crop.

(viii) FLOW OF ENERGY

The sole source of all energy present in an ecosystem is the light received from the sun. according to Geiger, 42% of incoming solar radiations are reflected, (33% by clouds and 9% by

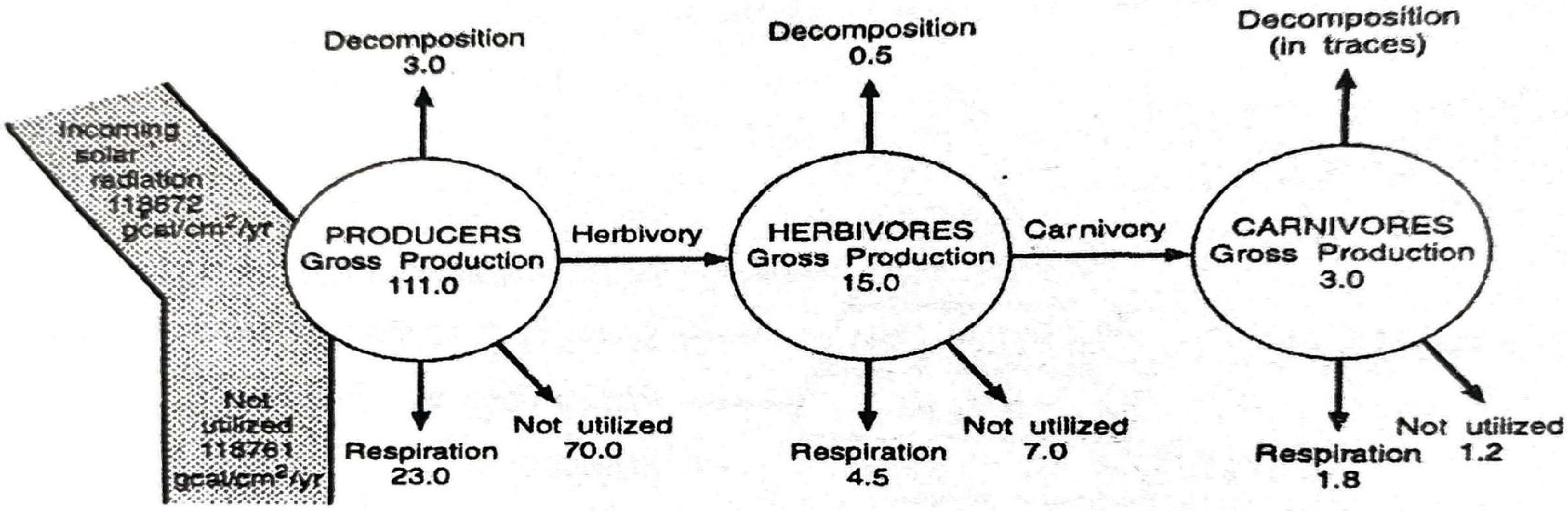

Fig. :The concept of Lindernann's energy flow in ecosysm.

dust particles), about 10% are absorbed by Ozone, oxygen, and water vapours. Finally, only 48% reach the surface of the earth. A portion of this radiant energy is used by producers the green plants and converted into chemical energy. This chemical energy is partly transferred to consumers through food. The concept of energy flow in the ecosystem is governed by the first two law of the rmodynamics. i.e. (i) energy can neither be created nor destroyed and every transfer of energy is accompanied by its dispersion so,100% transformation of energy is not possible and transfer accompanies some loss of energy in the form of heat. The term • **energy income** is used for inflow of energy during a particular period. The provision of different amount of energy for different activities is called **energy budget**.

On an average, only 111 Cal/cm2/yr of energy is trapped by the producers (autotrophs) in producing organic food. According to Linderman only O.2% of the incident solar radiations are trapped by aquatic ecosystem and 1% by terrestrial ecosystem. Herbaceous autotrophs are more efficient than trees in trapping solar energy. The modern crop plants can trap up to 5% of the radiations falling on them. The maximum efficiency is recorded for sugarcane. It is 10-12%.

The study of energy transfer between different trophic levels is called **bioenergetics**. (Phisllipson, 1966) According to Lindeman, 1942, the total solar input is 1,18,872 g cal/cm^2/yr, of which 1,18,761 g cal/ cm^2/yr remains unutilized. The green plants show a gross production of 1,11g/cal/ cm^2/yr(i.e. 0-10%). From this energy, 23g cal/ cm^2/yr(21%) is consumed in respiration, 3.0 g cal/ cm^2/yr in decomposition and about 70 g cal/ cm^2/yr remains unutilized. The net primary production is, therefore, 111 –(23+3) = 85 g cal/ cm^2/yr. Hence, the green plants transfer 17% of their net primary production to herbivorous and accumulate about 79.5% food energy. Out of 15 g cal/ cm^2/yr, the herbivores use 4.5 g cal/ cm^2/yr (i.e 30%) in metabolic activities, 0.5% g cal/ cm^2/yrin decomposition and 7.0 gcal/ cm^2/yr remains unutilized. Only 3.0 g cal/ cm^2/yr (i.e. 28.6% of net production) is passed into carnivores. The carnivores use 60% (1.8 g cal/ cm^2/yr) of energy in metabolic activities and 40% (1.2 g cal/ cm^2/yr) remains unutilized. Hence, from gross production of 111 g cal/ cm^2/yr by autotrophs, a total of 29.3 g cal/ cm^2/yr energy is used in respiratious 3.5 gcal/cm^2/yr. in decomposition and 78.2 g cal/ cm^2/yr remains unutilized. It may be noted that there is progressive decrease in the energy at each trophic level.

Odum's energy flow concept (1963) consists of three boxes representing the biomass of autotrophs (producers), herbivores (primary consumers) and carnivores (secondary consumers). The pipes joining the different tropic levels depict the flow of energy. The energy losses taking place by way of heat, respiration (R), non utilization (NU) and non assimilation (NA) are shown by open pipes.

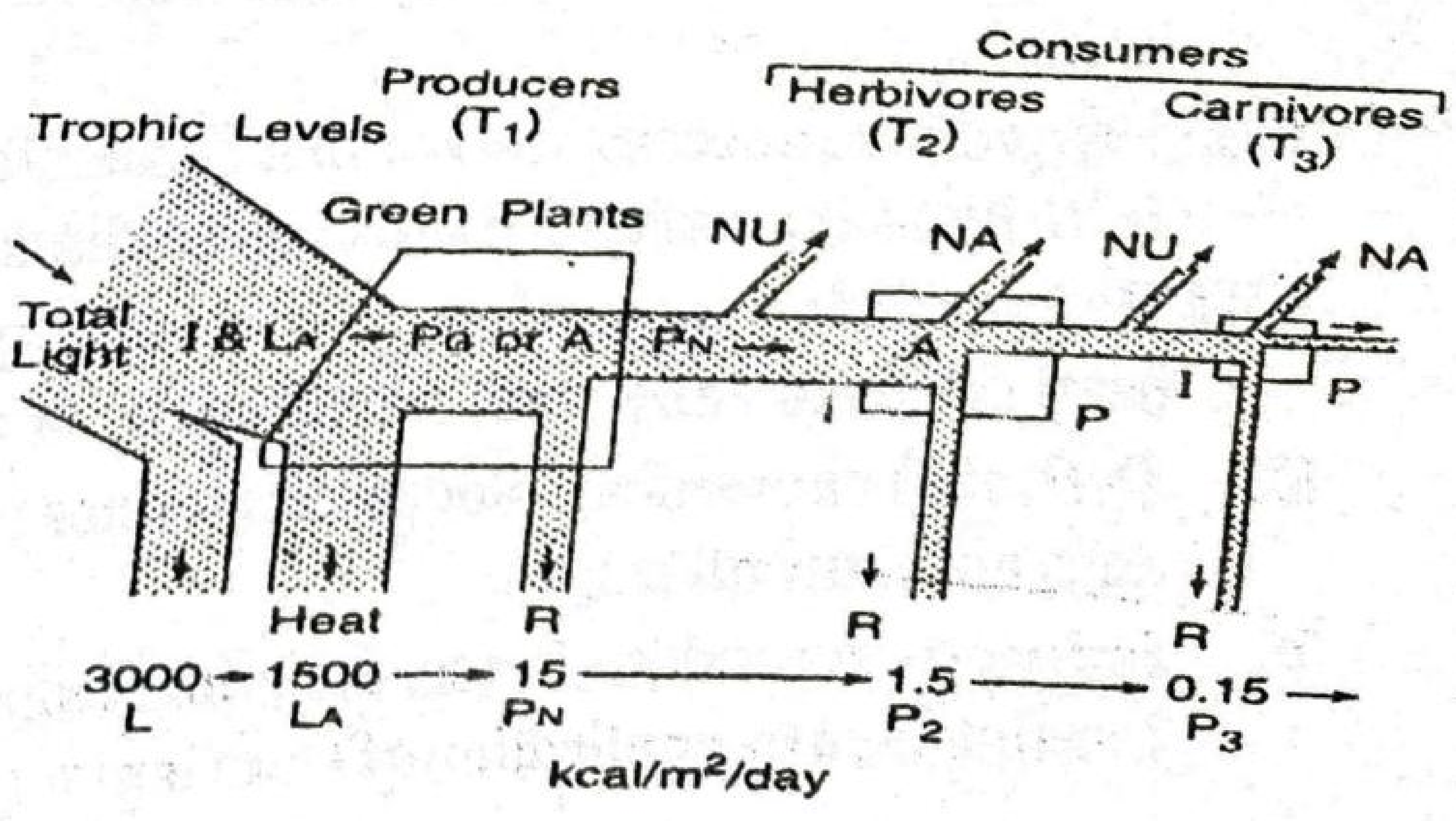

Fig. : The Concept of enery flow in ecosystem.

The unused energy is stored or exported. This concept believes that the total sol input is 3000 k cal/ m^2/day and the light absorbed by the plant cover is 1500 k cal/ m^2/day. Th net primary production is 15 k cal/ m^2/day i.e., 1% of the total light intake. The secondar productivity at the herbivore (primary consumer) level is 15 k cal/ m^2/day i.e. 10% of producer, and at carnivore level, 0.15% k cal/ m^2/day i.e. 10% of herbivores.