

Bringing an old quarry to life

Quarry rehabilitation comprises more than just the planting of different varieties of trees on land no longer used. Cimenterie Nationale’s rehabilitation project in Lebanon also includes the country’s first green belt buffer area, natural windbreakers, stormwater management, hydroseeding and beehives.

■ by **Ahmed Hoteit**, *Cimenterie Nationale, Lebanon*

Cimenterie Nationale owns a 3Mta cement plant in Chekka, Lebanon. To mitigate the environmental impact of the production facility and in particular, its quarrying operations, the company has developed an environmental mitigation plan and is working on creating a rich ecological reserve.

From quarry exploitation to rehabilitation

The quarry’s management plan starts with managing the reserves and establishing a well-defined excavation plan. The rehabilitation process then depends on this excavation plan as it estimates the exact time every specific area of the quarry needs to be fully exploited. As the exploitation ends, the rehabilitation process immediately begins.

Cimenterie Nationale’s rehabilitation efforts have covered a total area of 283,598m² since 1995 and comprise six different approaches.

Planting trees

Cimenterie Nationale strives to value and accommodate all resources available, including soil that is put aside for later use. This involves planting young trees in



Cimenterie Nationale, Lebanon, has rehabilitated an area of 283,598m² of the quarry at its Chekka plant following its extraction phase

fully-exploited areas as well as replanting older trees taken from newly-excavated areas. The key with quarries is to micro-manage the landscape to get the best out of the available space. Rehabilitated areas include a wide variety of trees: olive, pine, spruce, eucalyptus and fruit-bearing trees such as lemon, orange and avocado.

pine and local fruit trees are planted in areas away from the work front and with immediate water access (for example, by the lake). In most cases the company also plants seeds of local shrubs in designated areas to fill in the gaps and cover the benches separating the rehabilitated areas.

Preplanning the area that will be planted one year ahead of time is crucial to ensure that the land is rich enough with organic material for the plants to feed on. This involves introducing the following two layers:

1. Crushed, weathered bituminous limestone serves as a base given the hard limestone layers that are left after excavation. This is usually 2-3m thick to allow the planted tree roots to grow deeply.
2. A 0.5m-thick soil cover will serve as the “horizon zero” for plants that ensure a green cover and act as a humidity retainer for the trees.

A road network is also part of the complete plan, which includes all required

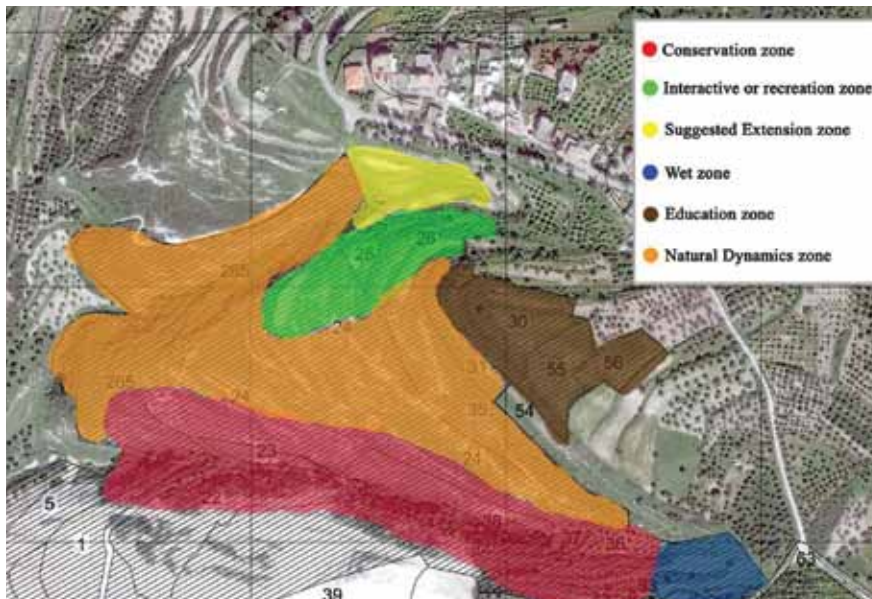
To ensure high survival rates, the design and type of plant distribution depend on conditions such as accessibility, dryness and proximity to the work front. Areas subjected to extreme conditions are usually planted with eucalyptus and spruce trees while olive,



In line with its goal to accommodate and value all of the quarry’s available resources, the cement producer has replanted older trees from newly-excavated areas

Table 1: Green Belt zones at Cimenterie Nationale, Lebanon

Zone	Description
1. Conservation zone	To protect existing biodiversity, allowing it to consolidate and grow. The introduction of plants, watering and any other agricultural practices are prohibited. No excavation or any other endangering activities are carried out near this zone.
2. Wet zone	Water accessibility point to increase the incidence of species preferring a humid environment.
3. Natural dynamics zone	To protect existing biodiversity, allowing it to consolidate and grow. The introduction of plants, watering and any other agricultural practices are prohibited. No excavation or any other endangering activities are carried out near this zone.
4. Recreation zone	Used as a playground and relaxation area. To facilitate access to the area, a track was created. It is the ideal playground for families and includes benches in designated resting areas.
5. Education zone	To educate people accessing the site about the natural species growing in the region. This zone incorporates a wide variety of trees as well as medicinal and aromatic plants. Explanatory signs are distributed throughout the zone.



The Green Belt Project takes biodiversity, natural conditions and ecological potential into account and has created five different zones as well as suggested an extension area



The site's windbreakers consist of two visual natural barriers, planted with cypress trees



Clear signage helps educate visitors about the species living in the rehabilitated areas

resources to ensure the plants are irrigated as necessary, particularly during the dry season. Trees are usually irrigated for the first three years, with the frequency of irrigation decreasing over time (three times a week in the dry season for newly-planted trees and only once a week by the third year).

The Green Belt Project

The Green Belt Project includes 250,000m² of unexploited land surrounding the quarry in all directions that indicates the point at which excavation processes will cease in the future. The Green Belt project came in response to local residents anxious about the cement facility's excavation activities. It serves as a buffer between the areas to be exploited and the neighbouring villages and reduces the impact of quarrying activities.

The Green Belt is the first of its kind in Lebanon. It was studied by engineering consultancy firm Eco-Med France which provides applied expertise and advice relating to land and natural environmental development and ecological integration of projects. The project was developed and implemented taking into consideration the prevailing biodiversity, natural conditions and ecological potential.

It comprises five different zones (see Table 1):

1. conservation zone
2. wet zone
3. natural dynamics zone
4. recreation zone
5. education zone.

The Green Belt was opened to the public in December 2012 and accommodates visitors all year round.



Hydroseeding uses a slurry of seed and mulch to control soil erosion

site's specific environment and will accelerate the growth of the fauna and flora. It also does not require irrigation after application due to the suitability of the climate.

Following the project's initiation in 2015, a number of trials were carried out to explore the most successful type of local seeds, able to withstand the existing environmental conditions. A number of internally-developed breakthroughs were also validated to enhance the hydroseeding process, such as adding soil to the excavated benches and the introduction of fertilisers and water all summer long to prepare the soil for the plantation process in winter.



Bees act as a useful indicator species to monitor environmental pollution

Beehives

Since 1962 the bee has been increasingly employed as an indicator species to monitor environmental pollution and radionuclide presence in the environment.

The bee acts as a detector of environmental pollution in two ways. Firstly, it signals via high mortality rates the presence of toxic molecules. In addition, via the residues in honey, pollen and larvae, it indicates the presence of fungicides and herbicides that are harmful to it. For these reasons, the company chose to use bees in the quarry as part of the rehabilitation programme. The project's 60

beehives have yielded 450kg of honey to date, which the company distributes to the local community.

Harmonious cohabitation

Committed to harmonious cohabitation with the surrounding communities, Cimenterie Nationale's experienced quarry rehabilitation team forges ahead. Its biggest challenge is to return the environment and its ecosystems to stakeholders with the intelligence, generosity and vision that is expected of the company. ■



This year has seen an extension of the quarry's rehabilitated area

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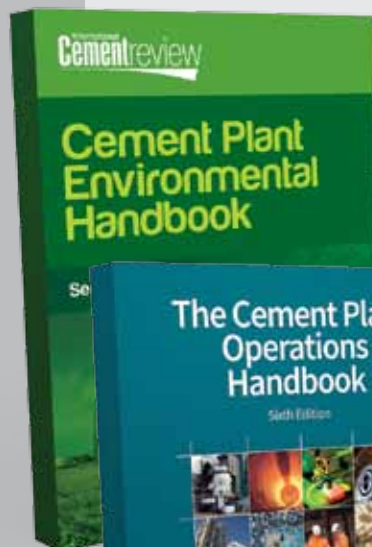
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