Artificial habitats vary widely in their physical characteristics but generally share features such as small volume, intermittent water availability, and proximity to human dwellings. Studies from semi-urban Dhaka revealed that chemical oxygen demand and dissolved oxygen levels influenced the abundance of Culex larvae in drainage ditches and other urban water bodies (Bashar et al., 2016). Additionally, urban microclimates characterized by higher temperatures (urban heat islands) can accelerate mosquito development rates compared to rural settings (Wilke et al., 2019). The diversity of artificial habitats supports multiple mosquito species simultaneously; however, *Ae. aegypti* tends to dominate container habitats while Culex species are more common in larger drainage systems or polluted waters (Wilke et al., 2019; Bashar et al., 2016). Effective control requires understanding the heterogeneity of these anthropogenic environments.

4.3 Physicochemical properties of habitats

The physicochemical environment within mosquito larval habitats significantly affects species presence, abundance, and developmental success. Key parameters include water temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), turbidity, dissolved oxygen (DO), alkalinity, chloride content, and light exposure. For instance, studies from West Azerbaijan Province in Iran reported significant interspecific differences in chloride content and temperature preferences among mosquito larvae but no significant variation regarding pH or turbidity (Amini et al., 2020). Similarly, research along the Mara River basin found strong correlations between larval abundance and DO levels as well as temperature and turbidity (Dida et al., 2018).

Light exposure influences habitat suitability by affecting algal growth and predator presence; shaded or partially shaded sites often harbor different mosquito assemblages than open sunlit pools. Water temperature typically ranges between 25°C to 29°C in productive tropical habitats such as those used by *Anopheles funestus* (Nambunga et al., 2020), with warmer temperatures generally accelerating larval development but potentially increasing mortality if too high. Electrical conductivity and TDS reflect mineral content which can affect larval survival differently across species; some Culex mosquitoes tolerate higher salinity levels while others prefer fresher waters (Wang et al., 2020; Martínez-Barciela et al., 2025). Overall, the complex interplay of these physicochemical factors shapes habitat quality and determines which mosquito species can successfully exploit particular aquatic environments (Figure 3).

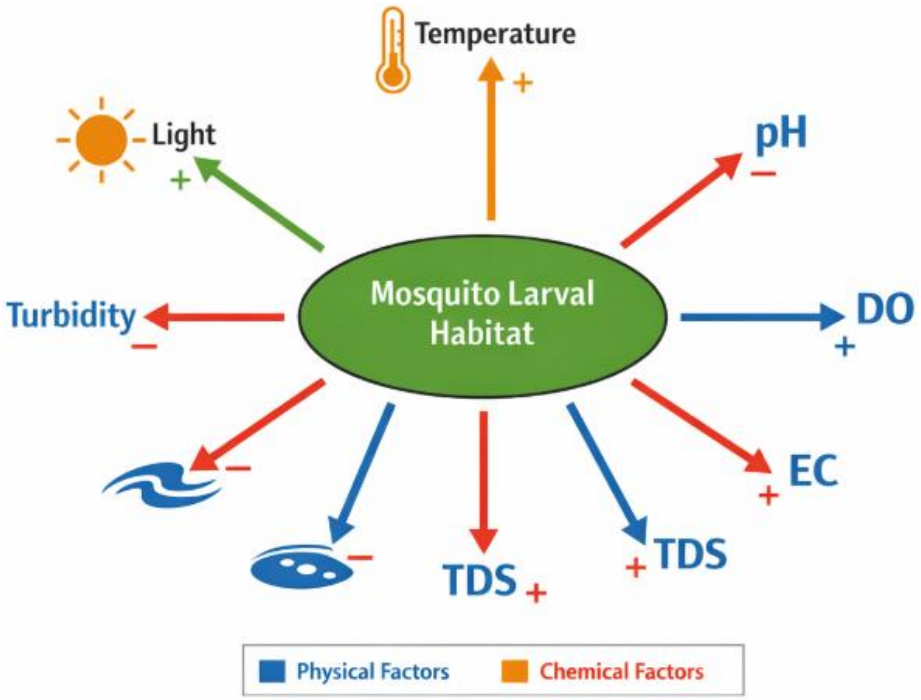

Figure 3 Conceptual diagram illustrating the influence of physicochemical parameters on mosquito larval habitat suitability and species distribution. Arrows indicate the direction and relative strength of influence of each environmental factor