

development of, and access to, new markets and, even more importantly, the increase in the number of stakeholders involved.

Community forest management, or community forestry, has been promoted as a viable strategy for bringing conservation objectives into alignment with local practices and livelihoods. Under this approach, collective action serves as a means of achieving long-term conservation objectives, through the establishment of use, management and access rules, and by developing control mechanisms and forms of organization tailored to the resources that forests provide. Initiatives involving community forest management plans can be found in Oaxaca, Puebla and Quintana Roo, in Mexico; further examples include the Mayan Biosphere Reserve initiative in El Petén, Guatemala, and community initiatives in the Brazilian and Peruvian Amazon.

Latin America would benefit greatly from a region-wide joint monitoring effort. This could involve more effectively defining forest ecosystems, facilitating comparisons between countries and over time, and providing more precise information for decision-making.

Developing national forest accounts (based on the United Nations System of Environmental-Economic Accounting) can help ensure that forest stocks, annual changes, and flows of forest stocks in the economy are given proper consideration and assigned appropriate value in national decision-making.

In theory, industrial tree plantations can offset the disappearance of natural forests in terms of coverage, wood supply and certain environmental services. However, commercial plantations are often monocultures, and thus do little to foster local biodiversity. Conserving native forests and diversifying tree farming should therefore be ongoing priorities for the region's governments.

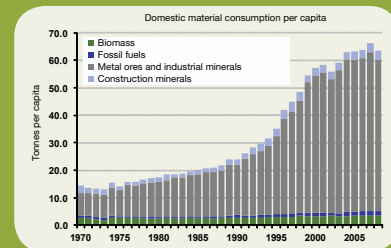
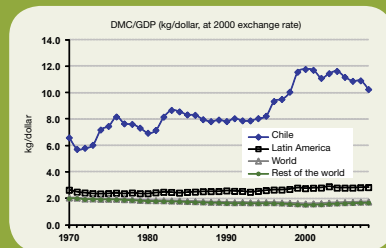
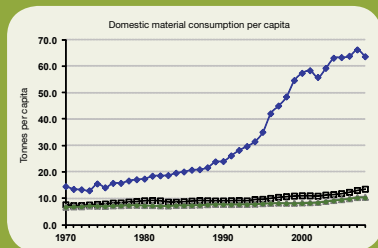


### Box. 3

## Forestry industry in Chile

### Chile

Chile has the highest DMC and MI in the region (Figure 2a, 2b), due to an enormous increase in the extraction of metal ores and industrial minerals for export (primarily copper). However, Chile also has a large forestry sector, which accounts for 20% of the country's exports (FAO, 2009).



Figures 2a, 2b, 2c. Graphic overview of flow and intensity of materials in Chile

Chile has the second largest area of planted forest in Latin America (after Brazil), with nearly 2.7 million hectares as of 2005 (FAO, 2006). Incentives promoting such plantations were created by Decree 701 of 1974 and the associated regulations, and by a national policy that led to a steady annual increase in the planted forest area.

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This policy note is based on the UNEP publications "Recent Trends in Material Flows and Resource Productivity in Latin America", authored by Heinz Schandl and Jim West, The Commonwealth Scientific and Industrial Research Organisation (CSIRO), and "Resource Efficiency in Latin America: Economics and Outlook."

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# Forest resources

## Material Flows and Resource Productivity in Latin America



The report “Recent trends in material flows and resource productivity in Latin America,” published by the United Nations Environment Programme (UNEP) in collaboration with the Commonwealth Scientific and Industrial Research Organisation (CSIRO), indicates that since 1970, contrary to the global trend, Latin America has become less efficient in converting its primary resources into income. If the current trend continues, environmental pressures will intensify more rapidly than economic growth. Achieving more efficient use of resources is therefore essential to increasing environmental sustainability and maintaining competitiveness, while it can also be a powerful tool for reducing poverty and inequality.

The report’s conclusions are based on the first-ever database of material flows created specifically to cover most of the countries of Latin America<sup>1</sup>. The database uses standardized material flow accounting methodologies to construct empirical evidence of resource productivity in Latin America. The present policy brief only touches on social and economic aspects of the extractive industries that dominate the economies of many Latin American countries. These aspects, however, remain an important concern that deserves serious consideration.

### Key messages

- **Despite the growth of agriculture and the consumption of forestry resources, these activities represent a continually decreasing percentage of production in Latin American countries. Deforestation is the highest of any region in the world, but the pace may have slowed in the last few years.**
- **Forest products account for a larger proportion of Latin America’s material extraction than would be expected considering the region’s level and pace of development.**
- **A balanced forestry policy should take into account not only timber resources but the complete value of forests, and apply established approaches such as certification schemes, community forest management, and strengthen monitoring of forest extent, stocks and resource flows.**

Forests are estimated to cover approximately 48% of the total area of Central and South America, (FAO, 2010). The forestry sector is highly important in the region's economy, given that forests supply not only timber but also fibre, firewood, and other non-timber forest products for industrial and non-industrial uses. Moreover, they provide a number of ecosystem services (habitat, biodiversity, carbon storage, etc.), which, although sometimes without direct commercial value, are essential both locally and globally. Since these services normally do not figure in national statistics, the value of ecosystems is often underestimated in policy making.

The specialization of the region's productive and export profile with its strong reliance on natural resources, creates multiple pressures on forest resources.



## Consumption of biomass in Latin America: the importance of forest resources

Material flow accounting (Box 1) focuses on the extraction and consumption of natural resources as key factors in an economy's environmental impact. One of the categories of materials considered in this analysis is biomass, whose subcategories include primary crops, crop residues, grazed biomass and wood. The present policy brief focuses on wood and other forest products.

The pressure on the environment caused by the use of biomass in economic activities - expressed here as domestic material consumption (DMC) (Box 1) - has nearly tripled between 1970 and 2008. In 1970, 145 million tonnes of wood were extracted in Latin America; in 2008, this figure had grown to 293 million tonnes (Table 1a).

Accounts of forest product flows consider the gross quantity of materials extracted from forests, and are thus dominated by wood extraction, due to its weight and volume. Extraction of wood products in the region amounted to 450 million m<sup>3</sup>/year between 2000 and 2005, of which 48.7% was firewood, while 51.3% was timber for industrial use. In South America, extraction of non-timber forest products (NTFP) (e.g., edible seeds, mushrooms, fruits, and fibres) accounts for approximately 3.3% of total extraction of forest products (UNEP, 2010).

Although in absolute terms biomass extraction and consumption in the region is growing, in relative terms the trend has moved in the opposite direction: biomass as a percentage of total DMC has declined (Table 1b). This is also true for the subcategory of wood; while extraction and consumption of wood has doubled, as a percentage of the region's DMC it has declined from 7% in 1970 to 4% in 2008 (Table 1b). Due in large part to the importance of raw materials in Latin America's pattern of development, biomass continues to represent a large proportion of the material flows in the region, in relation to the level of industrialization and development of countries in the region.

The demand for forest products depends on the demand for various secondary products, particularly sawn wood and panels made of wood, paper and cardboard. At the regional level, urbanization, with the consequent demand for forest products and construction materials, has contributed to the rise in the DMC of wood. For most forest products,

### Box 1.

#### Measuring environmental impact

The use of natural resources in Latin America is driven by various factors. To better understand how this has evolved and what its trajectory may be in the future, it is useful to define and analyze independently the principal driving forces.

An analytical framework often used for this purpose is the **IPAT** equation proposed by Ehrlich, P.R. and Holdren (1971):

$$I = P * A * T$$

where

**(I)** is the impact on the environment, which can be defined as an extractive pressure – in this case the domestic material consumption (DMC);

**(P)** is the population;

**(A)** is the affluence, or level of wealth, of the population (per capita GDP); and

**(T)** is the “technological coefficient” or “material intensity”, in other words, the efficiency with which an economy is able to convert raw materials into GDP (DCM/GDP).

however, the increased production of the last few years has been attributable more to increased exports (principally of pulp and paper) than to a rise in domestic consumption (FAO, 2006).

	1970	1990	2008	2008/1970
<b>Biomass</b>	<b>1308</b>	<b>2118</b>	<b>3650</b>	<b>2.8</b>
<b>Primary crops</b>	440	754	1305	3.0
<b>Crop residues</b>	364	595	1152	3.2
<b>Grazed biomass</b>	359	571	901	2.5
<b>Wood</b>	145	198	293	2.0

Table 1a. Total changes in the DMC of biomass and its subcategories in the 1970-2008 period, in millions of tons.

	1970	1980	1990	2000	2008
<b>Biomass</b>	<b>61%</b>	<b>51%</b>	<b>53%</b>	<b>46%</b>	<b>48%</b>
<b>Primary crops</b>	21%	18%	19%	16%	17%
<b>Crop residues</b>	17%	14%	15%	13%	15%
<b>Grazed biomass</b>	17%	14%	14%	13%	12%
<b>Wood</b>	7%	5%	5%	5%	4%

Table 1b. Biomass and its subcategories, as proportions of the region's total DMC in 1970-2008.

## The forestry industry and deforestation

Globally, the forested area dedicated to the production of wood and non-wood products dropped from 1.16 billion hectares to 1.13 billion hectares over the 2000-2010 period (UNEP, 2012). This decline, also evident at the regional level, is due largely to the deforestation associated with the expansion of the agricultural frontier, poor forest management practices, fire, excessive firewood extraction and illegal cutting. The land area covered by tree farms, however, grew more rapidly in Latin America between 2000 and 2010 (3.23% annually) than in any other region of the world (UNEP, 2010).

In addition to tree farming initiatives, a number of strategies to conserve and protect forest resources have unfolded in the region thanks to policies, national decrees and regulation governing the management of natural resources. Protected areas represent one such initiative in this regard; they have come to represent over 20% of the region's total area over the last few years.



## Box 2. Forestry industry in Brazil

### Brazil

In 1970, domestic material consumption in Brazil totaled 6.4 tons per capita – close to the world average – and grew at an annual rate of 2.3%, reaching 15.3 tons per capita in 2008, approximately 50% higher than the world average (Figure 1a). While countries in the process of agricultural-industrial transition normally experience a reduction in the proportion of biomass in the DMC, in the case of Brazil 70% of the increase is attributable to biomass.

In regard to the extraction of forest resources, the figure for Brazil in 2005 was 290 million m<sup>3</sup> of which an estimated 58% consisted of timber for industrial use, with much of the remainder consisting of firewood (UNEP, 2010). The high rate of extraction of forest products in Brazil relates at least partly, of course, to the country's large area of forest cover.

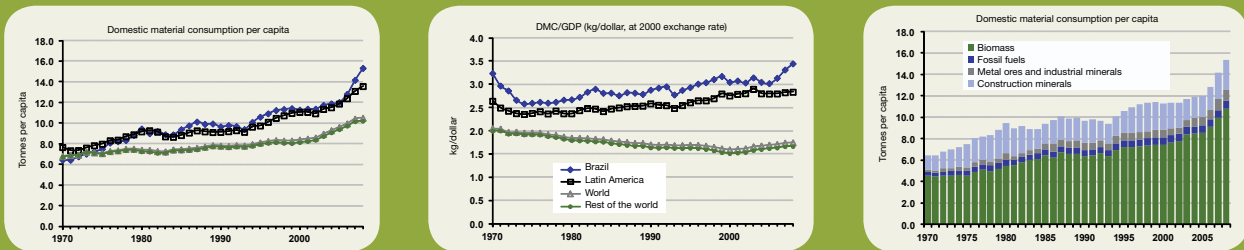


Figure 1a, 1b, 1c. Graphic summary of flow and intensity of materials in Brazil

Brazil's policies during the 1960s and 1970s promoted the relocation of thousands of settlers from the coastal areas to sparsely populated areas in the Amazon region, and stipulated logging as a prerequisite to accessing loans. In 2012, the Forestry Code was amended, providing sanctions for prior practices and requiring offenders to reforest affected areas. This new Code stipulates that 80% of the Amazonian territory must be preserved in its original state. In addition, it establishes the National Forestry Inventory, the main purpose of which is to generate information on forest products, both natural and farmed, based on five-year measurement cycles, to serve as a basis for formulating public policies on resource use and conservation.

### Policy options

Generating products and income, promoting socio-economic development from forests, at the same time as preserving these resources and future income, is one of the greatest challenges facing Latin American societies. There is no model or recipe for addressing this issue; rather, there is a range of tools and practices which, when adapted to specific situations and contexts, work toward achieving this goal. Sustainable forest management is achievable at various scales and by different actors.

Forest management certification is an instrument that has demonstrated enormous potential for the preservation of natural patrimony. Although this approach has been promoted by non-government organizations (in particular, the World Wildlife Fund, WWF) and a variety of global consortiums (the Forest Stewardship Council (FSC), for example) – it has also served as an important framework for country-to-country cooperation across the production chain. Despite as-yet undeveloped potential, major results from certified forest management can already be seen in terms of not only the amount of forest area under such management, but also with regard to business volume – due to the