

## Running waters in general

### Running waters

Investigation on running water series is less compared to that of lakes. A comprehensive and prolonged study has been made in America on Illinois river over a period of 50 years. The lotic environments differ from lakes and similar waters in the following respect :

1)**Depth** – As a rule, the depths of running water units are small compared to lakes

2)**Width of basin** - Apart from the channel expansions (sometimes designated as river lakes), the water is confined to relatively narrow channel.

3)**Current** - Whole volume of water flows in one direction.

4)**Condition of gradient from source to mouth** - All conditions such as physical, chemical and biological gradually change with distance along the main channel in a definite direction.

5)**Extension of channel with age** - Stream systems usually increases their length, width and depth with increasing age.

6)**Permanent removal of eroded and transported materials** - At any position during the course of running water unit, materials eroded are transported downstream.

7)**Absence of prolonged stagnation** - Constant flow and mixing of water usually eliminates prolonged summer stagnation of the bottom waters.

8)**Relative influence of physical factors** - Physical factors of the environment are relatively more important than in lentic waters.

9)**Basic food materials** - Streams manufacture within themselves the basic food materials but much depends upon the contribution from surrounding land areas.

### Physical and Chemical conditions of Lotic environments

#### 1)Water movement

Current in one direction is the outstanding feature of lotic environments.

Current is the greatest velocity which interfere during water falls and finds minimum where long distances of slope of channel becomes negligible during which the channel approaches base level. Some streams are slow and sluggish throughout their length and other swift throughout their whole course. The distribution of velocities in streams is determined by different factors such as shape of channel, roughness of channel, size of channel and slope channel. The maximum velocity is usually found somewhere within the first one third of the depth of water. The velocity pattern of a stream altered by strong winds which blowing either sometimes upstream or predominantly downstream. Ice cover reduces the surface velocity because of the greater retarding effect of ice as compared with air. The

current rate may vary markedly at positions on the front, top, sides and rear side of submerged stones likewise the same is true of the gaps, channels and interstices between stones and similar objects. Erosion, transportation and sedimentation are inseparable accompaniments of stream currents. Those materials which are not carried in suspension are rolled downstreams. The transporting power of the streams varies with changes in velocity.

## 2)Temperature

In lotic environments, the temperature phenomena are different from those in lentic situations. The principles features are :

- a) tendency toward a uniform temperature at all depths
- b) tendency to follow air temperatures more closely
- c) thermal stratification usually absent or temporary

The temperature variation is common in stream especially in long stream and slow current situations. Certain circumstances leading to temperature variations are differences in

- a. depth of water
- b. current velocity
- c. bottom materials
- d. temperature of entering of tributary / small stream
- e. exposure to direct sunlight
- f. degree of shading and
- g. time of day

In long stretches of shallow unshaded, slow moving currents, there is gain in temperature during the clear days of mid summer, but there is different temperature during night.

## 3)Turbidity

A greatest extreme of turbidity occur in the flowing water series. Streams in mountain and rock beds the turbidity is minimal while in the plain region the turbidity is high (eg, North American Missouri and Kansas rivers). In some stream systems, high turbidity is a permanent feature throughout the year. The turbidity in streams is largely due to silt, detritus and other non-living materials. Since plankton production is commonly restricted, it usually plays a minor role in turbidity production. Domestic sewage and other forms of stream pollution commonly increase turbidity.

## 4)Light

The most important factor in the determination of light punctuation is turbidity and its influence is great in certain waters which reduce the development of plants. In turbid rivers where light decreases due to presences of suspended silt in excess of 90% in first 25 mm of water depth.

## **Chemical conditions**

### 1)Dissolved gases

Due to the involvement of mechanical condition in water current, the dissolved oxygen supply of uncontaminated streams is high leading to saturation point. Generally oxygen content begins to increase soon after sunrise, reaches a maximum shortly after mid-day and then declines to a minimum. This variation extend from considerable supersaturation to a substantial reduction in some instances is due to oxygen production by green plants during day and consumption by respiration of biota and decay of organic matter during both days and night. Under some circumstances, some rivers show very distinct diurnal oxygen pulses. The factors affecting the dissolved oxygen are: character of stream flow, slope of channel, temperature, oxygen released by chlorophyll bearing plants, oxygen consumed in respiration of the biota and oxygen consumed in the decay of organic deposits on the bottom.

### 2)Dissolved solids

The dissolved solids vary greatly depending upon the regional characteristics of the drainage basin. It is known that in general the lotic water contains more salts and less soluble nitrogen than lentic waters (Chapman, 1931). The dissolved solid content is often subjected to changes by dilution or addition at stream junctions. Loads of solids in streams are common and it has been estimated that the range of total solid in the river systems of Upper Peninsula is 100 to 200 ppm while in Lower Peninsula is 200 to 500 ppm.

### 3)Hydrogen ion concentration

The general features of pH in lotic environment are not different from that of lentic environments. Currents tend to keep the pH uniform over considerable distance; it keeps any acidity due to accumulating free carbon dioxide reduced. However, a uniform pH over considerable distance in lotic environment is kept. So, the streams would never develop more intense acidities unless they are contaminated or receive heavy seepages from mineral deposits.