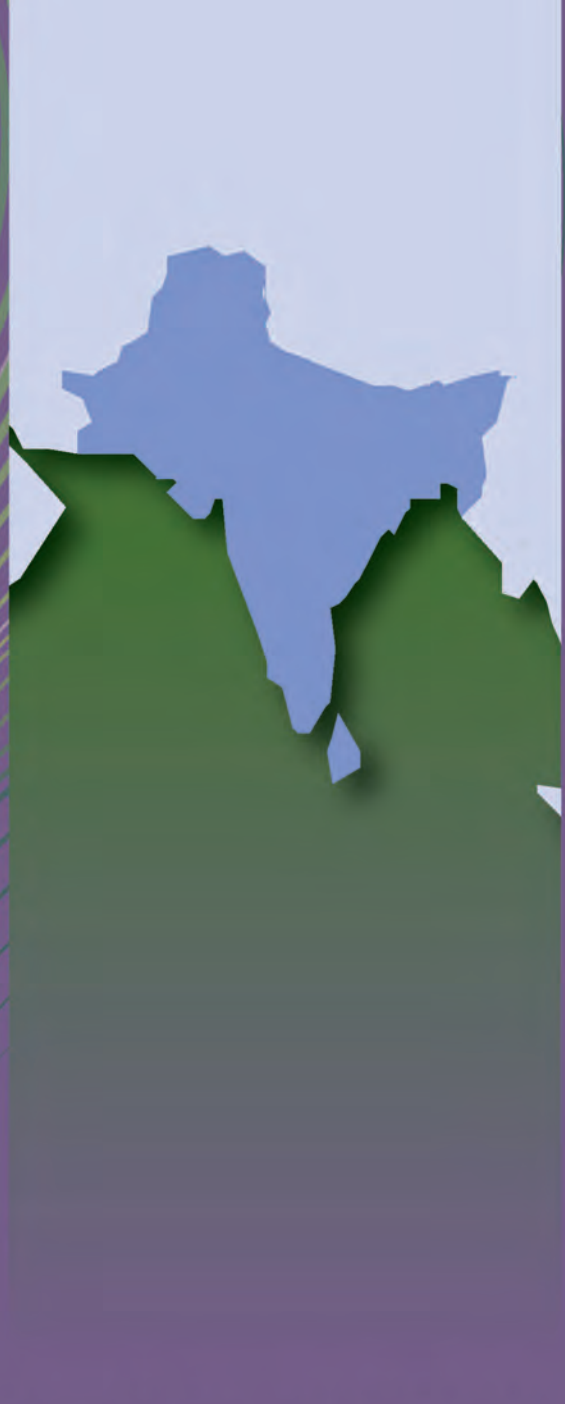


1980
1981
1982
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020



SOUTH ASIA SUBREGIONAL REPORT

Asia-Pacific Forestry Sector Outlook Study II



ASIA-PACIFIC FORESTRY COMMISSION

SOUTH ASIAN FORESTS AND FORESTRY
TO 2020

SUBREGIONAL REPORT OF
THE SECOND ASIA-PACIFIC FORESTRY SECTOR OUTLOOK STUDY

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Bangkok, 2012

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Information Division, Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, 00100 Rome, Italy.

Cover design: Chanida Chavanich

For copies, write to:
Patrick B. Durst
Senior Forestry Officer
FAO Regional Office for Asia and the Pacific
39 Phra Atit Road
Bangkok 10200
Thailand
Tel: (66-2) 697 4000
Fax: (66-2) 697 4445

E-mail: patrick.durst@fao.org

Printed and published in Bangkok, Thailand.
Food and Agriculture Organization of the United Nations
Regional Office for Asia and the Pacific
Bangkok, Thailand

2012 © FAO

ISBN 978-92-5-107263-9

FOREWORD

Great changes have occurred and major advances have been made in Asia-Pacific forestry since the first Asia-Pacific Forestry Sector Outlook Study was published in 1998. Heightened awareness of the values of forests and their greater inclusion in international climate change agreements have increased the importance of linking spatial levels and broadening understanding of issues and opportunities likely to affect forestry in the coming years. Identification of key trends in forestry – both physical and political – and construction of scenarios for the future add a valuable dimension to regional forestry discussions. Improving the responsiveness of institutional mechanisms and adapting to change constitute the most important steps in creating a robust sector in a fast evolving world.

It is in this context that FAO, on behalf of the Asia-Pacific Forestry Commission, embarked on revising the first Asia-Pacific Forestry Sector Outlook Study to capture the changes that have taken place since 1998 and to outline the probable directions of developments and what may be done to enhance the forest sector's contribution to societal well being. Considering the enormous diversity in the region, it was considered useful to have an in-depth assessment of the subregional situation in addition to analysing the larger regional trends. The South Asia Outlook Report is one of the four subregional reports that FAO prepared as part of the Asia-Pacific Forestry Sector Outlook Study.

Significant challenges remain in many parts of the region and it is increasingly evident that countries cannot develop forestry policies in isolation – rights and responsibilities are increasingly spilling across borders and across sectors as populations increase, demands on resources heighten and economies integrate. The collegial nature of the process through which this outlook study was developed gives credence to the success of collaborative regional action and sharing in a common future. By openly contributing information, the countries and organizations involved in the outlook study have demonstrated their commitment to the future of forests and forestry and their desire to improve upon the benefits from forests that the current generation has received.

FAO welcomes this opportunity to once again contribute, at the behest of the Asia-Pacific Forestry Commission, to the regional forestry dialogue. Many organizations and individuals have put huge effort into preparing this subregional report on South Asia. In bringing it together seven country reports and over 15 thematic studies have been prepared. The first Asia-Pacific Forestry Sector Outlook Study provided a benchmark in regional and global forestry and was followed by a series of regional outlook studies around the world. We hope that this subregional study will be as well received and that this contribution to the region's forestry sector is both timely and appropriate and will challenge countries to build forests that future generations will value.



Hiroyuki Konuma

Assistant Director-General and Regional Representative for Asia and the Pacific
Food and Agriculture Organization of the United Nations

CONTENTS

FOREWORD	iii
BOXES	ix
ACKNOWLEDGEMENTS	xi
EXECUTIVE SUMMARY	xiii
FORESTS AND FORESTRY	xiii
CHANGE DRIVERS	xv
SCENARIOS AND THEIR IMPLICATIONS	xvii
FORESTS AND FORESTRY IN 2020	xviii
PRIORITIES AND STRATEGIES.....	xx
CHAPTER 1	
INTRODUCTION	1
1.1. Background	1
1.2. Scope and objectives.....	1
1.3. The process.....	2
1.4. Report structure.....	2
CHAPTER 2	
FORESTS AND FORESTRY IN SOUTH ASIA	5
2.1. Land use: An overview	5
2.2. Forests in South Asia	6
2.2.1. Forest types	6
2.2.2. Extent of forests	8
2.2.3. Change in forest area	10
2.2.4. Forest degradation	11
2.2.5. Trees outside forests: An expanding resource	12
2.3. Forest management	15
2.3.1. Management of natural forests for production	15
2.3.2. Planted forests	17
2.3.3. Forest certification	19
2.3.4. Management of forests for environmental protection	20
2.4. Forest policies, legislation and institutions	22
2.4.1. Forest policies	22
2.4.2. Legislation	24
2.4.3. Institutions	26

CHAPTER 3

ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPORTANCE OF FORESTS	35
3.1. Production, trade and consumption of wood and wood products.....	35
3.1.1. Industrial roundwood	35
3.1.2. Sawnwood	37
3.1.3. Wood-based panels	37
3.1.4. Paper and paperboard	37
3.1.5. Wood and wood product trade	38
3.1.6. Low levels of consumption	40
3.1.7. Secondary wood products	41
3.2. Wood industry in South Asia.....	43
3.3. Wood energy.....	44
3.3.1. Dependence on wood energy	45
3.3.2. Projection comparisons: APFSOS I and APFSOS II	46
3.3.3. Issues in wood energy use	47
3.3.4. Developments in biofuel production	48
3.4. Summary overview of the wood products sector	49
3.5. Non-wood forest products	51
3.5.1. Overview	51
3.5.2. Management of non-wood forest products	53
3.5.3. Development of new processes and products	55
3.5.4. New institutions	56
3.5.5. Non-wood forest products: The changing landscape	57
3.6. Ecosystem services	57
3.6.1. Conservation of biodiversity	57
3.6.2. Protected areas	59
3.6.3. Forest-based recreation and ecotourism	61
3.6.4. Urban forestry	64
3.6.5. Watershed protection	65
3.6.6. Land degradation and desertification	68
3.6.7. Forests and climate change mitigation and adaptation	69
3.7. Socio-economic importance of the forest sector.....	71
3.7.1. Contribution of forestry to GDP	71
3.7.2. Employment in the forest sector	73
3.7.3. Forests and poverty reduction	74
3.8. Economic, social and environmental benefits: An overview	75

CHAPTER 4

DRIVERS OF CHANGE	77
4.1. Demographic changes.....	77
4.1.1. Population growth	78
4.1.2. Urbanization	79
4.1.3. Migration	81
4.1.4. Changes in age structure	82
4.1.5. Demographic changes: An overview	83
4.2. Economic changes.....	84
4.2.1. Growth rates of income and GDP	84
4.2.2. Structural changes in economies	89
4.2.3. Globalization and its impacts	90
4.2.4. Economic changes: An overview	94

4.3. Environmental changes	95
4.3.1. Local and national issues and actions	96
4.3.2. Global and regional environmental drivers	98
4.4. Political and institutional changes.....	102
4.4.1. Changes in governance and institutions	102
4.4.2. Governance and corruption	103
4.5. Developments in science and technology	105
4.5.1. Overall level of science and technology investments	106
4.5.2. Agricultural technologies	107
4.5.3. Traditional technology	108
4.5.5. Developments in cutting-edge technologies	108
4.5.6. Emphasis on green technologies	108
4.6. Change drivers: An overview	108

CHAPTER 5

PROBABLE SCENARIOS.....	111
5.1. Scenario analysis.....	111
5.2. South Asian development scenarios	114
5.3. Key characteristics of the scenarios.....	118
5.3.1. The high-growth scenario	118
5.3.2. The low-growth/stagnation scenario	120
5.3.3. The green economy scenario	121

CHAPTER 6

SOUTH ASIAN FORESTS AND FORESTRY IN 2020	125
6.1. State of forests and trees	125
6.1.1. Deforestation and forest degradation	125
6.1.2. Forest management	126
6.1.3. Forest plantations	127
6.1.4. Trees outside forests	127
6.2. Forest products	128
6.2.1. Wood and wood products	128
6.2.2. Wood energy	130
6.2.3. Non-wood forest products	131
6.3. Ecosystem services	132
6.3.1. Conservation of biodiversity	132
6.3.2. Watershed protection	132
6.3.3. Climate change mitigation and adaptation	132
6.3.4. Ecotourism	133
6.4. The green economy scenario	135
6.4.1. Management of natural forests	135
6.4.2. Management of plantations	135
6.4.3. Demand for wood and wood products	135
6.4.4. Wood energy	136
6.4.5. Non-wood forest products	136
6.4.6. Ecosystem services	136
6.5. Forest transition in South Asia	137
6.6. Scenarios and their implications: An overview	138

CHAPTER 7

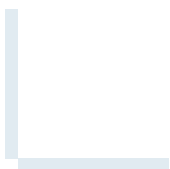
PRIORITIES AND STRATEGIES	139
7.1. Priorities	139
7.1.1. Poverty reduction	140
7.1.2. Invest in rebuilding and regenerating the forest asset base	142
7.1.3. Improve efficiency in the use of energy and raw materials	142
7.2. Strategies	143
7.2.1 Reforming policies, legislation and institutions	143
7.2.2. Institutional changes	143
7.2.3. Science and technology development	145
7.3. Priorities and strategies: An overview	146
REFERENCES.....	149



BOXES

Box 1.1:	Questions on the future of forests and forestry in South Asia	2
Box 2.1:	Threats to the Sundarban mangroves	8
Box 2.2:	Definition of forests	9
Box 2.3:	Potential output of Nepal's forests	12
Box 2.4:	Trees outside forests in South Asian countries	13
Box 2.5:	Home gardens – the most important source of wood supply in Sri Lanka	14
Box 2.6:	Home gardens and wood supply in Kerala, India	14
Box 2.7:	Criteria and indicators of sustainable forest management – India	17
Box 2.8:	The challenges of plantation management in Bangladesh	19
Box 2.9:	Forest certification in South Asia	20
Box 2.10:	Community management in the Annapurna Conservation Area, Nepal	21
Box 2.11:	Targets for forest cover in some South Asian countries	23
Box 2.12:	Sri Lankan policy changes	24
Box 2.13:	Forest ownership in South Asia	24
Box 2.14:	Indian Forest Rights Act, 2006	26
Box 2.15:	Provincial forest departments in Pakistan	28
Box 2.16:	Sandalwood in India	29
Box 2.17:	Leasehold forestry in Nepal	30
Box 2.18:	Industry-farmer partnership in pulpwood production in India	30
Box 2.19:	Community forestry in Nepal	32
Box 2.20:	JFM in India	32
Box 3.1:	Import of wood and wood products by India	39
Box 3.2:	An overview of forest industries in India	43
Box 3.3:	Hand-made paper production in Nepal	44
Box 3.4:	Impact of urbanization on woodfuel use	47
Box 3.5:	Potential woodfuel supply in Sri Lanka	48
Box 3.6:	Biofuel initiatives in India	49
Box 3.7:	Non-wood forest products in Pakistan	51
Box 3.8:	NWFPs and traditional medicine in South Asia	52
Box 3.9:	Unsustainable trade depleting traditional Asian medicines	54
Box 3.10:	NWFP certification in Nepal and India	54
Box 3.11:	Scaling up through collective action in India	56
Box 3.12:	Biodiversity hotspots in South Asia	58
Box 3.13:	Human-wildlife conflicts in Bhutan	60
Box 3.14:	The growing problem of illegal insect collection	61
Box 3.15:	Ecotourism in Bhutan	62
Box 3.16:	Collaborative initiatives to promote ecotourism	63
Box 3.17:	Sanjay Gandhi National Park: Challenges in managing an urban forest	64
Box 3.18:	Watershed protection and upland forests in Pakistan	65
Box 3.19:	Vulnerability of river basins in South Asia	66
Box 3.20:	Integrated approach to regenerating forests for improved watershed conditions	67
Box 3.21:	Local-level efforts to combat desertification in Pakistan	69
Box 3.22:	CDM afforestation and reforestation (A/R) projects in India	70
Box 3.23:	Estimation of employment in the forest sector	74
Box 4.1:	Impact of the economic crisis on South Asia	86

Box 4.2:	Key facts about agriculture in South Asia	90
Box 4.3:	Economic significance of remittances in Bangladesh	93
Box 4.4	Regional and subregional integration	94
Box 4.5:	The Chipko movement: Hugging trees to protect the environment	96
Box 4.6:	Pakistan – floods and logging ban	97
Box 4.7:	Public Interest Environmental Litigation (PIL) and forestry	97
Box 4.8:	Forestry in national climate change action plans/strategies	99
Box 4.9:	Controversy over melting Himalayan glaciers	100
Box 4.10:	REDD+ in South Asia	101
Box 4.11:	The Declaration of Rights of Indigenous Peoples	103
Box 5.1:	Definition of scenarios	112
Box 5.2:	UNEP’s GEO 4 scenarios	112
Box 5.3:	Bhutan’s pursuit of Gross National Happiness	116
Box 5.4:	Carbon-neutral Maldives	122
Box 7.1:	Good governance, the environment and green development	140



ACKNOWLEDGEMENTS

FAO expresses sincere appreciation and gratitude to all who contributed to this subregional report of the Second Asia-Pacific Forestry Sector Outlook Study (APFSOS). Governments in the region nominated national focal points who met early in the process to discuss their roles and to agree upon a common national report structure. The national focal points were instrumental in running national-level outlook consultation processes, collecting country-level data and information, clarifying issues and verifying statistics and coordinating submission of country outlook papers. The work that went into compiling and developing the country outlook papers, which formed the foundation for this report is duly acknowledged and greatly appreciated.

The implementation of the overall regional outlook study was endorsed by the Twenty-first Session of the Asia-Pacific Forestry Commission, which was chaired by Shri J.C. Kala (Director-General of Forests and Special Secretary, Ministry of Environment and Forests, Government of India); and reviewed at the twenty-second session chaired by Mr Nguyen Ngoc Binh (Director-General, Forest Department, Ministry of Agriculture and Rural Development, Government of Viet Nam).

Implementation of the regional study was coordinated by CTS Nair and Patrick Durst, and assisted by Chris Brown and Jeremy Broadhead under the supervision of He Changchui, Michael Martin and Hiroyuki Konuma. Implementation was overseen by a Scientific Steering Committee comprising Sairusi Bulai (Secretariat of the Pacific Community); Neil Byron (Australia Productivity Commission, Government of Australia); Barney Chan (eSFM Tropics, Malaysia); Lu De, Bai Weigao and Zhang Zhontian (State Forestry Administration, Government of China); Steve Elliott (Forest Restoration Research Unit, Chiang Mai University), Steven Johnson (International Tropical Timber Organization); Togu Manurong (Bogor Agricultural University, Indonesia); Kaosa-ard Mingsarn (Chiang Mai University, Thailand); Javed Mir (Asian Development Bank); Ram Prasad (Indian Institute of Forest Management); Victor Ramos (former Secretary of Environment and Natural Resources, Philippines); Tonny Soehartono (Ministry of Forestry, Indonesia), Rowena Soriega (Asia Forest Network); Takako Teranishi and Hiro Miyazono (International Forestry Cooperation Office, Japan); James Turner (Scion Research) and CTS Nair, Patrick Durst, Purushottam Mudbhary, Aru Mathias, Jeremy Broadhead, Chris Brown, Rebecca Rutt and Akiko Inoguchi (FAO).

National reports were submitted by government forestry agencies from nearly all the South Asian countries; contributors to these reports are attributed in those documents and thanked for their efforts. The following individuals served as National Focal Points or participated in National Focal Points' meetings: A.K.M. Shamsuddin (Bangladesh), Md. Abdulla Abraham Hossain (Bangladesh), Dhan Bahadur Dhital (Bhutan), Jitendra Vir Sharma (India), Husain Faisal (Maldives), Pem Narayan Kandel (Nepal), Shahzad Jehangir (Pakistan), A.U. Sarath Fernando (Sri Lanka) and K.P. Ariyadasa (Sri Lanka). Very valuable support was provided by Junaid K. Choudhury and Ravi Thuppalli in the preparation of the country outlook papers for Bangladesh and Maldives respectively.

This subregional report was prepared by CTS Nair and Rebecca Rutt with assistance from reviewers Ram Prasad, Jeremy Broadhead and Chris Brown and advice from Patrick Durst and Simmathiri Appanah. Thanks are due to the Forestry Staff of the FAO Regional Office for Asia and the Pacific and the Forestry Department, FAO, Rome, many of whom

contributed to the study. Support provided by Arvydas Lebedys in compiling data on production, trade and consumption of forest products is gratefully acknowledged.

The report was edited by Chris Brown and Robin Leslie and formatted by Somchai Singa and Jeremy Broadhead.

Finally, special thanks go to FAO Bangkok staff that provided essential secretarial support: Kallaya Meechantra and Sansiri Visarutwongse, and to Janice Naewboonnien for proofreading.

EXECUTIVE SUMMARY

The South Asian subregion, together with the rest of Asia and the Pacific, is undergoing rapid social and economic changes. These changes have important implications for forests and forestry and consequently on long-term societal welfare. It is in this context that the Asia-Pacific Forestry Commission recommended conducting the second outlook study to assess the likely changes to the year 2020. This report covers the seven countries of the South Asian subregion: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

FORESTS AND FORESTRY

Some of the key features relating to forests and forestry in the South Asian subregion are:

High population density implies low per capita land and forest area

South Asia is one of the least-forested subregions in the Asia-Pacific region with a per capita forest area of about 0.05 hectares or about a quarter of the per capita forest area of the Asia-Pacific region and less than one-tenth of the global per capita forest area. This implies intense pressure on the forests to meet society's multiple and conflicting demands. Although at the aggregate level forest area has stabilized in the subregion, this is entirely due to afforestation/reforestation efforts in India and Bhutan. In all the other countries forest area continues to decline.

Intense human pressures and consequent degradation

South Asian forests are subjected to severe problems of deforestation and degradation. Given the very low per capita arable land, the pressure on land is extremely high, with consequent impacts on forests. Most countries have recorded significant forest loss since 1990. More than deforestation, degradation stemming largely from intense human pressures remains the major problem.

Agriculture-related deforestation is slowing down while demand for raw materials is worsening the problem of forest clearance

During the last few decades expansion of agriculture has been the main cause of deforestation. However this is changing. As most forests suitable for agriculture have already been converted and the scope for expansion of agriculture is limited, the pace of agriculture-related forest clearance has declined significantly. Also the growth of industrial and services sectors is reducing the dependence on agriculture. However, rapid growth of mining and infrastructure is becoming a major cause of deforestation

affecting the livelihoods of forest-dependent people and undermining the provision of environmental services. An increase in demand for biomass, especially as countries give greater thrust to renewable energy, could also trigger forest clearance to raise intensively-managed bioenergy plantations.

Forests and resource-use conflicts

Considering the growing demand for a wide array of products and services by different sections of society, resource-use conflicts centred on forests are on the increase. Forests are the home for a sizeable section of tribal communities, most of them living below the poverty line. Increasingly the same forests are under pressure to provide timber and other products and services, and more recently the growing demand for minerals, energy and so forth. Underdevelopment and poor governance coupled with appropriation of resources for industrial needs have undermined the livelihood of local communities. Resentment due to marginalization has paved the way for the emergence of extremist movements. This has severely affected the ability to manage forests sustainably, some of which have had a long history of systematic management.

Low productivity and declining carbon stock in most countries

Historically forest management has focused on protecting the forest estate and the investments in improving the forests through regeneration, tending, managing pests and diseases, and fire protection have been low. Coupled with intense biotic pressures the productivity of most forests, including plantations, is far below their potential. In most countries the growing stock per hectare is on the decline. Even in the case of plantations, full productivity is not being realized. The decline in growing stock has important implications, especially regarding the carbon stock of forests. With the exception of Bhutan and India, forest carbon stocks have declined in all the countries between 1990 and 2010

Expansion of trees outside forests

One of the positive developments in South Asian forestry is the expansion of trees outside forests, especially as farmers and other landowners take up tree planting under farm forestry. Declining profitability of agriculture, especially in the context of increasing wages, and the growing local demand for timber has encouraged a rapid expansion of tree growing on farms. Often this is supported through industry-farmer partnership arrangements. Farm-grown trees have become a major source of wood supply, especially in the context of declining supply from forests.

Shift in objectives of forest management focusing on provision of environmental services

Provision of environmental services has become the primary objective of forest management and large tracts of forests are excluded from the purview of wood production. Issues like conservation of biodiversity, climate change mitigation and adaptation, protection of watersheds and other amenity values like ecotourism are

gaining prominence, generating major changes in the management of forests. In particular climate change concerns are having a profound influence on forests and forestry and most countries have included greening as an important component in their climate change adaptation and mitigation strategies. Nonetheless, difficulties persist in establishing appropriate trade-offs between competing objectives, especially in the context of divergent needs of different sections of the society.

Greater thrust on people's participation

Realizing the limitations of traditional state control, there is increased thrust on local participation in forest management. Some of the notable examples of this are the forest user groups in Nepal and Joint Forest Management (JFM) in India. While these initiatives have been able to partially address the first generation problems of ownership, issues relating to increased investments to enhance productivity and equitable distribution of benefits persist.

Value addition lags behind

One of the major problems relating to forestry in South Asia is the low levels of value addition whether for wood or non-wood forest products. Almost 90 percent of all wood is used as fuel, particularly in traditional low efficiency wood-burning stoves. There is considerable scope for producing more value-added products and enhancing the efficiency of use of wood and other products.

Rapidly growing demand and increased dependence on imports

On the whole, South Asia is on a path of rapid economic growth and the associated increase in demand for a wide array of products including wood and wood products. Considering the limited domestic supplies, imports of both primary and secondary wood products have expanded rapidly during the last ten years. South Asia's increasing demand for wood and wood products could lead to deforestation and forest degradation within and outside the subregion.

Low levels of consumption of wood and wood products

In comparison with the overall situation in the Asia-Pacific region, and that of the world as a whole, estimated consumption of wood and wood products is extremely low in the South Asian subregion. This partly stems from an inability to fully account for the transactions in the unorganized sector and is partly due to the low effective demand stemming from very low incomes. Rapid economic growth will entail substantial increase in demand for wood and other forest products.

CHANGE DRIVERS

As in other countries, South Asian countries are undergoing important social, economic and political changes, with significant consequences on the use of natural resources including forests. Some of the major changes expected in the next couple of decades are:

Changing demography

The population in South Asia is predicted to grow from about 1.6 billion in 2010 to about 1.82 billion by 2020, increasing the density from 388 to 441 persons per square kilometre with all the attendant direct and indirect impacts on forests. Although there has been rapid urbanization, the absolute number of rural people is expected to increase, accentuating the pressures on land and other natural resources, especially for food, fuel, fibre and water. Migration to other countries and remittances have provided a safety valve, reducing the dependence on land; but the increase in real estate prices and boom in construction have led to diversion of agricultural and forest land.

South Asia has a young population, implying a significant increase in the number of those of working age during the next two decades. This could increase the demand for a wide array of products and services including wood. The changing age structure will also affect society's values and perceptions. A younger generation with increased environmental awareness is already influencing forest-related issues.

Impressive economic growth, but widening inequality and persistent poverty

Notwithstanding the global economic downturn of 2008/2009 and the anaemic recovery of the developed economies since then, most South Asian countries have registered impressive growth rates and there are indications that these rates could be sustained on the basis of internal strengths, especially high savings and investments, and increasing domestic demand, largely attributed to the swelling middle class. However, inequality is increasing and levels of poverty remain extremely high. Although poverty based on the cut-off rate of US\$1.25 per person per day has declined, this has not been sufficient to reduce the region's total number of poor, which stands at about 596 million people in 2010, accounting for 46 percent of the world's poor.

One of the notable features of South Asia's economic transformation is the structural change in the economies, altering the relative importance of various sectors and shifting from a predominantly agrarian society. Rapid growth of industrial and services sectors has reduced the overall importance of agriculture and allied activities (forestry, fisheries, animal husbandry, etc.) in South Asian economies. Nonetheless, agriculture's role in providing rural employment remains critical.

Environmental issues are receiving increased attention, but willingness to pay for environmental services remains limited

There is wider concern about environmental issues, especially in the context of ensuring peoples' livelihoods. Local environmental issues that affect people's livelihoods have led to significant intervention by civil society organizations. Issues like loss of biodiversity, decline in the quality and quantity of water, climate change-related events, desertification and land degradation are receiving increased attention at all levels. This trend is likely to persist and a more environmentally-conscious society will be placing increased demands on forests for their environmental services. However, people's willingness and ability to meet the costs of providing environmental services remain limited. Market and non-market mechanisms to establish acceptable trade-offs between competing objectives are poorly developed.

Policies are changing, but institutional adaptation is lagging behind

Forest policies in most countries have adapted to the changes and greater thrust is being given to social and environmental issues. However, policies in several other sectors have not mainstreamed conservation objectives, consequently accentuating resource-use conflicts. Decentralization policies have helped to transfer resource management responsibilities to local institutions and communities. Yet several challenges persist, especially on account of the inability of long-established institutions to reinvent themselves and adapt to changes. Corruption and lack of transparency remain major problems at all levels and governance deficiencies continue to be a serious issue. Democratic processes of decision-making are yet to percolate to all levels.

Progress in science and technology is very uneven

South Asia has made impressive strides in science and technology. However, the reach of technology is extremely uneven. Large segments of the economy, including forestry, are still dependent on outdated technologies and have not been able to access and adopt improved technologies. This applies to almost all spheres of forestry, including production of wood and other products and their processing and marketing.

SCENARIOS AND THEIR IMPLICATIONS

Three probable scenarios based on future growth rates and improvement in political and institutional contexts

With the exception of Sri Lanka and Maldives, all South Asian countries are low-income economies. South Asia has been largely agrarian and most rural people are still highly dependent on agriculture for income and employment. The countries in the region are highly vulnerable on account of several internal and external factors. Poverty continues to be a major concern and efforts hitherto are yet to make a significant dent in the problem. Conflicts relating to natural resource use are bound to escalate and mechanisms to establish acceptable trade-offs remain weak. Taking into account the major drivers of change and key uncertainties, three broad development scenarios, each having different implications on the economy as a whole and on the forest sector, can be visualized:

- **The high-growth** scenario is one under which countries remain on a path of rapid economic growth, but giving inadequate attention to critical social and ecological problems from the rapid economic growth. Most of the growth stems from rapid exploitation of available natural resources. Policy-makers assume that high growth rates will help to address the problem of poverty through trickle-down effects and environmental issues can be addressed later, once society becomes better off and willingness and ability to pay for environmental services improve.
- **The low growth and stagnation scenario** presents a future restrained by weak economic performance and poor social and ecological sustainability. Unfavourable internal and external factors could take countries on a path of low economic growth or stagnation, which could also have a number of negative social and environmental implications. Several densely populated low-income countries (or regions within

countries) with limited natural resources and poorly developed human capital are prone to such a scenario. In many cases, the high-growth scenario, based on rapid exploitation of natural resources ignoring equity and sustainability, is likely to end up in a low growth and stagnation scenario or further decline.

- **The green economy scenario** focuses on balancing growth with social and ecological sustainability. In fact, this is increasingly becoming the vision for a number of countries, especially in the context of significant economic and environmental crises, including climate change.

A mix of different scenarios to emerge in the subregion

In most South Asian countries, all the three pathways/states can be found in varying proportions. Large tracts of countries may remain in the low growth stagnation scenario, while there could be a rapidly growing industrial segment, adopting modern technologies and managed entirely by focusing on market competitiveness. Isolated pockets of more equitable low carbon green economies may also occur. The proportion of development changes over time, depending on the collective impact of the main drivers of change. The most acceptable situation will be one where the 'green segment' expands rapidly, reducing pockets trapped in the low growth and unsustainable high growth paths.

FORESTS AND FORESTRY IN 2020

Deforestation and forest degradation will remain major problems

The pace of agriculture-related forest clearance is expected to decline significantly, especially in the context of rapid economic growth and the reduced dependence on land as a major source of income. However, increasing demand for minerals, energy, infrastructure, etc. will entail continued forest clearance. Hence the situation regarding forest area changes will be at best mixed under the high growth and low-growth scenarios. Greater stability on the forest front is possible only under the green economy scenario.

Considering high population densities and the limited availability of land and forests, degradation from intense use of forests is expected to persist in most South Asian countries. In spite of increased awareness about the environmental values of forests, the level of investments in protection, regeneration and management is likely to remain suboptimal. Much of the problem will be related to weaknesses of existing institutions. Especially under the low-growth scenario, dependence on forests will increase with no concomitant increase in investments to improve management, thus accentuating degradation.

Farm-level tree growing expected to increase

One of the most positive developments in South Asia is that wood production is moving out of forests to farms as more farmers are taking up tree planting in response to the changes in the relative profitability of agriculture vis-à-vis tree cropping. A decline in

dependence on farming on account of alternative opportunities under a high-growth scenario will increase the pace of tree planting. Alternatively, some marginal agricultural land may be left fallow, encouraging forest growth.

A slow growth and stagnation scenario coupled with increasing food prices will lead to a different outcome. In such a situation there will be increased efforts to cultivate all available land with agricultural crops, discouraging tree growing.

Low probability for forest transition during the next decade

On the whole most South Asian countries are unlikely to accomplish forest transition during the next decade in view of the persistence of a number of fundamental problems. The apparent transition that shows signs of emerging in some of the countries is unlikely to be sustained.

Wood demand to increase significantly

Considering the current low per capita consumption of forest products, a high-growth scenario will imply a demand boom for wood and wood products. This is all the more pertinent in the context of the high proportion of younger people in the population, implying increased demand for housing, furniture and other wood products. A low-growth scenario will obviously imply a reduction in demand for wood and wood products. A green economy scenario will entail an increase in wood demand, especially as energy-intensive materials are substituted with more environmentally-friendly materials like wood.

A high-growth scenario will imply a slight reduction in the use of wood as a source of energy, especially as increased incomes lead to a shift to more convenient fuels, especially liquid petroleum gas (LPG) and electricity. Woodfuel consumption would be peaking around 2010 with a total estimated consumption of 386 million cubic metres and then declining marginally to about 376 million cubic metres by 2020. A low growth and stagnation scenario would necessarily imply a higher trajectory for woodfuel consumption, especially in the context of a slower pace of switch-over to alternative fuels.

The pursuit of a green path could have a mixed outcome. Energy policies discouraging consumption of non-renewables could significantly increase the demand for woodfuel. At the same time efforts to enhance efficiency in the use of woodfuel through improved devices could reduce woodfuel consumption.

Non-wood forest products

Production and processing of non-wood forest products (NWFPs) will face a mixed situation under the various scenarios. Higher incomes would imply that many subsistence products will go out of fashion, especially as the costs of collection increase. However, in the case of certain items, especially those used in beauty and health products, a surge in demand would be expected. Collection of products from the wild is expected to decline and an increasing share of supply will be sourced from non-wood products cultivated on farms.

Ecosystem services

Provision of forest-derived ecosystem services will continue to be challenging for most countries under both the high-growth and low-growth scenarios. Although a high-growth scenario implies increased willingness to pay for ecosystem services, the opportunity costs also tend to be higher in such a situation. The pursuit of rapid industrial growth would increase the demand for energy and raw materials. A construction boom is already resulting in unsustainable extraction of building materials and the use of agricultural land (including wetlands) for residential and commercial buildings on an unprecedented scale.

Almost all ecosystem services – biodiversity, watershed services, carbon sequestration, arresting land degradation and desertification – are likely to be affected adversely under the high-growth scenario – at least in the early stages. Coastal areas and islands will be particularly affected on account of intense human pressures, notwithstanding efforts to regulate development through zoning and other coastal zone management regulations. Large stretches of coastal areas are vulnerable to environmental damage stemming from sea-level rise and storm surges. Climate change-related events are predicted to affect agriculture significantly.

Under the low-growth scenario, the scale of damage to ecosystem services will be relatively small; at the same time the ability of society to mitigate adverse impacts will also be much lower.

PRIORITIES AND STRATEGIES

Considering the emerging society-forest relationship and social and ecological vulnerabilities, it is important to steer away from the high-growth and low-growth scenarios and pursue a green path that balances economic, social and environmental dimensions. Outlined below are priorities and strategies for South Asian forestry in the context of a green economy scenario.

Forestry priorities

In view of the social and ecological vulnerabilities of South Asian countries – in particular the very high level of poverty – limited resources and the current and emerging environmental problems, forestry should focus on: (a) poverty alleviation; (b) improving the natural resource base; and (c) enhancing energy and material efficiency. Poverty alleviation is particularly important on account of the unacceptably high number of poor and marginalized people and the very high proportion of poor people dependent on forests. The main elements of the above priorities are outlined below.

Poverty alleviation through improved tenure and access to land

Improving access to land for the poor – especially those who live within or adjacent to the forests – will be a key element in combating poverty. Current efforts in this direction, for example, the Indian Forest Rights Act 2006, need to be strengthened. Other key measures include:

- Large-scale employment generation through public works, especially for reforestation and afforestation, silvicultural operations, tending, fire protection, etc.

- Development of micro-, small- and medium-scale enterprises to enhance value addition and to improve the performance of those operating in the informal sector.
- Strengthening the skill sets of people, especially forest-dependent communities, building upon the traditional skills and knowledge they possess.
- Development of infrastructure and other basic amenities, especially to enhance living conditions in rural/forest areas and improve access to better education, health care, markets, etc.

Regenerate and recapitalize the forest asset base

Considering the highly depleted state of forest asset bases, South Asian countries need to increase their investments in rebuilding forest resources. A shift to a green economy would significantly increase the demand for wood and wood products as well as for ecosystem services. Large-scale investments in rebuilding forest capital could significantly increase rural employment opportunities, helping to address the problem of poverty.

Enhance efficiency in the use of energy and raw materials

Considering the resource scarcity in the subregion, enhancing efficiency in the use of resources will be another key priority. At all stages in the value chain – from production of wood and other products, transport, value addition, etc. – there is enormous scope for improving efficiency in raw material use and reducing energy requirements. Technologies already exist, but their uptake and wider application are slow on account of policy, institutional and financial constraints. With almost 90 percent of wood being used for energy production, known technologies could significantly reduce consumption, making a significant share of this available for production of more value-added products. Similarly there is substantial scope for improving the efficiency of wood industries, especially sawmilling, to improve recovery and reduce waste.

Strategies

The pursuit of the aforesaid priorities would require a two-pronged strategy, giving emphasis to: (a) reforming policies, legislation and institutions; and (b) enhancing science and technology capacities. Particular emphasis needs to be given to the following:

Reinventing public sector forestry agencies

Throughout South Asia, forests are largely under public ownership, managed by government forest departments. Although there are ongoing changes in the objectives, approaches and structures of forest departments, these changes are often extremely slow processes. Often the larger economic and social changes are taking place at a much faster pace making it extremely difficult for public forestry institutions to function effectively. Most forestry departments in the subregion require major overhauling to make them much more responsive to the changing needs of society and to provide services much more efficiently.

Strengthening the science and technology base of forestry

Considering the severe resource constraints facing South Asian countries, there is a need to reform the science and technology system to enhance resource-use and energy efficiency and to ensure that technologies are affordable and accessible. A key objective will be to empower the many players, especially local communities, farmers, forest dwellers, etc., who have remained outside the mainstream of technological changes. This should also help society to leap-frog into a green economy, enhancing livelihoods and reducing resource and energy needs, including reducing the subregion's carbon footprint. Some of the areas that require specific attention include:

- Strengthening the science of integrated land use based on a better understanding of ecosystem processes;
- Shifting to the production of green products.

1

INTRODUCTION

1.1. Background

The Asia-Pacific region as a whole is undergoing rapid social and economic change and South Asia is no exception. Such transformation has important implications for forests and forestry and, consequently, on long-term societal welfare. Larger global developments, especially climate change and shifts in economic power, will also impact forests and forestry – directly and indirectly. Often developments outside the forest sector – in other sectors within countries, the region and at the global level – are more influential than developments within the sector. Since the completion of the first Asia-Pacific Forestry Sector Outlook Study in 1998, profound changes have taken place at all levels, affecting the long-term outlook for the forest sector. It is in this context that the 21st Session of the Asia-Pacific Forestry Commission endorsed an updating of the earlier outlook study, projecting the likely changes to 2020.

Considering the diverse social, economic and environmental conditions in the Asia-Pacific region and the divergent patterns of development of forests and forestry, it was agreed to prepare outlook reports capturing changes taking place at the subregional levels. This report on South Asia is one of four subregional reports produced as part of the larger regional outlook study.

1.2. Scope and objectives

This report covers the seven countries of the South Asian subregion, namely Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. The report aims to identify the collective impacts of the main drivers, namely demographic, economic, political and institutional, technological and environmental changes on forests and forestry in the subregion to 2020. The main objectives of the study are to:

- Analyse the main trends as regards forests and forestry in South Asian countries in the context of changing society-forest relationships;
- Assess the critical driving forces and identify probable scenarios for development, indicating the situation that may emerge by 2020; and
- Identify the options available to improve the situation, including the priorities and strategies appropriate to the various scenarios that may emerge in the subregion.

Box 1.1 lists some of the important questions that are addressed in this report.

Box 1.1: Questions on the future of forests and forestry in South Asia

- What will be the future for forests in the rapidly evolving situation in South Asia?
- How will the overall changes in the socio-economic situation impact the South Asian forest sector?
- How will forest transitions unfold in South Asia?
- What are the challenges in implementing sustainable forest management in South Asia?
- How will the future demands for wood and wood products and ecosystem services from forests be met?
- What are the implications of climate change mitigation and adaptation on forests and forestry?
- Considering the underdevelopment of large areas in South Asia and the high level of poverty, what will be the role of forests and forestry in fulfilling various social objectives, in particular poverty reduction?

1.3. The process

The forestry outlook study for Asia and the Pacific has been a participatory initiative involving all the countries in the region. All countries took part by providing national outlook papers, prepared through a consultative process involving the main stakeholders. National focal points, who coordinated the preparation of the country outlook papers, participated in regional planning meetings to agree on the study process and the structure of the country outlook papers. In addition, a number of regional thematic studies on cross-cutting issues were undertaken to supplement information provided in the country outlook papers. Further, an international conference on the future of forests and forestry in the Asia-Pacific region was organized in October 2007 in Chiang Mai, Thailand, which provided substantial information on the forestry outlook for the subregion. Drawing upon the various sources of information, including a thorough survey of the literature, a draft report was prepared, which was discussed in a meeting of the outlook study's Scientific Committee meeting in June 2009. The final report has incorporated the various comments and suggestions obtained from several reviewers.

1.4. Report Structure

The report largely follows the structure of the regional outlook report (FAO 2010a). An overview of the current state of forests and forestry, focusing on forests and tree cover, forest management and policies, legislation and institutions in South Asia is provided in Chapter 2. The economic, social and environmental significance of forests, outlining the production of goods and services, is discussed in Chapter 3. Chapter 4 discusses key drivers of change, giving particular attention to overarching factors like changes in demography, economy, political and institutional environment, science and technology

capacity and local, national and global environmental concerns. Taking into account the various uncertainties in the collective impact of the critical drivers, Chapter 5 explores probable paths or scenarios of development, and their implications for the forest sector. Chapter 6 gives an indication of how the forest sector is likely to evolve by 2020. The priorities and strategies required to address the challenges of the sector, especially in the context of transition to a green economy are outlined in Chapter 7.

2

FORESTS AND FORESTRY IN SOUTH ASIA

The South Asian subregion covers a land area of 412 million hectares (or 10.4 percent of Asia and the Pacific's land area) and accounts for 42 percent of the Asia-Pacific region's population. Stretching from the Indian Ocean in the south to the Himalayas in the north, South Asia is ecologically one of the most diverse subregions. The wide variation in rainfall, temperature, altitude and soil conditions is compounded by the varied pattern of human interventions, creating an extremely diverse and complex landscape. Vegetation varies from coastal mangroves found in Bangladesh, India, Maldives, Pakistan and Sri Lanka to alpine meadows in the Himalayas in Bhutan, India, Nepal and Pakistan, and from the tropical rain forests in Bangladesh, India and Sri Lanka to the arid scrublands in India and Pakistan. Within this broad range there are several types and subtypes of forests, which are interspersed by populated stretches with a wide array of farming systems growing a variety of agricultural and horticultural crops.

2.1. Land use: An overview

Agriculture is the predominant land use in South Asia and arable land and permanent crops account for about 49 percent of the total land (Figure 2.1). Forests account for only 19 percent of the land area. Agricultural land use is largely determined by the agro-ecological conditions and population density. The proportion of arable land varies from 3 percent in Bhutan to 65 percent in Bangladesh, reflecting the variation in soil and climate, the intensity of human pressure on available land and the extent of investments in land, especially irrigation. Production of important food crops like rice and wheat is dependent on irrigation. In the vast dry zones, cultivation is primarily rain fed, limiting productivity and enhancing vulnerability to the erratic monsoon. Considering the very low per capita arable land, which varies from 1 800 square metres per person in Bhutan to 540 square metres per person in Bangladesh, the pressure on land is extremely high and this has important implications on other land uses, including forests.

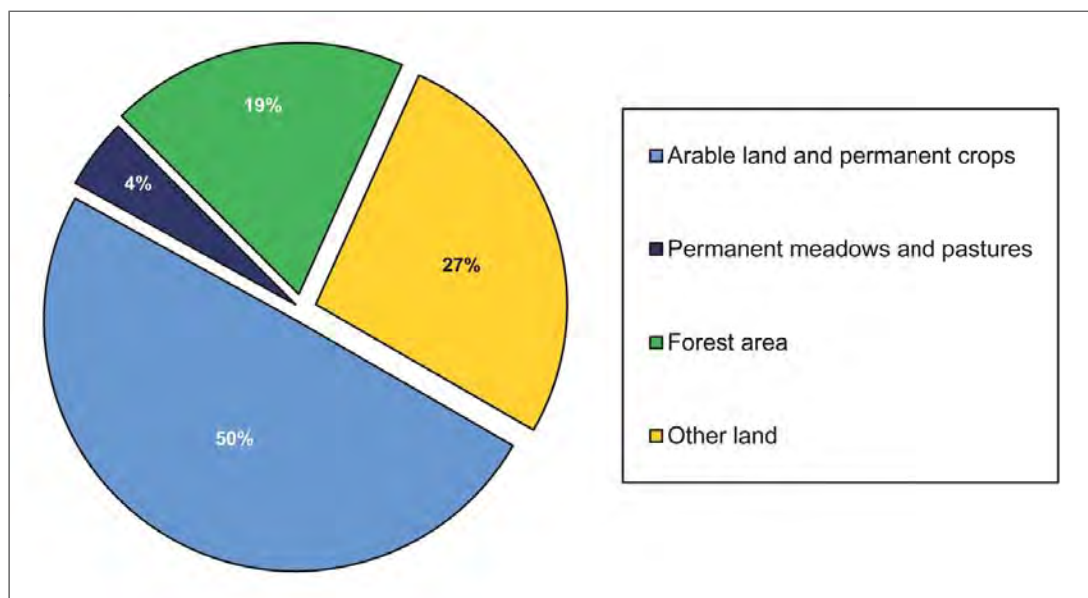


Figure 2.1: Land use in South Asia (as a percentage of the total land area in 2007)

Source: FAO (2009a)

2.2. Forests in South Asia

2.2.1. Forest types

The enormous variations in soil, temperature and rainfall have created highly diverse forest vegetation in the subregion (Table 2.1); South Asia contains almost all of the major forest types (Figure 2.2).

Table 2.1: Main forest types in South Asia

Main Type	Subtypes	Countries
Tropical forests	Tropical wet evergreen forests	Bangladesh, India and Sri Lanka
	Tropical semi-evergreen forests	Bangladesh, India and Sri Lanka
	Tropical moist deciduous forests	Bangladesh, India, Nepal and Sri Lanka
	Tropical dry deciduous forests	India, Pakistan, Sri Lanka
	Tropical thorn forests	India and Pakistan
	Littoral and swamp forests	Bangladesh, India, Maldives, Pakistan and Sri Lanka

Main Type	Subtypes	Countries
Subtropical forests	Subtropical broadleaved hill forests	Bhutan, Bangladesh, India, Nepal and Pakistan
	Subtropical pine forests	Bhutan, Bangladesh, India, Nepal and Pakistan
	Subtropical dry evergreen forests	India and Pakistan
Temperate forests	Montane wet temperate forests	India and Sri Lanka
	Himalayan moist temperate forests	Bhutan, India, Nepal and Pakistan
	Himalayan dry temperate forests	Bhutan, India, Nepal and Pakistan
Alpine and subalpine forests		Bhutan, India, Nepal and Pakistan

Source: Various APFSOS II country papers

The structure and composition of these forests differ considerably and so does their economic and ecological significance. The moist deciduous forests have been commercially the most important; they are renowned for some of the most valued species like teak (*Tectona grandis*) and sal (*Shorea robusta*), which have accounted for a significant share of industrial roundwood output. In fact, forest management in countries like Bangladesh, India and Nepal has been particularly centred on these species. Similarly, in the subtropical belt extending over Bhutan, India, Pakistan and Nepal, management in the past has focused largely on the pine forests (especially chir and blue pines). Mangroves, found in all countries excepting Bhutan and Nepal, are ecologically and economically important (Box 2.1). Located in the densely populated coastal regions, mangroves have been subjected to intense modification, especially urban development and shrimp farming.

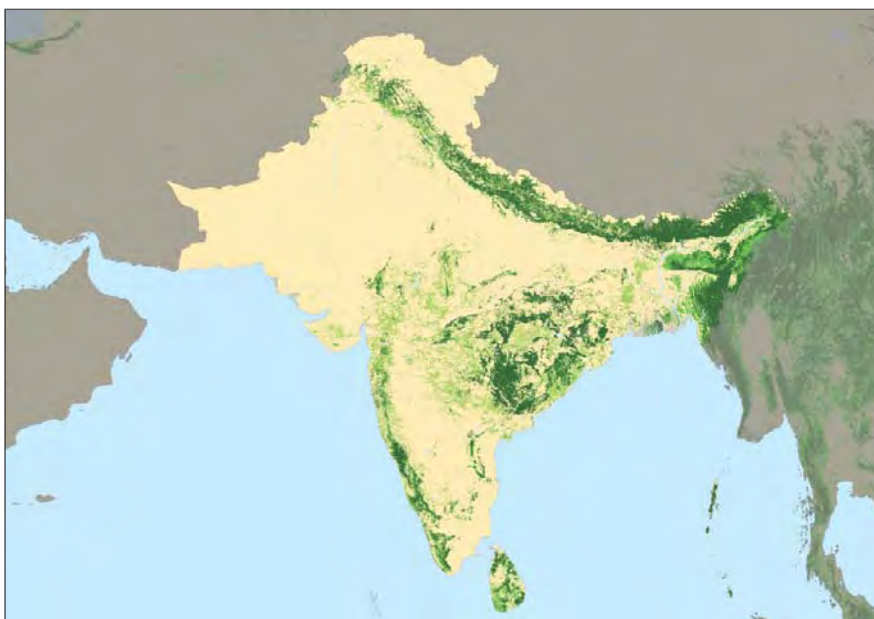


Figure 2.2: Forest cover in South Asia 2005

Box 2.1: Threats to the Sundarban mangroves

The Sundarbans, covering some 1 million hectares of land and water, is the largest contiguous block of coastal mangrove forests in the world and is part of the world's largest delta. It is formed from sediment deposits of the Ganges, Brahmaputra and Meghna rivers. Around 60 percent (577 100 hectares) of the Sundarbans are in Bangladesh; the remaining 40 percent lies in India, stretching along the Bay of Bengal.

Rich in biodiversity, the Sundarbans is vital to the livelihoods of millions of people who live on its fringes. The mangroves provide the primary source of food including fish, other sea life and honey as well as materials for crafts, timber and fuelwood. The Sundarbans also offers significant protection to coastal areas.

Portions of the Sundarbans were declared World Heritage sites by UNESCO in 1997. Ecotourism opportunities are emerging in both countries, and through increasing community involvement in management, species such as the tiger are better protected. However, despite the establishment of sanctuaries and protected areas, the Sundarbans remains seriously threatened by continued human interferences; in addition to the negative impacts of climate change, particularly the rising sea level affecting the delicate balance of salt- and freshwater. Changes in the degree of salinity will affect the species distribution in view of the differing levels of salt tolerance of various mangrove species.

Source: FAO (2009a)

2.2.2. Extent of forests

Forests (see Box 2.2 for definition) occupy about 19 percent of the total land area in South Asia, ranging from 69 percent in Bhutan to just 2 percent in Pakistan (Table 2.2). South Asia accounts for about 11 percent of the Asia-Pacific region's forests and around 2 percent of global forests. With approximately 510 square metres of per capita forest area (despite Bhutan's high figure due to the large area under forests and the low population density), the subregion's per capita forest area is the lowest in the world.

In addition to what is classified as forests, South Asia has an area of about 7.5 million hectares of land categorized as other wooded land. About 45 percent of this is in India (FAO 2010b).

Box 2.2: Definition of forests

The Global Forest Resource Assessment (FRA) 2005 defines forest as land spanning more than 0.5 hectares, with trees higher than 5 metres and a canopy cover of more than 10 percent or trees able to reach those thresholds in situ. It does not include land that is predominantly agricultural or under urban use. Other wooded land has been defined as land spanning more than 0.5 hectares with trees higher than 5 metres and a canopy cover of 5 to 10 percent, or trees able to reach these thresholds in situ, or with a combined cover of shrubs, bushes and trees above 10 percent.

Source: FAO (2004)

Table 2.2: Forest area, forests as percentage of land area and forest area per 1 000 persons, 2010

Country	Forest area (1 000 ha)	Forest area share of land (%)	Forest area per 1 000 persons (ha/1 000 persons)
Bangladesh	1 442	11	9
Bhutan	3 249	69	4 750
India	68 434	23	58
Maldives	1	3	3
Nepal	3 636	25	126
Pakistan	1 687	2	10
Sri Lanka	1 860	29	93
South Asia	80 309	19	51
Asia-Pacific	740 383	26	195
World	4 033 060	31.0	597

Source: FAO (2010b) and FAO (2011)

Due to its large size, India alone accounts for about 85 percent of the subregion's forests (Figure 2.3). Yet in view of the high population, its per capita forest area is only 0.058 hectares. With the exception of Bhutan and Nepal, all the South Asian countries have a forest area of less than 0.1 hectares per person. Comparable figures for Asia and the Pacific and the world are 0.195 hectares and 0.597 hectares respectively, suggesting severe constraints as regards land and forest area availability.

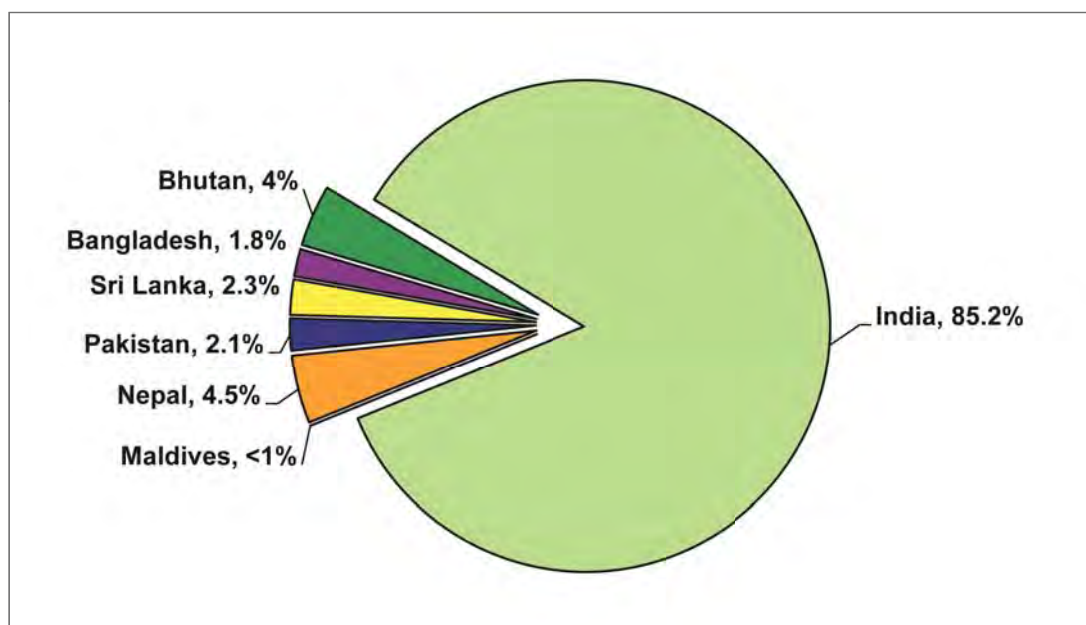


Figure 2.3: Distribution of forests in South Asia, 2010 ('000 ha)

Source: FAO (2010b)

2.2.3. Change in forest area

Evidently South Asian forests are under tremendous pressure and their conversion to alternative uses is widespread. With the exception of Bhutan, India and Maldives (which recorded no change), all countries have recorded significant forest loss since 1990 (Table 2.3).

Table 2.3: Annual change in forest area

Country/ region	1990-2000		2000-2005		2005-2010	
	1 000 ha/ yr	%	1 000 ha/ yr	%	1 000 ha/ yr	%
Bangladesh	-3	-0.18	-3	-0.18	-3	-0.18
Bhutan	11	0.34	11	0.34	11	0.34
India	145	0.22	464	0.70	145	0.21
Maldives	0	0.0	0	0.0	0	0.0
Nepal	-92	-2.09	-53	-1.39	0	0.0
Pakistan	-41	-1.76	-43	-2.11	-43	-2.37
Sri Lanka	-27	-1.20	-30	-1.47	-15	-0.77
South Asia	-7	-0.01	347	0.44	96	0.12
Asia-Pacific	-708	-0.10	2 315	0.32	494	0.07
World	-8 323	-0.20	-4 841	-0.12	-5 581	-0.14

Source: FAO (2010b)

The positive trend in forest area in South Asia is largely due to the increase recorded in Bhutan and India, with most of the increase in the latter due to afforestation/reforestation efforts. All the other countries (excluding Maldives, whose forest area is extremely low) suffered a decline in view of the growing demand for land. Agricultural expansion in response to population growth remains the most important cause of forest loss in South Asia, although this tends to vary in space and time.

Estimating the change in forest area remains problematic in most countries. Credible monitoring and assessment capacity exists only in India, where the Forest Survey of India (FSI) undertakes regular biannual assessment of the forest resources. In most other countries there is no regular system of monitoring and assessment and in some cases no forest inventory has been undertaken since the early 1990s.

2.2.4. Forest degradation

More than deforestation, degradation remains the major problem confronting South Asian forests. While the boundaries of forests may remain intact, the condition of forests in terms of productivity, measured on the basis of growing stock, is on the decline except in Bhutan and India (Table 2.4). Current forest monitoring and reporting at national levels fails to capture the less perceptible degradation. Nonetheless it is evident that the very low per capita forest area in South Asia means that what exists is subjected to intense pressures resulting in severe degradation.

Table 2.4: Growing stock volume (million m³ over bark) and growing stock (m³)

Country	Growing stock in forests per ha			Per ha growing stock in 2010 (m ³)
	1990	2000	2005	
Bangladesh	72	71	70	48
Bhutan	535	592	650	200
India	4 363	4 662	5 489	80
Nepal	856	694	647	178
Pakistan	261	211	160	95
Sri Lanka	57	47	39	21

Source: FAO (2010b)

Decline in productivity is primarily due to:

- Most forests in South Asia are subjected to intense human pressure, especially from woodfuel collection and grazing. As a very large part of woodfuel collection is in the informal sector, most remains unreported and unaccounted.
- Fire, pests and diseases are important factors affecting growing stock and productivity and most of these incidences also go unreported. More than 90 percent of forest fires in the subregion are human-induced (Benndorf and Goldammer 2006).
- Although the subregion is at the forefront of establishment of plantations, institutional constraints affect their intensive management. Due to poor management, actual productivity is very low in comparison with potential productivity.

The current level of productivity of forests in South Asia is much less than the potential productivity (see Box 2.3), largely due to underinvestment in forest management. Investments in forest management including for protection from fire, pests and diseases have remained low or are on the decline in many countries. Increased concern for provision of ecosystem services has led to scaling down of logging and in some cases a total ban. This has had some negative impacts on investments in management. While more organized extraction of wood has declined, illegal removal persists. Logging bans intended to conserve forests have not had the desired effect, especially as logging has shifted from the formal to the informal (illegal) domain.

Box 2.3: Potential output of Nepal's forests

The Current Annual Increment (CAI) of forests in Nepal is estimated at 0.6 to 1.2 cubic metres per hectare, well below the theoretical potential. The present CAI could increase five- or six-fold if productive forests are better managed. Production forests in the Terai region could reach an average productivity of 6 cubic metres per hectare, while those in the hills and mountains could reach a productivity of 3 cubic metres per hectare. Altogether Nepal's forests could produce about 21.65 million cubic metres of wood annually.

Source: Ministry of Forests and Soil Conservation, Nepal (2009)

2.2.5. Trees outside forests: An expanding resource

While forests under public ownership are facing enormous human pressures, reducing their extent and quality, there has been an increase in trees outside forests on account of increased farm tree planting (Box 2.4). Trees outside forests cover over 10 percent of the total land area of the subregion and form an important source of wood, as well as providing fruits, nuts and other NWFPs. They also have important social, cultural and environmental functions. For example, 'sacred groves' have been an integral part of the cultural life of many communities in South Asia. The beliefs and rituals linked to sacred groves have helped to conserve biodiversity, although they are under threat due to changing values and perceptions. Land value appreciation has led to their clearance for alternative uses, especially agriculture and housing. This is in contrast to the expansion of tree planting on farms, which is catering to the growing demand for wood.

Box 2.4: Trees outside forests in South Asian countries

The national Forest Sector Master Plan survey in 1992, estimated that there were 330 million trees on farms in Pakistan, equivalent to about 466 000 hectares at a density of 710 trees per hectare. According to the survey in 2004, the number of farm trees has increased to 554 million, covering an area equivalent to block plantations of 781 000 hectares (Office of the Inspector General of Forestry, Ministry of Environment, Government of Pakistan 2009).

The growing stock of trees outside forests in India is estimated at about 1.6 billion cubic metres (FSI 2009). The country's farm tree resources received a major boost on account of the social forestry programme implemented in the 1970s and 1980s.

In Bangladesh, the extent of home gardens where trees are grown is estimated at about 0.25 million hectares. Most home gardens consist of small land parcels, but account for about 88 percent of the country's wood supplies. In view of the high population density and the growth in population, the extent of home gardens is decreasing, especially on account of construction of new dwellings (Rahman 2003).

The number and extent of home gardens are steadily increasing in Sri Lanka. In 2002, the area of home gardens was estimated at 818 394 hectares, or about 14.3 percent of the land area. Several studies have highlighted the major role of home gardens in wood production, which is currently estimated at about 642 000 cubic metres. Home gardens currently account for 42 percent of Sri Lanka's wood production (Forest Department 2009).

Trees outside forests can be grouped into two broad categories. The first includes mixed tree crops found in home gardens, for example, in parts of southern India, Bangladesh and Sri Lanka (Box 2.5). In most cases, tree growth is incidental, largely stemming from the less intensive use of land. This is particularly so in areas of high precipitation. Many species grow naturally when agricultural use is less intensive. The major challenge facing traditional home gardens is their fragmentation and clearance, especially for construction of houses in the context of increasing populations and urbanization. The second category consists of intensively-managed tree crops in blocks or lines in farms with production or protection as a primary objective. Several factors have contributed to the expansion of such farm tree planting. Foremost is the increasing demand as reflected in wood price escalation. Declining profitability of agriculture, increasing cost of labour and absentee ownership have also encouraged farm tree planting. Declining wood supplies from forests have encouraged industries to source their supplies from farms and there are several examples of industry-farmer partnerships supporting farm tree planting in large tracts.

Box 2.5: Home gardens – the most important source of wood supply in Sri Lanka

Home gardens are a traditional perennial cropping system in Sri Lanka that use a wide range of trees, shrubs and herbs yielding fruits, medicines, spices and wood. Home gardens in the dry zone are low in tree density, while the Kandyan home gardens in the north are very dense and have a highly diverse species composition. The number and extent of home gardens are steadily increasing in Sri Lanka. In 2002, the area of home gardens was estimated at 818 394 hectares or about 14.3 percent of the land area. Several studies have highlighted the major role of home gardens in wood production, which is currently estimated as about 641 800 cubic metres per annum. Home gardens currently account for 42 percent of the entire wood production in the country.

Source: Sri Lanka Forest Department (2009)

Considering the subregion’s high population density and intense land-use pressures, the scope for expansion of large-scale plantations is limited. Further, the potential for natural forests to fill the wood supply gap that currently exists in many countries of South Asia is also minimal due to the increasing demand for ecosystem services from forests. Hence, across the subregion, trees outside forests will become the most important source of wood (Box 2.6). In addition, wood as a by-product of a number of horticultural crops – for example rubber and coconut – will also help to meet increasing wood demand.

Box 2.6: Home gardens and wood supply in Kerala, India

In South Asia, household trees form an indispensable source of wood, primarily catering to local demand. For example, in Kerala, India, it is estimated that home gardens account for about 75 percent of the total wood production (41.2 percent of timber production and 81.8 percent of woodfuel production). Forests accounted for less than 10 percent of the total supply in 2001 (see table).

Supply source	Volume ('000 m ³)	% of total
Home gardens	9 190	74.9
Rubber estates	1 362	11.1
Forests	1 162	9.5
Imports	547	4.5
Total supply	12 261	100.0

Source: Krishnankutty et al. (2008)

2.3. Forest management

Forest management in South Asia has a very long history although much of the attention has centred on the last 150 years since the introduction of forest management practices from Europe. Since then, considerable attention has been paid to conserving and managing forest resources for sustainable wood production. Much of the thrust has been to bring forests under public control, through constituting reserved forests, and to manage them on the principles of sustained yield, largely following the classical forestry framework developed in Europe in the nineteenth and twentieth centuries. Although most forests fulfil multiple functions, there have been efforts to make distinctions based on their primary functions (Table 2.5).

Managing forests for multiple functions continues to be challenging, especially in the context of divergent interests and the difficulties in establishing acceptable trade-offs between the competing objectives of various stakeholders. During recent decades there has been an increasing thrust on protection and conservation, resulting in the exclusion of natural forests from production and setting them aside exclusively for the provision of ecosystem services. A number of countries have introduced logging bans in natural forests, often in response to environmental disasters like floods and landslides.

2.3.1. Management of natural forests for production

Until recent times, forests under public control have been managed systematically according to the prescriptions outlined in working plans and a variety of silvicultural systems – including selective felling, uniform and coppice systems – with sustained yield as the main consideration. Detailed inventories, including regeneration, were undertaken and an annual allowable cut worked out for each forest management unit. Management also focused on postharvest operations to ensure regeneration and thus the sustainability of wood production. However, these systems of management have undergone changes and in many cases have been abandoned on account of:

- Designation of natural forests as protected areas led to drastic scaling down of all management activities related to wood production.
- Unsustainable wood removals (which led to degradation) made wood production unfeasible in many areas; particularly on account of a failure to regenerate the forests after logging. Intense biotic pressure has led to poor regeneration in vast tracts of forests, especially those close to human settlements.
- Vast tracts of forests in the subregion (some of which have a long history of systematic management) continue to be affected by conflicts making it impossible to implement any management.

Although traditional management has been broadened as sustainable forest management and complementary criteria and indicators have been developed (Box 2.7), the extent of forests that are actually managed adhering to the principles of sustainable forest management is very limited. The shift away from wood production has to some extent discouraged efforts to improve technical aspects of natural forest management, especially as an increasing share of wood is supplied from planted forests and farm trees.

Table 2.5: Designated functions of forests, 2010

Country	Forests										Share of forests under mgt plan %
	Total area	Production	Protection	Conservation	Social services*	Multiple use	Other	None or unknown			
	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	1 000 ha	
Bangladesh	1 442	713	110	247	14	358	0	0	0	60	
Bhutan	3 249	516	1 488	883	0	0	0	362	0	10	
India	68 434	17 403	10 703	19 761	0	20 567	0	0	0	45	
Maldives	1	0	0	0	0	0	0	0	0	n.a.	
Nepal	3 636	380	440	526	0	848	0	1 442	0	41	
Pakistan	1 687	540	0	216	0	931	0	0	0	n.a.	
Sri Lanka	1 860	161	19	558	0	1 122	0	0	0	n.a.	
Total South Asia	80 309	19 713	12 760	22 191	14	23 826	0	1 804	0		

* Social services as defined in FRA 2005 may include recreation, tourism, education and conservation of sites with cultural or spiritual importance.

Source: FAO (2010b)

Box 2.7: Criteria and indicators of sustainable forest management – India

In line with various international initiatives, India has attempted to define country-specific criteria and indicators for sustainable forest management. Spearheaded by the Indian Institute of Forest Management and the International Tropical Timber Organization, a consultative process has defined eight criteria and 43 indicators, emphasizing the three pillars of sustainability (ecological, economic and socio-cultural). These criteria and indicators have been incorporated into the preparation of forest working plans and the Ministry of Environment and Forests has established a cell on sustainable forest management to oversee the wider application of the criteria and indicators.

Source: Rawat et al. (2008)

Natural forests continue to be the most important source of NWFPs despite the decline in their role in wood production. With the exception of a few commercialized products (for example bamboo, rattan, sandalwood, resins, gums and beedi leaf), most collection remains unorganized and largely in the informal sector. Much of the thrust is on improving institutional arrangements for collection, often to establish public sector control especially to: (a) ensure sustainability of production; and (b) enhance the income of those engaged in their collection. As many of the more valuable NWFPs are domesticated, sourcing them from the wild is on the decline.

Innovation in forest management in the last two decades has primarily focused on social and institutional aspects, especially to involve local communities in the management of forests. Some of the notable efforts include transfer of forest management to forest user groups in Nepal and Joint Forest Management (JFM) in India. In India, the total extent of forests covered by JFM is about 22 million hectares or approximately 34 percent of forests in the country (Ministry of Environment and Forests 2009). Effectiveness of these institutional changes is extremely varied, reflecting the enormous diversity in social, economic and ecological conditions in the subregion.

2.3.2. Planted forests

Plantation forestry has a long history in South Asia, dating back to the 1850s and in the early decades much of the thrust was on enhancing the supply of high quality timber, especially species like teak. This continued till the 1960s. A declining supply of long-fibre pulpwood from natural forests (particularly bamboo) for the pulp and paper industry and technological changes in wood processing – including greater use of short-fibre pulp – led to significant expansion of pulpwood plantations, especially of Eucalyptus. Plantations were also established for their protective values, for example to improve watersheds, stabilize coastal zones and to arrest desertification. The total extent of planted forests in South Asia is about 11 million hectares, with India accounting for most of this (Table 2.6).

Table 2.6: Extent of planted forests in South Asia, ('000 ha)

Country	1990	2000	2005	2010	% of forest area (in 2010)
Bangladesh	239	271	278	237	16
Bhutan	1	2	2	3	n.s.
India*	5 716	7 167	9 486	10 211	15
Maldives	-	-	-	-	-
Nepal	40	42	43	43	1
Pakistan*	234	296	318	340	20
Sri Lanka	242	221	195	185	10
Total	6 472	7 999	10 322	11 019	14

Source: FAO (2010b)

The main species planted are: *Eucalyptus*, poplars, acacias, silver oak, casuarinas, teak and sal. Rubber (*Hevea brasiliensis*) is also another species planted widely, although its inclusion as a forest plantation species could potentially distort and create misleading statistics on changes in the extent of forest area, especially when natural forests are cleared to establish rubber plantations.

Some of the key features and issues relating to planted forests in the subregion are:

- Almost all forest plantations are within the public sector, managed by forest departments. Other than trees grown outside forests (on farms), private sector involvement in the establishment and management of plantations is very limited.
- Historically, plantation management focused on long rotation high value species for sawlogs and veneer logs and the scale of plantations was small. A rapid increase in demand for industrial roundwood, especially by the pulp and paper industry, led to accelerated planting since the 1970s; particularly of *Eucalyptus* and other fast-growing species.
- The pace of establishment of planted forests slowed significantly as clear-felling of natural forests to establish plantations became unacceptable in view of adverse impacts. Between 2005 and 2010, the annual rate of plantations established was about 139 000 hectares (over 99 percent of which is accounted for by India), down from over 465 000 hectares during 2000 to 2005. In the absence of efforts to improve productivity of plantations, the significant slackening in the pace of plantation establishment will have a negative impact on domestic wood supplies unless production from trees outside forests increases significantly.
- There are extensive degraded wastelands in South Asia, particularly in India and Pakistan. Yet there are several constraints to their afforestation, especially as many continue to be used as free access resources by local communities. Although levels of wasteland productivity are very low (largely because of unregulated use), there are instances where plantation development proposals based on public/private partnerships could not be pursued in view of opposition by local communities.

- Existing plantations could potentially meet a major share of the demand for industrial roundwood. However, currently this is not the case due to their very low productivity. Institutional and technical problems constrain improving productivity and in many cases forestry departments have not been able to manage plantations efficiently (Box 2.8). After establishment of a plantation and some maintenance in the first three years, very little attention is paid (largely on account of financial and institutional constraints), leading to degradation and thus failing to realize the full potential productivity.

Box 2.8: The challenges of plantation management in Bangladesh

Natural forests in Bangladesh are deteriorating on a continuous basis and their overall health and productivity are very poor. Plantations are a different case. Almost all the country's plantations are established under some sort of development programme, with reasonable funding for establishment and maintenance for the first three years. Once the project funding ceases, however, protection and maintenance are dependent on the limited budget of the Forest Department, often resulting in neglect. As soon as seedlings have grown into poles, they become attractive to illegal loggers. Continuous illegal logging leads to depletion; hence, plantations look 'scattered' at just 15 to 20 years of age. Thus, plantations that appear promising at the initial stage turn out to be failures.

Source: Choudhury and Hossain (2009)

Constraints of land availability and consequent competition from alternative uses limit the scope for expansion of plantations in South Asia. Improving productivity of existing plantations and farm tree planting seems to be the main option to enhance domestic wood supplies. Obviously, these require significant technological changes backed by effective policies and efficient institutions.

2.3.3. Forest certification

Although South Asian countries have a long history of scientific forest management, the extent of certified forests is extremely low in the subregion. The total certified forest area in South Asia is about 43 000 hectares, an extremely negligible proportion of the 377 million hectares of certified forests in the world. Interestingly, most of the certified area consists of rubber plantations (Box 2.9). Partly this is on account of the absence of market incentives and the preponderance of public ownership. Demand for certified wood and wood products remains very low and the willingness and ability to pay a premium for certified products remains negligible. While certification has brought some improvement in forest management, this has not translated into increased income and employment. Most of the efforts on certification have focused on the supply side (often supported by international organizations), while the demand side – the markets – remains unchanged.

Box 2.9: Forest certification in South Asia

There is little certified forest area in South Asia. What does exist – found primarily in Sri Lanka, but also in Nepal and India – is registered with the Forest Stewardship Council (FSC). Most certified area is planted forests. In India, currently only 676 hectares of plantations, all of which are rubber (*Hevea brasiliensis*), have been FSC certified. Sri Lanka has some 28 000 hectares of FSC-certified plantations, again primarily rubber. In Nepal, most FSC certification (covering a total of 14 145 hectares) has been granted to forests managed under the Federation of Community Forest User Groups Nepal (FECOFUN), whose members manage community forests and supply the international herbal, medicinal and natural products industry.

Apart from the FSC, India is the only country involved with the other leading global certification scheme, the Programme for the Endorsement of Forest Certification (PEFC). India holds two chain-of-custody (CoC) certificates and one user logo (involved in forestry industry and trade) (PEFC 2011). India is looking into developing a system for forest-based medicinal and aromatic plants certification in order to create a general standard for all steps from raw material collection to marketing. Certification efforts in South Asian countries are driven by demand from external markets, especially Europe and United States. Demand for certified timber is yet to emerge in South Asian domestic markets.

Sources: ANSAB (2005); FSC (2011); PEFC (2011)

2.3.4. Management of forests for environmental protection

An increase in the demand for ecosystem services has led to the withdrawal of more natural forests from wood production with some being set aside as protected areas. In South Asia (as of 2010), 44 percent of forests had been set aside specifically for either protection or conservation purposes (FAO 2010). Reflecting the specific situation in each country, the percentage of forest area set aside or designated as protected, varies. Bhutan has designated over 73 percent of the forest area for protective or conservation purposes, while India has designated 45 percent for these purposes. For Bhutan and India, 27 percent and 29 percent of forests respectively are located within nationally protected areas, while Pakistan has set aside 13 percent of its forest area for protective or conservation purposes (FAO 2010b). Protected land areas in all countries in the subregion appear to have reached a plateau since about 1998 (UN 2008b). Most of the less accessible areas (which are relatively less populated) have been constituted as protected areas; any further increase has to come in more densely populated areas, which will be extremely difficult, especially in the context of population growth and escalating demands for a wide array of products.

As elsewhere, protected area management in South Asia has to address a number of human issues, for example encroachment, poaching, illegal logging, unsustainable grazing and removal of NWFPs. As forest area shrinks, human-wildlife conflicts have increased significantly. The management of forests for environmental protection – both in designated as well as protected and undesignated areas – has largely focused on enforcement of legislation to: (a) prevent conversion of forests to alternative uses; and (b) protect fauna and flora from poaching and other illegal activities. Two areas that

have received particular attention are:

- Promoting local community involvement in protected area management through participatory approaches; and
- Fine-tuning management based on research, especially on ecological processes and population behaviour.

In most countries, there has been a paradigm shift in the approach to protected area management, from excluding local people to actively seeking their involvement. Largely this stems from the realization that protected areas cannot exist in the midst of poverty. This has led to the adoption of participatory approaches, enabling local communities to benefit from tourism centred on protected areas. There are several examples of successful community involvement in managing protected areas (Box 2.10). Some of these community involvement initiatives have even turned poachers into wildlife guards and tourist guides, as in the case of the Periyar Tiger Reserve in India (Kutty and Nair 2005).

Box 2.10: Community management in the Annapurna Conservation Area, Nepal

In Nepal, most protected areas have been established in accordance with a rigid policing approach. A number of problems have emerged, including displacement of local communities, poaching of protected species, and confrontation between guards and community members. To address these issues, the government has (over the past 20 years) introduced community-based approaches to protected area management, as in the Annapurna Conservation Area (ACA). In the ACA, local communities are involved in conservation planning and management, while being allowed to maintain their traditional land-use practices.

The community-based approach to management of ACA has been successful in delivering conservation benefits including increased tree species diversity, reduced poaching of wildlife and a stabilization of some wild species populations. Additional activities created to increase conservation awareness, the planting of fuelwood species and the provision of alternative energy sources have helped to achieve reductions in fuelwood collection from natural forests.

Although the success of the ACA management scheme in delivering conservation benefits can be attributed to the development and strengthening of local institutions, additional features such as the provision of expert assistance and improved infrastructure as well as the popularity of the region as a tourism destination contributed significantly.

Source: Bajracharya et al. (2005)

2.4. Forest policies, legislation and institutions

Forest policies, legislation and institutions together form the foundation of how forest resources are actually managed, although in practice extra-sectoral policies and institutions have possibly greater impacts on forests and forestry. Often the pace of change in forest policies, legislation and institutions has been slow, while those relating to other sectors are changing at a much faster pace, causing considerable inconsistencies. In view of their common colonial origin, the policies, legislation and institutions in Bangladesh, India, Pakistan and Sri Lanka are very similar, notwithstanding changes in the post independence period. The overall state of forest policies, legislation and institutions is outlined below.

2.4.1. Forest policies

Historically, forest policies in South Asia have focused on exercising control over forests with the objective of securing wood supply for public purposes, especially railways and defence. Forests were brought under government ownership through a process of reservation, extinguishing or drastically curtailing the rights of local communities. National priorities (often defined narrowly from the perspectives of the government in power) took precedence over local needs. The post independence period has seen revision of forest policies reflecting the larger changes, as indicated below:

- Although forest policies emphasized the need to increase the extent of forests (Box 2.11), the overriding demand for land on account of population growth and agricultural expansion has led to substantial diversion of forest land. More recently, the expansion of infrastructure (especially roads, irrigation and hydropower projects) and mining has become an important cause of deforestation.
- The 1980s and 1990s witnessed an important shift in forest policy objectives with environmental protection becoming a major objective. Largely, this reflects a growing awareness about the role of forests in the provision of ecosystem services and the declining extent of forests in view of their conversion to agriculture and other uses. This has even led to assigning low priority to wood production as large tracts of forests have been set aside for environmental protection.

Box 2.11: Targets for forest cover in some South Asian countries

- The 1994 Bangladesh Forest Policy envisaged an increase in the extent of forest cover to 20 percent of land area by 2020.
- Bhutan's Forest Policy of 1974 envisaged maintaining at least 60 percent of land under forests. Subsequent revisions, however, did not provide any physical target, largely because forest cover exceeded the goal.
- Indian forest policies, of both 1952 and 1988, stipulated an increase in forest area to cover one-third of the country's land area.
- The National Forest Policy of Pakistan 2007 (yet to be approved) envisages increasing the forest area to 6 percent of the land area by 2015.

Other changes in forest policies relate to the process of policy formulation and implementation, with increased emphasis on stakeholder participation in determining objectives, priorities and strategies. Such broad-based involvement is expected to improve policy implementation as diverse demands are addressed and trade-offs agreed upon during the policy formulation process, reducing potential conflicts during implementation. Innovation in the implementation of policies includes a wide array of institutional arrangements that enable participation of communities, the private sector and civil society organizations. Involvement of diverse stakeholders has broadened the objectives of management to include a wide array of economic, social and environmental objectives. Yet many challenges persist, especially when the pace of concomitant changes in institutions is slow or long-established institutions find it difficult to adapt to changes.

In recent years, an important development in this regard has been the formulation of policies on environment-related issues – for example biodiversity, climate change mitigation, protection of wildlife, desertification control, etc. – which transcend traditional sectoral boundaries. This has led to considerable fragmentation of the forestry agenda, often resulting in conflicting policies and strategies as pursued by different institutions. Although they may not explicitly deal with forests and forestry, policies relating to agriculture, industrial development, trade and rural development have significant direct and indirect impacts on forests (Box 2.12). Often what happens to forests is influenced more by these policies than by forest policies *per se*.

Box 2.12: Sri Lankan policy changes

The overarching government policy on forests and forestry and its implementation may change in the future. Since independence, the forest policy has been revised on three occasions (1953, 1980 and 1995) to be on par with the prevailing social, environmental and economic conditions. Currently, forest conservation for biodiversity and environmental protection is given the highest priority in forest policy. The present drives for increased food production, reducing the impacts of natural disasters, infrastructure development, increased timber production to reduce imports and the drive for alternative energy sources are potential areas that could lead for policy revisions in future.

Source: Sri Lanka Forest Department (2009)

2.4.2. Legislation

Although forest policies are revised regularly to take into account larger societal changes, in most cases the legislation that translates policies into action remains relatively unchanged (Yasmi et al 2010). For example, the 1927 Indian Forest Act, focused on policing of forests to exclude people, still remains the framework of forest legislation in Bangladesh, India and Pakistan. Access to, and use of, forest products are still largely regulated by the provisions in the Indian Forest Act 1927 or the rules and regulations formulated within its framework and are largely aimed to maintain strong public sector control (Box 2.13). Notwithstanding the more people-oriented policies subsequently developed, the draconian provisions of earlier forest acts are still in force. Some of the countries (and states) have amended legislation to encourage private sector involvement in tree growing. However, in several others, for example, the transport of wood produced on private lands, requires permits issued by forest departments (ostensibly intended to prevent illegal removal of timber from public forests). The transaction costs of obtaining such permits are often very high, indirectly discouraging investments in tree growing by private entrepreneurs.

Box 2.13: Forest ownership in South Asia

There has been little change in the structure of ownership of forests in South Asia, with a continuation of public sector dominance (although an increasing share of wood is produced from trees outside forests). Public ownership is justified in the context of provision of public goods, especially ecosystem services.

Changes that increase community control over forest resources are occurring as underfunded public sectors seek cost efficient ways to improve management. Community involvement in forest management has sought to provide better access to products through initiatives like JFM. Private involvement in management of forests and plantations has been very limited, largely due to the preponderance

of public ownership and the complex political and economic situation, including socialist policies that discouraged large-scale private ownership of land.

Country/ region	Public ownership			Private ownership			Other ownership		
	1990	2000	2005	1990	2000	2005	1990	2000	2005
Bangladesh	62	62	62	36	36	36	2	2	2
Bhutan	100	100	100	0	-	-	0	0	0
India	86	86	86	14	14	14	0	0	0
Maldives	-	-	-	-	-	-	-	-	-
Nepal	100	100	100	0	0	0	0	0	0
Pakistan	66	66	66	34	34	34	0	0	0
Sri Lanka	92	92	93	8	8	7	0	0	0
South Asia	86	86	86	14	14	14	0	0	0

Source: FAO (2010b)

Private ownership consists of three broad categories namely: (a) individuals; (b) business entities and institutions; and (c) local communities. Very little information is available on how private ownership is distributed between the above three groups. Available information relating to Bhutan and Bangladesh suggests no corporate ownership of forests and most of the area under private ownership is either held by individuals or under community management.

The Global Forest Resources Assessment 2010 provides some indication of who holds rights to manage public sector forests. In the case of India and Nepal (for which information is available), about one-third of public forests is managed by communities, largely on account of the implementation of JFM in India and management by forest user groups in Nepal.

One of the major problems with forestry legislation, especially as regards ownership, relates to the rights of indigenous communities and other forest dwellers. Forest reservation has led to the appropriation of traditional rights, resulting in considerable hardship for local communities. Strict interpretation of the rules and regulations makes collection of woodfuel, grazing, collection of NWFPs, etc., illegal. These rules have often fostered rent-seeking behaviour by local officials. In contrast, large-scale use of forests for mining and infrastructural projects continues unchecked in the name of 'national development'. Such double standards have led to considerable resentment in local communities, often strengthening extremist movements.

Realizing the historical injustice done to tribal communities and other forest dwellers, India enacted the Forest Rights Act in 2006, conferring ownership rights to indigenous communities and traditional forest dwellers (Box 2.14). Rules and regulations for the implementation of the Act have been approved, and *Gramsabhas* (or village bodies) have been empowered to identify eligible households. While the Act is bound to face a number of implementation problems, it is seen as a major step in redressing the marginalization of local communities.

Box 2.14: Indian Forest Rights Act, 2006

Prior to 2006, millions of forest-dwelling people in India did not have any rights to land and were subjected to the punitive provisions of forest laws and rules. At the time of constituting forest reserves under the Indian Forest Act 1927, their rights were taken away, although they continued to live in the forests. In late 2006, India enacted landmark legislation, the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act to remedy the historical injustice done and to recognize a number of rights, including rights to own and use land that the tribals and other forest dwellers have been cultivating. Discussions leading to the formulation of the legislation were acrimonious. While a large section of society agreed with the need to empower tribal people, there was also a large section opposed to the legislation on the argument that conferring land rights would have significant negative impacts on forests and wildlife.

The progress in implementation of the Forest Rights Act has been rather chequered. As of December 2010, over 3.03 million claims have been made and about 1.11 million titles have been distributed (see www.fra.org.in/fra_status.htm for current status). Progress has been hampered by litigation, inadequate institutional capacity and procedural delays. Malpractice also seems to be widespread, especially interference by vested interests and overall institutional deficiencies. On the whole, the pace of implementation is faster where civil society organizations are active. Identification of critical wildlife areas, where no rights are to be recognized, has also delayed the implementation of the Act in certain cases. A number of studies have pointed out the deficiencies in implementing the Forest Rights Act, which to some extent stems from the reluctance of established institutions to give up their control over forests.

Source: Government of India (2010)

2.4.3. Institutions

The institutional landscape in the forest sector is undergoing slow, but important, changes, largely on account of the emergence of a diverse array of players, including the private corporate sector, community organizations, farmers and civil society organizations.

(i) Public sector forestry institutions

In view of the preponderance of public ownership of forests, government departments dominate the forestry institutional landscape in South Asia. Public forestry agencies undertake the following functions:

- Protection of public forests from encroachment, illegal logging, etc.;
- Management of forest resources;
- Regulatory functions, especially relating to policy formulation, legislation and provision of oversight mechanisms that encourage better management of forest and tree resources; and

- Facilitating functions, primarily supporting other players to manage forest and tree resources.

In most of South Asia, the main thrust of forest departments has been on policing and management functions, with the former getting most attention. Although no reliable statistics are available on the extent of resources allocated to these various functions, a substantial share of human and financial resources is used for policing functions, while others tend to be neglected, except when targeted funds (often through international development assistance) are available. Nonetheless, problems of deforestation and degradation persist, especially in the context of ill-defined and conflicting rights over resources and the very limited capacity – financial, human and technical – of the forestry departments. In many cases, there is significant difference between de jure and de facto ownership, especially in areas where private or community control over land is dominant. Deforestation and degradation have been accentuated on account of changes in ownership, especially from communities to governments, coupled with weak capacities of forestry departments to manage the resources. Lack of transparency and poor governance compound the problems, encouraging unsustainable resource exploitation (Hasan 2008).

Some functional separation of different activities has been attempted within the public sector domain. For example, management of protected areas is often the responsibility of a separate wildlife department, while management of the remaining forests rests with the forest department. This is the case in Nepal and Sri Lanka. In Nepal, management of national parks is shared between the Department of National Parks and Wildlife Conservation and the Nepal Army, which has engaged 4 500 personnel to safeguard the 11 protected areas (Ministry of Forests and Soil Conservation 2009).

As forest departments have to function in the larger governmental framework, most often they have very little operational flexibility. Further, as more public funds have been allocated to other sectors (for example, health and education), even routine management functions have been affected. Establishment of commercially-focused parastatal corporations has been a major thrust to enhance operational flexibility and to improve resource mobilization. For example, most Indian states have established forest development corporations, registered under the Indian Companies Act. These corporations have taken up several functions including logging, establishment and management of plantations, trade of NWFPs, ecotourism, etc. Although their structure has enabled them to focus on technical and commercial aspects of business, their performance is extremely varied. In many cases the larger governance problems continue to undermine the performance of these institutions (Tewari 2006). In many cases their commercial focus has brought them into confrontation with local communities. There are also cases where long established public sector corporations have resisted privatization of commercial functions, often at the insistence of powerful trade unions.

Increasingly the ability of public sector forestry departments to fulfil their traditional functions is being challenged on account of:

- In the context of increasing demands for products and services and pressure from alternative uses, forest departments are finding it extremely difficult to protect forests, especially through traditional policing approaches.
- While most forest departments have substantial skills in the technical aspects of forest management, deficiencies exist as regards social and economic issues relevant to forestry.

While efforts for improvement are underway, often the pace of change lags far behind the larger social and economic changes, leading to significant performance gaps. In most cases, regulatory and policing functions dominate, while managerial and facilitation functions remain underdeveloped (Box 2.15). With the exception of countries like India, most public sector forestry agencies are facing severe financial constraints. Limited government budgets are often merely adequate to cover employee salaries, leaving few resources to undertake even routine forest management activities. Consequently there is high dependence on external support, which has created new problems, especially on sustainability and the distortion of priorities.

Box 2.15: Provincial forest departments in Pakistan

As in other countries, forest departments in Pakistan are largely focused on protection through law enforcement. They have not adopted modern technologies such as water-use efficiency, sustainable forest use and other aspects of forest management. They also lack capacities to cope with new challenges such as integration of biodiversity conservation, protected area management and carbon management. Lack of human resources, mobility and authority affect their functioning.

Source: Office of the Inspector General of Forestry, Ministry of Environment, Government of Pakistan (2009)

Historically, all the functions of forestry covering the entire value chain from wood production to processing and marketing were undertaken by the government forestry departments. This also included functions such as research, education, training and extension. Capacities in this regard vary considerably among South Asian countries. For example, India, by its large size and its better developed overall science and technology capability, has one of the largest forestry research organizations in the region, addressing a wide array of issues. Smaller countries find it difficult to maintain adequate research and education capability in view of their limited human and financial resources.

(ii) Private sector

While the private sector is very active in wood processing, its role in wood production (other than by farmers) remains limited. Rigid rules relating to wood production and transport have discouraged private sector involvement in tree growing. For example, until recently, in India the government maintained ownership of species like sandalwood, even when trees were growing on private lands (Box 2.16). These restrictive rules, which discouraged private sector initiatives, are being gradually removed. Nepal has expanded the scope of leasehold forestry (Box 2.17) to industrial investors. However, access to land remains a major issue, especially for private investors. Considering the unavailability of land, the corporate sector is increasingly entering into partnerships with farmers for tree growing, and is providing the necessary technical support and a stable market for farm-grown wood (Box 2.18). The recent boom in biofuels has been partly driven by major corporate players.

Box 2.16: Sandalwood in India

Since 1792 when it was declared a royal tree, Indian sandalwood has been under state government control. In the 1980s, rapidly increasing international demand (particularly for its oil for use in perfumes, incense and other products) stimulated widespread illegal harvesting. In reaction, the Government of India restricted the exports of the tree. As universal government ownership already had eliminated most incentives for individual and industrial growers (even on private and temple grounds), and given the country's population growth and consequent land-use changes, sandalwood resources in India quickly declined. Meanwhile, the increasingly high value of sandalwood (as supplies became fewer) resulted in even more uncontrolled illegal harvesting and smuggling.

Saplings of *Santalum album*, the finest species of sandalwood found only in India, were taken to Australia over 30 years ago. With growing global demand, Australia will start exporting sandalwood products by 2011. It is expected that India will soon become a sandalwood importer. The need to revise the laws to allow growers to utilize the natural resource effectively, to stimulate new plantings and to improve management in order to maintain a sustainable supply was clear.

Some state governments relaxed the tree ownership clause (such as in the amended Karnataka Forest Act 2001), giving control of sandalwood trees to landowners. In Karnataka, tree growers can also fell their sandalwood with the Forest Department's assistance and sell the tree to three organizations – Karnataka Soaps and Detergents Limited, Karnataka State Handicrafts Development Corporation and Karnataka State Forest Department. It is hoped that improved legislation and communication among tree owners and state forest departments will ease illegal harvesting and smuggling of the endangered tree while boosting legitimate supplies.

Source: DNA (2008)

Box 2.17: Leasehold forestry in Nepal

Leasehold forestry, with the objective of strengthening private sector participation in the management of national forests, was declared as a priority programme for poverty alleviation in 1998 by the National Planning Commission. It addresses the problems of common access to forest areas as well as reducing poverty by directly transferring assets to the poor. Land with degraded forests is leased to individuals, cooperatives, institutions and even commercial enterprises on a 40-year lease. The agreements are automatically renewable given satisfactory performance, with exclusive rights to the produce from the forests.

Leasehold forestry has achieved much success. The International Fund for Agricultural Development (IFAD) funded a Hills Leasehold Forestry and Fodder Development Project (HLFFDP) from 1992 to 2003 in ten districts of Nepal, which initiated direct transfers of land assets including degraded forests to the poor. The project handed over 8 500 hectares of degraded forest land to more than 13 000 households and over 2 000 leasehold forestry groups. When IFAD support ended, the government increased the district coverage from ten to 26 districts. In 2005, the Leasehold Forestry and Livestock Programme (also funded by IFAD), a continuation of the HLFFDP, began in 22 districts. By the end of 2008, a total of 3 799 Leasehold Forest Groups had been formed; the programme is expected to continue to 2013.

Sources: Sharma (2009); Forestry Nepal (2008); Forests Monitor (2006); IFAD (2003)

Box 2.18: Industry-farmer partnership in pulpwood production in India

One of the most successful examples of industry-farmer partnership is that of ITC Ltd and farmers in the state of Andhra Pradesh. Eighty percent of pulpwood supply to the company comes from farm woodlots. ITC Ltd has promoted over 80 000 hectares of clonal tree planting involving nearly 35 000 farmers. Clonal technology has increased the mean annual increment of woodlots by five- to nine-fold, helping to reduce growing rotations from seven years to four years. Average net income to farmers from clonal plantations is estimated at about US\$625/year/hectare under rain fed conditions and about US\$1 000/hectare/year under irrigated conditions.

Source: Kulkarni (2008)

The South Asian forest sector is dominated by small- and medium-sized industrial enterprises, for example making matchboxes, paper, furniture, construction wood items, sports goods, packing cases and other wooden articles. The rural industry segment depends upon farm and non-farm production of raw material, a large proportion of which comes from forest products. Social forestry has become very important in ensuring sustained supplies of wood and non-wood products for craft, artisan and value

addition segments of rural industries. Small and medium enterprises face enormous challenges, including those of secure tenure, improved market access, enhancing skills and access to technology, and more importantly, entrepreneurship to deal with the increasing complexity of enterprise management in a rapidly globalizing environment.

(iii) Farmers

Throughout South Asia farmers have become major players in the forest sector and as indicated earlier, farm-grown trees are now the major source of wood supply, especially in Bangladesh, India, Pakistan and Sri Lanka. The main factors contributing to the increased involvement of farmers in tree growing are:

- Secure tenure;
- Increasing local demand and hence increasing price for wood, especially in the context of declining supplies from forests;
- Reduced profitability of agriculture, especially in the context of increasing input prices (especially labour) and consequent shift to low input tree cropping;
- Diversification of income through non-agricultural activities and reduced dependence on agriculture; and
- Absentee ownership that often encourages landowners to maintain control through less labour-intensive tree farming.

A diverse array of support mechanisms has promoted farm tree planting. These include technical advice and supply of seedlings under various public-funded programmes, and financial and technical support through joint initiatives of financing institutions and industries (for example outgrower schemes). However, the removal of restrictive rules and regulations, especially related to transport of wood and wood products, remains the most critical factor.

Despite the relatively small size of most farms, there are indications of continued expansion of tree growing by farmers. New institutional arrangements, for example cooperatives, are supporting farm tree planting. Tree growers' cooperative societies and the National Tree Growers' Cooperative Federation in India are extending a wide array of technical support to farmers. In a number of states in India, tree growers' cooperatives have also taken up afforestation and reforestation of public land, involving the landless.

(iv) Local communities

Community forestry has a long history in South Asia, although later government dominance, especially through forest reservation, led to the marginalization of community management. In view of the inability of public forestry organizations to protect and manage forests sustainably, community involvement is being rediscovered. Nepal has made pioneering efforts in this regard through the establishment of forest user groups, which have become an effective grassroots-level mechanism for sustainable management of forests and other resources (Box 2.19).

Box 2.19: Community forestry in Nepal

Community forestry in Nepal emerged in the mid-1970s and led to the devolution of management and user rights to forest user groups, largely as a shift in the approach to conserve the hill forests in the context of degradation and deforestation. During the last three decades Nepal's community forestry programme has evolved in terms of coverage and institutional innovation, supported through appropriate changes in policies and legislation. Substantial international support has also helped to sustain community participation. Community forestry appears to have stood the test of time in contributing to the welfare of the rural population. This has been facilitated by changes in policies and legislation which empowered the local communities. As of April 2009, 1.6 million households, or one-third of the country's population, are participating in community forestry, directly managing more than 1 million hectares or more than one-fourth of the country's forest area. As in the case of all institutional arrangements there are both highly successful and less successful forest user groups. FECOFUN has become a powerful institution helping forest user groups to improve their efficacy, sustainability and equity.

Source: Ojha et al. (2009)

JFM in India is another model of community participation. Unlike forest user groups, there is much more involvement of state forest departments in regulating the functions of communities under JFM. In many cases the real power still remains with the forest departments. Currently about 22 million hectares are under JFM, covering about 125 000 villages and involving about 104 700 JFM committees (Ministry of Environment and Forests Government of India 2009). There are several studies that outline the successes and failures of the JFM system (e.g., Murali et al. 2003). Although the evolution of JFM is a major institutional innovation in forest management in India, the commitment of state governments and forest departments to implement JFM varies across the country. Forest protection committees at the local level are seldom given the power to develop management plans or to exercise executive and legal functions. They do not enjoy legal status and often are liable to be disbanded by the forest department (Damodaran and Engel 2003). There is growing concern that JFM is losing steam, especially as donor assistance declines and many of the problems like benefit sharing, domination of forest protection committees by forest department officials, etc., remain unresolved (Box 2.20).

Box 2.20: JFM in India – facing an existential crisis?

Although JFM has gained considerable momentum since 1990 and covers almost a third of the forests in India – contributing significantly to improving the condition of forests – there is increasing concern about its long-term viability on account of several problems. The foremost of these relates to benefit sharing. The rules and regulations in this regard are unclear and there is increasing dissatisfaction among

participating communities that their efforts to protect and manage forests have not been taken into account while apportioning benefits, a major share of which is appropriated by the forestry departments. Although attractive benefit-sharing terms were proposed in the initial stages, in practice these have not been adhered to; undermining interest in JFM. A third of the forest protection committees are reported to be functioning poorly. There are also questions about the legal status of benefit-sharing arrangements under JFM, especially in the context of the statutory rights given under the Forest Rights Act 2006 and the Panchayat Extension to Scheduled Areas Act 1996.

Source: Bera et al. (2011)

(v) *Civil society organizations*

Civil society, including national and international non-governmental organizations (NGOs), has been playing a key role in influencing the South Asian forest agenda. The exact number of NGOs is not available, but certainly there has been a significant increase in their numbers during the last two decades. Some are largely local, working at the grassroots level focused on a narrow agenda, while others are large, highly networked national and international NGOs addressing a broad range of economic, social and environmental issues. Improved access to information on account of technological development, increased demands for openness in governance (for example the Right to Information Act in India) and the proliferation of mass communication media have created a favourable environment for civil society intervention. A number of civil society organizations have well-established research units that undertake problem-focused studies, supporting their advocacy and action initiatives.

Although the environment in which civil society organizations are able to function differs, all the indications are that civil society will continue to play an important role in the sphere of environment and natural resource management, including forestry. For example, NGOs are playing a major role in India addressing the rights of tribal communities, especially in the implementation of the Forest Rights Act. Similarly, NGOs have played a key role in the implementation of community forestry in Nepal. There are several such examples from other countries in South Asia.

3

ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPORTANCE OF FORESTS

Forests in South Asia provide a wide range of goods and services, contributing to people's economic, social as well as environmental well-being. These goods and services include wood and wood products and a wide array of ecosystem services. Forests and trees also have considerable cultural and religious significance. Considering the limited resources and the diversity of demands, establishment of trade-offs between competing demands remains the most important challenge. This chapter provides an overview of general trends in production and consumption of the main products and services from forests and trees in the subregion.

3.1. Production, trade and consumption of wood and wood products

Notwithstanding changes in forest management priorities giving thrust to the provision of ecosystem services, wood production continues to remain an important function of forestry in most countries in the subregion. However, the absence of reliable statistics remains a major problem in gaining an accurate picture of trends in wood production and consumption. A substantial share of wood production, processing and trade is in the informal sector, which goes unaccounted in official statistics. As wood production from public forests declines in view of logging bans and other restrictions and the share of production from farms increases, official statistics for wood production become less reliable in view of the difficulties in capturing farm wood production. Hence, the following analysis, which is based on official statistics, at best provides a broad indication of the general trends in wood product production, trade and consumption.

3.1.1. Industrial roundwood

Industrial roundwood is produced from three sources: (a) natural forests; (b) plantations; and (c) trees outside forests, especially from farms. No disaggregated statistics on production from these different sources are available.

Logging bans in most countries have led to an evident decline in recorded production

from natural forests and to some extent this may have been compensated for by increased production from trees outside forests, especially farm forestry. As no systematic information is collected on the quantity of farm forestry production, the nature of shifts cannot be assessed accurately.

In 2009, South Asia's industrial roundwood production was estimated at about 29 million cubic metres or about 10 percent of the Asia-Pacific region's total production. Industrial roundwood production increased till about 1990 and then remained relatively unchanged until recently (Figure 3.1). On the other hand, consumption has increased continuously, widening the gap between domestic production and consumption, and obviously increasing the dependence on imports. Nonetheless, with per capita annual consumption of just 0.019 cubic metres, South Asia's consumption is extremely low in comparison with regional and global per capita consumption.

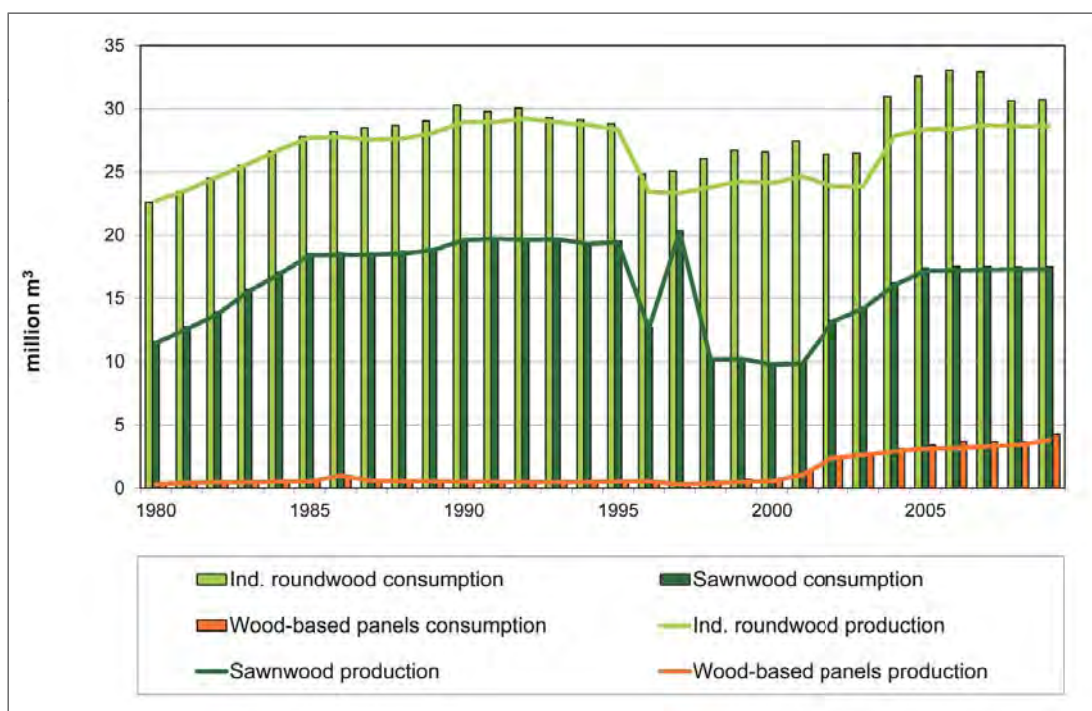


Figure 3.1: Trends in the production and consumption of industrial roundwood, sawnwood and wood-based panels in South Asia, 1990-2009

Sources: Jonsson and Whiteman (2008) and FAOSTAT

On account of its large size and population, India accounts for over 80 percent of the production and consumption of industrial roundwood. It also accounts for most of the deficit in industrial roundwood production, largely due to increasing demand and the stagnation in production. The most populated countries, namely Bangladesh, India and Pakistan, are where industrial roundwood production is short of the demand. Nepal's production is slightly higher than consumption and some of this is exported to India.

3.1.2. Sawnwood

Production of sawnwood declined from about 20 million to 18 million cubic metres between 1990 and 2009 (Figure 3.1). This possibly reflects data inaccuracies, rather than a real decline. Preponderance of small and medium enterprises operating in the informal sector makes it difficult to collect accurate data on production. A decline in sawnwood production also reflects the change in the source of industrial wood supply. Traditionally a major share of industrial roundwood produced from natural forests went to the production of sawnwood. As the source of supply changes to planted forests and farm woodlots, there is a shift in end use to panel products and pulp.

Unlike industrial roundwood production, South Asia's share in the sawnwood production of the Asia-Pacific region is relatively high, accounting for about 22 percent of the region's share in 2009. India accounts for over 85 percent of this. On the whole, production and consumption are more or less balanced and import volumes are relatively minor.

3.1.3. Wood-based panels

Wood-based panel production has increased significantly in South Asia since 2000, increasing from about 0.5 million cubic metres in 2000 to about 3.8 million cubic metres in 2009 (Figure 3.1), with India, Pakistan and Sri Lanka accounting for the entire increase. Mainly newly installed or expanded medium density fibreboard (MDF) production capacities caused this increase in the region. During the same period, consumption of wood-based panels also increased from 0.7 million cubic metres to 3.8 million cubic metres and the deficit has been met through increased imports.

As in the case of sawnwood, the wood-based panels sector is dominated by small and medium enterprises, many of which are unregistered making it difficult to provide a realistic picture of production.

3.1.4. Paper and paperboard

The paper and paperboard sector has witnessed consistent growth in production, increasing from about 2.6 million tonnes in 1990 to about 8.9 million tonnes in 2009 (Figure 3.2). As in the case of other wood products, this increase is almost entirely accounted for by India and Pakistan. Consumption of paper and paperboard has increased at a much faster pace, increasing from 2.9 million tonnes to about 11.0 million tonnes during the same period, making the subregion more dependent on imports. As literacy increases, and the trade and other services sectors grow, demand for paper and paper products is expected to increase.

Traditionally, pulp and paper production in South Asia was mostly undertaken using agricultural residues and long-fibre material like bamboo. However, expansion of the pulp and paper industry led to the use of alternative material, especially short fibres from hardwood plantations like Eucalyptus. Raw material supply has thus become a major issue in the development of the pulp and paper sector. There has been a significant

expansion of pulp and waste paper imports in view of the limitations in enhancing the domestic supply of pulpwood. Alternatively, industries are promoting farm tree planting, providing technical and financial assistance.

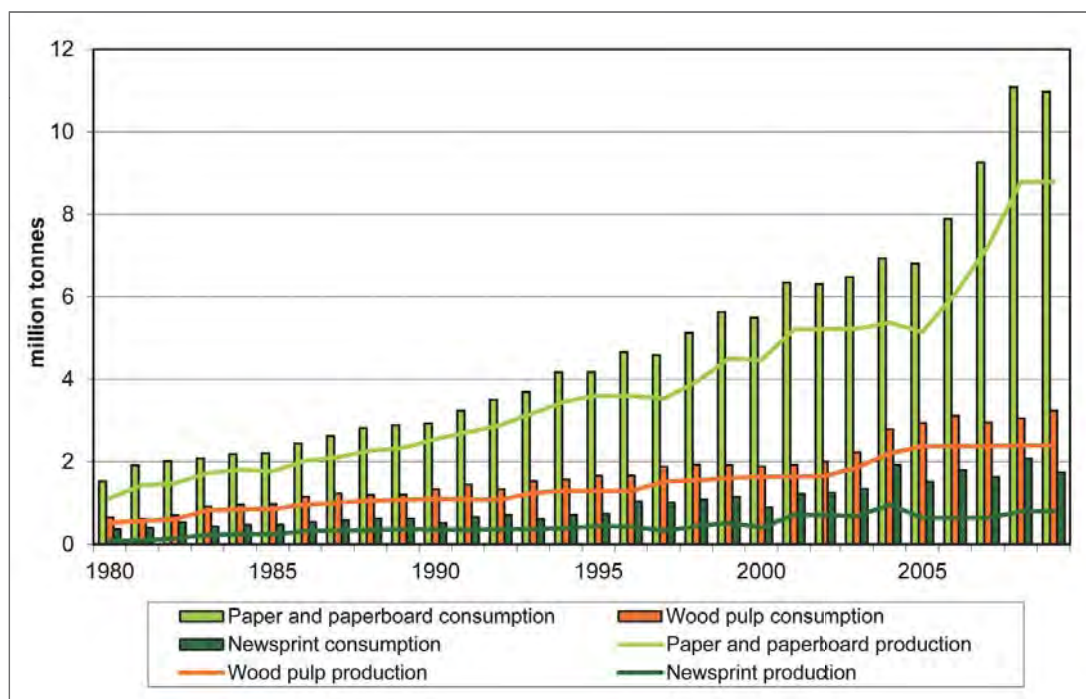


Figure 3.2: Trends in the production and consumption of paper and paperboard, pulp for paper and newsprint in South Asia, 1990-2009

Source: Jonsson and Whiteman (2008) and FAOSTAT

3.1.5. Wood and wood product trade

As indicated earlier, consumption is much higher than production for several products; hence, the increased dependence on imports, particularly of industrial roundwood and paper and paper products (Figure 3.3). Slashing of import tariffs in the context of adoption of liberalized trade policies in the post1995 period led to a surge in imports, especially in view of constraints in increasing domestic production.

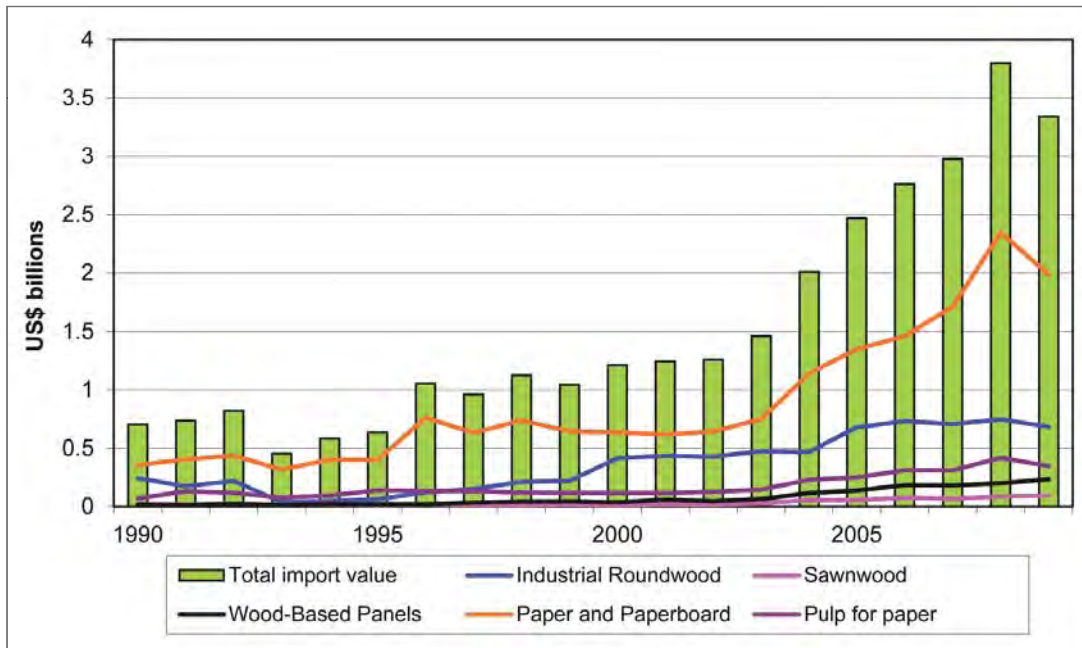


Figure 3.3: Value of South Asia's imports, 1990-2009

Source: FAOSTAT – ForesSTAT

Major importers in the subregion, like India, are sourcing their wood and wood products from various countries (Box 3.1). The value of primary wood and wood product imports by South Asia rose from about US\$700 million in 1990 to over US\$3 billion in 2009, with India accounting for most of this. South Asia has also increased wood and wood product exports (Figure 3.4), especially of paper and paperboard and wood-based panels, but this is relatively insignificant in comparison with the value of imports.

Box 3.1: Import of wood and wood products by India

In South Asia, India is the largest importer of wood and wood products, followed by Pakistan. In 2006, industrial roundwood imports to South Asia mainly came from Malaysia, as well as from China, New Zealand, Myanmar, Papua New Guinea, Gabon and Côte d'Ivoire. Paper and paperboard imports came from the Republic of Korea and Indonesia, as well as from Australia, China and Germany. Pulp originated from Indonesia and Canada. Most coniferous sawnwood arrived from the Russian Federation, while the non-coniferous variety arrived from Guyana. Wood-based panels were imported primarily from Malaysia, China, Turkey and Thailand.

Source: FAOSTAT – ForesSTAT

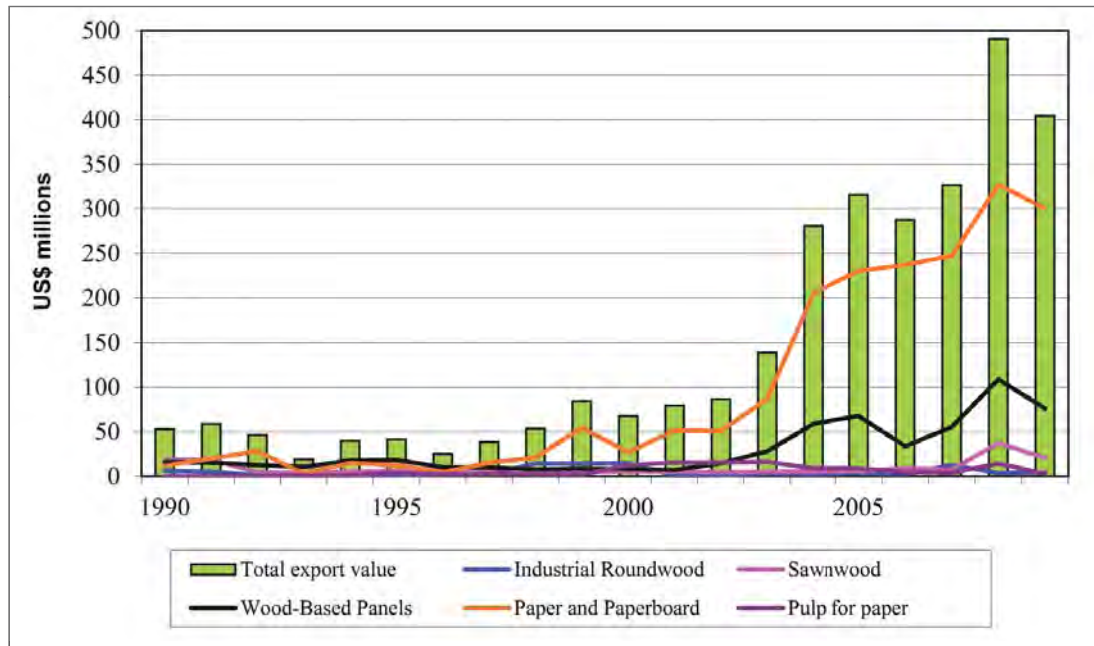


Figure 3.4: Value of South Asian wood exports, 1990-2009

Source: FAOSTAT – ForesSTAT

3.1.6. Low levels of consumption

South Asian consumption of wood and wood products as reported in the official statistics remains extremely low in comparison with regional and global consumption figures (Figure 3.5). For example, industrial roundwood consumption is just 0.019 cubic metres per person, while the regional and global consumption figures are 4 times and 10 times higher, respectively. In the case of industrial roundwood, the relatively low consumption could be partly explained by unrecorded consumption. South Asia's paper and paperboard consumption is less than one-eighth and one-eleventh of the regional and global consumption levels.

These low levels of consumption are indicative of:

- Low effective demand on account of low incomes; and
- Low levels of supply in view of the limited resources.

Evidently as incomes increase, demand is likely to increase substantially and this would require a significant increase in investments to improve domestic production and/or substantial increase in imports. There has been very little discussion at the policy level on the implications of the various options giving due attention to the emerging potential of wood as a more energy-efficient raw material with a wide array of uses.

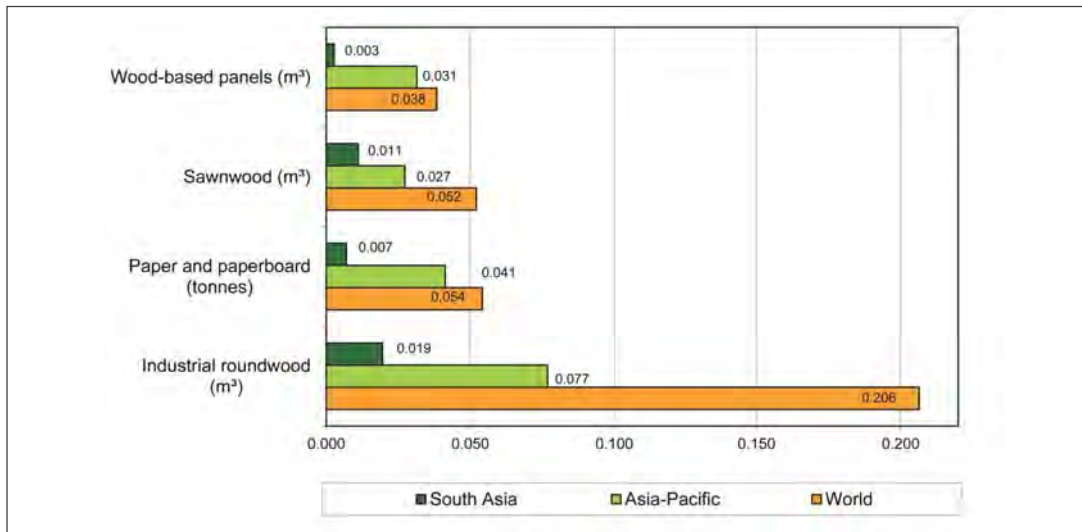


Figure 3.5: Wood and wood product consumption per capita, 2009

Source: FAOSTAT

3.1.7. Secondary wood products

Secondary wood products, especially wooden furniture, are another product group whose production, trade and consumption have registered significant increases. The value of trade has risen slowly and steadily from 1990 to 2000. Since 2000, there has been exponential growth with an eightfold increase in export values reaching US\$426 million by 2007. The value of imports also increased by over sevenfold from US\$50 million in 2000 to US\$370 million in 2007 (Figure 3.6) with India accounting for most of this.

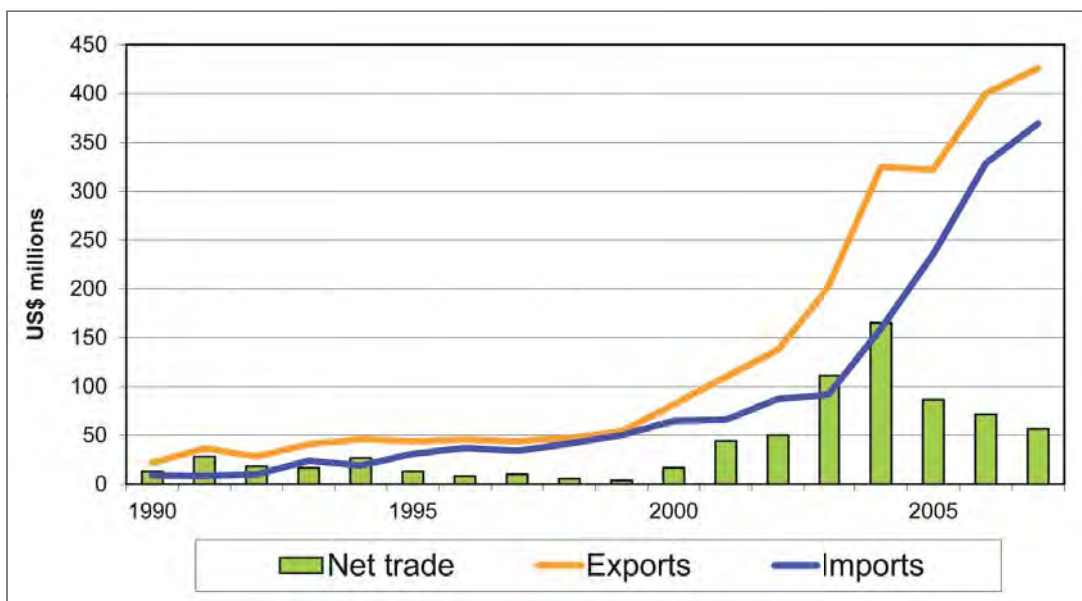


Figure 3.6: Total value of secondary wood product exports and imports in South Asia, 1990-2007

Source: FAO (2009a)

However, South Asia's share of the trade in secondary wood products in the Asia-Pacific region as a whole remains extremely low in comparison with the other subregions (Figure 3.7). East and Southeast Asia together account for 97 percent of exports, largely due to the dominant role played by China, Viet Nam, Indonesia and Malaysia. South Asia's share in the entire Asia-Pacific region is approximately 2 percent. Similarly, South Asia is also not a major importing subregion – in 2007 it accounted for about 4 percent of the value of imports into the region as a whole – largely due to South Asia's relatively low incomes.

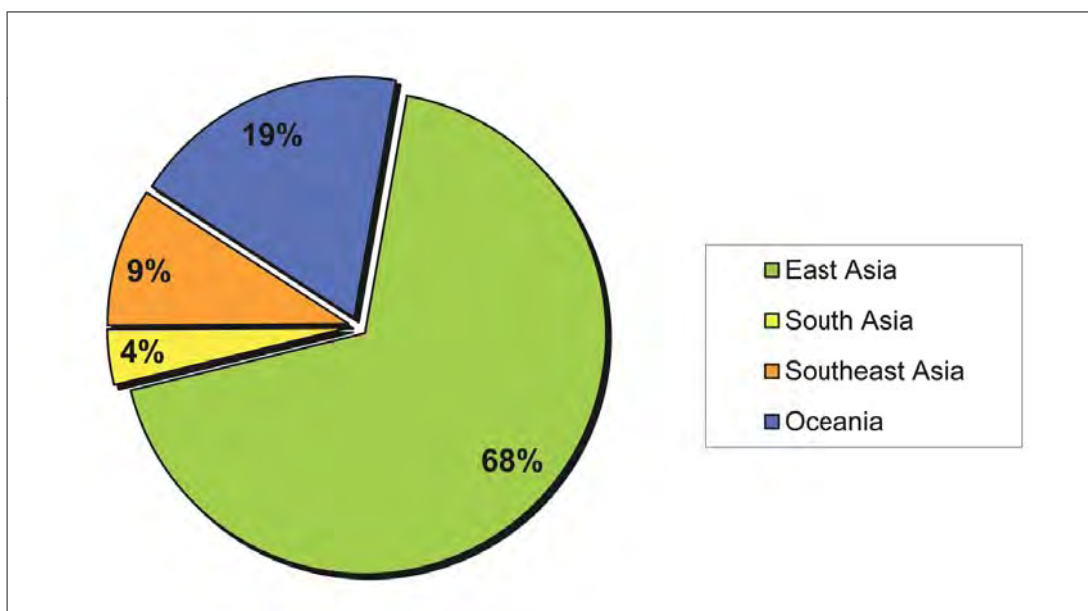
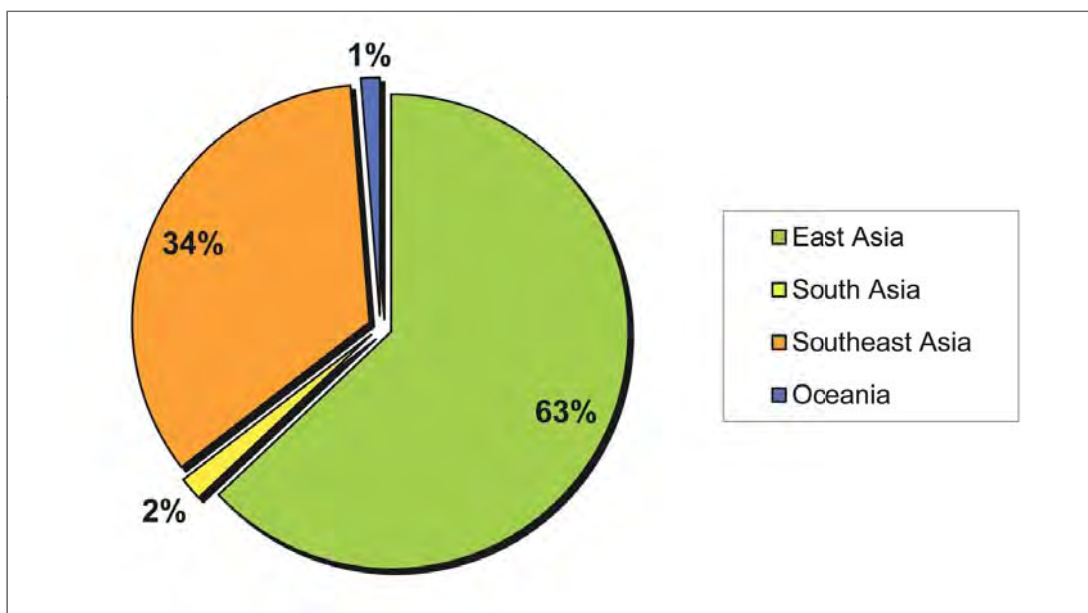


Figure 3.7: Share of the value of exports (A) and imports (B) of secondary wood products in the Asia-Pacific region, 2007

Source: FAO (2009a)

3.2. Wood industry in South Asia

The wood industry in South Asia has historically been dominated by small and medium enterprises (Box 3.2) largely catering to local markets and drawing upon nearby resources. The absence of product standardization has led to market fragmentation,

Box 3.2: An overview of forest industries in India

Although there has been some expansion of large-scale production, especially in the pulp and paper and wood-based panel sectors, small-scale enterprises account for a major share of the production as indicated in the table below. This is representative of the preponderance of small scale production in the South Asian wood industry.

Industry	Number of units	Share of small-scale units (% of production)
Sawmills	23 000	82
Matches	12 000	82
Wood-based panels	506	80-90
Pulp, paper and & paperboard	406	66
Doors and wood-working plants	98	95

It is also important to note that these figures show only the registered units; the actual number of industrial units including those in the unorganized sector is manifold.

Source: Ministry of Environment and Forests Government of India (2009)

providing little incentive to scale up production. Dependence on public forests and fluctuating wood supplies have also discouraged investments in modern large-scale production. Only recently has there been some change, especially in the case of pulp and paper units, which are forced to compete with large-scale producers. Some of the major challenges confronting the wood industry in the region include:

- Preponderance of small and medium enterprises with a significant share operating in the informal/unorganized sector;
- Most enterprises have limited access to credit, markets and technology, and have very limited capital to upgrade technology and improve efficiency of production; and
- Access to raw material remains a major constraint, although this is changing in the context of the increasing supply from farm woodlots and, in some areas, imports.

While growth in the production and consumption of conventional wood products (like sawnwood, panel products and paper and paperboard) may be slow, South Asian countries have several traditional wood products that cater to niche markets within and outside the subregion. Of particular significance are the sporting goods industry (especially producing hockey sticks and cricket bats in Pakistan) and the hand-made paper industry in Nepal (Box 3.3). There is also a rapidly growing furniture industry in some of the South Asian countries. In fact, South Asian countries may have a competitive advantage in producing labour-intensive products based on traditional skills.

Box 3.3: Hand-made paper production in Nepal

Hand-made paper production in Nepal based on lokta (*Daphne bhoulia* and *Daphne papyracea*) is a typical example of the changing fortunes of small-scale forestry enterprises. Production of lokta paper has a long history dating back to at least the twelfth century in catering to demands for government records and religious texts. Decline of the industry started in the 1930s due to imported hand-made paper products from Tibet. This decline was accentuated by imports of machine-made paper from India and by the 1960s the lokta paper industry in Nepal had almost collapsed. Traditional knowledge of lokta paper production was limited to only a few families in Baglung and Parbat districts.

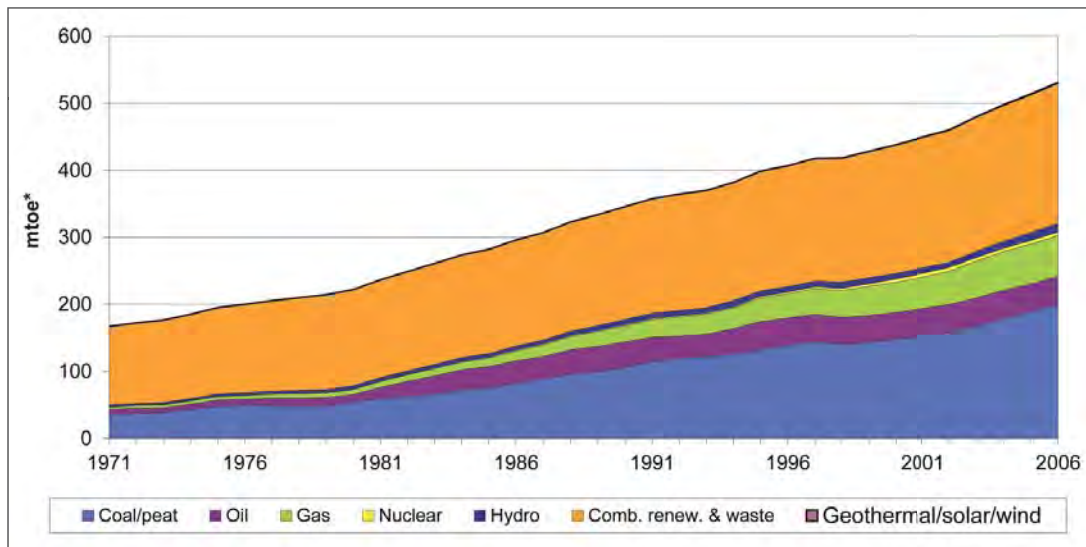
The growth of tourism in the 1970s led to the revival of the industry and this brought to light the potential for tapping into international markets. Favourable market opportunities were taken advantage of by the United Nations Children's Fund (UNICEF)/Agricultural Development Bank/Nepal (ADB/N) project *Community Development through the Production of Handmade Paper Project* launched in 1980. The project facilitated the creation of global value chains including the creation of a craft products factory with the final products ending up as UNICEF greeting cards and other handicrafts. There are about 600 hand-made paper units in the country including 377 registered units. Of these, 175 produce about 30 000 tonnes of paper products. The industry is currently growing at an annual rate of 16 percent and paper making is now carried out in 16 hill districts. Community involvement in the management of forests through forest user groups has strengthened the resource base and a number of forest user groups have taken up hand-made paper production. Presently the industry is reported to employ about 28 000 persons, of whom over 70 percent are women.

Source: Ministry of Environment and Forests Government of India (2009)

3.3. Wood energy

Energy consumption in South Asia has grown significantly during the last few decades in the context of the growth in population and income. The use of commercial energy (fossil fuels and central grid electricity) is increasing by about 10 percent annually in South Asia. In view of the limited domestic supply of fossil fuels, there is considerable

reliance on imports. Energy imports represented almost 30 percent of total energy consumption (primarily crude oil) in South Asia in 2006 (IEA 2008) and the share of imports continues to increase. Domestic energy production is also increasing, primarily from combined renewable and waste materials (including biomass) and coal (Figure 3.8).



*Million tonnes oil equivalent (mtoe); for equivalency rates see www.iea.org.

Figure 3.8: Energy production in South Asia, 1970-2006

Source: IEA (2008)

3.3.1. Dependence on wood energy

Although the share of commercial energy has increased, wood remains the primary energy source in rural areas of the subregion with almost 90 percent of roundwood being used as woodfuel. In 2009, the subregion accounted for about 21 percent of global production and consumption of woodfuel. In many countries the dependence on wood as energy is extremely high, for example:

- Woodfuel accounted for 78 percent of total energy consumption in Nepal in 2004/2005 (WECS 2006);
- Woodfuel made up 59 percent of Bhutan's total energy consumption in 2005, all of which was harvested from natural forests (DOE 2005);
- In Sri Lanka, 48 percent of energy needs is supplied by fuelwood (Forest Department 2009); and
- In India in 2002, woodfuel provided 50 percent of rural energy demand.

The consumption of woodfuel in the subregion has increased since 1990, with India and Pakistan accounting for most of the increase (Figure 3.9). However the high level of unreported harvesting makes official estimates on woodfuel consumption a fairly inaccurate indicator of the actual situation.

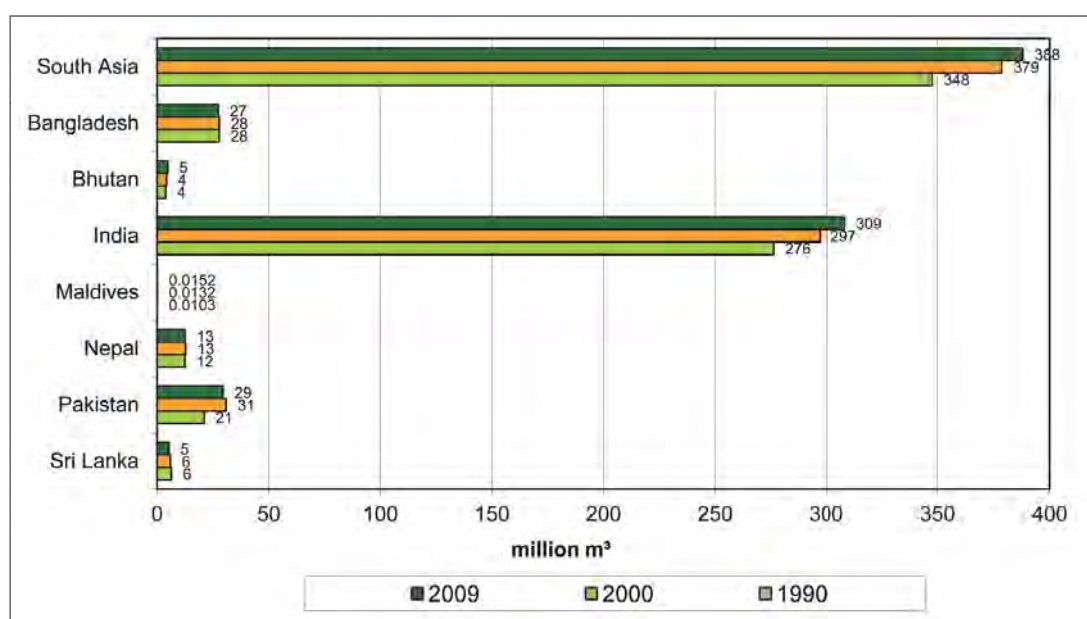


Figure 3.9: Woodfuel consumption in South Asia, 1990-2009 (in million m³)

Source: FAOSTAT – ForesSTAT

3.3.2. Projection comparisons: APFSOS I and APFSOS II

Table 3.1 provides a comparison of the trends and projections of woodfuel production and consumption for various years. Evidently, the rate of growth of woodfuel consumption has been much less than what was visualized in the first Asia-Pacific Forestry Sector Outlook Study (FAO 1998), possibly on account of substitution with commercial fuels, especially LPG and other more convenient fuels, particularly in urban areas (see Box 3.4).

Table 3.1: Projected and revised woodfuel consumption (million m³) in South Asia

Year	APFSOS I projections/actual	Revised projections
1994	364	364
2000	n.a.	378
2005	n.a.	382
2010	495	386

Sources: FAO (1998); Jonsson and Whiteman (2008)

Box 3.4: Impact of urbanization on woodfuel use

A recent study in India examined how urbanization is impacting energy use, and in particular use of wood as fuel and the consequent impacts on forests. The study noted that in 1995, 30 and 78 percent of urban and rural households in the country respectively used wood for cooking. By 2005, the percentage of urban households using fuelwood had decreased to 22 percent (with a shift towards LPG). The transition occurred across almost all income classes. Meanwhile in rural areas in the country, the use of LPG increased fourfold, although 75 percent of households still rely on fuelwood. The increased pace of urbanization and improved access to more convenient fuels will lead to Indian households climbing the energy ladder. An important benefit of the transition is the reduction in exposure to indoor air pollution. Implications of reduced fuelwood demand on forest cover are uncertain, but some data suggest that urbanization has the potential to accelerate forest transition, resulting in an increase in forest cover.

However, the energy ladder will become much steeper in the context of the recent decision by the Government of India to do away with the subsidized LPG supply. Implications of this on biomass demand are not fully understood. Certainly fuel switching will become more costly, encouraging continued use of woodfuel and other biomass.

Source: DeFries and Pandey (2009)

3.3.3. Issues in wood energy use

Several studies are available on the economic, social and ecological aspects of wood energy production and consumption. High dependence on wood energy is largely due to its low cost and accessibility. In addition to domestic cooking and heating, woodfuel is used extensively in a number of rural enterprises, especially for drying agricultural products, curing of tea leaves, production of bricks, etc. Some of the major issues relating to the use of wood as a source of energy include:

- *Sustainability of production:* Although there is very little evidence to show that woodfuel use by local communities is resulting in deforestation, there are instances of increased forest degradation on account of intensive, but unorganized, woodfuel collection. This is especially the case for forests and woodlands close to urban centres. However, initiatives like JFM and forest user groups are helping to streamline woodfuel collection to prevent degradation.
- *Efficiency in woodfuel use:* A number of factors influence wood energy efficiency. Traditional use of three-stone stoves often yields less than 10 percent of the potential energy. There have been innumerable efforts to develop and popularize improved stoves that enhance energy efficiency, thus reducing wood demand significantly.
- *Environmental and health problems:* There are growing concerns about the health and environmental problems related to traditional household use of woodfuel. In addition to increasing carbon emissions, smoke inhalation is a major cause of

respiratory illness of rural women (Smith 2009). Increased awareness of this problem will be a major factor encouraging fuel switching or the use of improved devices which could enhance energy efficiency.

As wood supply from natural forests declines, sources of wood energy will be highly diversified through farm-grown trees including rubber wood, coconut residues, etc., all of which will become important sources of biomass energy. This is already the case in countries including Bangladesh, Maldives, Sri Lanka (Box 3.5) and parts of India and Pakistan.

Box 3.5: Potential woodfuel supply in Sri Lanka

Considering the high biomass productivity and the preponderance of farming systems that have trees as an integral component, Sri Lanka's potential wood supply exceeds current requirements. A study undertaken by the Regional Wood Energy Development Programme in 2002 estimated the potential supply of fuelwood in Sri Lanka as indicated in the table.

Potential sources for fuelwood supply in Sri Lanka

Source	Quantity ('000 tonnes)
Sustainable supply from natural forests	1 463
Sustainable supply from forest plantations	485
Agricultural lands	5 273
Other wooded lands (e.g. home gardens)	239
Wood waste from forest clearing	1 529
Total potential supply	8 963
Primary wood energy requirement	5 681

These sources have not been fully utilized due to the non-extraction of timber and fuelwood from natural forests. There is no shortage of fuelwood in Sri Lanka, as it is substituted with other types of biomass fuel.

Source: Forest Department (2009)

3.3.4. Developments in biofuel production

As the price of commercial energy soared during 2007 and 2008, there have been significant efforts to identify alternative sources of energy. In addition to traditional renewable sources like solar energy, wind power and biogas, there have also been significant efforts to expand the area under oil-yielding tree crops like *Jatropha curcus* and *Pongamia pinnata*. *Jatropha* has been a favoured oil-yielding crop on account of its ability to grow on marginal lands. India has one of the most ambitious *Jatropha*

biodiesel production programmes backed by policies and regulations mandating the blending ratio of biodiesel (Box 3.6).

Box 3.6: Biofuel initiatives in India

India has set a voluntary bioenergy target for transport fuels, with proposed blending mandates of 5-10 percent for ethanol and 20 percent for biodiesel. The Indian Government is supporting the development of an ethanol industry based on sugar cane. Production is set to increase to 3.6 billion litres by 2017, while consumption is projected to reach 3.2 billion litres (FAO 2008a).

India has also seen some investment directed towards stimulating biodiesel production from *Jatropha curcas* on marginal lands. In fact, the largest-scale venture globally in *Jatropha* planting is the Indian Government's 'National Mission' to cultivate the species on 400 000 hectares between 2003 and 2007 (Gonsalves 2006). By 2011-2012, the goal is to replace 20 percent of diesel consumption with biodiesel produced from *Jatropha*, cultivated on around 10 million hectares of wasteland and creating 5 million year-round jobs (Gonsalves 2006; Francis *et al.* 2005).

However, there is growing scepticism about large-scale *Jatropha*-based biodiesel production. It has been promoted as a crop highly suitable for degraded lands. But there are indications that under degraded conditions productivity will be very low. Allocating more productive land will obviously be at the cost of food production. Evidently the hype about *Jatropha* as a 'wonder tree' is losing its lustre (Kant and Wu 2011).

As biofuels cater to a very different market segment – mainly transportation fuel – they may not alleviate the traditional wood energy problem. On the other hand, diversion of low productivity marginal lands could have a negative impact on those dependent on such lands (Friends of the Earth Europe 2009), especially the landless poor, by curtailing access to traditional woodfuel supplies. Commercial viability of *Jatropha* cultivation is another important issue and depends on fossil fuel prices and productivity. Although *Jatropha* is able to grow in degraded areas, oil yield varies considerably depending on soil and moisture conditions and without a high level of inputs cultivation in large tracts may not be commercially viable. Volatility of oil prices compounds the problem.

3.4. Summary overview of the wood products sector

Some of the general conclusions emerging from the analysis are:

A very high proportion of wood produced is used as woodfuel (Table 3.2). For most South Asian countries woodfuel accounts for more than 90 percent of total roundwood production. For Asia and the Pacific the share of woodfuel is about 74 percent, while globally this is about 57 percent. Low incomes and limited availability and access to commercial fuels are the main reasons for the high share of wood being used as energy.

Table 3.2: Share of different components of roundwood production

Product	Share in total roundwood production, 2009 (%)		
	South Asia	Asia-Pacific	World
Sawlogs and veneer logs	6.3	15.5	23.7
Pulpwood, round and split	0.2	4.4	15.2
Other industrial roundwood	0.4	6.3	4.4
Woodfuel	93.1	73.8	56.7
Total	100.0	100.0	100.0

Source: FAOSTAT – ForesSTAT

- Industrial roundwood supply has remained relatively unchanged because of logging bans and the withdrawal of natural forests from production on account of increasing demand for ecosystem services. This reduction in wood production is offset partly by planted forests and farm woodlots and by increased imports. Getting a complete picture is, however, difficult on account of unrecorded production and consumption. This could be substantial in view of the dominance of production by the informal sector.
- Although there have been significant increases in the trade of wood and wood products, South Asia's share in the regional trade of wood and wood products remains relatively low. The total value of imports of primary wood products in 2009 for South Asia was over US\$3 billion, or 6.5 percent of the total value of imports of all Asia-Pacific countries. Similarly, South Asia exported primary wood products worth about US\$320 million, amounting to just about 1 percent of exports from the Asia-Pacific region.
- The low level of current consumption is largely a reflection of low purchasing power. In the context of anticipated income growth, demand for wood products could increase significantly. South Asia could potentially become a major market for wood and wood products if trends in income growth continue unabated. In addition to increases in imports of primary wood products, South Asia's imports of secondary wood products and secondary paper products are increasing.

Notwithstanding that South Asia accounts for 23 percent of the global population, the level of production and consumption of various wood products is very low (Table 3.3).

Table 3.3: South Asia's share of global and regional production and consumption, 1990-2009

Product	% of world production			% of Asia-Pacific production			% of world consumption			% of Asia-Pacific consumption		
	1990	2000	2009	1990	2000	2009	1990	2000	2009	1990	2000	2009
Industrial roundwood	1.7	1.5	2.0	13.4	9.1	10.4	1.8	1.7	2.2	11.7	9.2	10.3
Sawnwood	4.2	2.5	4.7	19.0	15.3	19.0	4.2	2.5	4.9	17.1	12.9	16.6
Wood-based panels	0.4	0.3	1.4	3.1	1.1	2.9	0.4	0.4	1.6	2.2	1.4	3.5
Paper and paperboard	1.1	1.4	2.4	4.4	8.4	5.5	1.2	1.7	3.0	4.8	8.8	6.9
Pulp for paper	1.3	1.6	2.4	6.6	7.5	9.9	1.4	1.7	3.0	6.2	6.3	9.0

Source: FAOSTAT – ForesSTAT

3.5. Non-wood forest products

3.5.1. Overview

NWFs have received increasing attention in South Asia in view of their economic and social importance. The latter largely comes from their role in meeting the subsistence needs of rural communities. A wide array of products – food, medicine, cultural artefacts, etc. – is used by local communities or provide income through their collection and sale (Box 3.7). For many forest-dwelling communities who have very limited livelihood opportunities, NWFs help to fill gaps in income and consumption and often are important safety nets to tide over periods and seasons of low agricultural production and consequent low incomes.

Box 3.7: Non-wood forest products in Pakistan

Non-wood forest products constitute an important forest resource in Pakistan and include medicinal, aromatic and other economic plants, mushrooms, honey, wild fruits, resin, mazri palm (*Nannorrhops ritcheana*) and 'chilgoza' pine nuts (*Pinus gerardiana*). Unfortunately, NWFs did not receive attention in earlier forest policies and most management focused mainly on production and sale of timber. There are ten leading *dawakhana*s (small industries making herbal drugs) in Pakistan, which are using about 20 million rupees worth of medicinal herbs per year. The 50 000 registered tabibs/hakims dispense traditional herbal medicines.

Source: Office of the Inspector General of Forestry, Ministry of Environment, Government of Pakistan (2009)

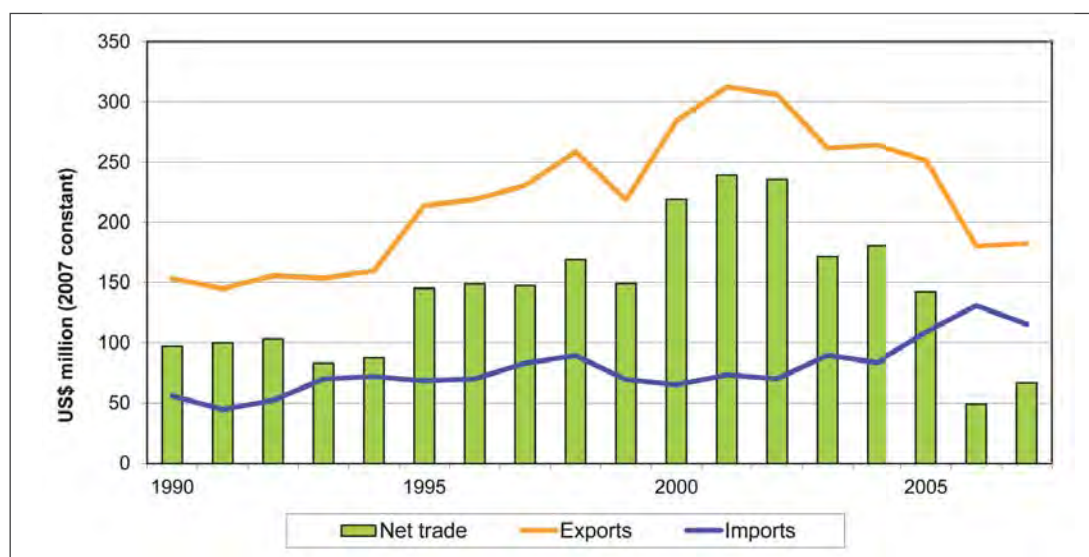
While social and economic development is reducing the importance of some subsistence products, several others are gaining popularity on account of the discovery of new uses, thanks to developments in processing and marketing innovations. A number of NWFPs are collected and traded nationally and internationally. However, the reported value of NWFPs is often extremely low, in view of the preponderance of subsistence use and the dominance of the informal sector. Absence of reliable information implies that actual values could be significantly higher than what is reported. This is particularly the case with medicinal plants (Box 3.8)

Box 3.8: NWFPs and traditional medicine in South Asia

In India, Sri Lanka, Bhutan and Nepal, the traditional health care systems of *Ayurveda*, *Siddha* and Unani, based mostly on medicinal herbs, are extremely important in domestic and international markets. In India, Nepal and Bhutan, several thousand tonnes of NWFPs (mainly medicinal and aromatic plants) worth millions of dollars are extracted and traded each year (FAO 2009b). For example, Nepal trades about 20 000 tonnes of medicinal and aromatic plants worth US\$18-20 million per year with about 90 percent exported mainly to India in raw form. India's domestic *Ayurveda* industry market size has increased rapidly in recent years and was expected to rise to US\$970 million by 2010; the export potential of *Ayurveda* is currently valued at over US\$2 billion (ASSOCHAM 2008).

Source: Hansda (2009)

Although consistent data at aggregate levels remain deficient, the reported value of NWFP exports is still significant (Figure 3.10). Figure 3.10 includes primarily unprocessed and a few semi-processed items, but many traditional NWFP items, especially processed items, are omitted. In view of the high level of under-reporting and illegal trade, the total value of trade could be substantially higher than what is reported.



* Based on UN Comtrade data and Harmonized System (HS) 2002.

Figure 3.10: South Asian non-wood forest products trade, 1990-2007

Source: Lebedys (2008)

3.5.2. Management of non-wood forest products

Traditionally, most NWFPs (with the exception of a few commercially important items) received very little attention in forest management. Until recently, they were referred to as 'minor forest products' in forestry terminology, signifying the limited importance assigned to them. Much of the focus was on regulating NWFP harvesting to ensure sustainability. Two broad patterns of management prevailed:

- Products that are commercially valuable and grow extensively received considerable attention and their management was systematized through harvesting rules giving due attention to sustainability. Such products include bamboo, rattan, and pine resin. Other products originating from different sources with very diverse approaches for collection were lumped together. In most cases, rights to collect them were given as short-term leases to traders who, in turn, employed local communities (in particular forest-dwelling tribes) to collect the products. Considering the diversity of products and the highly dispersed nature of collection, there was seldom any monitoring of the collection process. Traders and those who ultimately bought the products controlled the market and this often led to overharvesting and exploitation of local communities (especially as communities had little access to information on end uses and market prices).
- As some of these products became commercially important, there were more concerted efforts to manage them, especially as regards their harvesting. Increased government intervention was justified on ecological (to curtail overexploitation) and social grounds (to enhance incomes of collectors and to curtail their exploitation by intermediaries). The collection and trade of some NWFPs were nationalized with the purported objectives of improving management and ensuring fair remuneration of the collectors. Such public sector takeovers often coincided with the increasing value of specific NWFPs and declining incomes of forestry departments from wood production (especially on account of the scaling down of logging from natural forests).

While such public intervention did have some positive impacts on a small number of products (especially those collected in large quantities as in the case of *beedi* leaves in India), many remained outside the purview of such management, leading to significant illegal collection and trade (Box 3.9). Increasing cross-border demand combined with absence of information on the operation of value chains and free access to resources has led to a significant increase in illegal collection, resulting in depletion.

Box 3.9: Unsustainable trade depleting traditional Asian medicines

India, the hub of the wild-harvested medicinal plant industry in the Asia Pacific region, dominates manufacturing and consumption of medicinal plants. Yet key species have declined in the wild due to massive overcollection to satisfy domestic and foreign medicinal markets.

A recent study commissioned by the German Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN) focuses on plant species of conservation concern protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). Species include Himalayan Yew (*Taxus wallichiana*), Elephant's Foot (*Dioscorea deltoidea*) and Indian Snakeroot (*Rauwolfia serpentina*).

Many of the medicinal plants traded in India are collected in alpine areas of Nepal, where the harvest of species such as Jatamansi and Kutki runs to hundreds of tonnes of rhizomes, gathered by thousands of collectors who supply intermediaries and large-scale wholesalers in Nepal and India. A wide range of trade networks ensures that these products reach markets in major consuming countries like China and India.

Source: TRAFFIC (2008)

Continued demand and uncertain supply from the wild led to the domestication of some commercially important products. High demand for health and beauty products (especially medicinal plants) and food items (especially mushrooms) has also led to more organized cultivation of some products on farms. Increasingly, NWFP-processing companies are supporting cultivation of important items including through the provision of technical support.

The demand for environmentally friendly 'natural' products, particularly in Europe and the United States, is rapidly rising. This has created an opportunity for NWFP producers to enter international markets through certification of NWFP collection and/or production (Box 3.10).

Box 3.10: NWFP certification in Nepal and India

In many places in South Asia, the collection and sale of NWFPs represent an important source of income for local villagers. However, villagers typically sell their goods to intermediaries who encourage them to harvest as much as they can while paying them poorly for their products.

In response to depletion of wild supplies and the effects this can have in terms of exacerbating poverty, a Nepalese initiative was created to achieve certification of NWFPs. The Forest Stewardship Council (FSC) certification in Nepal required extensive capacity building of stakeholders. In 2005, the Rainforest Alliance/SmartWood awarded FSC certification to FECOFUN, whose members practise

sustainable harvesting of the local non-wood resources and then process and market products including hand-made (*lokta*) paper, essential oils, Ayurvedic medicines and supplements, herbal teas, pain relief oil, personal care products and raw herbs. According to FECOFUN, 23 species of NWFPs have been certified by FSC and Nepal is the first country in Asia and the fifth in the world to obtain an FSC certificate for NWFPs.

Lack of proper management and few manufacturing companies in the country remain major drawbacks in Nepal. However, in a one-year period, ten Nepalese companies and Aveda Corporation, a United States-based manufacturer of NWFPs, have joined the Asia Network for Sustainable Agriculture and Bio Resources (ANSAB) to manufacture certified products.

More recently, India has undertaken a project to evaluate the potential for forest-based medicinal and aromatic plants certification and to develop a general standard for all steps from raw material collection to marketing. Sponsored by the National Medicinal Plant Board, the Medicinal and Aromatic Plants (MAP) Certification Standard Development project covers four Indian states where MAP resources are socio-economically important and a suitable institutional framework is in place: Madhya Pradesh, Chhattisgarh, Orissa and Uttarakhand. MAP certification is a new and still emerging concept in India.

Sources: FAO (2006); Bhattacharya et al. (2008)

3.5.3. Development of new processes and products

A major step forward in recent years is the development of new products adopting a variety of new technologies. Technological advancements have generated major changes in processes and products. For example, bamboo, which was considered as 'poor man's timber' is being transformed into several high value-added products (Table 3.5).

Table 3.5: Overview of the emerging bamboo-processing industry and its characteristics

Processing/ industry category	Type of products	Characteristics
<i>Low-value and bulk processing industries</i>	Charcoal	Industry achieves only marginally higher levels of income as compared to those selling unprocessed raw bamboo culms. Industry can utilize low quality bamboo and leftovers and processing waste from other industries and various species.

Processing/ industry category	Type of products	Characteristics
<i>Medium-value processing industries</i>	Chopsticks, bamboo shoots and vinegar, juice, mat boards, handicrafts	Industries are able to use lower grades of bamboo than in the premium processing industry.
<i>Premium processing industries</i>	Bamboo flooring and ceiling, high quality yarns and fabric	Premium quality bamboo is required. Industry's rate of economic impact is twice the level of the medium-value processors and five times the level of the low-value and bulk processors.

Source: Hansda (2009)

3.5.4. New institutions

Widespread interest in NWFPs has led to the proliferation of institutions involved in and supporting their production, processing and marketing. For example, cooperatives and similar arrangements that empower growers and collectors (Box 3.11) have emerged as important players. With improved access to information these institutions are able to provide timely advice to producers and, more importantly, help to scale up activities, overcoming some of the inherent problems of small-scale production.

Box 3.11: Scaling up through collective action in India

Established in 2000, the Gram Mooligai Company Limited (GMCL) united collectors and cultivators of medicinal plants in the Amul region. The pioneering concept of GMCL has been promoted by Foundation for Revitalization of Local Health Traditions (FRLHT) (www.frlht.org.in/), an NGO based in Southern India.

GMCL is a member-owned cooperative with shareholding restricted to MAP gatherers and cultivators. As of 2007, its shares are held by 30 groups representing 1 200 members. GMCL has collaborated with 13 NGOs in seven states whereby local community-based organizations are involved in upscaling operations. GMCL has linked with 1 200 retail outlets and several large pharmaceutical companies to market its processed raw herbs and finished products, mainly honey. The company's turnover rose from US\$0.06 million in 2001 to 2002 to US\$ 0.17 million in 2003 to 2004, growth close to an average rate of 30 percent annually. This is very high performance as compared to the general forest-based industry.

GMCL has been attempting to link producer groups with national and global value chains, thereby ensuring fair prices. The mostly female members have learned simple value-addition techniques like sorting, grading, packing and sustainable harvesting along with aspects of trade. GMCL has also launched a set of herbal remedies for primary health care under the brand name 'Village Herbs'.

The Tribal Cooperative Marketing Development Federation of India Limited (tribal.nic.in/trifed1.html) established by Government of India in 1987 is another cooperative arrangement focused on improving the situation of tribal communities through procurement and marketing of over 80 NWFP items.

Source: Hansda (2009)

3.5.5. Non-wood forest products: The changing landscape

The landscape for NWFPs is undergoing very rapid transformation. Subsistence collection of most NWFPs is on the decline, while many of the important items collected from the wild will be domesticated and cultivated more systematically. While some of the problems related to unsustainable collection from the wild still persist, there is much more concerted action on different fronts – collection, cultivation, processing and marketing – than there was a few years ago. In many cases supply chains have been reinvented and what were largely local have expanded to become national and global value chains. New institutions have emerged providing a wide range of support with increasing effort to strengthen the small producers and collectors. Many of the products that were primarily collected from the wild are now being cultivated in farms. Processing technologies have changed and several new products have emerged in the market. This is particularly the case for health and beauty products, whose demand is increasing in the context of the burgeoning middle class.

3.6. Ecosystem services

Forests in South Asia provide a variety of ecosystem services, which for a long time were taken for granted. These include conservation of biological diversity, protection of watersheds, arresting land degradation and desertification, and climate change mitigation. Recreation, in particular in the form of ecotourism, has emerged as another important ecosystem service centred on forests and unspoiled landscapes. Supply of these services is largely determined by the condition and quality of forests and the nature of interventions. As the extent of forests decline and more forests are degraded – most often to enhance the production of goods – there is a decline in the services provided by forests. At the same time, as society becomes more conscious about the importance of ecosystem services, there is greater demand for such services. This section provides an overview of key issues in the provision of various ecosystem services.

3.6.1. Conservation of biodiversity

In view of its enormous differences in climate, soil, latitude and altitude, South Asia is one of the most biodiverse regions in the world. Three of the world's 34 biodiversity hotspots – areas that are biodiversity rich, yet threatened – are in the South Asia subregion (Box 3.12). All countries in the subregion are signatories to the Convention on

Biological Diversity. Most countries have also prepared national biodiversity strategies and/or action plans, although these are not often adequately mainstreamed into the activities of the sectors whose actions impact biodiversity protection.

Box 3.12: Biodiversity hotspots in South Asia

The Western Ghats and Sri Lanka. Due to the yearly monsoons and high elevation, the Western Ghats of southern India and Sri Lanka are home to a rich collection of endemic plants and animals. Sri Lanka alone is home to up to 140 endemic species of amphibians. The region is a haven for species like the Asian elephant, tiger, lion-tailed macaque and over 140 native freshwater fish species. The forests of the Western Ghats and Sri Lanka have been severely impacted by demands for timber and agricultural land. Forest fragmentation remains a major problem in this zone in view of the high pressure from human populations. Only a fraction of the original vegetation remains intact.

The Himalaya. Stretching over 3 000 kilometres across northern Pakistan, Nepal, Bhutan and the northwestern and northeastern states of India, the diverse Himalaya hotspot is home to multiple ecosystems offering habitats to keystone species like tigers, elephants, rhinos and wild water buffalo. Much of the area is tree covered, including subtropical broadleaf forests along the foothills, temperate broadleaf forests in the mid-hills, mixed conifer and conifer forests in the higher hills, and alpine meadows above the treeline. Despite their remoteness and inaccessibility, legal and illegal logging, mining and agriculture have led to severe degradation. As the Himalaya is a geologically recent formation, it is extremely fragile and subjected to severe erosion. Increasing population adds to the fragility of Himalayan ecosystems. The shrinking of the Himalayan glaciers on account of climate change could have serious impacts on various ecosystems within and outside the region.

Indo-Burma. This hotspot stretches from eastern Bangladesh and northeastern India, across southern China and Southeast Asia to Malaysia. The Indo-Burma hotspot contains a great diversity of forest ecosystems, including mixed wet and dry evergreen, deciduous and montane forests and lowland floodplain swamps and mangroves. This hotspot is home to about 7 000 endemic plant species, as well as 18 bird species and 25 mammalian species that are endemic and threatened. The current population density in this area is 134 persons per square kilometre which is expected to increase as the area becomes more accessible on account of the investments in infrastructure; conservation of biodiversity will remain extremely challenging.

Source: Conservation International (2007)

3.6.2. Protected areas

As the pressures on forests increase, the establishment of protected areas has been the main strategy for conservation of biological diversity. In general these are relatively undisturbed biomes with a high proportion of natural vegetation and associated fauna. The proportion of land area set aside as protected area varies among countries (Table 3.6).

Table 3.6: Extent of terrestrial protected areas in South Asia (IUCN categories I to IV)

Country	Area ('000 ha)	% of land area
Bangladesh	67	1
Bhutan	1 241	26
India	14 721	5
Maldives	n.a	n.a
Nepal	992	7
Pakistan	3 335	4
Sri Lanka	567	9
Total South Asia	20 923	5

Source: UN (2008a)

While there was a spurt in the establishment of protected areas in the 1980s and 1990s, in recent times this has slowed considerably (Figure 3.11). In view of the high subregional population density the scope for further expansion is very limited. Despite ongoing efforts to improve management of protected areas, countries face a number of challenges as outlined below:

- **Fragmentation of protected areas.** Considering high population densities, the size of protected areas is often insufficient to support viable populations of especially mammalian species and in many cases protected areas are interspersed with human settlements. Efforts to establish corridors enabling uninterrupted movement of animal populations often require resettlement of villages and this poses enormous problems.
- **Infrastructure development.** Irrigation and hydroelectric projects, roads and new urban development are major threats to many protected areas. Some protected areas are rich in minerals and other resources and as demands for these products increase, the opportunity costs of retaining the protected areas increase, and many governments are unable to establish appropriate levels of trade-off between conservation and development. Most often the 'development' option gets precedence and is justified on the pretext of development of backward areas and poverty alleviation.
- **Human wildlife conflicts.** Along the fringes of protected areas, where populations rise causing consequent increases in demands for agricultural land, grazing and woodfuel, human-wildlife conflicts are also increasing (Box 3.13). This has often led to considerable antagonism by local communities towards protected areas and there have been instances of animals being killed (especially Asiatic lions, tigers and leopards) by those living on the fringes of protected areas.

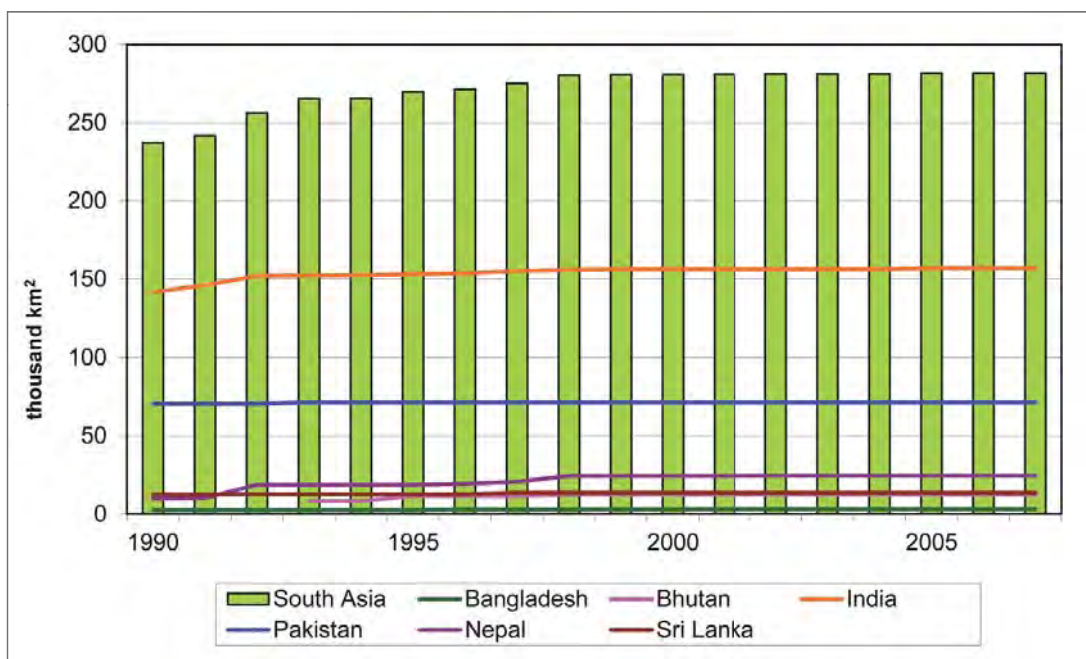


Figure 3.11: Terrestrial protected areas in South Asia

Source: UN (2008b)

Box 3.13: Human-wildlife conflicts in Bhutan

Most villages in Bhutan are in the close vicinity of forests, meaning human-wildlife conflicts can be intense. Predation of domestic animals and crop destruction are major challenges facing farmers. The growing human population and expansion of agriculture to new areas suggest that human-wildlife conflicts are likely to escalate. With the establishment of a network of protected areas, new challenges have surfaced which inevitably have sparked conflicts between people and wildlife, and have gained momentum over the years. The Nature Conservation Division of the Royal Government of Bhutan, with support from the United Nations Development Programme (UNDP) and other partners such as the World Wild Fund for Nature (WWF) and Bhutan Trust Fund for Environmental Conservation, has developed a plan to address human-wildlife conflicts. The overall approach is to address these conflicts through a comprehensive consideration of social, economic and ecological factors and involves interventions including: improving rural livelihoods through sustainable utilization of natural resources; conserving endangered carnivores by devolving livestock compensation to farmers; and combating rural crop damage and alleviating poverty.

Sources: UNDP (2008); Dhital (2009)

- **Animal poaching.** The poaching of animals and illegal collection of plants on account of their high commercial value is rising. Rhinos and tigers have been the most prized, and recent reports also indicate poaching of insects (especially butterflies) and other species (Box 3.14).

Box 3.14: The growing problem of illegal insect collection

The poaching of tigers, Asiatic lions and rhinos in Asia is a well-publicized problem. Now, conservationists are expressing concern about smaller wildlife being caught in a criminal net. Many of the region's insects are being killed to satisfy a demand for beautiful and rare bugs encased in plastic key chains and paperweights or enclosed in greeting cards. Extracts of some beetles are also used in traditional medicines in parts of Asia and Latin America. Some of the insect species, dead or alive, can bring thousands of dollars from wealthy international collectors. Although only a few criminal cases of insect poaching are filed in India each year, wildlife experts believe the total illegal trade is quite large. Analysts say smugglers can be in possession of thousands of insects at a time.

Source: Herman (2008)

Protected area management in South Asia has largely focused on excluding people to establish inviolate areas that reduce human interferences in natural habitats. However, increasing populations and the demand for land and other products continue to exert pressure on the protected areas, making traditional approaches ineffective. In response to this, there has been a shift from the 'fortress approach' to making local people active partners in protecting and managing protected areas. A number of protected areas in South Asia (especially India, Nepal and Sri Lanka) are adopting participatory approaches. Development of appropriate institutional frameworks and adequate financial incentives are important in sustaining local community participation in protected area management.

3.6.3. Forest-based recreation and ecotourism

Domestic and international tourism, including ecotourism, is increasing in South Asia in the context of increased incomes and mobility. Tourism is already playing a major role in South Asian economies (Table 3.7) and gross value added from tourism is expected to continue to increase. Less disturbed landscapes, in particular forests, form an important ecotourism asset. In Nepal, approximately 45 percent of tourists visit protected areas, generating substantial revenues. Increased demand for recreation is due to changing perceptions in society driven by improved education and incomes and by urbanization, which often stimulates metropolitan residents to demand more nature-based recreation. Tourism is also emerging as a major sector providing employment and, as in the case of ecotourism, a significant share of this is in rural areas. Tourism is the second most important source of foreign exchange for Nepal.

Table 3.7: Tourism's share in GDP and contribution to employment in South Asia, 2008 and 2018 (projected)

Country	% of GDP		US\$ billions		Number of jobs (millions)	
	2008	2018	2008	2018	2008	2018
Bangladesh	3.9	4	3.0	6.4	2.1	2.8
India	6.1	6.1	73.6	171.5	30.5	40.1
Maldives	67	59	0.8	1.3	0.6	0.8
Nepal	6.8	7.9	0.7	1.2	0.5	0.8
Pakistan	6.1	5.9	9.9	20.9	2.8	3.6
Sri Lanka	8.4	8.2	3.0	6.4	0.5	0.7

Source: WTTC (2007) (Bhutan not included due to lack of data)

There has been some decline in tourist arrivals in the subregion on account of the global economic decline during 2008/2009. While recovery is proving slow, in the longer term tourism is expected to grow on account of improvements in transport infrastructure and access to information. National parks and sanctuaries are becoming major tourist attractions, although this poses important management challenges relating to sustainability. Often there are pressures to open up core areas of biosphere reserves in the context of expanding tourism and the opportunity for income generation in the short term tends to override long-term conservation objectives. A number of countries have also witnessed a spurt in 'agri-tourism' or 'home stays' taking advantage of urban populations' desire to spend holidays in rural settings. Certainly ecotourism has considerable potential, but it requires addressing a number of challenges, discussed next.

(i) Environmental sustainability

A rapid and often unplanned expansion of ecotourism in response to rising demand will have significant negative impacts on the ecosystem itself. There are several instances in which influxes of visitors have led to environmental degradation, undermining the recreational experience. Destruction of vegetation, pollution of water and dumping of wastes are major problems in a number of recreational sites, especially those close to urban centres. In a number of countries there has been a rapid expansion of tourism infrastructure (especially resorts) without giving due consideration to their ecological impacts. However, Bhutan has been highly successful in regulating the number of visitors giving due attention to its ecological, cultural and social impacts (Box 3.15).

Box 3.15: Ecotourism in Bhutan

In Bhutan, planned socio-economic development has brought about significant changes in the Bhutanese economy and tourism is now one of the greatest sources of hard currency. In 2001, the Department of Tourism, with the help of the WWF, developed the Bhutan National Ecotourism Strategy. One of the main principles of

the strategy is a high tourist entry tax, between US\$100-200 a day depending on the season, along with a restricted number of tour operators and an earnings tax of around 30-35 percent as government royalty.

In 2006, the tourism industry of Bhutan earned about US\$24 million from just 17 342 tourists, and royalties paid by the industry to the government increased from US\$6.5 million in 2005 to US\$8.3 million. In 2007, the country recorded even higher income with 21 094 tourists visiting the country, with gross revenue of US\$30 million, one-third of which went to the government. This 'high value-low volume' approach has helped to keep the number of tourists low while increasing overall revenue.

Sources: *Royal Government of Bhutan (2002); Royal Government of Bhutan (2009).*

(ii) *Economic and social issues*

Another major issue is the impact of ecotourism on the local economy and in particular its role in poverty alleviation. If managed properly, ecotourism has the potential to significantly boost local incomes. Largely this depends on how local communities are involved in managing ecotourism, including in the provision of various services. There are increasing efforts to promote economically, socially, culturally and environmentally sustainable ecotourism as well as a number of collaborative efforts to improve the capacities of the key players involved (Box 3.16).

Box 3.16: Collaborative initiatives to promote ecotourism

International involvement is also stimulating ecotourism ventures with cross-country participation. For example, the project *Development of Cultural- and Ecotourism in the Mountainous Regions of Central Asia and the Himalayas*, sponsored by the Norwegian Government and the United Nations Educational, Scientific and Cultural Organization (UNESCO), aims to establish links and promote cooperation among local communities, national and international NGOs, and tour agencies to bring the benefits of ecotourism – including increased employment, incomes and environmental preservation – to local people. South Asian mountain areas involved by the project include Ladakh in India, Humla in Nepal and the Chitral and the Kalash valleys in Pakistan. Local project partners include the Mountain Institute and Snow Leopard Conservancy in Ladakh, India and the Aga Khan Rural Support Programme in Chitral in Pakistan.

Source: *UNESCO (2008)*

Forestry agencies in the region face a number of institutional challenges, especially transforming themselves as providers of recreational services. With the proliferation of institutions involved in ecotourism (for example tour operators, local communities, the private sector, specialized agencies, etc.), coordinating the various efforts to ensure responsible ecotourism has become a challenge.

3.6.4. Urban forestry

The rapid urbanization of South Asia has brought into focus the need to improve urban environments. Urban forestry has a long history in the region and there have been substantial efforts to develop and manage green spaces in cities for environmental and recreational purposes. However, urban forests face a number of challenges (Box 3.17), including the issue of investment in urban greening not keeping pace with urban growth. Further, much of urban forestry is centred on commercially and administratively important cities and in the richer segments of these cities. On the whole, urban forestry presents a mixed picture as indicated below:

Box 3.17: Sanjay Gandhi National Park: Challenges in managing an urban forest

With an area of 104 square kilometres and surrounded on three sides by one of the world's most populous cities, Mumbai, the Sanjay Gandhi National Park is one of Asia's most visited national parks with 2 million annual visitors. On the northern rim of the city, the park is home to around 20 adult leopards and hundreds of other kinds of animals and birds, but also to about 200 000 people, many of whom are involved in illegal forest activities.

Urban sprawl around Mumbai has led to human encroachment into the park, driving leopards to hunt in the city fringes, often resulting in lethal attacks on humans.

The question of ownership has led to major conflicts over the rights of forest dwellers to remain in the park, particularly with the passing of the Forest Rights Act in 2006, which provided forest-dwelling communities with rights to land and other resources. In an effort to protect endangered species, a Mumbai environmental group obtained an order to evict 61 000 families living inside the park; around 35 000 of these families are eligible for alternative housing. Clearing human settlements within the park remains an extremely challenging task.

Source: Mukherjee (2007)

- **Unplanned urban expansion.** A significant part of urban expansion is unplanned and is in the form of mushrooming shanty towns and slums. While these areas particularly require more green spaces, the unplanned nature of the expansion and space constraints limit the scope for urban forestry. These urban areas get the least public investment even in terms of basic facilities, especially water supply, sanitation, electricity and roads. With a significant number of residents being illegal squatters and most of them living in these areas, resources for developing green spaces are accorded low priority. In a situation where even basic amenities like electricity, drinking water, basic health care and sewage disposal are in short supply, neither governments (nor municipal authorities) nor the inhabitants assign priority to developing green spaces.

- **Most greening is limited to high-income areas.** In sharp contrast, urban greening is getting considerable attention in upper-income metropolitan zones. These segments are relatively better planned with substantial emphasis on developing green spaces. On the whole, infrastructure facilities are much better developed and, more importantly, residents are able to exert considerable pressure on the authorities.

3.6.5. Watershed protection

South Asia has the largest rural population in the world (over 1 billion people), and in consideration of the subregion's economic dependence on agriculture (and on irrigation, with 39 percent of the area in production under irrigation), watershed protection remains one of the most important functions of forests (Box 3.18). This is all the more important because South Asia has less than 5 percent of the planet's freshwater resource (UNEP 2009).

Box 3.18: Watershed protection and upland forests in Pakistan

"Ninety percent of water in Pakistan's rivers originates from the Northern mountainous watersheds. The most valuable function of forests and rangelands in Pakistan is sustained supply of sediment-free water for generation of electricity and water supply for agriculture. The agricultural and industrial economies of the country are entirely dependent on sustained supply of water from its reservoirs, rivers and also the efficient working of the vast canal system. Due to erosion and sedimentation the Mangla and Tarbela reservoirs are silting up at the rate of 48.47 million and 167.75 million cubic metres per year, respectively. Annual loss to the nation, mainly due to deforestation and devegetation resulting in floods, erosion of fertile soils from upland watersheds and siltation of reservoirs, is estimated at about Rs.2.3 billion."

Source: Office of the Inspector General of Forests, Ministry of Environment s, Pakistan (2009)

Existing water resources are poorly managed and unevenly distributed in most areas, often to the disadvantage of the rural poor. Increasing demand on account of population growth will increase the stress on water resources, with the impacts of climate change worsening the situation (Box 3.19). Many areas throughout South Asia are expected to experience severe water stress by 2025. In countries like Bangladesh, Pakistan and India, water scarcity is becoming the most critical issue affecting the lives of all people. The sharing of water from the transnational rivers flowing through these countries remains a contested issue.

Box 3.19: Vulnerability of river basins in South Asia

A recent assessment of vulnerability of river basins in South Asian countries, particularly the Ganges-Brahmaputra-Meghna River Basin and the Indus River Basin, based on resource stress, development pressures, ecological health and management challenges revealed the following critical information:

- Climate change is likely to lead to severe water shortages in all of the basins in the long term, affecting Himalayan glaciers and reducing the glacial runoff which feeds these rivers.
- Water resources in the Indus River Basin are affected by decreasing vegetation cover and declining water quality.
- The Ganges-Brahmaputra-Meghna River Basin is not water-stressed currently, but uneven endowment and exploitation needs to be addressed through basin-wide development and management.
- Groundwater levels are declining at a rate of two to four metres annually in many parts of the Ganges-Brahmaputra-Meghna and Indus river basins due to intense pumping, which threatens soil and water quality, with consequent saltwater invasion into groundwater aquifers.

Source: UNEP (2009)

Water quantity and quality are largely influenced by land uses. Most of the land in the major watersheds in South Asia is under cultivation and the extent of forests remains extremely low (Table 3.8). Considerable thrust has thus been given to improving land use, with particular attention to improving vegetation cover including through afforestation and improved management of forests. Almost all forest policies underscore the role of forests in regulating water supply, although often the precise cause-effect linkages remain unclear.

Table 3.8. Major watersheds in South Asia

Watershed	Area ('000 km ²)	Countries	Cropland (%)	Forests (%)
Brahmaputra	651.3	China, Bhutan, Bangladesh, India	29	19
Ganges	1 016.1	Nepal, India, Bangladesh	71	4
Godavari	319.8	India	63	7
Indus	1 081.7	Afghanistan, Pakistan, India, China	29	0
Krishna	226.0	India	67	3
Mahanadi	145.8	India	59	8
Narmada	96.3	India	76	1
Tapti	74.6	India	78	1

Source: WRI (2010)

Watershed management has long received considerable attention and the concepts and approaches have undergone major changes in the last few decades. Emphasis in watershed management has shifted, with particular attention to:

- Adoption of integrated approaches focusing on all land uses in the watershed (Box 3.20); and
- Increased involvement of all the stakeholders, especially local communities.

Box 3.20: Integrated approach to regenerating forests for improved watershed conditions

The people of Darewadi Village in Maharashtra, India have effectively fought drought and desertification by managing their watershed with support from the Indo-German Watershed Development Program and the Watershed Organization Trust (WOTR). Village-based participatory watershed projects have worked with local people to maintain a temporary tree-cutting and grazing ban in order to regenerate the forest through replanting trees. Villagers were willing to forego immediate benefits from resources that were still available from residual forest in the watershed area because of the future prospect of earning incomes from regenerated forests.

The programme and WOTR also helped villagers negotiate a JFM agreement with the Maharashtra Forest Department to legally work on state-owned common land and have ownership of the agricultural production from the land. This agreement was crucial to reducing the threat to areas that were in the process of being reforested. The Village Watershed Committee became the registered project authority responsible for funds and development activities, helping to ensure that common and informal institutions were followed by villagers to protect areas for regeneration.

After five years of regeneration activities, villagers were able to benefit from an increased water table, plentiful fodder to raise cows and high agricultural yields. Additionally, villagers benefited from developing links with local government officials for future projects. Although there are many benefits to regenerating forests in watersheds, equity remains a challenging issue in watershed management, especially where land tenure rights are absent or weak.

Source: WRI (2005)

Increasingly, watershed management is being taken up by local administration and community groups and involves a combination of various techniques including water-harvesting structures (check dams, contour bunds, terraces) and maintaining and improving vegetative cover (including through protection of natural vegetation from grazing, fire and afforestation).

A more recent development is the adoption of market mechanisms through payment for watershed services. There are several examples of such efforts (as in the case of the Sukhomajri Catchment in the Indian State of Haryana). There are also instances of upstream and downstream communities developing appropriate institutional

arrangements for sharing water and compensating upstream land users for adopting practices that enhance water supplies. However, such approaches are yet to be widely adopted.

The major challenges as regards the provision of water-related ecosystem services are:

- Understanding the technical linkages between forests and water and having a clear idea of how land-use changes (including changes in the condition of forests) will alter water regimes. This becomes particularly complex in the case of large watersheds.
- Development of appropriate institutional arrangements to improve watershed management.

Although some progress has been made, major gaps remain as regards technical knowledge and institutional arrangements. Forests and forestry will have an important role in improving watersheds in conjunction with other land uses.

3.6.6. Land degradation and desertification

One of the major environmental problems facing most South Asian countries is dryland degradation, which at its extreme results in desertification and irreversible loss of productivity. The desertification risk, a percentage based on two indicators (the area of dry lands as a percentage of productive agricultural land, and the population on dry lands as a percentage of population on agriculturally productive land) is extremely high in India and Pakistan and to some extent in Nepal (Table 3.9). An outcome of faulty agricultural practices and intense grazing, degradation and desertification change land ecologies and affect the flow of goods and services, while drastically reducing the carrying capacity. Populations in dry lands are particularly affected by food insecurity, which will be further exacerbated by climate change-induced events.

Table 3.9: Desertification risk in South Asia, 2003

Country	Semi-arid dry lands (%)	Subhumid dry lands (%)	Desertification risk (%)
Bangladesh	0	0	0
Bhutan	2	7	9
India	18	50	72
Nepal	3	31	42
Pakistan	16	3	100
Sri Lanka	0	6	6

Source: FAO (2003)

Tree growing, especially as windbreaks and shelterbelts, is an integral part of farming in dry lands. More importantly, communities have developed institutional arrangements to avoid intensive use of land, for example through rotational grazing. However, many traditional conservation practices, including local institutional arrangements, have become ineffective in the context of population growth and increasing demands. Most of the interventions to arrest land degradation and desertification are focused on improving institutional arrangements and to develop and adopt improved land-use practices (Box 3.21).

Box 3.21: Local-level efforts to combat desertification in Pakistan

Pakistan is under threat from desertification on account of faulty land-use practices including deforestation and forest degradation. Desertification, soil erosion, floods and sedimentation in rivers and dams have been increasing. Monoculture agricultural practices are contributing to degradation. To address this, women of Morkhoon in the mountain desert areas of Pakistan play a critical role in natural resource management. With support from the private Aga Khan Foundation (AKF), several women's organizations provide strong institutional support to run a credit and savings programme to better manage natural resources and prevent desertification. The AKF has promoted forest plantations on the boundaries of fields, communal land, private land and other areas where original vegetative cover has disappeared. This has helped to overcome fuelwood and fodder shortages. The women have created committees to monitor forest use and grazing. They have also planted trees on family plots and have switched from monoculture practices to crop rotation. These actions not only check the desertification process but have also provided the women with incomes from selling fruits from the trees. This income has empowered them both economically and socially.

Source: UNCCD (2007)

Almost all South Asian countries are signatories to the United Nations Convention to Combat Desertification (UNCCD) and national land degradation and desertification action plans have been prepared by India, Nepal, Pakistan and Sri Lanka. Forestry is an important component of all these action plans. As in the case of efforts to improve watersheds, arresting land degradation and desertification also focuses on integrated land uses with considerable emphasis on protecting natural vegetation and improving vegetative cover through afforestation. Substantial technical knowledge exists at various levels, but institutional problems make implementation extremely challenging.

3.6.7. Forests and climate change mitigation and adaptation

With climate change becoming one of the most critical environmental issues, forests and forestry are gaining increasing attention in mitigation and adaptation strategies, particularly because deforestation and forest degradation account for about 17 percent of carbon emissions. Forests have immense potential as carbon sinks. All South Asian countries are signatories to and/or have ratified, accepted, approved or accessed the Kyoto Protocol that provides a framework for climate change mitigation and adaptation till 2012. A more comprehensive framework is under negotiation to address the problem beyond 2012.

The key challenge to reducing emissions from deforestation and to sequestering more atmospheric carbon is improving forest management, including through afforestation and reforestation efforts. A major thrust of climate change mitigation strategies is to develop market approaches through cap-and-trade systems (see Chapter 4), which have significant implications for forestry. An important component of this is the Clean Development Mechanism (CDM) that generates carbon credits in Annex II countries. Although afforestation and reforestation are included under the CDM, forestry is a very

insignificant component of CDM projects. Of the estimated total of 3 682 CDM projects as of December 2011, there were only 36 afforestation and reforestation projects registered; the seven projects in South Asia are all in India (Box 3.22).

Box 3.22: CDM afforestation and reforestation (A/R) projects in India

India is the only country in South Asia to have registered A/R projects under the CDM. India's CDM projects include:

- The small-scale Cooperative Afforestation CDM Pilot Project Activity on Private Lands Affected by Shifting Sand Dunes in Sirsa, Haryana will improve degraded croplands spread across eight villages. Comprised of 369.87 hectares belonging to 227 farmers, *Ailanthus excelsa*, *Acacia tortilis*, *Eucalyptus* hybrid, *Acacia nilotica*, *Dalbergia sissoo*, *Zizyphus mauritiana* and *Prosopis cineraria* will be used to achieve a reduction of 11 596 tonnes CO₂ equivalent per annum.
- India's large-scale reforestation of a severely degraded landmass in Khammam District of Andhra Pradesh, India under the ITC Social Forestry Project will remove 57 792 tonnes of CO₂ equivalent per annum while attempting to provide long-term income security for the rural tribal people.
- The Bagepalli CDM Reforestation Programme is being implemented in Karnataka State through an NGO, the Agricultural Development and Training Society. The total area of the project is 8 933 hectares, which is owned by 8 107 families in 394 villages. The land is currently private uncultivable lands, fallow lands or marginal croplands.
- The Himachal Pradesh Reforestation Project aims to undertake A/R CDM activities in about 10 000 hectares of degraded lands spread over 11 watersheds. Supported by the World Bank, the project aims to restore degraded lands with carbon revenues going to the village community, providing the necessary incentive to protect the watersheds.

Source: UNFCCC (2011)

Considering high levels of emissions from deforestation, the Bali Action Plan agreed on a system of incentives to desist from forest clearance and to prevent forest degradation to be considered as part of the post Kyoto climate change arrangements. Although there has been some broad agreement, including commitments for financial support, the details of the United Nations Collaborative Program on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD+) are still to be worked out. The programme envisages payments to forest owners for the potential income losses they may suffer on account of maintaining forests intact. REDD+ could be supported through international transfers or through trading of carbon credits generated through conservation.

Preliminary efforts are underway in a number of countries to develop baseline information and to develop methodologies for effective monitoring, assessment, reporting and verification. In South Asia, Nepal has taken up some steps to launch a REDD readiness

plan. In addition to the challenges of generating the baseline data, especially on carbon stocks (considering that forest resource assessments and inventories have not been undertaken regularly), implementation of REDD will have to address a number of policy and institutional issues. Its dependence on international transfers makes it extremely vulnerable to changes in international financial situations.

While forests could potentially play an important role in mitigating climate change, management will also have to adapt to the potential impacts of climate change on forests. A number of potential impacts have been identified in the context of various scenarios of greenhouse gas concentration in the atmosphere. These include:

- Changes in temperature and rainfall patterns and consequent impacts on species distribution and biodiversity;
- Increases in the incidence and severity of forest fires;
- Increased incidence of disease, insect and pest damage; and
- Decreases in agricultural crop yields, which may have direct and indirect impacts on forests, especially through increased forest clearance for agriculture.

Adaptation to climate change in the forest sector largely focuses on implementation of sustainable forest management, especially to maintain the forests in a healthy state and to take early actions to prevent outbreaks of wildfire and insect pests.

Forests also have an important role in climate change mitigation strategies. Foremost is the role of mangroves in protecting coastal zones, especially against storm surges, although there are concerns that some of the claims of reduced damage from the December 2004 tsunami (Kathiresan and Rajendran 2005) may be overstated (Kerr *et al.* 2006).

3.7. Socio-economic importance of the forest sector

3.7.1. Contribution of forestry to GDP

Divergent views exist on the overall importance of the forest sector in national economies in South Asia. Largely this stems from the significant contribution to environmental values that are not incorporated into national income accounts. Although there are efforts to develop alternative approaches to national income estimation taking into account environmental values, measures like gross value added remain the most widely used indicators of the importance of the sector. The total value added from wood production, the wood industry, pulp and paper and furniture in South Asia increased from about US\$7.5 billion in 1990 to US\$9.6 billion in 2006 (Figure 3.12). Most of this is accounted for by the value of primary production, especially industrial roundwood and woodfuel (seldom processed further), which in 2006 made up 81 percent of value addition. There has been a minor increase in value added in pulp and paper production.

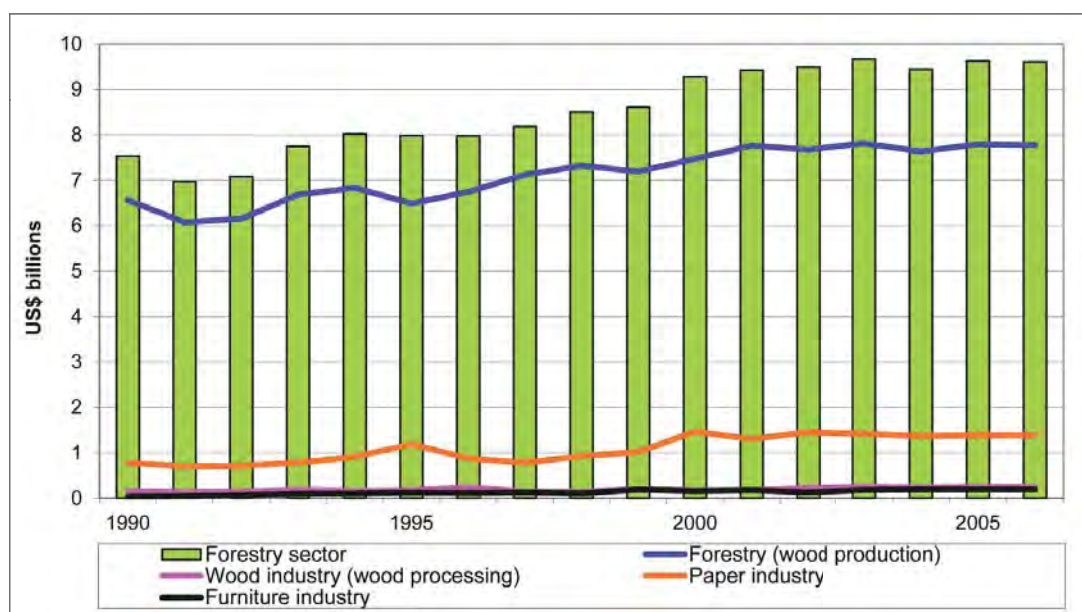


Figure 3.12: Forest sector value added in South Asia, 1990-2006

Source: Lebedys (2008)

Although absolute values of production have increased, the relative share of the forest sector in subregional GDP declined between 1990 and 2006. This decline has taken place in almost all the South Asian countries (Table 3.10), largely on account of the faster growth of other sectors, and follows similar trends at regional and global levels. Within South Asia, the forestry sector is particularly important for the Bhutanese economy, where it contributed to about 6.9 percent of GDP in 2006 (although this represents a significant decline in relative terms from the 1990 level of 13.8 percent).

Table 3.10: Changing economic significance of forestry in South Asia

Country	Share of forestry in GDP (%)		
	1990	2000	2006
Bangladesh	2.2	2.0	1.7
Bhutan	13.8	8.8	6.9
India	1.8	1.3	0.9
Maldives*	-	-	-
Nepal	3.7	5.0	4.3
Pakistan	1.2	0.8	0.4
Sri Lanka	1.6	1.0	1.0
South Asia			0.9
Asia and the Pacific			1.0
World	1.4	1.2	1.0

Note: No data available for Maldives.

Source: Lebedys (2008)

As pointed out earlier, it is important to note that the estimates of gross value added do not include the full range of incomes generated in the forest sector, particularly on account of not including value addition in the informal sector. NWFPs are not fully accounted for and often they are included as part of other sectors (e.g., agriculture). Further, a significant share of production takes place in the informal sector, which is left unaccounted. Informal production is particularly high in the case of sawmilling and plywood production.

A comparison of the share in value added under different components of the forest sector indicates that a major share of value added comes from wood production and much less from processing (Table 3.11). For example, wood production accounted for about 81 percent of the value added in South Asia in 2006, while this was 23 percent and 20 percent at the regional and global levels. Correspondingly, South Asia's value added is extremely low in wood processing in comparison with the Asia-Pacific region and the world. Largely this reflects the low level of investments in processing, as most of the wood harvested (mainly woodfuel) is directly consumed. This also suggests significant potential for improving value addition without increasing the volume of wood produced.

Table 3.11: Share in total value added by different subsectors, 1990 and 2006 (%)

Region/subregion	Wood production		Wood industry		Pulp and paper		Furniture		Total	
	1990	2006	1990	2006	1990	2006	1990	2006	1990	2006
South Asia	87	81	2	3	10	14	1	2	100	100
Asia and the Pacific	26	23	19	21	36	40	19	16	100	100
World	18	20	23	26	37	34	22	20	100	100

Source: Lebedys (2008)

3.7.2. Employment in the forest sector

Estimating forest sector employment is extremely difficult in view of the absence of systematic collection and analysis of data. One of the major problems with employment data is that, with the exception of a handful of industries, most jobs are seasonal. In most cases a significant share of employment is in the informal sector and thus seldom enters national employment statistics. Reports of formal forestry sector employment in the subregion (including various subsectors) indicate an increase in employment (full-time equivalent) from about 617 000 in 1990 to 663 000 in 2006 (Figure 3.13). However, differing trends in employment in various subsectors largely reflect data problems rather than the actual employment situation (Box 3.23). NWFPs also contribute significantly to employment, particularly in rural areas. For example, in Madhya Pradesh, which produces nearly a quarter of all tendu leaves used for making country cigarettes (or *beedis*) in India, over 1 million people were involved in leaf harvesting in 2006 (M.P. State Minor Forest Produce Co-op 2006). However, apart from such fragmented information, no comprehensive data for the entire NWFP sector are available. This is also applicable to the production of woodfuel, which again mostly takes place in the informal sector.

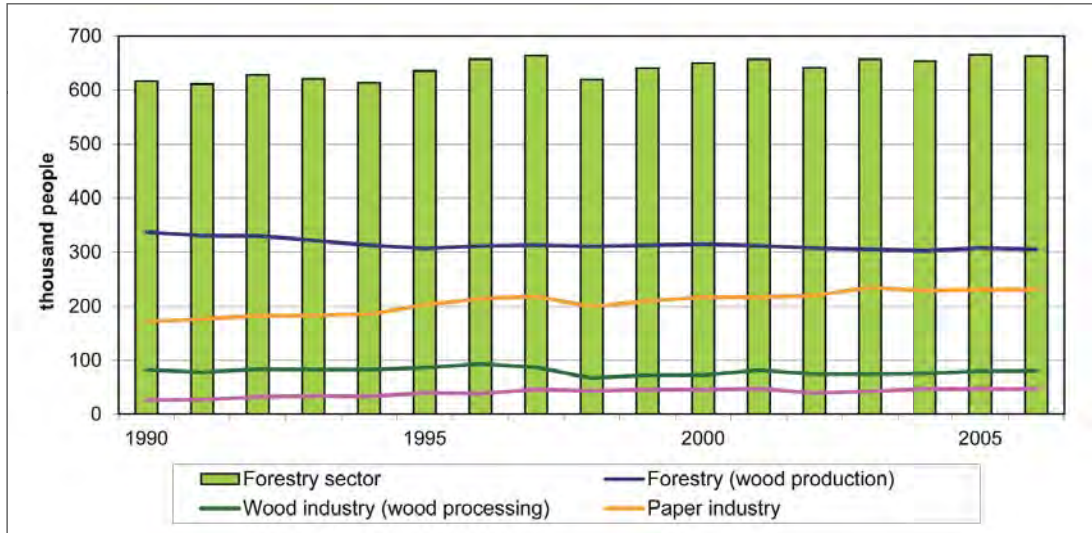


Figure 3.13: Trends in employment in the South Asian forest sector, 1990-2006

Source: Lebedys (2008)

Box 3.23: Estimation of employment in the forest sector

Notwithstanding some of the difficulties in estimating gross value added, substantial progress has been made in refining methodologies for national income estimation. However, this is not the case with employment. Invariably most employment data exclude the informal sector, which is substantial in the South Asian situation. This is one of the reasons for low values for employment in the wood production sector and the wood-processing sector in South Asia. As noted before, 90 percent of roundwood production is in the form of woodfuel, with most of the production taking place in the informal sector. This is also the case in the case of the wood industry, especially sawmilling. Pulp and paper production, on the other hand, is largely in the formal sector and most employment is recorded. A study by the International Labour Organization (ILO) estimated that globally, the share of employment in the informal sector is about 63 percent of total employment. Applying this ratio, actual forestry employment in South Asia would be as high as 1.9 million. In fact, it could be much higher considering that proportionately the informal sector is much larger in South Asia than the global average estimated by the ILO.

3.7.3. Forests and poverty reduction

Throughout South Asia, forests overlay the poorest localities. This stems from a number of factors, especially the absence of secure tenure over resources (primarily on account of the preponderance of public ownership), poor infrastructure, very low investment in human skills and a host of issues stemming from poor governance. Most often forest resources are managed to meet demands from those sections of society with a much higher ability to pay for goods and services. Underdevelopment of forested regions has been one of the primary causes of social conflicts, in particular the emergence of extremist movements. A number of efforts are underway to improve the situation with

forests forming the main thrust of interventions. These include:

- Providing secure tenure to indigenous communities and other forest dwellers. India is currently implementing the Forest Rights Act 2006, a far-reaching legislation intended to correct the historical injustices done to local communities during past public sector take-overs of forest land. The eventual impact of this will depend on the effectiveness of implementation and the extent to which forest dwellers are able to adopt improved land management practices and have better access to skills, inputs and markets.
- Involving local communities in forest management (for example, forest user groups in Nepal and JFM in India) is another option being pursued by South Asian countries to enhance incomes and thus to alleviate poverty. Certainly this has improved access to resources for the poor, although there are considerable differences in the efficacy of arrangements.
- There are also some efforts towards involving local communities in the provision of ecosystem services, for example ecotourism. However, conflicts between the needs of local communities and conservation persist, notwithstanding efforts to develop participatory approaches.

While forests continue to be an important safety net for the poor, especially those living in their vicinity, there are no clear indications on whether forests will play a significant positive role in lifting large numbers of people out of poverty. While low incomes persist, there is a very high dependence on forests; but this is largely an outcome of the absence of other income opportunities. In the context of high population densities, a low intensity management option is unlikely to generate substantial incomes. Poverty alleviation will require intensification of land use or a significant improvement in human skills, enabling a diversification of income opportunities to reduce dependence on land and forests.

3.8. Economic, social and environmental benefits: An overview

Although timber has been the main focus of forest management in South Asia, this has changed significantly during the last two decades; social and environmental functions of forests are receiving increasing attention. Considering high population densities and rapid growth of national economies, demand for all products and services has increased. Establishing trade-offs between conflicting demands by diverse sections of society is becoming extremely challenging. Key issues and challenges include:

- Wood product consumption in South Asia remains very low, largely reflecting low household incomes. However, this is expected to change in view of rapid increases in incomes as growth in the South Asian economies accelerates. Constraints in increasing domestic wood production have led to increased dependence on imports, especially by the rapidly growing economies like India.

- More than 90 percent of wood is used for energy production, largely reflecting the limited availability of alternative energy sources. There is considerable scope for improving energy efficiency through the application of improved technologies and at the same time increasing the share of wood used in processing.
- The NWFP sector has undergone enormous changes as regards production, processing and trade. In general, subsistence collection and use are declining while commercially important NWFPs are domesticated and grown in farms. Development of new products and processes, domestication, increased involvement of farmers in cultivation and improved institutional arrangements have brought about major changes in the NWFP sector.
- Provision of ecosystem services has become the most important objective of forest management in most South Asian countries. Forests are the most significant repository of biodiversity and the subregion contains three of the 32 global biodiversity hotspots. There is also greater recognition of the role of forests in addressing land degradation and climate change mitigation and adaptation. However, resolving conflicts between divergent uses remains extremely challenging, especially in view of the high population density in the subregion.
- The challenges of forest management are particularly severe in forested areas in South Asia, which is home to many indigenous communities (probably the most impoverished people in the subregion). Much of this is due to the absence of any development efforts and the appropriation of rights of local communities in the name of conservation or development. As elsewhere, poverty and underdevelopment in forested regions are posing major political, economic and social challenges to governments in South Asia. Some efforts have been made to address the problem of poverty through increased involvement of local communities in the management of forest resources, although this continues to face enormous political and institutional challenges.

4

DRIVERS OF CHANGE

The state of forests and forestry and the flow of goods and services in South Asia described in the earlier chapters are influenced by a number of factors external to the sector. In fact, external factors tend to affect forests much more than internal ones. In most cases, management responds largely to the demands emanating from outside the sector, including those from within and from outside countries. In the context of the growing linkages among economies on account of globalization, forests are now more vulnerable than ever to what once were seemingly remote changes.

Broadly, the drivers impacting forests and forestry can be grouped as direct or proximal (where the impacts are immediate) and indirect, which affect the sector by triggering a series of changes. The impacts of these drivers vary depending on the specific conditions. Sometimes indirect drivers prove to be more significant than direct drivers. In analysing the outlook for South Asian forests and forestry, the main drivers considered are:

- Changes in demography;
- Economic changes;
- Environmental changes;
- Political and institutional evolution; and
- Developments in science and technology.

Although each may independently affect forests and forestry, the larger changes in the sector stem from the collective impact of all drivers in view of their interlinkages and feedback loops. Thus, the impact of any particular driver is moderated or aggravated by others. This chapter provides an overview of the main drivers of change affecting South Asian forests and forestry.

4.1. Demographic changes

The South Asian subregion is undergoing a range of demographic changes. Growth in population, changing age structures and trends of urbanization and migration all have important implications on the use of natural resources, including forests.

4.1.1. Population growth

The total population in South Asia in 2010 is estimated at about 1.6 billion, or approximately 23 percent of the global population (UN 2010). This is projected to increase to 1.82 billion by 2020 (Table 4.1). Although population growth rates are declining, the increase in the absolute numbers (220 million) is quite substantial. This absolute increase is likely to increase the pressures on natural resources considerably.

Table 4.1: Population by country* (millions), 1990-2020

Country	1990	1995	2000	2005	2010	2015	2020
Bangladesh	105.25	117.49	129.59	140.59	148.69	158.32	167.25
Bhutan	0.56	0.52	0.57	0.66	0.73	0.78	0.83
India	873.78	964.49	1053.90	1140.04	1224.61	1308.22	1386.91
Maldives*	0.22	0.25	0.27	0.30	0.32	0.34	0.36
Nepal	19.08	21.60	24.40	27.28	29.96	32.58	35.16
Pakistan	111.84	127.35	144.52	158.64	173.59	189.65	205.36
Sri Lanka	17.34	18.23	18.74	19.84	20.86	21.71	22.34
South Asia	1128.1	1249.9	1372.0	1487.4	1598.8	1711.6	1818.2

*Medium variant.

Source: UN (2010)

India, Pakistan and Bangladesh together account for most of the population in South Asia. Sri Lanka and Nepal each have populations of less than 30 million people, while populations in Bhutan and the Maldives are below the 1 million mark. Particularly noteworthy is that South Asia has a much higher population growth rate than all the other Asia-Pacific subregions (Table 4.2) with considerable intercountry differences. For example, the annual population growth rate has fallen below 1 percent in Sri Lanka since 2000 and is expected to be about 0.4 percent during 2015 to 2020. On the other hand, Nepal and Pakistan registered growth rates of over 2 percent during 2000 to 2005 and will have growth rates significantly above the average subregional rate during 2015 to 2020.

Table 4.2. South Asia population growth rate (1990-2020)

Country	1990-95	1995-00	2000-05	2005-10	2010-15	2015-20
Bangladesh	2.3	2.2	2.0	1.9	1.7	1.6
Bhutan	2.6	-1.5	1.9	2.6	1.4	1.5
India	2.2	2.1	1.8	1.6	1.5	1.3
Maldives	3.2	2.8	1.9	1.6	1.8	1.8
Nepal	2.3	2.5	2.4	2.1	2	1.9
Pakistan	3.5	2.5	2.4	1.8	1.8	1.9
Sri Lanka	1.3	1.1	0.7	0.4	0.5	0.4

Country	1990-95	1995-00	2000-05	2005-10	2010-15	2015-20
South Asia	2.12	1.91	1.66	1.52	1.40	1.24
Asia-Pacific	1.57	1.38	1.17	1.06	0.97	0.86

Source: UN (2010)

Population-forest linkage is largely related to the extent of direct and indirect dependence on land as a source of livelihoods and income. Although the subregion accounts for 23 percent of the global population, it accounts for just 3.2 percent of the global land area, suggesting a very high population density. Some of the most densely populated countries in the world (for example Bangladesh and Maldives, with over 1 000 persons per square kilometre) are in the South Asia region, where average density was about 388 persons per square kilometre in 2010 (Figure 4.1). This is significantly higher than regional (Asia-Pacific) and global population densities. Continued increase in populations according to median growth variants implies an increase in the subregional density to 441 persons per square kilometre by 2020, accentuating the pressures on land, forests, water and other natural resources.

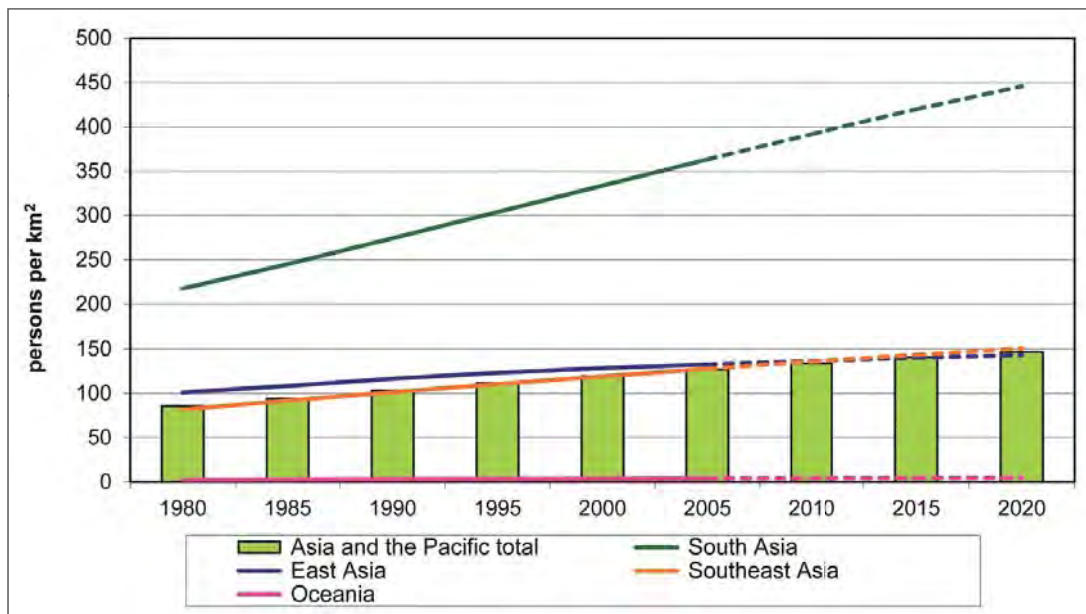


Figure 4.1: Population densities in Asia and the Pacific, 1990-2020

Sources: Based on FAO (2009a) and UN (2010)

4.1.2. Urbanization

With an estimated 70 percent of the population living in rural areas in 2010, South Asia remains largely rural in nature. However, urbanization is taking place at a rapid rate and South Asia is home to some of the fastest growing cities in the world. By 2020, Mumbai will be the second largest city in the world, closely followed by Delhi and Dhaka. With Karachi and Kolkata, five of the world's 11 megacities will soon be in South Asia. Urban populations will increase by over 156 million, accounting for about 71 percent of the

total population increase between 2010 and 2020. The proportion of urban dwellers is increasing in all countries except Sri Lanka (Table 4.3).

Table 4.3: Share of urban population in South Asian countries (%), 1990-2020

Country	1990	1995	2000	2005	2010	2015	2020
Bangladesh	19	21	23	31	28	32	35
Bhutan	16	20	25	30	36	41	45
India	25	27	28	29	30	32	35
Maldives	26	26	28	34	42	49	55
Nepal	9	11	13	16	18	21	24
Pakistan	30	31	32	33	35	37	39
Sri Lanka	17	16	16	15	15	15	16
South Asia	25	26	27	29	30	32	35
Asia-Pacific	30	33	35	38	41	44	47

Source: UN (2009a)

While there has been rapid horizontal expansion of existing urban centres, there has also been a significant increase in the number of new urban centres and towns. For example, the number of towns in India increased from 3 378 in 1981 to 5 161 in 2001. According to the 2011 census, the number of towns has increased to 7 935. Notwithstanding the rapid pace of urbanization, the absolute number of rural people will continue to grow, and South Asia will be the only subregion in Asia and the Pacific where the absolute number of rural people will increase (Figure 4.2).

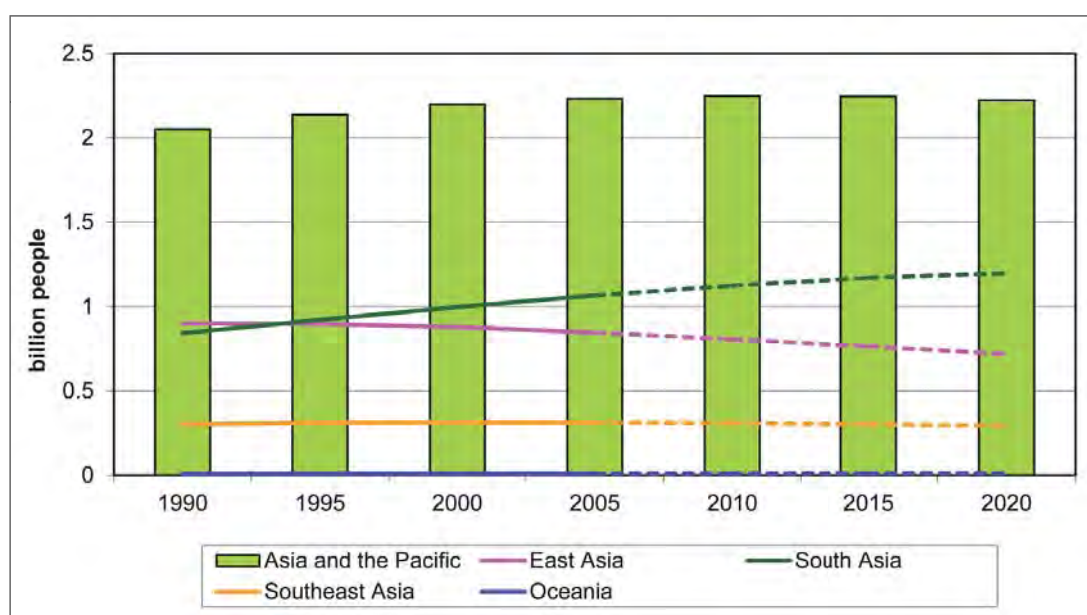


Figure 4.2: Asia-Pacific subregional rural populations*, 1990-2020 (in billions)

Source: UN (2010)

Poverty and limited opportunities in rural areas have been the 'push factors' encouraging urbanization. Insecurity and conflicts have also contributed to rural-urban migration, for example in Nepal until the end of 2006. However, urban employment opportunities in formal sectors have not kept pace with the increase in urban populations. Consequently, a significant number of less-educated migrants end up in the less-remunerative informal sector.

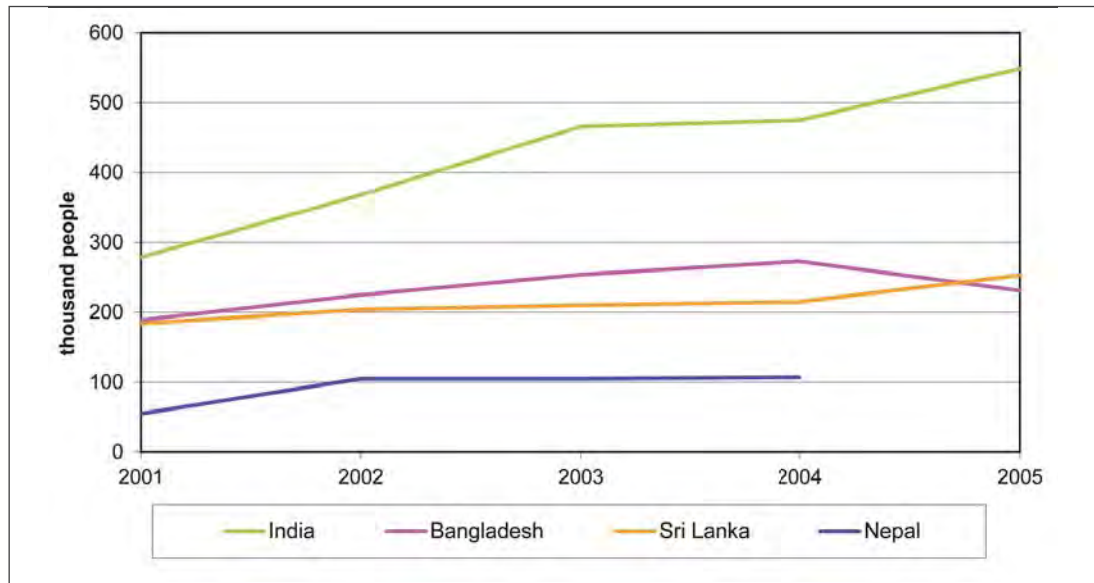
Changes in the rural-urban distribution of population have several implications on land use and forests as indicated below:

- Continued increase in the number of rural dwellers implies increasing pressure on resources, especially land and forests.
- Expansion of urban centres to adjoining areas is negatively impacting peri-urban vegetation. Coastal vegetation, especially mangroves, has been cleared to develop residential and commercial complexes. Even well-established national parks close to urban centres have been affected directly and indirectly on account of urban expansion. Although a number of city administrations are attempting to enhance urban 'green spaces', the expansion of residential and commercial buildings and infrastructure also threatens agricultural and forest lands. As real estate prices surge, agriculture and other non-urban land uses become less viable in lands adjacent to urban areas. Conversion of agricultural land into built-up areas transfers new pressures onto forests (Basnyat 2008).

4.1.3. Migration

Emigration is an important driver that has direct and indirect impacts on the use of resources including forests. Improved access to information and transportation has increased the movement of people across national borders in search of better employment opportunities. South Asia – especially India, Bangladesh, Pakistan, Sri Lanka and Nepal – is one of the largest global sources of migrant workers (Figure 4.3).

Most temporary contractual workers from South Asian countries live and work in the Gulf countries and a substantial share of employment is in the booming construction and services sectors. There has also been migration to other countries, especially to Europe and the United States and more recently to Australia and some Southeast Asian countries like Malaysia and Singapore. Political and economic changes sweeping West Asian countries could bring about a significant change in the volume and direction of migration. International migration of workers has a significant impact on national economies on account of money that workers send home (which is discussed later).



Note: Figures based on official statistics for the South-Central Asian region and the Nepal Institute of Development Studies.

Figure 4.3: Labour migration outflows for selected South Asian countries, 2001-2005

Source: IOM (2008)

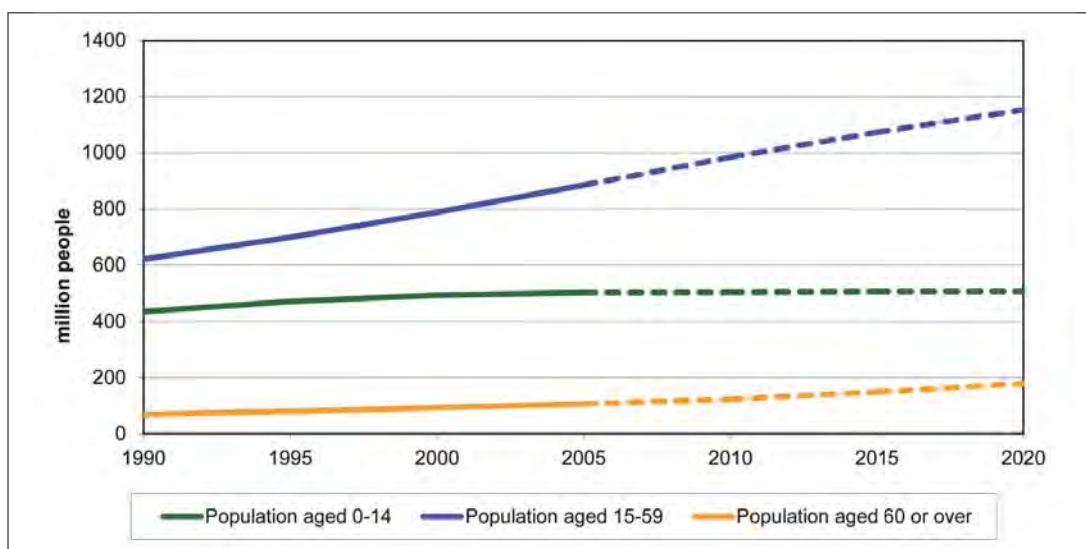
4.1.4. Changes in age structure

Changes in age structure over time will have important implications on an economy and, indirectly, on the use of natural resources. South Asia has a high proportion of population below the age of 15. This means there will be a significant increase in the proportion of the working age population during the next decade (Figure 4.4). Potential impacts of changing age structures include:

- The demand for products and services, including housing, will increase especially as the proportion of the working population increases. In most countries there is an acute shortage of housing and efforts to remedy the situation and to improve its supply will increase the demand for wood and wood products.
- Employment generation will be a major concern for most countries especially as the proportion of people of working age increases in the next decade. Almost all sectors will be under pressure to provide more remunerative job opportunities. Failure to expand opportunities in the formal sector could encourage growth of informal activities, which may have a host of negative consequences on resources, people and the overall fabric of society.
- Changes in the circumstances under which different generations grow up influences values and perceptions, especially on account of improved access to information. Increasingly, the younger generation is seeking employment outside the agriculture and forest sectors, especially as opportunities expand in the industrial and services sectors. In many countries, this generational change has already led to a reduction in the number of agricultural workers and an increase in wage rates. This has also encouraged mechanization of agricultural and forestry operations and, as labour

availability declines, the pace of introduction of capital-intensive technologies is expected to accelerate. An alternative response will be to produce less labour-intensive crops, especially perennials including timber-yielding trees.

- The percentage of those above the age of 60 in South Asian countries ranged from around 5 to 8.8 percent in 2005, and this will increase to 6 to 11 percent by 2020. Maldives has the lowest proportion of elderly, while Sri Lanka is at the high end in both periods. Although the proportion of elderly will remain low in comparison with the regional and global situation, the absolute numbers are quite substantial. In India alone, the number of persons above 60 will double between 2000 and 2020, rising to 140 million people. An increase in the size of the elderly population will have manifold direct and indirect impacts on the nature of goods and services demanded (Basnyat 2008).



* Medium variant.

Figure 4.4: Age structure in South Asia*, 1990-2020

Source: UN (2009a)

4.1.5. Demographic changes: An overview

Demographic changes will be of major consequence as regards land use and forests in the South Asia subregion for the following reasons:

- Although population growth rates are on the decline, South Asia will remain the most densely populated subregion. This will increase the pressure on natural resources, including land, forests and water for the production of food, fibre and energy.
- Notwithstanding rapid urbanization, South Asia remains largely rural. This implies continued pressure on land and other natural resources.
- Work-related migration to other countries has brought about land-use changes, including regrowth of natural vegetation as marginal lands are left uncultivated. In

several areas of the subregion migration and remittances have significantly reduced the pressure on forest land. In areas where more remunerative options are available, there has been a decline in illegal logging and forest encroachment.

- South Asia has a young population, implying a significant increase in the number of those of working age during the next two decades. This could increase the demand for a wide array of products and services including wood. Changing age structures will also affect values and perceptions. A younger generation with increased environmental awareness is already influencing forest-related issues.

As pointed out earlier, the impact of demographic changes will be influenced – moderated or accentuated – by economic changes as discussed in the next section.

4.2. Economic changes

The South Asian subregion is undergoing rapid economic changes with most economies registering rapid growth. However, it also remains the poorest subregion in Asia and the Pacific. Forests will be directly and indirectly affected by changes in incomes and, in particular, how natural resources, including land and forests, are used.

4.2.1. Growth rates of income and GDP

During the last ten years, most South Asian economies have pursued liberal economic policies, especially encouraging increased private sector investment. Domestic savings and investment rates continue to be high in most countries in the subregion, with countries like India saving and investing over 30 percent of GDP. Along with increased foreign direct investment, this has led to rapid growth in incomes and until recently, forecasts of future economic growth of the subregion have been highly optimistic (Figure 4.5).

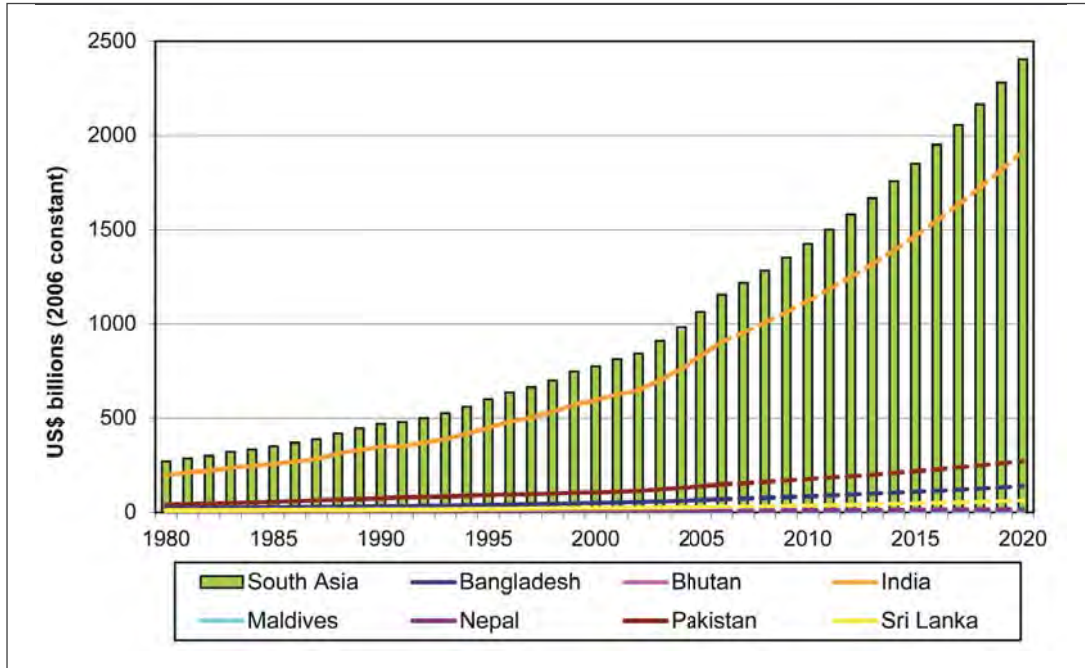


Figure 4.5: Changes in GDP, 2000-2020

Sources: Based on UN (2008b); World Bank (2007a)

However, since 2007 there has been considerable uncertainty over the likelihood of continuation of high growth rates, largely due to changes in the global economic situation. Escalating food and energy prices in late 2007 and early 2008 have driven high rates of inflation: budget deficits have widened and trade balances worsened. As a result, growth rates have slowed down (World Bank 2009a). This has been exacerbated by the global economic downturn that began in mid-2008, reducing South Asian growth rates (although these remain relatively high in comparison with the growth rates of most countries in other regions) (Box 4.1). These lower growth rates are likely to compromise the accomplishment of the Millennium Development Goal of halving poverty rates by 2015, considering that poverty reduction still relies on trickle-down processes.

Box 4.1: Impact of the economic crisis on South Asia

Although all countries in South Asia are affected by the global economic downturn, the severity of the impacts varies depending on the linkages of the economies with the global economy and more importantly the responses of governments in dealing with the crisis. Some countries like Bangladesh, Bhutan and Nepal have been relatively insulated from the initial effects of the crisis, largely due to their less-developed financial markets and their limited linkages with global financial markets. Among those that are strongly linked to the global financial markets, India has responded through a number of fiscal measures including stimulus packages to create stability in domestic markets. Others continue to struggle in view of the limited options available.

There is considerable uncertainty over how long the global downturn will last. Although there was some optimism in 2010, this seems to be vanishing in the context of slow growth in the US and Euro-zone economies and the debt default rescue efforts in a number of European countries. A slowdown in the global economy, especially of the United States, Japan and Europe will negatively impact South Asian exports. Political changes in the Gulf countries will be another factor that could have significant impact on South Asian economies, especially as these could affect employment opportunities and remittances. These adverse impacts have potential to reverse the gains that South Asia has achieved over the past decade and obstruct the subregion's progress towards achieving the Millennium Development Goals. Concern about the growth of economies could have a negative impact on environmental policies and legislation.

(i) *Per capita incomes*

South Asia, with about 23 percent of the global population, accounted for about 2.5 percent of global GDP in 2007. Per capita income in the subregion remains extremely low in comparison with the rest of the Asia-Pacific region and the world (Table 4.4). With the exception of Maldives and Sri Lanka, all countries in the subregion are classified as low-income countries.

Table 4.4: Per capita income (in US\$ PPP) for the South Asia subregion (2005 constant international US\$)

Country	1995	2008
Bangladesh	772	1 356
Bhutan	2 323	4 759
India	1 409	2 946
Maldives	2 520	5 597
Nepal	807	1 104
Pakistan	1 856	2 538

Country	1995	2008
Sri Lanka	2 476	4 564
South Asia subregion	1 383	2 724
Asia-Pacific	3 507	5 835
World	6 975	10 384

Note: PPP = purchasing power parity.

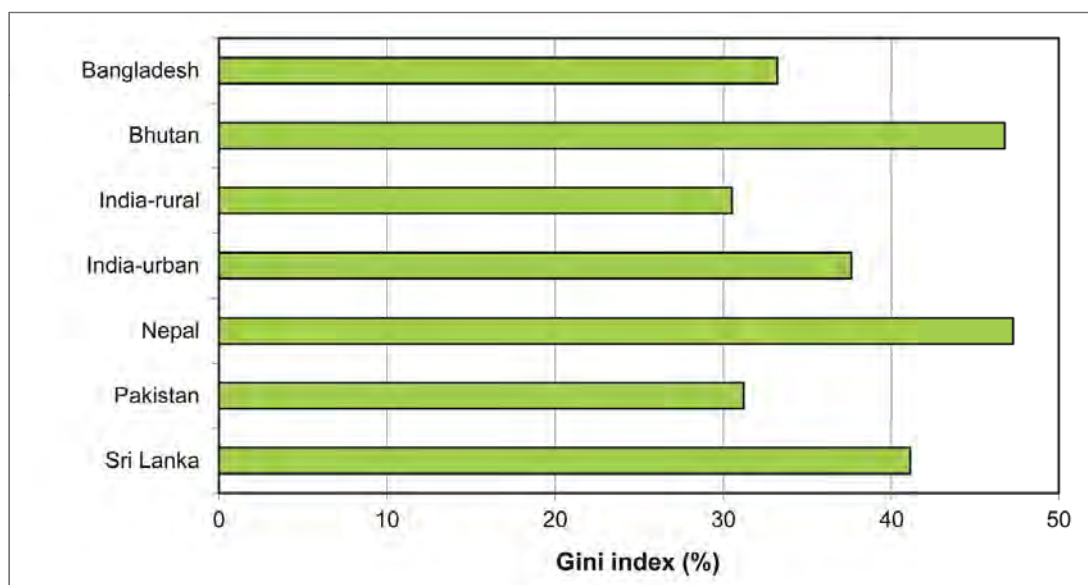
Sources: World Bank (2007a) and FAO (2011)

The implications of low per capita income on forests and forestry include:

- Very high level of dependence on natural resources, but the ability to invest in improved management remains extremely low. There are several studies that suggest an inverse relationship between the level of income and the extent of dependence on natural resources. At lower levels of income there is high dependence on forests.
- Low per capita levels of consumption of wood and wood products. As pointed out in Chapter 3, South Asia's consumption of wood products is very low in comparison with the rest of the region. This also implies enormous demand growth potential as incomes rise. The burgeoning imports of wood and wood products into India in the last few years are indicative of potential growth in demand.

(ii) *Income inequality and poverty*

Although per capita incomes are increasing, poverty remains a major problem for most South Asian countries. This is largely on account of the inequitable distribution of wealth and income (as displayed by the Gini index that measures disparity in income distribution) (Figure 4.6). This disparity is reinforced by a pattern of growth that is concentrated on the urban manufacturing and services sectors.



The Gini index is defined as a ratio of the areas on the Lorenz curve diagram, the basis of the Gini coefficient. A lower number on the Gini index indicates more equal distribution, with 0 corresponding to perfect equality, while higher number indicates more unequal distribution, with 100 corresponding to perfect inequality.

Figure 4.6: Income inequality in selected South Asian countries, 2005

Source: World Bank (2009b)

Changes in income distribution have important implications on the use of natural resources. A highly skewed income distribution implies very divergent demand on resources and consequent potential for resource-use conflicts, especially in situations of high population density. High levels of poverty, especially in rural areas, lead to high dependence on forests to provide basic needs. Although poverty based on the cut off rate of US\$1.25 a day per person in South Asia has fallen (from 60 percent to 40 percent in the period 1981-2005), this has not been sufficient to reduce the region's total number of poor, which stood at almost 596 million in 2005, accounting for 46 percent of the world's poor (UN 2009). India alone accounted for about 456 million poor (World Bank 2007a). Growth is trickling down only at a slow pace to the rural areas where most people live. Rural populations largely consist of small farmers and landless who remain trapped in poverty on account of their narrow asset base and limited skills (especially in the context of inadequate investments in education and skill development). Hence poverty will remain the most critical issue confronting South Asian countries.

Poverty has important implications on the forest sector. In South Asia, as in many developing regions, forested areas are the most underdeveloped in terms of infrastructure and other facilities. The small size of landholdings or landlessness makes people highly dependent on public lands, including forests, for a wide array of products, especially woodfuel, fodder and NWFPs. At the same time, poverty also affects the ability of people to invest in managing the resources sustainably, especially in the context of unclear user rights. Undefined ownership of land and forests in the context of high levels of poverty leads to highly unsustainable use of resources and consequent degradation.

4.2.2. Structural changes in economies

Changes in the structure of economies, especially the relative share of the agriculture, manufacturing and services sectors in income and employment are a major factor contributing to forest transition. An increase in the shares of the manufacturing and services sectors in income and employment implies a corresponding reduction in agriculture's share in employment and income.

Since 1990, the share of agriculture in GDP has declined consistently in all South Asian countries (Table 4.5). The share of agriculture in gross value added has also declined significantly. The most significant decline has been in Sri Lanka, where agriculture's share in GDP went down from about 26 percent in 1990 to about 14 percent in 2009.

Table 4.5: Changes in the share of GDP of the main sectors (in percentage)*

Country	1990			2009		
	Agriculture	Industry	Services	Agriculture	Industry	Services
Bangladesh	31%	21%	48%	19%	29%	53%
Bhutan**	43%	25%	32%	23%	41%	37%
India	32%	28%	41%	17%	28%	55%
Pakistan	27%	25%	48%	21%	24%	55%
Maldives	18%	15%	67%	9%	17%	74%
Nepal	51%	16%	33%	34%	16%	50%
Sri Lanka	26%	29%	45%	14%	28%	58%

Sources: World Bank, (2007b) and (2011)

Nonetheless, the proportion of population dependent on agriculture for employment is declining at a much slower pace, reflecting slower growth in employment opportunities in the industrial and services sectors, rigidity in labour markets and difficulties in transferring skills. Between 1990 and 2006, the proportion of agriculture-dependent people in the population in South Asia declined from 59 percent to 51 percent (FAO 2009a) and absolute numbers increased.

If past trends persist, the share of agriculture in GDP is expected to decline as manufacturing and services sectors expand. This reduces the pressure on land and paves the way for stabilization and recovery of forests as has happened in most developed countries. However, the slower pace of change in employment is a cause for concern (Box 4.2); as incomes from agriculture remain depressed the dependence on non-farming activities, including in forestry – for example, collection of wood and non-wood products – could increase significantly.

Box 4.2: Key facts about agriculture in South Asia

- About 75 percent of South Asia's poor live in rural areas.
- Most of the rural poor depend on rain fed agriculture, livestock, fragile forest and/or casual often migratory employment.
- Agriculture employs about half of the labour force in South Asia and contributes 18 percent of subregional GDP.
- Both the share of agriculture in value added and the percentage of the population involved in agricultural activities are declining.
- Agricultural growth in South Asia is at 4 percent, which is far below the growth rates of other economic sectors.

Sources: World Bank (2007b); FAO (2009a)

The economic downturn during 2008-2009 gives an indication of vulnerability to a decline in the primary sector and increased dependence on exports of goods and services. The crisis has particularly affected the manufacturing and services sectors that are linked to global markets. Slow growth in employment and incomes from the manufacturing and services sectors could affect the structural changes witnessed in the last few years. Returning unemployed urban workers will rejoin the pool of agricultural workers, potentially resulting in both intensification of cultivation and expansion of cultivation to new areas, potentially impacting forests and forestry.

4.2.3. Globalization and its impacts

Although South Asia has a long history of globalization, it is still a relatively less-globalized region in comparison with the rest of Asia and the Pacific. Largely this stems from the less-open policies that prevailed in most countries till the early 1990s. Protectionist policies in the pre-1990 period discouraged imports and foreign investments. However, gradual liberalization has opened up economies since the 1990s, helping to increase FDI, trade and, most importantly, remittances by migrant workers. South Asian countries have joined a number of global, regional and subregional economic cooperation and trade agreements, enabling them to take advantage of trade opportunities.

(i) Foreign direct investments

Foreign direct investment (FDI) in South Asian countries is rising, particularly in the services and manufacturing sectors (Figure 4.7). In 2007, FDI into the subregion reached a high of US\$29.6 billion, an increase of nearly 30 percent from the previous year (and sharply contrasting the low investment in the early 2000s). In 2009, this increased to about US\$38.0 billion (World Bank 2011a) with close to 90 percent flowing to India. However, the current economic downturn in developed countries is likely to be having a negative impact on foreign investments into South Asia.

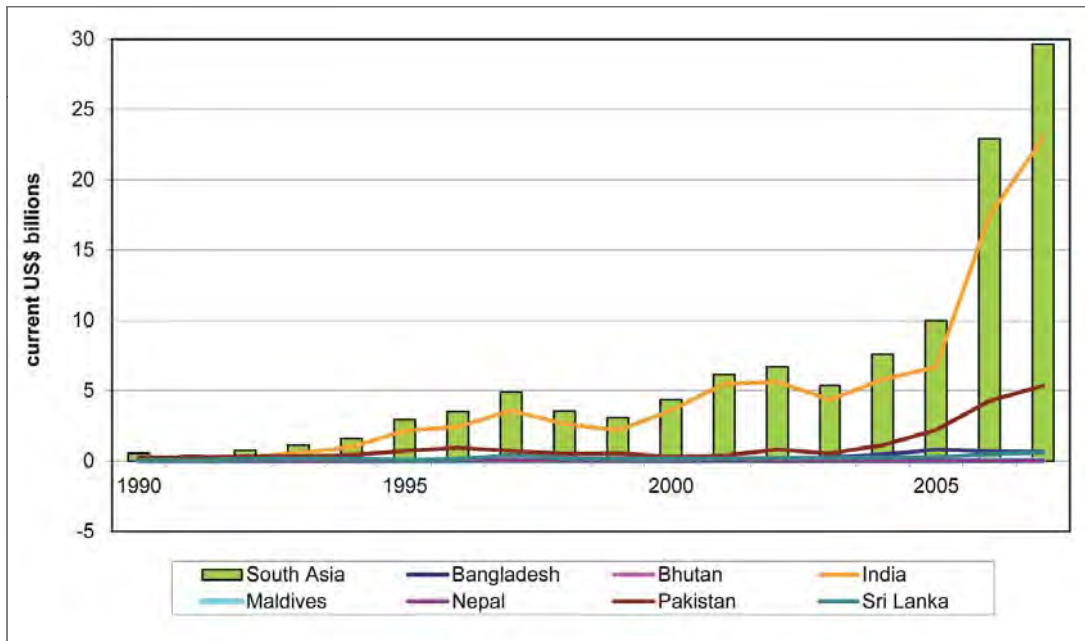


Figure 4.7: Foreign direct investment, net inflows, 1990-2007

Source: World Bank (2007a)

India's dominance in South Asian receipts of FDI is due to its large economy, the huge market constituted by its expanding middle class and some of the country's liberalization policies. Shifts favouring liberalization to promote FDI are now common across all of South Asia. Yet South Asia, along with Sub-Saharan Africa, is regarded as one of the least business-friendly regions in the world. Primarily this is due to poor infrastructure, political uncertainties and civil conflicts, weak regulatory systems and corruption among other major challenges (ADB 2008b), all of which contribute to a risky investment environment.

(ii) Remittances

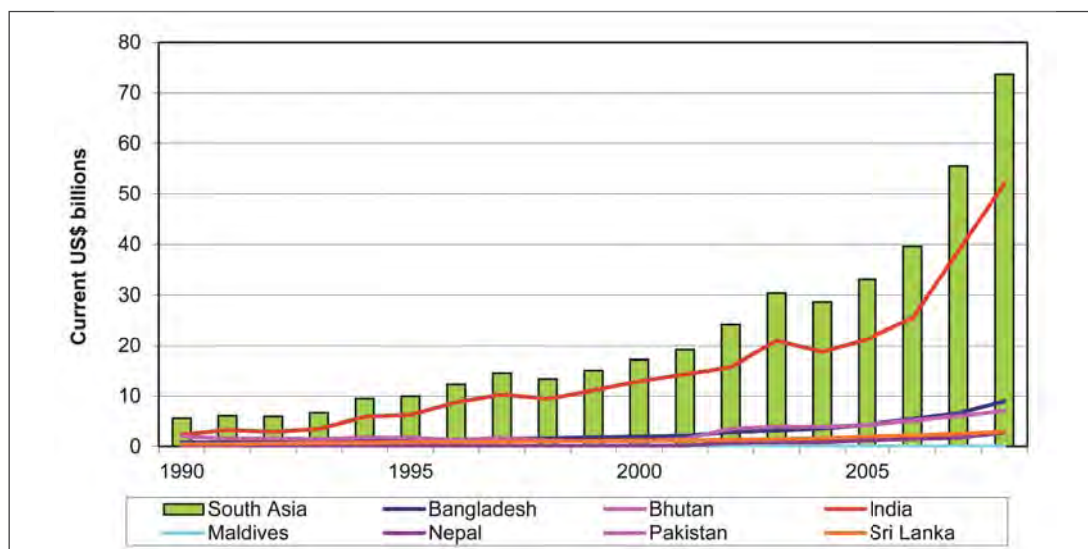
Remittances by migrant workers from South Asia increased from US\$17 billion in 2000 to US\$83 billion in 2010 (Figure 4.8). In 2009, this accounted for about 4.8 percent of the GDP of the South Asian economies (World Bank 2011b), but in some countries (for example Nepal) remittances account for more than one-fifth of GDP and far exceed the combined value of international development assistance and FDI. In the case of Bangladesh, remittances accounted for about 12 percent of GDP (Box 4.3). Actual values of remittances tend to be much higher than what is reported officially in view of the widespread use of informal channels for money transfers.

Work-related migration and remittances have important implications on the use of land and have been identified as important factors contributing to forest transition as indicated below:

- When remittances become an important source of household income, there is a significant reduction in dependence on land and other natural resources. Land-use intensity declines and in some cases land is left fallow (enabling regrowth of natural vegetation) or labour-intensive crops are substituted by less labour-demanding perennial crops.

- Migration reduces overall labour availability, pushing up wage rates significantly. This also makes cultivation of marginal agricultural areas less profitable, often resulting in their reversion to wooded land. There are several examples of how migration and remittances have encouraged land-use changes.
- One of the consequences of increased remittances has been a boom in construction in many parts of South Asia. This has led to: (a) a change in land use (especially via clearance of home gardens and conversion of agricultural land to residential areas); and (b) an increase in the demand for construction materials including wood and wood products, especially in the context of increased pace of house construction.

Although there was concern that the economic downturn during 2008/2009 could reduce the rate of growth of remittances, this has not happened and hitherto the inflow of remittances has remained high. However, a long-term decline in employment opportunities in the context of continued economic woes in the United States and the Eurozone countries, and political and economic changes in the Gulf countries, could alter this. Increased restrictions on employment of migrant workers (especially to enhance employment opportunities for local people) and the slowing down of construction activity in the Gulf countries (which accounts for a significant share of semi-skilled and unskilled employment), could reduce remittances in coming years. Nonetheless, considering the demographic differences between South Asia and other regions, work-related migration is unlikely to diminish, although the number of migrants and the direction of migration may change.



Note: 2008 data are from World Bank staff estimates based on the International Monetary Fund's Balance of Payments Statistics Yearbook 2008.

Figure 4.8: Workers' remittance inflows into South Asia, 1990-2008

Source: World Bank (2009c)

Box 4.3: Economic significance of remittances in Bangladesh

Bangladesh is a major country of origin for migrants, particularly for low- and semi-skilled temporary workers. Between 2002 and 2006, an average of 275 000 Bangladeshi workers left the country for temporary employment overseas. The stock of emigrants in 2010 is estimated at about 5.4 million or about 3.2 percent of the population. Remittances by migrant workers increased from about US\$ 3.2 billion in 2003 to about US\$11.1 billion in 2010 (which in 2010 accounted for about 12 percent of GDP). A steady inflow of remittances to Bangladesh has reduced foreign exchange constraints, improved the balance of payments and helped to increase levels of national saving

Source: World Bank (2011b)

(iii) Global, regional and subregional cooperation and trade agreements

Except for Bhutan, all South Asian countries are members of the World Trade Organization (WTO), enabling them to fully participate in global trade in accordance with the WTO's rules and regulations. In addition, South Asian countries have joined a number of regional, subregional and bilateral trade agreements (Box 4.4). These have helped to open South Asian economies to trade. Significant reductions in tariffs as a consequence of these trade agreements has led to an increase in imports of wood and wood products, easing the pressure on limited forest resources in the subregion. All indications are that, notwithstanding some protectionist voices, economic linkages between the countries within and outside the region will continue to strengthen, helping to increase trade in wood and wood products.

Box 4.4: Regional and subregional integration

There is an ongoing trend towards regionalism in South Asia. Many bilateral initiatives on trade and other issues such as peace, border and conflict agreements have been formed over the past decades. One of the most important is the South Asian Association for Regional Cooperation (SAARC), an economic and political organization formed in 1985 by all countries in the subregion (including Afghanistan since 2007). Important trade agreements include the South Asia Free Trade Agreement (SAFTA) of 2006, the Asia-Pacific Trade Arrangement (APTA) in 1975, which includes Bangladesh, India and Sri Lanka as well as several other North and Southeast Asian countries, and the Bay of Bengal Initiative for Multi-sectoral Technical and Economic Cooperation (BIMST-EC) of 1997, which includes most South Asian countries and two Southeast Asian countries. India has also signed a free trade agreement with the Association of Southeast Asian Nations (ASEAN) and this could have important direct and indirect implications on forests and forestry.

Bilateral trade arrangements are also important to subregional growth. These agreements exist between India and most other South Asian countries. Sri Lanka, which depends heavily on a few export items and lags in export diversification, increased exports by 27 percent to Pakistan in 2007 following the Pakistan-Sri Lanka Free Trade Agreement (2005).

Yet South Asia is one of the least integrated regions in the world, although geographically and culturally it is well suited to widespread cooperation. Intraregional trade in South Asia constitutes less than 2 percent of GDP, while in the case of East Asia it constitutes about 20 percent. Costs of trading across borders are extremely high in South Asia. Low levels of trade are also reflected in low levels of intercountry investments among SAARC countries.

Sources: Khan et al. (2007); World Bank 2007

4.2.4. Economic changes: An overview

The economic outlook for South Asia provides contrasting trends that could have divergent implications on the forest sector as outlined below:

- South Asian economies have registered rapid economic growth during the last decade and there are indications of continued high growth, notwithstanding growth deceleration in the context of the global economic crisis. However, South Asia remains the poorest subregion in the Asia-Pacific region. Per capita incomes have remained very low and five of the seven countries are categorized as low-income countries.
- Rapid economic growth has largely been due to the growth of the manufacturing and services sectors. Agriculture's share in GDP has declined significantly, although the share of employment in agriculture remains high. Changes in the structure of the economy, especially the declining significance of agriculture in income, have important implications on land use and forests.

- South Asia is becoming increasingly linked to the rest of the world on account of the globalization process. However, globalization continues to be asymmetrical and vast segments of population are yet to benefit from increased linkages with the outside world. Uneven globalization has led to an increase in inequality.
- In general, low incomes will also imply reduced willingness and ability to pay for ecosystem services. Short-term income generation will receive precedence over long-term sustainability.
- International migration and remittances are having a number of direct and indirect impacts on the economies and land use in South Asia. There is anecdotal evidence linking increased flow of remittances with reductions in land-use intensity and consequent forest recovery.
- During the last two decades, South Asian economies have been liberalized as a consequence of various global, regional, subregional and bilateral trade and economic cooperation agreements. Trade has become an important engine of growth, enabling countries to capitalize on their competitive advantages, especially low labour costs. Reduced tariff barriers have helped countries to import wood and wood products helping to overcome domestic supply deficits. Yet South Asia remains one of the least economically integrated regions in the world.

4.3. Environmental changes

Environmental changes will be a major driver affecting forests and forestry in South Asia in the next few decades. Chapter 2 provided an overview of the most important forest-derived ecosystem services. As population and incomes increase, the demand for ecosystem services will increase. At the same time, population growth and the demand for goods will increase the pressure on limited resources. Determining the trade-offs between competing demands of different segments of population will continue to be a major challenge. Environmental issues are coming to the forefront because:

- Society is becoming more conscious about environmental values, especially as a decline in these values is affecting people's livelihoods.
- Improved access to information, especially in the context of progress in environmental sciences, is clarifying the cause-effect relationship of various actions, including resource exploitation or resource conservation.
- Advocacy roles of civil society organizations are helping to articulate environmental issues and mobilizing people to address them.
- Increases in incomes are resulting in increased willingness and ability of society to pay for ecosystem services and to meet the higher costs involved in adhering to improved environmental standards.

The demand for protecting and improving ecosystem services is local, national and global. There have been innumerable local environmental initiatives in South Asia that have influenced forests and forestry. Largely, these have a direct bearing on local livelihoods and many are related to conserving and protecting critical resources like water and biodiversity. Public goods like climate change mitigation and adaptation have been driven primarily at the global level, largely based on the work of the

Intergovernmental Panel on Climate Change (IPCC) and this has focused attention on the role of forests and forestry in climate change mitigation and adaptation strategies. How these diverse environmental drivers have affected forests and forestry is outlined next.

4.3.1. Local and national issues and actions

Local and national environmental issues have led to policies and actions directly impacting the forest sector. Withdrawals of water for irrigation and other uses as well as upland forest clearance are rapidly depleting water supplies (Rodell et al. 2009) triggering local initiatives to protect forests. One of the earliest initiatives in recent times has been the 'Chipko movement' in the Indian Himalayas in Uttar Pradesh State (Box 4.5). There are several instances of successful local-level community action to protect forests against logging that affected water supplies and other livelihood products like fodder and NWFPs. In a similar vein, the early 1980s and 1990s witnessed considerable opposition to the introduction of Eucalyptus species on account of its high water requirements and consequent impact on water availability for other crops.

Box 4.5: The Chipko movement: Hugging trees to protect the environment

Villagers in India have a long history of struggle to protect natural resources from exploitation. The Chipko movement is one such major initiative. The movement started in 1973 in the Uttar Pradesh Himalayas; it subsequently spread to several other states in India. Declining water supplies and fodder – on account of logging that was largely catering to distant markets – led to significant mobilization of local communities, especially women, who prevented loggers from cutting down trees by hugging the trees. The mass movement compelled the government to impose a ban on logging, which remains in force today.

Another issue that has attracted considerable attention at local and national levels is loss of biodiversity. In a number of South Asian countries, the system of sacred groves traditionally protected biodiversity and there are still many groves dotted across the agricultural landscape. Local- and national-level efforts help to safeguard these islands of biodiversity, notwithstanding their decline under market-driven developments and the erosion of traditional cultural beliefs.

The establishment of protected areas has also been a primary response to biodiversity loss; in a number of countries a functional separation of wood production and wildlife management has taken place.

Resolving some other local and national issues has been relatively less cumbersome and a number of policy and market interventions have been attempted. In many cases forest management plans have been altered to accommodate local demands for ecosystem services. Disasters like floods and siltation of water storage facilities have led to the imposition of logging bans (Box 4.6).

Box 4.6: Pakistan – floods and logging ban

In 1993, Pakistan experienced the worst floods in the country's history; these were attributed to deforestation in the northern watersheds. In response, a logging ban was imposed by the federal government. However, implementing the logging ban has remained very difficult on account of a number of institutional constraints, including conflicting legal rights. The logging ban also increased timber prices, making illegal logging highly profitable and creating what is referred to as the 'timber mafia'. In addition to deforestation in Pakistan, this organized illegal logging sector has targeted bordering areas of Afghanistan. In October 2005, Pakistan suffered its worst earthquake yet, causing enormous destruction in mountainous areas of the northwest. Areas denuded by logging suffered the most from the ensuing landslides.

Source: Shahbaz and Superi (2009)

Public interest environmental litigation has been extensively used in South Asia to address forest-related environmental issues. Concerned citizens, even when they are not directly affected, have recourse to judicial intervention that requires governments and other players to refrain from actions that could potentially affect ecosystem services, or to take affirmative action to enhance the supply of such services (Box 4.7).

Box 4.7: Public Interest Environmental Litigation (PIL) and forestry

Public interest litigations have become an increasingly effective tool in protecting and maintaining forest-derived ecosystem services in most countries in South Asia. The right to life guaranteed under national constitutions has been interpreted broadly to include the right to a clean environment. In many cases national judiciaries are actively applying internationally-recognized environmental principles such as the 'polluter pays' principle and precautionary principles. Judiciaries in a number of countries have established 'green benches', or environmental courts to deal with environment-related cases. For example, Bangladesh has an environment court established under the Environment Court Act 2000. India has separate tribunals under the National Environmental Tribunal Act and has also established a National Environment Appellate Authority under the 1997 National Environment Appellate Authority Act. Similarly, the 1997 Pakistan Environment Act has provisions for setting up environment tribunals.

These actions have helped to address environmental issues including those dealing with forest-related issues. Concerned citizens are able to take up issues like watershed degradation, loss of biodiversity, etc., stemming from acts of commission or omission by government agencies or other actors. Instances of recourse to PIL are increasing, especially in the context of improved access to information, often facilitated by legislation that makes it mandatory for government officials to provide information to anyone who requests it (for example the Right to Information Act in India). Successful examples of PIL include:

- Protection of mangroves from shrimp farming in India and Bangladesh;
- Abandoned proposals to construct dams that could result in loss of wildlife habitat in India;
- Dismantled electric fences between forests and cultivation that led to the death of wild animals in India;
- Protection of the Houbara Bustard in Pakistan on the basis of initiatives by the Society for Conservation and the Protection of Environment.

In many cases, the 'soft state' is unable to implement existing policies and legislation and PILs are becoming a powerful means for invoking judicial intervention to ensure that the right to a clean environment is safeguarded. However, compliance with judicial directives remains a major problem in view of institutional constraints, as does the limited capacity of the judiciary in the context of the proliferation of PILs.

Source: Partly based on Razzaque (2004)

4.3.2. Global and regional environmental drivers

While local and national environmental issues have long impacted forests and forestry, increasingly global issues are also becoming influential, especially in the context of the provision of global public goods. Impetus to global initiatives has come largely from the United Nations Conference on Environment and Development (UNCED) and various follow-up conventions, in particular the Convention on Biological Diversity (CBD), the United Nations Convention to Combat Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC). These have complemented pre-UNCED conventions like CITES, the Ramsar Convention and the World Heritage Convention.

All countries in South Asia are signatories to the important international forest-related conventions (Bhutan and Maldives are not signatories to the Ramsar Convention). These require that the signatory countries take appropriate actions to implement the conventions and, in many cases, this is pursued and supported by the secretariats of the respective conventions. The conventions have often been able to mobilize resources including technical assistance. Much of the thrust has been to develop national strategies and action plans and to develop necessary capacities to monitor and assess change. Almost all countries have prepared national biodiversity action plans focusing on strengthening in situ and ex situ conservation efforts. However, their implementation continues to be challenging. As elsewhere, in South Asia the main challenge relates to establishing trade-offs between competing objectives. Although efforts hitherto have helped to create considerable awareness, translating awareness into action remains extremely difficult.

Among the various international environment-related conventions, the UNFCCC and the related Kyoto Protocol are having significant impacts on forests and forestry, directly and indirectly, especially in view of forests' potential to alter carbon balances on

account of land-use changes. Since deforestation accounts for about 17 to 20 percent of greenhouse gas emissions, efforts are underway to include REDD under the post-Kyoto protocol climate change mitigation and adaptation arrangements. Most countries have developed their national plans and strategies for climate change mitigation with forestry as an important component (Box 4.8). The potential impact of changing water supplies (especially due to glacial melting) is also a major climate-related concern for most countries in the region (Box 4.9).

Box 4.8: Forestry in national climate change action plans/strategies

- The Bangladesh Climate Change Strategy and Action Plan (prepared in 2008) includes afforestation and reforestation as important components of mitigation strategies and low carbon development. Proposed actions include coastal afforestation to address future rises in salinity and sea levels and support to existing and new homesteads for social forestry to enhance carbon sequestration.
- In June 2008, India unveiled its climate change action plan, which includes eight national missions dealing with key areas that could significantly reduce carbon emissions. This includes the Green India Mission to afforest 6 million hectares of land and to increase the area of forests to one-third of the country's land area.
- Nepal has become a partner country for REDD+ under the Forest Carbon Partnership facility and a draft REDD strategy was produced in mid-2010. As of June 2011 this strategy was under revision.
- The SAARC Action Plan on Climate Change was adopted in the Ministerial Meeting on Climate Change held in Dacca in July 2008. It identified a number of areas for regional cooperation, which included sharing of best practices on sustainable forest management.

Box 4.9: Controversy over melting Himalayan glaciers

The issue of melting Himalayan glaciers has attracted considerable discussion. The IPCC's Fourth Assessment Report pointed out that "Glaciers in the Himalaya are receding faster than any other part of the world and, if the present rate continues, the likelihood of them disappearing by the year 2035 and perhaps sooner is very high if the earth keeps warming at the current rate". However, this assertion has been found to be based on a speculative statement and not based on scientific evidence, compelling the IPCC to retract the statement. Indeed, a number of experts now point out that such a rapid rate of melting is almost impossible.

Nevertheless, this controversy has led to renewed discussion on the implications of Himalayan glacial melting on the livelihoods of people in South Asia and China. The Himalayas are the water tower, supporting the economic well-being of some of the most rapidly growing economies in the world. While the glaciers may not be melting as fast as was originally indicated, continued global warming could have long-term implications on water supplies that are critical to the agrarian economies of South Asia. Any change in water flows would require significant adaptive responses, especially in the context of changes in rainfall patterns and potential degradation of land.

Source: Carrington (2010)

Payment for carbon sequestration to mitigate climate change is one of the most rapidly growing environmental markets. The Kyoto Protocol has created three mechanisms to provide financing: the CDM, joint implementation and emission trading. Under the CDM, Annex I (industrialized) countries may offset part of their emissions through investment in carbon sequestration or substitution projects in non-Annex I (developing) countries and thus acquire tradable certified emission reductions. Under joint implementation, Annex I countries may jointly execute carbon sequestration and substitution projects. Emission trading permits the trading of certified carbon emissions.

South Asia, mainly India, has been a recipient of support for CDM projects (Table 4.6). Most of these are in the renewable energy sector. Land Use, Land-Use Change and Forestry (LULUCF) has been included under the CDM, and as of December 2011 there are seven afforestation projects in South Asia, all in India. Considering high transaction costs, the chances of a significant increase in the number of afforestation/reforestation projects in South Asia under the CDM are limited.

Table 4.6: Registered CDM projects (as of September 2011)

Country	Number of projects
Bangladesh	2
Bhutan	2
India	720
Maldives	0
Nepal	4
Pakistan	12
Sri Lanka	7
South Asia total	747
Asia-Pacific total	2 765
World	3 456

Source: UNFCCC (2011). Last updated 21 September 2011

While the policy-driven carbon market contracted significantly in 2010, voluntary carbon markets – which included the structured and monitored cap-and-trade system of the Chicago Climate Exchange (which was closed in 2010) and more disaggregated over-the-counter (OTC) systems – continued to grow rapidly. During 2010, REDD projects accounted for 29 percent of the credits transacted in voluntary carbon markets (Peters-Stanley et al. 2011). However, voluntary carbon markets, which are not part of any mandatory cap-and-trade system, accounted for less than 0.3 percent by volume of the global carbon market (World Bank 2011c). While some increase may occur in the contribution of forestry to voluntary carbon markets, there remain considerable uncertainties as regards carbon markets overall; they continue to be pioneering efforts with significant risks. In view of land-use pressures, South Asian countries face a number of constraints in taking advantage of carbon markets for promoting forest conservation and arresting deforestation and forest degradation (Box 4.10).

Box 4.10: REDD+ in South Asia

With deforestation and forest degradation identified as major sources of carbon emissions, providing incentives to promote forest conservation has become an important thrust of post Kyoto climate change mitigation and adaptation arrangements. REDD+ is a system of payment for carbon sequestering and storage services aimed at compensating forest owners and other involved parties for potential income losses from alternative uses of forests. A key concern is the development of baseline information on carbon stocks and to develop effective monitoring, assessment, reporting and verification systems. Currently REDD+ is being supported by the multilateral UN REDD programme and, in South Asia, Bangladesh, Bhutan, Nepal, Pakistan and Sri Lanka are observer countries. Nepal is the only country in South Asia currently implementing REDD+ activities under the Forest Carbon Partnership Facility (FCPF) supported by the World Bank. Much of the thrust of the FCPF in Nepal is to develop baseline scenarios and monitoring, reporting and verification (MRV) capacities.

4.4. Political and institutional changes

Policies and institutions that influence forests and forestry are a subset of the larger political and institutional environment and therefore their evolution has an overwhelming impact on the future of the forest sector.

4.4.1. Changes in governance and institutions

Democratic institutions have developed substantially in South Asia, notwithstanding some recent conflicts. Monarchies are fading and so are authoritarian military governments. Some of the most important changes taking place in the governance sphere are discussed below.

(i) *Decentralization and devolution*

Most South Asian countries are making progress in decentralizing governance with provincial and local authorities increasingly taking responsibility for managing key sectors of the economy. However, the degree of decentralization varies across the subregion and the extent of empowerment of decentralized bodies differs considerably. In many cases, power remains concentrated in central or provincial governments and local bodies are often constrained by inadequate devolution of financial and managerial authority. Often, there is considerable inertia for change among established institutions, especially where devolution would undermine long-enjoyed power and authority.

(ii) *The private sector*

The strength of the private sector varies among countries, largely depending on policies and the enabling conditions. Economic liberalization in countries like Bangladesh, India, Pakistan and Sri Lanka has expanded space for the private sector. Notably, the rapid growth of these economies has been due to this expanding role of the private sector. Globalization has brought new opportunities and some corporate players have expanded their operations to become multinational corporations sourcing inputs from – and markets in – other regions. Liberalized policies have also led to a significant increase in FDI in South Asian countries.

The expansion of the private sector has impacted the forest sector. A conspicuous development is increasing wood production on farms and other non-forest areas, often facilitated by government programmes on social and community forestry. Encouraged by the potential to source wood supplies from smallholders, some of the large corporate players have established contractual arrangements with farmers, providing technical assistance for growing trees and eventually procuring wood. There are also instances where wood industries have invested in plantation management in other countries to secure a stable supply of wood.

(iii) *Community involvement*

Another major dimension of change is the increasing thrust of local community involvement in resource management. South Asia has broadly followed international

initiatives to support indigenous peoples rights (Box 4.11) and has made pioneering efforts to devolve forest management to local levels, through JFM (in India) and forest user groups (in Nepal). However, the degree of involvement varies considerably; there are examples where local communities (including forest-dwelling and tribal communities) are taking full responsibility for management of forests and other resources with very little external involvement. However, in many situations, local community involvement is at best passive and in reality government forestry departments continue to maintain very strict control, marginalizing community involvement (see Box 2.20). Yet, as democratic institutions strengthen at grassroots levels, community involvement is expected to broaden considerably. Much will depend on providing a robust policy and legal framework to level playing fields and prevent rent-seeking behaviour by vested interests.

Box 4.11: The Declaration of Rights of Indigenous Peoples

A non-legally binding instrument under international law, the 2007 Declaration of Rights of Indigenous Peoples outlines individual and collective rights of indigenous peoples, as well as their rights to culture, identity, language, employment, health, education and other issues. It also “emphasizes the rights of indigenous peoples to maintain and strengthen their own institutions, cultures and traditions, and to pursue their development in keeping with their own needs and aspirations.” As part of the UN General Assembly, all countries in South Asia have acknowledged and supported the Declaration with the exception of Bangladesh and Bhutan (which abstained). The Declaration represents a trend in South Asian countries toward a more inclusive political and institutional environment particularly as regards bringing local communities to the discussion table and recognizing their rights to resources.

Source: UNPFII (2007)

(iv) Non-governmental organizations

NGOs are emerging as major players in the forestry sector of South Asia. The overall democratic environment coupled with improved access to information has led to rapid growth of NGOs in South Asia during the last two decades. Considering the diverse conditions and issues, there is considerable variation in the objectives, scope and structure of NGOs in the subregion. Those who have strong local roots are pursuing local and national issues while several international NGOs are operating independently or support local-level and/or national organizations. NGOs address a wide range of social, economic, environmental and political issues. Enactment of legislation such as the Right to Information Act in India has strengthened NGOs.

4.4.2. Governance and corruption

While there have been a number of positive institutional developments, weak governance and corruption – given their potentially destabilizing effects – remain

major concerns in most South Asian countries. South Asian policy and institutional frameworks generally look robust on paper, but suffer from severe implementation deficits. Power and authority are often seen as a means of enrichment, corrupting political and administrative processes. With the exception of Bhutan, all South Asian countries have high levels of corruption according to Transparency International's Corruption Perception Index (Table 4.7).

Table 4.7: Perceived levels of corruption in South Asian countries

Country	Corruption Perception Index (CPI)* score, 2008	CPI global rank	CPI regional rank
Bangladesh	2.1	147	27
Bhutan	5.2	45	9
India	3.4	85	14
Maldives	2.8	115	19
Nepal	2.7	121	20
Pakistan	2.5	134	23
Sri Lanka	3.2	92	15

* The CPI represents the degree to which corruption is perceived to exist among public officials and politicians. In a ranking of 1 to 10, a higher score indicates less (perceived) corruption.

Source: Transparency International (2008)

Corruption is a key aspect affecting governance. In general, the share of the informal economy is an indicator of the extent of corruption and poor governance. As competition for access to limited resources intensifies and inequalities in income and wealth increase, informal transactions tend to boom; these are both indicative and contributory to corruption. In terms of the main indicators of good governance, South Asia's performance is far from satisfactory (Table 4.8).

Table 4.8: Trends in governance indicators for South Asian countries

Subregion	Country	Governance score (-2.5 to +2.5)								
		Control of Corruption			Rule of Law			Government Effectiveness		
		1998	2008	Trend	1998	2008	Trend	1998	2008	Trend
South Asia	Bangladesh	-0.7	-1.1	-	-0.8	-0.7	+	-0.6	-0.8	-
	Bhutan	0.7	0.7	+	0.3	0.4	+	0.7	0.1	-
	India	-0.3	-0.4	-	0.2	0.1	-	-0.2	0.0	+
	Maldives	0.1	-0.6	-	0.4	-0.2	-	1.0	-0.4	-
	Nepal	-0.4	-0.7	-	-0.1	-0.8	-	-0.5	-0.8	-
	Pakistan	-0.9	-0.8	+	-0.8	-0.9	-	-0.7	-0.7	-
	Sri Lanka	-0.2	-0.1	+	-0.1	0.0	+	-0.2	-0.3	-

Key:	>0.5	-0.5 to 0.5	<-0.5
------	------	-------------	-------

Definitions: *Control of Corruption* – capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as ‘capture’ of the state by elites and private interests.

Rule of Law – capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and the courts, as well as the likelihood of crime and violence.

Government Effectiveness – capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.

Source: Kaufmann et al. (2009)

Weakening faith in democratic institutions and the persistence of high levels of poverty (often maintained or worsened by corruption) have left an institutional and social vacuum that favours the growth of extremist religious and political groups. Almost all South Asian countries face major challenges in strengthening governance and improving institutions to meet people’s aspirations. Challenges posed by extremist groups are particularly severe in the less-developed zones, as in the case of the northwest region of Pakistan, parts of Nepal and central and northeast regions in India. Although Nepal was able to bring its Maoist insurgents into mainstream politics, considerable uncertainties remain. Sri Lanka has just emerged from a prolonged ethnic conflict and further progress depends on how the aspirations of those who have been marginalized for a long time are fulfilled.

4.5. Developments in science and technology

Development and application of science and technology are particularly critical in resource-scarce situations that exist in most of South Asia. Improving agricultural productivity, managing land and other resources sustainably, enhancing the share of high value-added products in trade and addressing key environmental issues like climate change and conservation of biodiversity are dependent on innovation and its wider adoption. A transition from an agrarian or industrial economy to a knowledge

economy largely depends on investments in science and technology. South Asia's progress in this regard is mixed and there are considerable differences between and within countries. Some of the major issues in science and technology developments in South Asia are summarized below.

4.5.1. Overall level of science and technology investments

Investments in science and technology are relatively low in South Asia, although there have been some significant efforts by countries like India during recent years. However, numbers of researchers and technicians and gross investment per capita on research and development lag far behind global and regional levels (Table 4.8).

Table 4.8: Indicators of research and development (R&D) efforts in South Asia

Country	Number of researchers per million people	Gross domestic expenditure on R&D (% of GDP)	R&D expenditure per capita (US\$ PPP)
India	137	0.85	20.5
Nepal	62	0.67	9.2
Pakistan	152	0.27	5.2
Sri Lanka	93	0.18	5.1
<i>China</i>	<i>630</i>	<i>1.44</i>	
<i>Japan</i>	<i>5 573</i>	<i>3.44</i>	

Note: No comparable information is available for Bangladesh, Bhutan and Maldives. Data for China and Japan give an indication of the relative scale of investments taking place in other key economies in the Asia-Pacific region.

Sources: Pathirage (2005); UNESCO (2010)

There is a direct correlation between the level of investment in research and development and levels of income, especially as shares of production and trade in high technology products increase.

The spread of innovation is also a major issue in most South Asian countries. While pockets of globally competitive high technology exist, vast areas and segments of economies remain outside the reach of new technologies, affecting their productivity and accentuating poverty and resource degradation. There are however some indications of change. The number of connections to the World Wide Web and the number of mobile phone users is slowly rising in South Asia (Table 4.9). India has the fastest growth rate of mobile phone users with the potential to revolutionize access to information, including in remote rural areas. Improved access to information is empowering people in an unprecedented way, triggering major social and economic changes. Improved access to information is creating a level playing field between producers and buyers in value chains. Many small and medium enterprises, including in forestry, have been able to improve their bargaining power. As mobile phones become a more accepted and accessible tool for a wide array of transactions (for example, financial transactions), the overall impacts could be phenomenal.

Table 4.9: Number of Internet users and mobile phone subscribers, 2006

Country	Number of Internet users (per 100 people)	Number of mobile phone subscribers (per 100 people)
Bangladesh	<1	13
Bhutan	4	10
India	11	15
Maldives	7	88
Nepal	1	4
Pakistan	8	22
Sri Lanka	2	26

Source: ADB (2008a)

4.5.2. Agricultural technologies

Agricultural technologies impact forests and forestry directly and indirectly. South Asia, especially India and Pakistan, has made considerable progress in the development and application of productivity-increasing technologies in agriculture, referred to as the 'green revolution'. Facilitated through a network of national and international institutions, the green revolution involved the use of high yielding varieties with increased inputs like water, fertilizers and pesticides. This helped to increase production and to enhance levels of self-sufficiency. Increased productivity to some extent has reduced the need for expanding cultivation into new areas including forests. While the green revolution certainly helped in improving production, a host of social, economic and environmental issues has arisen and there is increasing evidence of the unsustainability of the green revolution and the need for an 'evergreen revolution'. The main problems stemming from the green revolution include:

- Conventional green revolution technologies are resource-intensive as they are dependent on high levels of inputs like water, fertilizers and pesticides. This has limited the spread of the green revolution to resource-poor areas.
- Intensive use of fertilizers and water has led to significant soil degradation, including water logging and salinization. This degradation has been one of the major factors that have led to a tapering off of productivity and even reversal of the gains made during the early stages of the green revolution.
- In view of high input costs, green revolution technologies have been less accessible to small and marginal farmers. Increasing input costs and declining product prices have led to impoverishment and in many cases forced migration to urban areas. In extreme cases suicides of farmers have resulted.

To some extent forestry has been a slow adopter of resource-intensive green revolution technologies and much of the focus has been on their application in monoculture plantations, especially fast growing exotics.

4.5.3. Traditional technology

Many people in South Asia continue to rely on traditional technologies. Interest in these traditional technologies is increasing given the increasing valuation of indigenous cultures as promoted by civil society organizations and particularly in these technologies' ability to incorporate social and environmental issues. Traditional knowledge-based products are gaining importance, most notably within the plant-based health and medicinal industry. Increased investments in research and development are helping to rediscover traditional knowledge and to strengthen its scientific basis. This is changing the market situation for a wide array of NWFPs and their harvesters.

4.5.4. Developments in cutting-edge technologies

A number of Asia-Pacific countries, including India, are at the forefront of investments in cutting-edge technologies, especially remote sensing, biotechnology and nanotechnology. However, the other countries of South Asia are lagging behind. Developments in these areas will have major impacts on resource-use efficiency and energy intensity. Resource assessment and access to such information will change very rapidly in the next few years enabling real-time monitoring of changes. Nanotechnology could help to produce a number of unique products that reduce energy and material requirements. Developments in cellulosic biofuel technologies will also have a major impact on forestry.

4.5.5. Emphasis on green technologies

Growing concern about environmental degradation and more recently climate change has led to considerable emphasis on green technologies, especially those that are resource and energy efficient. Considerable thrust is being given for research and development into easily adoptable renewables, especially solar, wind and biomass energies. In particular, substantial research is underway to reduce the costs of renewables in order to make them competitive with fossil fuels. There is also increasing emphasis on organic farming, reducing the demand for fertilizers, pesticides and water.

Although the share of green technologies is still very small, this segment is expected to grow rapidly as the search continues for means to replace the current resource- and energy-intensive technologies, which are focused almost entirely on short-term commercial profitability.

4.6. Change drivers: An overview

As in the case of other regions, South Asia is also undergoing rapid changes, with significant consequences on the use of natural resources including forests. Some of the major changes expected in the next couple of decades are:

- Increases in population densities and continued urbanization are the major demographic changes that South Asia will witness in the next couple of decades. Notwithstanding the rapid pace of urbanization, most of the population in South Asia will continue to live in rural areas. Land, water, energy and forest resources will be under mounting pressure in view of high population densities.

- South Asia remains a low-income subregion with a very high level of poverty, which increases the pressure on forests. Nonetheless, economic growth during the last decade has been quite impressive for most countries in the subregion. Largely this has been due to favourable internal and external conditions. Although there was some deceleration of growth on account of the global economic crisis that started in 2008, most countries have registered impressive growth rates during the last decade.
- Structural change is taking place, resulting in a decline in the share of agriculture in value added while the share of manufacturing and services is increasing. However, employment growth in the non-agricultural sectors is slow and agriculture still accounts for a major share of employment.
- The global economic downturn is having significant impacts on most South Asian economies, especially those with strong linkages with the rest of the world. There is considerable uncertainty as to how long the current downturn will last. A prolonged slowing down of economies will have a number of adverse impacts on natural resources including forests.
- Although there are some positive developments in policies and institutions, this is an area of considerable uncertainty on account of weak governance and pervasive corruption.
- South Asia has made substantial progress in building a good science and technology foundation. However, this is unevenly distributed and vast segments of the population remain beyond the reach of modern science and technology. There are some signs of change, especially due to the spread of information and communication technologies and the growing thrust on green technology development.
- South Asia is highly vulnerable to endogenous and exogenous environmental changes that could significantly affect the lives of people. Intense human pressure has led to local environmental problems like land degradation, desertification, loss of biodiversity and decline in the quality, quantity and regularity of water supplies. Although the level of per capita carbon emissions from South Asia is very low, the region will be significantly affected by climate change. Most countries have initiated a number of mitigation and adaptation measures with forestry as an integral component.

5

PROBABLE SCENARIOS

The direction of the forest sector primarily depends on larger societal changes, driven by the collective impacts of the drivers described in the previous chapter. These impacts vary across and within countries depending on specific local conditions. Considering all the multiple feedback loops, it is difficult to identify an outlook based solely on one or a few quantifiable drivers of change. While such forecasts provide an indication of future changes, in many cases they are unable to address uncertainties, especially when changes are not easily amenable to quantification. Projections based on a limited number of measurable and quantifiable parameters become outdated within a short time, notwithstanding the use of sophisticated models. Hence there is a growing interest in using more open-ended scenario analyses that take into account all the potential uncertainties as well as drivers that are less amenable to quantification.

As forestry is one of the many components of a national economy and its future development is dependent on the larger changes, it is important to outline the larger societal scenarios. This chapter provides an outline of these wider scenarios, taking into account the collective impact of the drivers described earlier.

5.1. Scenario analysis

Scenario analysis combines quantitative and qualitative analyses, helping to indicate how a given situation is likely to unfold in the future, the implications for society and the options available to effect change (Box 5.1).

Box 5.1: Definition of scenarios

A scenario is a coherent, internally consistent and plausible description of a possible future state of the world. Scenarios are not predictions or forecasts (which indicate outcomes considered most likely), but are alternative images without ascribed likelihoods of how the future might unfold. They may be qualitative, quantitative or both. An overarching logic often relates several components of a scenario, for example, a storyline and/or projections of particular elements of a system. Exploratory (or descriptive) scenarios describe the future according to known processes of change, or as extrapolations of past trends. Normative (or prescriptive) scenarios describe a pre-specified future, optimistic, pessimistic or neutral and a set of actions that might be required to achieve (or avoid) it. Such scenarios are often developed using an inverse modelling approach, by defining constraints and then diagnosing plausible combinations of the underlying conditions that satisfy those constraints.

Sources: Millennium Ecosystem Assessment (2005); World Economic Forum, (2009)

Scenario analysis has been used to identify probable paths of development at the sectoral, regional, national and global levels. One of the earliest applications of scenario analysis is in the energy sector, in particular for oil, which takes into account the collective impact of changing demand, new discoveries of reserves, changing costs of oil extraction and developments in alternative energy technologies. The Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005), the Global Environment Outlook (UNEP 2007 – see Box 5.2) and the Intergovernmental Panel on Climate Change's Fourth Assessment Report have also used scenario analyses to provide an indication of future paths, their implications and various options available. Scenario analysis has also been undertaken at the country level, as in the case of India by the World Economic Forum and the Confederation of Indian Industry (Table 5.1).

Box 5.2: UNEP's GEO 4 scenarios

In assessing the outlook for the global environment, the Global Environment Outlook 4 prepared by the United Nations Environment Programme (UNEP) identifies four broad scenarios depending on the role of key players/institutions and the instruments used by them as outlined below:

- Under the Markets First scenario, the private sector plays the dominant role with a narrow focus on rapid economic growth and sustainability of markets rather than a broader human-environment system. Technological fixes to environmental challenges are emphasized at the expense of policy interventions.
- The Policy First scenario is driven by governments emphasizing strong policies still focused on economic development. Emphasis is on top-down approaches.

- The Security First scenario emerges when markets and governments focus on the betterment of life for a minority of rich people, enabling their better access to resources, ignoring the needs of the majority. Sustainable development is interpreted in a very narrow sense, from the perspective of the powerful with considerable emphasis on draconian rules and regulations to exclude the poor and deprived.
- Under the Sustainability First scenario all stakeholders – civil society organizations, governments and the private sector – work collaboratively to improve environmental and human well-being with a strong emphasis on equity. Equal weight is given to environmental and socio-economic policies and accountability, transparency and legitimacy are stressed across all sectors.

Source: UNEP (2007)

The World Economic Forum along with the Confederation of Indian Industry has undertaken a scenario analysis outlining three plausible paths of social and economic development for India as indicated in Table 5.1

Table 5.1: Plausible paths of social and economic development for India to 2025

Scenarios	'Bolly World' Illusory and superfluous development	'Pahale India' India first – balanced and integrated development	'Atakta Bharat' Directionless India
Economic performance	<ul style="list-style-type: none"> • Growth led by a few select sectors • Rural development neglected 	<ul style="list-style-type: none"> • Broad-based high growth that benefits all • Enhanced global integration 	<ul style="list-style-type: none"> • Low growth with potential constraints by a lacklustre global economy • Persistent domestic weaknesses
Social development	<ul style="list-style-type: none"> • Unbalanced development driven by a few internationalized sectors and states • High disparity across states and regions 	<ul style="list-style-type: none"> • Balanced development • Access to opportunities for all, especially women and the poor 	<ul style="list-style-type: none"> • Rural development neglected • Corruption and violence

Scenarios	'Bolly World' Illusory and superfluous development	'Pahale India' India first – balanced and integrated development	'Atakta Bharat' Directionless India
External relationship	<ul style="list-style-type: none"> Aspiration to become a major global player, but neglects regional relationships 	<ul style="list-style-type: none"> Proactive economic diplomacy and respected global player Peace and prosperity in South Asia and the world 	<ul style="list-style-type: none"> Reactive foreign relations largely shaped by global environment and immediate neighbours
Leadership and governance	<ul style="list-style-type: none"> Oriented towards the self-interest of vocal and privileged minorities Highly opportunistic, lacking in long-term vision 	<ul style="list-style-type: none"> Leaders put India first, above personal and sectoral interests Aligned, effective and inclusive at all levels 	<ul style="list-style-type: none"> Dissatisfaction with ineffective national and state governance Leaders focus on narrow local interests

Source: World Economic Forum (2005)

5.2. South Asian development scenarios

South Asia as a whole is a low-income subregion (according to the World Bank country grouping, only Maldives and Sri Lanka are middle-income countries, with others classified as low-income economies) with considerable intercountry differences in social, economic, technological, political and institutional development. Although there has been rapid growth of the industrial and services sectors and the share of agriculture in GDP is fast declining, the subregion remains primarily an agrarian society with most of the population dependent on agriculture for employment and income. On the whole, the current conditions facing the subregion can be characterized as follows:

1. High population density and low per capita natural resource availability (land, water, forests and energy). With the exception of Bhutan, most countries in South Asia are densely populated. This implies intense competition for limited resources and – in the absence of effective policies and institutions to resolve conflicts and to establish acceptable trade-offs between competing alternatives – the potential for intensified resource conflicts is very high.
2. Low levels of income and high levels of poverty. Rapid economic growth in recent years has led to a reduction in poverty. Yet, South Asia remains one of the poorest subregions in the world. It still accounts for a large share of food-insecure people worldwide and has low levels of accomplishment as regards the physical quality of life. Most countries rely on the 'growth and trickle down' approach to development. Income disparities are increasing rapidly.

3. Mixed situation as regards policy and institutional development. Despite the democratic political framework and the existence of vibrant private and civil society sectors, South Asia faces considerable uncertainties on the political and institutional fronts. Lack of transparency, poor governance and widespread corruption are undermining democratic processes and systems. Absence of effective and credible institutions has led to increased conflicts and the emergence of extremist religious and political groups who take advantage of the marginalization of people. The influence of the informal or underground economy is on the increase; for example, in India the share of the informal economy is estimated to be close to 50 percent of GDP. Corruption is severely undermining efficiency, equity and faith in formal systems.
4. Developments in science and technology are extremely uneven. South Asia has relatively well-developed science and technology capability and some countries like India are at the forefront of developing cutting-edge technologies, especially in space exploration, information and communication technologies, biotechnology, etc. However, the pace of technological penetration is very uneven. Pockets of high technology exist among large swathes where technological change is extremely slow and the essential conditions for adoption of improved technologies are non-existent. This is the case with most sectors including agriculture, forestry, animal husbandry, manufacturing, etc.
5. Global and regional economic situation. Changes in the global and regional economic situation will have profound direct and indirect impacts on the South Asian situation, notwithstanding the fact that South Asia as a whole is quite weakly integrated with the global economy. Of particular concern are the continuing economic woes of most developed countries, which could negatively impact South Asian economies.

Balancing economic growth against social and environmental stability will remain a major challenge for most countries in the subregion. Three broad paths of development can be visualized for South Asia considering the various constraints outlined earlier.

Table 5.2: Possible scenarios for the South Asian subregion

Scenarios	Economic growth	Social stability	Impact on environment
High growth path	<ul style="list-style-type: none"> • High growth rates but susceptible to internal and external uncertainties • Growth largely caters to market demand as influenced by those with the ability to pay for goods and services 	<ul style="list-style-type: none"> • Growing inequity and increasing conflicts as only a few people appropriate the resources • Marginalization of the poor 	<ul style="list-style-type: none"> • Intensive exploitation of natural resources with very little consideration for sustainability • High levels of pollution and carbon emissions
Low growth and stagnation	<ul style="list-style-type: none"> • Low growth rates on account of internal and external constraints 	<ul style="list-style-type: none"> • Persistence of social and economic inequities 	<ul style="list-style-type: none"> • Continued depletion of resources and inability to manage resources sustainably

Scenarios	Economic growth	Social stability	Impact on environment
Green economy	<ul style="list-style-type: none"> Moderate growth rates that can be sustained in the long run. Focus on producing basic needs in goods and services 	<ul style="list-style-type: none"> Thrust on reducing social and economic inequities Focus on meeting basic needs 	<ul style="list-style-type: none"> Thrust on sustainable use of resources Shift from non-renewables to renewable and improved energy and material efficiency

The above three scenarios can also be seen as three pathways in the context of the recent global economic crisis:

- The high growth path envisages a rapid recovery from the recent economic downturn, with countries returning to the high growth paths of the pre-crisis period. Underlying this business-as-usual scenario is the assumption of a rapid economic recovery, along with increased capital flows, growth in trade and high inward remittances.
- However, there is considerable uncertainty as regards a quick recovery. All the indications are that the global economic situation will remain turbulent and recovery could be slow (IMF 2009). Failure to manage domestic problems could push South Asian economies towards a low growth or stagnation scenario, resulting in negative outcomes for forests and forestry.
- The recent economic downturn and the constraints in reviving many economies are also encouraging a search for alternative paths of development. There is increasing discussion on the pursuit of green pathways that are more equitable and sustainable (UNEP 2011). There are already some efforts in this direction in South Asia, although the mainstream development efforts remain focused on achieving high growth rates. A notable country-level effort in this direction is that of Bhutan, which is putting emphasis on increasing 'Gross National Happiness' as opposed to increasing the GNP (Box 5.3).

Box 5.3: Bhutan's pursuit of Gross National Happiness

Bhutan's index of Gross National Happiness (GNH) is an attempt to holistically define quality of life in the country. First used in 1972 by King Jigme Singye Wangchuck, who modernized Bhutan while maintaining Buddhist values, GNH offers an alternative to GNP as a measure of development. While conventional development models emphasize economic growth, GNH stresses that true development of human society occurs only when material and spiritual development occur simultaneously. The four pillars of GNH are promotion of sustainable development, preservation and promotion of cultural values, conservation of the natural environment and establishment of good governance.

In 2007, Bhutan ranked eighth out of 178 countries in 'subjective well-being', a metric used by many psychologists since 1997. In fact, it is the only country in the top 20 'happiest' countries that has a very low GDP.

Source: Government of Bhutan (2009); White (2007)

Figure 5.1 is a schematic presentation of the three scenarios outlined earlier, indicating possible pathways of development focusing on changes in income and social and ecological sustainability.

In most South Asian countries, all three pathways and states could be found in varying proportion. Large tracts of countries may remain in the low growth stagnation scenario, while there could be rapidly growing industrial pockets, adopting modern technologies and managed entirely by focusing on market competitiveness. The subregion may also witness isolated pockets of more equitable low carbon green economies. Proportions of various segments occurring in each country are likely to change over time, depending on the main drivers of change. A more acceptable situation will be one in which the green segment considerably expands and becomes the mainstream economy.

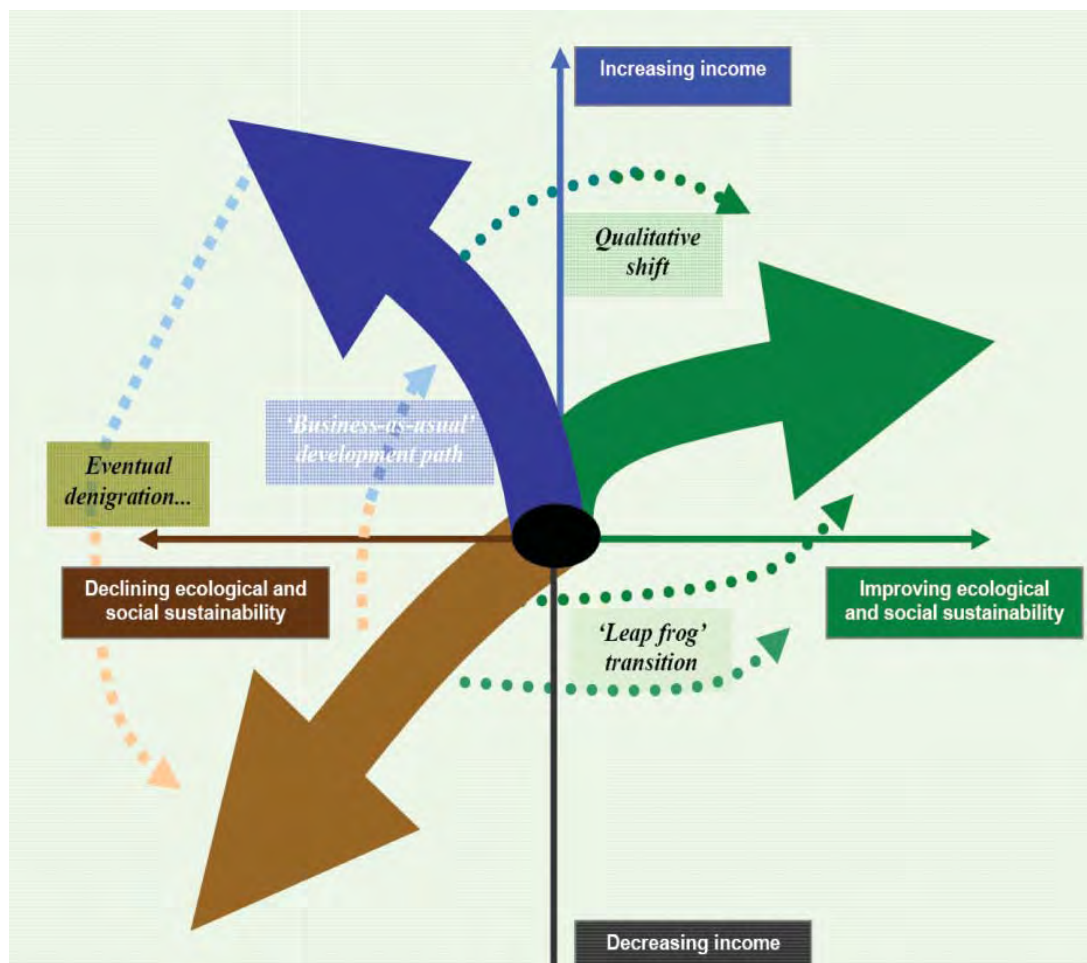


Figure 5.1: An overview of possible scenarios

5.3. Key characteristics of the scenarios

5.3.1. *The high-growth scenario*

Important characteristics of the high-growth scenario include:

(i) *High economic growth rates*

Most South Asian economies have been growing rapidly during the last few years at rates of over 6 percent per year and in some cases exceeding 8 percent. Although the 2008/2009 global economic downturn affected almost all South Asian countries to some extent, overall South Asian economic growth rates are expected to remain high on account of high domestic savings and investments and growing domestic markets.

(ii) *Continued structural changes in economies*

South Asian economies have witnessed important structural changes resulting in a significant reduction in the share of agriculture in employment and income. This structural transformation is expected to persist as indicated below.

- The share of the manufacturing and services sectors in income and employment is expected to increase with a corresponding decline in the share of agriculture in income and employment.
- Increasing wages in the manufacturing and services sectors will reduce the comparative economic viability of agriculture. Further, improved transport access implies market expansion to rural areas undermining the viability of local production.
- Structural transformation is also taking place on account of demographic changes. In many cases the more educated younger generation is less inclined to pursue agriculture as an occupation. This is resulting in less-intensive cultivation of farms and in some cases total fallowing of land. There has even been reduction in the extent of shifting cultivation as the younger generation opts out of farming.
- Another major factor that has contributed to structural change in economies is international migration and remittances. Rapidly expanding employment opportunities, especially in the Gulf countries, have attracted a substantial number of workers from almost all South Asian countries, in particular India, Bangladesh, Pakistan and Sri Lanka. Annual remittances by migrant workers back to South Asian countries in 2010 were estimated at almost US\$83 billion. Under the high-growth scenario, work-related migration and remittances are expected to increase, reducing pressures on land, resulting in the regrowth of vegetation, including trees, especially on farms and in home gardens. Wage increases will reduce the competitiveness of cultivating marginal lands, reducing forest encroachment. There is anecdotal evidence of a decline in illegal felling in parts of India, largely due to availability of more economically attractive options.
- Structural changes of economies will be aided by increased investments in education. Most countries are investing in education and in improving technical skills and this is again helping in the development of the manufacturing and services sectors. This is also contributing to improvements in agricultural technologies, including crop diversification.

All of these factors will help to accelerate structural change, reducing land-use pressures, although demand for minerals and other industrial raw materials is already a major countervailing cause of resource-use conflicts.

(iii) *Energy use*

Rapid economic growth implies an increase in energy demand as well as a shift in the source of energy. In the early stages of industrialization there is a direct correlation between growth in GDP and demand for energy. Some of the changes taking place in regard to energy use are:

- Increased use of fossil fuels, including natural gas, coal, electricity and oil. As transportation infrastructure improves, access to commercial fuel is improving, reducing dependence on traditional biomass energy. Higher incomes further encourage the shift to more convenient sources of energy, resulting in a decline in the use of biomass, including wood.
- As demand for commercial fuels increases and prices escalate, a number of countries has initiated bioenergy programmes aimed to reduce dependence on fossil fuel imports. South Asia has very limited fossil fuel reserves. Oil-producing crops like *Jatropha curcus* and *Pongamia pinnata* have received particular attention, especially in countries like India. Whether there will be increased investments in bioenergy largely depends on relative prices and government policies. More land under bioenergy crops will alter land-use patterns. Although currently bioenergy crops are purportedly established in less-productive wastelands, this is still depriving benefits to those who are traditionally dependent on these so-called wastelands. Change in landownership that marginalizes local people on account of large corporate investments in bioenergy production is another important concern.

(iv) *Accelerating pace of globalization*

Globalization has contributed significantly to the rapid growth of South Asian economies. Increased flows of FDI, improved access to better technologies, increased trade, rapid growth of tourism and increased levels of migration and remittances have all contributed to the globalization of South Asia. South Asia continues to be a destination for investments in manufacturing on account of relatively low wages. These cost advantages also attract investments in high-end manufacturing and business-processing services. Assuming that the current downturn does not have a lasting impact, this trend will help in the transition of South Asian economies, strengthening their linkages with the rest of the world.

However, it is important to recognize the asymmetries in globalization. Often it favours regions and people who are well connected with the rest of the world. This has already led to polarized economic development with pockets of high-income earners among vast areas of poverty and underdevelopment, thereby increasing social tensions and resource degradation. There is increasing realization that growth cannot be sustained in the absence of efforts to correct inequities and imbalances. Efforts are underway to address asymmetries in globalization, although these are often undermined by weak governance and corruption.

(v) *Technological changes*

Rapid uptake of information and communication technologies has brought about a number of positive changes. The rapid growth of mobile phone connectivity has improved access to information even in very remote areas, empowering those who have been traditionally marginalized. Producers, including farmers, have better access to information on prices of inputs and products and can take advantage of the price differentials. E-mail and Internet access are enabling even small-scale forestry enterprises to market products in distant countries. Improved access to information is also compelling fundamental changes in the functioning of institutions including government departments.

(vi) *Political and institutional development*

Considerable uncertainties exist as regards political and institutional developments in South Asia. On the positive side is the emergence of broad-based institutions and government formation through democratic processes. Political freedom has improved significantly and there is rapid growth in private sector and civil society organizations. However, institutional development is uneven and poor governance and corruption are having severe negative impacts on society. This is resulting in considerable public scepticism and the emergence of extremist political and religious groups with narrow agendas. Conflicts are hence on the increase.

The long-term viability of this high-growth path of development is entirely dependent on a highly favourable external environment and the continued growth of the global economy. Considering limited natural resources, there are limits to a resource-exploitative path of development and this necessarily implies the need for resource transfers from outside – investments, remittances, trade surpluses, development assistance, etc. The limitations of such an approach are already evident in the context of the current economic downturn.

5.3.2. *The low-growth/stagnation scenario*

A low-growth/stagnation scenario develops when the domestic resource situation is unsatisfactory and the external environment is also unfavourable, especially in the context of slow recovery from the 2008/2009 economic crisis. Occurrence of major natural calamities, like the floods in Pakistan during August 2010, could worsen the situation, trapping countries in a low-growth scenario as assets are destroyed and resources are allocated for rehabilitation. Continued growth in population densities will strain the situation. Decline in the economic situation of developed countries could decelerate the pace of globalization as many countries focus on improving their domestic situations. With globalization in reverse, incomes from trade and remittances would decline. The general characteristics of a low-growth/stagnation scenario are:

(i) *Structural changes in economies*

- Slow growth and even potential contraction of the manufacturing and services sectors. Employment opportunities not only decline but as production declines more people are thrown out of employment. This could trigger a reverse migration from urban to rural areas increasing the pressures on land.

- As incomes from the manufacturing and services sectors decline, agriculture and other related activities become more attractive. Transition from an agrarian economy is thus stalled or the pace of transition slows down significantly.
- Global economic contraction reduces the scope for overseas employment. Political and economic changes in the Gulf countries could reduce job opportunities for South Asian migrant workers, affecting remittances. A prolonged downturn will delay structural changes in South Asian economies, increasing the pressure on land.
- Contraction of the global economy and slow growth of South Asian economies will also affect growth in the tourism sector. This will again reduce opportunities for non-agricultural incomes, increasing the importance of agriculture in employment and income.

(ii) Globalization in reverse gear

Economic crisis often strengthens the hands of those advocating increased protection. Compulsion to increase domestic employment has encouraged anti-offshoring/anti-outsourcing policies in several countries. Although there is consensus on avoiding such protectionist measures, short-term political compulsions could trigger such measures, affecting the pace of globalization. Declining trade will further reduce the opportunities for structural changes in economies.

(iii) Reduced pace of technological changes

With lower investments, including reduced FDI, the pace of technological advancements may slow. During the past few years there has been a very rapid proliferation of information and communication technologies – especially in mobile phones – in South Asia, buoyed by expanding private sector investments. Private sector-driven technological change may be severely affected if the current economic downturn persists. Science and technology investments by governments may also be affected in view of declining tax revenues and increasing demand for public sector expenditure to deal with the economic crisis.

(iv) Political and institutional underdevelopment

Long-term economic downturn could severely affect political and institutional development. Especially as opportunities for advancements are affected, conflicts could intensify, encouraging the growth of extremist political and religious movements, undermining the pursuit of effective solutions. High levels of unemployment, both rural and urban, could lead to social tensions and conflicts that could potentially take countries on a downward path of underdevelopment, adversely affecting initiatives to manage natural resources sustainably.

5.3.3. The green economy scenario

The economic downturn offers an opportunity for bringing about a significant change from the traditional path of resource- and energy-intensive development pursued in the past. South Asia has considerable potential for shifting to a green economic pathway taking advantage of its science and technology capacity and institutional frameworks,

in particular the democratic institutions. Some elements of a green economy scenario include:

- Improvement in resource-use efficiency, especially land, water, forests and energy to ensure sustainability of production;
- Focus on the needs of the poor and redirecting efforts to meet domestic demand;
- Science and technology development to focus on resource and energy efficiency, including the development and application of new green technologies; and
- Strengthening institutions and improvement in governance and delivery of services.

Several countries are pursuing green pathways, at least in some spheres, with both governmental and non-governmental organizations addressing one or more critical developmental issues. On a national scale Maldives, which could face severe problems on account of climate change-induced sea-level rise, has already outlined its plans to become a carbon-neutral economy; fully tapping wind, solar and biomass energy (Box 5.4). Bhutan's adoption of Gross National Happiness as a measure of development is another example of pursuit of a non-conventional development path.

Box 5.4: Carbon-neutral Maldives

In early 2009, the Government of Maldives announced plans to make the island nation nearly carbon neutral within the coming decade. A package of low-carbon measures, which includes a new renewable electricity generation and transmission infrastructure with 155 large wind turbines, half a square kilometre of rooftop solar panels and a biomass plant burning coconut husks, is estimated to cost around US\$110 million annually for a ten-year period. The country will stop oil imports for electricity generation, transport and other functions and, with oil prices at about US\$100 a barrel, the system is expected to pay for itself in roughly 11 years. It is a very ambitious plan to almost fully decarbonize the economy.

Source: Clark (2009)

There are also several initiatives focusing on equitable and sustainable resource management, often at a local level. Investments in green energy including solar/wind power and biogas have helped local communities to reduce dependence on fossil fuels. Similarly, organic farming is finding wider acceptability on account of its positive impacts on the environment and human health. Water harvesting and improved water management are other areas where substantial work has been done, transforming drought-prone areas into productive agricultural areas. Many of these efforts are spearheaded by local-level institutions, including civil society organizations, fully involving all stakeholders.

To date, lack of investment and increasing demand has undermined the natural resource base in most countries in South Asia. Developing a green economy involves rebuilding the asset base, through land improvement, afforestation and reforestation, watershed protection, etc., which could generate millions of rural jobs, helping to alleviate poverty and food insecurity. Investments in green technologies must also be enhanced to improve efficiency in the use of resources, especially land, water and energy.

The major challenge in the pursuit of a green path to development is improvement in the policy and institutional environment; in particular improving governance and reducing corruption. South Asian countries have very ambitious policies and programmes, but weak institutional frameworks remain a major challenge. For example, India has launched an ambitious national employment generation programme primarily using the decentralized administrative system with most of the planning and implementation being done by the village administration or gramsabha; yet there are concerns about poor implementation, largely stemming from institutional deficiencies. There is significant potential to improve governance through improved access to information (for example the Right to Information Act in India) and increased use of social auditing.

6

SOUTH ASIAN FORESTS AND FORESTRY IN 2020

While an indication has been provided of three likely paths of development in South Asia, it is extremely difficult to indicate how the situation will unfold in the future. In all likelihood, it will be a mix of the three scenarios in varying degrees, especially considering the significant initial differences in situations within and among countries. An attempt is made here to indicate what may happen to forests and forestry in the next decade taking into account the divergent paths of development that may take place in the subregion.

6.1. State of forests and trees

6.1.1. Deforestation and forest degradation

A highly-mixed situation is expected as regards the state of forests and trees in South Asia in the context of the differing scenarios. Some of the broad trends vis-à-vis forest area changes are:

1. Agriculture-related forest clearance is expected to decline in South Asia, especially under the high-growth scenario as manufacturing and services sectors expand, providing employment and income. Such forest transition is already evident in certain pockets in South Asia. Forest area is stabilizing and in some cases starting to recover, especially as horizontal expansion of agriculture ceases and marginal agricultural areas are left uncultivated. Largely this stems from the reduced economic viability of agriculture in marginal areas, especially as input costs, including wages, increase.
2. While the threat of horizontal expansion of agriculture diminishes, public forests are coming under increasing pressure from the demands of a rapidly industrializing society, especially for minerals, infrastructure development and energy. Exploitation of minerals has become a contentious issue in some countries, leading to protests by forest-dependent local communities in view of expected adverse impacts on their livelihoods. A high-growth scenario will accelerate the process of forest clearance, especially in the mineral-rich areas in South Asia.
3. Furthermore, in most countries, degradation of public forests will continue particularly where poverty remains high and landlessness is widespread, increasing

the dependence of people on free-access resources like woodfuel, fodder, NWFPs, etc. High costs of commercial fuels and their inaccessibility to the poor living close to forests will result in increased woodfuel collection accentuating the degradation process.

4. An important development will be continued expansion of tree growing on private farmlands in areas where dependence on land as a source of income declines and labour supply for traditional agriculture becomes a constraint. Support from forest industries through the provision of technical extension services and assured markets will accelerate the process.

A low-growth/stagnation scenario will particularly decelerate forest transition, especially as land dependency increases. In particular:

1. Forest area will continue to decline and even in countries where there were signs of stabilization the situation could reverse on account of increasing dependence on land for income, employment and subsistence. Further, reduced incomes also limit the ability of farmers to invest in improved productivity, encouraging horizontal agricultural expansion.
2. As employment opportunities in manufacturing and services sectors decline, there will be increased dependence on public lands as a source of income. Unorganized collection of woodfuel, NWFPs, timber, etc. intensifies and accelerates forest degradation.
3. Tree planting on farms is likely to slow as farmers use land more intensively to produce agricultural crops in the context of declining incomes from non-agricultural activities, including, for example, remittances. Also, as demand for wood and wood products declines, tree growing becomes commercially less attractive. Declining wages on account of increased unemployment favours labour-intensive crops intended for local markets.

6.1.2. Forest management

In most South Asian countries, the extent of natural forests has declined considerably in the past few decades and there is increasing thrust on managing what remains as protected areas. Several countries have discontinued traditional management focused on wood production and in many cases have imposed logging bans. In view of the increasing demand for ecosystem services, most natural forests will continue to be excluded from the purview of wood production based on earlier systems of forest management. Unfortunately, this may have a number of negative consequences:

- Considering intense human pressures and scaling down of investments in management, degradation will persist. Of particular concern is the increasing incidence of fires, especially as protection is scaled down.
- In a number of countries, natural forests are located in inaccessible underdeveloped areas, subjected to conflicts. Despite a long history of systematic management extending over many decades, there has been a significant decline in capacity to manage these forests sustainably.

- Encouragement of illegal logging.
- With the developments in wood utilization technologies and the potential of plantations to produce wood at lower costs, the dependence on natural forests for wood production will continue to decline. While the growing interest in ecosystem services, especially recreation, may attract some investments, these are more likely to be confined to relatively more accessible areas and other forests could be neglected. Both will contribute to continued degradation of natural forests, especially if current institutional weaknesses persist.

6.1.3. Forest plantations

The total extent of planted forests in South Asia is about 11 million hectares (India alone accounts for about 10 million hectares). Although there has been some expansion of forest plantations, the scope for significant expansion is constrained because:

- High population densities imply severe constraints as regards land availability. Most of the more productive areas are already under intensive uses. The scope for large-scale industrial plantations is extremely limited considering the non-availability of suitable land.
- Although such land can be found in the extensive tracts of publicly-owned forests, they are unlikely to be made available for plantations. Clearing natural forests for the establishment of plantations is becoming increasingly unacceptable. There is considerable reluctance even to allow establishment of plantations on low-productivity wastelands on account of their potential negative impacts on supplies of subsistence products and services to local communities; though often such benefits tend to be very low. Some countries such as Sri Lanka are attempting to convert plantations of exotic species into mixed crops by encouraging the growth of natural vegetation. Very little land is available outside public forests, which are under government control.

On the whole, the extent of plantations is unlikely to expand very much during the next decade under either high-growth or low-growth scenarios. Under the high-growth scenario, imports will be considered as a preferred option in view of constraints on the availability of land and water; especially when wood can be procured at low prices from countries where it can be produced more efficiently.

The pursuit of a green path to development will however lead to considerable expansion of tree planting, especially if climate change mitigation becomes a major concern. Similarly, climate change may inspire a compulsion to produce wood locally to reduce the carbon footprint stemming from long distance transport.

6.1.4 Trees outside forests

Trees outside forests, especially on farmlands, are expected to increase in the context of declining economic viability of agriculture, as input costs escalate and agricultural prices remain low. Especially as the average size of farms declines and wages increase, many farms find it uneconomical to cultivate agricultural crops. This results in a significant

reduction in the intensity of farming, paving the way for an increase in tree crops especially in areas where soil and climatic conditions are favourable or where farmers systematize efforts to plant less labour-intensive tree crops. Often this is supported by industries seeking an assured supply of wood raw material.

6.2. Forest products

6.2.1. Wood and wood products

Under the high-growth scenario, the demand for wood and wood products will grow significantly. Table 6.1 indicates key trends and outlook for demands for important products to 2020.

Table 6.1: Demand (consumption) for wood and wood products (in million m³/tonnes)

Product	2005	2010	2015	2020	Average annual growth (%), 2000-2020
Sawnwood (m ³)	17	29	22	26	3.5
Wood-based panels (m ³)	3	4	4	5	4,4
Paper and paperboard (tonnes)	7	10	15	20	12.4
Newsprint (tonnes)	2	3	4	6	13.3
Industrial roundwood (m ³)	33	42	54	66	6.7

Source: Jonsson and Whiteman (2008)

In view of the current very low per capita consumption of wood and wood products, an increase in incomes would entail a significant increase in the demand for most products. Figures 6.1 and 6.2 give an indication of likely trends in consumption of important products under the high-growth and low-growth scenarios.

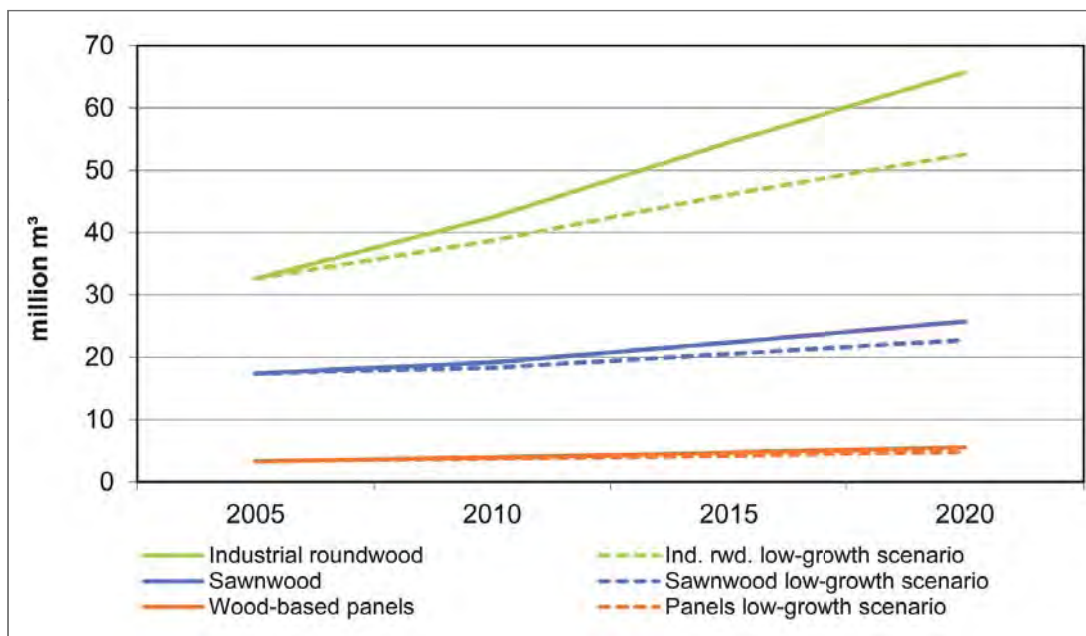


Figure 6.1: Industrial roundwood, sawnwood and wood-based panel consumption under the high-growth and low-growth scenarios, 2005-2020

Source: Jonsson and Whiteman (2008)

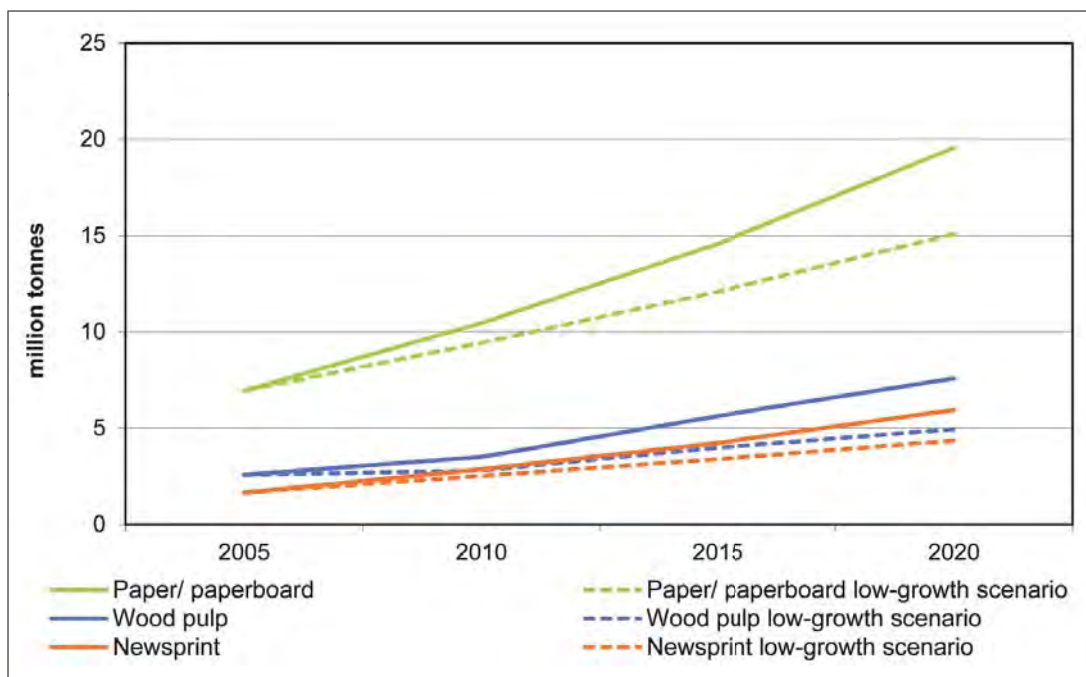


Figure 6.2: Paper, paperboard and newsprint consumption under the high-growth and low-growth scenarios, 2005-2020

Source: Jonsson and Whiteman (2008)

Resource constraints – especially land and water – imply that South Asia will have to rely on other countries – within and outside of the Asia-Pacific region – to meet an increasing

share of its demand for wood and wood products. The value of imports to the subregion has increased significantly during the last ten years (Figure 3.3), indicating a growing dependence in the subregion (especially India) on wood resources from countries outside the subregion.

Under the low-growth scenario imports will decline significantly in line with an overall contraction of trade. This could be accentuated in the context of protectionist policies. Although demand will be much lower than the high-growth scenario, reduced imports will imply increased pressure on domestic forest resources in the subregion.

6.2.2. Wood energy

Demand for energy is expected to grow in line with growth in incomes and the share of biomass energy will largely depend on relative costs of different energies and their availability. The rapidly growing manufacturing and services sectors largely use commercial energy, primarily fossil fuels, although there are increasing investments in renewables like wind and solar energies, and very recently nuclear energy. Currently over 90 percent of wood in the subregion is used as woodfuel. Under the high-growth scenario the potential for moving up the energy ladder is significant, provided fossil fuel prices remain low. Recent forecasts suggest a levelling off in woodfuel consumption in South Asia (Figure 6.3) and eventually some decline on account of increased incomes and improved access to more convenient commercial fuels.

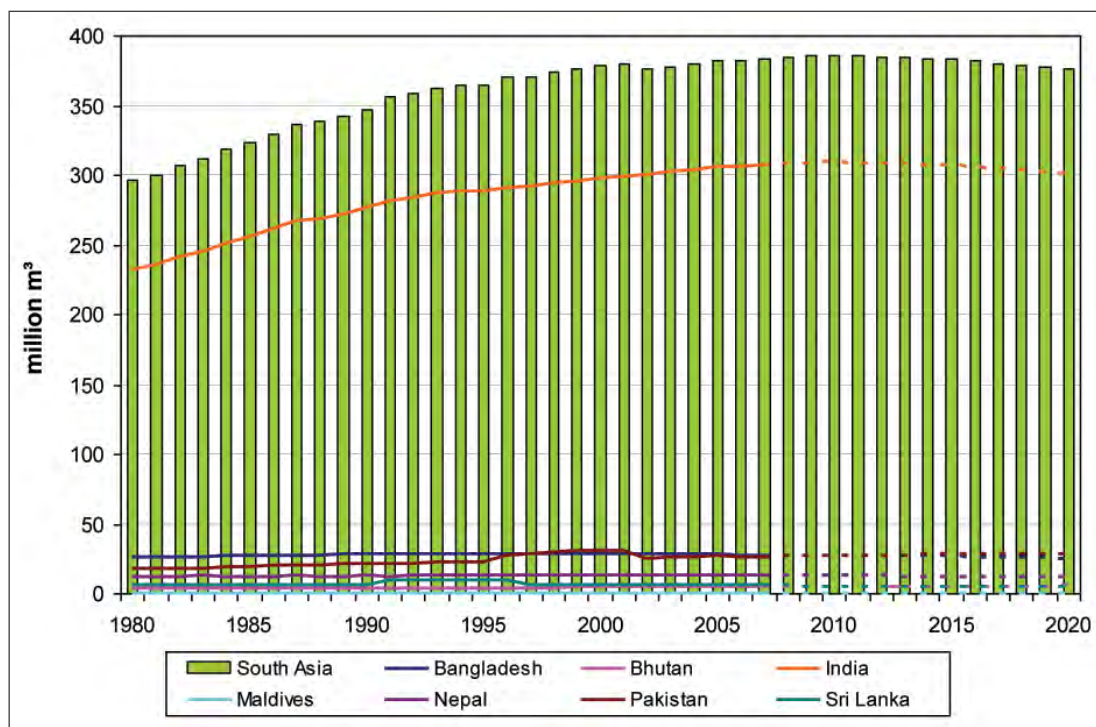


Figure 6.3: Woodfuel consumption, 1990-2020

Source: Jonsson and Whiteman (2008)

Climate change mitigation policies may, however, encourage greater use of bioenergy. As indicated earlier, a number of countries have already embarked on ambitious bioenergy production programmes, growing oil crops like *Jatropha*. In the context of increasing oil prices, some governments have formulated policies encouraging the increased use of bioenergy. While these may help to substitute for fossil fuels, traditional biomass including woodfuel and other biomass materials (especially agricultural residues) will remain the dominant energy source for meeting household energy needs, especially for cooking.

The wood energy outlook will be extremely varied under the low-growth/ stagnation scenario on account of a number of complex factors that could change the balance of demand and supply in several ways. Most important will be factors constraining ability to move up the energy ladder and hence requiring continued dependence on low cost biomass energy, including woodfuel. With lower incomes and more people living in rural areas, unsustainable exploitation of wood and other biomass resources is likely to intensify.

6.2.3. Non-wood forest products

Considering the enormous diversity of products, it is extremely difficult to indicate the path of development of NWFPs under the high-growth scenario. A wide range of pathways can be identified even under one broad scenario depending on product, end uses and markets. Some of the broad trends will include:

- Significant decline in the consumption of subsistence products, especially in the context of increased access to products perceived as superior;
- Reduction in subsistence collection, especially on account of increasing wages and better employment opportunities;
- More systematic cultivation of some commercially important products in view of increasing demand by NWFP-based industries. There has been significant growth in demand for health and beauty products and industries are supporting domestication and cultivation to ensure regular supply of raw materials. Farmers are also opting for cultivation as a product diversification strategy and to take advantage of demand for new products.
- Increased cultivation entails a shift from collection from the wild to domestication and more organized activities. However, some limited collection from the wild may persist, especially in the case of some high value products that are in great demand, but which face problems as regards organized cultivation or in the case of products that command a high price premium in view of their wild origin.

A low-growth scenario implies the following for NWFPs:

- Continued importance of subsistence products, especially as markets for those produced in the organized sector shrink;
- Unstable demand for products and reduced incentives for domestication and organized cultivation; and
- Greater role of the informal sector, including illegal collection.

6.3. Ecosystem services

Under the high-growth scenario, the provision of ecosystem services will face a very mixed situation. Increased incomes and growing pressure from more educated sections in society will create greater demand for ecosystem services; greater ability of society to pay for such services will support these efforts. At the same time, rapid economic growth entails increased use of natural resources – including land, water, wood, energy, minerals, etc. – that could undermine ecosystem services within and outside the region. Some specific issues with regard to selected ecosystem services are:

6.3.1. Conservation of biodiversity

Management of protected areas will continue to face challenges in South Asia. While pressures on land on account of agricultural expansion may diminish and there will be more resources available to manage protected areas, most countries will find it extremely difficult to protect biodiversity in view of growth in mining and infrastructural development aimed to support rapid growth of the manufacturing and industrial sectors. Coastal ecosystems, especially mangroves, will be particularly vulnerable to urban expansion. Although regulations exist to curtail large-scale development in more densely-populated coastal zones, institutional deficiencies – and more particularly inability to establish appropriate trade-offs between conservation and development – will affect the implementation of various regulations.

6.3.2. Watershed protection

A mixed situation will prevail as regards watershed protection in South Asia. Improvement in some areas on account of less-intensive use of land for agriculture will be overwhelmed by widespread degradation of public lands. Although existing water scarcity may permit increased investments in improving watersheds, institutional constraints will remain a major hurdle in promoting integrated management of land and water. Market mechanisms, especially through payment for watershed services by downstream water users, are unlikely to find wider application.

6.3.3. Climate change mitigation and adaptation

Carbon emissions under the high-growth scenario are expected to increase significantly, unless energy intensity is reduced through technological improvements. As a relatively low cost option to improve carbon balance, afforestation and reforestation will gain prominence. Reducing emissions from deforestation and forest degradation will also gain substantial attention, especially in the context of ongoing international initiatives like REDD+ and the Forest Carbon Partnership. Increased incomes and willingness to pay for ecosystem services will encourage such efforts. Some of the specific issues that South Asia has to address in this regard include:

- Most forests are under *de jure* but not necessarily *de facto* public ownership, in view of the very limited capacities of public sector forestry institutions. A significant

share of forest clearance and degradation stems from less tractable informal sector activities.

- In view of intense pressures on forests on account of high population densities, costs of sequestering and storing carbon will be very high, especially in the absence of appropriate institutional changes. This makes South Asia less competitive in comparison with other regions where productivity is high or pressures on land are few.

6.3.4. Ecotourism

Forest-based ecotourism will be one of the fastest growing ecosystem services, largely due to rapid growth of world tourism and greater involvement of the private sector to develop and manage tourism facilities (supported by appropriate government policies). Increasing incomes, greater mobility of people and improved access to information will be major factors contributing to this rapid growth. Private and public sector tourism promoters will continue to use innovative approaches to publicize and attract visitors. Especially as infrastructure improves, more forests and adjoining landscapes will be valued for their recreational benefits. In a number of countries in South Asia, there has been rapid growth of resorts and other such facilities in forests and adjoining areas. Such developments could have both positive and negative impacts. While scenic and other values are cherished by an increasingly environmentally-conscious section in society, this could also have negative impacts in the context of unmanaged expansion of infrastructure and influxes of visitors. Promoting socially and environmentally responsible tourism will be extremely challenging. High population densities will result in severe human pressures on recreational assets.

The low-growth/ stagnation scenario will have a number of negative impacts on the provision of forest-related ecosystem services. As incomes from the manufacturing and services sectors decline, direct dependency on natural resources will increase. Lower incomes also imply a significant reduction in society's ability and willingness to pay for ecosystem services. Some potential impacts of the low-growth/ stagnation scenario on ecosystem services are indicated in Table 6.2.

Table 6.2: Impact of a low-growth scenario on forest-derived ecosystem services

Ecosystem services	Potential developments
Conservation of biodiversity	Biodiversity conservation will face a mixed situation. Agricultural expansion, especially by smallholders, may lead to forest clearance as well as increased degradation on account of unorganized collection of woodfuel and NWFPs. Declining incomes will reduce the ability of society to invest in improving management of biodiversity. However, reduced investments in mining, infrastructure development and large-scale plantation crops could potentially have a positive impact.

Ecosystem services	Potential developments
Watershed protection	Watershed protection will face challenging times under the low-growth/stagnation scenario. The ability of farmers to adopt soil- and water-conserving farming techniques will be affected severely. Public land will be under increasing pressure, especially on account of increased demands for grazing and collection of wood and NWFPs. A prolonged economic recession will affect government abilities to invest in improved management of public lands including forests. All these factors will have a negative impact on watershed values.
Climate change mitigation and adaptation	<p>The low-growth/stagnation scenario will also have direct and indirect impacts on climate change mitigation and adaptation, affecting both demand and supply sides of the equation. In the context of a long-term economic recession the ability and willingness of society to implement measures that reduce emissions will decline significantly. Also as industrial activity slows down, energy use and consequent greenhouse gas emissions could decline significantly, although there could be a potential increase of emissions from land-use changes, in view of agricultural expansion and forest degradation.</p> <p>Sustained economic decline will have a number of negative impacts especially on some ongoing efforts like the CDM and REDD. Emission-trading schemes could be affected by declines in carbon prices. Support for initiatives like REDD could be affected especially if transaction costs are seen as high.</p>
Ecotourism	A long-term decline in the economic situation will affect both the supply and demand for ecotourism. As incomes stagnate or decline, visitor numbers could decline significantly. Reduced profitability will make investments in ecotourism less attractive. Efforts to cut costs could potentially result in lowered social and environmental standards affecting long-term sustainability.

Despite these negative impacts, there could be some positive effects on account of reduced demand for minerals and other industrial raw materials, resulting in reduced forest clearance for mining, infrastructure development and expansion of industrial plantations (for example rubber and oil-palm). Reduced wood demand will also reduce logging, which could have positive impacts on natural forests, especially in countries that are major exporters of wood to South Asia.

However, the low-growth scenario will significantly disrupt the provision of ecosystem services, especially as society's ability and willingness to pay for such services diminishes. Direct dependence on land will increase with much of the focus on its use at the extensive margin. Although fossil fuel-related greenhouse gas emissions might decline, land-use change-related emissions are likely to increase.

6.4. The green economy scenario

The green economy scenario gives considerable thrust to institutional development and empowerment of people to pursue a path of sustainable development. While economic growth will be moderate, equity and environmental sustainability will receive greater attention. The primary focus will be to adopt green technologies that are more environmentally friendly, significantly improving efficiency in the use of energy and raw materials. The implications of such a scenario on forests and forestry are outlined below, though often more far-reaching effects are likely to be evident only beyond 2020.

6.4.1. Management of natural forests

In the high-growth scenario, economic dimensions receive the most attention and wood production shifts away from natural forests to intensively-managed forest plantations. In the green economy scenario, natural forests under sustainable management will remain an important source of wood supply. Much of the thrust will be to implement an ecosystem approach to management based on a thorough understanding of ecological processes and management techniques designed to fine-tune them. Management will be highly skill-intensive, based on the latest technologies, helping to closely monitor changes in ecosystems including carbon fluxes. Reduced impact logging will be applied on a wider scale. Precision forestry, which is extremely skill- and knowledge-intensive, will find wider application.

6.4.2. Management of plantations

Plantation forestry will undergo major changes both in scale and species composition. Greater thrust on environmental considerations, especially microvariations in site conditions, will result in a reduction of large-scale monoculture plantations, which are currently an important source of industrial wood supply. Mixed plantations, mainly indigenous species, will find wider acceptance. Developments in wood-processing technologies will be able to deal with differences in physical and chemical properties, obviating the need for large-scale plantations producing uniform material.

Wider adoption of forest certification will significantly improve the management of natural forests and forest plantations, ensuring compliance with social, economic and environmental criteria.

6.4.3. Demand for wood and wood products

With increasing emphasis on the use of less energy-intensive products, wood will become the most favoured product, replacing cement, steel and aluminium. While this could increase the demand for wood, efforts to recycle and reuse wood will reduce overall demand. Other technological developments – for example nano technology – could enhance resource and energy efficiency, further reducing demand for wood. Wood will become the raw material for a wide array of green products including energy.

As electronic communication improves, growth in demand for printing and writing paper and newsprint will be slower than under present trends. Most pulp and paper units will be redesigned as 'bio refineries', ensuring total utilization of biomass and significantly reducing the emission of pollutants.

Trade will continue to be important, especially for items that cannot be produced domestically; but as society becomes more conscious about the carbon footprint of long-distance procurement of products, growth of trade entirely based on short-term competitive advantage will decline.

6.4.4. Wood energy

Energy and climate change policies under the green economy scenario will significantly boost demand for wood as a source of energy, partially replacing non-renewables. However, wider application of known energy-efficient technologies and the development of new technologies (including cellulosic biofuel production, small-scale biogasifiers, etc.) could considerably reduce overall demand and bring other benefits, including, for example, reduced indoor pollution from burning wood.

6.4.5. Non-wood forest products

Improved management of natural forests will pay particular attention to conserving the wealth of NWFPs, ensuring their sustainable production. NWFPs produced sustainably from the wild will command higher price premiums and wider adoption of certification and fair-trade systems will ensure that local producers have the necessary incentive to sustainably manage resources. Improvements in information and communication technologies, especially mobile phones, will ensure that producers have timely access to market information. Domestication and cultivation of NWFPs will also expand, and these will be well integrated with farming practices.

6.4.6. Ecosystem services

The compartmentalized approach to environmental management will be replaced by a more integrated approach, combining different environmental values such as conservation of biodiversity, watershed management, climate change mitigation and arresting land degradation and desertification. Biodiversity conservation will not be confined simply to protected areas, but will be integrated with all land-use practices. There are already a number of examples of such efforts at local levels (for example, sacred groves in most South Asian countries and villagers protecting wildlife). Similar approaches could be designed and developed to suit diverse conditions.

Watershed values will be significantly improved through better land-use planning and more systematic efforts for water and soil conservation. Even in highly unfavourable conditions, farmers have adopted a wide variety of soil and water conservation measures, significantly increasing productivity on a sustainable basis. There are several instances of highly successful water-harvesting techniques that have helped villagers to maintain productivity. Improved management of natural forests and plantations will further help to improve watershed values.

While mass tourism with its high environmental footprint of energy and resource intensity is expected to decline, there will be a significant increase in ecotourism that protects and sustains natural and cultural landscapes. Local communities will be the main beneficiaries.

Climate change mitigation and adaptation will become an integral part of management of the economy. Effective monitoring of carbon footprints along with implementation of sustainable forest management and energy conservation measures will reduce the need for stand-alone and often fragmented climate change mitigation and adaptation measures.

6.5. Forest transition in South Asia

An important issue as regards the future of forests and forestry in South Asia is the likelihood of forest transition (when forest area stabilizes and a net increase in forest area occurs) in the near future. As economies become wealthier and more diversified, dependence on land as a source of income declines and horizontal expansion of agriculture slows, paving the way for stability and recovery at the forest frontier. In South Asia, India is often considered as an example of early forest transition (Gregersen et al 2011). Considering the diverse situation in the subregion the onset of forest transition will vary between countries as indicated in Table 6.3.

Table 6.3: Forest transition in South Asian countries

Country	Likelihood of forest transition
Bangladesh	Forest loss is expected to persist in the next ten years and even beyond in view of the collective impact of several negative factors.
Bhutan	A relatively resource-abundant situation with less skewed distribution of wealth and income, significant investments in social sectors and expanding service sectors are contributing to the stability at the forest frontier. Increasing demand for resources from rapidly growing neighbouring economies could have a significant impact on the economy and the forests.
India	Considering the enormous diversity in economic, social and ecological conditions, a mixed situation is likely to prevail. While there are pockets of forest transition (especially due to intensive farm forestry as in the case of states like Gujarat, Haryana and Punjab, or due to abandonment of shifting cultivation in some of the North Eastern States), there are also areas and states losing large tracts of forests for mining, infrastructure development etc. Large-scale imports of forest products have to some extent exported deforestation problems to other countries.
Maldives	The scope for increasing the extent of forests (other than to improve amenity values in support of the tourism industry) is limited. The challenge will be to protect and improve existing tree growth in the context of increasing population density.

Country	Likelihood of forest transition
Nepal	A mixed situation with potential for early forest transition. Initial forest recovery is more likely in the hills, partly on account of migration to the plains and other countries and the consequent remittance effect on land use. In the more densely populated and productive Terai region, conflicts could intensify resulting in continued deforestation and degradation.
Pakistan	Pakistan faces acute pressures on its natural resources including forests. There are no signs of stability at the forest frontier. Forest transition is quite unlikely in the next decade on account of the impact of several negative factors.
Sri Lanka	Several factors – especially demographic and economic – could aid forest transition during the next decade.

6.6. Scenarios and their implications: An overview

One of the major features of South Asia is severe natural resource constraints. With the exception of Bhutan, availability of land, water, energy and forests is limited and conflicts in their use are intense. Deforestation and forest degradation are largely an outcome of this intense human pressure. Most countries find the adoption of sustainable forest management extremely challenging. Supplies of goods and services from forests are far from satisfactory. Even managing protected areas that were established long ago has become difficult in view of persistent resource-use conflicts.

Economic diversification, especially through development of the manufacturing and services sectors, has been an important development that has helped to reduce rural poverty. Globalization has accelerated the process, leading to increased FDI, offshoring and remittances, all contributing to increased incomes and multiplier impacts on domestic economies. The declining share of agriculture in employment and income has to some extent reduced the pressures on forests. However, rapid industrialization and consequent demand for raw materials and energy are putting countervailing increased pressure on forests. Thus while agriculture-related pressure may decline, the pressures from rapid industrialization could have a significant impact on forest resources and consequently on supplies of goods and services.

7

PRIORITIES AND STRATEGIES

The scenario analysis in the previous chapter provides an indication of the choices available to South Asian countries. As such there is considerable thrust on accomplishing high growth rates with the expectation that this will eventually trickle down to the grassroots helping to alleviate widespread poverty in the subregion. There are, however, internal and external limitations to the high-growth scenario considering the severe resource constraints facing countries, persistent poverty, growing inequality and mounting social conflicts. A more balanced approach will require the pursuit of a green path as outlined under the green economy scenario. There are already some efforts in this direction, although still a very small fraction of the totality of development efforts. The forest sector has a unique opportunity to play an important role in build a green economy. This chapter outlines some of the priorities and strategies that may be pursued to accomplish this objective.

7.1. Priorities

The South Asian subregion is subject to three major vulnerabilities:

- Economic vulnerability on account of limited resources, high population densities and very low levels of income – notwithstanding the rapid growth that most South Asian economies have witnessed in the last decade. Rapid economic growth is also dependent on a number of external factors which could change unpredictably, affecting growth in incomes.
- Ecological vulnerability, in view of potential impacts of climate change as well as other problems like land degradation, biodiversity loss, etc. High population densities are also causing severe declines in water quality, especially as untreated waste finds its way into watercourses. Desertification and land degradation are also major problems facing South Asian countries.
- Social vulnerability stemming from escalating income disparities, high levels of poverty and the perceived deficiency of political and institutional arrangements – including poor governance and corruption – in fulfilling the aspirations of people and providing social justice (Box 7.1).

Box 7.1: Good governance, the environment and green development

Good governance has important implications for the environment. Strong, accountable governance enables countries to balance the demands of economic growth with those of environmental protection. As wealth accumulates, living standards commonly rise with investments in improving water supplies and sanitation facilities. As economies become sophisticated, they too may transform (for example from producing steel to manufacturing technologies). However, these shifts may not occur without support by good governance that gives high priority to environmental concerns. Many elements of good governance also strengthen environmental protection, such as a system of checks and balances, dependable data and transparent administration. Hence, economic growth united with good governance can improve the environment and help to combat climate change.

Source: UNESCAP (2008)

Although forestry in itself will not be able to address all the problems, as a predominantly rural-based sector it could play an important role in tackling the above vulnerabilities, helping the transition to a green economy. The main priorities of forestry are discussed below.

7.1.1. Poverty reduction

Considering the widespread poverty in rural areas of most South Asian countries, poverty reduction will be a major thrust for forestry. In general, communities living in forested regions are probably among the most impoverished in South Asia. Supporting their livelihoods should be a key priority of forestry in such regions. The main thrust of poverty reduction will include:

(i) Access to land and security of tenure

Tenure reform and improved access to land will remain one of the core issues in the empowerment of local communities and could lay a foundation for addressing the problem of poverty. Forest reservation has, in the past, undermined the traditional rights of forest-dwelling communities. Efforts are underway to remedy this (for example the Forest Rights Act in India) and to involve local communities in managing resources, through community forestry and JFM in India. There is considerable scope for improvement of current efforts in community forestry, building on experience gained. Many existing forest policies and much legislation still adopt a narrow sectoral approach and remain 'forest-centric' and much less 'people-centric'. With the increasing role of land outside forests in producing products and services, the traditional segregated approach and related policies and legislation have become less tenable. It is important to visualize a situation where most land is owned and managed by smallholders producing most goods and services more efficiently.

(ii) Employment generation

Absence of opportunities for productive employment is one of the major problems facing communities living in forested regions. With a reduction in forestry activities, especially harvesting and silvicultural operations, there has been a significant reduction in employment opportunities for many forest-dwelling communities. At the same time, there is an urgent need to improve the condition of forests through undertaking regeneration, tending, fire protection, etc. All of these activities provide significant opportunities for employment generation. Countries like India are already implementing a national programme for rural employment, with reforestation and drought-proofing as important components, through strengthening convergence between the National Afforestation Programme and the implementation of the National Rural Employment Guarantee Act.

(iii) Micro-, small- and medium-scale enterprises

Development of micro-, small- and medium-scale enterprises is a key component of poverty reduction. Such producers or collectors of different products get low returns as most of the products are sold unprocessed. Consequently, there is considerable scope to develop small and medium enterprises that could process wood and other products at the local level, enhancing income and employment opportunities.

Related to this is the need to help the multitude of enterprises operating in the informal sector. Most of these operate informally for the reason that entry into the formal sector is very costly and is not commensurate with potential benefits. By simplifying rules and regulations, transaction costs of operating in the formal sector could be considerably reduced, encouraging the shift from the informal sector to the formal sector with attendant benefits. Improved access to credit, technology and markets could boost the development of small and medium enterprises.

Ecotourism is a particular area that could be operated via small- and medium-scale enterprises. There are already examples of local communities managing ecotourism with most of the benefits accruing locally. Such income will be a major incentive for communities to protect and manage resources sustainably.

(iv) Skill/ technology improvement

With the current state of skills and technology, there are limits to the income-earning capacity of local communities. Reducing dependence on natural capital – which is a prerequisite to conserving resources – but at the same time enhancing incomes will require stepping up efforts to improve the skills and knowledge of local communities. There are already several efforts in this direction, focusing on improved resource-use efficiency.

(v) Infrastructure and basic amenities

One of the major problems confronting many forested regions is their infrastructure deficit and hence poor access for local communities to various essential services, especially education and health care. Development of infrastructure not only benefits

local communities (and reduces their marginalization) but also improves forest management, especially transport of forest products and improving the opportunities for ecotourism.

This implies a need for a major change in the approach to forestry development, with more local community-centred development rather than the current sectorally-fragmented product- and market-focused approach.

7.1.2. Invest in rebuilding and regenerating the forest asset base

With the exception of Bhutan, the forest resource situation in South Asia is far from satisfactory to meet current and future demands. Vast tracts of forests are unable to provide the goods and ecosystem services required in view of very low investment in their management. The current level of consumption is extremely low in comparison with the rest of the Asia-Pacific region. As incomes increase, demand for all products will rise and even if resource-use efficiency grows, demands for wood and other raw material will increase substantially. Vast tracts of land remain degraded. The limited recovery witnessed in some countries or areas is largely incidental and results from low productivity marginal agricultural lands being abandoned in the context of uneconomic cultivation. Regeneration of forests should be undertaken as a systematic effort to rebuild the natural asset base.

In view of increasing demand and inadequacy of domestic supplies, South Asia is becoming highly dependent on imports of wood and wood products from resource-rich countries. Increasing energy costs of transportation and pressures to reduce carbon footprints will increase the vulnerability of supplies from distant sources. While South Asia could depend on outside resources for wood and wood products, it has no choice as regards enhancing ecosystem services – biodiversity, watershed conservation, arresting land degradation and desertification and improvement of recreational services – all of which will require rebuilding the domestic natural resource base.

7.1.3. Improve efficiency in the use of energy and raw materials

Considering resource scarcity in the subregion, enhancing resource-use efficiency will be a key priority. At all stages in the value chain – from production of wood and other products, to transport, value addition, etc. – there is enormous scope for improving efficiency in raw material use and to reduce energy requirements. Enhanced technologies already exist, but their uptake and wider application are slow on account of policy, institutional and financial constraints. With almost 90 percent of wood being used for energy production, known technologies could significantly reduce woodfuel consumption creating a significant share for production of more value-added industrial wood products. Similarly, there is substantial scope for improving the efficiency of wood industries, especially sawmilling, to improve recovery and reduce waste.

The forest industry is undergoing major changes all over the world with the introduction of new technologies. Advancements in nanotechnology and biorefineries are resulting in a major shakeup in how wood is processed and the kinds of products that are produced. South Asia could substantially strengthen its forestry sector by investing in the development of these and other technologies.

7.2. STRATEGIES

Two broad areas where intervention is required relate to: (a) reforming policies, legislation and institutions; and (b) strengthening science and technology capacities.

7.2.1. *Reforming policies, legislation and institutions*

The policy, legal and institutional framework forms the most critical component of adaptation to change, determining the freedom available to various actors. Although most countries have revised forest policies the following problems are somewhat endemic:

- Often forest policies inadequately take into account the larger changes, including policies in other sectors, and consequently remain impossible to implement. In many cases they lag behind the larger developments and rarely outline how potential conflicts between competing objectives are to be resolved and trade-offs determined.
- Often policies are revised in response to the larger changes; however, the legal framework remains unchanged. In many cases, stringent rules and regulations that were formulated several decades ago remain intact, resulting in considerable inconsistencies between policies and legislation. Rules and regulations, including those related to transport of wood and other products – even when they are grown in private land – have hampered involvement of landholders in tree cultivation. Legislation has, in the past, treated local communities as a problem and most often traditional community arrangements have been undermined in the process.
- Institutional changes remain the cornerstone of making forestry relevant to a changing society. While the institutional map has undergone important changes, there are several segments of institutions that remain wedded to the past. Some of the issues in this regard are outlined in the following sections.

7.2.2. *Institutional changes*

(i) *Reforming public sector forestry agencies*

Historically, management of forests has remained the domain of government forestry departments. Much of the thrust has been on protecting the resource – in particular from encroachment and illegal felling – and on implementing appropriate management practices to regulate the harvest of wood and other products at what is considered a sustainable level. Forestry departments combined several functions, namely: (a) policy and regulation; (b) policing of the public forest estate; and (c) management of resources to produce various goods and services. In a situation of low population density and limited demand for products and services, combining these functions was less problematic. However, the complexity of resource management has increased in the context of burgeoning demand for products and services that are often mutually exclusive.

Added to this is the emergence of new players, who are sometimes able to produce goods and services more effectively. As outlined in Chapter 4, an increasing share of wood in South Asia is produced in farms and home gardens. The traditional policing approach has not been effective as evident from the significant resource degradation that has taken place. Transaction costs of enforcing conventional rules and regulations have been prohibitive. This is, to some extent, leading to a rethinking of approach, with greater emphasis on community or private management of forest resources. Public forestry agencies in countries attempting to shift towards a green economy will need to reinvent themselves, focusing on:

- Enhancing efficiency in the delivery of services: Public sector agencies have to reinvent themselves as service providers with much of the thrust on ensuring transparency and accountability in fulfilling their functions (FAO 2008b).
- Integrating forest policies with development policies: Although what happens to forests and forestry is very much dependent on policies in other sectors, there has been very little progress towards intersectoral integration. There is a strong case to develop more integrated development policies with forestry as a component rather than stand-alone sectoral policies.
- Transferring resource management responsibility to other players: While specialized public sector units may retain the management of strategically important forests, management of most other forests could be transferred to non-state actors, especially communities, smallholders and private enterprises. Much of the focus of public sector forestry departments should shift towards providing a broad framework to enable these actors to implement sustainable forest management.
- Improving strategic planning capacity: Within the larger framework of development policies, one of the core functions of a public forestry institution will be to undertake strategic planning so that forestry policies fulfil the larger societal goals of development policies. Strategic planning will identify and support broad, long-term changes and provide options to accomplish policy objectives. Such capacity is almost non-existent in most public sector forestry institutions in South Asia. Consequently the sector lacks direction and is often driven by short-term fads.
- Strengthening policy and regulatory functions: Forestry departments should focus on providing a robust policy and regulatory framework, enabling other players to manage resources. There is already clear evidence that empowering communities, farmers and the private sector will more effectively manage resources and enhance the production of goods and services.

(ii) *Community organizations*

In future, community organizations, including associations, federations and cooperatives will play a major role in the management of forest resources. A number of countries have already devolved forest management responsibilities to community organizations and other local bodies. The main thrust in the leap towards a green economy will be on:

- Strengthening the democratic functioning of these organizations, especially to ensure transparency in their operations to avoid being hijacked by local vested interests.

- Improving technical and entrepreneurial competence to enhance efficiency and to equip organizations to deal with challenges and opportunities.

7.2.3. Science and technology development

On the whole, South Asia has a reasonable science and technology foundation with a number of institutions, including universities with the capacity to undertake cutting-edge research. However forestry faces the following problems:

- Forestry science and technology remain far less developed than science and technology in other spheres, for example agricultural sciences.
- Within forestry science and technology, development remains unbalanced. Most often it is focused on small segments of forestry – for example, large-scale plantation forestry using a small number of species and with productivity enhancement as the primary objective. Other areas – management of forests to provide ecosystem services, improved technologies for value addition, etc. – have received much less attention. There has been relatively little effort to develop technologies that are appropriate to the needs of small-scale enterprises.
- There are major gaps in the application of known technologies, largely stemming from policy and institutional constraints and the absence of clarity in the objectives of management. Forestry departments continue to give emphasis to legal control of forests, and much less attention is given to managing resources to enhance the flow of goods and services.

Considering the severe resource constraints facing South Asian countries, there is a need to reform science and technology systems; particularly to ensure that technologies are affordable and accessible, empowering the many players, especially local communities, farmers, forest dwellers, etc., who have remained outside the mainstream of technological changes. Much of the thrust will be to enhance efficiency in the use of raw materials and energy and thus to move towards a carbon neutral economy. Some of the areas that require specific attention include:

(i) Improving and developing the science of integrated land use, including agroforestry

As farmers become the major producers of wood and NWFPs more emphasis needs to be given to providing technical support for integrated resource management; this is particularly relevant to small farmers.

(ii) Developing management practices based on a better understanding of ecosystem processes

As ecosystem services become a major focus for forest management, research needs to be redirected to better understand ecosystem processes and how management will have to be fine-tuned to enhance the flow of ecosystem services. This will also be important if land users have to be paid for (or penalized for adversely affecting) the ecosystem services they provide. There is considerable scope to develop more effective but easy-to-use tools and techniques, including advanced remote sensing techniques.

(iii) Improving energy efficiency of woodfuel

Improving energy efficiency in the use of wood and other resources will be a major goal. While wood is a very important renewable resource, its current use is resulting in a number of problems, especially on account of low energy recovery and the health hazard it poses to users, especially women. While technologies already exist, more attention will have to be paid to their adaptation to varied local conditions and wider adoption. With a slight increase in energy efficiency along with some increase in technology uptake, the amount of woodfuel that can be saved will be very significant.

(iv) Shifting to production of green products

The wood industry needs to increasingly move towards producing a range of products through the total utilization of wood, including cellulose and lignin. Substantial work is underway to transform wood industries as biorefineries to produce a wide range of green products, including biofuels, bioplastics and other products including paper and paper products.

Considerable potential exists to revolutionize forest product industries through the application of nanotechnology. At the nano scale, wood fibre will have very different physical and chemical properties, enabling the production of a very different range of new products.

(v) Reinventing science and technology institutional frameworks

All of these issues will require substantial improvement in the institutional arrangements relating to science and technology. There is considerable fragmentation of research within and between institutions and the linkage between the different components of the science and technology value chain is extremely weak. This has been one of the main reasons why science and technology has not made a significant impact on the lives of people in South Asia. Reinventing science and technology institutions will hence be unavoidable if the priorities identified earlier are to be accomplished.

A technology platform involving industry, universities, research institutions and governments in the subregion – in line with what some other regions have done – will help to accelerate the development and adoption of more energy-efficient technologies.

7.3. PRIORITIES AND STRATEGIES: AN OVERVIEW

Considering key driving forces and probable scenarios, the South Asian forest sector needs to redefine its priorities and strategies taking into consideration social, economic and environmental vulnerabilities. Severe natural resource constraints along with the high proportion of people living below the poverty line underpin a necessary focus on poverty reduction and rebuilding the natural resource base. A shift towards a green economy, particularly one that skips beyond traditional business-as-usual paths, cannot be accomplished without improving efficiency in the use of raw material and energy.

Poverty reduction will require a major thrust on job creation, access to land and security of tenure, support for micro-, small- and medium-scale industries, skill and technology development and improved infrastructure. Especially in forested regions, forestry departments will have to go far beyond their traditional mandate and function as facilitators of broader social and economic development.

Institutional changes and improved application of science and technology will be a major strategic focus. There are already some changes taking place in institutional arrangements and these need to be accelerated. Public forestry departments should focus on providing policy and legal frameworks, with most management of forests being done by non-state actors, especially communities, small farmers and the private sector. Science and technology efforts also require major changes with focus on improving resource- and energy-use efficiency and making sure that science and technology are widely accessible and empower people to achieve their aspirations for forests and forestry.

REFERENCES

- Asian Development Bank (ADB).** 2008a. *Basic statistics 2008*. Manila, Asian Development Bank. Available at: www.adb.org/Statistics/default.asp
- Asian Development Bank (ADB).** 2008b. *South Asia Economic Report Foreign Direct Investment in South Asia*. Manila: Asian Development Bank. Available at: www.adb.org/Documents/Reports/South-Asia-Economic-Report/2008/default.asp.
- Asia Network for Sustainable Agriculture and Bio resources (ANSAB).** 2005. *Nepali and Rainforest Alliance representatives to present first certified sustainable Nepal Forest products at the Natural Products Expo in Anaheim, CA. Kathmandu, Nepal, ANSAB.* Available at: www.ansab.org/certification/cer17072634.pdf
- Associated Chambers of Commerce and Industry of India (ASSOCHAM).** 2008. Ayurveda & medical tourism to boom in 2010 CWG. Press release. New Delhi, India, ASSOCHAM. Available at: www.assochem.org/prels/shownews.php?id=1448
- Bajracharya, S.B., Furley, P.A. & Newton, A.C.** 2005. Effectiveness of community involvement in delivering conservation benefits to the Annapurna Conservation Area, Nepal. *Environmental Conservation*, 32(3). Available at: journals.cambridge.org/download.php?file=%2FENC%2FENC32_03%2FS0376892905002298a.pdf&code=313ef9bf1bbd05985695a37a3d8fa71f
- Basnyat, B.** 2008. *Impacts of demographic changes on forests and forestry in the Asia and Pacific*. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/08. Rome, FAO.
- Benndorf, A.M & Goldammer, J.G.** 2006. *Global Forest Resources Assessment 2005 – report on fires in the South Asian Region*. Fire Management Working Papers. Rome, FAO. Available at: <ftp://ftp.fao.org/docrep/fao/009/J7570E/J7570E00.pdf>
- Bera, S., Srivastava, K.S., Pallavi, A., Paliwal, A. & Narayanan, S.** 2011. Wealth of forests withheld. *Down to Earth*, September 2011, <http://www.downtoearth.org.in>
- Bhattacharya, P., Prasad, R., Bhattacharyya, R. & Asokan, A.** 2008. Towards certification of wild medicinal and aromatic plants in four Indian states. *Unasylva*, 230(59), Rome, FAO.
- Biggs, S. & Messerschmidt, D.** 2005. Social responsibility in the growing handmade paper industry of Nepal. *World Development*, 33(11): 1821-1843.
- Carrington, D.** 2010. IPCC officials admit mistake over melting Himalayan glaciers. Published in *The Guardian* (Wednesday 20 January 2010).
- Choudhury, J.K. & Hossain, A.A.** 2009. Bangladesh forestry outlook study. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/33. Bangkok, FAO.

- Clark, D.** 2009. Maldives first to go carbon neutral. Published in *The Observer* (Sunday 15 March 2009).
- Conservation International.** 2007. *Biodiversity hotspots*. Arlington, VA, USA. Available at: www.biodiversityhotspots.org
- Damodaran, A. & Engel, S.** 2003. *Joint forest management in India: Assessment of performance and evaluation of impacts*. ZEF Discussion Papers on Development Policy. University of Bonn.
- DeFries, R. & Pandey, D.** 2009. Urbanization, the energy ladder and forest transitions in India's emerging economy. *In Land use policy*. In press.
- Department of Energy (DOE).** 2005. *Energy data directory of Bhutan*. Ministry of Trade and Industry, Royal Government of Bhutan.
- Dhital, D.B.** 2009. *Bhutan forestry outlook study*. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/04. Bangkok, FAO. 73 pp.
- DNA.** 2008. *People's help sought to grow sandalwood*. DNA India. Available at: www.dnaindia.com/report.asp?newsid=1209298
- Food and Agriculture Organization of the United Nations (FAO).** 1998. *Asia-Pacific forestry - towards 2010: report of the Asia-Pacific forestry sector outlook study*. Rome.
- FAO.** 2003. TERRASTAT database. Available at: www.fao.org/ag/agl/agll/terrastat/#terrastatdb
- FAO.** 2004. *Global Forest Resources Assessment update 2005: terms and definitions*. Working Paper 83. Forest Resources Assessment Programme, Rome, Italy. Available at: www.fao.org/forestry/media/7797/1/0/
- FAO.** 2006. Nepal: Certification of NTFPs. *Non Wood News*, 13. Available at: www.fao.org/docrep/009/a0467e/a0467e00.htm
- FAO.** 2008a. *The state of food and agriculture 2008*. Rome. Available at: www.fao.org/sof/sofa/index_en.html
- FAO.** 2008b. *Re-inventing forestry agencies: Experiences of institutional restructuring in Asia and the Pacific*, RAP Publication 2008/05, Food and Agriculture Organization of the United Nations, Regional Office for Asia and the Pacific, Bangkok.
- FAO.** 2009a. FAOSTAT statistical database. Available at: faostat.fao.org
- FAO.** 2009b. *Forest tenure in South and Southeast Asia*. Available at: www.fao.org/forestry/33867/en/
- FAO.** 2010a. *Asia-Pacific forests and forestry to 2020 - Asia-Pacific Forestry Sector Outlook Study II*, RAP Publication 2010/06. Bangkok, FAO Regional Office for Asia and the Pacific.
- FAO.** 2010b. *Global forest resources assessment 2010*. main report. FAO Forestry Paper 163, Rome.
- FAO.** 2011. *State of the world's forests*. Rome, FAO.
- Forest Department.** 2009. *Sri Lanka forestry outlook study*. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/29. Bangkok, FAO. 66 pp.

- Forestry Nepal.** 2008. *Leasehold forestry improving livelihoods in Nepal*. Kathmandu. Available at: www.forestrynepal.org/article/news/2585
- Forest Stewardship Council (FSC).** 2011. *Global FSC certification: Type and distribution. August 2011*. http://www.fsc.org/fileadmin/web-data/public/document_center/powerpoints_graphs/facts_figures/2011-07-15-Global-FSC-Certificates-EN.pdf
- Forest Survey of India.** 2009. State of forest report 2009. Ministry of Environment and Forests.
- Forests Monitor.** 2006. *Forest policy and practice*. Cambridge. Available at: www.forestsmonitor.org/en/reports/549391/549395
- Francis, G., Edinger, R. & Becker, K.** 2005. A concept for simultaneous wasteland reclamation, fuel production, and socioeconomic development in degraded areas in India: need, potential and perspectives of jatropha plantations. *Natural Resources Forum*, 29: 12-24.
- Friends of the Earth, Europe.** 2009. *Losing the plot: the threats to community land and the rural poor through the spread of the biofuel jatropha in India*. Belgium, Friends of the Earth Europe. Available at: http://www.foeeurope.org/agrofuels/jatropha_in_india.pdf
- Gonsalves, J.B.** 2006. *An assessment of the bio fuels industry in India*. UNCTAD/DITC/ TED/2006/6. Geneva, Switzerland, United Nations Conference on Trade and Development.
- Government of Bhutan.** 2009. *About us*. Gross National Happiness Commission. Available at: <http://www.gnhc.gov.bt/mandate/>
- Government of India.** 2010. *Status report on the implementation of Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006 for the period ending 28 February 2010*. New Delhi, Ministry of Tribal Affairs.
- Government of India.** 2011. Census 2011.
- Gregersen, H., El Lakany, H., Bailey, L. & White, A.** 2011. *The greener side of REDD+: lessons for REDD+ from countries where forest area is increasing*, Rights and Resources Initiative.
- Hasan, L.** 2008. *An anatomy of state failures in forest management in Pakistan*. Pakistan Institute of Development Economics, Munich Personal RePEc Archive, MPRA Paper No: 6513. Available at: <http://mpra.lib.uni-muenchen.de/6513>
- Hansda, R.** 2009. *The outlook for non-wood forest products in Asia and the Pacific*. Rome, FAO. In press.
- Herman, S.** 2008. India's conservationists bugged about growing insect poaching. Voice of America.
- International Energy Agency (IEA).** 2008. *IEA online statistics*. © OECD/IEA, 2008. Paris, France, International Energy Agency. Available at: http://www.iea.org/Textbase/stats/regionresults.asp?COUNTRY_CODE=35&Submit=Submit
- International Fund for Agricultural Development (IFAD).** 2003. *Breaking new ground: leasehold forestry in Nepal*. Available at: www.ifad.org/evaluation/public_html/eksyst/doc/profile/pi/np.htm

- International Monetary Fund (IMF).** 2009. *World economic outlook database, April 2009*. Available at: www.imf.org/external/pubs/ft/weo/2009/01/weodata/weorept.aspx?sy=2007&ey=2014&scsm=1&ssd=1&sort=country&ds=.&br=1&pr1.x=46&pr1.y=10&c=513%2C558%2C514%2C564%2C534%2C524%2C556&s=NGDPD&grp=0&a=
- International Office of Migration (IOM).** 2005. *World migration 2005: costs and benefits of international migration*, IOM.
- Jonsson, R. & Whiteman, A.** 2008. *Global forest product projections*. Rome, FAO.
- Kant, P. & Wu, S.** 2011. The extraordinary collapse of *Jatropha* as a global biofuel. *Environmental Science and Technology*, 45: 7114-7115.
- Kathiresan, K. & Rajendran, N.** 2005. Coastal mangrove forests mitigated tsunami. *Estuarine, Coastal and Shelf Science*, 65 (2005) 601e606.
- Kaufmann, D., Kraay, A. & Mastruzzi, M.** 2009. *Governance matters viii: governance indicators for 1996-2009*. World Bank Policy Research Working Paper No. 4978. Social Science Electronic Publishing, Inc. Available at: info.worldbank.org/governance/wgi/mc_chart.asp
- Kerr, A.M., Baird, A.H. & Campbell, S.J.** 2006. Comments on "Coastal mangrove forests mitigated tsunami" by K. Kathiresan and N. Rajendran. *Estuarine, Coastal and Shelf Science*, 65 (2005) 601-606]. *Estuarine, Coastal and Shelf Science*, 67(3): 539-541.
- Khan, S.R., Shaheen, F.H., Moeed, Y. & Tanveer, A.** 2007. *Regional integration, trade and conflict in South Asia*. IISD. Available at: www.iisd.org/pdf/2007/tas_rta_south_asia.pdf
- Kulkarni, H.D.** 2008. Private farmer – private industry partnerships for industrial wood production: a case study. *International Forestry Review*, 10(2): 147-155.
- Kumar, K.** 2008. industrialization and development: discontentment among tribals in Orissa. Available at: joharadivasi.org/?p=201
- Kutty, M.G. & Nair, T.K.R.** 2005. Periyar Tiger Reserve: Poachers turned game keepers. In *In search of excellence, exemplary forest management in Asia and the Pacific*. FAO RAP Publication 2005/2.
- Krishnankutty, C.N, Balachandran Thampi, K. & Chundamannil, M.** 2008. Trees outside forests (TOF): a case study of wood production-consumption situation in Kerala. *International Forestry Review*, 2.
- Lebedys, A.** 2008. *Contribution of the forestry sector to national economies, 1990–2006*. Rome: FAO. (updated)
- Limbu, R.** 2001. *Wild for beauty and health*, naturally Issue #58 (31 Aug 2001 to 06 Sept 2001), Nepali Times. Available at: <http://www.nepalitimes.com.np/issue/2001/08/31/Nation/7517>
- Millennium Ecosystem Assessment.** 2005. *Ecosystems and human well-being: synthesis*. Washington, DC, Island Press.
- Ministry of Environment and Forests Government, of India.** 2009. *India forestry outlook study. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No.APFSOS II/WP/2009/06*. Bangkok, FAO. 78 pp.
- Ministry of Forests and Soil Conservation, Nepal.** 2009. *Nepal forestry outlook study. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/05*. Bangkok, FAO. 83 pp.

- Mukherjee, K.** 2007. *Development preys on world's largest urban forest*. Reuters. Available at: www.reuters.com/article/latestCrisis/idUSDEL4495
- Murali, K.S., Jagannatha Rao, R., Sudha, P., Sangeetha, G., Murthy, I.K. & Ravindranath, N.H.** 2003. Evaluation studies of joint forest management in India: social and institutional implications, *International Journal of Environment and Sustainable Development*, 2(1): 19-35.
- M.P. State Minor Forest Produce (T & D) Co-op.** 2006. *Tendu patta*. Available at: www.mfpfederation.com/content/tendupatta.html
- Office of the Inspector General of Forestry, Ministry of Environment, Government of Pakistan.** 2009. *Pakistan forestry outlook study*. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/28. Bangkok, FAO. 64 pp.
- Ojha, H., Persha, L. & Chhatre, A.** 2009. *Community forestry in Nepal: a policy innovation for local livelihoods*, IFPRI Discussion Paper 00913, International Food Policy Research Institute.
- Pandey, D.** 2008. Indian forest resource base. *International Forestry Review*, 2, 2008.
- Pathirage, R.** 2005. *S&T statistics in Asia*. South Asia Regional Workshop on Science, Technology and Innovation Indicators, New Delhi, India 21-24 November 2005. Available at: http://www.uis.unesco.org/ev.php?ID=6906_201&ID2=DO_PRINTPAGE
- Peters-Stanley M., Hamilton K., Marcello T., & Sjardin, M.** 2011. *Back to the future: State of the voluntary carbon markets 2011*. A report by Ecosystem marketplace and Bloomberg New Energy Finance. Available at: http://www.forest-trends.org/documents/files/doc_2828.pdf
- Programme for the Endorsement of Forest Certification (PEFC).** 2011. *Statistical figures on certification*. Paris, France. Available at: register.pefc.cz/statistics.asp
- Rahman, L.M.** 2003. The homegardens of Bangladesh: Trends and implications for research, Paper presented at the XIIth World Forestry Congress 2003, Quebec City, Canada. Available at: www.fao.org/DOCREP/ARTICLE/WFC/XII/0497-B5-HTML
- Rawat, T.S., Menaria, B.L., Dugaya, D. & Kotwal, P.C.** 2008. Sustainable forest management in India. *Current Science*, 95(8), April 2008: 996-1002.
- Razzaque, J.** 2004. *Environmental human rights in South Asia: towards stronger participatory mechanisms*. Paper presented at the Roundtable on Human Rights and the Environment, Geneva, March 2004, Geneva Environment Network. Available at: www.environmenthouse.ch
- Rodell, M., Velicogna, I. & Famiglietti, J.S.** 2009. Satellite-based estimates of groundwater depletion in India. *Nature*, 10.1038/nature08238.
- Royal Government of Bhutan,** 2002. *Bhutan national ecotourism strategy*. Available at: openlibrary.org/b/OL3713762M/Bhutan-national-ecotourism-strategy
- Royal Government of Bhutan,** 2009. *Statistical Yearbook of Bhutan 2009*. National Statistics Bureau. Available at: <http://www.nsb.gov.bt/pub/syb/syb2009.pdf>
- Shahbaz, B. & Superi, A.Q.** 2009. The political economy of forest management in Pakistan. In R. Cronin & A. Pandya, eds. *Exploiting natural resources: growth, instability and conflict in the Middle East and Asia*. Washington, The Henry L. Stimson Center.

- Sharma, J.K.** 2009. *Harmonizing and organizing institutions to support leasehold forestry*. Available at: Tcp/nep/3102: institutional and technical capacity building in support of leasehold forestry. Draft report.
- Smith**, 2009. Indoor air pollution and respiratory disease in India. In Environmental risks of respiratory disease: recommendations and abstracts. Report of the September 2008 Workshop of the Indian Council of Medical Research, NIEHS, and CDC, Postgraduate Institute of Medical Education and Research Chandigarh (March 2009).
- Subedi, B.P., Binayee, S. & Gyawali, S.** 2006. *Handmade paper value chain of Nepal: prospects and challenges in growth, distributional equity and conservation*. Presented at the 11th Conference of the International Association for the Study of Common Property, Bali, Indonesia, June 19–23. Available at: dlc.dlib.indiana.edu/archive/00002036
- Tewari, D.D.** 2006. The effectiveness of state forest development corporations in India: an institutional analysis. *Forest Policy and Economics*, 8(3): 279-300.
- Thupalli, R.** 2009. *Maldives forestry outlook study*. Asia-Pacific Forestry Sector Outlook Study II. Working paper series. Working Paper No. APFSOS II/WP/2009/03. Bangkok, FAO. 29 pp.
- TRAFFIC.** 2008. India's wild medicinal plants threatened through over-exploitation. Available at: www.traffic.org/home/2008/11/24/indias-wild-medicinal-plants-threatened-through-over-exploit.html
- Transparency International.** 2008. *Corruption perceptions index 2008*. Berlin.
- United Nations (UN).** 2006. World migrant stock: The 2005 revision population database. Available at: esa.un.org/migration/
- United Nations (UN).** 2008a. *Terrestrial areas protected*. Millennium Development Goals indicators database series. New York, USA. Available at: mdgs.un.org/unsd/mdg/SeriesDetail.aspx?srid=783&crd
- UN.** 2008b. Common database. Available at: unstats.un.org/unsd/cdb/cdb_help/cdb_quick_start.asp
- UN.** 2009. *Rethinking poverty. Report on the world situation 2010*. New York, Department of Economic and Social Affairs, UN.
- UN.** 2010. *World population prospects: the 2010 revision*. Population database. Available at: esa.un.org/unup
- United Nations Convention on Combating Desertification (UNCCD).** 2007. *Women pastoralists: preserving traditional knowledge facing modern challenges*. Bonn, UNCCD
- United Nations Development Programme (UNDP).** 2008. *Implementation of Bhutan human-wildlife conflict management strategy*. Available at: <http://www.undp.org.bt/Human-Wildlife-Conflict-Management-Project.htm>
- United Nations Environment Programme (UNEP).** 2007. *Global environment outlook, GEO 4, environment for development*. Nairobi, UNEP.
- UNEP.** 2008. *Sundarbans National Park, India, the Sundarbans, Bangladesh*. World Conservation Monitoring Centre. Available at: www.unep-wcmc.org/sites/wh/pdf/Sundarbans%20%5Bboth%5D.pdf
- UNEP.** 2009. Hundreds of millions of South Asians face increasing water stress. Press release. Available at: www.unep.org/documents.multilingual/default.asp?documentid=562&articleid=6068&l=en&t=long


- UNEP.** 2011. *Towards a green economy: pathways to sustainable development and poverty eradication - a synthesis for policy maker*. Available at: www.unep.org/greeneconomy
- United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP).** 2008. *A future within reach 2008*. Asia-Pacific MDG Study Series. Bangkok, Thailand.
- United Nations Educational, Scientific and Cultural Organization (UNESCO).** 2008. *Cultural and eco-tourism in the mountainous regions of Central Asia and in the Himalayas*. Available at: portal.unesco.org/culture/en/ev.phpURL_ID=1392&URL_DO=DO_TOPIC&URL_SECTION=201.html
- UNESCO.** 2010. *UNESCO science report: the current status of science around the world*. UNESCO Publishing.
- United Nations Framework Convention on Climate Change (UNFCCC).** 2011. *Registered project activities by host party*. Available at: cdm.unfccc.int/Statistics/Registration/NumOfRegisteredProjByHostPartiesPieChart.html
- United Nations Permanent Forum on Indigenous Issues (UNPFII).** 2007. *United Nations Declaration on the Rights of Indigenous Peoples*. Available at: www.un.org/esa/socdev/unpfii/documents/FAQsindigenousdeclaration.pdf
- Water and Energy Commission Secretariat (WECS).** 2006. Energy synopsis report 2006. WECS, Government of Nepal.
- White, A.** 2007. A global projection of subjective well-being: a challenge to positive psychology? *Psychtalk*, 56: 17-20. Available at: www.le.ac.uk/users/aw57/world/sample.html
- World Bank.** 2007a. *World development indicators*. Washington, DC.
- World Bank.** 2007b. *World development report 2008*. Agriculture for development. Available at: go.worldbank.org/FBVYS4AX70
- World Bank.** 2008a. Climate change: why is South Asia vulnerable? Available at: web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/0,,contentMDK:21991827~menuPK:158937~pagePK:2865106~piPK:2865128~theSitePK:223547,00.html
- World Bank.** 2008b. *World Bank updates poverty estimates for the developing world*. Available at: go.worldbank.org/C9GR27WRJ0
- World Bank.** 2009a. As global economy deteriorates, World Bank predicts sharply slower growth in developing world in 2009; weak recovery in 2010. Press release. Available at: go.worldbank.org/MMLHZQ1UP0
- World Bank.** 2009b. *PovcalNet*. Available at: iresearch.worldbank.org/PovcalNet/povDuplic.html
- World Bank.** 2011a. *World development indicators*. Washington, DC.
- World Bank.** 2011b. *Migration & remittances Factbook 2011*, Washington DC. Available at: <http://siteresources.worldbank.org/INTLAC/Resources/Factbook2011-Ebook.pdf>
- World Bank.** 2011c. *State and trends of the carbon market 2011*. Environment Department, Washington DC.
- World Economic Forum.** 2005. *India and the world: scenarios to 2025*. World Scenarios Series, World Economic Forum and the Confederation of Indian Industry.
- World Economic Forum.** 2009. *Scenario planning*. Available at: <http://www.weforum.org/en/initiatives/scenarios/index.htm>

World Resources Institute (WRI). 2005. *More water, more wealth in Darewadi village*. Washington, DC, USA, World Resources Institute.

World Resources Institute (WRI). 2010. *Earth trends, the environmental portal*. Available at: http://earthtrends.wri.org/maps_spatial/watersheds/asiaocea.php

World Travel and Tourism Council (WTTC). 2007. *TSA country reports*. Available at: www.wttc.org/eng/Tourism_Research/Tourism_Satellite_Accounting/TSA_Country_Reports/Bangladesh/

Yasmi, Y., Enters, T. & Broadhead, J. 2010. *Forest policies, legislation and institutions in Asia and the Pacific: Trends and emerging needs for 2020*. Bangkok, FAO Regional Office.



In the 14 years since the first Asia-Pacific Forestry Sector Outlook Study was completed in 1998, the region has experienced tremendous change in nearly every aspect. These changes have been particularly profound in the forestry sector, especially in the context of increasing demands and expectations of society on forests and forestry. This report on South Asia summarizes the key findings and results collated under the second Asia-Pacific Forestry Sector Outlook Study – a comprehensive effort spanning nearly four years and involving all the member countries of the Asia-Pacific Forestry Commission. Based on seven country outlook reports and numerous thematic studies, the report provides an assessment of developments in the South Asian forestry sector, linking it with larger societal changes. It gives an overview of the forestry sector, including the economic, social and ecological significance of forests and summarizes major developments, including changes in demand for forest products and ecosystem services, specifically highlighting resource constraints in the subregion. The publication analyses the key factors driving developments in the sector, scenarios that may unfold and how forests and forestry are likely to evolve to the year 2020. The report also outlines priorities and strategies to enhance forestry's contribution to societal well-being.

ISBN 978-92-5-107263-9



9 789251 072639

I2785E/1/06.12