

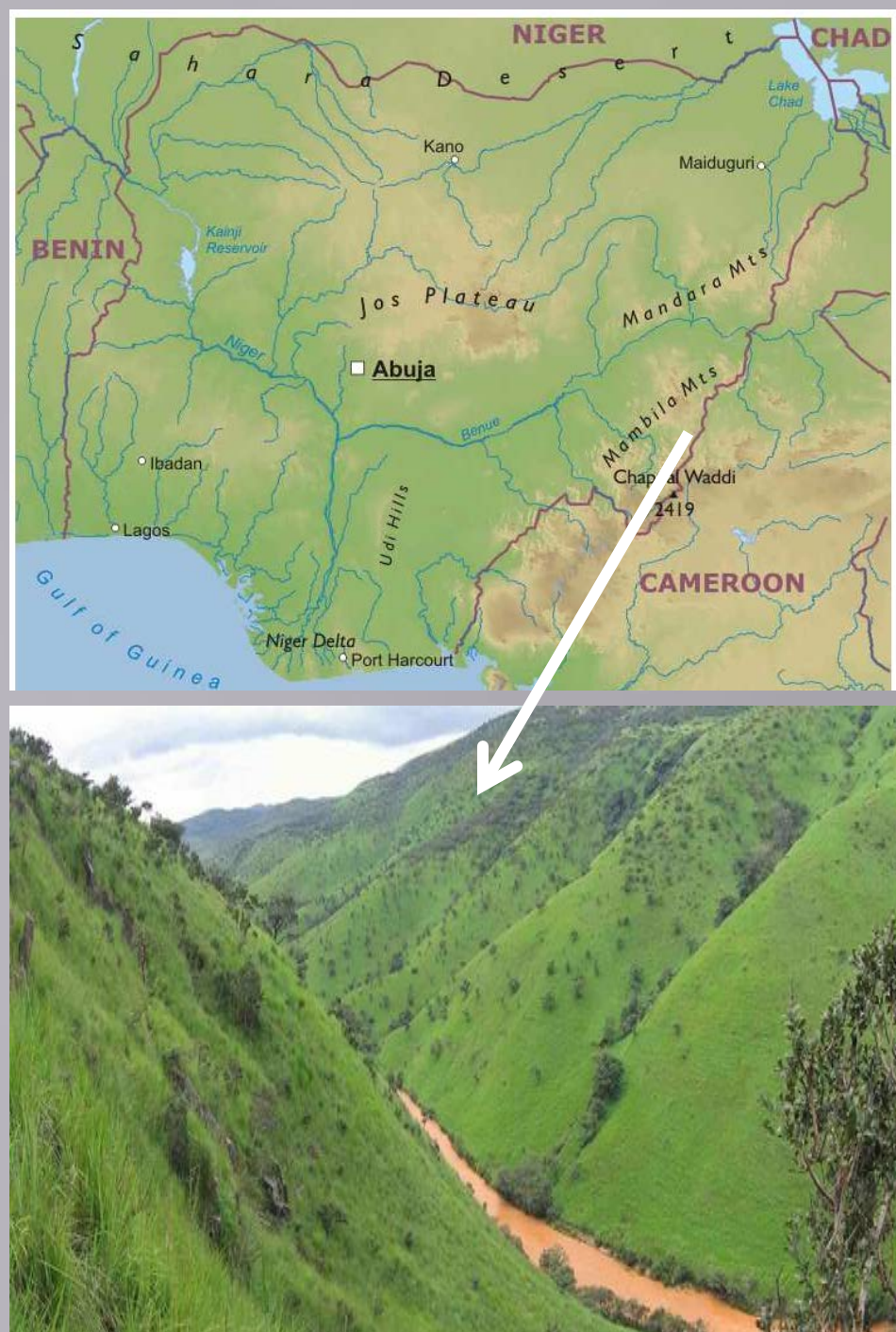
Exploring the Adaptation of Conifers on Mambilla Plateau, NE Nigeria



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Geographic Data of Mambilla



Latitude: 6.7138N
Longitude: 11.2500E
Average Alt: 1600m (5000ft)
Average annual Temperature:
16°C (61 F)
January and December:
9-10°C (48.2-50°C)
Mean annual Rainfall:
1800mm (70 in)
Vegetation: grasses, shrubs,
planted forests and crops
(eucalyptus, apples, pears)

Objectives and Goals

Nigeria is in need of softwood plantations for pulp and lumber. Currently, only eucalyptus is grown on Mambilla. I came to WFI to learn about the possibility of using PNW conifer species for growing in Nigeria.

My Goals:

- Identify conifers that are suitable for Mambilla Plateau
- Develop a plan for sustainable conifer plantations on the plateau
- Boost the economy of the plateau dwellers by providing jobs and income

Steps involved in pre-selection of species

- Extensive literatures review
- Field tours of tree farms within PNW
- Study of timber/lumber value of species suitable for plantations
- Adaptive capacity of species
- Interviews of land owners and forest managers in PNW
- Consultations with academic experts in the field
- Mambilla plateau ecological condition as base line

Methodology

- Parameters set with Mambilla site in focus characteristics- data from previous research (Geography Dept FUTY Nigeria)
- Took PNW species data for three variables: rainfall, temperature, geographic location
- Climate Envelope Model was used to determine the native range (ecological niche) of PNW conifers
- Compared and matched PNW species data with Mambilla data

What are the conifers to explore?

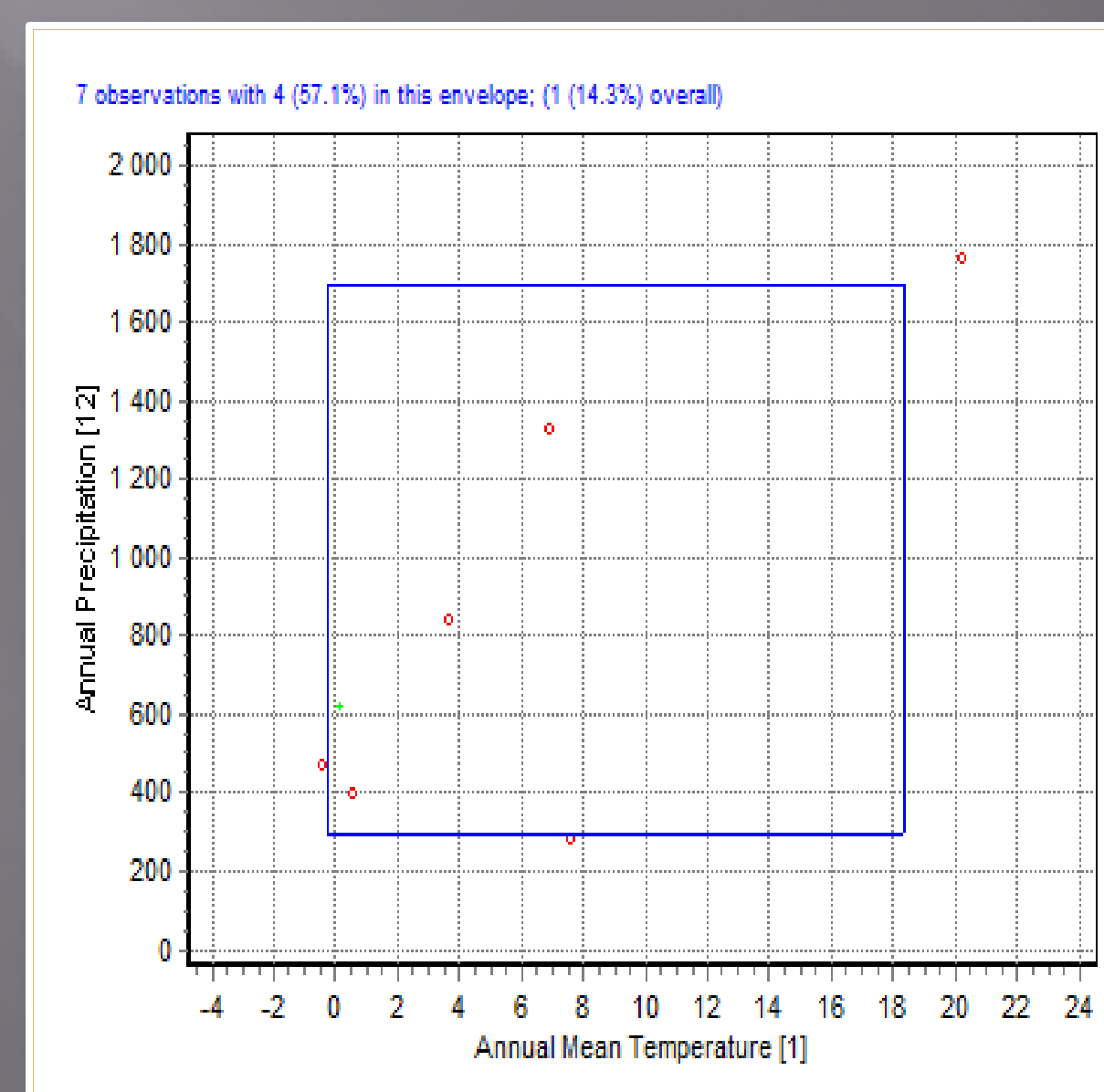
The following conifers fall within the ecological parameters of Mambilla:

- Pinus patula* (Mexican weeping pine)
- Pinus radiata* (Monterey pine)
- Pinus caribaea* (Caribbean pine)

- Pseudotsuga menziesii* (Douglas-fir)
- Thuja plicata* (Western red cedar)
- Pinus ponderosa* (Ponderosa pine)
- Pinus taeda* (Loblolly pine)

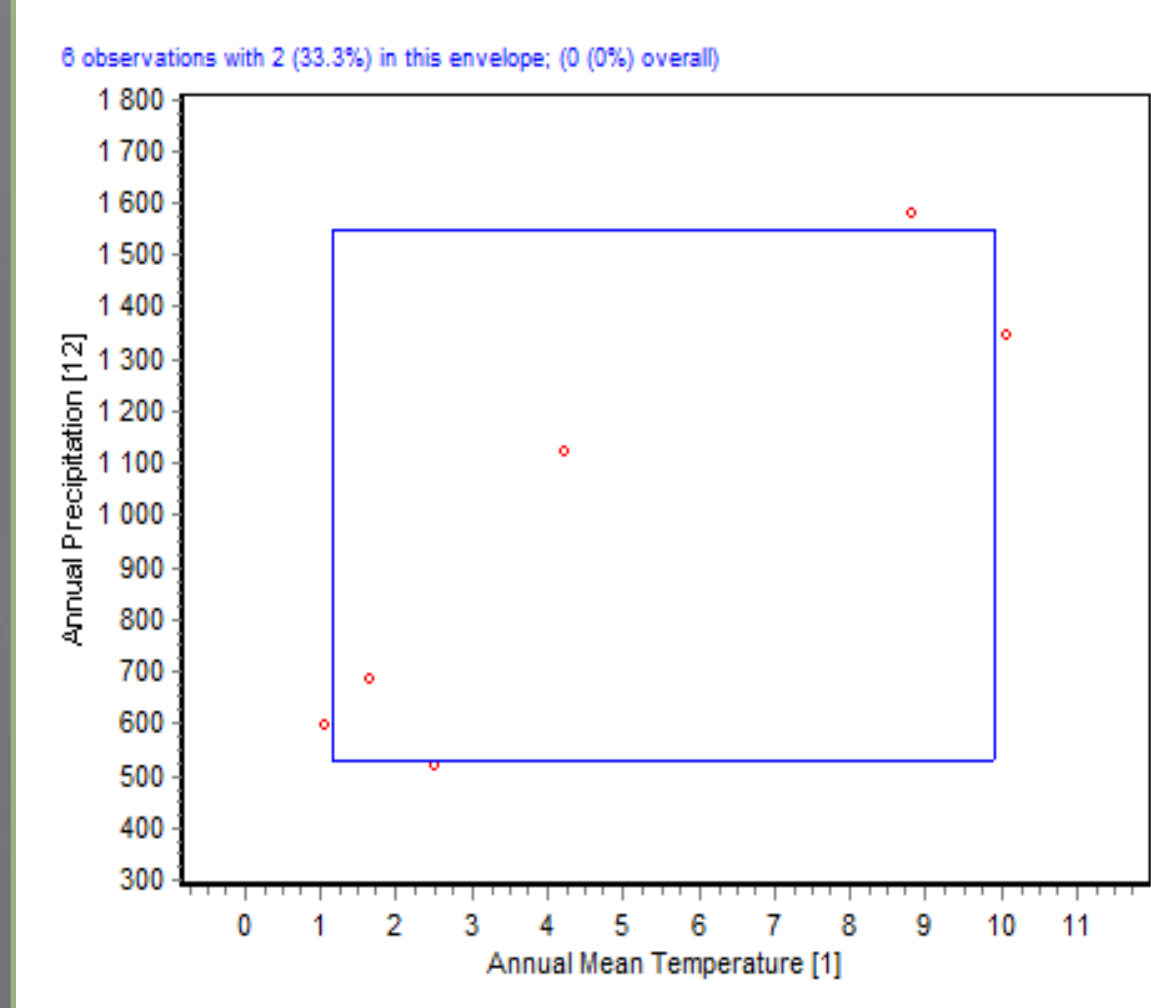
- Conifers in red are those I focused on for this project

Douglas fir: Climate Envelope Model



- The blue rectangle represents the ecological niche boundary of Douglas fir
- Red points within the blue rectangle are presence points
- Given the temp. and precip. averages in Mambilla, Douglas fir conceptually falls within its' ecological niche and would be suitable to plant there.

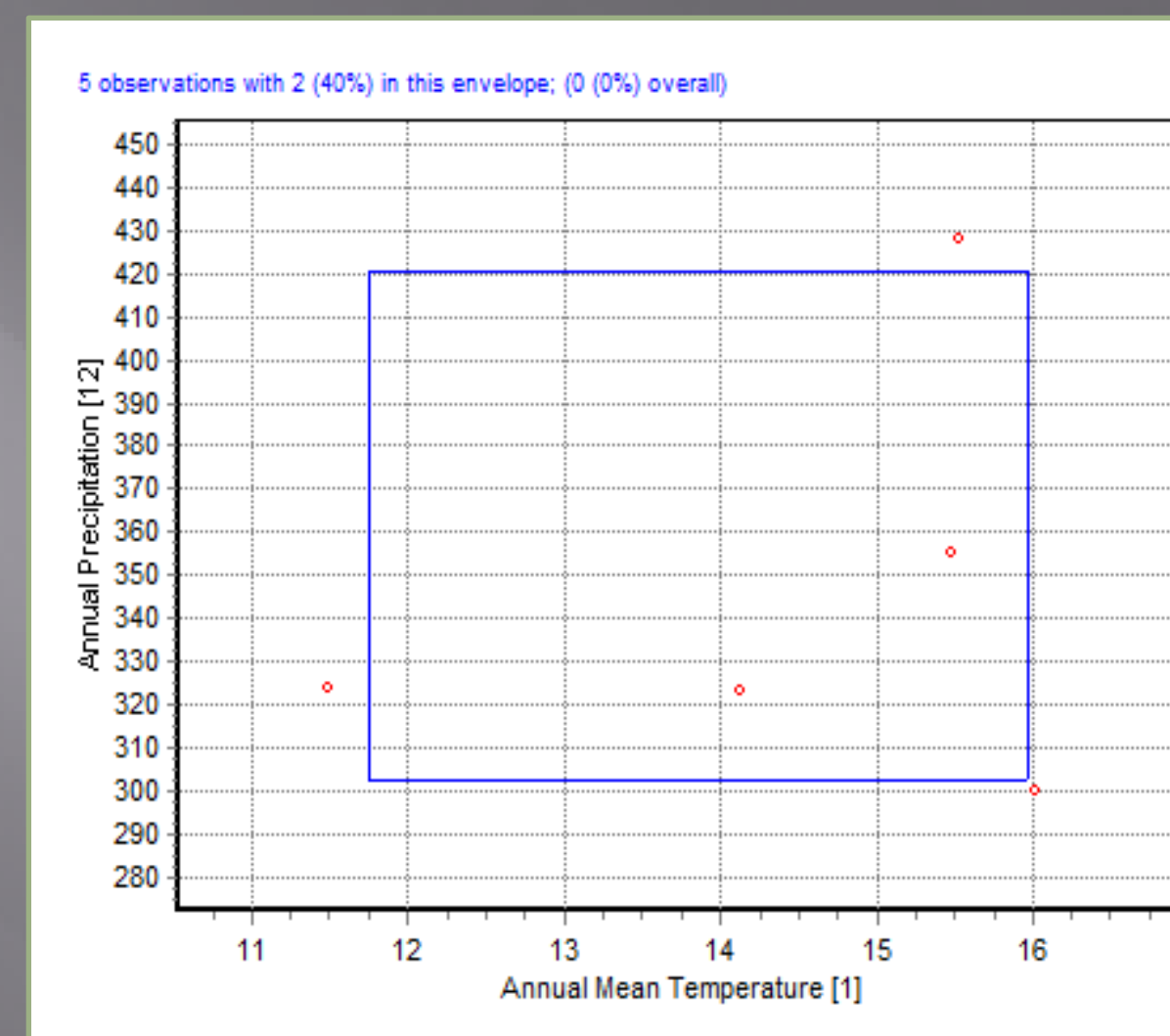
Western red cedar: Climate Envelope Model



- Western red cedar would be limited to a relatively colder region on the plateau where the annual rainfall is ~ 1500mm

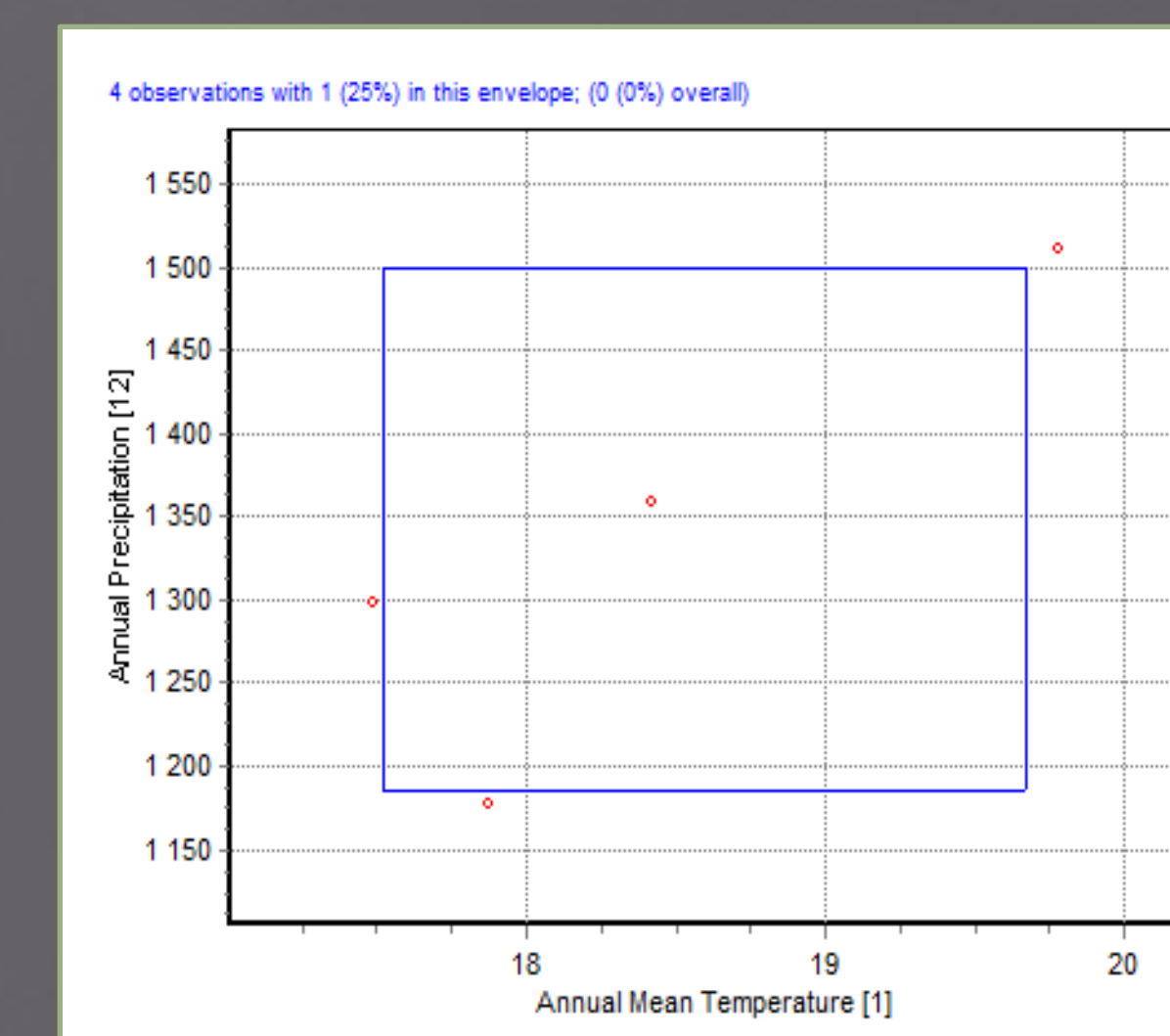


Ponderosa pine: Climate Envelope Model



- Ponderosa pine could occur in relatively warm areas, as long as the rainfall is not in excess of 1000mm
- On the Mambilla plateau this species could probably be tried in one of four possible sites - the Nguroje site

Loblolly pine: Climate Envelope Model



- The mean annual temperature and the annual rainfall variables of loblolly are within the range found on the plateau

Summary of potential sites on Mambilla for each species

species	sites	remarks
Loblolly pine	Dorofi, Gembu	Relatively high mean temperature and rainfall
Ponderosa pine	Nguroje	Cooler temperature moderate rainfall
Douglas-fir	Dorofi, Maisamari	Similar soil, good rainfall tolerable mean annual temperature
Western red cedar	Maisamari	Heavy rainfall, tolerable temperature

Lessons learned from PNW

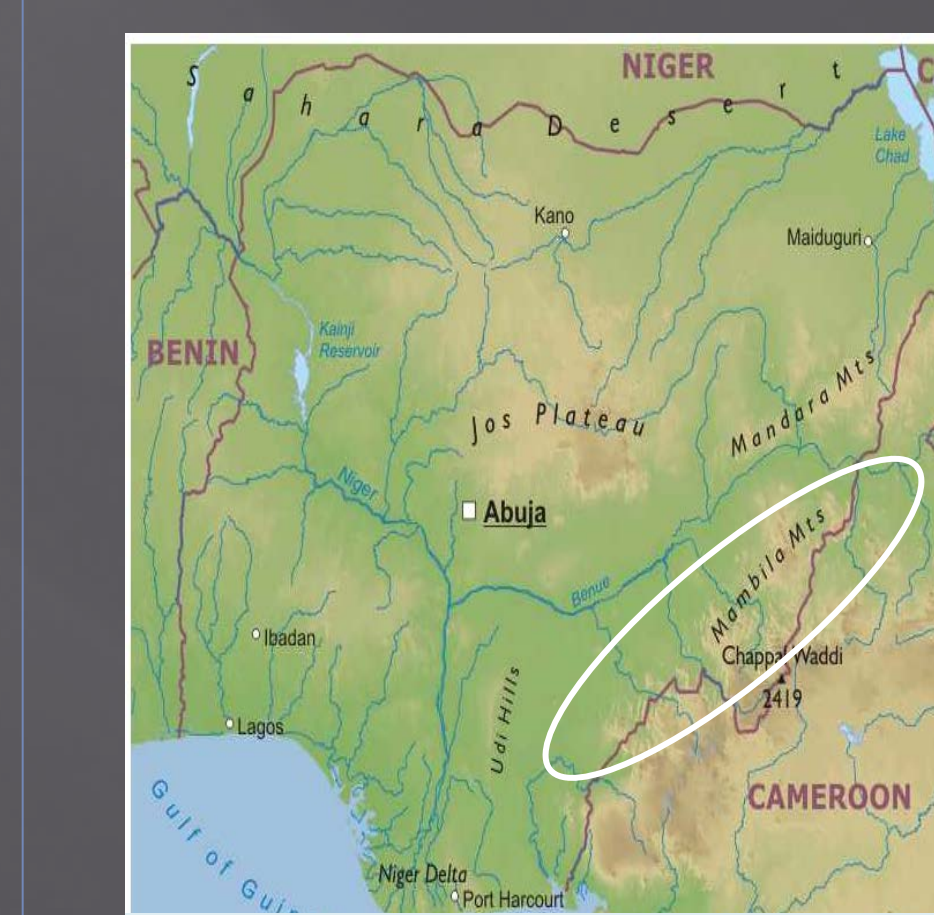


- Douglas fir can re-establish itself in area previously logged and burnt
- P and K are essential nutrients for Douglas fir and western red cedar in early years of growth



- Lower soil temperature reduces nutrient uptake in Douglas fir
- Source and quality of seedling are critical factors
- Introduction of exotic pests and diseases must be considered

Conclusion and Recommendations



- Two sites (Dorofi and Maisamari) have high potential for the growth of almost all the conifers
- Gembu sites is particularly identified for Loblolly pine
- Further field trials and experiments are required before any full-scale operation begins

Maisamari, Gembu, Dorofi, Nguroje

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