

ABSTRACT

Communities pass through stages of development. Under the influence of a complex set of variables, it grows and evolves with time. While some communities adapt themselves to changing scenarios and continue to flourish, some decay. Non-linearity and unpredictability are essential characteristics of community evolution. Almost like a biological system, an underlying principle of self-organisation drives a community towards an ever-changing horizon. The Generalised Lotka-Volterra model is able to explain these phenomena.

Planners and policy makers try to identify a set of indicators to assess the developing state of a community. A debate is going on to ascertain the true meaning of development. Growth is now defined not only in terms of quantity but also in the perspective of qualitative indicators. As for measure, international bodies have proposed several yardsticks. The very basic one constitutes of health, education and access to resources.

In the present work attention is focused on the study of the social growth of a community in the developing world. A methodology has been developed to assess the state of a community in terms of a small number of indicators, as suggested by different international bodies.

Based on the logistic equation an attempt has been made to explain and simulate an apparently unorganised and unpredictable self-organising system. In the present work, a general Lotka-Volterra (L-V) form has been proposed to study the flexible nature of a community. A region in the eastern India, Medinipur (Midnapur) district in the State of West Bengal, India has been chosen as the study area.

Based on the belief that some parameters change very slowly and are ingrained in the history, model parameters have been assessed. Main difficulty one faces in this approach is the dimensional multiplicity of parameters. A random search process based on genetic algorithm (GA) has been developed. Performance of the community is represented by three state variables--Health, Education and Infrastructure. As a driving or controlling vector, a new dimension is added - the effective investment in a particular sector.

Behaviour of the system under different inputs, such as investment in education, health and infrastructure is studied and various paths of development are identified. The concept of sustainability has been introduced through constraints, which reflect the 'limits to growth'. Alternative scenarios are created through varying ratios of control variables – the 'handles' that may be used to steer the society to a better-planned state. It has been shown that by changing the relative values of control parameter, it is possible to induce qualitative changes in a particular state variable. To illustrate the application of the methodology proposed, performance of the community in terms of education - primary, high school and college level enrolment have been considered. Options, which guide a community towards qualitative development rather than quantity, are traced.

Keywords

Development, community, quality of living, human development index, growth, indicator of growth, longevity, educational attainment, infrastructure, resource constraint, sustainability, self organisation, chaos, socio-spatial dynamics, non linear systems, predator prey model, logistic model, Lotka-Volterra model, L-V model, predator prey, parameter assessment, artificial intelligence, genetic algorithm, GA.