

# Charcoal plantations and efficient cook stoves reduce deforestation

by Meindert Brouwer

**Tree plantations producing charcoal for cooking and efficient cook stoves are important solutions to reduce deforestation and pull people out of poverty at the same time. Worldwide Fund for Nature WWF, local NGOs, tree planting farmers and women networks are proving this every day in the eastern Democratic Republic of Congo (DRC).**

EcoMakala, the solution is called, ‘makala’ being the Swahilian word for charcoal: sustainable charcoal produced in tree plantations set up by WWF and its partners to reduce pressure on forests inside Virunga National Park, where people have gone to burn charcoal and collect firewood on a massive scale in the past two decades. The production of charcoal is combined with the production of energy-efficient cook stoves for a greater impact. Thierry Lusenge (39) of WWF DRC, manager of the EcoMakala project, explains how it has all evolved.

Lusenge: ‘Developing tree plantations for charcoal outside Virunga National Park was part of a large scheme to tackle deforestation, one of the three major threats to Virunga. The other big threats are poaching and plans to drill for oil. The scheme to reduce deforestation was twofold: DRC’s wildlife authority Congolese Institute for the Conservation of Nature (ICCN) was to scale up patrolling on the borders of the park and inside, by increasing its number of ecoguards to keep charcoal burners and firewood collectors out. Parallel to that, WWF and local partner organizations were to create new sources of charcoal outside Virunga by developing tree plantations and hence reforest the degraded hills and mountains outside the national park.’

**PRESSURE** Virunga is the oldest national park of Africa and one of the most important on the continent because of its variety of landscapes and wildlife, including elephants, chimpanzees and the last remaining mountain gorillas. Pressure on the park for wood energy and bushmeat hunting had become huge after hundreds of thousands of people fled to eastern DRC to escape the genocide in Rwanda in 1994. More than twenty years of war between militias in eastern DRC followed and today armed gangs remain to be a threat. Due to the acts of war, people fled to the city of Goma, located just outside Virunga National Park.

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Planting tree seedlings.

In 1994 Goma had 15,000 inhabitants. In 2007, the year the EcoMakala project of sustainable charcoal started, Goma had 800,000 inhabitants, who needed 50,000 to 60,000 tons of charcoal annually for cooking. Imagine, that is 50,000,000 to 60,000,000 kilos of charcoal per year. In 2007 80% of the charcoal sold in Goma came from the natural forest in Virunga. Twelve years later, in 2019, Goma had 2 million inhabitants. Around 4.1 % had access to electricity: 20% of the households used electricity and LPG to cook, while 80% still cooked on charcoal. Thanks to the charcoal plantations, the destruction of forest in Virunga national park has decreased. Now a substantial part of the charcoal sold in Goma is supplied by farmers in the region who have a new source of income.

**CHAIN** Lusenge explains how the charcoal plantations evolved: ‘In 2006, after ten years of war, we began by helping to settle landrights of small holder farmers. That provided the basis to actually start. We did not deal with farmers individually. WWF concluded contracts with almost 75 tree planting associations, which are in fact local grassroots NGOs.’ He continues: ‘Together with the associations we

developed a production chain and a marketing chain for sustainably produced charcoal. First we helped the associations to set up nurseries for tree seedlings. We provided them with seeds and bags for the seedlings. Then we trained the associations to select, train and assist individual farmers to become tree planters and caretakers of their own tree plantations. The associations received a fee per hectare. The farmers received seedlings free of charge and starting capital per hectare.’

The project consisted of two main components. The first one was that WWF DRC obliged the tree planting farmers to save part of their field for food production, so they would have food and short-term income while waiting for the trees to grow, either indigenous species or exotic species, such as eucalyptus. The second component was securing income from charcoal every year. Tree plantations were divided into three blocks. Every year farmers would harvest in one block only, so that way they would have a permanent income from charcoal.

The size of small holder tree plantations outside Goma varied from 0.25 to 5 hectares. Big landowners took part as well with 10 hectares and more. More than 12,000 hectares of tree plantations were realized during the period 2007 - 2020. After initial doubts among farmers in the beginning, other small holder farmers around Goma, who were not part of the EcoMakala project, also started to grow trees for charcoal. They noticed that charcoal from tree plantations is good business. Despite disruptions by armed gangs the EcoMakala project has become a remarkable success.

Marketing the charcoal played an important role, Lusenge tells: ‘We also assisted the farmers in setting up cooperatives. Organized that way, tree planting farmers were able to sell their legal charcoal for prices competitive to illegal charcoal from Virunga. It is still an informal sector controlled by armed groups. Around the year 2015, trade in charcoal in and around Goma was worth an estimated 40 million US dollars a year.’



Above: tree plantation with Eucalyptus (*Eucalyptus saligna*) for charcoal and timber outside the city of Goma in eastern DRC. From left to right: Thierry Lusenge, sustainable energy program manager of WWF-DRC and his colleagues Hicham Daoudi, Ernest Ntumba and Gregory Claessens (WWF-Belgium).

Right: start of charcoal production.





**Goma had 2 million inhabitants in 2019. Around 4.1 % had access to electricity, while 80% of the households in Goma still cooked on charcoal and firewood.**

**COOK STOVES** ‘A mix of different solutions is necessary to meet the need of wood energy supply in a sustainable way,’ Lusenge explains. That’s why WWF DRC has undertaken local production of energy-efficient cook stoves, which reduce charcoal usage by 50%, a major reduction. The cook stoves have become a remarkable success too, just like the charcoal plantations.



Lusenge: ‘Between 2009 and early 2020, a growing network of women in Goma (around 600 women organized in 20 local NGOs), produced over 115,000 energy-efficient cook stoves, of which 95,500 were sold in Goma, 16,000 in the province of South-Kivu and there were even sales in DRC’s capital Kinshasa. In 2017 WWF helped them to set up a company called Goma Stove so they could scale up their business. Based on this experience we started supporting another women’s network in the city of Beni in North-Kivu to also produce energy efficient cook stoves.’

12,000 hectares of more than 9,000 small-holder tree plantations for charcoal are not sufficient. In 2020 40,000 hectares of additional charcoal tree plantations would still be required to satisfy the need of the population in Goma. Nearby there is not much land available anymore, due to the large population density in the region of 300 people per km2. The need for charcoal outside the city is huge as well. Lusenge: ‘In 2018, charcoal consumption of households in Goma’s province of North Kivu was estimated to be between almost 115,000 and almost 159,000 tons and predicted to rise to a range between approximately 160,000 and 222,400 tons by 2028, according to ONF International.’

**ALTERNATIVES** There is a need for alternatives, also because burning charcoal is not healthy, although a test has shown that the energy efficient cook stoves are healthier than the ones used before. Lusenge and his colleagues are trying out home biogas. In 2019 they installed biogas digesters of food scraps and manure in 39 households outside Goma. Lusenge is also examining the feasibility of the so-called PV-eCook, a battery-supported solar electric cooking device. Energy left in



Improved, energy-efficient cook stoves in the making.



Cook stove sales.



The proof is in the cooking.

**I AM AGAIN FEELING ALIVE**

‘Thanks to EcoMakala, I am able to meet the needs of my family and pay for the education of my children. I stopped selling fruits on the streets and carrying charcoal and other products for less than 1 \$ a day. After the death of my husband during the war, I am the only one to look after my 5 children. This was difficult with the little income I was making from the hand jobs. However, not only am I now involved in preserving the Virunga Park, I am again feeling alive ...’ Helène Batachoka, member of the Improved Stoves Producers Network (REPROFCA).



## Charcoal will be needed until the access and the price of other sources such as LPG and electricity will be reliable and affordable.



Charcoal transportation.

### THREE PILLARS

According to project manager Thierry Lusenge, the sustainability of the EcoMakala project is based on three pillars:

1. Networking by establishing cooperatives of farmers for charcoal business.
2. Revolving capital: farmers pay back 20% to the local association that produces seedlings for other farmers.
3. Carbon credits. Setting up tree plantations for sustainable charcoal – which is a form of reforestation – and the large production of energy-efficient cook stoves have resulted in carbon credits, which have been paid for by Belgian company UCB in this case, offsetting its own emissions. Belgian consultancy CO2logic has acted as carbon credits project developer. A carbon revenue share mechanism has been initiated.

the battery can also enable access to lights, TV, radio, mobile phone charging and other low power energy services.

Virunga Alliance – a public-private partnership – has built 3 hydropower plants in the region. Moreover, Wildlife authority ICCN also started a project to generate hydropower in the rivers. The local government established a hydropower plant in the city of Butembo, not far from the national park of Virunga. In February 2020 the Congolese company Nuru launched an off-grid solar hybrid production facility in Goma. The installation has nearly 4,000 solar panels, each with a generation capacity of 335 Watts, giving a total output of 1.3 MW. The facility is a result of the ÉLAN RDC project, a market systems development project financed by UKAID.

What will be the impact of these projects for cooking in households in Goma, I ask Lusenge. He replies: 'Households could adopt electricity for cooking, depending on the price. That could contribute to reducing deforestation. Charcoal plantations and energy-efficient cook stoves for charcoal will be needed until the access and price of other sources such as LPG and electricity will be reliable and affordable.'

### RESULTS ECOMAKALA PROJECT

The EcoMakala project was mainly funded by the European Union, the Ministry of Foreign Affairs in the Netherlands (Department of Development Cooperation), the Swedish International Development Cooperation Agency (SIDA), the Directorate-General of Development Cooperation and Human Aid (DGD) of Belgium, the Wallonian Agency of Air and Climate (AwAC), Congo Basin forest Fund (CBFF), WWF Belgium, WWF Sweden, IFDC (International Fertilizer Development Center) and Kellogg corporation. WWF-DRC received two awards for the EcoMakala project: the International Ashden Award in 2013 and the Energy Globe National Award in 2016. The EcoMakala project shows that nature conservation in Central Africa is also about meeting energy needs and job creation and poverty alleviation.

#### Charcoal plantations

1. More than 12,000 hectares of tree plantations were realized during the period 2007 - 2020.
2. On top of that, almost 3,000 hectares of agroforestry were realized between 2016 - 2020.
3. Less pressure on natural forests in Virunga National Park. Between 2007 and 2017 the rate of deforestation decreased in comparison with the 1997-2007 period (55% drop in real terms from 154,764 ha to 69,390 ha).
4. Less soil erosion outside Virunga because of the newly planted trees.
5. Increase of soil fertility.
6. Job creation in a new, legal charcoal product chain: producers of tree seedlings; more than 9,000 farmers diversified their product range and became sellers of charcoal and timber; 159 charcoal makers (in some cases farmers became charcoal makers themselves); 4 cooperatives in charcoal wholesale; transporters of charcoal; charcoal retailers.

7. Gold Standard certification of 'Emission reduction through sustainable charcoal production and consumption': <https://registry.goldstandard.org/projects/details/1558>
8. Carbon credits.
9. Replication of the Ecomakala model in the province of North-Kivu, resulting in 20,000 hectares of planted trees for charcoal.
10. 39 households provided with biogas digesters, solar lighting systems and kitchen gardens.
11. 156 farmers produced almost 30,000 kilograms of honey between 2016 - 2020.

#### Energy-efficient cook stoves

1. Between 2009 - 2020 a growing network of women in Goma produced over 115,000 energy-efficient cook stoves, which reduce charcoal usage by 50%.
2. Significant reduction of emissions of greenhouse gas CO<sub>2</sub>.
3. Job creation for more than 600 women producers.
4. Sales in Goma, South-Kivu and Kinshasa.
5. Establishment of a business company: Goma Stove.
6. Replication by a second network of women JIKO Bora in the city of Beni in North-Kivu, which produced over 4,350 energy-efficient cook stoves in just a few years.

Source: WWF DRC

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Sustainable energy

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