PRINCIPLES PERTAINING TO LIMITING FACTORS AND ECOLOGICAL ASSESSMENT FOR SUSTAINABILITY

1. Liebig's law of the minimum
2. Shelford's law of tolerance
3. Regulatory Factors
4. Ecological indicators

1.Liebig's law of the minimum

-Growth of plant is dependent on the amount of food stuff which is presented to it in minimum quantity

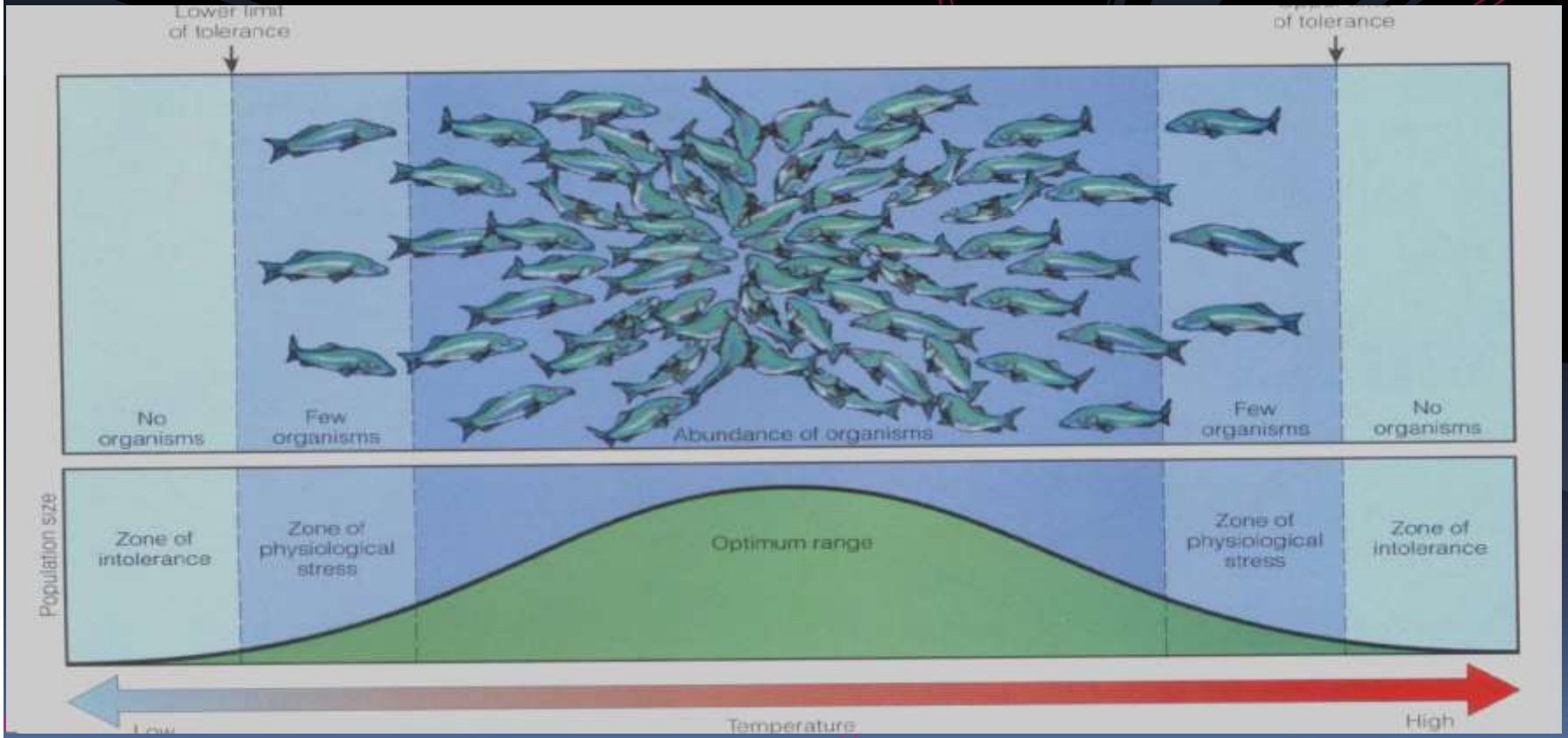
-This was first expressed by JUSTUS LIEBIG in 1840.\

-This law is less applicable under transient-state conditions when the amounts, and hence the effects, of many constituents are rapidly changing

Shelford's law of tolerance

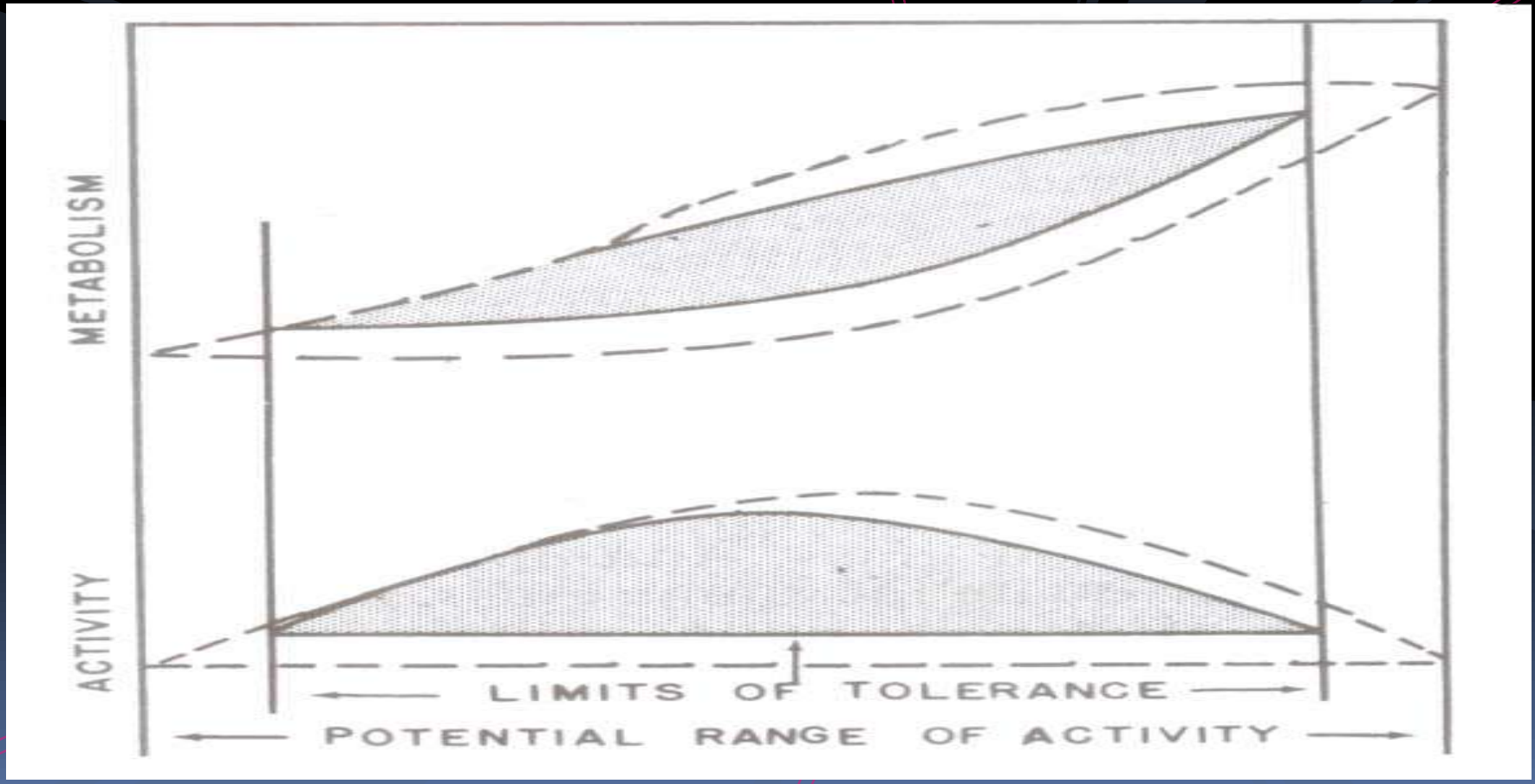
-the existence and the, abundance, and the distribution of a species in an ecosystem are determined by whether the levels of one or more physical or chemical factors fall within the range tolerated by that species.

This concept of the limiting effect of maximum as well as minimum was incorporated into the ‘law’ of tolerance by V. E. Shelford in 1913



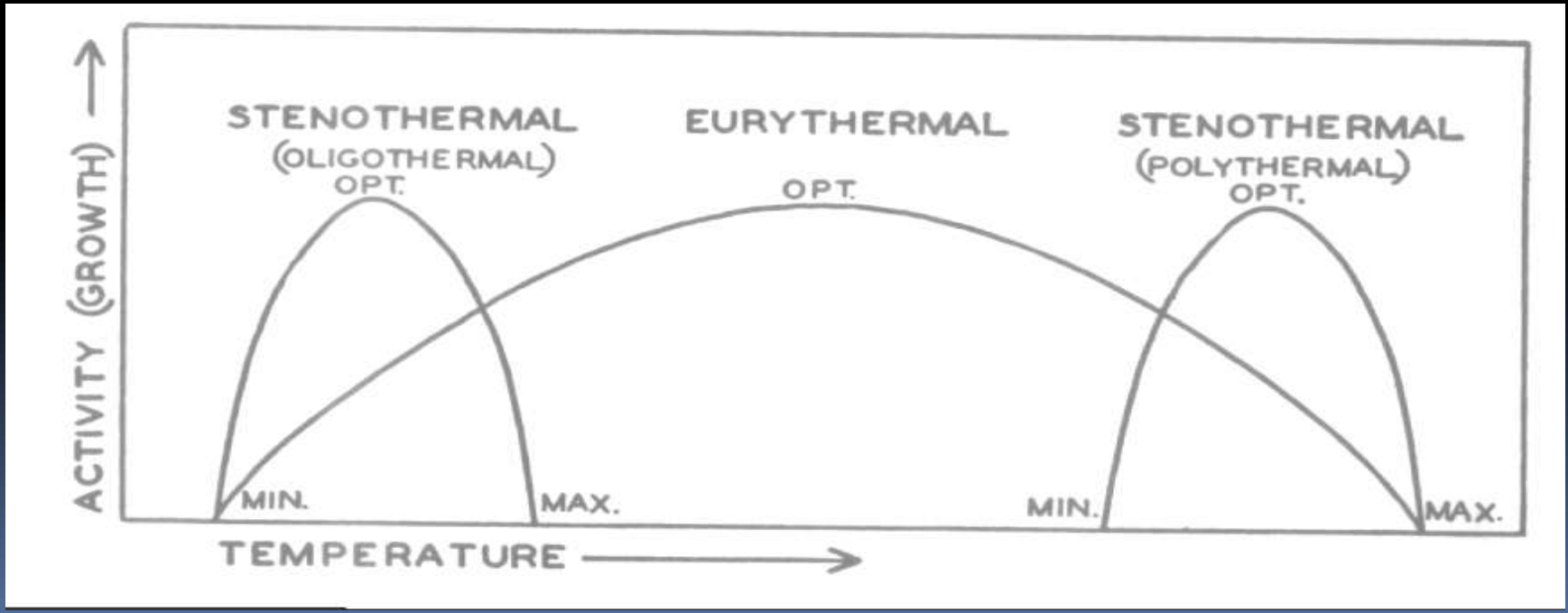
Limiting Factors

The presence and success of an organisms or a group of organisms depend upon a complex of conditions. Any condition which approaches the limits of tolerance is said to be a limiting condition or a limiting factors



Physical factors of importance as limiting factors

- TEMPERATURE:
- 1.Life can only exist within -200 deg. To 100deg C.
- 2.Most species are restricted to a narrower range of temperature.
- 3.Aquatic organisms have narrower range of tolerance than equivalent land animals.
- 4.Organisms which are subjected to temperature variations tend to be depressed, inhibited or slowed down by a constant temperature

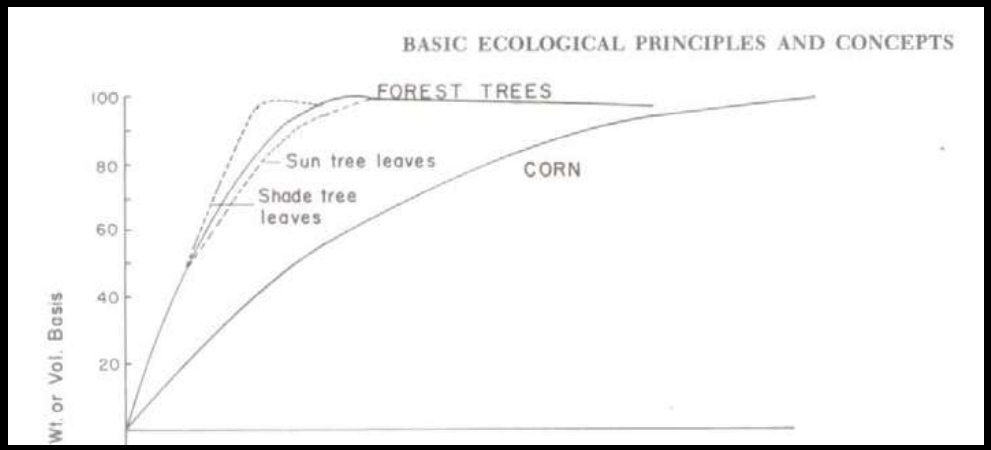


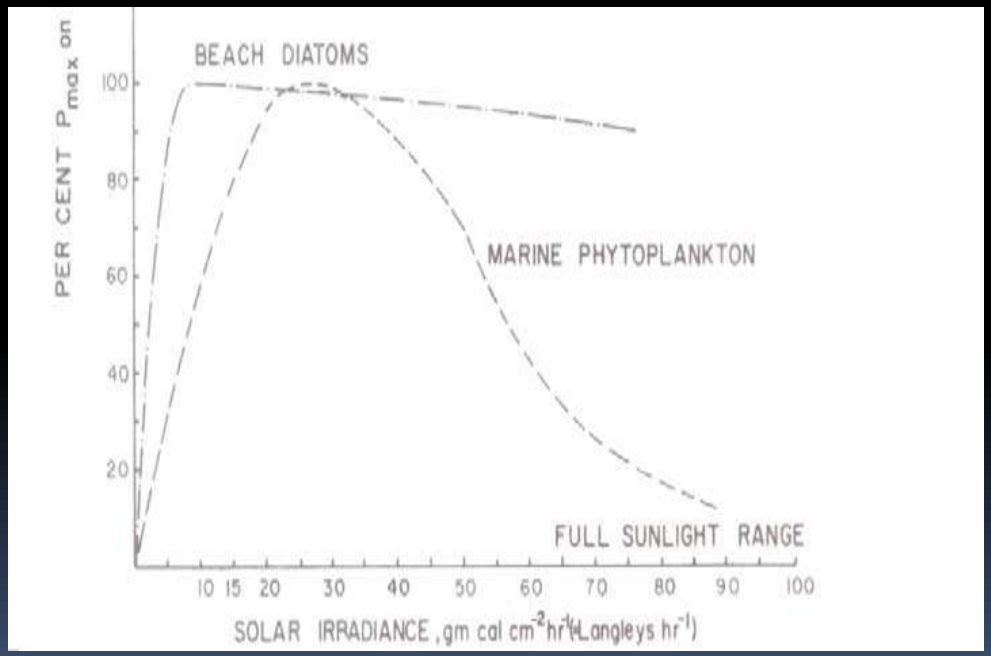
LIGHT:

The quality of light , the intensity of, and the duration are known to be the important factors of light .

Both plant and animals respond to different quality of light.

Individual plants as well as communities adapt to different light intensities by becoming 'shade-adapted'. Or 'sun adapted'





WATER :

- Rainfall distribution over the year is an extremely important limiting factor for organisms.
- Humidity has a daily rhythm, and has a special role in modifying the effects of temperature, hence regulates the activities of organisms and in limiting their distribution.
- Evapo-transpiration is also an important limiting factor. Desert plants expose only green buds or stems.
- Dew , in areas of low rainfall, is vital contributor to precipitation.

ATMOSPHERIC GASES:

-The concentration of carbon di-oxide an oxygen is limiting to many higher plants.

BIOGENIC SALTS(MACRONUTRIENTS&MICRONUTRIENTS

-Nitrogen and phosphorous salts are of major importance to ecologist as limiting factors.

CURRENTS AND PRESSURES

- Currents in water not only influence the concentration of gases and nutrients, but act directly as limiting factors.

CHARATERISTICS OF ECOLOGICAL INDICATORS

1. In general, ***steno*** species make much better indicators than ***eury*** species.
2. Large species usually make better indicators than small species. A large and more stable biomass and standing crop can be supported with a given energy flow. The turnover rate of small organisms may be so great that the particular species present at any time may not be very instructive as an ecological indicator.

3. Before relying on a single or group of species as indicators, there should be abundant field evidence .
4. Numerical relationships between species,populations and whole communities often provide more reliable indicators than single species.