Allometric Equations For Biomass Estimation Of Woody

Forest biomass is the second-largest renewable energy resource in Canada, representing a major pool in the global carbon budget, but better estimates of forest biomass are needed. In the 1980s, numerous empirical biomass equations were developed for estimating forest biomass. However, many of these were reported inconsistently by different authors in terms of their form and parameter values, even for the same species, which has complicated their application. This study was undertaken to review existing methods of biomass measurement and estimation, and to identify and evaluate the existing biomass equations that might be most suitable for estimating the biomass of major species at a large spatial scale in westcentral Canada. Seventeen commonly used biomass equations and two biomass extrapolation methods were compared at the individual tree and stand scales for major species in west-central Canada. The biomass equations usually provided more consistent estimates for medium-sized trees than for small or large trees. Equations developed for the Prairie provinces and/or for national data sets were more appropriate for estimating the individual tree biomass of six boreal forest species in west-central Canada. There were no significant differences between the mean tree method and the normal distribution approach for extrapolating from individual tree biomass to stand biomass. For shrub understory biomass, there were no significant differences among the species-specific equations. For estimating belowground biomass, equations based on the aboveground biomass are recommended; therefore, accurate estimation of aboveground biomass is a prerequisite for accurately determining belowground biomass.

Forest Biometrics presents the methods of mathematical statistics and biometrics that are significant to forestry. This book explores other fields related to forestry, which are explained with the help of a large number of practical examples. Organized into 25 chapters, this book starts with an overview of the variety of data that play a significant role in forest management, including the age of trees, the damage caused by storms, the fluctuation of timber prices, bark beetle infestation, and timber volume. This text then examines the factors that are responsible for a random distribution of the values in biological experimentation. Other chapters consider the important advantages of sample surveys compared to complete enumerations, include cheaper samples, wider applicability, quick results, and greater accuracy. The final chapter deals with the factors to be considered in determining the best time for harvesting of

timber. This book is a valuable resource for students, research project leaders, and practical workers.

Most biologists use nonlinear regression more than any other statistical technique, but there are very few places to learn about curve-fitting. This book, by the author of the very successful Intuitive Biostatistics, addresses this relatively focused need of an extraordinarily broad range of scientists.

Forest biomass is increasingly important for calibrating worldwide carbon changes and ensuring sustainable forest management. However, there are no consistent standards for aboveground biomass (AGB) estimation methods. Direct field estimation is costly and destructive. We explored alternative methods for estimating AGB based on different sources of ground-based remote sensing data. We compared alternative methods for estimating AGB based on different sources of ground-based remote sensing data. We compared allometric equations derived from metrics extracted from terrestrial laster scanning (TLS) to equations derived from metrics extracted from spherical images. Spherical image metrics consistently performed better than TLS metrics. Alternatively, we developed sector subsample selection methods that utilized only measurements from spherical photos with a smaller subsample of angle sample counts to correct for tree occlusion. The sector subsampling methods were comparable to widely used big BAF subsampling and were much more efficient for estimating AGB than the allometric equations. Sector subsampling has great potential to reduce costs for AGB estimation and enabling access to monetized carbon markets.

Sampling Methods, Remote Sensing and GIS Multiresource Forest Inventory

Carbon Inventory Methods

Terrestrial Global Productivity

Management and Restoration

Biology, Uses and Propagation Techniques

Indigenous Trees of Ethiopia

Silvology is the general science of forest ecosystems, without the usual division between Man and Nature. This systematic treatment of forests intends to integrate and harmonize existing approaches with the help of systems modeling in a hierarchy of close system levels, according to criteria of biological architecture, biomass production and species composition. Scientists and practitioners will appreciate this synoptic treatment of

forests and their ecology, allowing the balance of holistic and reductionist viewpoints, and the placement of phenomena and techniques. Topics covered include: - introduction of the methods, - sections on forest organisms, - a special chapter on trees, - eco-units, i.e. forest ecosystems developing after some zero-event like fire, storm or waterlogging, - silvatic mosaics built by the eco-units of different size, architecture and species composition, - a summary of silvological rules determining system's behaviour at every level, e.g. fragmentation and fusion, transfer of functions, irreversibility and process oscillation.

Allometry, the study of the growth rate of an organism's parts in relation to the whole, has produced exciting results in research on animals. Now distinguished plant biologist Karl J. Niklas has written the first book to apply allometry to studies of the evolution, morphology, physiology, and reproduction of plants. Niklas covers a broad spectrum of plant life, from unicellular algae to towering trees, including fossil as well as extant taxa. He examines the relation between organic size and variations in plant form, metabolism, reproduction, and evolution, and draws on the zoological literature to develop allometric techniques for the peculiar problems of plant height, the relation between body mass and body length, and size-correlated variations in rates of growth. For readers unfamiliar with the basics of allometry, an appendix explains basic statistical methods. For botanists interested in an original, quantitative approach to plant evolution and function, and for zoologists who want to learn more about the value of allometric techniques for studying evolution, Plant Allometry makes a major contribution to the study of plant life.

Lord Rutherford has said that all science is either physics or stamp collecting. On that basis the study of forest biomass must be classified with stamp collecting and other such pleasurable pursuits. Japanese scientists have led the world, not only in collecting basic data, but in their attempts to systematise our knowledge of forest biomass. They have studied factors affecting dry matter production of forest trees in an attempt to approach underlying phYf'ical principles. This edition of Professor Satoo's book has been made possible the help of Dr John F. Hosner and the Virginia Poly technical Institute and

State University who invited Dr Satoo to Blacksburg for three months in 1973 at about the time when he was in the final stages of preparing the Japanese version. Since then the explosion of world literature on forest biomass has continued to be fired by increasing shortages of timber supplies in many parts of the world as well as by a need to explore renewable sources of energy. In revising the original text I have attempted to maintain the input of Japanese work - much of which is not widely available outside Japan - and to update both the basic information and, where necessary, the conclusions to keep them in tune with current thinking. Those familiar with the Japanese original will find Chapter 3 largely rewritten on the basis of new work - much of which was initiated while Dr Satoo was in Blacksburg.

As the global climate changes, there are concomitant changes in global biological productivity. This book is devoted to the assessment of terrestrial Net Primary Productivity ("the total amount of energy acquired by green plants during photosynthesis, minus the energy lost through respiration"--APDS&T, pp. 1457). The book is comprised of three major sections. The first section is a review of the processes that operate globally to influence productivity--these are the initial conditions of any model of primary productivity. The second section is comprised of chapters that assess the contribution of particular ecosystems to global productivity. The final major section contains chapters of a synthetic nature that describe attempts to model global productivity. This book should appeal to both ecologists and environmental scientists.

Trees, Shrubs and Lianas of West African Dry Zones

Estimating Biomass and Biomass Change of Tropical Forests

Biomass Volume Estimation and Valorization for Energy

Acacia mangium Willd.: Ecology, silviculture and productivity

Forests: Elements of Silvology

Biomass Quantification of Live Trees in a Mixed Evergreen Forest Using Diameter-based Allometric Equations

CLIMATE IMPACTS ON SUSTAINABLE NATURAL RESOURCE MANAGEMENT Climate change has emerged as one of the predominant global concerns of the 21st century. Statistics show that the average surface temperature of the Earth has increased by about 1.18°C since the late 19th century and the sea levels are

rising due to the melting of glaciers. Further rise in the global temperature will have dire consequences for the survival of humans on the planet Earth. There is a need to monitor climatic data and associated drivers of changes to develop sustainable planning. The anthropogenic activities that are linked to climate change need scientific evaluation and must be curtailed before it is too late. This book contributes significantly in the field of sustainable natural resource management linked to climate change. Up to date research findings from developing and developed countries like India, Indonesia, Japan, Malaysia, Sri Lanka and the USA have been presented through selected case studies covering different thematic areas. The book has been organised into six major themes of sustainable natural resource management, determinants of forest productivity, agriculture and climate change, water resource management and riverine health, climate change threat on natural resources, and linkages between natural resources and biotic-abiotic stressors to develop the concept and to present the findings in a way that is useful for a wide range of readers. While the range of applications and innovative techniques is constantly increasing, this book provides a summary of findings to provide the updated information. This book will be of interest to researchers and practitioners in the field of environmental sciences, remote sensing, geographical information system, meteorology, sociology and policy studies related to natural resource management and climate change.

As the United Nations Decade on Biodiversity 2011–2020 comes to a close and countries prepare to adopt a post-2020 global biodiversity framework, this edition of The State of the World's Forests (SOFO) examines the contributions of forests, and of the people who use and manage them, to the conservation and sustainable use of biodiversity. Forests cover just over 30 percent of the global land area, yet they provide habitat for the vast majority of the terrestrial plant and animal species known to science. Unfortunately, forests and the biodiversity they contain continue to be under threat from actions to convert the land to agriculture or unsustainable levels of exploitation, much of it illegal. The State of the World's Forests 2020 assesses progress to date in meeting global targets and goals related to forest biodiversity and examines the effectiveness of policies, actions and approaches, in terms of both conservation and sustainable development outcomes. A series of case studies provide examples of innovative practices that combine conservation and sustainable use of forest biodiversity to create balanced solutions for both people and the planet.

This book presents the state-of-the-art of forest resources assessments and monitoring. It provides links to practical applications of forest and natural resource assessment programs. It offers an overview of current forest inventory systems and discusses forest mensuration, sampling techniques, remote sensing applications, geographic and forest information systems, and multi-resource forest inventory. Attention is also given to the quantification of non-wood goods and services.

A review of stem volume and biomass equations for tree species growing in Europe is presented. The mathematical forms of the empirical models, the associated statistical parameters and information about the size of the trees and the country of origin were collated from scientific articles and from technical reports. The collected information provides a basic tool for estimation of carbon stocks and nutrient balance of forest ecosystems across Europe as well as for validation of theoretical models of biomass allocation.

Forest Mensuration

Comprehensive Database of Diameter-based Biomass Regressions for North American Tree Species

A Practical Guide to Curve Fitting

Analysing REDD+: Challenges and choices

Biomass Estimates for Major Boreal Forest Species in West-central Canada

Forest Biomass

Forest plays a special role in carbon sequestration and thus mitigating climate change. However, the large uncertainty in biomass estimation is

unable to meet the requirement of the accurate carbon accounting. The use of a suitable and rigor method to accurately estimate forest biomass is significant. Moreover, the world is increasingly facing the conflicting pressures of economic growth and environmental protection. Improving energy structure and vigorously developing biomass energy has become the development trend of energy utilization in the future. As energy plant is characterized by a large net accumulation of biomass. Therefore, the scientific evaluation of the size and potential of energy from plant also requires a suitable method for estimating biomass. Here, we reviewed the estimate methods, including allometric equation, mean biomass density, biomass expansion factor, geostatistics, et cetera For each method, we will present background, rational, applicability, as well as estimation procedure by exemplifying a case. In this chapter, we argued that the new developed technique such as geo-statistics and remote sensing technique (e.g. LIDAR) would be the key tools to improve forest biomass estimation accuracy. However, prior to this, spatial variation of forest biomass at various levels should be explored using multi-source data and multi-approaches.

Above ground biomass has been listed by the Intergovernmental Panel on Climate Change as one of the five most prominent, visible, and dynamic terrestrial carbon pools. The increased awareness of the impacts of climate change has seen a burgeoning need to consistently assess carbon stocks to combat carbon sequestration. An accurate estimation of carbon stocks and an understanding of the carbon sources and sinks can aid the improvement and accuracy of carbon flux models, an important pre-requisite of climate change impact projections. Based on 15 research topics, this book demonstrates the role of remote sensing in quantifying above ground biomass (forest, grass, woodlands) across varying spatial and temporal scales. The innovative application areas of the book include algorithm development and implementation, accuracy assessment, scaling issues (local – regional – global biomass mapping), and the integration of microwaves (i.e. LiDAR), along with optical sensors, forest biomass mapping, rangeland productivity and abundance (grass biomass, density, cover), bush encroachment biomass, and seasonal and long-term biomass monitoring.

We sampled trees grown with and without competing vegetation control in an 11-year-old Douglas-fir (Pseudotsuga menziesii var. menziesii (Mirb.) Franco) plantation on a highly productive site in southwestern Washington to create diameter- based allometric equations for estimating individual-tree bole, branch, foliar, and total aboveground biomass. We used these equations to estimate per-hectare aboveground biomass, nitrogen (N), and carbon (C) content, and compared these results to (1) estimates based on biomass equations published in other studies, and (2) estimates made using the mean-tree method rather than allometric equations. Component and total-tree biomass equations were not influenced by the presence of vegetation control, although per-hectare biomass, C, and N estimates were greater where vegetation control was applied. Our biomass estimates differed from estimates using previously published biomass equations by as much as 23 percent. When using the mean-tree biomass estimation approach, we found that incorporating a previously published biomass equation improved accuracy of the mean-tree diameter calculation.

Climate change has emerged as one of the predominant global concerns of the 21st century. Statistics show that the average surface temperature of the Earth has increased by about 1.18 ° C since the late 19th century and the sea levels are rising due to the melting of glaciers. Further rise in the global temperature will have dire consequences for the survival of humans on the planet Earth. There is a need to monitor climatic data and associated drivers of changes to develop sustainable planning. The anthropogenic activities that are linked to climate change

need scientific evaluation and must be curtailed before it is too late. This book contributes significantly in the field of sustainable natural resource management linked to climate change. Up to date research findings from developing and developed countries like India, Indonesia, Japan, Malaysia, Sri Lanka and the USA have been presented through selected case studies covering different thematic areas. The book has been organised into six major themes of sustainable natural resource management, determinants of forest productivity, agriculture and climate change, water resource management and riverine health, climate change threat on natural resources, and linkages between natural resources and biotic-abiotic stressors to develop the concept and to present the findings in a way that is useful for a wide range of readers. While the range of applications and innovative techniques is constantly increasing, this book provides a summary of findings to provide the updated information. This book will be of interest to researchers and practitioners in the field of environmental sciences, remote sensing, geographical information system, meteorology, sociology and policy studies related to natural resource management and climate change.

Plant Allometry

Ecosystems and the Global Carbon Cycle

Methods of Estimating Forest Biomass: A Review

Applications of Remote Sensing Data in Mapping of Forest Growing Stock and Biomass

Allometric Equation for Biomass Determination

Estimating Tree Biomass, Carbon, and Nitrogen in Two Vegetation Control Treatments in an 11-year-old Douglas-fir Plantation on a Highly Productive Site

Human activities are significantly modifying the natural global carbon (C) cycles, and concomitantly influence climate, ecosystems, and state and function of the Earth system. Ever increasing amounts of carbon dioxide (CO2) are added to the atmosphere by fossil fuel combustion but the biosphere is a potential C sink. Thus, a comprehensive understanding of C cycling in the biosphere is crucial for identifying and managing biospheric C sinks. Ecosystems with large C stocks which must be protected and sustainably managed are wetlands, peatlands, tropical rainforests, tropical savannas, grasslands, degraded/desertified lands, agricultural lands, and urban lands. However, land-based sinks require long-term management and a protection strategy because C stocks grow with a progressive improvement in ecosystem health.

Urbanization drastically alters the ecosystems structure and functions, disrupts cycling of C and other elements along with water. It alters the energy balance and influences climate at local, regional and global scales. In 2008, urban population exceeded the rural population. In 2050, 70% of the world population will live in urban centers. The number of megacities (10 million inhabitants) increased from three in 1975 to 19 in 2007, and is projected to be 27 in 2025. Rapid urbanization is altering the ecosystem C budget. Yet, urban ecosystems have a large C sink capacity in soils and biota. Judicious planning and effective management can enhance C pool in urban ecosystems, and off-set some of the anthropogenic emissions. Principal components with regards to C sequestration include home lawns and turfs, urban forests, green roofs, park and recreational/sports facilities and urban agriculture.

Tree based production systems abound especially in the tropics. Despite the pervasiveness of such multipurpose "trees-outside-forest" resources, they have not attracted adequate attention in the development paradigms of many nation states. These multispecies production systems impact the ecosystem processes favourably. Yet, our understanding of the diversity attributes and carbon dynamics under agroforestry is not adequate. This book focuses on the role of multispecies production systems involving tree and crop species as a means for carbon sequestration and thereby reduce atmospheric carbon

dioxide levels. Sixteen chapters organized into three broad sections titled: Measurement and Estimation, Agrobiodiversity and Tree Management, and Policy and Socioeconomic Aspects represent a cross section of the opportunities and challenges in current research and emerging issues in harnessing carbon sequestration potential of agroforestry systems.

Allometric equations are widely used to estimate forest aboveground biomass (AGB). However, their development rarely includes the oldest and largest trees, leading to estimation errors. Black locust (Robinia pseudoacacia) is an early successional nitrogen-fixing tree, native to the Eastern United States. It is widespread, often the dominant tree following disturbance, and can be a significant source of new nitrogen to recovering forests. Here we developed allometric equations for black locust to predict AGB and leaf area based on diameter at breast height (DBH). We compiled existing data from our study site and sampled new trees, ranging in size from 6.0-58.5 cm DBH. Destructively harvested new trees were measured for foliage, branch, and bole dry biomass and carbon and nitrogen concentrations. Parameters for our predictive equations were lower than those previously published; existing equations applied to these largest individuals resulted in overestimates of bole and branch biomass on average by 33.6 and 325.3 percent, respectively. We also found that foliage and woody nitrogen concentrations declined with age, together suggesting age-related declines in black locust are greater than other co-occurring species. Our equations significantly improved accuracy of AGB predictions and will aid in site-specific forest biomass estimates and new nitrogen inputs.

The State of the World's Forests 2020

Forest Biometrics

Remote Sensing of Above Ground Biomass

Monograph

Estimating Aboveground Tree Biomass on Forest Land in the Pacific Northwest

Biodiversity, Ecosystem Functioning, and Human Wellbeing

The book starts by summarizing the development of the basic science and provides a meta-analysis that quantitatively tests several biodiversity and ecosystem functioning hypotheses.

A framework for quantifying the various effects of tree-crop interactions. Mexed cropping of annuals and woody perennials: an analytical approach to productivity and management. Mulch and shade model for optimum alley-cropping design depending on soil fertility. Principles of resource capture and utilization of light and water. Microclimatic modifications in agroforestry. The water balance of mixed tree-cropi systems. Biological factors affecting form and function in woody-non-woody plant mixtures. Tree-soil-crop interactions on slopes. Root distribution of tress and cropos: competition and/or complementarity. Woody-non-woody plant mixtures: some afterhoughts.

This Book is about developing allometric equation for two dominant tree species in Dryafro mountain Forest of Ethiopia. In order to develop the equation the study used FAO's guideline which was semi-destructive way of biomass estimation. The equations which developed have

capacities to estimate the carbon sequestration potential of these particular tree species and the carbon sequestered in the trees will be powerful tool for climate change mitigation and sustainable forest management practice.

A database consisting of 2,640 equations compiled from the literature for predicting the biomass of trees and tree components from diameter measurements of species found in North America. Bibliographic information, geographic locations, diameter limits, diameter and biomass units, equation forms, statistical errors, and coefficients are provided for each equation, along with examples of how to use the database. The CD-ROM included with the paper version of this publication contains the complete database (Table 3) in spreadsheet format (Microsoft Excel 2002® with Windows XP®). The database files can also be viewed in both spreadsheet and pdf formats by directing your browser to the Global Change page at http://www.fs.fed.us/ne/global/pubs/books/index.html

Fitting Models to Biological Data Using Linear and Nonlinear Regression

Climate Impacts on Sustainable Natural Resource Management

SAS/ETS 9.3 User's Guide

Handbook for Greenhouse Gas Inventory, Carbon Mitigation and Roundwood Production Projects

Carbon Sequestration Potential of Agroforestry Systems

Forests, biodiversity and people

This Special Issue (SI), entitled "Applications of Remote Sensing Data in Mapping of Forest Growing Stock and Biomass", resulted from 13 peer-reviewed papers dedicated to Forestry and Biomass mapping, characterization and accounting. The papers' authors presented improvements in Remote Sensing processing techniques on satellite images, drone-acquired images and LiDAR images, both aerial and terrestrial. Regarding the images' classification models, all authors presented supervised methods, such as Random Forest, complemented by GIS routines and biophysical variables measured on the field, which were properly georeferenced. The achieved results enable the statement that remote imagery could be successfully used as a data source for regression analysis and formulation and, in this way, used in forestry actions such as canopy structure analysis and mapping, or to estimate biomass. This collection of papers, presented in the form of a book, brings together 13 articles covering various forest issues and issues in forest biomass

calculation, constituting an important work manual for those who use mixed GIS and RS techniques.

Provides detailed reference material for using SAS/ETS software and guides you through the analysis and forecasting of features such as univariate and multivariate time series, cross-sectional time series, seasonal adjustments, multiequational nonlinear models, discrete choice models, limited dependent variable models, portfolio analysis, and generation of financial reports, with introductory and advanced examples for each procedure. You can also find complete information about two easy-to-use point-and-click applications: the Time Series Forecasting System, for automatic and interactive time series modeling and forecasting, and the Investment Analysis System, for time-value of money analysis of a variety of investments. This title is also available online.SAS Products and Releases: SAS/ETS: 9.3 Operating Systems: All

This book is the outcome of contributions by many experts in the field from different disciplines, various backgrounds, and diverse expertise. This book provides information on biomass volume calculation methods and biomass valorization for energy production. The chapters presented in this book include original research and review articles. I hope the research presented in this book will help to advance the use of biomass for bioenergy production and valorization. The key features of the book are: Providing information on biomass volume estimation using direct, nondestructive and remote sensing methods Biomass valorization for energy using thermochemical (gasification and pyrolysis) and biochemical (fermentation) conversion processes.

Carbon Inventory Methods Handbook fills the need for a handbook that provides guidelines and methods required for carbon inventory. It provides detailed step-by-step information on sampling procedures, field and laboratory measurements, application of remote sensing and GIS techniques, modeling, and calculation procedures along with sources of data for carbon inventory. The book is driven by a growing need for 'carbon inventory' for land use sections such as forests.

Carbon Sequestration in Urban Ecosystems

Novel Methods for Estimating Above Ground Biomass

Opportunities and Challenges
Tropical Forestry Handbook
A Comparison of Approaches
Tree-crop Interactions

Forest degradation as a result of logging, shifting cultivation, agriculture and urban development is a major issue throughout the tropics. It leads to loss in soil fertility, water resources and biodiversity, as well as contributes to climate change. Efforts are therefore required to try to minimize further degradation and restore tropical forests in a sustainable way. This is the first research-based book to examine this problem in East Africa. The specific focus is on the forests of Ethiopia, Tanzania and Uganda, but the lessons learned are shown to be applicable to neighbouring countries and others in the tropics. A wide range of forest types are covered, from dry Miombo forest and afromontane forests, to forest-savannah mosaics and wet forest types. Current management practices are assessed and examples of good practice presented. The role of local people is also emphasized. The authors describe improved management and restoration through silviculture, plantation forestry and agroforestry, leading to improvements in timber production, biodiversity conservation and the livelihoods of local people.
This book provides a cross-section of all outstanding experience in all fields of tropical forestry under a drastically changing environment induced by climate change. It sheds light on the existing know-how and presents it in a concise and efficient way for the scientist and professional in charge of planning, implementing and evaluating forest resources. The Tropical Forestry Handbook provides proven and/or promising alternative concepts which can be applied to solve organizational, administrative and technical challenges prevailing in the tropics. Presented are state of the art methods in all fields concerning tropical forestry. Emphasize is given to methods which are adapted to- and which safeguard - environmental conditions.
Due to demands placed on natural resources globally and subsequent deterioration of the environment, there is a need to source and develop appropriate technology to satisfy this requirement. For decades mankind has largely depended on natural resources such as fossil fuels to meet the ever increasing energy demands. Realizing the finite nature of these resources, emphasis is now shifting to investigating alternate energy source governed by environmentally friendly principles. The abundance of biomass and associated favorable techno-economics has recently changed global perceptions of harnessing biomass as a valuable resource rather than a

waste. To this end this book aims to make a contribution to exploring further this area of biomass research and development in the form of a compilation of chapters and covering areas of ecological status of different types of biomass and the roles they play in ecosystems, current status of biomass utilization and deriving energy and other value added products from biomass. In this context biomass can be defined as large plants and trees and different groups of microorganisms. This book will serve as an invaluable resource for scientists and environmental managers in planning solutions for sustainable development.

Forest mensuration – the science of measurement applied to forest vegetation and forest products – holds value for basic ecology as well as sustainable forest management. As demands on the world's forests have grown, scientists and professionals are increasingly called on to quantify forest composition, structure, and the goods and services forests provide. Grounded in geometry, sampling theory, and ecology as well as practical field experience, forest mensuration offers opportunities for creative problem solving and critical thinking. This fifth edition of the classic volume, Forest Mensuration, includes coverage of traditional and emerging topics, with attention to SI and Imperial units throughout. The book has been reorganised from the fourth edition to better integrate non-timber and ecological aspects of forest mensuration at the tree, stand, forest, and landscape scales throughout. The new edition includes new chapters that specifically address the integration of remotely sensed data in the forest inventory process, and inventory methods for dead and downed wood. One unifying theme, not only for traditional forestry but for the non-timber inventory and for remote sensing, is the use of covariates to make sampling more efficient and spatially explicit. This is introduced in the introductory chapter on statistics and the chapter on sampling designs has been restructured to highlight this approach and lay the foundation for further learning. New examples will be developed throughout the textbook with an emphasis on current issues and international practice. Students in applied forestry programs will find ample coverage of forest products and timber inventory, while expanded material on biodiversity, biomass and carbon inventory, downed dead wood, and the growing role of remote sensing in forest assessment will be valuable to a broader audience in applied ecology.

Biomass

Improved Allometric Equations for Black Locust (Robinia Pseudoacacia) in the Coweeta Basin

Degraded Forests in Eastern Africa

Recarbonization of the Biosphere

A Physiological Approach

Allometric Models for Estimating Tree Biomass at Various Forest Ecosystem Types in Indonesia

Live tree biomass estimates are essential for carbon accounting, bioenergy feasibility studies, and other analyses. Several models are currently used for estimating tree biomass. Each of these incorporates different calculation methods that may significantly impact the estimates of total aboveground tree biomass, merchantable biomass, and carbon pools. Consequently, carbon markets, bioenergy projects, and similar efforts may be affected. In addition to differences in allometric equations, the various methods are most suitable for particular geographic scales of analysis. We examine three approaches that might be used for midscale analyses (e.g., 25,000 to several million acres) and compare the regional models with equations developed by Jenkins et al. and with the component ratio method (CRM). These three methods produce relatively similar estimates of total aboveground biomass for softwood species in Oregon, but substantially different estimates for the proportion of total biomass that is merchantable . For the major softwood species in Oregon, the total aboveground biomass using the CRM is 3 percent lower than estimates with regional equations, and the Jenkins models produce estimates that are 17 percent higher. However, on average, the proportion of softwood merchantable biomass computed with CRM is about 83 percent of the total aboveground biomass with little variation from species to species, whereas regional models estimate that 72 percent is merchantable, and the Jenkins equations estimate that 78 percent is merchantable.

Climate Impacts on Sustainable Natural Resource ManagementJohn Wiley & Sons

An Ecological and Economic Perspective

A Primer

The Scaling of Form and Process

Biomass and Stem Volume Equations for Tree Species in Europe