WATER QUALITY IN AQUACULTURE

REDOX POTENTIAL

The redox potential (Eh) characterises the oxidation-reduction state of natural waters.

Ions of the same element but different oxidation states form the redox-system which is characterised by a certain value.

Organic compounds can also form redox-systems.

REDOX POTENTIAL

Oxygen, iron and sulphur, as well as some organic systems are the most influential in determining Eh.

The presence of hydrogen sulphide is usually associated with a sharp decrease in Eh and it reflects the reducing conditions.

REDOX POTENTIAL

The Eh may vary in natural waters from - 500 mV to + 700 mV.

Surface waters and groundwaters containing dissolved oxygen are usually characterised by a range of Eh values between + 100 mV and + 500 mV.

The Eh of mineral waters connected with oil deposits gets negative values in other words lower than zero.

DISSOLVED OXYGEN

Oxygen is essential to all forms of aquatic life, including those organisms responsible for the self-purification processes in natural waters.

The oxygen content of natural waters varies with temperature, salinity, turbulence, the photosynthetic activity of algae and plants, and atmospheric pressure.

DISSOLVED OXYGEN

The solubility of oxygen decreases as temperature and salinity increase.

In fresh-waters dissolved oxygen (DO) at sea level ranges from 15 mg l^{-1} at 0° C to 8 mg l^{-1} at 25° C. Concentrations in unpolluted waters are usually close to, but less than, 10 mg l^{-1}.

Dissolved oxygen can also be expressed in terms of percentage saturation, and levels less than 80 per cent saturation in drinking water can usually be detected by consumers as a result of poor odour and taste.

DISSOLVED OXYGEN

Water temperature(°C)	Salinity (‰) 0	5	10	20	30	35
20	9,08	8,81	8,56	8,06	7,60	7,38
25	8,24	8,01	7,79	7,36	6,95	6,75
30	7,54	7,33	7,14	6,75	6,39	6,22
35	6,93	6,75	6,58	6,24	5,91	5,61

Table 2. Oxygen solubility for different water temperature and salinity values (Boyd 2001).

DISSOLVED OXYGEN

Variations in DO can occur seasonally, or even over 24 hour periods, in relation to temperature and biological activity.

Biological respiration, including that related to decomposition processes, reduces DO concentrations.

In still waters, low concentrations of dissolved oxygen can occur depending on the rates of biological processes.

DISSOLVED OXYGEN

Waste discharges high in organic matter and nutrients can lead to decreases in DO concentrations as a result of the increased microbial activity (respiration) occurring during the degradation of the organic matter.

In severe cases of reduced oxygen concentrations, anaerobic conditions can occur particularly close to the sediment-water interface as a result of decaying material.

DISSOLVED OXYGEN

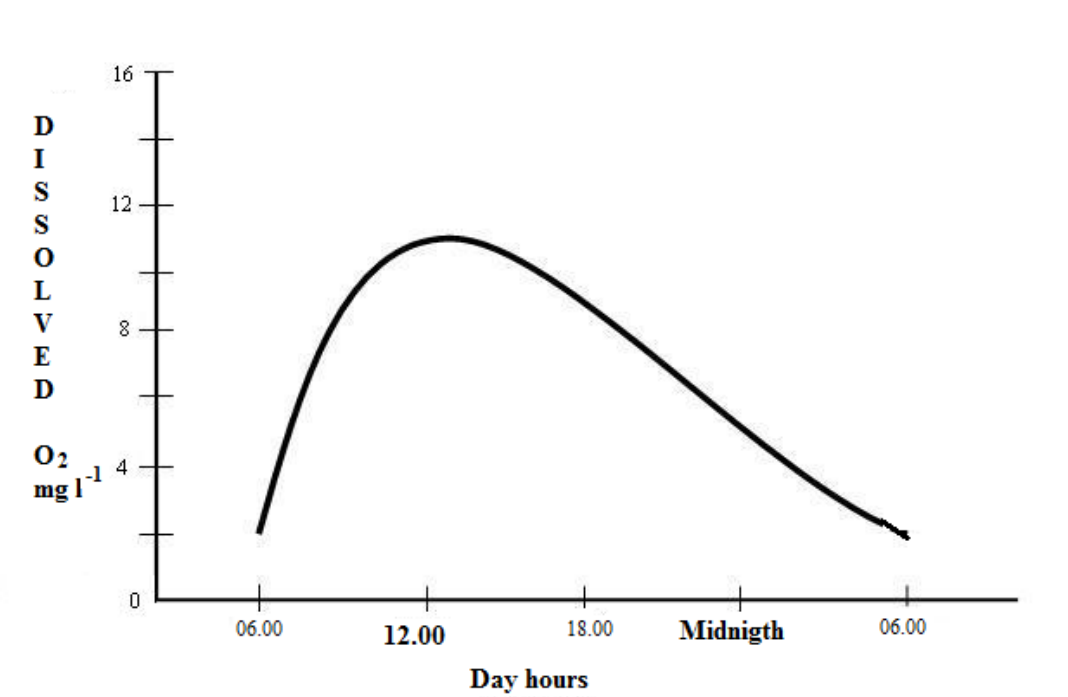

Figure 4. In fish ponds with dense plankton activity distribution of dissolved oxygen (Boyd 2001).