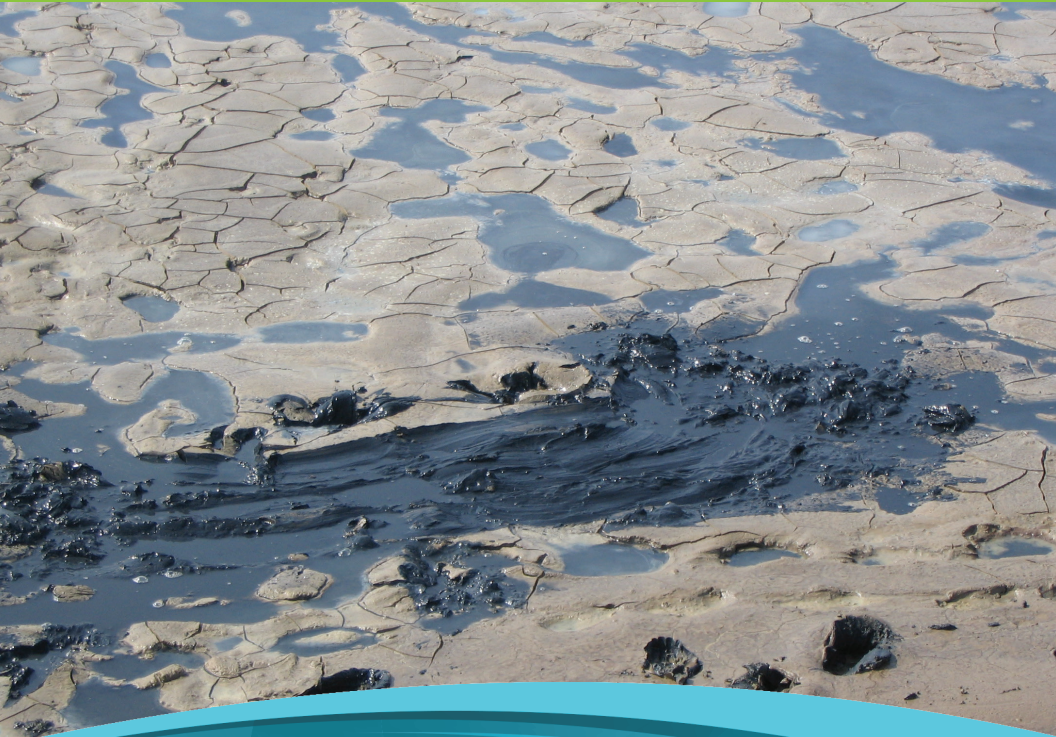


# REDOX POTENTIAL - AN INDICATOR OF AQUACULTURE POND HEALTH



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**2016**

Pond environment is crucial in the outcome of aquaculture operations. As the culture period progresses, the pond bottom condition deteriorates due to accumulation of organic matter residues. This leads to high oxygen consumption and the development of reducing (anaerobic) conditions in the pond bottom. When reduced species are building up, the pond condition is termed “REDUCED”. This condition leads to the diffusion of toxic reduced compounds from the bottom soil upward into the water column, high sediment oxygen demand, deterioration of the pond environment and adverse effects on shrimp growth.

### **What are the indicators of pond bottom condition?**

1. Redox potential also called as oxidation-reduction potential (ORP) is an important parameter to measure the relative degree of oxidation and reduction in aquaculture ponds. ORP in the pond soils decreases towards reduction (more -ve side) with progress of culture period. Though highly variable, ORP values denoted by Eh and quantified in milli volts (mV) are best used as an indicator to understand relative status of the soil.
2. Organic carbon (OC) content of soil is one index of pond sediment condition. High OC values imply more organic matter accumulation on pond bottom. The pond bottom soil organic matter contains a large fraction of stable, slowly degradable OC and hence, it is not a sensitive indicator. Conventional soil organic carbon determination procedure includes exposing the soil to air and drying and analysis has to be done in the laboratory.
3. Concentration of soluble iron and manganese (reduced species) is more sensitive indicator of the redox conditions. The reduced species of ferrous or manganese ions (2+) becomes soluble in the pond bottom soils which can be analysed.



Though OC and reduced species content can be used as indicators for pond bottom deterioration. Estimation of OC takes more time and hence cannot be used as quick indicator to plan management practices for improvement of pond bottom condition. It is possible to evaluate the intensity of the pond anaerobic conditions by measuring the sediment redox potential. Hence, redox potential is considered as one of the important, instant and better indicators that can be used to understand the deterioration of pond bottom condition.

### **How to measure redox potential?**

In order to measure the redox potential of pond bottom sediment at any point of time during culture period, the following steps are recommended.

1. ORP can be measured at soil water interface (SWI) near sluice gate and away from the aerators by portable multi parameter analyser with ORP probe.
2. If probes are not available, the sediment sample at 10-cm depth is to be collected in a polythene bag under air tight condition near sluice gate and away from the aerators. Once the sample is brought out of the pond, immediately ORP has to be measured under air tight condition by using a portable/ bench top redox meter.



3. In order to minimise the errors of ORP variability, minimum of three sampling places have to be fixed near sluice gate and repeated measurements are to be taken at each sampling place (SWI or 10-cm depth soil in polythene bag) and the average value can be taken as final value.

In intensive shrimp culture ponds, the accumulated black sludge in the pond bottom leads to reducing conditions and negative redox values. CIBA studies have revealed that ORP value of -200 mV or more is not desirable during the culture period. This problem can be avoided by providing proper aeration uniformly throughout the pond by placing aerators at right place, chain dragging along the pond, central drainage system and disposal of sludge through heavy duty pumps.

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*Published Under*

**National Innovations in Climate Resilient Agriculture (NICRA)  
National Surveillance Programme for Aquatic Animal Diseases (NSPAAD)**

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