



World Business Council for
Sustainable Development

Quarry Rehabilitation Case Study

2009

Quarry rehabilitation: the CEMEX experience Ecosystem restoration in a tropical dry forest

This case study is part of a series on quarry rehabilitation practices by WBCSD Cement Sustainability Initiative member companies. [Read about what other companies are doing.](#)

Location and situation

Opened in 1980 and used by CEMEX since 1999, the Colorado site is located in the province of Guanacaste, in the Nicoya Gulf in northwestern Costa Rica.

With a total surface of 290 hectares, the site includes a limestone quarry (20 hectares), a clay quarry (70 hectares) and a cement plant.

Known biodiversity

The site is surrounded by a tropical dry forest, highly fragmented by human activities, especially cattle-raising and overexploitation of high value wood.



The area is of high biodiversity value and includes a number of protected areas and species. It is less than 10km from the Palo Verde protected area, listed as a Wetland of International Importance according to the Ramsar Convention, and within 20km from 11 different national protected areas. The site is also on an important corridor for migratory birds, between North and South America.

The area concentrates a high number of species listed on the IUCN Red List of Threatened Species: birds – Great Green Macaw (*Ara ambiguus*), mammals – Geoffroy's Spider Monkey (*Ateles geoffroyi*), plants – Lignumvitae (*Guaiaacum sanctum*), Black Rosewood or Cocobolo (*Dalbergia retusa*), Big Leaf Mahogany (*Swietenia macrophylla*), Flamboyant (*Delonix regia*). The Jabiru storks (*Jabiru mycteria*), a protected bird in Costa Rica, and the White-tailed deer (*Odocoileus virginianus*), which has been declared Costa Rica's national symbol in 1995 and which population is reducing due to illegal hunting and the development of urban areas, can also be found in the vicinity of the site.



White-tailed deer

Targets and aims

First focused on the rehabilitation of the exploited areas through reforestation, CEMEX's management approach for the site was changed in 2008 with the decision made to dedicate 100 ha to an ecosystem restoration project and with the adoption of a Biodiversity Action Plan targeted at the followings goals:

- To contribute to the restoration of the tropical dry forest and its ecosystem services. For instance, the forest facilitates the infiltration of water into the ground, which is especially important in an area like Guanacaste where water resources are limited and where the water demand is increasing with the development of tourism.
- To participate in the conservation of the local biodiversity and particularly local threatened and emblematic species, as the Jabiru, the White-tailed deer, the *Lignumvitae*, the Black Rosewood, the Big Leaf Mahogany and the Flamboyant.

Restoration activities and Results

Between 1999 and 2005, 6,000 trees were planted to reforest 12 ha of the clay quarry and 50 ha were rehabilitated through natural regeneration. The main species planted at that time were *Enterolobium cyclocarpum*, *Astronium graveolens*, *Tectona grandis*, *Tapirira Mexicana*, *Tabebuia ochracea*, *Hymenaea courbaril*, and *Samanea saman*.

In 2009, following the establishment of the Biodiversity Action Plan, the 100 ha of the restoration project were mapped and a biological survey was conducted by various experts, under the coordination of FUNDACA. Nearly 450 species from diverse taxonomic groups were identified, confirming the biodiversity value of the site. This inventory provides an initial ecological status of site that will guide the future restoration activities and against which the improvements will be measured.



Collecting insects for the biological survey

A biodiversity database was also designed and developed in order to record all the species inventoried in the field. The database includes taxonomic descriptions, species prioritization in order of conservation importance, and photographs. It constitutes both a scientific information source to be used for the biodiversity monitoring plan and a user-friendly tool that will support the development of learning materials for educational purposes.



Book on the Jaribu distributed in primary schools

In parallel, FUNDACA elaborated a detailed biodiversity monitoring plan with inventory protocols for each taxonomic group as well as a precise schedule of field investigations. This monitoring plan, to be implemented from 2010, aims at measuring the efficiency of the restoration activities.

Finally, communication materials were distributed in primary schools and villages of the neighbourhood to raise the community's awareness of the Jabiru micterya and its habitat. The Jabiru builds its nest in one particular type of trees and the document explains the importance of protecting those trees to protect the bird.

Next steps

For the years to come, the restoration activities planned will focus on the following elements:

- Create a seedbed in order to provide plants at low cost for the reforestation works. The seedbed will prioritise the growth of threatened species such as Lignumvitae, Black Rosewood, Big Leaf Mahogany and Flamboyant.
- Strengthen the White-tailed deer population by encouraging the development of vegetation that supplies them with the food they need. The White-tailed deer will be the object of a special attention within the monitoring plan.
- Implement a specific management plan for the cattle present in the site. Indeed overgrazing can cause severe damage to the vegetation, but at the same time, if well managed, the cattle can participate in the prevention of fires by controlling the vegetation growth in certain areas. The objective will thus be to better monitor the population and distribution of the cattle in the site, to limit the number of animals in the space and in the time and to install fences to prevent access to the newly restored areas.
- Ensure the maintenance of the rehabilitated areas by opening the tree canopy where it closes over time and by eradicating exotic and invasive species.
- Open the site to scientists and students and develop environmental awareness-raising activities for the local communities, for instance a pedagogical walkway with information panels or guided tours and birdwatching activities.



Trogon melanocephalus, identified during the biological survey

Partners

CEMEX established a partnership with FUNDACA (Fundación para el Desarrollo del Areal de Conservación Arenal), a local conservation organization. In consultation with the Ministry of Environment and the National Biodiversity Institute of Costa Rica, FUNDACA is helping CEMEX through the realisation of a fauna and flora inventory of the site, the development of a biodiversity monitoring plan and by providing advice on the restoration activities.

Lessons learned

During the early rehabilitation works, it was common to privilege plant and tree species with a high growth rate to achieve fast esthetic recovery. But some of these species appeared to be invasive. Today, the plantations are made up of native species only, which better fit in the local environment.

Further information

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