

The Effect of Temperature on the Circulation of Water in Fish Rearing Ponds



The Effect of Temperature on the Circulation of Water in Fish Rearing Ponds in Northern Thailand

The quality of water in the pond greatly affects the yield and profit that the farmer will receive come harvest time. Climate has a direct effect on water quality. Thermal layers in the pond and the rapid circulation of the water between these layers results in the rapid decrease of overall oxygen; a main cause of fish mortality (see Figure 1). The effects are especially pronounced during the winter and wet seasons of Northern Thailand.

The circulation of water allows oxygen to be distributed throughout the pond, while simultaneously curbing the accumulation of organic matter. During the wet season, clouded skies might interfere with oxygen production, which can affect the quality of water in ponds. Therefore, farmers should pay particular attention during these periods. Using pumps or water aerators can effectively decrease thermal layering of water, which is important in the rearing of Tilapia in ponds.

Ponds in areas of high altitude face colder weather and cooler water temperatures. From measuring ponds for a duration of 24 hours, it was found that at night time and early morning, water temperatures remained constant at all depths, whereas during the day, thermal layering was observed; but the effect began to dissipate with the evening breeze. The highest water temperature in all ponds was recorded at 3pm; which is considered normal when rearing fish in shallow ponds, regardless of water height of rearing method.



Figure 1: Fish surface due to low oxygen content in the pond

The water circulation in areas that are below 400 meters above sea level tend to occur slower than if it was above this altitude. In general, water circulation occurs more rapidly during the wet season than it does in winter. The average rate of oxygen dissolution is higher in winter than in the wet season, whilst the temperature of the water and amount of ammonia nitrogen in the wet season is higher than during winter.



The Effect of Temperature on the Circulation of Water in Fish Rearing Ponds



In conclusion, altitude and weather both contribute to the circulation of water in ponds rearing fish. Water circulation occurs more rapidly in high altitude areas and during the wet season. This might be due to factors such as cold rain and wind, which can make the temperature at the water's surface drop. During the wet season, risks become high, as it is in this period when oxygen content tends to become low (see Figure 2).

come more effective. For instance, reduce feed, and install water aerators (see Figure 3) in order to ensure a steady supply of oxygen. In this way, they curb the risks which can incur due to extreme weathers, and moreover, help build their skills so to better respond to climate variability in future.

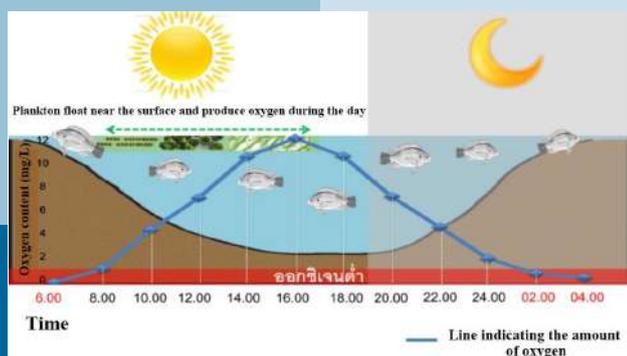


Figure 2: Oxygen content in a pond throughout the day

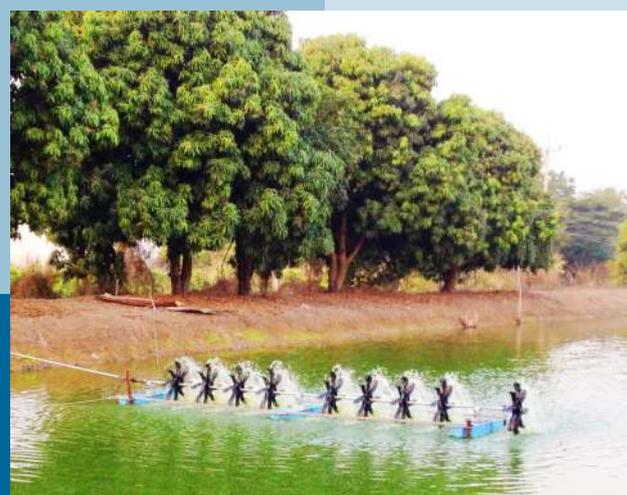


Figure 3: Water aerators

Commercial ponds located in low altitudes face problems from climate variability, high temperatures, high ammonia content, alkaline water, and expensive costs to bring in electricity. Likewise, ponds in high altitudes must contend with oxygen and ammonia content, turbidity and suspended substances.

Therefore, farmers with commercial ponds need to adjust their fish rearing methods to be-

