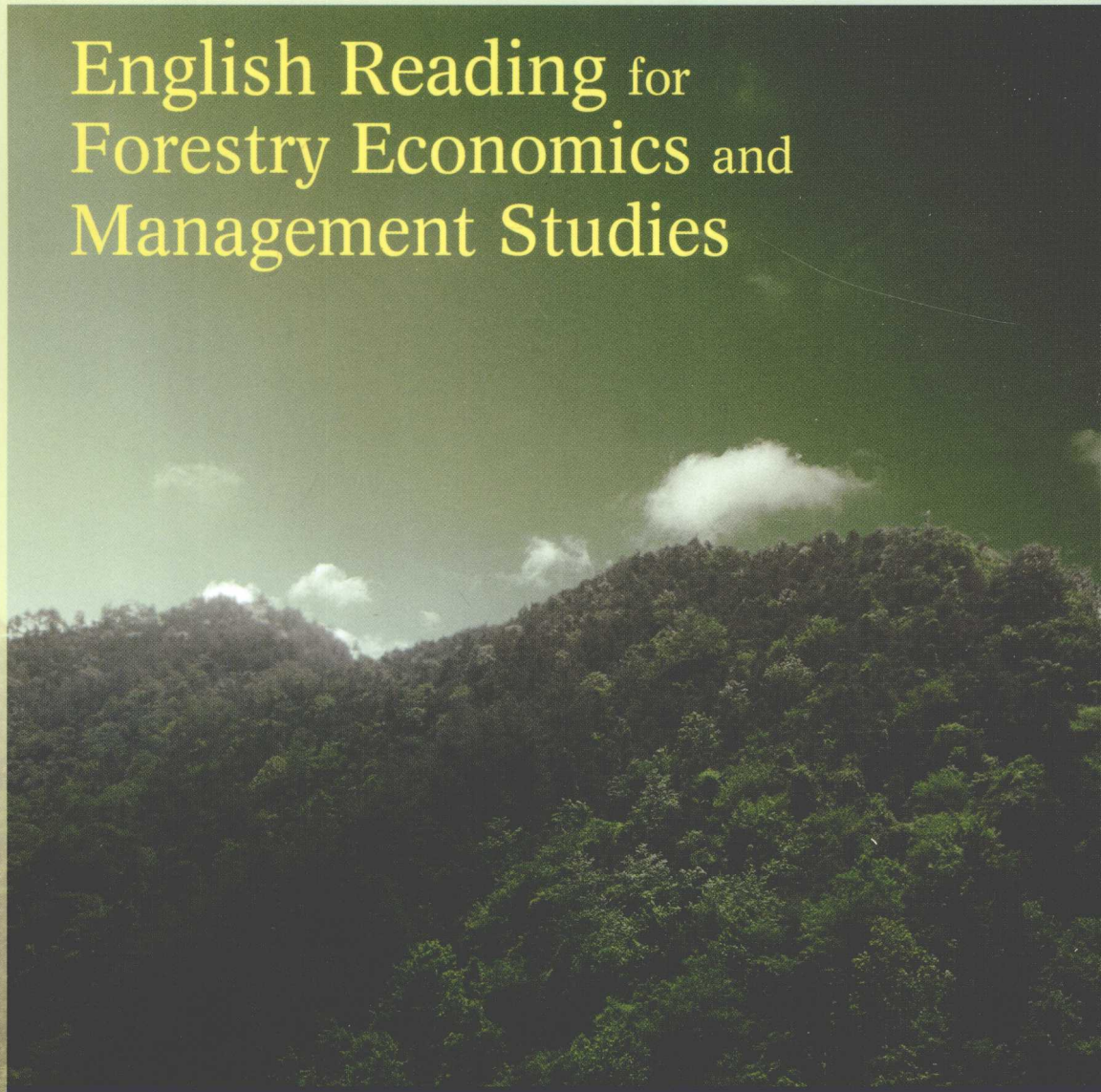
北京市高等教育精品教材立项项目

# 林业经济管理英语阅读教程

◎ 肖文科 主编

# English Reading for Forestry Economics and Management Studies



中国林业出版社

北京市高等教育精品教材立项项目

# 林业经济管理英语阅读教程

# English Reading for Forestry Economics and Management Studies

肖文科　主编

中国林业出版社

**图书在版编目(CIP)数据**

林业经济管理英语阅读教程/肖文科主编. -北京:中国林业出版社,2009.11
(北京市高等教育精品教材立项项目)
ISBN 978-7-5038-5735-5

Ⅰ.林… Ⅱ.肖… Ⅲ.林业经济-经济管理-英语-阅读教学-教材
Ⅳ.H319.4

中国版本图书馆 CIP 数据核字(2009)第 195053 号

**出版** 中国林业出版社(100009 北京西城区刘海胡同 7 号)
E-mail forestbook@163.com 电话 010-83222880
**网址** www.cfph.com.cn
**发行** 中国林业出版社
**印刷** 北京林业大学印刷厂
**版次** 2009 年 11 月第 1 版
**印次** 2009 年 11 月第 1 次
**开本** 850mm×1168mm 1/16
**印张** 19
**字数** 950 千字
**定价** 35.00 元

# 前　言

森林，人类文明发祥的摇篮，既是生命赖以维系的物质环境，又是我们的精神家园。自古以来，人类与森林就一直在相依相存、和谐融洽的关系中生生不息，世代传承。森林，以其丰富的物产为人类生存繁衍提供衣食住行等必要的条件，同时以其无可替代的生态价值呵护着地球母亲的健康发展；作为回报，人类的先祖们对森林心怀敬畏、兢兢保育，并极尽讴歌与膜拜。世界各地质朴的林中居民、睿智的先哲大儒，从森林获取无限灵感，提出了“道法自然”、“天人合一”等朴素的生态理念，进而发展成为各民族灿烂的森林文化和生态文明体系。

然而，工业文明的铁蹄打破了人与自然的和谐。在物质贪欲的驱使下，人类开始了对自然的疯狂掠夺。轰鸣的采伐机械走过，大片大片的天然林被切割得七零八落，失去了自我更新恢复的能力；垦荒开地的熊熊火光中，生机盎然的雨林顷刻间荡然无存，随之化为灰烬的是其间所蕴藏的生物多样性宝库。

失去了天然生态屏障的地球母亲，以其沉默的愤怒教育了无知的人类。对林地经济价值的无度掠夺，致使残存的森林日益退化，失去了其涵养水源、防风固沙、固碳净气等生态功能。20 世纪后期，世界各地生态灾难频发，土地沙化、洪灾肆虐、气候变暖、物种消失……，种种劫难，不一而足。严峻的生态危机，威胁着人类的未来。

所幸，在这场存灭攸关的危机面前，人类开始反思，对森林经济价值及生态价值关注度的失衡逐步得以缓减。森林对解决环境问题、避免生态危机恶化等方面的价值得到了全人类的承认。林业发展迎来了前所未有的机遇，世界各地都出现了盛世兴林的热潮。

然而，作为一个产业，林业的健康发展，离不开学术界、经济界、政府、林农等部门的共同认识与通力合作。如何协调科学地评估并合理利用森林的生态价值和经济价值，避免从一个极端走向另一个极端？如何以经济和市场的手段确保森林生态价值的实现？林业政策及相关各方的参与程度对林业经营管理的良性健康发展具有什么样的影响？对此，中国及国际业内人士都进行了积极的探索与实践，并取得了一定的成效。加强该领域的国际合作，沟通交流各自所取得的成果，对世界林业发展具有无可比拟的意义和价值。西方在探索以市场化手段促进森林生态价值的实现方面起步较早，因此，吸收借鉴西方学者在林业经济管理方面的高招卓见，更加科学、合理、全面地实施林业发展规划，对中国实现其发展目标，再造秀美山川，意义尤为重大。

《林业经济管理英语阅读教程》一书，正是为了满足这样的需求而编写的。全书共十个单元，每一单元由三篇课文组成，集中讨论一个中心问题。本书以阅读为中心，重在了解、理解、掌握文章所述的概念、理论、原理及方法。因此，许多单元的课文为同一篇文章的几个部分，以确保原作者观点和论述的完整性。课文后附有词汇与短语、专业术语、课文注释、技能练习等，以帮助读者更好地理解原文，强化语言技能，提升英语水平。

本书第一单元，全球森林资源的历史及其动态变化。介绍了全球森林发展的历史变迁；全球森林覆盖率，天然林的近况，人工林的发展、目标、面积以及对木材供给的贡献；森林

覆盖率及森林状况的变化等。

第二单元的前两课，历史长河中的林业。介绍了林业部门木材的损耗与演变，人类对森林的环境保护功能认知的兴起；人工林作用的强化，森林碳存储作用的加强。第三课，森林的价值与效益，介绍了森林在扩大就业和增加收入方面的效益，森林提供的木材与木质产品，非木材林产品，城市与社区效益，游憩与娱乐效益和生态效益等。

第三单元第一课，国际间围绕森林进行的对话及其对制定国内森林政策与实际经营的影响。内容涉及全球森林状况回顾，国际范围内的森林问题，区域范围内的森林问题，国际森林政策的进展，政府间森林政策的商讨。第二课，森林管理。介绍了美国林务局的历史、职责与权限，森林的多种用途和森林的永续利用，恢复造林，森林病虫害的防控等。第三课，森林经营与持续。介绍了森林的主要类型，森林的商业与生态价值，森林经营的主要类型，林木采伐，森林病虫害的预防，林火对森林生态的影响，大气污染和气候变化对森林的威胁，工业化林业的可持续性及可持续林业。

第四单元，土地成本的计算：土地资源的经济价值。主要介绍了自然资源经济学的概念与方法，包括无偿的自然环境、边际价值与总价值、经济总价值、投资决策：福利与自利；成本效益分析与折旧，包括常规方法简介、折旧法在土地资源作价中的不恰当性、对过去的投资决策的分析、折旧失灵的原因和代际平等，土地价值的再评估，包括显性效用评估法和土地资源的未来期权价值；土地资源经济学的应用，包括土壤保护经济学、土地退化的成本和自然环境核算。

第五单元前两课，森林的管理、保护与可持续发展。介绍了森林可持续经营论与生态体系论，包括森林可持续经营的概念、生态体系论及其在森林经营中的应用、可持续经营与生态体系两种概念的比较，森林景观修复，包括现行森林景观修复方法、未来可采用方法的一些设想；林业与生态体系：发展中国家日益增长的机遇，包括环境、社会文化、经济等方面的种种考虑及面临的挑战；第三课，森林认证的兴起与发展。介绍了全球对森林关注的日益密切，联合国环境与发展大会、国际热带木材组织的作用、非法采伐与森林施政，森林认证的兴起，认证计划的快速发展及相互承认。

第六单元前两课，实施森林可持续经营的原因。介绍了森林施政，包括森林施政的定义与意义、良莠森林施政对森林可持续经营的要求、森林可持续经营的其他条件、对非法采伐的围追堵截；环境与社会风险的减少，森林在发展中发挥的作用，森林可持续经营的商业案例，林业未来面临的挑战；第三课，森林可持续经营标准。标准的实质与标准的制定，过程标准与业绩标准，国际上最初制定与实施的标准，包括国际热带木材组织制定的热带森林指南、森林管理委员会制定的原则与标准和泛欧操作指南，国家层面的实施情况。

第七单元第一课，森林游憩娱乐管理。介绍了森林游憩的定义，森林游憩管理，森林多种用途框架内的游憩，游憩基本管理，区域总体规划，分片森林规划；后两课为森林管理与野生动植物。介绍了野生动植物与森林的关系，荒野、环境与野生动植物保护，枯木残干在保护野生动物中的作用，枯死木作为薪柴与作为生态循环体的差异；林火与野生动植物，过熟林作为一个特例在野生动植物保护中的作用。

第八单元前两课，人工林及其变化。介绍了人工林发展的驱动因素，政府职能的不断转换，不断变更的所有制与管理模式带来的机遇与思考，几种可资借鉴的转让途径，如：服务外包、转让使用权、转让所有权等；人工林面临的主要挑战，包括当地社团在所有制和管理

方面的参与、最佳货币价值的保障、转让后标准的强化、对变化等带来的社会冲击的管理、投标人土地使用权与其他目标的均衡，因势利导实施变革，包括森林施政基础的培植、设定变革的目标、转让方式的选择与实施、使转让对目标群体具有吸引力和可接受性、培养目标群体、形成最佳交易等；第三课，对环境影响的反应与变革。介绍了国际标准与指标体系，包括联合国环境与发展大会森林原则、21 世纪议程、联合国环境与发展大会公约及其他倡议，加拿大的政策实践与伙伴关系，包括加拿大国家森林战略、加拿大示范林项目、森林可持续经营标准与指标、地方伙伴关系及其反应。

第九单元，林权、管理激励机制及可持续发展政策探索。介绍了林业发展面临的新压力和发展的新方向，处于十字路口的林业，自然资源产权类型；目前的林权形式：管理协议与采伐管理许可证，林权制度的优缺点：林业投资不足与森林发展的失衡性；产权特征和进一步改善的方向。

第十单元前两课，农林复合经营实践的财务分析。农林复合经营实践描述：肯尼亚的饲料灌木、坦桑尼亚的轮伐小片林地、赞比亚得到改善的林木休耕地，评估可营利性的方法；农林复合经营实践结果与讨论；第三课，通过供应链改善森林经营：林产工业木材采购管理体系评价。介绍了评价方法，包括木材采购实践的选择、问卷调查表的设置、抽样设计、统计分析；评价结果，包括样本的人口统计描述、具有特征性的发展层次、按制造类型划分的发展情况，对分析结果的讨论。

本书主要是针对林业经济管理专业本科生编写的教科书，可供学生进入专业阅读阶段后自学或课堂教学使用。用于课堂教学时，教师可在学生快速浏览全篇，紧抓中心思想和文章基本结构的基础上，帮助学生从宏观上了解全篇的内容及其表达方式。就内容而言，重点在于引导读者了解、理解和借鉴林业经济管理的概念、理论、方法；就结构而言，重点在于培养读者在英语学术论文写作方面的方法与技巧。如教学课时数允许，建议按现有顺序安排讲授全书内容；如学时有限或教师根据学生情况有所侧重，也可选择书中的部分单元讲授。选择式讲授时，后面单元中出现的部分新词语和专业术语，可在前面单元中查找。

本书还可供林业专业技术科研和管理人员提升自己的英语水平，了解林业经济管理的最新理念，更新自己的知识结构；也可供社会环境部门和经济管理部门的高层专业人员、管理人员和科研人员借助英语了解林业部门经济管理方面的一些核心理论和方法。

本书是林业经济管理专业本科生的教科书，是该专业高层专业人员的案头书，也是其他经济管理专业高层专业人员的重要参考书。

本书由主编从几十部著作、近百篇文章中精选而成。主编在研究原始素材的基础上，对所选内容进行了分类，按一定的逻辑顺序编排好，然后由柴晚锁、张燕、肖楠、吕英莉和关莉编写词语、术语、注释和练习。在几位编者精心编写的基础上，主编对编写内容进行了逐字逐句的审阅，增删了部分词语，追加查证了全部专业术语，并对所有练习进行了逐一审核。本书出现的任何差错由主编负责。

本书得以付印，首先要对本书课文的原作者、编者和出版社致以最诚挚的谢意。没有他们的研究成果和辛勤工作，就没有本书的基础。

这些作者是：Ball Jim B，Becker Robert H and Alan Jubenville，Binkley Clark S，Bolen Eric G，William L Robinson，Draper Dianne，Franzel Steven，Harris Stephen，Rene Germain，Maini Jagmohan S，Miller G Tyler Jr，Owen Oliver S，Daniel D Chiras，John P Reganold，Pearse

Peter H, Young Anthony.

编者包括：Adamowicz W L, W White, W E Phillips, Alavalapati, Janaki R R, D Evan Mercer, Evans Julian, Garforth Michael, James Mayers, Higman, Sophie, James Mayers, Stephen Bass, Neil Judd, Ruth Nussbaum, Nussbaum, Ruth, Markku Simula, Teeter L B Cashore, D Zhang, Young, Raymond A, Ronald L Giese.

出版社有：Blackwell Science Oxford UK, CABI Publishing Wallingford, Cambridge University Press, Commonwealth Agricultural Bureau International Wallingford, Earthscan, Food and Agriculture Organization of the United Nations, Rome, John Wiley & Sons Inc, ITP Nelson, Kluwer Academic Publishers, National Academies Press, Washington D C, Prentice Hall Inc, Wadsworth Publishing Company.

同时，我们衷心地感谢北京市教委及北京市精品教材建设专家组，正是由于他们的支持和资助，才使本书的编写由一种梦想变成了现实；感谢中国林业出版社的同志们，他们的辛勤工作和严格把关，极大地提升了本书的内容效度和形式效度；感谢北京林业大学教务处和北京林业大学外语学院领导和有关人员的大力支持与鼎力相助。

编 者

2009 年 9 月

# 前　言

森林，人类文明发祥的摇篮，既是生命赖以维系的物质环境，又是我们的精神家园。自古以来，人类与森林就一直在相依相存、和谐融洽的关系中生生不息，世代传承。森林，以其丰富的物产为人类生存繁衍提供衣食住行等必要的条件，同时以其无可替代的生态价值呵护着地球母亲的健康发展；作为回报，人类的先祖们对森林心怀敬畏、兢兢保育，并极尽讴歌与膜拜。世界各地质朴的林中居民、睿智的先哲大儒，从森林获取无限灵感，提出了“道法自然”、“天人合一”等朴素的生态理念，进而发展成为各民族灿烂的森林文化和生态文明体系。

然而，工业文明的铁蹄打破了人与自然的和谐。在物质贪欲的驱使下，人类开始了对自然的疯狂掠夺。轰鸣的采伐机械走过，大片大片的天然林被切割得七零八落，失去了自我更新恢复的能力；垦荒开地的熊熊火光中，生机盎然的雨林顷刻间荡然无存，随之化为灰烬的是其间所蕴藏的生物多样性宝库。

失去了天然生态屏障的地球母亲，以其沉默的愤怒教育了无知的人类。对林地经济价值的无度掠夺，致使残存的森林日益退化，失去了其涵养水源、防风固沙、固碳净气等生态功能。20 世纪后期，世界各地生态灾难频发，土地沙化、洪灾肆虐、气候变暖、物种消失……，种种劫难，不一而足。严峻的生态危机，威胁着人类的未来。

所幸，在这场存灭攸关的危机面前，人类开始反思，对森林经济价值及生态价值关注度的失衡逐步得以缓减。森林对解决环境问题、避免生态危机恶化等方面的价值得到了全人类的承认。林业发展迎来了前所未有的机遇，世界各地都出现了盛世兴林的热潮。

然而，作为一个产业，林业的健康发展，离不开学术界、经济界、政府、林农等部门的共同认识与通力合作。如何协调科学地评估并合理利用森林的生态价值和经济价值，避免从一个极端走向另一个极端？如何以经济和市场的手段确保森林生态价值的实现？林业政策及相关各方的参与程度对林业经营管理的良性健康发展具有什么样的影响？对此，中国及国际业内人士都进行了积极的探索与实践，并取得了一定的成效。加强该领域的国际合作，沟通交流各自所取得的成果，对世界林业发展具有无可比拟的意义和价值。西方在探索以市场化手段促进森林生态价值的实现方面起步较早，因此，吸收借鉴西方学者在林业经济管理方面的高招卓见，更加科学、合理、全面地实施林业发展规划，对中国实现其发展目标，再造秀美山川，意义尤为重大。

《林业经济管理英语阅读教程》一书，正是为了满足这样的需求而编写的。全书共十个单元，每一单元由三篇课文组成，集中讨论一个中心问题。本书以阅读为中心，重在了解、理解、掌握文章所述的概念、理论、原理及方法。因此，许多单元的课文为同一篇文章的几个部分，以确保原作者观点和论述的完整性。课文后附有词汇与短语、专业术语、课文注释、技能练习等，以帮助读者更好地理解原文，强化语言技能，提升英语水平。

本书第一单元，全球森林资源的历史及其动态变化。介绍了全球森林发展的历史变迁；全球森林覆盖率，天然林的近况，人工林的发展、目标、面积以及对木材供给的贡献；森林

覆盖率及森林状况的变化等。

第二单元的前两课，历史长河中的林业。介绍了林业部门木材的损耗与演变，人类对森林的环境保护功能认知的兴起；人工林作用的强化，森林碳存储作用的加强。第三课，森林的价值与效益，介绍了森林在扩大就业和增加收入方面的效益，森林提供的木材与木质产品，非木材林产品，城市与社区效益，游憩与娱乐效益和生态效益等。

第三单元第一课，国际间围绕森林进行的对话及其对制定国内森林政策与实际经营的影响。内容涉及全球森林状况回顾，国际范围内的森林问题，区域范围内的森林问题，国际森林政策的进展，政府间森林政策的商讨。第二课，森林管理。介绍了美国林务局的历史、职责与权限，森林的多种用途和森林的永续利用，恢复造林，森林病虫害的防控等。第三课，森林经营与持续。介绍了森林的主要类型，森林的商业与生态价值，森林经营的主要类型，林木采伐，森林病虫害的预防，林火对森林生态的影响，大气污染和气候变化对森林的威胁，工业化林业的可持续性及可持续林业。

第四单元，土地成本的计算：土地资源的经济价值。主要介绍了自然资源经济学的概念与方法，包括无偿的自然环境、边际价值与总价值、经济总价值、投资决策：福利与自利；成本效益分析与折旧，包括常规方法简介、折旧法在土地资源作价中的不恰当性、对过去的投资决策的分析、折旧失灵的原因和代际平等，土地价值的再评估，包括显性效用评估法和土地资源的未来期权价值；土地资源经济学的应用，包括土壤保护经济学、土地退化的成本和自然环境核算。

第五单元前两课，森林的管理、保护与可持续发展。介绍了森林可持续经营论与生态体系论，包括森林可持续经营的概念、生态体系论及其在森林经营中的应用、可持续经营与生态体系两种概念的比较，森林景观修复，包括现行森林景观修复方法、未来可采用方法的一些设想；林业与生态体系：发展中国家日益增长的机遇，包括环境、社会文化、经济等方面的种种考虑及面临的挑战；第三课，森林认证的兴起与发展。介绍了全球对森林关注的日益密切，联合国环境与发展大会、国际热带木材组织的作用、非法采伐与森林施政，森林认证的兴起，认证计划的快速发展及相互承认。

第六单元前两课，实施森林可持续经营的原因。介绍了森林施政，包括森林施政的定义与意义、良莠森林施政对森林可持续经营的要求、森林可持续经营的其他条件、对非法采伐的围追堵截；环境与社会风险的减少，森林在发展中发挥的作用，森林可持续经营的商业案例，林业未来面临的挑战；第三课，森林可持续经营标准。标准的实质与标准的制定，过程标准与业绩标准，国际上最初制定与实施的标准，包括国际热带木材组织制定的热带森林指南、森林管理委员会制定的原则与标准和泛欧操作指南，国家层面的实施情况。

第七单元第一课，森林游憩娱乐管理。介绍了森林游憩的定义，森林游憩管理，森林多种用途框架内的游憩，游憩基本管理，区域总体规划，分片森林规划；后两课为森林管理与野生动植物。介绍了野生动植物与森林的关系，荒野、环境与野生动植物保护，枯木残干在保护野生动物中的作用，枯死木作为薪柴与作为生态循环体的差异；林火与野生动植物，过熟林作为一个特例在野生动植物保护中的作用。

第八单元前两课，人工林及其变化。介绍了人工林发展的驱动因素，政府职能的不断转换，不断变更的所有制与管理模式带来的机遇与思考，几种可资借鉴的转让途径，如：服务外包、转让使用权、转让所有权等；人工林面临的主要挑战，包括当地社团在所有制和管理

# CONTENTS

Unit 1

# Text A

# Global Forest Resources: History and Dynamics (1)

Jim B. Ball

## Historical Perspective

Forests covered about half of the earth's surface up to the development of early civilizations but today cover less than one-third of that area. Massive forest clearances were a feature of many early cultures, including ancient Assyria[1], Babylon, China, Egypt, Greece and Rome. Much of this forest clearance was to provide land for agriculture, although these societies were also voracious consumers of wood for cooking, heating, copper smelting, pottery making, brick-firing, house construction and shipbuilding, and this led to deforestation wherever the forest did not have the opportunity to regenerate. For more than 10,000 years the forests of the Mediterranean region[2] have been cleared; they now cover about one-sixth of the region and those that remain, often on land that cannot readily be cultivated, have been degraded by humans and their animals through unmanaged grazing. The export of high-quality cedar wood from Lebanon to Egypt began nearly 5,000 years ago and led, eventually, to the virtually complete destruction of the cedar forests. The clearance of forests is thus not a new phenomenon in human history, except in its present scale and spread.

At times, the pressure on the forests eased. The decline and ultimate fall of the Roman Empire following the sack of Rome by the Goths[3] in the fifth century AD, and the subsequent economic decline of much of Europe, led to the regrowth of forests in some areas. The same happened at the time of the Black Death[4] in the mid-fourteenth century when the population of western Europe was reduced by over one-third, and in some places by half. In Germany, people fled rural life and the oppression of rural overlords into the depopulated cities, while many responded to the invitation of the Polish kings and moved to the eastern territories (the Baltic, East and West Prussia, Pomerania[5]). As a result, the forests of central and western Europe colonized and regenerated over large areas, and it was not until the sixteenth century that population pressure and the demand for forest products again increased to a level comparable to that at the end of the thirteenth century.

Following the Thirty Years War (1618 ~ 1648)[6], famine and disease again reduced the population of rural Germany, on this occasion by 40%. This pattern was repeated during the Spanish Heritage War (1701 ~ 1714)[7] and the Seven Years War (1756 ~ 1763)[8]. Following the order of the French King Louis XIV, nearly all towns and castles in south-western Germany were burnt. Their reconstruction consumed an enormous amount of timber so that by the middle of the eighteenth century much of the forest wealth of central Europe had been destroyed, a timber shortage ensued and there was a loss of soil fertility and soil erosion. Vast tracts in northern Germany were degraded to deserts

with shifting dunes.

In Britain, where population growth, land clearance and economic development were especially rapid, the natural forests had been heavily depleted by the late Middle Ages. Iron smelting, relying on charcoal, and other wood-based energy users encountered supply difficulties. By the sixteenth century most of the accessible wood resources had been exhausted in England and iron-makers turned to the woodlands of Scotland, Ireland and Wales. Timber began to be imported into England in large quantities for every purpose.

Destruction of the natural forests has thus taken place over most of Europe. It accelerated as the demand for fuelwood and timber grew rapidly in the early years of the Industrial Revolution[9], but with the continuation of economic growth and industrialization the pressures on the forests have gradually eased. By the early years of the twentieth century, the total area of the European forests had more or less stabilized and in the past decade has even increased slightly. In particular, the pressure on the Mediterranean forests for the supply of fuelwood and land for agriculture and grazing has declined, although the risk of damage from fires continues.

A similar process of forest clearance occurred in the USA. At the time of European settlement in the early seventeenth century about 46% of the land was forested; by 1992 this area had declined to about one-third. Huge areas of forest were cleared in the eighteenth and nineteenth centuries as the population grew and industrialization progressed. Early clearing was for agriculture; in 1800, 95% of the people lived on the land, mostly practising subsistence farming. Most wood was used for firewood even in the late nineteenth century, which depleted forest resources especially around population centres. Fencing was the next most important use of wood, followed by early industrial use. The spread of the railroad then further increased demand for wood, which was used for locomotive fuel until the mid-eighteenth century but above all for sleepers or railroad ties. For example, in 1900 it was estimated that the replacement of ties on existing track required the output of 6 ~ 8 million ha of forest annually.

The importance of the sea for defence and trade led to laws being passed in several European countries in an effort to protect and expand wood resources for naval vessels and merchant fleets, especially oak for building the hulls and pine for masts. [10] The laws were only partially successful, even for these limited objectives. The forest cover of France had shrunk from perhaps 35% of the country's area at the beginning of the sixteenth century to about 25% by the middle of the seventeenth century, and despite the reforms of the administration of the forests and of the forest laws by Louis XIV and his minister of finance, Colbert, in 1661, the situation continued to deteriorate due to demands for shipbuilding and the smelting of iron ore. Nevertheless these reforms began a forestry tradition and laid the basis for a strong forest service.

A similar realization that the forest resource was not limitless led to the emergence of rules to control the use of forests in Germany, Denmark and The Netherlands in the eighteenth century, in India in the mid-nineteenth century, in Sweden and Finland in the late nineteenth century and in the USA in the early twentieth century. At that time colonial powers were reserving forests, introducing forest laws and establishing forest services in East Africa, Malaysia and many other now-independent

countries. In the eighteenth century, efforts to restore forest cover and guarantee future timber supplies were made. Today Germany has 30% forest cover, which originated in the plantations of the seventeenth century; initially these stands were largely of single species (oak, beech, Scots pine and Norway spruce) but today are slowly being converted into mixed stands with uneven age structure.

The development of management techniques for natural forest began in Europe for a number of purposes. Sometimes this process was accelerated for specific objectives, for example to reduce the risk of avalanches, to control erosion, to stabilize sand dunes or to protect agricultural crops, as well as to provide firewood for towns. Management planning in the sense of regulation of yield had been introduced in France by Colbert, while in Denmark management plans with rotations of oak of 100 years were instituted in 1763.

Originally recruited from retired soldiers, the foresters of the specialized forest services created by the rulers of various German states were to have a profound influence on forest science and practice even up to the present. [11] The experience they gained, combined with traditional forestry knowledge, was published and widely disseminated. One of the best-known publications of that time was *Sylvicultura Oeconomica*, published in 1713 by Hans von Carlowitz (1645 ~ 1714). Von Carlowitz was a mining engineer in Saxony preoccupied with the insufficient timber supply for the Saxon mines. His book dealt not only with timber harvesting, species selection, utilization of timber and sowing of conifer seeds to reforest clear fellings, but also with promoting the introduction of foreign (exotic) species and he was the one who first coined the term Nachhaltigkeit (sustainable forest management). The handful of German foresters who became the founders of forest science included Heinrich Cotta (1763 ~ 1844), Wilhelm Pfeil (1783 ~ 1859), Johann Christian Handshagen (1783 ~ 1834), Carl Heyer (1797 ~ 1856), Gottlob Konig (1779 ~ 1849) and George Ltidwig Hartig (1764 ~ 1837), who as professor at the university of Berlin introduced forestry training into the Prussian forest service and had a strong impact on the forest management principles of his day, not only in Prussia but all over central Europe. Hartig's rule was that no more nor less timber should be extracted annually from state forests than could guarantee perpetual supply, which became the principle of central European forestry, i. e. sustainable forest management. [12]

The reduction in forest area had been halted or even reversed in the industrialized countries by the 1920s. Since then the standing volume of forests has increased with better management and increased protection, and in Europe the yearly forest harvest of many countries is smaller than the annual increment. The reasons for this historical transition from rapidly diminishing to stable, or even increasing, forest areas in many countries of the Northern Hemisphere with industrial or service economies are complex. The substitution of coal for fuelwood for industrial and domestic use was one obvious factor. However, more important were the major demographic and economic changes that took place as industrialization and economic growth proceeded.

Rural populations fell drastically as people migrated to the cities and towns. By the turn of the twentieth century, the average proportion of the population living in the rural areas of the industrial countries was around 40% compared with 80% or more at the beginning of the Industrial Revolu-

tion. Today, in Europe and the USA the rural population is about 25% of the total. National population growth rates have dropped to around replacement level in most of the industrial countries. Equally important were the changes that took place in agricultural production. Subsistence farming gave way to an increasingly capital-intensive form of agriculture relying on mechanization and high inputs of fertilizers and pesticides and, in animal husbandry, the stall-feeding of animals. Rather than requiring ever-expanding amounts of land, agriculture became more productive, leading eventually to the present politically charged problems of crop surpluses and the need to 'set aside' or take increasing amounts of farmland out of food production. [13] Additionally, increased public awareness of the value of forests and of environmental issues in urbanized societies of the postindustrial or service economies, combined with increasing demand for new services from forests such as recreation and amenity, have been important recent trends in stabilizing forest areas.

Although history does not repeat itself exactly, the experience of the industrial world helps shed light on what is happening in many developing countries in relation to the pressures on their forests. [14] Expanding populations (especially those existing at subsistence level), accompanied by significant rural-urban migration, result in increased demand for agricultural production. Even highly punitive forest protection legislation has been largely ineffectual in the face of the desperation of people trying to grow enough food, or graze sufficient animals, to survive.

It is only with increased agricultural production supplying stabilized populations that the pressure to clear forest land diminishes. Indeed, sustainable forestry may be possible only where agriculture is, if not sustainable, at least stable. This transition can be seen taking place today in some of the rapidly industrializing countries of the developing world. The Republic of Korea, for example, where the rural population has fallen sharply while agricultural production has increased dramatically, has reached the turning point at which the area of forest can begin to expand again, aided by massive reforestation programmes. In others, such as the newly industrializing countries of the Pacific Rim, forest depletion continues, although the economic and demographic conditions and social demands for stabilizing the remaining areas of forest are beginning to emerge.

In many other developing countries, however, rural population growth continues virtually unabated, agricultural productivity is low and economic stagnation means that there are few employment opportunities for those wishing to leave the land. In such cases, increasing pressure to clear forest for agriculture is inevitable whether legalized by land reform or not.

The parallels with the experience of the industrial world are thus obvious but what makes today's position in the developing world different is the sheer impact of population numbers, the pace of change and the fragile nature of many tropical soils and their inability to be used for long-term agriculture. [15] Regarding population numbers, for example, the population of the European continent grew from about 140 million in 1750 to 265 million by 1850, 392 million by 1950 and 499 million by 1990. The population of the USA grew from 23 million in 1850 to 151 million in 1950 and 248 million in 1990. Today, on the other hand, around 50 million people are being added to the rural populations of the developing world every year. Where there were about 12 ha of forest per head of the global population of about 500 million people in 1750 there is now about 0.75 ha per head, and

the rate at which the forests are disappearing, especially tropical forests, is far faster than at any other time in human history, despite net gains of forest cover in some developed countries and some evidence of a slightly slower rate of deforestation in developing countries in recent years.

## For Your Information

***Two essential components of global assessments of forest resources: national forest inventory systems and a common classification system for forests***

*National forest inventory systems*

The quantity and quality of information provided by global and regional assessments depend to a large extent on the capacity of national forest inventory systems to collect and analyse data at national and subnational levels, and to adjust the information so that it is compatible with global and regional reporting parameters. Of the 143 developing countries covered by the Forest Resource Assessment 1990[16], all but seven had performed one reliable nationwide estimate of forest cover at some time between 1970 and 1990. However, only 25 had performed more than one national forest cover assessment, and very few of these had carried out more than one comprehensive national forest inventory. The database for developed countries is more complete; practically all developed countries were able to provide information not only on areas but also on biomass, volume and other forest parameters. However, work remains to be done to make the inventories carried out in many industrialized countries suitable for analysing changes over time. UNCED (United Nations Conference on Environment and Development)[17] recognized that assessment and systematic observations were 'often neglected aspects of forest resources management, conservation and development …' and that 'in many developing countries there was a lack of structures and mechanisms to carry out these functions'. Consequently, it devoted one of the four programme areas of the forest chapter of Agenda 21[18] to the 'strengthening and establishment of systems for the assessment and systematic observations of forests and forest lands' and the 'provision of sound and adequate updated information on forest and forest-land resources to economists, planners, decision-makers and local communities'. FAO[19], with the support of several donor countries, is pursuing an active programme of country capacity building in forest assessment, which ultimately will contribute to improving the quality of global forest resource assessments.

*A common classification system for forests*

A common set of concepts and classifications that can be applied to all wooded lands of the world is essential for securing consistency between national, regional and global forest resource assessments. The FAO and UN-ECE (United Nations Economic Commission for Europe)[20] secretariats have tried over the years to build consensus on a minimum core of definitions and classifications within and between developed countries (all of which lie in the temperate and boreal zones) and developing countries (most of which fall within the tropical belt). In June 1996, FAO, in cooperation

with UN-ECE and UNEP (United Nations Environment Programme)[21] and with the support of the government of Finland organized an expert meeting in the Finnish town of Kotka at which agreement was reached on a common core set of parameters to be assessed within the framework of the next global forest resource assessment in 2000 and on some of the concepts and classifications to be used to that end. (2686 words)

(Abridged from ***The Forests Handbook, Volume I: An Overview of Forest Science*** edited by Julian Evans, 2001)

## Words and Expressions

accessible *adj.* 可到达的
assessment *n.* 评估;测评
avalanche *n.* 雪崩;滑坡
coin *v.* 杜撰(新词)
compatible *adj.* 兼容的;适宜的
consensus *n.* 共识
cultivate *v.* 开垦利用
degrade *v.* 退化
demographic *adj.* 人口的
deplete *v.* 枯竭;耗尽
depopulated *adj.* 人迹稀少的;灭绝的
deteriorate *v.* 恶化;退化;衰退
disseminate *v.* 传播;宣传
drastically *adv.* 巨大地;激烈地
emergence *n.* 出现
ensue *v.* 接踵而至;相继而起
exhaust *v.* 耗尽;枯竭
extract *v.* 采集;采伐;提取
famine *n.* 饥荒
fertilizer *n.* 肥料;化肥
fragile *adj.* 脆弱的
fuelwood *n.* 薪炭林;燃料
ha = hectare *n.* 公顷
hull *n.* 船体
ineffectual *adj.* 未见效的;无效的
institute *v.* 创立;制定
legalize *v.* 使合法化;公认
legislation *n.* 立法
locomotive *n.* 机车;牵引机
mast *n.* 桅杆
mechanism *n.* 机制;体系
migrate *v.* 迁移;移民;迁徙;移居
originate *v.* 起源;开始;发生
overlord *n.* 大地主;封建领主
parameter *n.* 参数
perpetual *adj.* 永久的
pesticide *n.* 杀虫剂
preoccupied *adj.* 关心;关注
profound *adj.* 深远的;巨大的
punitive *adj.* 刑罚的;惩罚性的
railroad ties *n.* 铁路枕木
regenerate *v.* 更新;再生
reverse *v.* 逆转
sack *v.* 劫掠;洗劫
secretariat *n.* 秘书处
sleeper *n.* 枕木;轨枕
smelt *v.* 冶炼
stablize *v.* 稳定;趋于平稳
subsequent *adj.* 其后的;随之而至的
substitution *n.* 替代品
timber *n.* 木材
tract *n.* 一片(土地);成片(森林)
ultimate *adj.* 最终的
unabated *adj.* 不衰退的;不减弱的
urbanize *v.* 使城市化
virtually *adv.* 几乎
voracious *n.* 大量消耗;贪得无厌的