Bookmark File Alaskas Changing Boreal Forest Long Term Ecological Research Network Series Pdf For Free

Alaska's Changing Boreal Forest Fire, Climate Change, and Carbon Cycling in the Boreal Forest Managing Boreal Forests in the Context of Climate Change Boreal Forests in the Face of Climate Change The Boreal Forest *Boreal Forest and Climate Change* **Management of Boreal Forests** Boreal Forests and Global Change *Climate Change Adaptation and Sustainable Forest Management in the Boreal Forest* **Fire, Climate Change, and Carbon Cycling in the Boreal Forest** Climate Change in the Canadian Boreal Forest The Carbon Bomb **Radio Congo** Climate Change and Best Management Practices in the Boreal Forest Boreal Forest and Climate Change **Past and Future Impacts of Climate Change on Boreal Forest Timber Supply Impacts of Climate Change on Carbon and Nitrogen Cycles in Boreal Forest Ecosystems** *A Systems Analysis of the Global Boreal Forest* Climate Change: the Boreal Forest and Implications for Forestry in British Columbia **Managing Forest Carbon in a Changing Climate Future Climate Change Impacts on the Boreal Forest in Northwestern Ontario. Implications for the Forestry Sector and the Local Community [electronic Resource] Global Change and Forest Soils Carbon Balance and Climate Change in Boreal Forests Implications of Climate Change for the Boreal Forest of Ontario** Carbon Sequestration in Alaska's Boreal Forest **Towards Sustainable Management of the Boreal Forest** *Productivity of America's Forests and Climate Change Productivity of America's Forests and Climate Change* **Harvesting Of Old-Growth Boreal Forest Decrease Soil Carbon Stock Using Landscape Simulation Models to Help Balance Conflicting Goals in Changing Forests** *The Boreal Forest of Interior Alaska Biogeographic Consequences of Historic and Contemporary Climate Change in Boreal Forest Birds* **Life in the Boreal Forest The Importance of Forest Sector Adaptation to Climate Change Dynamic Forest** Climate Change in the Canadian Boreal Forest **A Vicious Circle Fire History of Boreal Forests Climate Change and Variability Fire, Climate Change, Carbon and Fuel Management in the Canadian Boreal Forest**

Climate change will pose increasing challenges to forest managers working to achieve sustainable forest management in the boreal forest. A logical starting point for climate change adaptation is to proactively identify management practices and policies that have a higher likelihood of achieving management objectives across a wide range of potential climate futures. This research implemented an approach to identifying such measures by tapping into the experiential knowledge base of local forest practitioners. The assessment was organized according to a structured decision-making (SDM) approach. Northern forest practitioners consider the goals of climate change adaptation to be synonymous with those of sustainable forest management indicating that the criteria for the conservation and sustainable management of boreal forests as defined by the Montréal Process are suitable objectives against which the performance of alternative adaptation options can be assessed. The case study area for this research was the Champagne and Aishihik Traditional Territory of southwest Yukon where a climatically-driven, large-scale spruce bark beetle disturbance has been driving forest management planning yet climate change considerations have not been directly addressed in the planning process. Twenty-four adaptation options were identified as being important to implement in forest development areas to achieve regional goals and objectives of forest management across three scenarios of climate change. In addition, the performance of alternative strategies to re-establish forests was assessed. Results indicate that the applicability of alternative forest renewal adaptation strategies is strongly related to the objectives of forest management which differed across the forest management planning area. However, since none of the strategies were judged to perform highly across any of the scenarios of climate change, additional work is needed to explore whether a threshold of acceptability can. Examines the amazing ecosystem, plants, animals, and endangered species that call this rich and vibrant forest home with a review of the climate changes and increase in human development that are threatening its survival. A discussion of the direct and indirect mechanisms by which fire and climate interact to influence carbon cycling in North American boreal forests. The first section summarizes the information needed to understand and manage fires' effects on the ecology of boreal forests and its influence on global climate change issues. Following chapters discuss in detail the role of fire in the ecology of boreal forests, present data sets on fire and the distribution of carbon, and treat the use of satellite imagery in monitoring these regions as well as approaches to modeling the relevant processes. Boreal forests form Earth's largest terrestrial biome. They are rich in ecosystem and landscape diversity, though characterized by relatively few plant species, as compared to other forested regions. The long term viability and sustainability of boreal forests is influenced by many factors. They are subject to interruptions at intervals by large-scale natural disturbances, and increasingly by human activities. Boreal ecosystem development is typically a slow process; hence rapid changes in the global environment may invoke complex responses. Many industrial nations border, or lie within, boreal regions, deriving much of their economic wealth and culture from the forests. The response of boreal forests to changes in the global environment - whether caused by direct human activity or by indirect changes such as the anticipated changes in climate - are therefore of considerable international interest, both for their policy implications and their scientific challenges. This book which contains almost 50 peer-reviewed papers from a world-wide group of experts assembled under the auspices of IBFRA, the International Boreal Forest Research Association, covers topics which will stimulate further research and the development of constructive policies for improved management and conservation of global boreal forest resources. This report summarizes current knowledge about recent changes in the climate of Canadas forests and projects further changes over this century based on scenarios of future global greenhouse gas emissions developed by the Intergovernmental Panel on Climate Change. Even with sustained reductions in global emissions the future climate is predicted to be quite different, meaning that adaptation will be essential. Impacts on the forest are already occurring and will be substantial in the future. The current upward trend in area burned annually is expected to continue. Forests will be prone to widespread stress induced by the changing climate, increasing the likelihood of pest outbreaks in the short to medium term. Recent outbreaks of several pests have exceeded in scope all previous known epidemics of these pests and are associated with the crossing of a climatic threshold. Invasion of the boreal forest by the mountain pine beetle, Dendroctonus ponderosae (Hopkins), appears likely, although the effect of this range expansion would likely be less severe than that observed recently in British Columbia, and outbreaks of the spruce budworm, Choristoneura fumiferana (Clemens), are predicted to be longer and more severe in the future. Future forest growth in response to climate change is expected to be variable, with growth reduction because of drought in parts of Canadas western forests perhaps the most dramatic short- to medium-term outcome, though modestly increased growth in the east is predicted. Such impacts have implications for the cost and characteristics of timber supply, and climate change will also affect forestry operations, recreation opportunities, biodiversity, and carbon storage. Planning based on past approaches will need to be reconsidered. Current objectives for sustainable forest management may not be attainable in the future, although there may be some new opportunities. Climate change may produce public safety risks, significant economic and social dislocation in forest-dependent communities including Aboriginal communities, and impacts on the competitiveness of companies as well as on the actions and policies of all levels of government. These effects can be reduced through early identification and implementation of actions to reduce vulnerabilities or take advantage of new opportunities. The key needs associated with adaptation in the forest sector include awareness building and debate, improved knowledge and information, vulnerability assessments, planning frameworks and tools, and enhanced coordination and cooperation among governments and other forest sector participants. Meeting the challenge of adaptation will require sustained effort for many years. This comprehensive textbook explores the boreal forests of Northern Europe, Finland, Sweden and Norway. Students will gain an overview of the forest ecosystem and the services it provides for modern

society. From the production of timber, to the supply of food products or their use as a recreational space for human wellbeing – our forests serve many needs. Accordingly, the respective chapters cover various types of ecosystem service, e.g. supporting, provisioning, regulating and cultural services. The book’s main focus is on the management of boreal forests for the production of these ecosystem services. Addressing modern challenges, e.g. managing vulnerable boreal forests for adaptation to climate change, is an important aspect throughout the volume. Traditional forest management has to adapt and evolve in order to meet the increasing risk of abiotic and biotic damages to our forest biomass. Future forestry graduates will have to face more and more of these challenges; consequently, the book provides them with a wealth of scientific knowhow and possible counter-strategies. Forestry students in the Northern Hemisphere, be it in Europe, North America or Asia, will find this book an excellent reference guide. To make the content more accessible, it has been enriched with a clear structure, numerous illustrations and learning objectives. Analyzes the impacts of elevated carbon dioxide & climate change on forested ecosystems, & the economic feedbacks on harvest patterns & vegetation change on private timberlands in the U.S. Used as a framework linking general circulation model output, an ecosystem model (TEM), models of the forest sector, & a carbon accounting model. Future climates are described with output from the different models. The strong demand for wood products in the future dampens any positive growth effects on forests, for all but the maximum scenario. Charts, tables & maps. Presenting a summary of the development in boreal forest management, this book provides a progressive vision for some of the world's northern forests. It includes a selection of chapters based on the research conducted by the Sustainable Forest Management Network across Canada. It includes a number of case histories. At the 2008 Northern Development Ministers Forum, senior officials were directed to form a working group to explore the impacts of climate change on northern communities and economies in general, and more specifically on boreal forest management practices. This briefing paper is a synthesis of information collected from NDMF jurisdictions by the working group, to prepare Ministers for discussion and engagement and to recommend further action. Many related issues are not covered in this paper, e.g., the release of metals under changing temperature conditions, the need for more transition planning for communities that might be highly affected, etc. Such issues may be very significant, but our goal is to focus on climate change and the boreal forest. The boreal forest is a vast region, consisting of diverse ecosystem types with different carbon dynamics and vulnerability to climate change, exposed to various intensities of forest management. There are large uncertainties among scientists on the contribution of boreal forest management to climate change mitigation, and disagreements among stakeholders whether bio-economy or conservation is the winning concept. The most appropriate mitigation actions will be decided by current forest conditions and climate change impacts, socio-economic state and regional policy for mitigation actions. Therefore, mitigation strategies need to be adapted to regional conditions to meet objectives regarding carbon as well as other forest management objectives. This study focus on the effects on soil carbon in old-growth boreal forests in northern Sweden after a first regeneration cut. This was done by empirically quantifying soil carbon stock in the humus layer and down to 20 cm in the mineral soil at 14 paired sites of adjacent old-growth and younger stands. The younger stands had been established after clear cutting of old-growth forests similar to the one at the adjacent site 15-55 years ago. Results indicate a reduction of soil carbon after a final harvest. This temporary or permanent carbon debt needs to be considered when assessing the climate benefit of turning old growth forests into managed forests. Climate change is emerging as one of the most important issues of our time, with the potential to cause profound cascading effects on ecosystems and society. However, these effects are poorly understood and our projections for climate change trends and effects have thus far proven to be inaccurate. In this collection of 24 chapters, we present a cross-section of some of the most challenging issues related to oceans, lakes, forests, and agricultural systems under a changing climate. The authors present evidence for changes and variability in climatic and atmospheric conditions, investigate some the impacts that climate change is having on the Earth's ecological and social systems, and provide novel ideas, advances and applications for mitigation and adaptation of our socio-ecological systems to climate change. Difficult questions are asked. What have been some of the impacts of climate change on our natural and managed ecosystems? How do we manage for resilient socio-ecological systems? How do we predict the future? What are relevant climatic change and management scenarios? How can we shape management regimes to increase our adaptive capacity to climate change? These themes are visited across broad spatial and temporal scales, touch on important and relevant ecological patterns and processes, and represent broad geographic regions, from the tropics, to temperate and boreal regions, to the Arctic. The Forest Primary Production Research Group was born in the Department of S- viculture, University of Helsinki in the early 1970s. Intensive ?eld measurements of photosynthesis and growth of forest vegetation and use of dynamic models in the interpretation of the results were characteristic of the research in the group. Electric instrumentation was based on analogue techniques and the analysis of the obtained measurements was based on self-written programs. Joint research projects with the Research Group of Environmental Physics at the Department of Physics, lead by Taisto Raunemaa (1939–2006) started in the late 1970s. The two research groups shared the same quantitative methodology, which made the co-operation fruitful. Since 1980 until the collapse of the Soviet Union the Academy of Finland and the Soviet Academy of Sciences had a co-operation program which included our team. The research groups in Tartu, Estonia, lead by Juhan Ross (1925–2002) and in Petrozawodsk, lead by Leo Kaipiainen (1932–2004) were involved on the Soviet side. We had annual ?eld measuring campaigns in Finland and in Soviet Union and research seminars. The main emphasis was on developing forest growth models. The research of Chernobyl fallout started a new era in the co-operation between forest ecologists and physicists in Helsinki. The importance of material ?uxes was realized and introduced explicitly in the theoretical thinking and measurements. The world's boreal forests, which lie to the south of the Arctic, are considered to be the Earth's most significant terrestrial ecosystems. A panel of ecologists here provide a synthesis of the important patterns and processes which occur in boreal forests and review the principal mechanisms which control the forest's patterns. The boreal forest is home to a thriving forest industry which requires stable, long term timber to remain viable. Anthropogenic climate change, caused by the release of greenhouse gasses, is occurring rapidly in northern locations. Climate change impacts the boreal forest in many different ways and has the potential impact forestry operations considerably. While there has been significant research on both climate change and the boreal forest, few studies combine both topics to include long-term timber supply. Knowledge gaps exist in terms of how ecological impacts from climate change will affect forestry, particularly in terms of net biomass, species compositions, forest disturbances and species migrations. There is also a lack of timber forecasting studies that utilize forest disturbances and implement drought mortality. Throughout this thesis, these key areas are addressed. We first conducted a literature review and synthesis of the impacts of climate change on boreal forest timber supply. We found that the disparity between migration rates of tree species with ongoing climate change may reduce the overall forest area of the boreal long term. Regional forest disturbances are increasing in frequency and intensity, affecting harvestable volumes and timber quality. Species compositions are changing; favoring early successional conifers and deciduous broadleaf species because of new local climates and more frequent disturbances. Most importantly, net biomass is likely in decline since regional increases in growth are outweighed by general increases in overall tree mortality. Our synthesis concluded that considerable reductions in the quality and quantity of boreal timber supply are likely to occur in the near future without forestry adaptation strategies or climate mitigation measures being implemented. We then simulated four climate change scenarios in three boreal forest regions to test the effect on long term timber supply and the success of two harvesting intensities. By adding annual, species specific, drought-induced tree mortality to a previously published landscape model, we sought to more completely study this important topic. Our results show long term declines in aboveground biomass, regional increases in tree mortality (from fires, insects and drought), and species composition shifts favoring broadleaf and temperate forest species. Our area-based harvesting prescriptions show that with lower harvesting intensity, consistent harvest levels area more likely to be maintained. However, our most severe climate forcing shows considerable reductions in aboveground biomass and harvested biomass. These findings necessitate action for mitigation of climate change and forestry adaptation strategies to cope with negative climate impacts. In summary, climate change considerably impacts the future success of boreal forestry. Our review of recent literature suggests that the consequences of climate change far outweigh the benefits. Our

simulation results show annual biomass levels generally declines, especially in extreme future climates. Continued study and urgent management actions are needed to successfully adapt forest industry to the pressures of climate change. A discussion of the direct and indirect mechanisms by which fire and climate interact to influence carbon cycling in North American boreal forests. The first section summarizes the information needed to understand and manage fires' effects on the ecology of boreal forests and its influence on global climate change issues. Following chapters discuss in detail the role of fire in the ecology of boreal forests, present data sets on fire and the distribution of carbon, and treat the use of satellite imagery in monitoring these regions as well as approaches to modeling the relevant processes. In many places in the world, forests dominate landscapes and provide various products. Future climate change could profoundly alter the productivity of forest ecosystems and species composition. Until now, climate impact research has primarily focused on the likely impacts of rise in temperature, increased atmospheric CO2 concentration, and varying precipitation on unmanaged forests. The issue that now needs to be addressed is how to sustainably manage climate change for timber production and biomass. Though climate change is a global issue, impacts on forests depend on local environmental conditions and management methods, so this book will look at the issue under varying local contexts. A unique look at the boreal forest, Earth’s vast and vital wilderness. The boreal forest, the planet’s largest land biome, spans the northern regions like “a scarf around the neck of the world.” Besides providing homes for many species, the forest’s influence is far-reaching: its trees and wetlands clean our air and water and are helping slow global climate change. In this evocative tour, a lyrical fictional narrative is paired with informational sidebars that describe life in the forest throughout the year, from one country to another. One of the world’s most magnificent regions comes to vivid life through the art of storytelling. "Disturbances are mechanisms that mediate ecosystem changes in response to climate-driven vegetation changes. While many studies have looked at the effect of fire on ecosystem components, few have considered the response of fire to climate and vegetation change. The effects that past climate and vegetation shifts have on fire regimes and the potential consequences to ecosystem change are examined here. Charcoal and pollen analyses were used to determine geographic and temporal patterns of past fire regimes in the North American western boreal forest. Seventeen high-resolution records from north-central Canada (NWT and Manitoba), interior Alaska, and northwestern Ontario were analyzed for large charcoal particles in continuously sampled sediment cores to calculate fire return intervals during the Holocene. Fire, vegetation, and climate data were used to interpret regional and temporal differences in fire importance. In addition, sediment charcoal accumulation was compared to modern experimental fires to interpret fire events from sediment records. Particle-size distributions were equal among all lakes, and deposition occurred directly from fires, not from secondary deposition following fires. Based on the similar patterns of charcoal accumulation from the modern burn and particle-size distributions, the largest 10% of charcoal accumulation rates represent individual fire events. The Holocene records show variations among the regions in timing of the maximum fire period (highest charcoal accumulation rates and shortest fire return intervals). The maximum fire period occurred prior to 5,000 yr BP (calendar years before 1950) for North-central Canada in response to a dry climate regime. In interior Alaska, fire was unimportant until the establishment of Picea mariana at 5,500 yr BP. In northwestern Ontario, the maximum fire period occurred between 2,200 yr BP and present in response to climate-induced forest structure shifts. Despite the different timings, the mean fire return intervals of 70 - 100 years are characteristic of each maximum fire period. Modern fire regimes for these regions developed at approximately 2000 yr BP with fire-return intervals ranging from 70 years in the mixed boreal forest to 600 years in the northern lichened boreal woodlands. Twentieth century charcoal accumulation increases suggest that modern fire regimes may have been influenced by recent climate changes"--Leaves iv-v. Brash hustlers, sinister colonels, resilient refugees, and intrepid radio hosts: meet the future of Congo In this extraordinary debut – called ‘gripping’ by The Times of London – Ben Rawlence sets out to gather the news from a forgotten town deep in Congo’s ‘silent quarter’ where peace is finally being built after two decades of civil war and devastation. Ignoring the advice of locals, reporters, and mercenaries, he travels by foot, bike, and boat, introducing us to Colonel Ibrahim, a guerrilla turned army officer; Benjamin, the kindly father of the most terrifying Mai Mai warlord; the cousins Mohammed and Mohammed, young tin traders hoping to make their fortune; and talk show host Mama Christine, who dispenses counsel and courage in equal measure. From the ‘blood cheese’ of Goma to the decaying city of Manono, Rawlence uncovers the real stories of life during the war and finds hope for the future. Global Change and Forest Soils: Cultivating Stewardship of a Finite Natural Resource, Volume 36, provides a state-of-the-science summary and synthesis of global forest soils that identifies concerns, issues and opportunities for soil adaptation and mitigation as external pressures from global changes arise. Where, how and why some soils are resilient to global change while others are at risk is explored, as are upcoming train wrecks and success stories across boreal, temperate, and tropical forests. Each chapter offers multiple sections written by leading soil scientists who comment on wildfires, climate change and forest harvesting effects, while also introducing examples of current global issues. Readers will find this book to be an integrated, up-to-date assessment on global forest soils. Presents sections on boreal, temperate and tropical soils for a diverse audience Serves as an important reference source for anyone interested in both a big-picture assessment of global soil issues and an in-depth examination of specific environmental topics Provides a unique synthesis of forest soils and their collective ability to respond to global change Offers chapters written by leading soil scientists Prepares readers to meet the daily challenges of drafting multi-resource environmental science and policy documents A large body of research has documented evidence of climate change impact already occurring on different systems on earth, future impacts can be expected. Accordingly, research is urgently needed to analyze the potential impacts of climate change on forest ecosystems in order to contribute to better landscape planning and management. This thesis investigates how climate change affects landscape change, and how to use this understanding in the analysis of land-use and landscape planning and management to adapt to climate change impacts. In particular, this study examines how climate change may impact a managed forest in terms of timber availability, and the regional community that relies on it for its survival. I hypothesized that the Boreal forest in north western Ontario will change in the short term (i.e. 60 years) in species composition and will produce less available timber as a result of human-induced climate change as modeled by different General Circulation Models plus harvesting, compared to a baseline climate. The study objectives were (a) to evaluate the degree of change in land cover (species composition) under forest harvesting and various climate change scenarios; (b) to analyze timber availability under different climate change scenarios, and harvesting; (c) to describe possible scenarios of land cover change as a result of climate change impact and harvesting to assist in policy-making related to land-use and landscape planning; and (d) to identify possible sources of both land-use conflicts and synergies as a result of changes in landscape composition caused by climate change. The study area was the Dog-River Matawin forest in north western Ontario ˜(8 x 104 ha). It is currently under harvesting. I used the Boreal Forest Landscape Dynamic Simulator (BFOLDS) fire model to simulate landscape change under different climate change scenarios (CCSRNIES A21, CGCM2 A22), which were then compared to simulations under a baseline climate scenario (1961-1990). I also developed an algorithm for the geographic information systems Arc View©, that selected useful stands, and simulated harvesting and regeneration rules after logging, processes not currently included in BFOLDS. The studied period covered 60 years to analyze impacts in the medium term in the landscape change. Results obtained were the following. (1) There will be a shortage in timber availability under all scenarios including the baseline. The impacts of climate change will cause a deficit in timber availability much earlier under a warmer scenario with respect to the baseline. The combined impact of climate change and harvesting could diminish timber availability up to 35% compared to the baseline by year 2040 under the CCSRNIES A21 scenario mainly due to an increase in fires. Deficits will occur 10 years before in the same scenario compared to the baseline (by year 2035). (2) In both scenarios and the baseline, there will be a younger forest. In 60 years, there will not be mature forest to support ecological, social and economic processes, as the forest will only have young stands. (3) Results obtained indicated that species composition will not change importantly among the scenarios of climate change and the baseline every decade, but there will be a change in dominance along the 60 years of the simulation under each scenario including the baseline. Softwood increased in dominance and hardwood decreased in all scenarios. The period length used in the simulation of 60 years appeared to be too short to reveal conspicuous changes in species composition. Increases observed in softwood over hardwood related to

the increase in fires which promoted the establishment of species such as jack pine as well as the application of regeneration rules after logging. This finding did not agree with the hypothesis. Results of timber availability were consistent with what I expected. Warmest climate change scenarios (CCSRNIES A21) impacted both the amount of timber available (less availability every ten years) from the beginning of the simulation and the time when deficits occurred. There are important economic, social and environmental implications of the results of this study, namely a future forest that would be young and would supply much less timber. For the forestry industry, production goals would be hindered in the medium term, falling short of industry demands. For a society that depends heavily upon the forest to survive, declining production can imply unemployment, thus affecting the welfare of the community. For the environment, such a young, fragmented forest could be unable to sustain important key species and ecological processes, leading to a loss of biodiversity, Land-use and landscape planning should be used to regulate how the land is used to minimize climate change impact. They should be further used as adaptation tools, to help in ameliorate those climate change impacts that do occur. The boreal forest is always changing: when disaster strikes — be it fire, moose, insects, or other perils — a forest that recovers on its own is forever changed, and often more resilient. Forester Malcolm F. Squires argues that, if we don’t change our views to fit this reality, we may be conditioning the boreal forest for future disaster. Simulations of increased CO2 also confirmed positive growth response in the short term. The response of soil carbon was similar, however predicted to be less than the increase of biomass. Nitrogen availability and negative feedback mechanisms of the plant soil system were critical to the results, indicating that nitrogen progressively limited the growth response. The aim of this book is to provide an accessible overview for advanced students, resource professionals such as land managers, and policy makers to acquaint themselves with the established science, management practices and policies that facilitate sequestration and allow for the storage of carbon in forests. The book has value to the reader to better understand: a) carbon science and management of forests and wood products; b) the underlying social mechanisms of deforestation; and c) the policy options in order to formulate a cohesive strategy for implementing forest carbon projects and ultimately reducing emissions from forest land use. Northern ecosystems and those who rely upon them are facing a time of unprecedented rapid change. Global boreal forests will play an important role in the feedback loop between climate, ecosystems, and society. In this thesis, I examine forest carbon dynamics and the potential for carbon management in Interior boreal Alaska in three distinct frameworks, then analyze my results in the context of social-ecological resilience. In Chapter 1, I analyze comparative historical trends and current regulatory frameworks governing the use and management of boreal forests in Russia, Sweden, Canada, and Alaska, and assess indicators of socio-ecological sustainability in these regions. I conclude that low population density, limited fire suppression, and restricted economic expansion in Interior Alaska have resulted in a 21st-century landscape with less compromised human-ecosystem interactions than other regions. Relative wealth and a strong regulatory framework put Alaska in a position to manage for long-term objectives such as carbon sequestration. In Chapter 2, I model the landscape-level ecological possibilities for sequestration under three different climate scenarios and associated changes in fire and forest growth. My results indicate that Interior Alaska could act as either a weak carbon source or as a weak sink in the next hundred years, and that management for carbon credits via fire suppression would be inadvisable, given the associated uncertainty and risks. In Chapter 3, I perform a social, ecological, and economic analysis of the feasibility of switching from fossil fuels to wood energy in Interior Alaska villages. I demonstrate that this is a viable option with the potential benefits of providing lower-cost power, creating local employment, reducing the risk of catastrophic wildfire near human habitation, and earning marketable carbon credits. Finally, in Chapter 4, I assess how each of the above factors may impact social-ecological resilience. My results show some system characteristics that tend to bolster resilience and others that tend to increase vulnerability. I argue that in order to reduce vulnerability, management goals for Alaska's boreal forest must be long-term, flexible, cooperative, and locally integrated. The boreal forest is the northern-most woodland biome, whose natural history is rooted in the influence of low temperature and high-latitude. Alaska's boreal forest is now warming as rapidly as the rest of Earth, providing an unprecedented look at how this cold-adapted, fire-prone forest adjusts to change. This volume synthesizes current understanding of the ecology of Alaska's boreal forests and describes their unique features in the context of circumpolar and global patterns. It tells how fire and climate contributed to the biome's current dynamics. As climate warms and permafrost (permanently frozen ground) thaws, the boreal forest may be on the cusp of a major change in state. The editors have gathered a remarkable set of contributors to discuss this swift environmental and biotic transformation. Their chapters cover the properties of the forest, the changes it is undergoing, and the challenges these alterations present to boreal forest managers. In the first section, the reader can absorb the geographic and historical context for understanding the boreal forest. The book then delves into the dynamics of plant and animal communities inhabiting this forest, and the biogeochemical processes that link these organisms. In the last section the authors explore landscape phenomena that operate at larger temporal and spatial scales and integrates the processes described in earlier sections. Much of the research on which this book is based results from the Bonanza Creek Long-Term Ecological Research Program. Here is a synthesis of the substantial literature on Alaska's boreal forest that should be accessible to professional ecologists, students, and the interested public. This open access book explores a new conceptual framework for the sustainable management of the boreal forest in the face of climate change. The boreal forest is the second-largest terrestrial biome on Earth and covers a 14 million km2 belt, representing about 25% of the Earth’s forest area. Two-thirds of this forest biome is managed and supplies 37% of global wood production. These forests also provide a range of natural resources and ecosystem services essential to humanity. However, climate change is altering species distributions, natural disturbance regimes, and forest ecosystem structure and functioning. Although sustainable management is the main goal across the boreal biome, a novel framework is required to adapt forest strategies and practices to climate change. This collaborative effort draws upon 148 authors in summarizing the sustainable management of these forests and detailing the most recent experimental and observational results collected from across the boreal biome. It presents the state of sustainable management in boreal forests and highlights the critical importance of this biome in a context of global change because of these forests' key role in a range of natural processes, including carbon sequestration, nutrient cycling, and the maintaining of biodiversity. This book is an essential read for academics, students, and practitioners involved in boreal forest management. It outlines the challenges facing sustainable boreal forest management within the context of climate change and serves as a basis for establishing new research avenues, identifying future research trends, and developing climate-adapted forest management plans.

- Carbon Balance And Climate Change In Boreal Forests
- Implications Of Climate Change For The Boreal Forest Of Ontario
- Carbon Sequestration In Alaskas Boreal Forest
- Towards Sustainable Management Of The Boreal Forest
- Productivity Of Americas Forests And Climate Change
- Productivity Of Americas Forests And Climate Change
- Harvesting Of Old Growth Boreal Forest Decrease Soil Carbon Stock
- Using Landscape Simulation Models To Help Balance Conflicting Goals In Changing Forests
- The Boreal Forest Of Interior Alaska
- Biogeographic Consequences Of Historic And Contemporary Climate Change In Boreal Forest Birds
- Life In The Boreal Forest
- The Importance Of Forest Sector Adaptation To Climate Change
- Dynamic Forest
- Climate Change In The Canadian Boreal Forest
- A Vicious Circle
- Fire History Of Boreal Forests
- Climate Change And Variability
- Fire Climate Change Carbon And Fuel Management In The Canadian Boreal Forest