



# Spatial distribution of the piscivorous predator *Varanus niloticus* for efficient management of fish farms in the Republic of Bénin

**KASSA Parfait<sup>1</sup>, BIO BANGANA Abdoul-Sahabi<sup>1</sup>, KPOGUE GANGBAZO Diane Nathalie Sènami<sup>1</sup>, OROU BATA Ibrahim<sup>1</sup> and AGADJIHOUEDE Hyppolite<sup>1,2,3</sup>**

<sup>1</sup>Aquaculture school (EAq), National University of Agriculture (UNA), Kétou, Bénin Republic,

<sup>2</sup>School of Rural Engineering (EGR), National University of Agriculture (UNA), Kétou, Bénin Republic

<sup>3</sup>Faculty of Agronomic Sciences (FSA), University of Abomey-Calavi (UAC), Abomey-Calavi, Bénin Republic.

\*Corresponding author: [parfaitos2007@yahoo.fr](mailto:parfaitos2007@yahoo.fr)

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## ABSTRACT

**Objectives:** Aquaculture in Bénin suffers economic losses from the Nile monitor lizard, *Varanus niloticus*. This study aimed to map the spatial distribution of *V. niloticus* in Southern Bénin and identify the key environmental factors influencing its abundance to guide targeted control strategies.

**Methodology and Results:** Using field surveys across 39 communes and spatial statistics, the predator's distribution pattern was analysed. The relationship between abundance and environmental variables was modelled using linear regression. Results revealed a significant spatial cluster of high *V. niloticus* abundance in the southeastern part of Bénin. A single-variable model using mean temperature explained a high proportion of the variance in abundance ( $R^2 = 0.854$ ). The prediction map shows a gradient of decreasing abundance from the warm southeast to the cooler northwest. Validation with reserved field data confirmed a strong correlation ( $r = 0.88$ ) between predicted and observed values.

**Conclusions and application of findings:** This study conclusively identifies mean temperature as the primary driver of the Nile monitor lizard (*Varanus niloticus*) distribution in Southern Bénin's aquaculture zones. This finding enables the creation of a definitive Predator Risk Map, pinpointing the warmer southeastern region as a high-risk hotspot. These results provide a scientific basis for a paradigm shift in management, moving from uniform, often ineffective, control to a targeted and cost-efficient strategy. Resources for mitigation (e.g., fencing subsidies, technical support) can now be strategically prioritized for high-risk areas, maximizing impact. Farmers in these zones can be proactively advised to implement stronger protective measures. Meanwhile, new aquaculture development can be encouraged in lower-risk zones. This data-driven approach directly helps reduce economic losses, safeguards investments, and enhances the overall sustainability and profitability of Bénin's vital aquaculture sector by focusing efforts where they are most needed.

**Keywords:** Aquaculture, Pest Management, Spatial Ecology, Nile Monitor Lizard, West Africa.