One area of fish keeping often neglected is aquarium lighting. Effective lighting not only enables you to view the contents, but it also enhances the colour of fish, plants and invertebrates. Inappropriate lighting may not only have a direct effect on the welfare of plants and corals, but may also impact the health of fish.



Keep watching...

Our fish, inverts and plants have developed complex behaviours that they exhibit when they are healthy and stress-free. The slightest deterioration, however, such as a variation in water quality, a change in the quality of food or even the appearance of a predator or competitor may lead to changes in these behaviours.

These become more and more exaggerated as the conditions deteriorate until the animal cannot cope and becomes exhausted. At this stage, it is likely to suffer from physiological damage, even if its environment is returned to its former stress-free state. As an example, the feeding frequency of goldfish will reduce to zero when exposed to low concentrations of dissolved oxygen.

Many other aspects of behaviour such as gill movement, swimming speed or patterns and colour changes have been used as an indicator of any deterioration within the aquatic environment. By detecting these subtle changes, you may be able to reverse any deterioration before it begins to affect the long-term health of the inhabitants. Using the appropriate form of lighting enables you to observe the slightest change in the behaviour of your stock.

Corals and plants

The health of many species is directly related to the quality and quantity of light they receive. They use the energy from lighting as a means of powering photosynthesis on which their health depends. Those that concern us most are the microscopic symbiotic algae, or zooxanthellae, which inhabit the tissues of many marine corals, and the tropical aquatic plants that we grow in our freshwater aquariums.

Improper lighting may lead to a range of health and other problems. It is possible to measure the intensity of light, but most fish keepers do not have the specialised equipment required to measure light intensity. Instead, they rely on wattage as an indicator. Some fish keepers have grown corals successfully by illuminating produces approximately 1-2W of light per litre of water, while many aquatic plant specialists have achieved notable success by providing their plants with a level of illumination equal to 1-2W per 2 l. However, as the wattage of a bulb does not provide an accurate estimation of light intensity, many fish keepers prefer to use the concept of colour temperature as a means of estimating the lighting requirements for their species.

Colour temperature and colour spectrum

The colour of light may often be referred to as warm or cold. A white light that contains a comparatively high proportion of red or yellow light may be appear 'warm', whereas light that contains a bit more blue light is referred to as 'cool'. Assigning each mix of colour components as colour temperature, given as degrees Kelvin (ºK), can assess the warmth of each colour. To understand colour temperature, think of an iron bar that is slowly heated up and changes from a dull grey to a warm red. This latter has been allocated the colour temperature of around 3500ºK. As the bar is heated further, it slowly takes on a bluish hue, which is allocated a colour temperature of around 6000ºK. The spectrum of colours produced by any bulb may be equated to the rainbow of colours that is produced when the light is passed through a glass prism.

While sunlight may be considered as a mix of colours, many of the light sources produced for the aquatics market are designed to produce a particular range of spectra to match the specific requirements of corals or plants, all associated with the environment in which they have evolved.

As the red colour spectrum cannot penetrate more than 5m through clear water, photosynthetic organisms below this depth would not be exposed to red light and will have evolved the ability to use the blue colour or spectrum of light that can penetrate this depth. Consequently, marine algae and many corals need a very high proportion of blue light to survive. Photosynthetic organisms that inhabit shallower water or even grow above the surface of the water, such as aquatic plants, will have evolved the ability to use a far greater proportion of red light, and could not survive if provided with the same blue light as required by marine zooxanthellae.