Grant No. 43221-2

This project received co-funding from ITTO (010/23A). The study area has been revised and currently covers the entire territory of Togo, rather than being limited to the Guinean zone.

MI-TERM REPORT 4

Objective 3: Determine current and future ecological niches of three vulnerable forest resources in Togo

A total of forty (40) potential models were produced for each species of interest. Among the models produced, six (06), eighteen (18), and four (04) had an area under the curve (AUC) greater than 0.8 for *A. africana, K. senegalensis*, and *V. paradoxa*, respectively. Since several predictive models have the same AUC scores, the model with the lowest average omission rate was selected. The models selected for predicting distribution areas according to the scenarios are presented in Table 1.

Table 1 : Metrics used to evaluate prediction models for targeted species

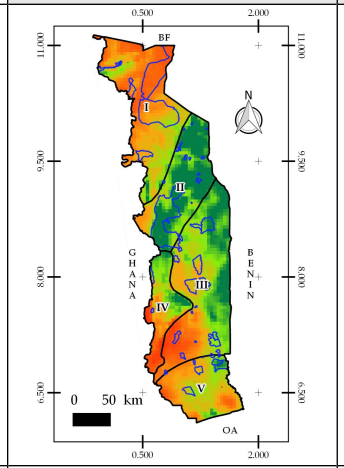
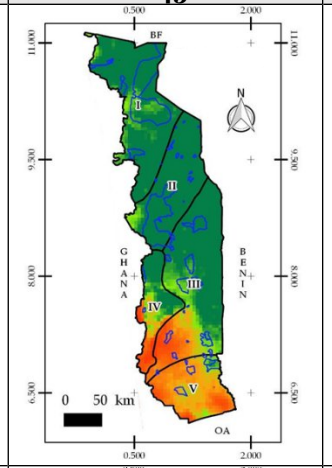
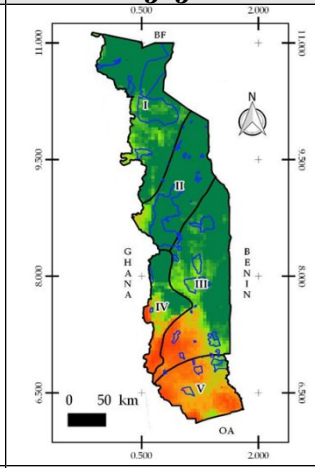
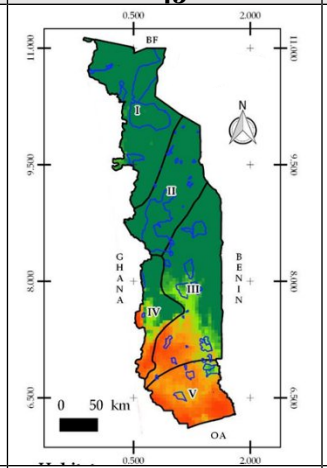
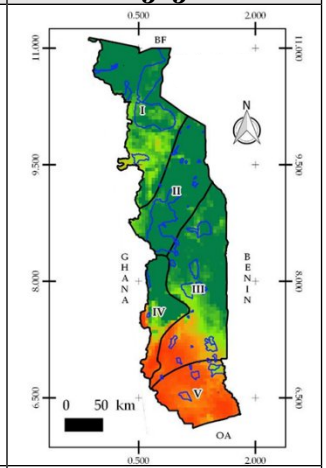
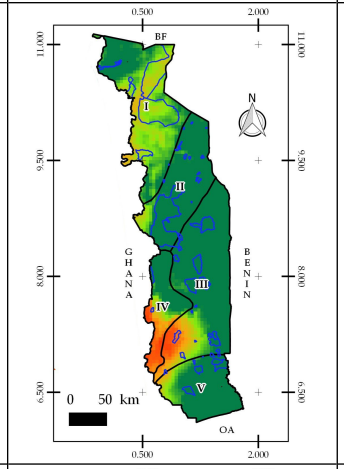
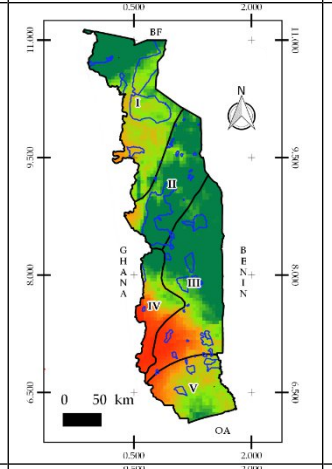
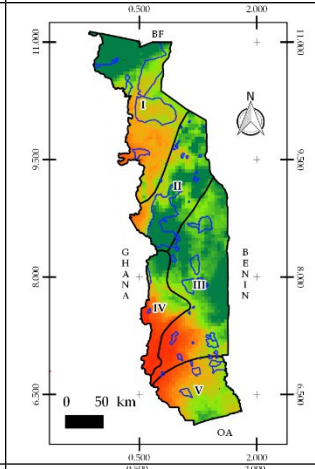
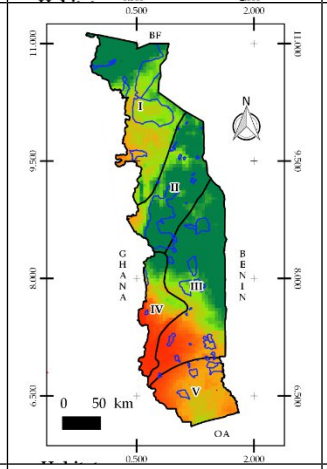
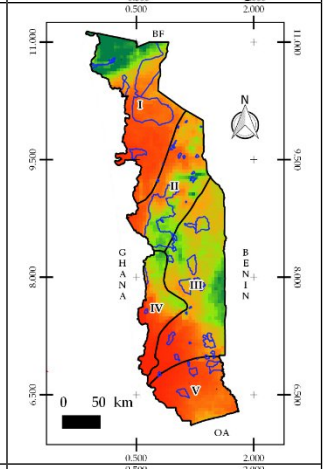
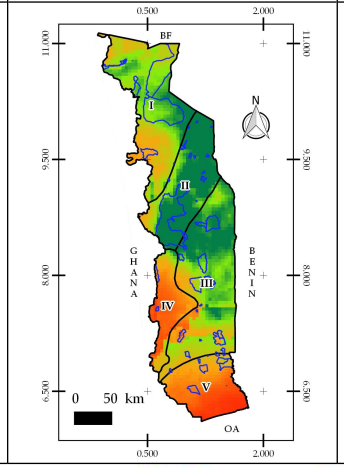
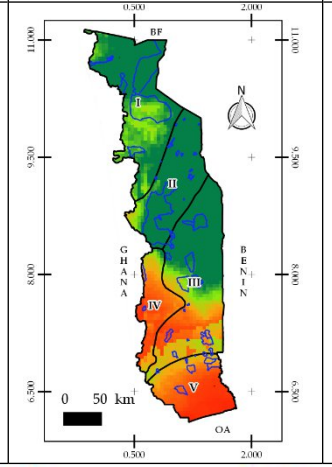
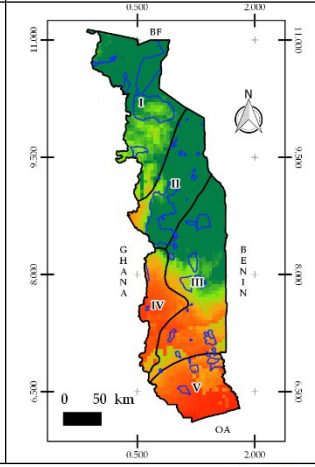
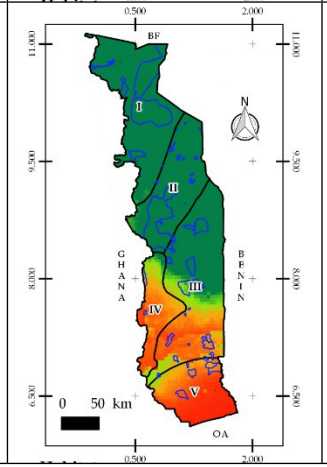
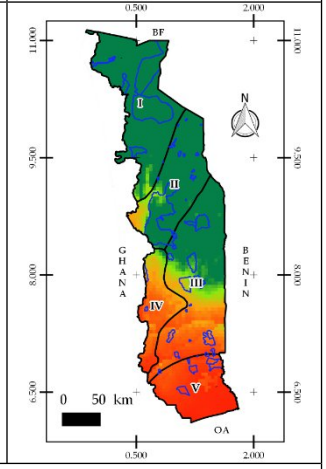
Species	Class	Regulation multiplier	AUC	Omission error	AICs
A. africana	Quadratic linear	1.5	0.83	0.11	6,444.64
K. senegalensis	Linear	1.5	0.83	0.17	7,044.77
V. paradoxa	Linear	0.5	0.81	0.09	6,672.9

Under current climatic conditions, approximately 71.42%, 94.34%, and 78.67% of the territory are highly favorable for the conservation of *A. africana, K. senegalensis,* and *Vitellaria paradoxa*, respectively. The predicted impact of climate change on the distribution areas of the targeted species according to the four scenarios is presented (table 2 and 3). Habitat changes within ecological zones according to current and future projections have been carried out for *A. africana* (Figure 1), *K. senegalensis* (Figure 2), and *V. paradoxa* (Figure 3).

Table 2 : Predicted impact of climate change on the distribution areas of the targeted species

			Unsuitable (Area)	Slightly suitable (Area)	Moderately suitable (Area)	Highly suitable (Area)
Afzelia africana	**Actual distribution**		16,180.15 km²	20,311.69 km²	12,801.65 km²	7,306.51 km²
	Scenarios	**2040 – ssp 245**	6,237.64 km²	9,268.61 km²	7,050.29 km²	34,043.46 km²
		2040 - ssp 585	9,364.73 km²	5,742.33 km²	13,604.58 km²	27,888.36 km²
		2060 - ssp 245	10,689.74 km²	4,304.73 km²	5,210.99 km²	36,394.54 km²
		2060 - ssp 585	11,863.76 km²	4,819.65 km²	14,541.34 km²	25,375.25 km²
Khaya senegalensis	**Actual distribution**		3,209.49 km²	8,376.96 km²	11,021.26 km²	33,992.3 km²
	Scenarios	**2040 – ssp 245**	8,048.16 km²	15,671.67 km²	13,123.76 km²	19,756.41 km²
		2040 - ssp 585	10,810.78 km²	18,186.36 km²	17,458.91 km²	10,143.95 km²
		2060 - ssp 245	11,373.25 km²	17,972.78 km²	10,517.41 km²	16,736.56 km²
		2060 - ssp 585	30,015.76 km²	18,812.84 km²	6,055.63 km²	1,715.76 km²
Vitellaria paradoxa	**Actual distribution**		12,070.9 km²	19,135.81 km²	14,896.86 km²	10,496.43 km²
	Scenarios	**2040 – ssp 245**	14,306.38 km²	7,869.52 km²	8,656.47 km²	25,767.63 km²
		2040 - ssp 585	16,632.81 km²	7,387.87 km²	9,588.09 km²	22,991.23 km²
		2060 - ssp 245	15,623.54 km²	4,965.62 km²	2,624.11 km²	33,386.73 km²
		2060 - ssp 585	18,752.28 km²	4,339.87 km²	3,815.05 km²	29,692.8 km²

Table 3 : Distribution of suitable habitat areas for the target species under the scenarios modeled in Wallace.

	Actual distribution	Projection 2040 SSP 245	Projection 2040 SSP 585	Projection 2060 SSP 245	Projection 2060 SSP 585
Afzelia africana					
Khaya senegalensis					
Vitellaria paradoxa					

Unsuitable Slighly suitable Moderately suitable Highly suitable Protected area

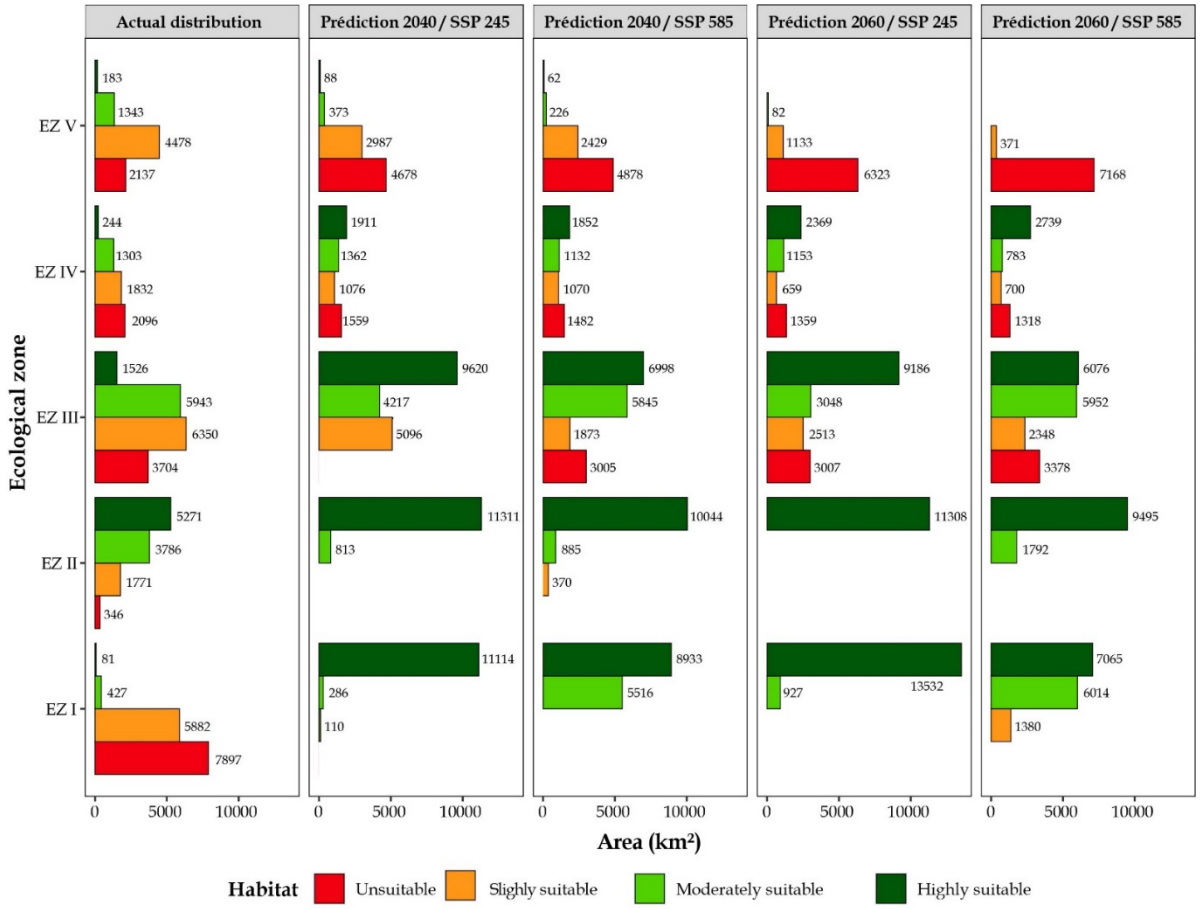


Figure 1 : Predicted impact of climate change on *A. africana* distribution areas across ecological in Togo

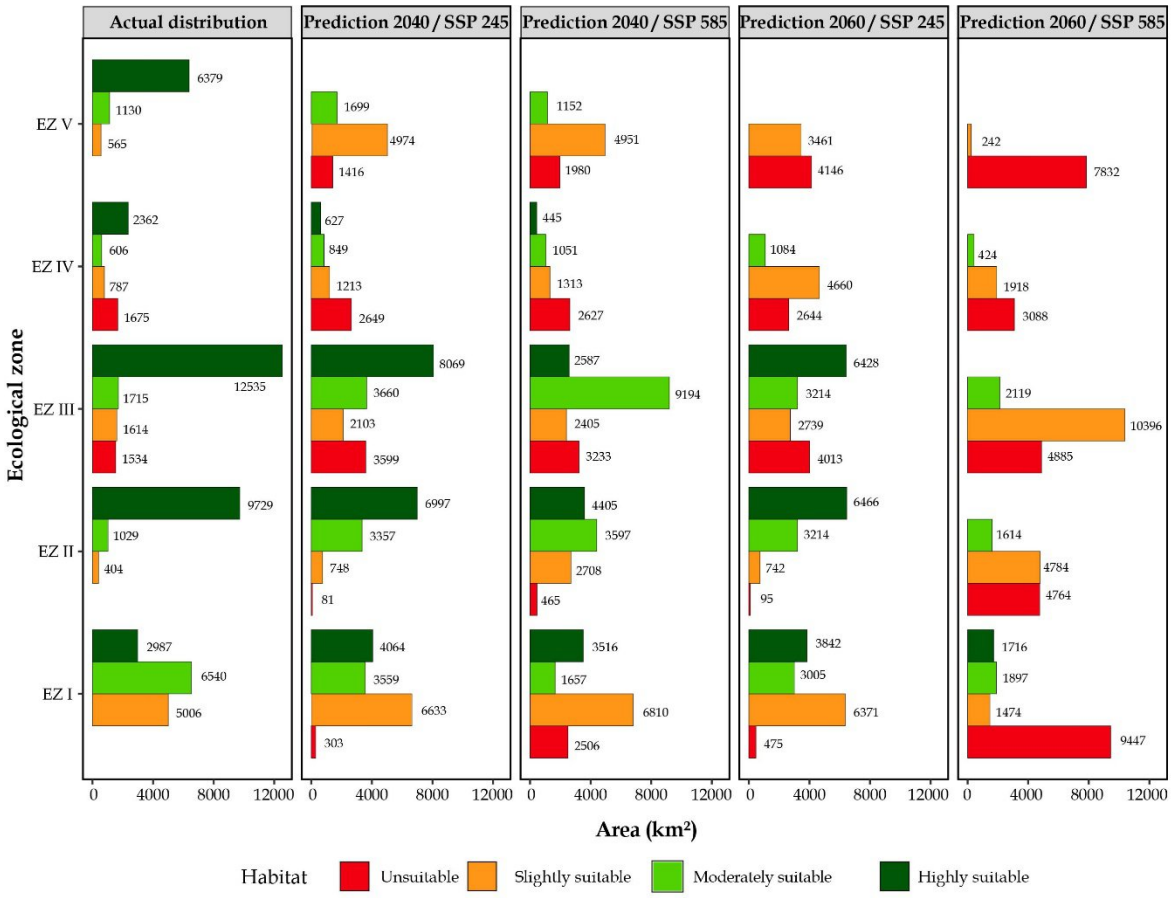


Figure 2 : Predicted impact of climate change on *K. senegalensis* distribution areas across ecological in Togo

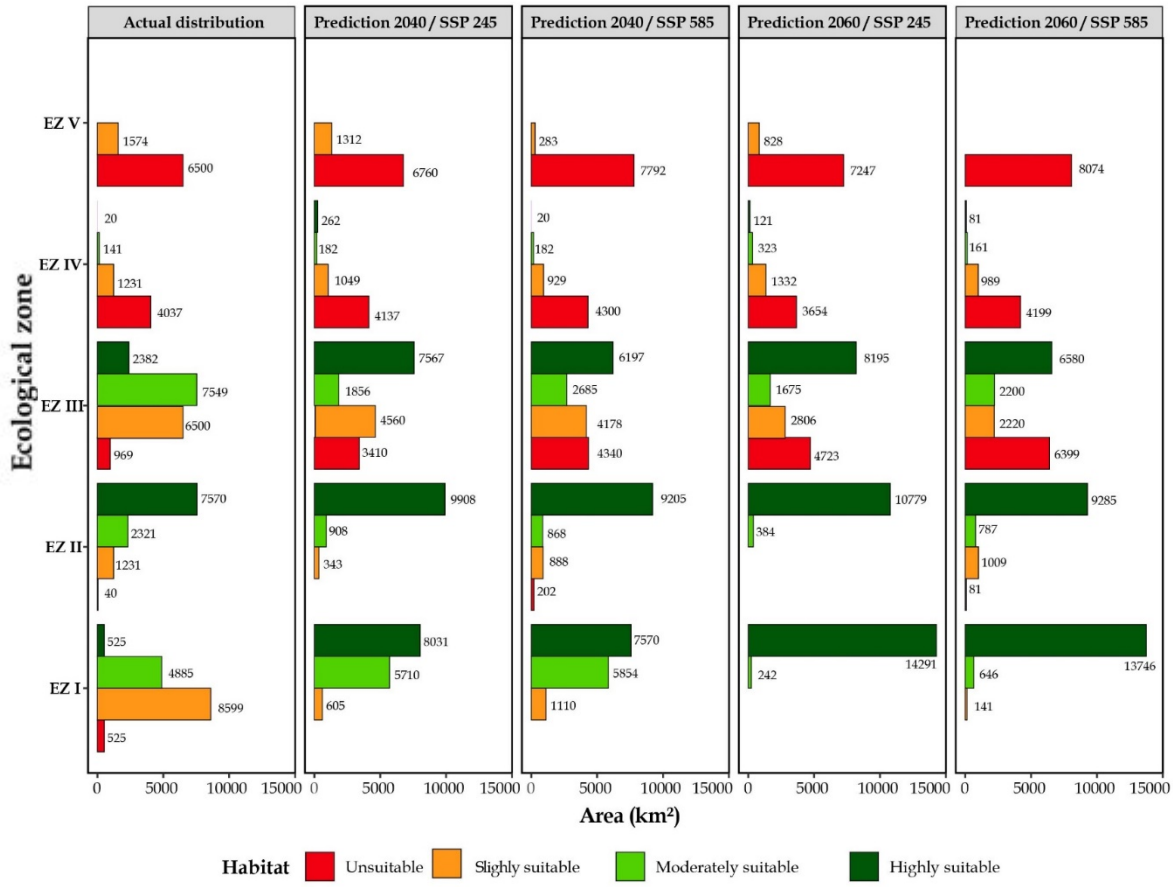


Figure 3 : Predicted impact of climate change on *V. paradoxa* distribution areas across ecological in Togo