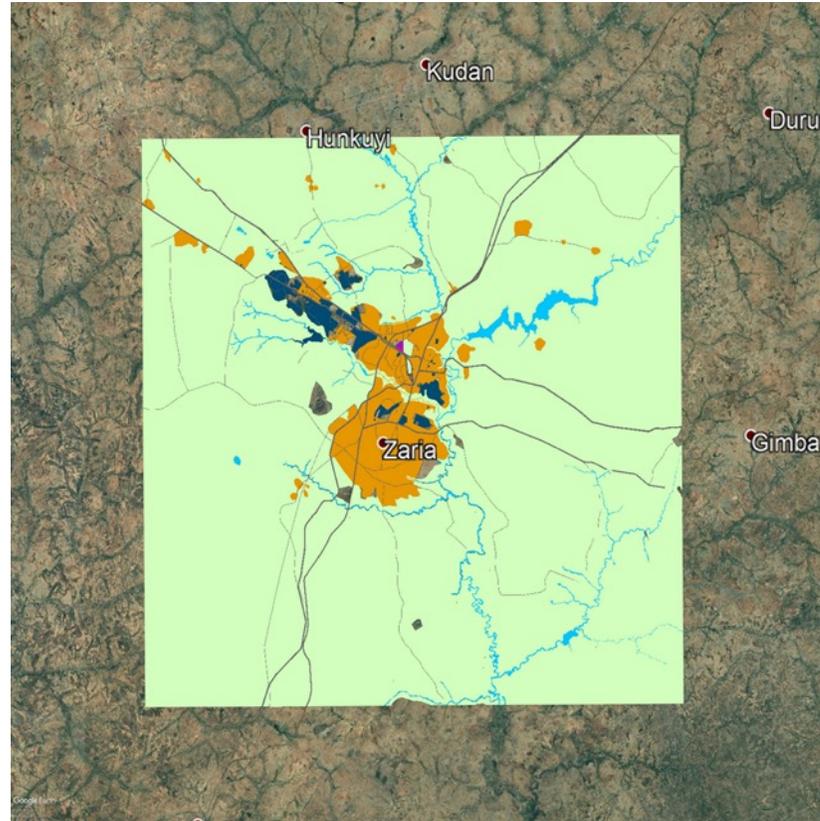


# Ahmadu Bello University, Nigeria. Tree Planting Towards Quality Env't. in Zaria IGC

## Trillion Trees Initiative: Reducing Impact of Climate Change

### Problem Statement

The study area is Zaria. It falls under the guinea savannah region of Nigeria. The projected growth rate is 1.38% at 2021 and 3.27% at 2035. Increasing population and demographic shifts to urban areas as a result of rising insecurity from banditry and insurgency translates to stripping land of vegetation for subsistent farming and urban development. Thus leading to loss of indigenous vegetation, landscape degradation and deforestation from forest-based livelihoods. Thereby, further posing adverse effect on micro climate. Indications of changing climatic patterns have similarly impacted food security. The trillion trees initiative has been adopted by Nigeria towards carbon sequestration for improved quality environment, human wellbeing and food security. Climate change amelioration is best done in our own backyards as the vulnerability of many communities is tied down to local diversity and ecosystem structure (MEA, 2005). Therefore, where can these trees be planted and of what significance.



### Location of the study area

The study area is located on a land of 40km x 40km within three neighbouring local government areas of Zaria, Sabongari and Giwa. It cuts across the rural, urban and suburban. The built up areas are also surrounded by farmlands



## Requirements

- Commitment by Government to strategies and adherence to development control towards tree planting initiative.
- Involvement and participation of multi-stakeholders
- Revitalisation of Agricultural, Agroforestry practices and planting indigenous trees

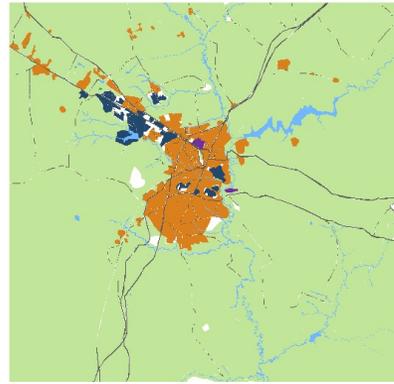
## Innovations

- GI 1 Riparian Line Restoration
- GI 6 Green Streetscape
- GI 27 Residential Tree Planting and Vegetated Stormwater Infrastructure
- WI 1 Water Storage Facility
- TRANS 5 Monorail Line
- AG 9 Cooperative Farming
- AG 13 Agro – Forestry
- INST 3 Agricultural Research Institute
- ENE 4 Renewable Energy Sources( solar farms)
- RES 11 Residential layout
- IND 3 Fruit Processing Factory

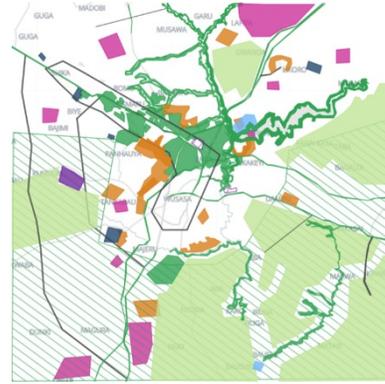
# Ahmadu Bello University, Nigeria. Tree Planting Towards Quality Env't. in Zaria



Location map



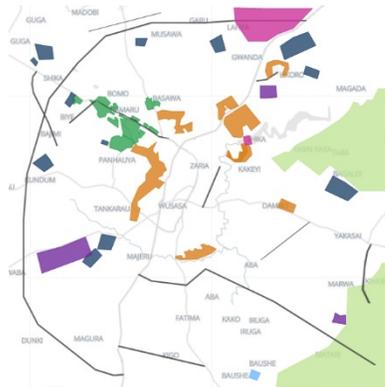
Current 2020



Early adopter 2035



Early adopter 2050



Late adopter 2035



Late adopter 2050



Non-adopter 2050

### Geodesign systems

-  Water Infrastructure
-  Agriculture
-  Green Infrastructure
-  Energy Infrastructure
-  Transport Infrastructure
-  Industry and Commerce
-  Institutional
-  Residential, mixed

### Geodesign process

The trillion trees initiative has been adopted to slow climate change. This project asks where can these trees be planted and what will be the significance to the study area. Appropriate planting is employed to eight geodesign systems. Findings indicate that despite challenges of insecurity, the early adopters planned for population growth, demographic changes as well as climate change. Thereby achieving significant impacts on addressing the SDGs and seven times more carbon sequestration when compared with non-adopters. The outcome by 2050 suggests that the tree planting will be most beneficial to addressing the SDGs.

In this scenario, insecurity and climate change issues are tackled along with other priority infrastructure ab initio. The general focus is on sustainable environment and food security. Therefore, green, agriculture, blue and energy infrastructure are emphasised

By 2035 insecurity has been significantly addressed. However, there is visible environmental challenges from climate change issues and food security as well as an increased population that requires 250ha of additional land for housing. Policies are enacted against tree cuttings.

Government is generally seen to have failed the people in the provision of security and basic amenities. Hence the mantra is for 'CHANGE'. Government pledges to provide good roads, quality education and provision of basic healthcare and amenities and address insecurity in the study area.

# Ahmadu Bello University, Nigeria. Tree Planting Towards Quality Env't. in Zaria IGC

		Existing								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	1	1	1	1	1	1	10
2		0	0	1	1	1	1	1	1	8
3		0	1	1	0	1	1	1	0	7
4										
5										
6		3	1	1	0	0	1	1	0	7
7		0	0	1	3	0	0	1	0	5
8		1	1	1	1	3	0	1	0	11
9		1	1	0	3	1	1	1	0	8
10										
11		1	1	1	1	3	0	0	1	14
12		0	1	1	1	0	0	0	0	6
13		1	3	3	3	0	0	1	-1	10
14		0	0	0	0	0	0	0	0	0
15		1	3	1	3	3	0	1	3	15
16										
17										
		12	18	12	17	13	11	14	4	101

SDG 2020

Sustainable Development Goals				
1: No Poverty				
2: Zero Hunger				
3: Good Health and Well-being				
4: Quality Education				
5: Gender Equality				
6: Clean Water and Sanitation				
7: Affordable and Clean Energy				
8: Decent Work and Economic Growth				
9: Industry, Innovation and Infrastructure				
10: Reduced Inequality				
11: Sustainable Cities and Communities				
12: Responsible Consumption and Production				
13: Climate Action				
14: Life Below Water				
15: Life on Land				
16: Peace and Justice Strong Institutions				
17: Partnerships to achieve the Goal				
Most benefit	Benefit	Neutral	Detriment	Most detriment
3	1	0	-1	-3

		Early adopter 2035								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	0	0	0	0	0	0	1
2		1	0	0	0	0	0	0	0	1
3		0	0	0	0	0	0	0	0	0
4										
5										
6		0	0	0	0	0	0	0	0	0
7		1	0	0	0	0	0	0	0	1
8		1	0	0	0	0	0	0	0	1
9		1	1	1	0	0	0	0	0	3
10										
11		1	0	0	0	0	0	0	0	1
12		1	0	0	0	0	0	0	0	1
13		1	0	0	0	0	0	0	0	1
14		1	0	0	0	0	0	0	0	1
15		0	0	0	0	0	0	0	0	0
16										
17										
		21	27	27	29	14	23	16	12	169

Early adopter 2035

		Late adopter 2035								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	0	0	0	0	0	0	1
2		0	0	0	0	0	0	0	0	0
3		0	0	0	0	0	0	0	0	0
4										
5										
6		0	0	0	0	0	0	0	0	0
7		0	0	0	0	0	0	0	0	0
8		0	0	0	0	0	0	0	0	0
9		1	1	0	0	0	0	0	0	2
10										
11		1	1	1	0	0	0	0	0	3
12		0	0	0	0	0	0	0	0	0
13		0	0	0	0	0	0	0	0	0
14		1	0	0	0	0	0	0	0	1
15		1	0	0	0	0	0	0	0	1
16										
17										
		11	15	15	18	12	13	9	2	95

Late adopter 2035

		Early adopter 2050								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	0	0	0	0	0	0	1
2		1	0	0	0	0	0	0	0	1
3		0	0	0	0	0	0	0	0	0
4										
5										
6		0	0	0	0	0	0	0	0	0
7		1	0	0	0	0	0	0	0	1
8		1	0	0	0	0	0	0	0	1
9		1	1	1	0	0	0	0	0	3
10										
11		1	0	0	0	0	0	0	0	1
12		1	0	0	0	0	0	0	0	1
13		1	0	0	0	0	0	0	0	1
14		1	0	0	0	0	0	0	0	1
15		0	0	0	0	0	0	0	0	0
16										
17										
		16	28	27	29	16	24	12	12	164

Early adopter 2050

		Late adopter 2050								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	0	0	0	0	0	0	1
2		0	0	0	0	0	0	0	0	0
3		0	0	0	0	0	0	0	0	0
4										
5										
6		0	0	0	0	0	0	0	0	0
7		0	0	0	0	0	0	0	0	0
8		0	0	0	0	0	0	0	0	0
9		1	1	1	0	0	0	0	0	3
10										
11		1	1	1	0	0	0	0	0	3
12		0	0	0	0	0	0	0	0	0
13		0	0	0	0	0	0	0	0	0
14		1	0	0	0	0	0	0	0	1
15		1	0	0	0	0	0	0	0	1
16										
17										
		16	28	25	24	13	22	11	6	145

Late adopter 2050

		Non-adopter 2050								
SDG		WAT	AGR	GRN	ENE	TRAN	IND	INST	RES	SUM
1		1	0	0	0	0	0	0	0	1
2		0	0	0	0	0	0	0	0	0
3		0	0	0	0	0	0	0	0	0
4										
5										
6		0	0	0	0	0	0	0	0	0
7		0	0	0	0	0	0	0	0	0
8		0	0	0	0	0	0	0	0	0
9		1	1	1	0	0	0	0	0	3
10										
11		0	0	0	0	0	0	0	0	0
12		0	0	0	0	0	0	0	0	0
13		0	0	0	0	0	0	0	0	0
14		1	0	0	0	0	0	0	0	1
15		1	0	0	0	0	0	0	0	1
16										
17										
		13	14	15	18	8	8	5	-3	78

Non-adopter 2050

## Early adopter SDG

The SDGs are strongly addressed through tree planting initiative by afforestation, restoration, conservation, Agroforestry and in other Interventions, projects and policies. Streetscapes SDG 11; urban farming SDG 2, 13,15; carbon trading SDG 1.2.13,11, 15; green energy SDG 7, 8. 9, 11; mono rails used for mass transit to reduce GHG emissions 13 and 11; water reservoirs, Protection of riparian fringe and industries within farms SDG 1,2,3,13,14.

## Late adopter SDG

Urban renewal and New residences mainly going vertical addresses SDG 11. Wind farms is SDG 7 and SDG 14, Climate change SDG 13 is addressed in the reduced GHG emissions and mono rail mass transportation as well as in agroforestry, Plantation, cooperative farming, research farms and institutes addressing SDGs 1, 2, 8 and 9. Restoration of riparian vegetation addresses SDGs 3,6,13, 14 and 15 while health centres within suburb addresses SDG 3.

## Non adopter SDG

The scenario addresses SDG no 2 on through agroforestry which further reduces impact of climate change SDG 13 through economic tree planting. Incessant power failure led to introduction of solar power hence this renewable energy source SDG 7 is continued thereby improving SDG 11. The commercial redevelopments in the urban renewal programme address SDG 8 and 11. Compliance with climate-smart agriculture assist in SDG 1 and 2.

## Project-level assessment

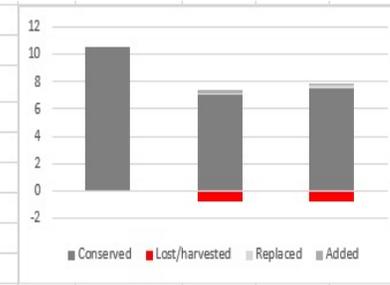
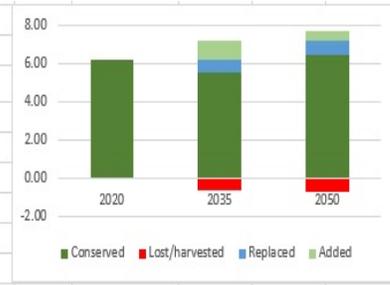
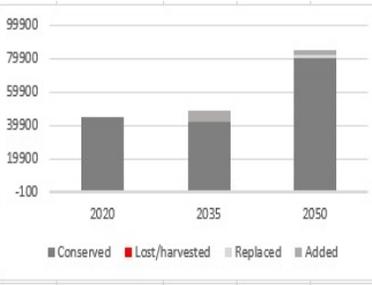
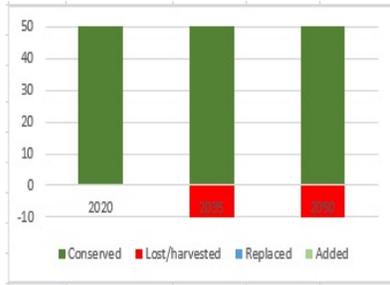
Project tree numbers

Project carbon capture

## National-level assessment

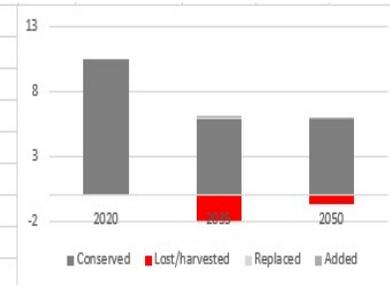
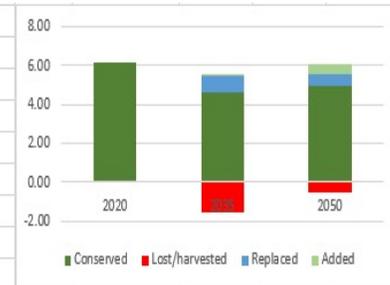
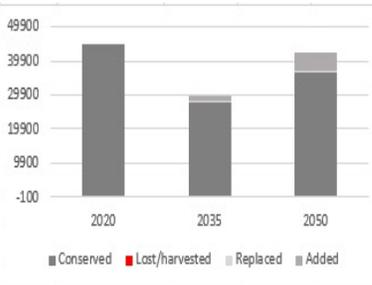
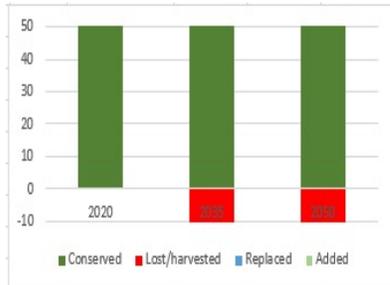
National scale trees

Carbon per capita



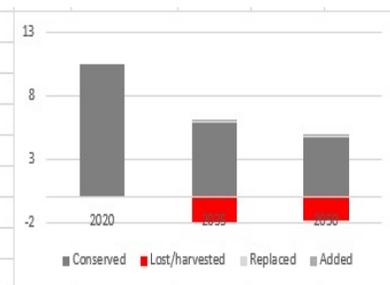
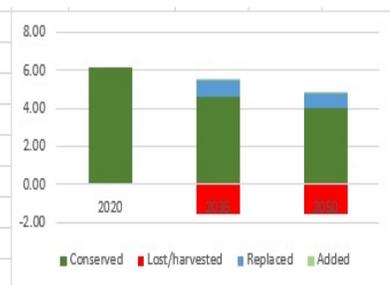
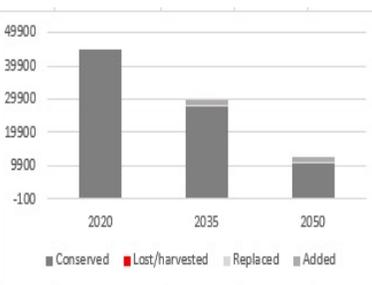
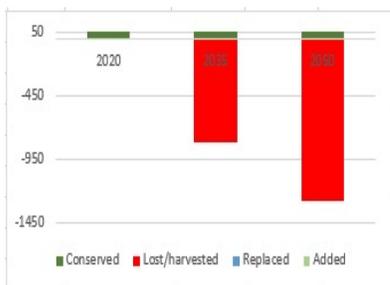
In order to avert the dangers of losing the tree population a total of 2.60M trees were added to realise a total of 4.64M. Policies and awareness campaigns are further put in place. The carbon sequestration in this scenario rose from 4.48M tonnes to 8.50M tonnes

## Early adopter scenario



Between the period 2035-2050, the number of trees added was 1.74M thus increasing the population to 3.13M trees. Policy against tree felling and tree planting campaigns were introduced. Carbon sequestration rose to 4.2M tonnes by 2050.

## Late adopter scenario



The Non-adopters in 2021 have a total of 2.04M trees. By 2035, the population was reduced to 1.74 M trees. By 2050, the population is further expected to decline to less than a million. Similarly, Carbon Sequestration drops from 4.5M tonnes in 2021 to 1.2M tonnes in 2050.

## Non adopter scenario

## Method Description

The team lead selected the study area, identified theoretical framework and assigned to students for literature review. Thereafter meetings with the relevant institutions were identified and arranged. These were the Ahmadu Bello University (ABU) Tree Planting Committee, the Savannah Forestry Research Station Zaria, Kaduna State Environmental Protection Authority (KEPA), ABU Afforestation Unit and the Urban Renewal Programme Zaria. There were site recognisant visits by the project team consisting of staff, graduating MLA class and two smart graduates who act as technical leads. Interviews were conducted with representatives of the agencies sometimes with team lead only, sometimes with team lead and technical leads only and sometimes with all students. Technology used were Geodesignhub, ARCGIS, Adobe InDesign, Inshot App and Microsoft office package.

Challenges of nonavailability of students for timely mappings and attending interview appointments were encountered because of the nature of the University's hybrid mode of lecture delivery due to covid protocols. This was overcome as indicated above for interviews. The students were in the recognisant visits, did the mapping on Geodesignhub to the negotiation stage. However, the coupling was done by the team lead and the two technical leads while the writings were by the team lead. The second semester commences after this submission therefore students will continue to train on the part missed.

## Agroforestry

...the *intentional* combining of agriculture and working trees to create sustainable farming systems.



Riparian buffer



Forest farming



Silvopasture



Alley cropping



Windbreaks

Forest Farming

Source: USDA National Agroforestry Center (NAC), Lincoln NE. USDA. As cited in Mustafa Acuff (2016).



## Project participants

Dr. Maimuna Saleh-Bala ( Team Lead)  
Abuh Joshua Onuche (Technical Lead)  
Aliu Aminat Omotayo (Technical Lead)  
Henry Chukwunonso okoro (Student Assistant)  
Zubayda Khalid Ibrahim  
Mokwe Chukwunonso Anthony  
Abdulazeez Zainab Umar  
Yakubu Nafisa Ize  
Abdullahi Mustapha

## Members of Landscape Architecture program

Bartho Ekweruo  
Deborah Nenchi  
Usman Gidado  
Iiyasu Isa Idris  
Prof. Musa Sagada

## Supporting material

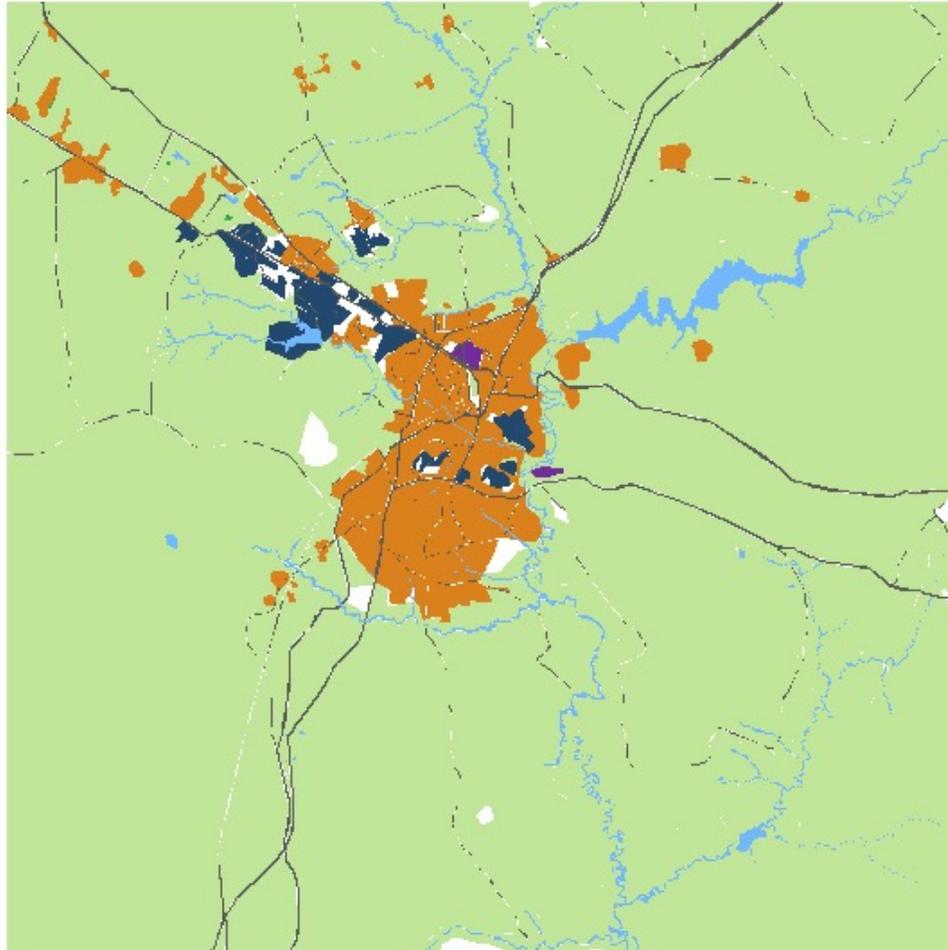
### Sources of data

- Dr. S. Musa  
Head of Tree Planting Committee  
Medical Centre, UHS / ABU Zaria
- Umar Salisu  
Head of Afforestation unit  
Medical centre, UHS / ABU Zaria
- Dr. Olaifa Rasheed Kolawole  
Savanna Forestry Research Station  
Forestry Research Institute of Nigeria (FRIN),  
Samaru Zaria
- Zonal Manager, Kaduna State Environmental Authority  
(KEPA), Zaria Zonal Office

### Software used

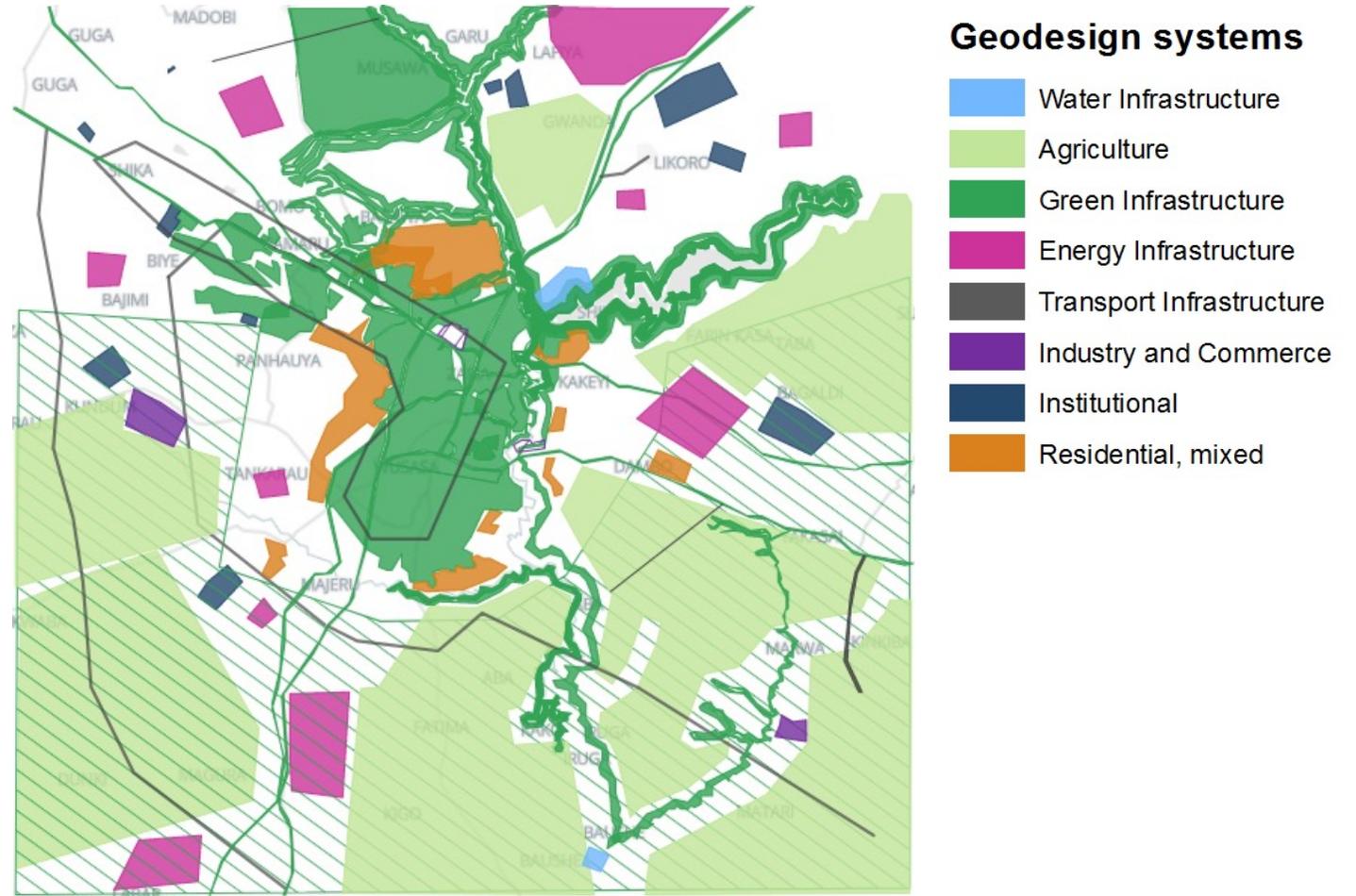
- Geodesignhub; ARCGIS; Adobe InDesign; Microsoft Office Package

# Ahmadu Bello University, Nigeria



Current 2020 situation

# Tree Planting and Improved Env't. in Zaria IGC



Negotiated or recommended plan

Important feature in the negotiated plan: Agroforestry for food security and reducing the impact of climate change.

Renewable energy sources ( solar and wind farms)