

conversion. This pattern aligns with broader aquaculture evidence that the most favorable salinity is often near the point where osmoregulatory costs are minimized and growth can receive a larger share of the energy budget (Mkulo et al., 2025). In practice, salinity regulation for yellowfin seabream should therefore be treated as a production lever rather than only a water-quality constraint.

A second implication is that salinity management should be integrated with acclimation strategy, nutrition, and life stage. Rapid changes caused by rainfall, estuarine mixing, or water exchange can trigger cellular stress responses involving energy reallocation and macromolecular protection, so gradual transfer remains important even in euryhaline species. Nutritional support can also modify tolerance: in black seabream, low-salinity performance improved when dietary cholesterol supported osmoregulation and reduced oxidative and inflammatory stress, while in yellowfin seabream other dietary additives have improved growth and haemato-immunological status under culture conditions. Overall, the case evidence indicates that optimal yellowfin seabream aquaculture depends on keeping salinity within a favorable intermediate range, avoiding abrupt fluctuations, and combining environmental control with nutritional strategies that stabilize health under osmotic challenge.

7 Environmental Regulation Strategies for Yellowfin Seabream Aquaculture under Salinity Variation

7.1 Salinity monitoring and dynamic regulation technologies

Effective salinity regulation in yellowfin seabream aquaculture depends first on continuous monitoring rather than periodic manual measurement. IoT-based pond systems can now track salinity in real time, issue threshold alarms, and support rapid corrective action, which reduces the likelihood that fish experience prolonged osmotic stress (Gulifardo et al., 2025). In automated pond-control trials, fuzzy logic systems maintained salinity within target ranges by activating freshwater pumps as salinity approached upper thresholds, thereby avoiding major deviations that would otherwise stress cultured animals. This type of dynamic control is especially relevant for euryhaline fish raised in estuarine or coastal systems where rainfall, evaporation, and tidal exchange can shift salinity over short time scales (Figure 3).

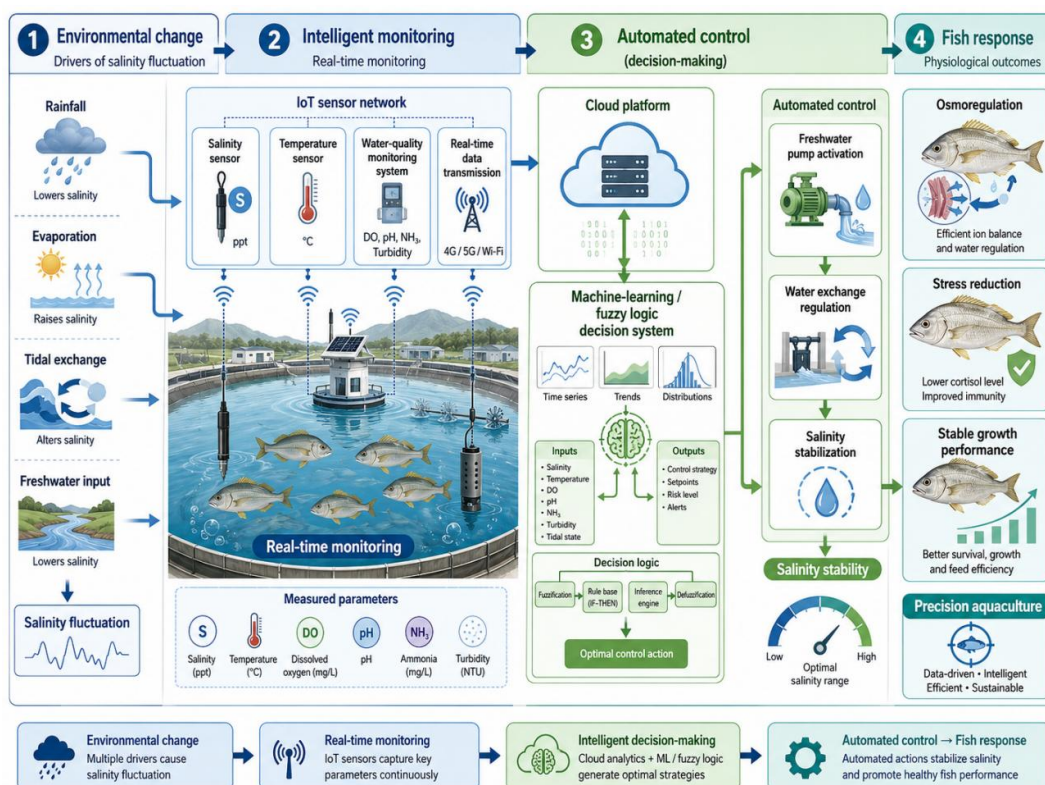


Figure 3 Environmental change-intelligent monitoring-automated control-fish response framework for salinity regulation in yellowfin seabream (*Acanthopagrus latus*) aquaculture systems