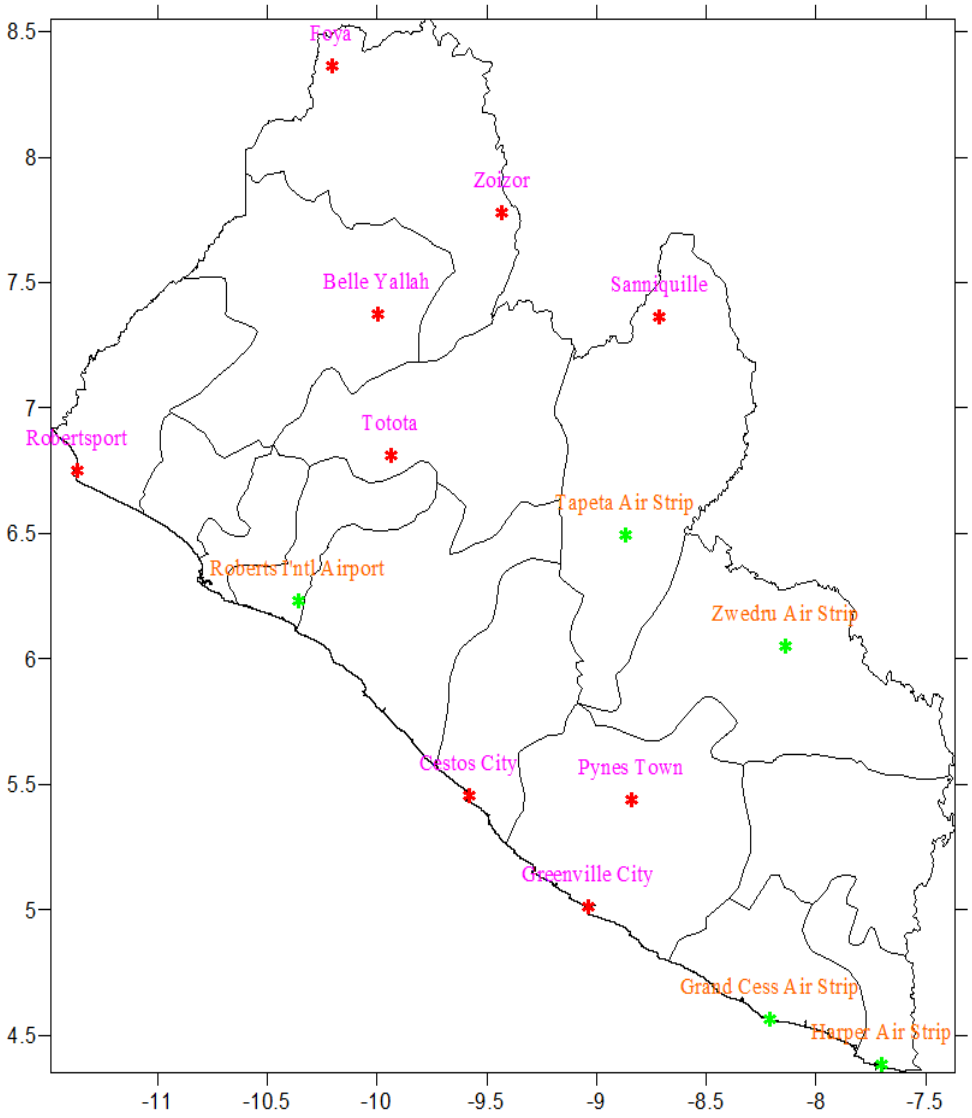
**Table 2: Proposed Synoptic Stations**

| No. | Station Location | County | Latitude | Longitude | Radius Distance |
|---|---|---|---|---|---|
| 1. | Foya | Lofa | 8.36219 | -10.20678 | Foya to Guinea border: 9.92 KM West, Foya to Belleh Yallah: 111.12KM South |
| 2. | Belleh Yallah | Gbarpolu | 7,3764 | -9,9983 | Belleh Yalla to Foyah: 111.12KM North, Belleh Yallah to Robertsport: 156.32KM South |
| 3. | Sanniquille | Nimba | 7.3621 | -8.7133 | Sanniquelle to Guinea border: 11.88 KM North, Sanniquelle to Totota: 139.9 KM South |

| | | | | | |
|---|---|---|---|---|---|
| 4. | Zorzor | Lofa | 7,7794 | -9,4303 | Zorzor to Guinea Border: 6.6KM, Zorzor to Voinjama: 80KM, Zorzor to Totota: 133.23KM |
| 5. | Robertsport | G. Cape Mount | 6.7533 | -11.3671 | Robertsport to Sierra Leone border: 24.83 KM Robertsport to RIA: 88.4KM, Robertsport to Totota:132.73KM |
| 6. | Totota | Bong | 6.8122 | -9.9386 | Totota to Sierra Leone Border: 142.76KM West, Totota to Guinea: 81.10KM North |
| 7. | Cestos City | Rivercess | 5.4568 | -9.5817 | Greenville to Cestos: 79.71 KM West |
| 8. | Greenville City | Sinoe | 5.0113 | -9.0388 | Greenville to Zwedru: 148.71 KM North, Greenville to Granscess: 78.73KM East |
| 9. | Pynes Town | Sinoe | 5.54 | -6.81 | Greenville to Pynes Town: 109.96KM South, Pynes Town to Zwedru: 50KM North |




**Map 2: Proposed Synoptic Stations**




**Map 1: Existing and Proposed Synoptic Stations**

**Legend**

Existing Synoptic Stations

Proposed Synoptic Stations