length scales. Theoretical challenges and controversies, as well as models ranging from the semiempirical Lum–Chandler–Weeks theory to the microscopic local molecular field theory are discussed. Amazingly, this is the only article in the entire volume that does not have even a single figure! Knobler and Gelbart educate us about the mechanisms by which a double stranded viral DNA is packaged into the capsid and later ejected into the host cell. The single molecule laser trap experiment summarized in figure 3 is highly informative and gives the reader an idea of how wonderful this 'mean machine' of nature is – packaging to crystalline densities, tens of piconewton force inside the capsid, and nearly 50 atmospheres of pressure exerted on the capsid walls. The success of simple analytical theories, outstanding challenges in terms of accurate estimates of the packaging rates and the dependence of the packing topology on capsid container shapes are clearly presented. In another well-written review, Fletcher and Geissler provide convincing arguments as to how active biological materials, making up a cell for instance, are very different from conventional materials. The authors have done a good job of motivating the theoretical challenges that need to be tackled in such systems exhibiting a complex interplay among various length, time and mass scales. So, for example, can one think of muscle fibres as usual materials with elastic modulus and viscous creep or we need to worry about the cytoskeletal activity involving filaments, motors, proteins, etc.? Using the example of growing actin filaments clearly brings out the central message – conventional approximations, in terms of properties and response, which are valid for static ordinary materials are rather poor when it comes to active biological materials. It seems like nature can integrate material responses with molecular controls with the utmost craftsmanship.

Finally, the article on equation-free multiscale computation by Kevrekidis and Samaey discusses a technique that should be useful in theoretical studies of many of the systems mentioned here. For complex systems one would like to simulate the microscopic dynamics on a long enough time scale to capture the emergence of novel and interesting phenomena on the macroscopic scale. However, despite knowing the microscopic evolution laws, the task is computationally difficult if not impossible. How does one come up with coarse-grained evolution equations with experimentally relevant approximations? Such a methodology is described in an exceptionally clear way by the authors. Three examples, although a bit sketchy on the details, provide a glimpse into the advantages of the approach and the difficult issues that still need to be resolved are mentioned. Interestingly, a very recent work by Noé *et al.* (*PNAS*, November 2009, early edition) adopts a similar philosophy in characterizing the equilibrium ensemble of protein folding pathways using short off-equilibrium simulations. Computer simulations of DNA packaging described by Knobler and Gelbart, for instance, would require some such approach in the near future.

I hope that the glimpse of the exciting advances in physical chemistry mentioned above is motivation enough to go and look up the current *ARPC*. For libraries it is a must and for those of you lucky enough to have a personal copy – happy reading!

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Economics of Forest Resources. Gregory S. Amacher, Markku Ollikainen and Erkki A. Koskela. The MIT Press, 55 Hayward Street, Cambridge, MA-02142. 2009. xxiv + 397 pp. Price: $60.00.

The history of forest economics tracks the history of forestry. Just like the science of forestry began as the science of timber management, so did forest economics begin as the economics of timber. The economics of timber deals with a straightforward question facing the owner of a piece of forest land. At what age should he cut the trees in a forest? This question can be broken down into a series of simpler questions, asked again and again. Should he cut the trees now, or wait a year before cutting them? If he cuts them now, then he gets the cash in his bank account right away, which can be invested at some interest rate, say r. If he waits a year, then the trees will have grown in the meantime, so he will get a larger sum of money, but will have foregone the interest he could have earned in the meantime from the proceeds of the sale of the timber. In 1849, a German forester, Martin Faustmann, was the first to publish a solution to the problem that took account of a second factor: cutting the trees now rather than delaying brings forward the profits from all future planting and felling cycles, and thus reduces foregone interest from those cycles. This solution to the problem became known as the Faustmann rule. The trees should be cut at the age when the gain from waiting a little longer is neither more nor less than the loss of interest from waiting a little longer. The gain from waiting a little longer is the value of the additional timber that accrues over the period of waiting. This, of course, depends on the price of timber and the rate of growth of the trees. The cost of waiting is the interest foregone over that period from not having sold the timber and invested the proceeds, as well as the interest losses from having delayed all future harvesting cycles.

It was soon realized that Faustmann's solution was correct. It is instructive to compare it with a solution popular among government foresters, that of choosing the rotation age to maximize the average yield of timber per year, also known as the mean annual increment. The problem with this solution is that it ignores the interest cost of delay.

Timber and pulpwood remained the primary interest for forest managers the world over until the last few decades of the twentieth century when other concerns assumed importance. (It is true that agrarian and tribal communities who managed forests had always had other interests, but these managers were not reading and funding forestry science. Managers acting on behalf of governments and corporations were.) Following the interest in recreational and amenity

values of forests, biodiversity values, carbon sequestration, and other ecosystem values, timber economics also expanded its domain to become more truly forest economics. This book reflects the strong dominance of timber economics while dealing with the newer topics as well.

This is a textbook on forest economic theory and pays little or no attention to the actual evolution of forest resource use, deforestation, production and prices (although its structure reflects that evolution to a considerable degree). It is meant for postgraduate students and is exclusively mathematical. That is, all questions are formulated in precise mathematical terms and their solutions found mathematically. Comfort with calculus is an essential prerequisite for using this book.

The book begins with the Faustmann rule, the solution to the harvesting problem for a single even-aged stand of trees under the assumption that all future prices are known, and that there is a constant and known interest rate at which the owner can freely borrow and lend. It goes on to consider the implications of relaxing these assumptions in different ways. For example, it incorporates the concern with recreational uses of forests in temperate countries by examining the harvesting problem when the volume of standing timber is valued in itself. It examines the problem when there is spatial and temporal interdependence in amenity values of stands. It goes on to consider appropriate tax policy when both timber and amenity values are a concern. Uncertainty about future timber prices, interest rates and possible damage to trees makes the Faustmann problem much harder to solve. It requires the use of stochastic calculus. This is taken up towards the end of the book and the necessary mathematical tools developed.

One chapter examines the use of auctions and other policies for preserving biodiversity in boreal and temperate forests. The idea is to find a suitable mechanism for the government to pay private forest owners and motivate them to manage their forests in a way that will conserve biodiversity. This chapter makes use of the economic theory of auctions. Although the context is not that of tropical forests, these ideas could be adapted for use in India.

The book has only one chapter that explicitly deals with problems of forestry in a developing-country context. It considers the problem of imperfect monitoring and enforcement of logging concessions to private companies, a problem that has led to much deforestation in south-east Asian countries, and also in India to some extent. It examines the optimal design of concession policy in terms of three parameters: concession size, royalty rate and auditing probability. It is shown that an increase in concession size reduces the probability of illegal logging, but the possibility that auditors may be bribed reduces the optimal size of the concession.

A second important cause of tropical deforestation is conversion of forest to agriculture. Allocation of private land to plantation forestry can reduce pressure on natural forests. These issues are taken up in this chapter in the context of migration and imperfect enforcement of property rights in plantations and felling restrictions in natural forests. This chapter does discuss some empirical findings on tropical deforestation, for example, the fact that higher wage rates tend to reduce deforestation. But it does not seriously attempt to paint a picture of how tropical deforestation has progressed or of the various forces that have driven this. The absence of historical context means that this book cannot be used to get a picture of these issues.

This statement applies to the book as a whole. It is best used for getting acquainted with the mathematical tools used by economists for examining the timber harvesting problem in various contexts. It can also be used as an introduction and reference book for other topics, such as the use of payments for biodiversity conservation, now commonly known as payments for ecosystem services and abbreviated as PES.

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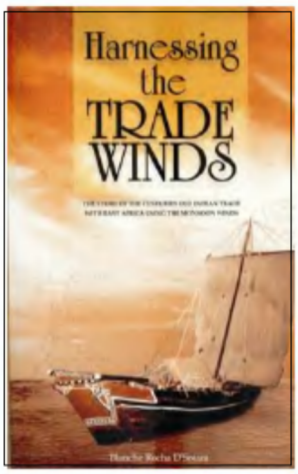

Harnessing the Trade Winds: The Story of Centuries Old Indian Trade with East Africa Using the Monsoon Winds. D'Souza, Blanche. Zand Graphics, Nairobi, Kenya. Available from African Book Collective, Oxford, UK/Michigan State University Press, East Lansing, MI, USA. 2008. 204 pp. Price: £10.

This slim volume is apparently the first and 'most direct statement on brown peoples' transcripts over at least three millennia of trade, labour, and migrations against a pervading backdrop of Arab, European, and African encounters in east Africa and the Indian Ocean'. The general and dominant academic opinion has been that African history is only 'black and white'. The Arab, African, and European sources of information have downplayed the importance of Indian influence in the Indian Ocean, even though it has contributed substantially in east Africa, stemming largely from their trading activities, to the development of agriculture, industry, and globalization of trade (Foreword).

This book paves the way for a social scientist to delve deeper into the subject in future. The author has used the term 'Indian' to cover the people of the entire Indian subcontinent (the present south Asia).

The author, a Kenyan of Indian origin, is a teacher and researcher by profession. She left Kenya for Karachi as a child with her parents, studied there, and returned to Kenya in 1962. The author worked also in the US Congress library for some time.

During the period she worked there, the author became aware of the invaluable historic and prehistoric contributions of