CHAPTER - IX

GENERAL CONCLUSION

"Successful science is abstractive: of all that is of interest, only a fragment is susceptible to explanation, and only a fragment of that fragment to serious mathematical analysis"

- D. Berlinski (1976)
Living things grow and develop well before the child knows that planets or atoms are, he is made aware of changes within himself and the living things that surround him. Growth and development, so readily observable, among the first concepts to establish themselves in the juvenile mind [Ulanowicz, 1980].

Growth is a part of the life process and is an important biological phenomenon. A proper understanding of growth required a rational quantitative theory inviting mathematical treatment, models and laws. In order to arrive at a rational theory of growth we take into consideration of the following points:

1) The living system, whether an individual or a biological community is an open system maintaining itself in continuous import and export of biomass and energy with the surroundings. The structuring of the biological system based on open system model.

11) The growth, the increase of biomass in time is not unlimited. As a general rule, there is first a rapid increase which generally slow down until the system or species reaches a steady or saturated state.
The growth is determined or influenced by a great number of factors which are either in the system (such as genetic factor, hormones, process of aging and differentiation etc.) or in its environment (such as temperature, humidity, nutrition, density of population etc.). The external or environmental factors are also subjected to variation or random perturbation.

The growth is a complex phenomena and is the outcome of the innumerable and largely unknown component processes. Notwithstanding this complexity, we have to assume that the growth can be expressed by relatively simple phenomenological equations. The non-equilibrium thermodynamic and stochastic modellings are to be based on these phenomenological equations.

Finally in order to arrive at a rational law of growth we must remember that the proposed law is subjected to empirical test. In doing so, one has to start with cases that are as simple and lucid as possible. Subsequently the analysis will proceed to more complicated cases which may entail consideration of interfering factors and complication. It is because the transition from simple to more complicated cases and correspondingly to more elaborate theories is the progress of Science. [Bertalanffy, 1962].
In line with the above assumptions we in the present thesis have discussed some problems starting from the simplest primitive model of Malthus to more realistic and complicated problems. The stress has been given not on the mathematical juggling of solving multi-species community but on the physico-mathematical modelling of biological system. The non-equilibrium thermodynamic and stochastic modellings give better realistic picture of the systems under consideration. There are, however, limitations of the models too. No phenomenological principle is a perfect description of Nature. The non-equilibrium thermodynamic and stochastic models which appear adequate to describe a good deal of complex phenomena, is yet to achieve the generality of explaining all the different aspects of growth or life processes.

"Just as the essence of food cannot be conveyed in calories; the essence of life will never be captured by even the greatest formulas"

Alexander Solzhenitsyn
The First Circle