

Predictive Site Suitability Modeling of Asian Sea Bass Using GAM (Generalized Additive Modeling) in Bakkhali and Naf River Estuary, Southeastern Coast of Bangladesh

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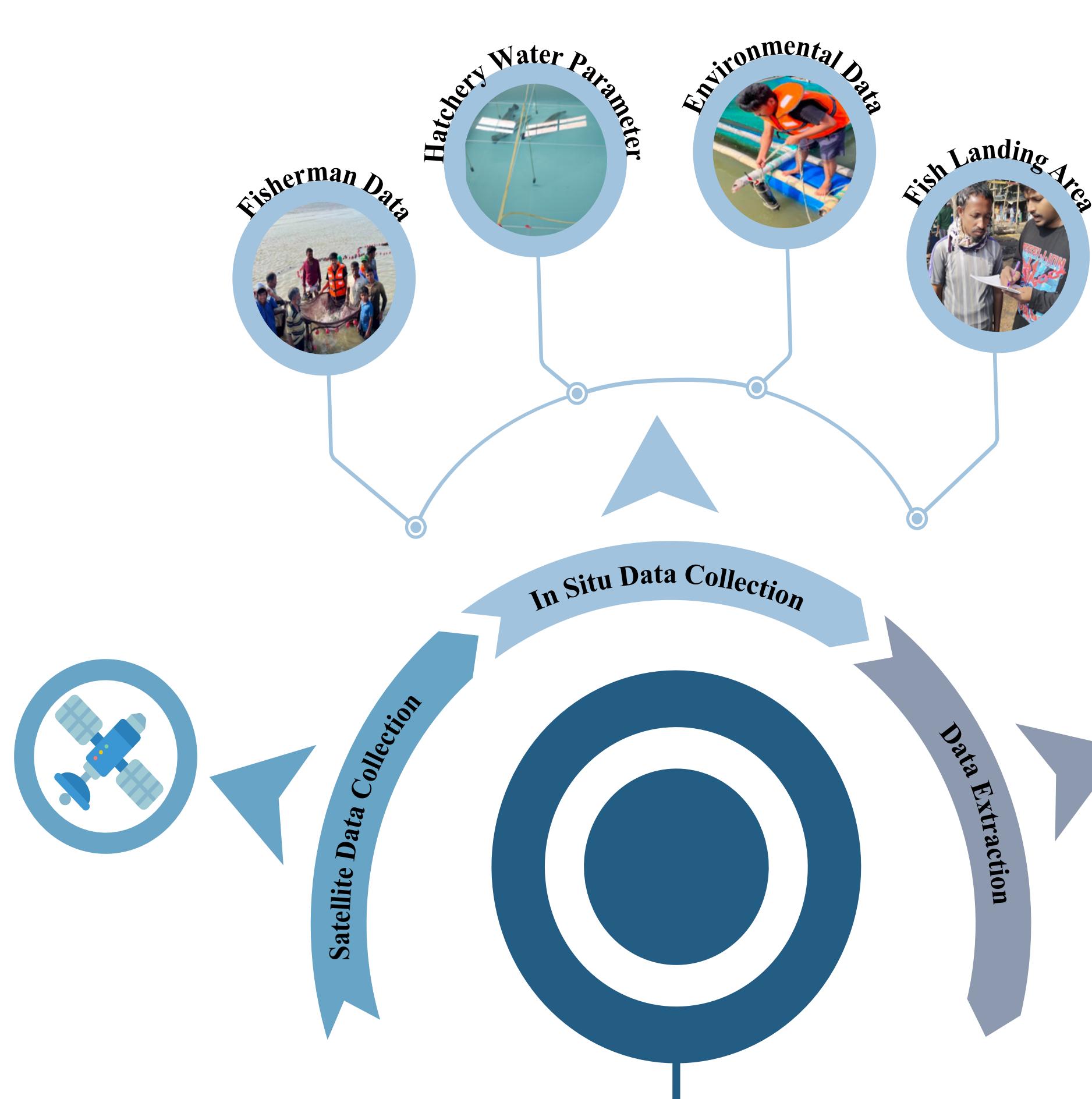
INTRODUCTION

1. Site suitability Modeling of species plays a crucial role in identifying optimal locations for aquaculture activities and understanding the environmental variables and species habitat preferences.
2. Generalized Additive Models (GAM) are helpful to understand complex relationships between environmental factors and species distribution patterns.
3. Environmental parameters such as sea surface temperature (SST), salinity, and depth levels significantly influence the distribution and growth of *L. calcarifer*.

Objectives

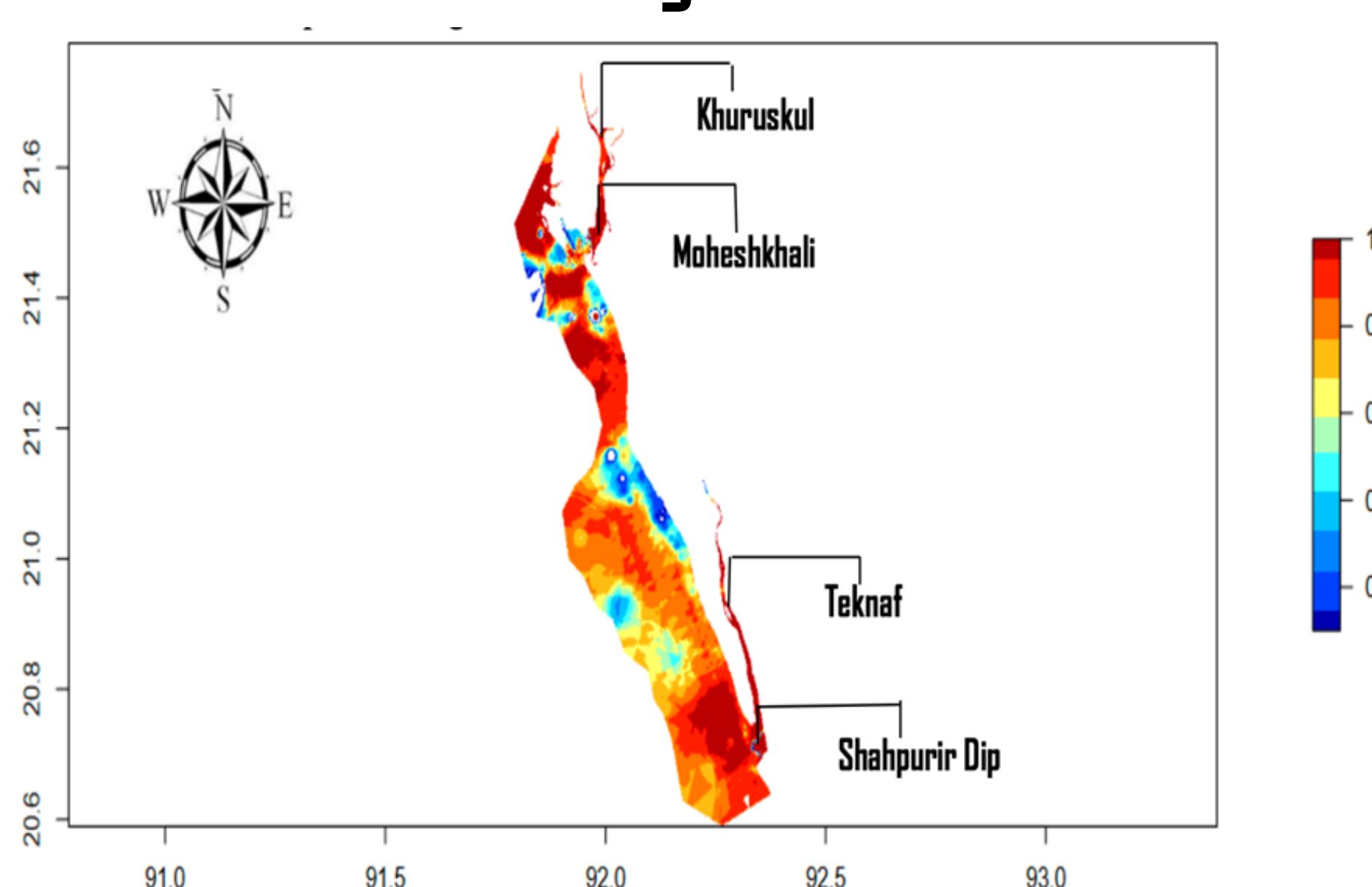
- To understand the spatial distribution and sites where the Asian sea bass (*Lates calcarifer*) habitats on the southeastern coast of Bangladesh, mainly the Bakkhali and Naf River Estuary.
- To assess the environmental factors (SST, salinity, currents, and chlorophyll) impact on the distribution of the Asian sea bass.

METHODOLOGY



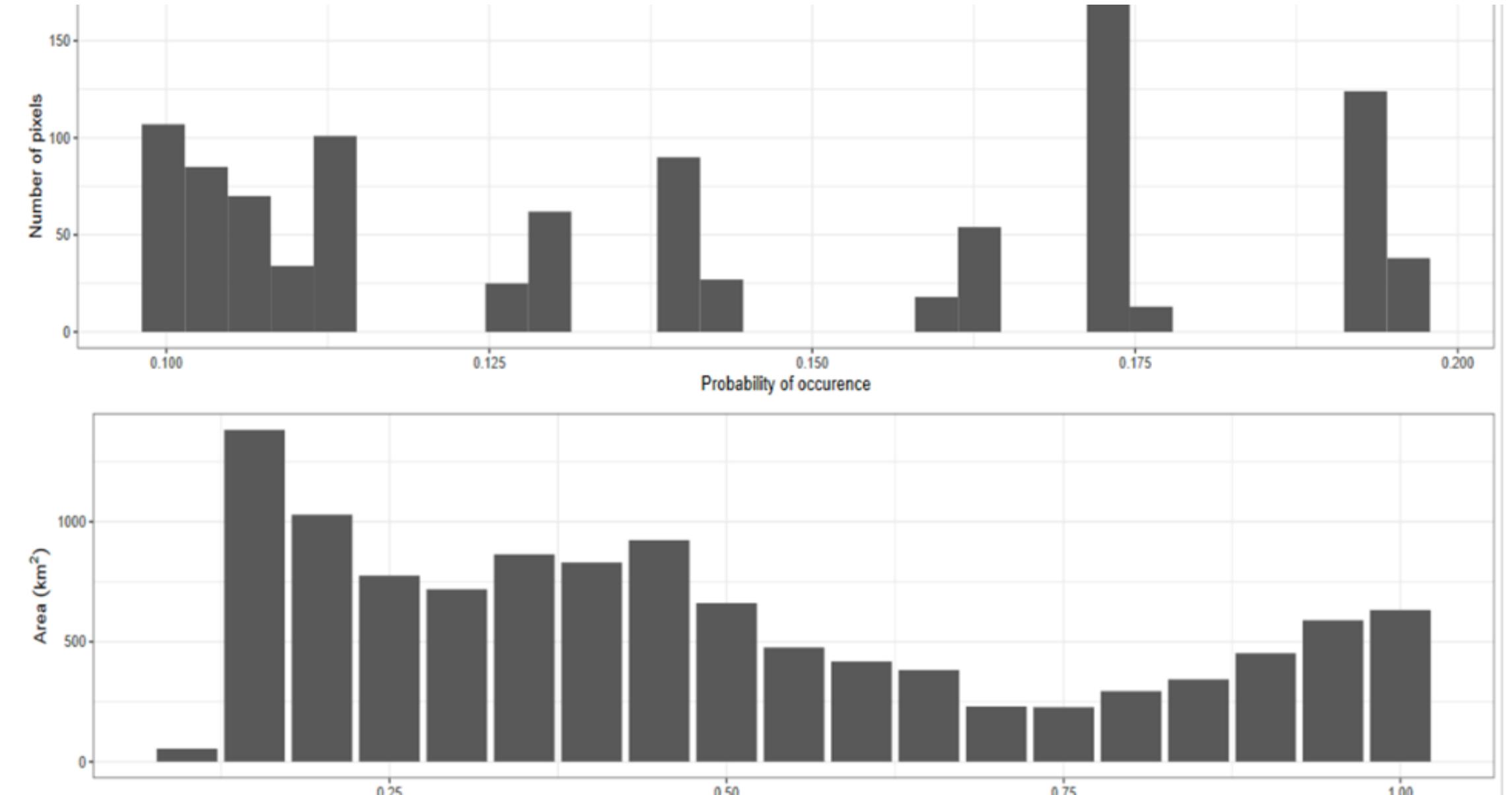
RESULT

The Distribution of Asian Sea Bass Using GAM



Probability of 1 indicates a 100% occurrence probability of Asian sea bass in the region.

The Probability of Asian Sea Bass Occurrence on the Southeast Coast of Bangladesh

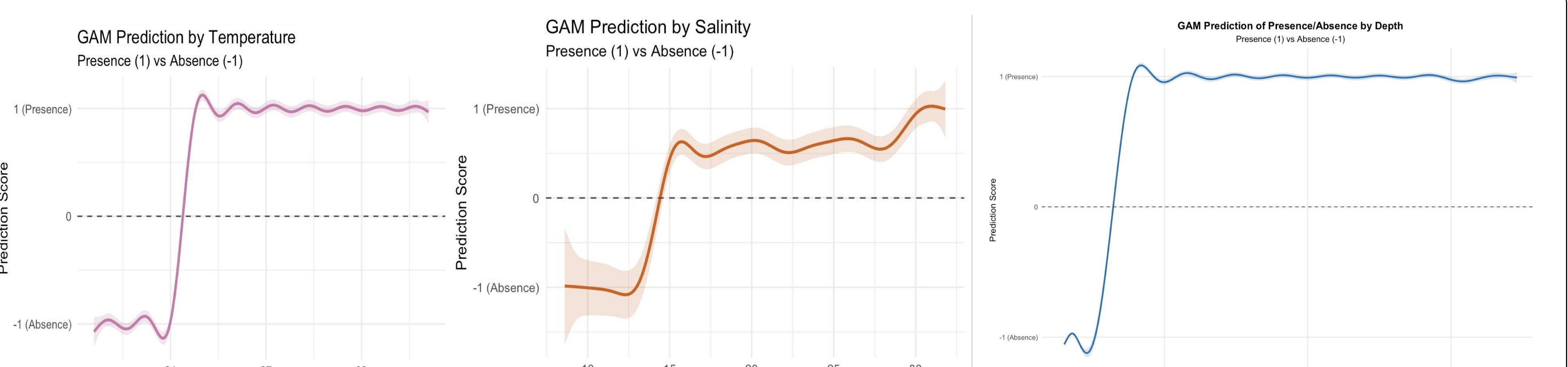


Pearson Correlation Matrix

	Chlorophyll	Depth	CurrentU	CurrentV	SST
Salinity	-0.01	0.77	-0.22	0.13	0.83
Chlorophyll	0.04	-0.07	0.06	0.04	
Depth	-0.49	0.29	0.99		
CurrentU	-0.30	-0.50			
CurrentV	0.30				

Relationship between environmental parameters and the distribution of Asian Sea Bass

GAM Prediction Model of Presence/Absence



Our study reveals that the distribution of this species is mainly driven by three environmental factors: depth, sea surface temperature (SST), and salinity. The most favorable habitats are found in areas where the temperature ranges from 24°C to 31°C, salinity levels fall between 12 and 31 ppt, and depths range from 5 to 15 meters. Among these variables, depth plays the most significant role in determining the species' presence. Chlorophyll concentration showed the least influence, likely due to the carnivorous nature of Asian sea bass, which relies more on animal-based prey than on primary producers.

CONCLUSION

A site suitability map for Asian sea bass can be used to guide conservation strategies during the breeding, spawning, and larval development stages of the species in the estuaries of the Bakkhali and Naf rivers. The selected areas with a high probability of success can be effectively regulated and enforced through the proper implementation of laws.