

WATER QUALITY REQUIREMENTS OF FISHES

DISSOLVED OXYGEN

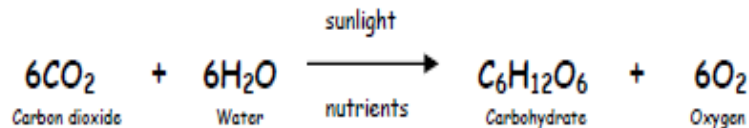
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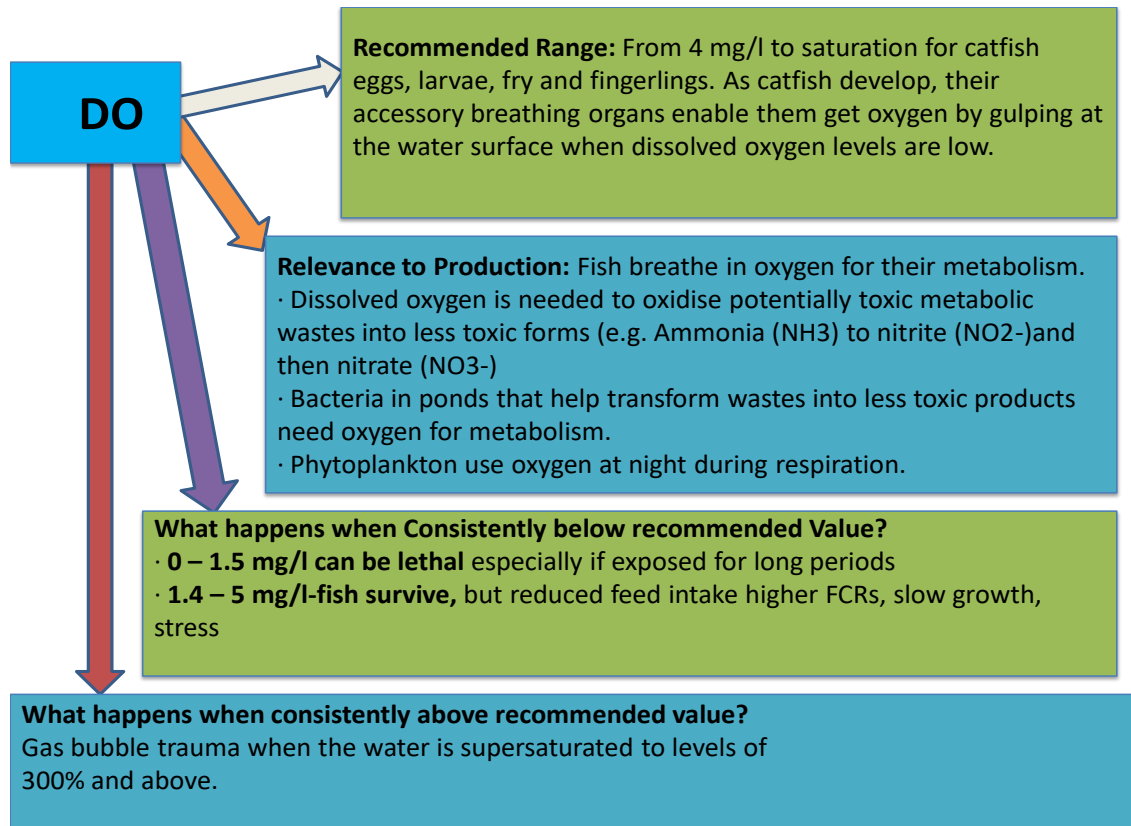
Oxygen largely comes in water either through direct diffusion from the atmosphere or by photosynthetic activities of green aquatic plants available in water bodies. Like other animals fishes also require oxygen for their metabolism. Dissolved oxygen (DO) is one of the prominent water quality parameters required for fish growth and maintenance. Soil and water quality influence dissolved oxygen. Higher amount of Oxygen demanding wastes (ODWs), excessive organic matter and feed wastages often lead to poor DO.

Amount of oxygen dissolved in water is directly influenced by

- Temperature: Solubility of DO in water is inversely proportional to temperature i.e., increasing temperature decreases the solubility of DO in water.
- Dissolved salts: Solubility of oxygen usually decreases with the increasing concentration of dissolved salts in water.
- Total pressure and partial pressure: Like other gases solubility of oxygen also depends on the total air pressure and the partial pressure of this gas. Super saturation of water is undesirable. When fishes are held in water supersaturated with O₂ and N₂ for a long time, they develop “**Gas-bubble diseases**”.

- Some oxygen is also incorporated into the water from the air, especially when the wind blows over the water surface and creates water movement (mixing).
- Photosynthesis occurs only in the column where sunlight can penetrate because sunlight is a catalyst to the process (see equation 2 below).





Wunder, 1936 have classified fresh-water fishes in following four groups depending on their D.O. requirement for carrying out normal respiration-

- 1. Fishes requiring very large amount of D.O.**-Normal D.O. concentration for them is 7-11cc/l, and at or below 5cc/ 1. Some of them begin to suffer. They include the trout, *Salmo trutta (L.)*, the minnow, *Phoxinus phoxinus (L.)*, the bullhead, *Cottus gobio (L.)*, the loach, *Namachilus barbatulus (L.)* and many other species inhabiting fast, cold streams.
- 2. Fishes requiring large amount of D.O.**-These fishes can survive at or below 5cc/ 1, they include – the gudgeon, ***Gobio gobio (L.)***, burbot, ***Lota lota (L.)***, the grayling, ***Thymallus thymallus (L.)***, the chub, ***Chondrostoma nasus (L.)***, etc.
- 3. Fishes requiring a small amount of D.O.** -These fishes can survive even at 4cc/ 1., e.g., the roach, *Rutilus rutilus (L.)*, ruff, *Acerina cernua (L.)*, etc.
- 4. Fishes requiring very low D.O.** -These fish species can survive at very low concentration of D.O., as low as 1/2cc/ 1. They include crucian carp, *Carassius carassius*, tench, *Tinca tinca*, carps, *Labeo rohita*, *Cirrhinus mrigala*, *Notopteus chitala*, etc.

