Novartis carbon-sink forestry projects

An inclusive business approach to fighting climate change and supporting local communities
Contents

Energy and climate at Novartis 4

Argentina: Santo Domingo Estate 6

Mali: Jatropha Mali Initiative 8

China: Sichuan Forestry Project 10

Colombia: Hacienda El Manantial 12

Performance summary and outlook 14
Four carbon-sink forestry projects around the world

<table>
<thead>
<tr>
<th>United Nations Sustainable Development Goals (SDGs)</th>
<th>Santo Domingo Estate</th>
<th>Jatropha Mali Initiative</th>
<th>Sichuan Forestry Project</th>
<th>Hacienda El Manantial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment, and decent work for all</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Goal 13: Take urgent action to combat climate change and its impacts</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation, and halt biodiversity loss</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Energy and climate at Novartis

At Novartis, minimizing our environmental footprint is an integral part of our Corporate Responsibility strategy and respect for the environment a guiding principle behind all our activities. Using energy efficiently, switching to renewable energy sources and reducing greenhouse gas emissions (GHG) are priority areas for our company. Since 2010, we have managed to grow our business while reducing our total GHG emissions by 20%.

The pharmaceutical industry is not an energy- or carbon-intensive sector, but energy efficiency and GHG emissions reduction are important for the long-term success of Novartis. We expect both our business and our operations to be affected by the growing effects of climate change and the shifting weather patterns in many regions. With energy, GHG emissions and water resources becoming growing cost factors, efficiency improvements and alternate sources will be increasingly important.

We have embarked on a dual strategy to reduce our GHG emissions. Internally, our main focus is to lower emissions by improving energy efficiency and using and purchasing energy from renewable sources at our operations. Externally, rather than purchasing emission credits, Novartis has established its own carbon-sink forestry projects in Argentina, Mali, China and Colombia.

Taken together, internal and external efforts are showing positive results. We are on track to achieve our 2020 GHG reduction target of 30% reduction versus 2010, steadily reducing our total Scope 1 and Scope 2 emissions year after year.

While supporting Novartis in meeting our emission reduction target, our four forestry projects provide long-term benefits to the environment and to local communities. These benefits range from conserving or enhancing biodiversity to building capacity, generating employment and local revenues.

In order to better determine the multiple benefits of our forest carbon-sink projects, we assessed their social and environmental value in 2017. While measuring gains in carbon storage from trees is standard practice, quantifying other benefits remains challenging. In the following pages, we indicate the results of this assessment for each project. Because a large proportion of the investment was made to establish the projects and tree plantations in the first years, social returns on our investment are expected to increase in the coming years.

We have designed our carbon-sink forestry projects with sustainability criteria in mind so they remain viable long-term and bring economic, social and environmental benefits to the communities where they are established.

This objective, we believe, is fully aligned with our company’s mission to improve and extend people’s lives.
Energy and climate
Reduce the company’s GHG emissions (Scope 1 and 2) by 50% compared to 2010 by increasing energy efficiency and the use of renewable energy

Water and micro-pollutants
Generate no adverse effects from our sites and products on water quality and water resource depletion

Materials and waste
Establish closed material loops for our major materials and avoid adverse effects from waste disposal

Environmental sustainability management
Be a leader in environmental sustainability performance, disclosure and engagement
In 2007, Novartis had a dual objective in mind when purchasing the Santo Domingo Estate in northern Corrientes, Argentina: sequester greenhouse gas (GHG) emissions and establish a sustainable forestry business. Today, 10 years later, the Santo Domingo project has become the company's most developed carbon-sink forestry project. Through the project, Novartis will collect an estimated 600,000 tons of carbon dioxide equivalents until 2020 and up to 2 million tons by 2040.

As a signatory to the Kyoto Protocol, Argentina offered unique advantages to establish the project: suitable land, expertise in forest management, and soil and weather conditions that favor tree growth, hence CO₂ sequestration.

Sequestering carbon and enhancing biodiversity

Yet, the Santo Domingo Estate is much more than a carbon-sink project. It is a true example of sustainable forestry. In contrast to most forest projects based on mono-cultural plantations, more than 20 different high-value native species such as lapacho have been planted together with non-native pine trees in order to quickly develop a biotope and protect the area from floods or continued soil degradation. Over time, native species will account for 75% of the total coverage.

The trees, which today measure more than 10 meters high, also provide a habitat to a variety of mammals and birds.

Turning the plantation into a commercial asset

What makes this project unique is that together with its local forest manager GMF Latinoamericana, Novartis is turning the plantation into a commercial asset by establishing a sustainable wood products business. In fact, timber production and sales are already beginning to generate revenues. In the longer term, mature native trees will be harvested selectively for the commercialization of hardwood products, and the carbon stock of the overall project will be maintained through re-planting. Young trees are already being pruned in order to develop longer and straighter stems which will make them higher value wood products once harvested.

In 2008, the Santo Domingo project received Forest Stewardship Council certification, the most widely recognized label for sustainable forest management and sustainable wood products, and has been recertified since then. Certification is important as it ensures a forest is managed following stringent health and safety, environmental and labor rights standards.

In 2011, the United Nations registered Santo Domingo as a Clean Development Mechanism (CDM) project. This was the first afforestation project in Argentina to receive CDM registration, and worldwide, only 20 similar projects had received CDM registration when the Novartis project was accredited.

As a token of recognition, Banco Galicia and La Nación, a leading Argentinean newspaper, honored the Santo Domingo project with the “Award for Agronomic Excellence” in the forestry category in 2014. The project was also recognized by the Food and Agriculture Organization/World Bank as a best-in-class example of a close-to-nature planted forest.

Results from the social and environmental valuation show that, by 2020, 52% of the project’s societal benefits are expected to arise from carbon sequestration, 43% from ecosystem services and 5% from job creation. By 2020, the Santo Domingo Estate is expected to have achieved a social return on investment (SROI) of 420%.

Timeline

<table>
<thead>
<tr>
<th>Purchase of the Santo Domingo Estate (3,400 hectares)</th>
<th>Initial plantation of 800 hectares</th>
<th>Plantation of 2,250 additional hectares of trees</th>
<th>Validation by TÜV Süd</th>
<th>CDM registration by the UN Framework Convention on Climate Change (UN-FCCC)</th>
<th>Issuance of 100,188 Certified Emission Reductions (CERs) by the UN-FCCC</th>
</tr>
</thead>
</table>
“Given the progress society and the world have made toward sustainable development, we are pleased to see such initiatives taking place in the Province of Corrientes. The Novartis project demonstrates that the country and the province are taking action with regards to sustainable development, responsible production and flora and fauna conservation.”

Ricardo Colombi, Governor of Corrientes Province, Argentina

Key facts

- 2,445 hectares of net plantation (3,400 hectares gross area) in the Province of Corrientes, Argentina
- More than 3 million trees planted from 20+ tree species (of which 18 native species)
- Business case approach to selling hardwood forest products in the future
- Certified by the Forest Stewardship Council and registered by the United Nations as a Clean Development Mechanism (CDM) project
- 360 kilotons of carbon stocks accumulated in first 10 years
- 100 kilotons of UN-CDM credits issued in 2013
- 1,000 kilotons of carbon projected to be sequestered by 2030
- 20 jobs created
- Partners: GMF Latinoamericana, Universidad Nacional de La Plata (UNLP), First Climate

---

First pruning and thinning of plantation Recognized by Banco Galicia and La Nación as best Forestry Operator in Argentina (Premio a la Excelencia Agropecuaria 2014)

FSC recertification

First commercial thinning and sale of pine wood completed

Next CDM credit issuance

First proceeds from sale of hardwood products

2014 2015 2017 2019 2024
Jatropha Mali Initiative

Started in 2007, the project in Mali, West Africa, cultivates jatropha in partnership with small landowners to sequester carbon, produce oil for soap and biofuel for rural motors and to generate electricity when mixed with diesel. Further, the by-products of jatropha oil are transformed into a high-quality organic fertilizer supplied back to the farmers.

The project aims to empower rural communities to adopt sustainable agro-forestry practices. It operates in more than 20 communes of Kita and its neighboring districts in the Kayes province, where agricultural exploitation is dominated by food crops such as beans, peanuts or sorghum. Jatropha cultivation thus provides local farmers with additional income and enables them to diversify their crops and revenue sources.

Plans are under way to extend the activity to soybean and sunflower plantations to improve the economic situation of our venture company, increase production, and further support income generation for small landholders.

The project was registered as the first agro-forestry voluntary carbon standard project in Africa in 2012.

Improving livelihoods

Today, the project contracts more than 5,000 farmers across almost 200 villages, providing income to 10,000 people in total. More than 5,000 hectares have been planted since 2007, and plantations have yielded 130 tons of processed jatropha seeds and 22 tons of jatropha oil in 2016.

Growing jatropha can help protect fields from soil erosion and counter desertification, a major environmental hazard in western Africa. Further, jatropha bushes provide shade and protection from wind, as well as soil enrichment for food and commercial crops.

A key benefit to rural communities is also the technical knowhow and training they gain – regarding variety selection, nursery technology and agroforestry management – as well as the guaranteed purchase of jatropha seeds at a fixed price.

Besides Novartis, partners involve rural communities represented by the Union des Producteurs de Pourghère, the farmers’ cooperative; Eco-Carbone, a French consultancy that develops jatropha and carbon projects; and Malian investors.

Key facts

- More than 5,000 farmers under contract, providing supplemental income for 10,000 local people
- More than 2,500 hectares of plantations and hedges provide harvests of jatropha seed
- Generates biofuel for soap production, rural motors and electricity
- Creates jobs and helps develop the local economy
- Protects land from sun and wind, and enriches soil quality
- Registered as a voluntary carbon standard and certified by ISO
- 11.3 kilotons of carbon credits issued and their respective value paid to local farmers from 2012 to 2016
- 100 kilotons of carbon projected to be sequestered by 2030
- 50 jobs created
- Partners: Union des Producteurs de Pourghère, Eco-Carbone, Malian investors

“Jatropha Mali Initiative

Feasibility study with three experimental jatropha fields

Formation of Jatropha Mali Initiative (JMI), a local venture company that oversees the plantations

350 hectares of jatropha planted in Kita, Katibougou and Cinzana/Ségou

More than 5,000 local farmers plant 5,000+ hectares of jatropha

Novartis becomes a 19% minority shareholder of JMI (Eco-Carbone owns 60% and Déguessi vert 21%)

Novartis signs a pre-purchase carbon offset agreement with JMI (€ 8 per ton of carbon offset)

Timeline

2006

2007

2007-2012

2008

I grow jatropha as an additional crop in my farm, and this provides me with extra income I can spend for my family.”

Karim Samaké, farmer in Koutiala
Generating carbon credits

One of the reasons Novartis invested in this project is to purchase this carbon credits generated by the plantation as jatropha trees sequester carbon. With an average of 900 to 1 000 trees per hectare, a plantation can sequester approximately 120 tons of CO₂ per hectare over 10 years. To date, 11 kilotons of carbon credits have been issued and their respective value paid to local farmers. It is expected that the project will generate 30 kilotons of carbon credits by 2020.

Unfortunately, in recent years, Mali has suffered from political unrest, military conflict, severe drought and the Ebola outbreak. These challenges have impacted the country’s agricultural productivity and slowed down the development of the project, which delivered a lower volume of carbon offsets than expected. Break-even which was due in 2014 is now slated for 2019.

Results from the social and environmental valuation show that, by 2020, 60% of the project’s societal benefits are expected to arise from income generation for rural farmers and job creation, 21% from environmental benefits and 19% from carbon sequestration. By 2020, the Mali Jatropha Initiative is expected to have achieved an SROI of 180%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>Construction of first processing plant in Kita to produce jatropha oil</td>
</tr>
<tr>
<td>2012</td>
<td>Registration as first agro-forestry voluntary carbon standard (VCS) project in Africa</td>
</tr>
<tr>
<td>2013-2014</td>
<td>Start of annual monitoring and verification of carbon-sinks</td>
</tr>
<tr>
<td>2016</td>
<td>JMI processes 250 tons of jatropha seeds leading to 100 tons of oil and 300 tons of organic fertilizer</td>
</tr>
<tr>
<td>2019</td>
<td>JMI and the project suffer from severe drought and from political and economic unrest in Mali</td>
</tr>
<tr>
<td></td>
<td>Additional Malian investors join JMI Board of Directors</td>
</tr>
<tr>
<td></td>
<td>Expected break-even for JMI</td>
</tr>
</tbody>
</table>
Sichuan Forestry Project

The Sichuan climate, community and biodiversity project was initiated by Novartis in 2010. It is the second forestry carbon project registered by the United Nations as a Clean Development Mechanism in Sichuan, China.

The project covers 61 plots of land across five counties, at an altitude ranging from 2 500 to 3 200 meters. The area used to be a biodiversity and nature reserve hotspot covered by forests of spruce and fir, with the arrow bamboo providing food for the pandas.

Economic growth takes a toll on forests

Yet, in the 1950s and 60s, Sichuan became a prime wood source for the furnaces that sparked China's industrial development and as a result, deforestation has left local people and wildlife pressed for the resources they need to survive. Overharvesting and animal overgrazing have further eroded the land, endangering ecosystems and degrading wildlife habitat.

The Sichuan climate, community and biodiversity project is a partnership with The Nature Conservancy China Program, a leading global conservation organization, and Shanshui, an affiliated Chinese nongovernmental organization. In addition, Novartis and its partners are working closely with forestry departments at the national, provincial and local levels, including the Sichuan Forestry Department and the Sichuan Daduhe Forestation Bureau.

From 2011 to 2015, within nature reserves and in lands adjacent to these reserves, 18 000 farmers planted more than 5 million trees on 3 835 hectares of deforested mountainsides, where habitat destruction threatens the existence of wildlife. Only high-altitude native species such as conifers (spruce, fir, Chinese white pine) or broad leaf trees (poplar or alder) have been planted. By end of 2017, the mixed plantation should be completed reaching 4 096 hectares.

Climate, community and biodiversity benefits

When the forest will have grown to its full maturity (80-100 years), it is expected to remove 1.2 million tons of carbon dioxide from the atmosphere.

In addition to carbon sequestration, the project protects the land and villages from soil erosion, landslides and flooding and provides labor and income to local communities (from wood and non-wood products). Further, villagers receive training on land care, tree planting, forest maintenance and management, hence improving standards of operations in the region.

“This project will generate carbon credits and provide local people with an incentive to protect forests. People aren’t the only beneficiaries of this work, which will also protect highly threatened species like the white-lipped deer, Sichuan partridge and giant panda.”

Zhang Xiaoquan, Program Leader China, The Nature Conservancy

The project is expected to also enhance biodiversity as restored forests help to provide better habitat for a variety of plants and animals, including rare and endangered species, such as the giant panda or the red panda, a small arboreal mammal native to the region.

In 2013, the Sichuan climate, community and biodiversity project was validated to the Climate, Community and Biodiversity Standards – the leading

Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>Project launch and plantation of first trees</td>
</tr>
<tr>
<td>2011</td>
<td>Start of plantation (507 hectares)</td>
</tr>
<tr>
<td>2011</td>
<td>Emission reduction Purchase Agreement signed with the Sichuan Daduhe Forestation Bureau for 1.05 million tons of carbon for CNY 55 million (circa USD 9 million)</td>
</tr>
<tr>
<td>2013</td>
<td>Registration as a CDM project and certification against Climate, Community and Biodiversity Standards</td>
</tr>
<tr>
<td>2013</td>
<td>1 453 additional hectares planted</td>
</tr>
</tbody>
</table>

10 | CHINA: SICHUAN FORESTRY PROJECT
social and environmental standards for land-based carbon projects – demonstrating that it generates significant climate, community and biodiversity benefits. The same year, it was registered as a CDM project under the UN Framework Convention for Climate Change (UN-FCCC).

Results from the social and environmental valuation show that by 2020, 87% of the project’s societal benefits are expected to arise from environmental benefits, 9% from job creation and 4% from carbon sequestration. By 2020, the Sichuan project is expected to have achieved an SROI of 320%.

Key facts
- 4,096 hectares in 5 counties, partly in natural reserves
- 3,835 hectares planted to date
- Registered by the United Nations as a Clean Development Mechanism (CDM) project and certified in accordance with the Climate, Community and Biodiversity Standards
- 120 kilotons of carbon projected to be sequestered by 2030
- 68 permanent and 129 temporary jobs created
- Partners: Sichuan Daduhe Forestation Bureau, Shanshui Conservation Center, Sichuan Forestry Department, The Nature Conservancy (TNC)
Hacienda El Manantial

In 2014, Novartis kicked off a carbon-sink forestry project in the Altiplanura region of Colombia – a rapidly developing area, with petroleum and agricultural activities displacing pastures. After purchasing 3,664 hectares of farmland and starting preparatory work, in 2014 we began planting the first 376 hectares with local native and commercial tree species such as acacia, rubber and other hardwoods. A tree nursery located on the farm produces the tree saplings used in the plantation.

The project aims to establish a sustainable forestry plantation in order to remove carbon dioxide from the atmosphere. By 2020, it is expected to generate 200 kilotons of carbon sinks, helping Novartis meet its voluntary emission reduction target. The forestry plantation is expected to be certified on sustainable forest management according to the Forest Stewardship Council (FSC) standard and is expected to be registered as a Clean Development Mechanism (CDM) project in 2018.

Most forest plantations in the region have been established using acacia, pines and eucalyptus. The project brings together commercial tree species and 8-10 native ones, that had proven to be most beneficial. This generates valuable knowledge on the management of native species, which are usually discarded given the lack of technical information about them. The project is also testing the production of a variety of non-wood products at the plantations, in order to improve long-term sustainability and keep higher carbon stocks. In 2017, 1,000 bee hives were installed throughout the plantation area. It is expected that these will produce 60-80 tons of honey each year.

Protecting a biodiversity-rich habitat

More than 90% of the region where the project is based is covered by a variety of plants broadly termed savannah, home to the vast majority of animals and plants. Yet, uncontrolled burning has led to the loss of biodiversity, and animals such as turtles, amphibians and mammals have perished in large numbers, unable to escape the fire, or because of habitat loss.

In addition to mitigating climate change and protecting the land from soil degradation, the project also shelters existing forest patches, riparian forests and water sources, hence supporting a more diverse ecosystem. The riparian forests in particular provide habitat for threatened species of mammals, birds and plants.

The two larger lagoons existing within the farm are also of high biodiversity value as they provide water supply sources for animals during the dry season.

Offering direct and indirect employment benefits

Beyond its environmental benefits, the project is generating employment and income to the local population. During site preparation, nursery operations, planting, pruning, thinning and harvesting, it offers direct employment to local communities. Spinoff employment comes from the supply of nursery and field consumables, wood merchants and timber. Overall, it is estimated the project will provide employment and competitive wages amounting to one million man-days over its 30 years.

Project activities also help to build and sustain local and regional markets for sustainable timber products and natural rubber production. It is therefore expected to generate additional benefits and to help foster economic development locally and regionally.

Results from the social and environmental valuation show that, by 2020, 41% of the project’s societal benefits are expected to arise from environmental benefits, 38% from carbon sequestration and 21% from job creation. By 2020, Hacienda El Manantial is expected to have achieved an SROI of 140%.

Timeline

- Plantation of 376 hectares
- Formal start of CDM project
- Plantation of an additional 393 hectares
- Stakeholder dialogue about the project in Puerto López
- Validation by TÜV Süd
- Plantation of 606 additional hectares
- Installation of 1,000 bee hives and start of honey production
- Start of regular monitoring

2014 2015 2016 2017
The Altillanura region where Hacienda El Manantial is located is known as the ‘new frontier’ as this is where Colombia has made significant infrastructural developments. In its own way, this forestry project is entering uncharted territory, protecting the region’s biodiversity-rich habitat, providing new sources of income, and improving the quality of life of communities.”

María Cristina Álvarez, President, Novartis de Colombia S.A.

**Key facts**
- 3,664 hectares of land, mostly degraded pasture land and some riparian forest areas, representing a net plantation area of circa 2,700 hectares
- 1,580 hectares planted by end of 2016
- 15 native and commercial tree species including acacia, rubber, balsa, pine and eucalyptus
- Business case approach to producing hardwood from local tree species, rubber latex and honey
- Clean Development Mechanism (CDM) registration expected in 2018
- 640 kilotons of carbon projected to be sequestered by 2030 with 12 permanent and 82 temporary jobs created
- Partners: Carbon Decision International (CDI) Panama, CDI Colombia, Ernst Basler and Partner (EBP)
Performance summary and outlook

In 2016, the four projects in Argentina, Mali, China and Colombia generated carbon offsets worth 68 kilotons of CO$_2$e, or 4.3% of our 2010 baseline emissions.

Looking to the future, carbon offsets from the four projects are expected to increase, with 150-200 kilotons of CO$_2$e each year between 2020 and 2030. In total, carbon offsets from all four projects are expected to amount to approximately 4.5 million tons of CO$_2$e in the next 30 years, which is the typical duration of a Clean Development Mechanism project.
Environmental and social impact of the four projects

<table>
<thead>
<tr>
<th></th>
<th>Carbon sequestration</th>
<th>Ecosystem services</th>
<th>Jobs created</th>
<th>Additional smallholder benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colombia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mali</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Argentina</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Small holder value includes the value of timber sold beyond the project lifetime
**Small holder value includes farmers additional income plus cooperative premium

---

**About Novartis**

Novartis provides innovative healthcare solutions that address the evolving needs of patients and societies. Headquartered in Basel, Switzerland, Novartis offers a diversified portfolio to best meet these needs: innovative medicines, cost-saving generic and biosimilar pharmaceuticals and eye care. Novartis has leading positions globally in each of these areas.

In 2016, the Group achieved net sales of USD 48.5 billion, while R&D throughout the Group amounted to approximately USD 9.0 billion. Novartis Group companies employ approximately 118 000 full-time-equivalent associates. Novartis products are sold in approximately 155 countries around the world.

For more information about Novartis:

[www.novartis.com](http://www.novartis.com)

For more information about our Corporate Responsibility and environmental programs:
