

Rio+20 and Forests

The Contribution
of the Collaborative
Partnership on Forests
to Rio+20



Photo credit for cover photo: UN Photo/JNHCR/Gienna Gordon

www.cpfweb.org

FOREWORD

The Rio+20 Summit is a unique opportunity to identify the key societal challenges for the coming decades while recognizing and addressing their environmental, social and economic aspects in an integrated manner. While forests have not been specifically identified as one of the key themes of the Summit, almost all of the themes are strongly connected to forests.

In a joint effort, the fourteen members of the Collaborative Partnership on Forests (CPF)¹ highlight the present and potential contribution of forests to the identified challenges. It is with pleasure that we present this publication portraying the full picture of forests and their role in providing solutions to critical 21st century global challenges. This CPF publication features stories illustrating the multiple functions and services of forests, which promote not only human well-being and poverty reduction, but also play a vital role in maintaining a sustainable environment, across landscapes and economies. It also conveys suggestions about the key

themes, linked to Rio+20, based on CPF's collective experience working on forest issues.

The focus of this publication is on the country level, reinforcing the fundamental message to Rio+20 – that forests are vital to the survival and well-being of people everywhere, all 7 billion of us. The diverse selection of stories reveals the progress and exemplary ways in which countries have taken a holistic landscape approach to implementing sustainable forest management at all levels.

Forests require the commitment at all levels to achieve social, economic, and environmental goals in a balanced, comprehensive, and cross-sectoral approach. Simply put, the cross-sectoral approach to forests is about breaking down the institutional silos and working horizontally across institutions in various sectors within the physical landscape, including agriculture, community and rural development, land-use planning and natural resources management, to name a few.

The landscape approach to forests places an emphasis on optimizing the social, economic and environmental benefits of forests. By developing this cross-sectoral landscape approach to forests, CPF member organizations have come together to present a successful model for other sectors to follow. For example, through landscape restoration efforts, the CPF has focused its work on forest-dependent communities, the private sector and local governments to identify and put in place land-use systems that help manage and restore forest functions across the whole landscape.

The value of forests can be best realized if we see the true impact forests have on the lives of real people, in a manner that all people can understand. It is with this mindset that we share this publication with you, in hope of raising awareness, building new partnerships and reinforcing cooperation for the benefit of forests and people everywhere.



Eduardo Rojas-Briales



Jan McAlpine

¹ The Collaborative Partnership on Forests is comprised of the following 14 international organizations, institutions and secretariats working in association to promote the implementation of sustainable forest management: the Centre for International Forestry Research (CIFOR), the Food and Agriculture Organization of the United Nations (FAO), the International Tropical Timber Organization (ITTO), the International Union of Forest Research Organizations (IUFRO), the secretariat of the Global Environment Facility (GEF), the secretariat of the Convention on Biological Diversity (CBD), the secretariat of the United Nations Convention to Combat Desertification (UNCCD), the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), the secretariat of the United Nations Forum on Forests (UNFF), the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the World Agroforestry Centre (ICRAF), the World Bank (WB) and the International Union for Conservation of Nature (IUCN).



THE SUBMISSION OF THE COLLABORATIVE PARTNERSHIP ON FORESTS TO RIO+20

Forests cover around one third of the Earth's land surface, and these ecosystems and their goods and services and related activities contribute to the objectives of the Earth Summit 2012 in multiple and essential ways. In the future—with pressures on land to meet increased food production projected to surge, the climate changing and energy prices rising—forests are going to be called upon extensively to garner solutions.

However forests offer more than immediate solutions—they provide some of the most insightful experiences the world has garnered so far as to how to practically operationalize the concept of sustainable development with respect to natural resources. Forests provide useful



Photo: FAO, David Gilbert, FO-6895

lessons for other sectors on how to approach 21st century challenges, including taking the aspiration of the Green Economy from rhetoric to reality.


The conservation and sustainable use of forests has been built from practical bottom-up experience rather than from conceptual theory. These experiences demonstrate time and again that the “so-called” social, economic and environmental pillars of sustainable development need to be treated as integral parts of a single system rather than being managed in isolation. In particular, the history of the conservation and sustainable use of forests illustrates that while some degree of specialization is possible—for example a protected area or a commercial forest—there is always a fundamental need to ensure that society benefits from a balanced supply of social, economic and environmental values.


In order to achieve such a balance, sustainable forest strategies need to be understood in terms of time and space. With respect to time this requires robust management and decision-making processes that not only satisfy societies' current needs but consciously ensure that future options remain open and are not foreclosed. In terms of space it requires an ability to think, plan and act at a broader “landscape level,” making sure that inevitable “site-level” trade-offs do not jeopardize the broader approach.


Landscape approaches facilitate the diversity and resilience of natural systems that true sustainability is built upon. Consequently there is no single blueprint for sustainability and no single approach can be relied upon to consistently deliver sustainable outcomes. Sustainability requires a process of dialogue, negotiations and learning as well as the active participation and involvement of all the key actors.


Whereas most environmental services provide benefits to a wide range of society (the benefit of carbon absorption is global), forests provide particular benefits to an estimated 1.6 billion of the most disadvantaged rural and drylands populations. The value of direct benefits to them from forests is estimated at \$130 billion per year—a figure that exceeds the totality of Official Development Assistance; and the global value of the environmental services provided by forests is still unknown but in the range of trillions of dollars, plus additional value that is added downstream. Governments and the private sector have mostly ignored these values.

The critical contributions of forests include:


 **Poverty alleviation, MDGs and rural development:** Forests are often one of the few locally available development resources; and they already provide a large proportion of rural income, GDP, food, medicine and cultural identity.


 **Climate change mitigation and adaptation:** Forests provide opportunities for ecosystem-based adaptation, to reduce greenhouse gas emissions from deforestation and forest degradation, to sequester additional carbon through forest restoration, and to capture social and environmental co-benefits—on a large scale.

 **Food security and agriculture including livestock:** New data shows that 25% to 30% of rural household income and food comes from off-farm resources, with forests providing a major share. A large proportion of forests' bounty provides nutritionally balanced wild protein, carbohydrates and vegetables to rural families. Forests also reduce soil erosion, optimize water supplies, filter and clean water, store water, and anchor an overall ecosystem that balances moisture, mitigating the severity of drought and water scarcity, as well as providing fodder for cattle during dry periods. Intensification of agriculture is a major opportunity not only to address the growing demand for food in developing countries but also for reducing and even reversing deforestation. Tenure reforms, capacity building and political priorities for agriculture are crucial.


 **Land use and land restoration:** Forests and tree cover stabilize soils, reduce water and wind erosion and enhance soil productivity. They are key to maintaining land productivity and restoring degraded lands. Globally, over 2 billion hectares offer opportunities for such

restoration, mostly in the tropical and temperate areas. About 50% of these are in degraded lands—equivalent to over 900 million hectares. The goods and services provided by drylands forests support livelihoods and contribute to poverty eradication and increased food security, targeting the poorest and most vulnerable groups, particularly women and children.

 **Biodiversity conservation:** A rich diversity of species can be conserved while livelihoods are sustained and improved. Maintaining and enhancing biodiversity in forest (production) systems and forest landscapes also contributes to their health and resilience, in addition to offering diversification of income possibilities. The value of healthy and functional natural and semi-natural forests for providing a wide range of ecosystem services to local communities, and also to societies globally, is increasingly recognized; and 'payment for ecosystem service' schemes are beginning to emerge. Forest conservation aims have been instrumental for developing these payment schemes, whether for water purification and storage, for storage of carbon, or for other ecosystem services. The most important contribution to biodiversity conservation is halting deforestation.

 **Renewable raw material, bioenergy supply and green growth:** Forests provide multiple renewable resources and can satisfy the needs of growing and changing markets for food, feed, fiber, fuel, shelter, and bio-based products originating

from renewable resources and ecosystem services. Wood has a high additional potential to contribute to climate change mitigation by substituting materials and energy from non-renewable sources. Forest industries are expected to contribute very significantly to green growth jobs in forest rich countries; and the net benefits of halving deforestation could amount to \$3.7 trillion over the long term.

 **Energy security:** Forests and trees are the most important source of renewable energy in the world, particularly in Africa, providing about 80% of the total primary energy supply of the continent. Globally, more than two billion people depend on fuel wood in rural settings and charcoal in urban areas for cooking and heating, and wood energy is often the only domestically available and affordable source of energy. Energy from forests is equivalent to about 20% of global crude oil production.


 **Trade:** Trade in forest products was worth over \$200 billion in 2010, plus a value of additional non-timber forest products that is more difficult to quantify. Concerns about trade in forest products led to initiatives to ascertain the environmental and social impacts of trade. Getting government, industry and community support for approaches to addressing these concerns has taken the many years since Rio—but forest certification of sustainability and legality have become market instruments that have a major impact in both producer and consumer countries.



Photo: FAO, Marguerite France-Lanord, FO-5550

Forest ecosystems can play a central role in contributing to a green economy while their management can also benefit from a green economy. Furthermore, institutional frameworks provide a foundation for the contributions by forest ecosystems to sustainable development. A focused action agenda can deliver the benefits of sustainable development from forests and for forests.

These action items include:

Green Economy

- Make development and management of forests and biodiversity a focus of poverty alleviation and the transition to a green economy.

- Cultivate the full range of climate benefits offered by forests, which include adaptation and carbon absorption and storage services, while recognizing that the values of forests are not limited to climate services.
- Bring the green value chain of forests and forest products to the service of sustainable development, including the value of recycling of fiber, the storage of carbon in housing and furniture, and a wide range of bio-products and ecosystem services.
- Manage forests to meet increasing demand for ecosystem goods and services including food, raw materials and renewable energy.

- Invest in a realistic target of restoring 150 million hectares of degraded lands by 2020 and thereafter focus on additional areas of the 2 billion hectares available for restoration globally (three quarters of which will be mosaic-based restoration and one quarter will be classic, wide-scale restoration).
- Commit to sustainable development goals on land use that will lead to a land-degradation neutral world with targets to achieve zero net land degradation whereby the amount of land degraded each year is offset by reclaiming and improving an equivalent amount of land.
- Invest in the dissemination and scaling up of sustainable land management techniques that promote forest growth, particularly agroforestry and evergreen agriculture, to capture multiple benefits for farmers including the ability to draw nitrogen from the air for fertilizer and provide fruits, medicines, livestock fodder, timber and fuelwood, shelter, erosion control, watershed protection, conservation of biodiversity, greater resilience to climate change, and carbon storage and accumulation.
- Assign a greater role in forest management to women, whose involvement has been shown to improve the condition and sustainability of forests.

- Invest in research and data collection on the full suite of forest ecosystem goods and services, particularly research on critical tipping points and thresholds.

Institutional Framework for Sustainable Development

- Engage in capacity building for forest management, education, and institutions.
 - Optimize land use by understanding and resolving conflicting cross-sectoral land use policies and mainstreaming sustainable land management.
 - Promote land planning at the landscape scale—using different decision making structures for local, regional, and international governance—to optimize the delivery of forest ecosystem goods and services from sustainably managed forests.
 - Advance the establishment of a strong and effective science-policy interface in support of land restoration and sustainable land management.
 - Facilitate the establishment of compensation for ecosystem services schemes to create incentives for sustainable use and investments in the management of forests.
 - Devolve forest management rights to local communities that know their forests—and that have a vested interest in the decisions being made.
- Adopt coordinated and coherent policies and financing to address desertification and land degradation, climate change, biodiversity loss, poverty, water scarcity, food production, and food insecurity, by strengthening relationships among sectors and institutions.
 - Minimize conflicting policies and measures by facilitating cross-sectoral and cross-institutional communication and understanding, notably with the agriculture, energy and trade sectors.
 - “Green” the value chain between producers and consumers by promoting demand for legal and sustainable products and building capacities for good governance and law enforcement.
 - The transition to a global sustainable future is particularly important for forests. The action agenda above offers pathways for sustainable development and a green economy in which forests both contribute and benefit. Forests have much to offer to other sectors in the practice of sustainable development but they also need enabling policies that allow them to perform to their full potential. By adopting balanced policies and financing for effective institutional frameworks, we can support governance structures that will capture



Photo: FAO, Supratim Bhattacharjee, FO-7435

the multiple benefits of forests for sustainable development.

- A future that does not incorporate forests and their essential values and services as key elements in a green economy would miss unique opportunities. Forests already offer a range of tested solutions to key topics in sustainable development such as climate change, biodiversity, livelihoods, soil and water, and could contribute in many ways to a green economy. A sustainable future in which forests play a central role would also empower some of the most disadvantaged people in society and facilitate their contribution to global sustainable development.



ON-THE-GROUND ILLUSTRATIONS

1. Speaking for the forest: the role of communications and education

No public relations firm works for the species that live in and around the forest—and the news media do not often provide stories about the local and rural peoples who gather forest products, protein, and fuel. Who will speak for the forest? Who will speak for the people whose livelihoods, diets, energy, and ways of life revolve around forests? Because people are critical to the sustainable management of all forests, the International Year of Forests (Forests 2011) set out to tell stories about the importance of Forests and People.



Photo: UNFFS, Benjamin Singer, 2011

With this need in mind, the Forests 2011 communications team stepped in to fill this gap, and built a communications and education platform that will support key messages for years into the future. It launched a multi-faceted communications campaign featuring events, a central website, films and photos, and partnerships spanning all continents and reaching out to all ages. The forest education that Forests 2011 offered was available both to people who live and work around forests and to those who live and work in cities and offices.

The year got off to a strong start with a launch ceremony attended by key partners from inside and outside the United Nations, including top officials. This set up a “bookend” pattern, which resulted in several closing ceremonies at the end of the year including the official closing ceremony at the United Nations in February 2012—and both were designed to launch these key forest activities far into the future.

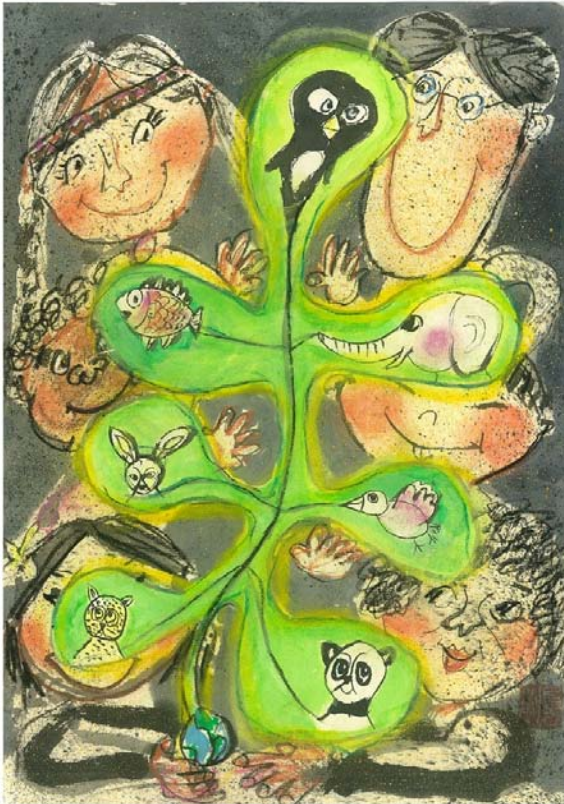
Film and photography emerged as strengths of the Forests 2011 communications strategy, and partners from all over the world led these media to the central website. A partnership with the Jackson Hole Wildlife Film Festival proved a tremendous asset. As a result, films from a variety of sources collected for the Year will be available for years into the future.

The ability to reach out to young people also emerged as a Forests 2011 strength. The jargon-free language of forests, films, and photographs appealed to young people, and they demonstrated great talent in using multimedia over a wide range of mobile devices and computers. A partnership with the Gabarron Foundation resulted in several thousand remarkable drawings and paintings by children, and through the Foundation was made available to audiences worldwide.

The Forests 2011 communications team was able to measure the public’s attention on forests using new media analytical



Photo: UNFFS, Benjamin Singer, 2011



2011 Children's Art Contest, Child Category 5 winner, Lau King Gi (China)

tools. It found, for example, that coverage of forest topics in the blogosphere rose substantially around the times of peak activity at Forests 2011 events. The blogosphere was of particular interest because blogs come from the public, including the public in developing countries, whereas the mainstream news media come from more elite writers and producers. Measurement of social change and absorption of public policy messages has traditionally been difficult, but new

technologies are now making it more possible and Forests benefitted from the arrival of these new tools.

Forests 2011 found that story telling, particularly story telling about successes, is key to engaging the public. It focused on stories told in plain language. It also focused on human-interest angles and films as strong tools for communicating. Likewise, the communications team launched an award ceremony that brought attention to "forest heroes," with great success.

Speaking to the Future

The Forests 2011 communications strategy marked a global effort targeting all segments of society, all economies, age groups and cultures.

The Forests 2011 team adopted an ingenious strategy for bridging the gap between these large goals and needs, on the one hand, and minimal resources. This strategy was to leverage the resources of a wide range of partners, and to reach into local regions through the assets and abilities of those partners. This strategy turned a finite set of activities into a global campaign and optimized the investment made on behalf of Forests and People.

This strategy will be useful far into the future, both as a method and as a now-built platform from which to reach out further. The audiences and partnerships captured by Forests 2011 are long-term assets.



2011 Forest Heroes

Photo: UN Photo by Rick Bajornas

2. Integrating health and conservation for success

“In many forested areas, there are no formal healthcare services—no doctors, no clinics, no ‘modern’ medicines,” says Carol Colfer, Senior Associate at the Center for International Forestry Research (CIFOR) and co-author of “Forests, women and health: opportunities and challenges for conservation.” “The only healthcare is often what is available locally, through indigenous knowledge and locally available plants,” Colfer continues.

A survey of communities in Kalimantan, Indonesia by Indonesian NGO Alam Sehat Lestari, for example, showed that villagers spend around \$209 per year on health care, far exceeding food expenditure of \$145 per year, partly due to a lack of nearby access to other health care facilities.

In the absence of such medical facilities, responsibility for the care of sick relatives typically falls to women. In many areas, women are the primary traditional healers and often have greater knowledge of forest resources as cures and preventatives against disease and other health problems.

Unfortunately, steep medical bills have forced some into illegal logging, the study found. Others have cleared rainforests, often with government or industry support, to make room for pesticide-laden crops and plantations, which have contaminated groundwater and help to spread disease.

As forest populations continue to soar in many countries, the expanding populations are also putting significant pressure on forest resources. Some women, facing a scarcity of fuel wood, have been forced to use less efficient fuels including twigs, leaves, dung, crop residue or even plastic.



Fortunately, the study noted several examples of initiatives underway that integrate conservation and human health, such as family planning, which aims to improve local livelihoods and environments, including among rubber tappers in Brazil and rural communities in Madagascar. Although a number of gender-related issues have garnered the attention of policy makers and researchers, health issues of forest-reliant women in developing countries merit more serious attention, the study concluded.

In the future, the integration of initiatives for conservation, human health, and livelihoods offers great potential for success.



Photo: FAO, Roberto Faidutti, CFU000641



3. Integrating the three pillars of sustainability: the Miyun watershed in China

Many examples show that the three pillars of sustainability—the environmental, the economic and the social—are interdependent, integral parts of a single system, and should be treated or considered together.

The Miyun watershed in China, which supplies up to 80 percent of the freshwater used in Beijing, offers one such example. Worsening water shortages in Beijing have been linked directly to the disappearance and degradation of much of the original forest in the watershed. When it first recognized this, the government attempted to resolve the problems by imposing a strict logging quota—but the forest quality and water supply continued to be poor.

Several organizations have worked toward solutions, including the International Union for the Conservation of Nature (IUCN) and the German development agency GIZ. For example, the *Landscapes and Livelihoods Strategy* project of the IUCN worked with the local authorities and communities to introduce a more integrated form of landscape management and restoration, which recognized the multiple needs and functions of the watershed and which brought together the many different stakeholders. This included a partial lifting of the logging quota. A new set of forest management practices was introduced, representing a shift from a strict protective

approach towards more sustainable resource use through active management by forest-based communities.

The work resulted in a formal agreement that recognizes different forest management and forest use regimes, merging the technical information held by government foresters with local knowledge and priorities. Local communities are now carrying out forest regeneration projects, and this change has resulted in natural forest regeneration and improvements in forest structure, quality and function.

There are other positive outcomes: a permit for harvesting timber has been secured—the first to be issued in more than 20 years—and a new system of harvesting fuel wood has been established. Community-based

cooperatives are being established to develop the market potential of forest goods and services, with the aim of increasing and diversifying local livelihoods in the long-term.

In August 2012, the party secretary of the Beijing municipal government recommended to the Beijing Municipal Parks and Forestry Bureau that a scaling-up plan be devised, following the Miyun model. This is another sign of the success that comes from integrating the three pillars of sustainability. Community-based participation and local control of forests, along with small and subtle initiatives, can unleash wide-scale, positive change.

Another example of success comes from Uganda. In the area around Mount Elgon, for example, IUCN worked with the local



Photo: IUCN

community and partners and authorities on locally developed land-use by-laws, which went on to gain government recognition and approval. This resulted in multiple benefits, including significantly increased agricultural yields, decreased soil erosion and reduced sedimentation, and also reduced tensions between stakeholders and neighboring communities.

Together with other examples from many organizations working around the world, these illustrations show that integrated approaches can achieve sustainable development in the future.

4. Eradicating poverty through ecosystem-based approaches: Stopping vicious cycles with better land management

In many countries, growing human and livestock populations seem on a collision course with forest cover and vegetation. This leads to a vicious cycle in which land degradation, falling yields and increasing poverty stress rural ecosystems even further. Fortunately restoration programs based on community management, natural regeneration, and managed grazing have allowed several types of landscapes to bounce back and support growing yields and incomes.

Those programs show that rural development is not a linear process but rather a matter of systemic change triggered by restorative interventions in landscapes inhabited by the rural poor.



Photo: IUCN

The examples below illustrate the tight relationship between progress toward reducing poverty and hunger and progress through environmental sustainability (Millennium Development Goals 1 and 7).

Niger offers an example of just such a success. Rainfall is highly variable here, and 84 percent of the population depends on land-based activities for survival, with half the population suffering periodically from food insecurity. Niger is also home to a tree expansion program that has spread organically from village to village and farmer to farmer, and resulted in a major transformation of the landscape, especially in the Maradi and Zinder regions. Rules regulating the use of trees on farms were revised in 1993, giving farmers a freer

hand and stronger incentive to grow trees. This low cost reform, which transferred ownership of trees to individual farmers, is said to have unleashed private investment in excess of \$100 million.

After more than two decades, the results have been phenomenal—with over 5 million hectares of rejuvenated “parklands” and an indigenous agroforestry system benefitting 4.5 million people. The initiative mainly involved the selection and protection of tree species that were regenerating naturally from seed or roots in the soil. A range of species, including the signature species *Faidherbia albida*, now provide improved soil fertility, fodder, wood and fuel, and a variety of fruits and



Photo: FAO, Marguerite France-Lanord, FO-5570

foods, thereby diversifying farmers' incomes and reducing famine in times of drought. Benefits associated with increased tree cover have increased sorghum yields by 20 percent to 85 percent and millet yields by 15 percent to 50 percent in participating areas.

Ethiopia offers another example. The over-exploitation of forest resources there has left less than 3 percent of the country's native forests untouched. In Humbo, a small town nestled against the rocky slopes of Ethiopia's Great Rift Valley, deforestation threatens groundwater reserves that provide 65,000 people with potable water, and has caused severe erosion resulting in floods and in some cases deadly mudslides. Climate change is likely to compound Humbo's vulnerability to natural disasters and add to poverty. With a population that depends heavily on agriculture for its livelihoods, increasing droughts and floods will create poverty traps for many households, thwarting efforts to build up assets and invest in a better future.

Under the Humbo Assisted Natural Regeneration Project, seven forest cooperatives were established on the Humbo Mountain to manage and reforest the surrounding land sustainably. More than 90 percent of the Humbo project area has been reforested using the *Farmer-Managed Natural Forest Regeneration technique*, which encourages new growth from tree stumps previously felled but still living. The regeneration project has resulted in increased production of wood and tree products, such as honey and fruit, which contribute to household incomes. Improved land management has also stimulated grass growth, providing fodder for livestock that can be cut and sold as an additional source of income. Furthermore, the regeneration of the native forest is expected to provide an important habitat for many local species and reduce soil erosion and flooding. The protected areas of forest now act as a 'carbon sink,' absorbing and storing greenhouse gases from the atmosphere to help mitigate

climate change. The project is the first large-scale forestry project in Africa to be registered with the United Nations Framework Convention on Climate Change (UNFCCC).

Ethiopia's social protection program, known as the Productive Safety Nets Programme (PSNP), is also a noteworthy success. The program has evolved over time to target the underlying causes of food insecurity by paying people for public works in the areas of soil erosion control, water conservation, watershed management, reforestation and other land rehabilitation measures.

China offers an example as well. It has one of the world's largest erosion control programs, which has returned the devastated Loess Plateau to sustainable agricultural production and hence improved the livelihoods of 2.5 million people and secured food supplies in an area where food was sometimes scarce in the past. Thanks to the program, grain production increased from about 1 mt per household, which left a food gap of approximately two to three months a year, to 1.3 mt and more, enough to cover basic requirements.

The project encouraged natural regeneration of grasslands, tree and shrub cover on previously cultivated slope-lands. Replanting and managed grazing allowed the perennial vegetation cover to increase from 17 percent to 34 percent between 1999 and 2004, sustaining soil fertility and enhancing carbon sequestration. Together

with terracing, these measures not only increased average yields, but also significantly lowered variability. Agricultural production has changed from generating a narrow range of food and low value grain commodities to high-value products. As a result, farm and family incomes have increased steadily.

Albania offers another success story in this regard. The post-communist transition period in Albania was characterized by a massive internal and external migration of population, weak enforcement of laws and regulations, and overuse of natural resources—all of which resulted in degradation of forests and pastures and significant erosion of soil. In response, communal and participatory forest and pasture management plans were introduced in 251 rural communes, covering about 60 percent of Albania's total forest area. Coupled with investments, the management change helped curb illegal logging and overgrazing, increased incomes earned from forest and agricultural activities in communal areas, and resulted in a significant reduction in erosion. Average annual household income increased by 28 percent in micro-catchment communities that benefited from more sustainable use of natural resources between 2005 and 2011.

Future opportunities

There is huge potential worldwide for win-win interventions that heal degraded land, preserve ecosystem goods and services,

and restore incomes and dignity to the rural people who depend on natural resources for their livelihoods. Recent studies show that rural populations in developing countries derive an average of 25 percent of their incomes from Non-Timber Forest Productions. Those goods provide a particularly critical safety net in times of economic or climate shock. In addition, agroforestry (trees on farms) is an increasingly important part of rural development strategies that seek to achieve both sustainable intensification and poverty reduction goals by diversifying crops and improving soil fertility.

A recent assessment conducted on behalf of the Global Partnership on Forest Landscape Restoration (GPFLR) estimated that there are more than two billion hectares of degraded forests and croplands on former forestland that could benefit from restoration measures. Of those, one and a half billion hectares would be best suited for “mosaic”

restoration, in which forests and trees are combined with other land uses such as agriculture. Those mosaics are the landscapes where poor people typically live—at the boundary of forests and farms.

Experience shows that farmers, communities, governments, donor agencies, private companies and civil society can build effective partnerships to tackle land degradation and achieve large-scale poverty reduction. They are most effective at doing so when market incentives stimulate the transition from conventional practices associated with degradation to new practices with which crops, grasses and trees can be produced profitably with much less destructive environmental impacts.



Photo: FAO, Masakazu Kashio, FO-6732



5. Managing climate change with forests: Successes and potential

The relationship between forests and climate change is a two-way story. The storage and sequestration of carbon by forests helps to mitigate climate change, while the changes that have come about as a result of human-induced climate change affect forest conditions. These conditions include the areas forests cover, health, fires, and biodiversity, and changes in growth rates and species composition, as well as changes to the lives and livelihood opportunities of people who live in and around forests.



Photo: FAO, Masakazu Kashio, FO-6769

Forests have always adapted to climatic changes. Petrified forests exist in areas that, today, could not support even the driest forests. Forests have retreated and followed in the footsteps of the ice age edge during the last glacial period; oaks recolonized Europe at a rate of 380 meters per year.

The impacts of climate change on forests range from local-scale changes, to large-scale changes, to changes of entire ecosystems such as in the northeast Amazonian region where reduced availability of water combined with unsustainable land management practices is expected to cause widespread change. In Canada, Honduras, and the United States, infestation by pine beetles has changed the landscape and caused economic losses of millions of dollars.

Examples of success from many countries

Sustainable Forest Management (SFM) has been a key approach to maintaining forests and their ability to mitigate and adapt to climate change. For example, in Mexico the National Forest Commission, CONAFOR, has helped communities identify carbon rich areas and has negotiated agreements between carbon buyers and communities to manage and improve forest carbon stocks. In Bangladesh, Malaysia and Vietnam there are long traditions of sustainable management, reforestation and afforestation in mangroves, with a special focus on maintaining a coastal green belt

to protect communities from major storm surges.

Many other examples shine a light on significant approaches. The Federated States of Micronesia airport, located on a low-lying mangrove island, relies on mangroves' protection from erosion and damage by tidal surges, currents, rising sea level, and storm energy in the form of waves, storm surges and wind to provides its services.

In Cameroon, forestry law introduced the concept of community forests that give communities the right of access to forest resources in or around their villages. As a result, over 400 community forests have been requested so far, featuring sustainable activities such as hunting, timber production and protection of environmental services. Issues concerning inequitable distribution of benefits and capacity and access to finance and technical capacity are some of the constraints that still need to be addressed if these forests are to continue serving communities in a changing climate.

In India, the government has committed to increasing the quality and quantity of forest cover by ten million hectares over the next 10 years. The *Green India Mission* aims to achieve an annual CO₂ sequestration of 50 to 60 million metric tons by 2020. Submissions include improvements in fuel-use efficiency; the promotion of alternative energy sources; restoration of wetlands, grasslands and mangroves; enhancement of tree cover in urban and peri-urban



Photo: FAO, Ignace Fokou Sakam, FO-7130

areas; the securing of migration corridors; and livelihood enhancement through biomass/non-timber forest products (NTFP)-based enterprises.

A growing forest movement to tackle climate change

Successes of sustainable forest management at project and regional levels, including through landscape restoration, provide solutions at both local and global levels to address climate change. In addition to mitigating and adapting to climate change, upscaling of sustainable forest management can provide jobs and natural capital for sustainable development. The solutions forests provide reach beyond climate regulation, to locking up carbon in buildings and furniture that are built with wood and replacing fossil fuels with forest-based biomass (for example, lignocellulosic fuels).

REDD+ (Reducing Emissions from Deforestation and Forest Degradation + conservation of forest carbon stocks + sustainable management of forests and enhancement of forest carbon stocks) is a promising initiative, under the UN Framework Convention on Climate Change (UNFCCC). It has gained traction among countries, the private sector and civil society. REDD+ may well turn out to be a catalyst for a five-fold win-win solution. If the process is designed and managed well, this winning situation can consist of:

- Climate change mitigation and adaptation
- Enhanced business opportunities from new market demands created by a low-carbon development trajectory, such as demands for new energy and construction products, quality jobs, and a new low-carbon economy

- Improved livelihoods, poverty alleviation and social benefits for local communities
- Improved resource efficiency
- Biodiversity conservation and enhanced functioning of forest ecosystems

A large number of pilot projects are under development and some REDD+ projects are already beginning to deliver benefits for climate mitigation as well as the other benefits mentioned above. Examples include the Genesis Forest Project (Brazil), Kasigau REDD Project (Kenya), Madre de Dios Amazon REDD Project (Peru), and the REDD project in Oddar Meanchey Province (Cambodia). They have all been certified according to the Climate, Community and Biodiversity (CCB) standards.

Another success story on improved land management practices is in the making in Niger. The adoption of agroforestry practices such as planting more Gao trees (*Faidherbia albida*) on farmlands has increased the green cover, carbon stock, and productivity of more than 4.8 million hectares. Similar experiences from China and Ethiopia give us confidence that, with the right enabling conditions, it is possible to conceive and achieve positive large-scale transformations in livelihoods and sustainable forest management in the face of climate change. The learning that comes from these examples will offer great value in the future as the climate continues to change.



6. Applying a landscape approach: Forest restoration in Rwanda

In Rwanda, over-dependence on agriculture and biomass resources has contributed to widespread landscape degradation caused by deforestation, soil erosion and sedimentation. This has harmed incomes and livelihoods in rural communities. But the government of Rwanda responded recently through an approach of landscape restoration.

Forest landscape restoration (FLR) brings people together to identify, negotiate and implement practices that restore a balance of the ecological, social and economic benefits of forests and trees within a broader pattern of land uses.

It is applied to degraded and deforested landscapes, across all types of forestlands



Photo: Alan Nudman

(public, private, productive, protective, agricultural, and more) with the overall aim of improving human well-being and ecosystem integrity. It is sensitive to local contexts and needs, and it goes beyond simple tree planting to achieve functional goals.

The Government of Rwanda's bold steps reformed policies including the adopting of a Green Growth and Climate Resilience Strategy and the announcement, in early 2011, of an ambitious plan to integrate border-to-border landscape restoration into its national development plans.

The restoration of ecosystem services will improve agricultural productivity, stabilize hydropower generation and establish a sustainable green economy. This plan has political support at all levels of government, which has made tree planting and environmental conservation a part of the culture in Rwanda. Many countries are watching the Rwanda experience closely so that they can attempt similar endeavors.

During the early stages of this plan, the Government of Rwanda is working with IUCN and the Secretariat of the United Nations Forum on Forests (UNFF), and is in consultations with the Global Environmental Facility (GEF) and other partners. The government and its partners have framed the vision of the Rwanda Forest Landscape Restoration (RFLR) programme as follows:

“Multiple stakeholders motivated and engaging in informed, collaborative and

inclusive action to restore and conserve Rwanda's critical landscapes for resilient and sustainable economic development, livelihoods and biodiversity (within and beyond Rwanda).”

Within this broad vision, the project will put essential building blocks in place to provide a solid foundation, particularly related to the following needs:

- To build an accessible knowledge base on FLR for evidence-based planning and decision-making.
- To increase capacity to engage in landscape restoration approaches.
- To enhance the awareness, support and involvement of civil society and the private sector.
- To strengthen land use planning processes and initiate and/or reinforce implementation of FLR in pilot sites/watersheds.

Given the ambition behind this target, the Government of Rwanda is currently developing a large-scale program aimed at restoring the functionality, productivity and biological diversity of five or six key landscapes. This program will support and improve rural livelihoods, opening up new development trajectories for the people that live there.

Undertaking an initiative of this level and complexity will be challenging. It should be based on an in-depth conceptual and

technical understanding of the multiple factors that influence landscape functionality and the services landscapes provide and the relationships among them. In this regard, a number of valuable methodologies, tools and experiences are available to draw upon, from both within Rwanda and in other countries. However, most address only one or two dimensions embedded within the broader landscape. Given the multi-dimensional nature of landscapes, it is necessary to bring these multiple perspectives together into one integrated conceptual framework.

This project also responds to the need for urgency to restore key areas, emphasizes on-the-ground action, and tests practical restoration actions for future scaling out.

The project builds on and contributes to the achievement of the Bonn Challenge target of restoring 150 million hectares of lost forests and degraded lands by 2020, launched by German Environment Minister Norbert Rottgen on 2 September, 2011. The project links the implementation of CBD Target 15, which calls for the restoration of at least 15 percent of degraded ecosystems by 2020, and the CBD work programs on protected areas and forests, with the REDD-plus goal to slow, halt and reverse forest cover and carbon loss, including through the enhancement of forest carbon stocks. It also responds to the first Global Objective on Forests of the UNFF: to reverse the loss of forest cover worldwide through sustainable forest management (SFM),



Photo: Jeremy Doorten

including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.

The greatest synergies among these existing commitments are delivered through the application of the landscape restoration approach, and integrated through the national REDD+ strategies. The project will also contribute to REDD+ readiness, particularly in the area of governance including institution building, strategy development and integration. The project will lead to the restoration of important carbon sinks inside and outside forests, across broad landscapes. It will also contribute to the development of REDD+ project methodologies.

The Government of Rwanda selected pilot sites to begin the initiative based on the

following criteria:

- **National Significance:** The site is appropriate for achieving biodiversity goals (species and ecosystem functions) and socio-economic goals (e.g. importance for food security, agriculture, or an economic activity such as eco-tourism)
- **Multi-sectoral:** A site is of particular and shared interest to multiple sectors
- **Feasible:** The project can function at a scale in which programmatic approaches can realistically be tested and objectives realized given the time-frame and resources available

The learning that has come from these approaches can inform productive work in the future.



7. Sharing benefits with local people

For many years, traditional Samoan healers have made tea from pieces of the mamala tree (*Homalanthus nutans*) and used it to cure people with hepatitis. The bark and stemwood of the mamala tree contain a gene that naturally produces Prostratin, an active compound containing anti-viral properties.

Recently, an ethnobotanist from the University of California (UC) at Berkeley studying traditional Samoan medicine sent some samples of the tree to be tested against HIV. When the researchers isolated Prostratin in the laboratory, they discovered that it stopped cells from being infected by the virus. It also forced the virus outside the body's immune cells and acted as a supporting agent for other HIV-fighting drugs.

Before sending the samples of the tree for testing, and before further development of Prostratin, the University of California followed PIC (Prior Informed Consent) and MAT (Mutually Agreed Terms) principles. These principles are now enshrined in the *Nagoya Protocol*, which ensures the sharing of benefits with biodiversity-rich developing countries through technology transfer, research results, training and profits.

Following this Protocol, UC agreed to give back a substantial percentage of the net revenue arising directly out of the research



Photo: Falealupo rainforest, Savai'i island, Samoa

to the Samoan people. Funds have also been supplied to local villages for schools, medical clinics, water supplies, and an endowment to support the local rainforest.

The Nagoya Protocol was adopted by the Conference of the Parties to the Convention on Biological Diversity in 2010, at its tenth meeting, held in Nagoya, Japan. It's full name is the *Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity*, and it regulates the relationship between providers and users of genetic resources within and across scientific and economic sectors.

As some of the world's most biologically diverse ecosystems, forests harbor a great pool of genetic resources whose use may be affected by the new Protocol. In the future, the Nagoya Protocol can promote the development of new medicines and forest-based products while bringing benefits to populations that live in and around forests.

8. Empowering forest-dependent communities: livelihoods, landscapes and lessons learned

In Benin women often earn about \$7-36 a day harvesting shea kernels in forested areas. It may not be much, but it can be enough to meet their cash needs each year and requires not much in an up front financial investment. Their small enterprises can make the difference between not having quite enough that year to live and to eat — or having enough.

Likewise, shea nuts offer a tremendous opportunity in nearby Burkina Faso. The Burkinabé people derive a range of forest

products from their country's trees including medicine and foods to supplement their diets. The vast majority of the country's population consumes locally produced firewood and charcoal; but shea is the most lucrative forest product and one of Burkina Faso's most vibrant sectors. Shea trees grow naturally or in loosely managed plantations and produce a nut rich in fat.

Populations have transformed these nuts for generations, using the butter thus produced mainly as cooking oil and as a cosmetic. In recent years, shea butter has found its way in Western cosmetic products, and to a lesser extent as cooking oil for West Africa's expatriate community, thus making it one of the country's highest

ranking exports along with cotton.

Shea nut processing, and butter production, has always been done manually—mainly by women. They crush the nuts to a pulp and mix in water until the butter floats to the surface. NGOs and bilateral donors are now assisting women's groups and cooperatives to develop sustainable forms of shea butter production. Mechanized production has appeared in places, such as in Nununa Cooperative near Léo, where machinery for maple syrup production has been imported from Canada and adapted to local conditions—an innovative example of North-South technology transfer.

The shea sector is expanding rapidly and offers a promising way to reduce poverty in many regions. Pressure on the source is a cause of concern, as are sporadic conflicts over land tenure (especially where customary rights overlap with national legislation) and the arrival of intermediaries who do not always prioritize local livelihoods or the sustainability of the source. Nevertheless, the shea sector is a clear example of a win-win solution where the resource—savannah woodlands—can be managed sustainably and offer lucrative rural livelihoods.

Similarly, Africa is responsible for about one-third of the world's cashew crop. It generates essential income and protein rich food. However, a lack of cashew processing facilities in Africa has meant lost opportunities for income and jobs in processing. It is essential to understand



Photo: FAO, Juliane Masuch, FO-7236



Photo: FAO, Roberto Faidutti, CFU000146

the relationship between these non-timber forest products and livelihoods, to incentivize protection of forests and trees, and to support technical training to realize this otherwise lost potential.

Value from these forest products reaches the people who need it the most, including rural people, many of them women, those with little power in political systems, and some of the poorest people in the world. While the total value of these products may not rival that of some industries, it is value that *matches well to the areas of need*. Forests, trees outside of forests, and non-timber forest products are fundamental to addressing food security and poverty alleviation.

Future opportunities

These successes can expand in the future. But to make this happen, governments, multilateral organizations and communities need to support efforts to manage the landscape for all types of values—agriculture, forests and trees, water and more—and to support the women and communities who manage their forests sustainably. Doing so can create jobs in the local processing of forest products and can empower local cultivators. This is what is meant by sustainable forest management.

A cashew project, for example, aims to build African processing capacity, improve

linkages between local people and the marketplace, improve the quality of raw cashew nut cultivation, and promote a sustainable global market for African cashews. The project's goal is to help 150,000 smallholder cashew farming households in Benin, Burkina Faso, Côte d'Ivoire, Ghana, and Mozambique increase their incomes by 50 percent in the short term.

These crops do not grow in isolation from the forests and trees around them, the available water, or the threats from climate change and unsustainable timber harvesting. Projects need to be understood and viewed more broadly in the landscape of opportunity. Enhancing food security is not only a question of agriculture—it involves a completely different understanding of the landscape of natural resources and people, and how to manage all of these values.

9. Trading for sustainability: the essential role of markets for forest products and services

The small communities located around Toncontin in North-Eastern Honduras have traditionally supported themselves through small-scale agriculture, slashing and burning the natural tropical forests on the steep slopes around their villages to grow coffee and other cash crops. Timber production, where it occurred, was only for local use and was labour intensive, usually involving pit sawing of logs in the forest.

In the late 1990s these communities began receiving training through an International Tropical Timber Organization (ITTO) funded project in forest management to prevent over-harvesting of desirable species and to reduce processing waste when using chainsaw sawmills. Crucially,



Photo: ITTO

the project helped the communities to develop markets for finished products like furniture, giving them a sustainable stream of income from both domestic and international markets.

By combining trade in forest products with more sustainable agroforestry activities, the communities' annual incomes more than doubled. Destructive slash and burn agriculture practices were reduced significantly, and a new focus on maintaining their forests' value became prominent in all aspects of community organization, including the education of young people.

Markets for these products play a huge role globally in adding value to forests and preventing their conversion to other land-uses: the output value of the world's forest industries was \$1.7 trillion in 2010 and global exports of wood products (primary and secondary like furniture) were worth around \$400 billion.

Many countries want to add more value to forest products by processing them domestically and by inventing new products and uses. Tropical countries only account for about 10 percent of global forest products exports. The resulting lower perceived value of standing forests in these countries contributes to continued deforestation and forest degradation.

How can more value be added to forests to ensure that they are well managed and are not converted to other land-uses? Markets for forest products have a crucial role to

play in this regard. In addition to traditional forest products markets, recent studies have shown that the potential ecosystem values of forests, when taking into account their benefits to water, biodiversity, carbon storage and other diverse functions, total in the trillions of dollars. Few functioning markets exist to realize these values, however, so they remain largely theoretical, especially in developing countries where the need to increase the value of standing forests is most urgent.

Recent developments in carbon markets are encouraging. A voluntary market in forest carbon is developing to help countries in their efforts to mitigate and adapt to climate change. Discussions on reducing emissions from deforestation and forest degradation under the framework of the UN Framework Convention on Climate Change may result in an international forest carbon market, or a fund-based mechanism, but there is still work to be done to operationalize this. In the meantime, regional and bilateral initiatives to compensate countries that conserve and sustainably manage their forests have raised hopes that emerging forest carbon markets will be a significant new source of revenue to add value to forests.

Future opportunities

Even if carbon markets will deliver the benefits hoped for, there will still be a need to realize more of the values of forests to compete with highly lucrative alternative land-uses like oil palm, soy beans and



Photo: FAO, Johnson Herve Rakotoniaina, FO-7431

other agricultural and energy crops. International initiatives need to look for innovative solutions, including payments for the other functions and types of forests not captured currently. Despite global concern regarding the loss of biodiversity, for example, the forests that hold the bulk of it are those that are being lost the fastest. With this evidence of a market failure, it should be within humanity's grasp to introduce payments similar to those being developed for carbon to help fund the multiple functions of forests be it related to conservation of forest biodiversity, or other environmental services provided by forests.

Additionally, a move toward a green economy in many parts of the world has resulted in rising demand for eco-friendly products. This demand ranges from building materials to less carbon-intensive fuels. New technologies and the use of more wood fibre from forests can play a role in creating these markets. Increasing use of sustainably produced wood in existing and new applications needs to be a key component of any transition to a green economy.

In the effort to promote such products, market distortions need to be avoided and subsidies should not divert resources to

less than optimal uses. Forest certification and public procurement policies have become key components of global efforts to ensure that trade in forest products is sustainable and legal. Such efforts to ensure that forest products really do meet the environmental and social standards required of them should be designed so that they are not market barriers.

The forest sector has contributed and continues to contribute to an important and long-term role in the social, environmental and economic development of countries around the world. By bringing the green value chain of forests and forest products to the service of sustainable development, including the value of and markets for wood products, recycling of fiber, the storage of carbon in housing and furniture, and a wide range of bio-products and ecosystem services, countries can empower more communities like those in Toncontin to trade their way to sustainability in their forests.

10. Expanding the green economy: the great potential of forests

Through all of human history, forests have provided the raw materials for our housing, transport, and energy needs. Today, over 5,000 types of items are made from wood, including furniture, flooring, musical instruments, and toys, not to mention buildings.

While other raw materials have emerged during the era of industrialization, the importance of and demand for renewable raw material has never been greater than it is today. In most countries, wood-based energy is the most important and culturally accepted source. For example, in many African countries charcoal and firewood represent more than 80 percent of total energy consumption.

Across the world there are countless temples and churches and even entire cities built of wood, all standing the test of time. In the United States, Canada, and the Scandinavian countries, some 90 percent of houses are built of wood. In addition, to its superb qualities, wood is renewable, recyclable, and often available locally.

In construction, the use of composite or engineered wood has made it increasingly possible to use wood for aircrafts and taller and larger buildings. In London, the newly built Stadthaus, reaching 30 meters, is the largest timber-built apartment block in the



Photo: FAO, Sevgi Gormus, FO-6985

world. The wood itself has an asset value throughout its life. This means that the Stadthaus tower is completely recyclable and may one day be dismantled to build another building, or to help power London's electrical grid.

Other raw materials originating in forests, and especially dryland forests, provide many of our key cereals, fruits, and medicines. Traditional medicine and other traditional healers from many parts of the world depend on forests for their remedies. In some rural communities in Africa, plants with medicinal properties provide more than half of remedies available to the people who live there.

Only 5,000 species of higher (vascular)

species have been explored for their medicinal purpose, whereas there are hundreds of thousands of other plant species, each with dozens or hundreds of unique chemical compounds, that could also prove to be of medicinal value in the future.

Trees from the *Vernonia* genus, for example, which chimpanzees regularly seek out when sick, have been found to contain chemical compounds that show promise in treating parasites such as pinworm, hookworm and giardia in humans. Another example is the discovery of a new cancer-killing compound called taxol found within the Pacific Yew, a tree that was previously



Photo: FAO, Marguerite France-Lanord, FO-6849

disregarded as having no commercial value. The trade in medicinal plants, botanical drug products, and raw materials is highly rewarding in the international marketplace, which maintains an annual growth rate between 5 and 15 percent.

Because the use of forest-based raw materials is common and culturally accepted, renewable forest-based raw materials provide a high potential for the substitution of carbon intensive fossil fuel based products. For example, at the industrial level the use of charcoal as a smelting fuel for iron ore has, in South America, been experiencing resurgence and is also being investigated in Europe and Australia. This “green steel” could decrease carbon emissions by 65 percent for every metric ton of pig iron produced and can furthermore be “greenhouse neutral” when any CO₂ produced is absorbed by successive crops of growing trees.

Of course, fundamental to all of these technologies is that they must be sourced from sustainably managed forests.

Future opportunities

The potential future uses for forest products are impressive. We have barely scratched the surface of second and third generation biofuels, where woody mass becomes part of the fuel mix of tomorrow. In a Green Economy, forests will be at the heart of cradle-to-cradle production, where all forest-based raw materials will morph into new products as the material transforms in the product’s cycle of life. Forests will also provide more than just renewable raw materials, but a suite of renewable raw ideas and solutions for other sectors to use in the quest for zero emission and zero waste solutions.

“Dye-sensitized solar” is an example of a

forest-based renewable idea. Based on photosynthesis in leaves, this invention has recently become competitive with conventional solar in terms of efficiency and cost. Dye-sensitive solar cells (also called Graetzel cells) work the way leaves do, lassoing the sun’s energy with dye, even at shallow angles. This leaf-inspired innovation can be manufactured without toxins, at low temperatures, and can be flexible or integrated into a building skin (for example, as transparent and semi-transparent windows). Furthermore, the cell structures found in trees have been used in the design of cars and plastic bottles, improving the strength of the materials and composites, thus decreasing weight and material consumption.

Production of dissolved pulp into viscose, which could replace water, fertilizer and pesticide-intensive cotton production, and biodegradable paints and resins and other wood based products, will be readily available for the construction and fashion sectors. The result can be decreases in those industries’ carbon and ecological footprints.

Forests ecosystems provide a suite of solutions that have already been tested through millions of years of natural ‘research and development.’ These solutions can to be tapped in the future for their positive properties, such as non-toxicity and renewability, and for their tremendous green economy potential.

11. Harvesting non-timber forest products: the Brazilian Amazon

The history of the Brazilian Amazon is closely tied to international demand for non-timber forest products (NTFPs). The region was first “opened up” to international markets in the eighteenth century for its wealth in a wide range of products known as *drogas do sertão*—literally, “drugs from the bush.”

It was not until the late nineteenth century that the region became firmly anchored in the international economy when rubber production boomed to meet the demand from the European and North American tire industry. Rubber is produced by bleeding the trunk of latex trees (*Hevea brasiliensis*), which occur naturally throughout the forest, particularly in the southwestern part of the Amazon. When the British began harvesting latex from rubber plantations in Malaya in the 1910s, fortunes were lost in South America and the Amazon underwent a long period of economic decline.

Forests have often been perceived as lacking economic value in Brazil, partly because of the low historical visibility of the Brazilian timber sector and because of the specific history of Brazil’s policies in the Amazon. For decades, therefore, Amazonian policies focused on promoting infrastructure development, stimulating human colonization and encouraging agriculture and ranching. These policies

were interrupted in the early 1990s with the growth in popularity of a conservationist discourse taken up by the Brazilian Government.

Conservation *per se* has been unable to bestow economic value on Brazil’s forests, and payments for environmental services and REDD+ are too recent to have had any lasting impact yet. The timber sector has been identified as a potential solution for adding economic value to forests of the Amazon, but despite recent policies to encourage sustainable production the sector continues to be handicapped by the common perception that logging is the largest source of deforestation.

It is in this context that NTFPs have been increasingly viewed as a means of giving monetary value to the country’s natural forests, and therefore for addressing the deforestation crisis. Given the region’s history Brazil is already well acquainted with the Amazon’s range of NTFPs, which include Brazil nuts (*castanha do Pará*), guaraná and açai berries, copaíba and andiroba oils (commonly used in medicine), rosewood and other essential oils, and of course latex. With the exception of latex, the majority of these products are used in health foods, “natural medicine” and high-end cosmetics.

A large number of stakeholders have been involved in developing the NTFP chains of



Photo: FAO, Roberto Faidutti, CFU000637



Photo: FAO, Roberto Faidutti, CFU000109

custody. National and international NGOs have implemented a considerable number of local projects to assist local communities in increasing NTFP production through the creation of cooperatives and small businesses. State governments (particularly in Acre and Amazonas) have also played a large role in this respect by providing extension services to communities, materials for product collection in the forest and even subsidies to ensure a minimum revenue on certain products.

Such is the case of the State of Amazonas' policies to promote rubber production by local communities, which have seen the price of rubber guaranteed at a competitive R\$3.50 per kilogram (approximately US\$2). In addition, the government of Amazonas has also set up a Council for

the Sustainable Development of Traditional Communities and Peoples of the Amazon with the aim of enabling community representatives to provide advice on NTFP policies. The government of Amazonas has integrated these measures in a statewide poverty reduction plan, which in turn has been made a priority issue by the Federal Government in Brasilia.

Another factor explaining the growth of the NTFP sector is the rapid expansion of the Brazilian domestic market and of an educated middle class whose consumption patterns are increasingly favoring products perceived as natural. With Brazil set to be the world's fourth economic power by 2050, demand for Amazonian NTFPs will likely continue to increase. Furthermore, as these products are manufactured to

meet an ever more demanding domestic market, their quality often reaches the level required for export to developed countries, where many such products have made their entrance in the past decade. Today, both domestic companies (e.g., O Boticário and Chamma da Amazônia) and international firms such as the Body Shop, Yves Rocher and Aveda commonly compete to buy the region's best quality NTFPs.

Future opportunities

Challenges remain in the form of bottlenecks in the value chain of these NTFPs. First, continued research is needed to ensure that products are collected and transformed locally for the benefit of local communities in a cost-effective way, and that the quality of these products meets international standards. In this light, the private sector could play a crucial role, especially as demand for quality products often exceeds supply in many regions.

Second, with the evolving market comes increasing demand for products labeled as fair, sustainable, organic and/or natural. Most of the Amazon's NTFP production continues to be artisanal, albeit without such a guarantee. There is therefore a clear need to develop clear chains of custody systems, through certification or other means, so that these products meet the demands of increasingly well-informed consumers.

12. Harvesting bio-energy from forests: Biodiesel from *Jatropha*

A biodiesel boom is taking place in many countries that use it to cope with energy shortages and fuel economic growth. As a major oil importer, for example, China is encouraging the development and expansion of the biodiesel industry to reduce the country's reliance on fossil fuels such as crude oil and coal. But biodiesel production has several drawbacks.



Photo: *Jatropha curcas* plantation

Biodiesel production competes with food production, for example. Over the past decades, China has made great strides in improving agricultural productivity and alleviating hunger and poverty. But China faces food shortages as well as energy shortages. The government is struggling to balance its energy strategy with grain security, and thus is contemplating what to do about grain-based biodiesel.

An alternative is available. A non-grain crop, *Jatropha curcas*, is regarded as an excellent potential source for renewable energy. *Jatropha* can be planted on barren land unsuitable for grain cultivation.

Wenshan Prefecture in Yunnan Province was selected as a research area to evaluate *Jatropha* development. The project was implemented by the UN Development Programme and supported by a Yunnan-based mining company. Yunnan Province lies in the southwest of China and has more tropical, subtropical, temperate, and frozen zone plant species than any other province in China.

There is growing evidence that such plantations may have a place in regions where local employment generation and restoration of degraded land are priorities. Local farmers participating in the project tend to be from among the poorer or middle-income households, and the plantation project appears to bring work and income benefits to poor households in particular.

The plantations can be set up on eroded

lands and thus create a new forest resource that will also offer a valuable alternative to fuel wood for local communities.

Care must be taken, however, to ensure that these plantations themselves have no harmful side effects. Although studies indicate that plantations will in general not affect biodiversity and water resources, the introduction of an alien species into the environment must be analyzed carefully. Such invasive species can affect biodiversity, water use, soil and air qualities, and more.

Decisions regarding *Jatropha* plantations must also take into account issues of the on-going process of collective forestry tenure reform and fragmentation of forestlands, unification of farmers associations, and extension systems.



13. Strengthening community rights: harvesting *Gnetum* for food security

As many as 60 million of the world's poorest people hunt, forage and use shifting cultivation to get forest products such as fruits, roots, medicinal plants, bush meat, oils, gums and fuel wood.

In humid tropical forests across the Congo Basin, for example, the leaves of *Gnetum* spp. lianas are essential to fighting malnutrition and other ailments. It is an indigenous leafy vegetable, rich in protein (it has eight essential amino acids), which makes it useful as a meat substitute where meat is scarce. The leaves are also used to treat enlarged spleen, herpes, and sore throats, to ease childbirth, and as a cathartic. In Cameroon and Nigeria, the *Gnetum* leaves are eaten, both cooked and fresh, in almost all parts of society. They are also distilled into alcohol, and often served at important ceremonies. The species is ranked among the 10 most important non-timber forest products (NTFPs) in the Congo Basin.

It is women who typically harvest *Gnetum*, and cooking, farming and food marketing also remain women's work. Generally *Gnetum* harvesters are middle-aged, primary school educated and married, with an average household of five people. They travel on average five kilometers into the forest for a full days' collecting, twice a week, and sometimes take their children along. School children and students collect



Photo: FAO, Ignace Fokou Sakam, FO-7133

Gnetum during holiday periods. Currently, the value chains of *Gnetum* are almost completely dependent upon wild sources. Over two-thirds are harvested from customary village-owned primary and secondary forests with free access for the communities.

Recent studies conducted in Cameroon show that only about 14 percent of the *Gnetum* is used directly for consumption while over 80 percent is sold in local markets. The studies show that *Gnetum* sales provide, on average, 62 percent of a harvester's annual income (US\$1,125). Of that income, 80 percent is spent on food, making this forest resource an essential part of food security in the Congo Basin. The income and nutrition derived from forest resources such as *Gnetum* play particularly critical roles during times of crisis; and forests often serve as a safety

net for the populations hit hardest in times of crisis.

However, unsustainable harvesting can reduce the amount of *Gnetum* available. Fortunately, 40 percent of the harvest techniques used are sustainable, such as plucking leaves or climbing to harvest the youngest leaves. But 50 percent of harvesting techniques are not sustainable and involve uprooting, tree felling or cutting the whole liana. As a result, *Gnetum* is becoming scarcer. There is evidence that foraging distances have increased in the past decade, and that forests have diminished due to *Gnetum* harvesting. This is further exacerbated by clearance for farmlands and oil palm plantations, as well as in logging. These threats, together with rising population density, deforestation and degradation make the species vulnerable and thus pose a threat to food security, health and forests.

A case for community-rights of forest resources

The people who live in forests and depend on them for food, fuel, and medicines most often do not have explicit access or tenure rights. They lack control over decisions on how these resources are used and managed. Research and practice in countries across the world have proven that strengthening communities' rights over their own forests helps reduce poverty and also benefits forest biodiversity.

Many steps can be taken to increase the benefits of forests for nutrition, livelihoods, and biodiversity by increasing community rights. For example, the UN Food and Agriculture Organization (FAO) is helping several countries in Central Africa to reinforce the legal access of communities to forest resources and to secure a limited commercial right to sell non-timber forest products (NTFP). FAO is also supporting the domestication and cultivation of NTFP species in order to provide more resources to communities.

One example of this is in Congo and in the Central African Republic where FAO and the Center for Nursery Development and Eru Propagation trained 87 participants on the domestication of *Gnetum*. The training participants will in turn train other members of communities across the region. In the Central African Republic, 10 communities have already established their own *Gnetum* training demonstration sites. Similar projects are focusing on sustainable harvesting techniques for other

species such as *Prunus Africana* and Arabic gum (*Acacia*).

Likewise, the World Agroforestry Centre is working with local communities in Indonesia to build markets for a tree belonging to the same *Gnetum* genus. That tree is probably the most popular tree in home gardens, with both leaves and young fruits eaten as a vegetable (Melinjo) and the nuts used for crackers (Emping).

Future opportunities

Further policy measures may enhance long-term survival of threatened NTFP-species and their contribution to nutrition and food security, livelihoods and economic development. These policy measures include the linking of value chain

stakeholders, pragmatic regulations, and enforcement of customary control.

Other future opportunities to help NTFPs increase food security could include: increased investment in support of sustainable forest management and rehabilitation of degraded lands; development of deliberate pro-poor forestry measures; support to the development of economically, socially, and environmentally sustainable small and medium forest enterprises; integration of the contributions of forests and trees into national food security strategies and policies; and increased intersectoral and interagency collaboration.



Photo: FAO



14. Afforesting degraded croplands: the lower Amu Darya River, Uzbekistan

The Khorezm region of Uzbekistan depends on cotton, wheat, rice, and other crops, but has lost about 15 percent to 20 percent of its irrigated land to soil salinization from previous excess irrigation. This loss threatens food security, agricultural incomes, and rural livelihoods.

Two interdisciplinary research projects have assessed the viability of afforestation of marginalized and abandoned croplands as a way to reclaim the land, according to researchers Gulchekhra Khasankhanova and Raisa Taryanikova. These projects were implemented by the Center for Development Research of the University of Bonn, UNESCO, and other partners.

Degraded cropland parcels were converted to high-carbon stock ecosystems of salt-tolerant plants. These plants included *Elaeagnus angustifolia* L., *Ulmus pumila* L. and *Populus euphratica* Oliv., and this method was in contrast to water-intensive reclamation methods involving the leaching of highly salinized croplands. The goal was to improve soil fertility, increase crop yields, bring back ecosystem services, and generate income for local communities.

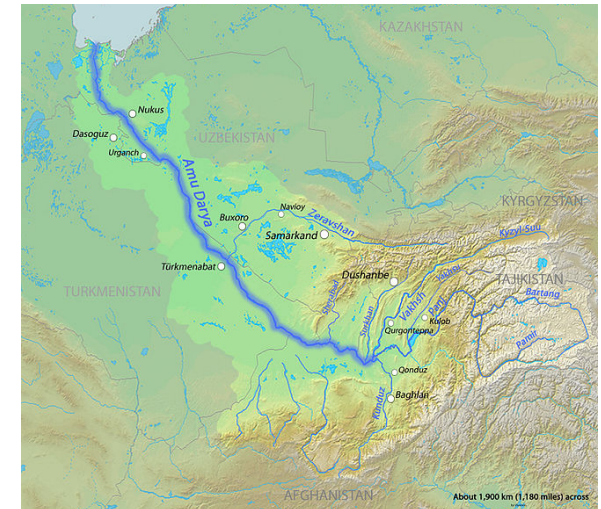
The afforestation methods succeeded. The tree plantations were established successfully on highly saline soils if irrigated with 80-160 mm yr⁻¹.

After two years, irrigation was stopped and the plantations used groundwater, according to researchers A. Khamzina, J.P.A. Lamers, and P.L.G. Vlek. The afforestation contributed to water efficiency because unused irrigation water from afforested plots became available for use on productive cropland. Additionally, the conversion of degraded cropland to tree plantations increased soil total nitrogen and phosphorus stocks by 6-30 percent in five years.

Thinning the five-year-old plantations by a half of their initial density generated a fuel wood energy value varying from 6 tons of oil energy equivalent (toe) per hectare to 10 toe ha⁻¹, depending on the plant species. This would satisfy the average annual per capita energy needs of 55-90 people in Uzbekistan and exceeds by 400 percent the energy value gained over the same period from cotton stalks, commonly used in rural households. Potential impacts of the thinning on the water table are currently unknown, but have to be taken into consideration.

These observations are further evidence that afforestation of the degraded cropland with mixed-species plantations would be a sustainable land use option that can also generate a new source of fuel wood and fodder, thus easing the pressure on natural forests and steppe/pastures.

Planting trees on degraded lands also provides an opportunity to combine the efforts of combating desertification, rehabilitating land degradation, and



Map of the Amu Darya Watershed

reducing CO₂ emissions. Five years after afforestation, the soil organic carbon stocks rose by 10 percent to 35 percent. After seven years the net present value of afforestation, considering the production of fruits, fuel wood, leaf fodder and carbon sequestered, ranged from US \$510 to US \$4,130 per ha⁻¹, depending on the species. This significantly exceeded the profits that farmers would receive from annual cotton and winter wheat cropping on marginal land.

Khorezm is an example of many irrigated low lands in the Aral Sea Basin—so the findings of this project shine light on solutions for other parts of Central Asia and elsewhere.

Future opportunities

In the future, additional benefits from afforestation and agroforestry can be captured through the processing and

RIO+20 AND FORESTS

marketing of tree products and services. Local processing of gathered non-timber products, such as turning traditional fuel wood into wood briquettes, can add value, create jobs, and reach new markets. Likewise, environmental services from afforestation, when converted into monetary terms, can significantly increase the value of degraded land used for plantation. In this context, the existing international carbon market can be explored for small-scale plantation participation in the Clean Development Mechanism thus linking the local and global interests via participatory afforestation.

National agricultural extension services and transfer of technical and ecological know-how can help to disseminate the knowledge gathered by this and similar projects and increase the appreciation of the benefits of tree-based systems and motivate farmers to plant ecologically appropriate tree species. And sometimes the best transfer of know-how can be by local farmers to each other.

Overall evidence of ecosystem rehabilitation and the financial viability of afforestation under low irrigation supply suggests that converting highly degraded cropland parcels within the irrigated

lowlands to long-term forest use is an attractive option to generate ecosystem services and income for local communities.

However, local communities are still farming degraded croplands in the Khorezm region and afforestation projects should not remove those farmers from that land. Agroforestry could be a solution, in these cases. The legislative aspects of using abandoned degraded croplands for artificial biological plantations, and related land tenure and governance issues, need to be addressed.



Photo: FAO, Masakazu Kashio, FO-6484



15. Employing traditional knowledge: Gum Arabic Cultivation in Sudan

Locally traded non-timber forest products (NTFPs) contribute to the fulfillment of daily needs and provide employment and income, mainly for rural people and especially women in many regions. In eastern and northern Sudan, for example, Doum (*Hyphaene thebaica*) forests provide a diversity of non-timber forest products of great importance in the rural economy, according to Risto Seppälä, Alexander Buck and Pia Katila.

One of the most important NTFPs in Sudan is gum arabic. It is an exudate from the *Acacia senegal* tree obtained by bark tapping. Gum arabic production is one of the main activities and sources of economic stability in the arid rural areas of Kordofan and Darfur regions of Sudan, where all community members (men, women and children) take part in gum-arabic operations i.e. tapping, collection, sorting, cleaning and marketing.

In all, more than five million people work in planting trees, gum production and marketing of gum Arabic in the Sudan. Over the years, traditional farmers in the Sudanese gumbelt have developed a close relationship with, and a comprehensive husbandry system for, this tree (known as Hashab in Arabic).

In ideal settings, a farmer will divide his landholding into four parts, each managed



Photo: FAO, Roberto Faidutti, CFU000187

differently for production of Hashab and/or agricultural crops. These four systems include: mature Hashab trees; younger trees among which crops are inter-planted; pure cropping where soil fertility is declining and will soon be planted or allowed to regenerate naturally with Hashab; and new cropping areas which had been under trees for 15–20 years (Abdel Nour 2003).

Farmers are now changing this system to adapt to shortages of land and declining rainfall. They now often allocate less area for cropping and put a greater emphasis on Hashab management.

Climate change carries great importance for Hashab production. The short-term (to 2030) and long-term (to 2060) effects of climate change on gum arabic production have been assessed in Sudan. The assessment showed that a rise in

temperature and associated increased water stress would lower gum arabic production significantly.

A southward shift in the natural distribution of this tree species is already being detected and is projected to continue with declining rainfall. It is estimated that this will result in a reduction in gum arabic production, region-wide, of between 25 percent and 30 percent.

To adapt to these changes, farmers will benefit from the revival and further development of traditional management of forests and trees for the sustainable production of NTFPs. Such knowledge, combined with insights from forest science, may be critical for developing effective strategies to cope with anticipated changes in land productivity in the future, especially in low-forest cover countries.

16. Managing community watersheds: A key to improved water quality in Pakistan

On October 8th, 2005, a disastrous earthquake struck the northeast of Pakistan, affecting some three to four million people and killing 80,000. The earthquake caused significant land destabilization—major landslides and thousands of landslips affected 10 percent of the arable land, forests and rangelands. In downstream areas, major water channels, roads and paths were blocked by rocks and debris, and many natural springs feeding irrigation and rural water supply schemes dried up as a result of this “natural disaster.”

The Food and Agriculture Organization of the United Nations (FAO) took part in a massive rehabilitation plan for the earthquake devastated zone. One key component of the project aimed to control potential hydro geological hazards in 17 watersheds across the earthquake affected areas through collaborative watershed management at the village level.

In each watershed, the project followed a landscape approach that combined landslide stabilization and improved natural resources management (particularly of forests and water) while enhancing agricultural production. Institutional innovations were also

introduced in the region, particularly the establishment of a Watershed Management Committee that allowed people to plan and prioritize their activities through participatory approaches.

Physical interventions stabilized a large landslide that threatened the major water channels needed by upland communities and provided water to the lowlands. These interventions included building retaining walls, installing check dams, undertaking a variety of bioengineering measures, protecting pastures, and planting tree species suitable for slope stabilization. In the watershed, activities carried out by the community included terracing, field leveling and construction of ponds for perennial stream and roof water harvesting.

This successful multi-sectoral, community-based approach supported by national technical agencies ensured sustainable management of water resources for the livelihoods of upstream populations, allowing the community to develop products for personal consumption and to sell or trade in the nearby market. These included kitchen and flower gardens and tree nurseries.

These achievements are the result of a policy of self-reliance promoted by the communities’ establishment of a Watershed Management Team, which targeted the removal of a culture of dependency on external aid. The project provided this Team with agriculture training and promoted marketing agreements for crops such as flowers that have downstream market demand.



Photo: FAO, Thomas Hofer



The Watershed Management Team also encouraged the development of agriculture and livestock strategies that recognize their mutual interdependency. Similarly, the project involved livelihood specialists in the planning and organizational processes to ensure that an integrated livelihood strategy was put in place. Moreover, the Watershed Management Team continued training other upstream communities to manage their natural resources, which in turn contributed to the improvement of water quality and quantity for the population living in the lowlands.

Future opportunities

This success story can be scaled up and replicated in the future. The experience is a reminder that natural resource management, particularly for forests and water resources, requires the participation of different stakeholders including politicians, technicians, local farmers, and foresters. It also validates the notion that the practices and points of view of local people must be included in the search for sustainable solutions in order to take action at the political level. In this context, policies regulating the use of forests, water and other natural resources become particularly important.

This experience highlights the need to give local communities access to their resources to enhance their interest in managing natural resources in a sustainable way that contributes to the supply of ecosystem services such as those provided by water. This is an



Photo: FAO, Patrick Durst, FO-5694

essential building block for long-term sustainable global development and poverty alleviation, and is key in the transition toward a green economy.

This process can further lead toward recognizing the value of positive externalities provided by watershed ecosystems through market mechanisms. Schemes such as payment for environmental services (PES) can be adopted to reward local populations and communities for the sustainable management of natural resources that originate in mountain areas and benefit billions of people.

PES schemes for watershed services may be translated into concrete measures such as upstream-downstream payments, in-kind incentives, and subsidies from

governmental organizations that reward the added value of the sustainable management of natural resources. The resulting benefits may cover opportunity costs faced by the community when developing other integrated income generating activities that can improve livelihoods.

This success story also highlights the importance of following landscape and watershed approaches based on input from the wide range of groups of people and institutions involved. Such approaches are tailored to local conditions, cultures, needs, and opportunities.

The **Collaborative Partnership on Forests** consists of 14 international organizations, bodies and convention secretariats that have substantial programmes on forests. The mission of the Collaborative Partnership on Forests is to promote sustainable management of all types of forests and to strengthen long-term political commitment to this end. The objectives of the Partnership are to support the work of the United Nations Forum on Forests and its member countries and to enhance cooperation and coordination on forest issues.

