

Life In A Changing Climate

Thousands of years ago human life on earth was in harmony with nature on a 100,000 year cycle between the ice ages; this is when the human mind and body evolved and essentially our genetic design stems from this period. The human race evolved from the primate starting around 150,000 years ago during the last warming period; the human DNA was fine tuned during this period. Then over the last 15,000 years, essentially since the last ice age, humans set up their icons; family, the concept of God, the various cultures and forms of government and the hierarchical ideas of respect and age. In the last 50 years, since the last world war, we have devoted ourselves almost exclusively to "liberating" ourselves from these icons and in the process trashing nature and removing most of our reference points. More importantly new feedback mechanisms have been established the consequences of which appear to be alarming. First, these are now controlling climate change. Second, recent research has shown that our genetic destiny is set in the prenatal period when the stress levels in the mother determines much of the well being of an individuals life; the more stress the mother is under the higher the incidence of pathological behavioral changes in the adult, rendering the resulting society less able to make mature decisions. This means the poorer society's response, the more stress, the more behavioral abnormalities occur with the result that society spirals into a cycle of increasing stress and or increasing fetal terminations. Third, economic growth is fueling the information age that, in turn, is increasing productivity leading to a positive feedback into economic growth; the result is that the GDP of most countries is now growing exponentially. The alarming feature of these three feedbacks is that they imply that, the climate, our psychological state and the economy will all move, irrespective of what humans do, to a new unknown state. Life will become interesting in the next 50 years!

Real Time, Adaptive Self Learning Management of Aquatic Natural Systems

Recent advances in sensor technology, computing power and data base management has opened the possibility of adaptively managing natural systems, such as lakes, estuaries and coastal seas in order to optimize for both environmental value and human support. In order to achieve this it is necessary to first define the index of sustainable functionality as the objective function. Then by setting up a hybrid system of real time data acquisition and 3D modeling embedded in a suitable GIS system it is possible to build decision support systems that are self learning in data acquisition, model validity and human decision making so that, over time, an optimum state is maintained as human values change. I will illustrate this new technology with examples from around the world.