availability and fishing productivity, consistent with established fisheries research (Welcomme, 2011). Furthermore, 86.8% acknowledged that river flow variations affect fish availability, and 85.7% observed significant declines in recent years, attributed to reduced rainfall, climate variability, and anthropogenic disruptions (Nwosu et al., 2022). These findings underscore that declining water levels pose both ecological and livelihood threats. Reduced flows diminish breeding grounds, nursery habitats, and migration corridors, undermining fish productivity and household income (FAO, 2022; Olusola et al., 2022). Addressing these challenges requires integrated water management, climate adaptation, and ecosystem conservation. Such interventions are vital for sustaining fisheries and safeguarding livelihoods in Ilaje LGA, where artisanal fishing remains central to food security and resilience (Ogunrayi et al., 2024).

Table 2 Effects of water level on fish catch volume in Ilaje coastal waters

Question	Agree	%	Disagree	%
High water level increases fish output	276	98.6%	4	1.4%
Low water level decreases fish output	273	97.5%	7	2.5%
Change in river flow affects fish availability	243	86.8%	37	13.2%
River water flow has considerably decreased	240	85.7%	40	14.3%
Total Respondents	280	100%		

Source: Field survey, 2025

3.3 Rainfall and temperature patterns in Ilaje LGA (1996-2025)

A longitudinal analysis of rainfall and temperature patterns in Ilaje Local Government Area (LGA) between 1996 and 2025 reveals significant variability in seasonal onset, cessation, annual rainfall totals, and mean annual temperatures (Table 3). Rainfall onset typically occurred between late March and early April, with cessation dates ranging from late September to late October. Shorter rainy seasons were observed in 2007 (179 days) and 2025 (182 days), compared to longer seasons in 1996 (218 days) and 2019 (208 days). This shortening trend indicates increasing unpredictability in rainfall duration, directly affecting river flow and fish breeding cycles. Similar disruptions have been reported in southeastern Nigeria (Nnaji and Nzeadibe, 2023), while Adetayo (2021) noted erratic onset but relatively stable cessation in southwestern Nigeria.

Annual rainfall totals also fluctuated, with above-average years such as 2004 and 2019 (2,200 mm, +8.9%) and deficits in 2015 (1,700 mm, –12.1%) and 2006 (1,740 mm, –11.0%). These alternating patterns mirror findings in the Niger Delta, where rainfall variability strongly influences fish catch volumes (Idogho et al., 2022a). In contrast, Ragatoa et al. (2020) documented prolonged dry spells across West Africa, suggesting Ilaje's variability may be less severe.

Temperature trends showed steady warming, with mean annual values rising from 27.4°C in 1996 to 28.5°C in 2025. Deviations shifted from –0.3°C in 1996 to +0.8°C in 2025, consistent with global climate change. Rising temperatures reduce dissolved oxygen and increase disease prevalence, threatening fish survival. These findings align with Akinsanola and Ogunjobi (2020), who reported nationwide warming, and Cohen et al. (2016), who linked warming in Lake Tanganyika to reduced nutrient mixing and fish productivity. Collectively, shortened rainy seasons, rainfall variability, and rising temperatures pose significant risks to Ilaje fisheries and livelihoods, underscoring the need for climate-resilient practices, improved water management, and livelihood diversification.

3.4 Decadal rainfall variation (1996-2025)

Table 4 presents decadal rainfall averages in Ilaje Local Government Area (LGA), highlighting notable shifts in intensity and duration. The first decade (1996-2005) recorded 929.2 mm, reflecting a slight decline that constrained water availability and disrupted fish breeding cycles. Similar declines were observed in southern Nigeria during the late 1990s, linked to reduced river discharge and agricultural productivity (Edokpa, 2020). In contrast, Adetayo (2021) reported relatively stable rainfall onset and cessation in southwestern Nigeria, suggesting Ilaje's decline may be localized. The second decade (2006-2015) showed a significant increase to 1,072.6 mm (+15.4%), supporting higher river flows and aquatic productivity, consistent with findings in the Niger Delta