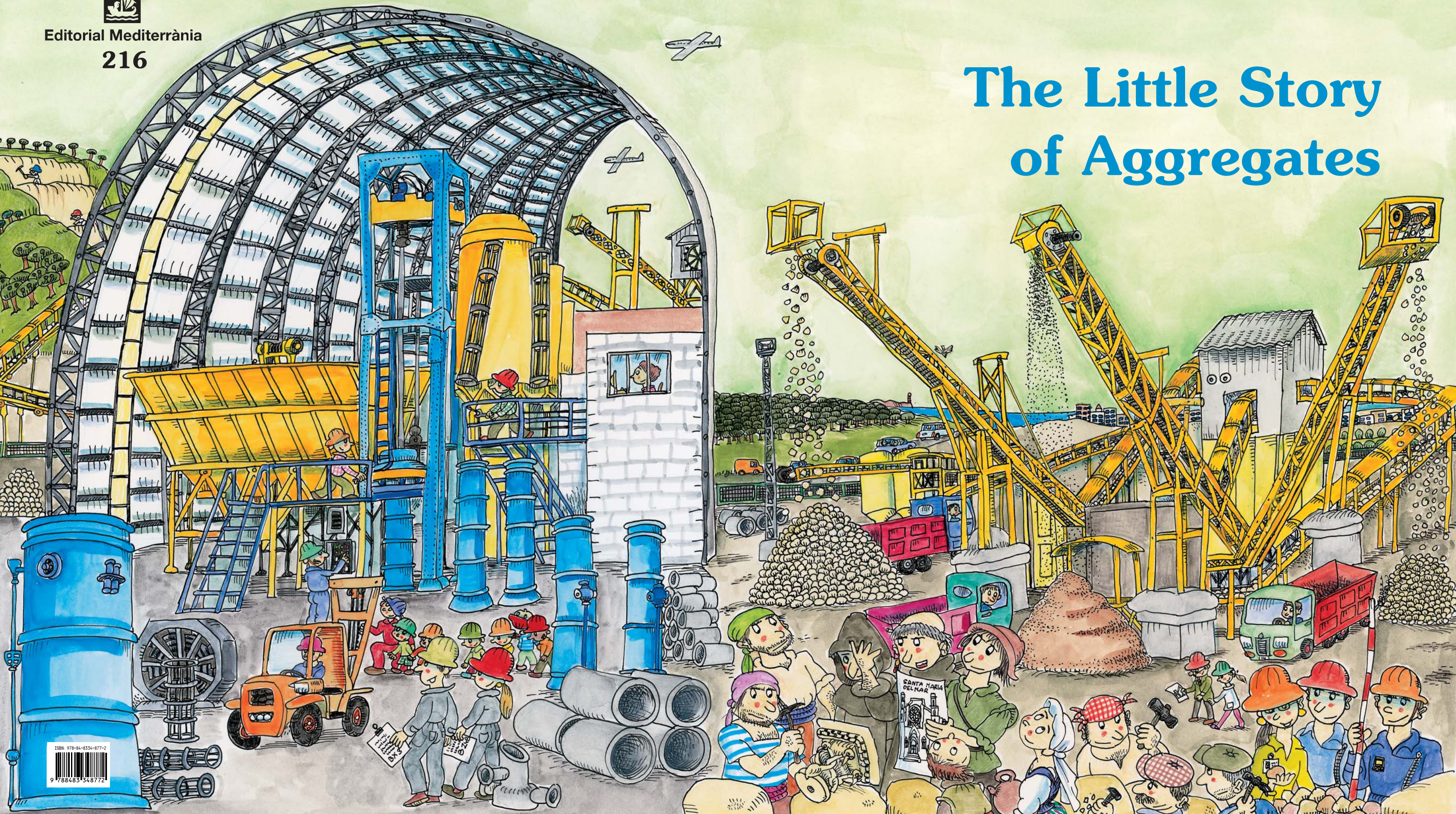




Editorial Mediterrània

216

The Little Story of Aggregates



ISBN: 978-84-8336-877-2
9 788483 348772

The Little Story of Aggregates

Text: Gremi d'Àrids de Catalunya / Federación de Áridos

Illustration: Pilarín Bayés



FEDERACIÓN
DE ÁRIDOS | FdA



The Little Story of Aggregates that you are reading now aims to open a window to a world that up to now has not been very well known. Business associations within the field of aggregates have been working hard for many years to gain recognition for the importance of this sector in our daily lives. This book hopes to be a step further in that direction. It is important that we all became aware of how necessary aggregates are, since without this basic material we simply couldn't make our houses and roads, our glasses, or even our computers. Thanks to the efforts of the companies members of the aggregates associations, the sector is progressing day by day towards a more sustainable structure, and this effort also needs to be recognised. That's why the *Little Story of Aggregates* tries to bring this reality closer to children, to show them how important aggregates are in society as a whole.



First edition: December 2007

© Text: Gremi d'Àrids de Catalunya
© Illustration: Pilarín Bayés
© Translation: SIMTRAD
© Editorial Mediterrània, SL
Guillem Tell, 15-17, entl. 1a.
08006 Barcelona
Tel. 93 218 34 58 - 93 237 22 10
editorial@editorialmediterrania.cat
www.editorialmediterrania.cat

ISBN: 978-84-8334-877-2
DL: B-9.019-2008

Printer: J. Massanés
Printed in Barcelona



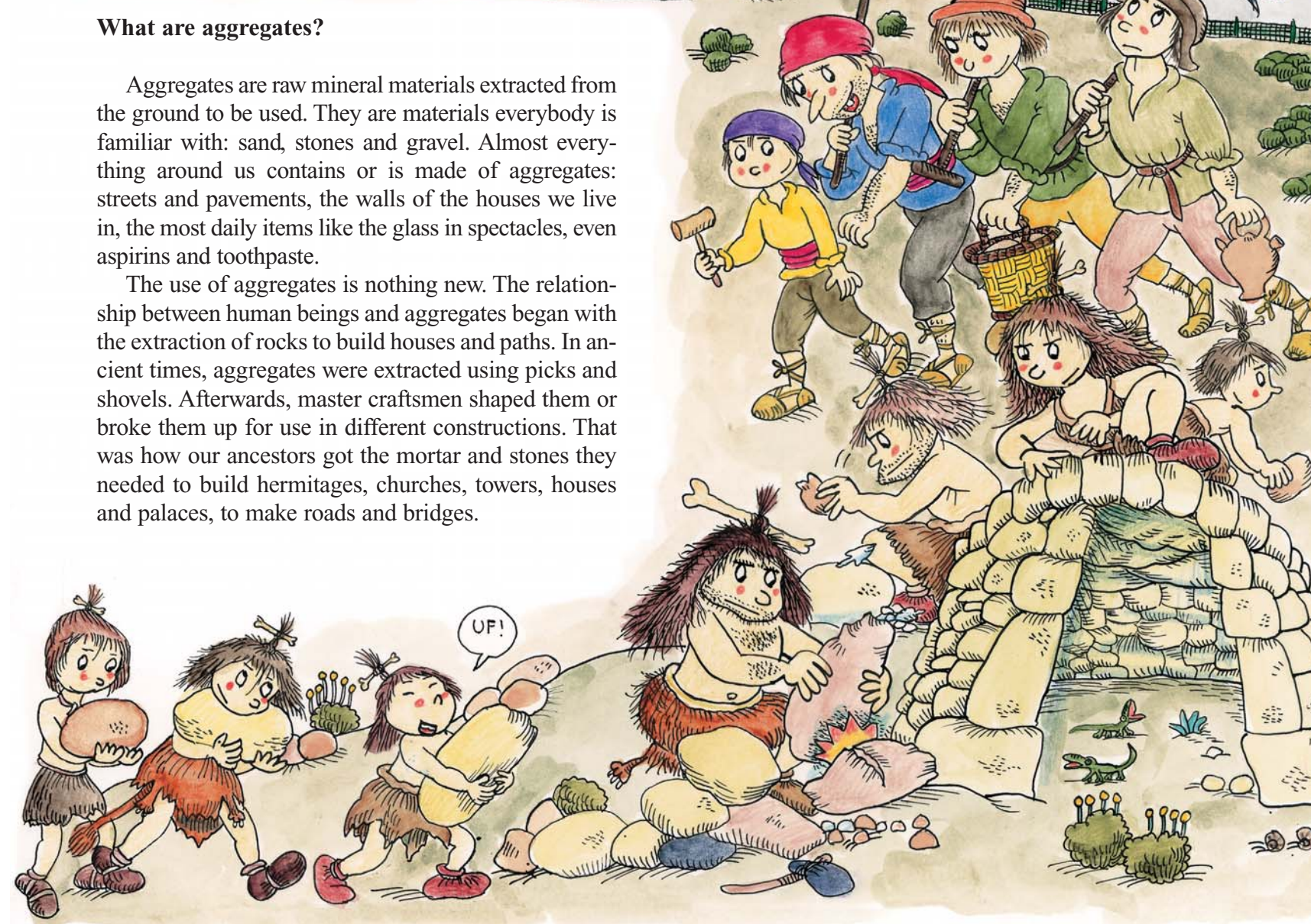
Editorial Mediterrània

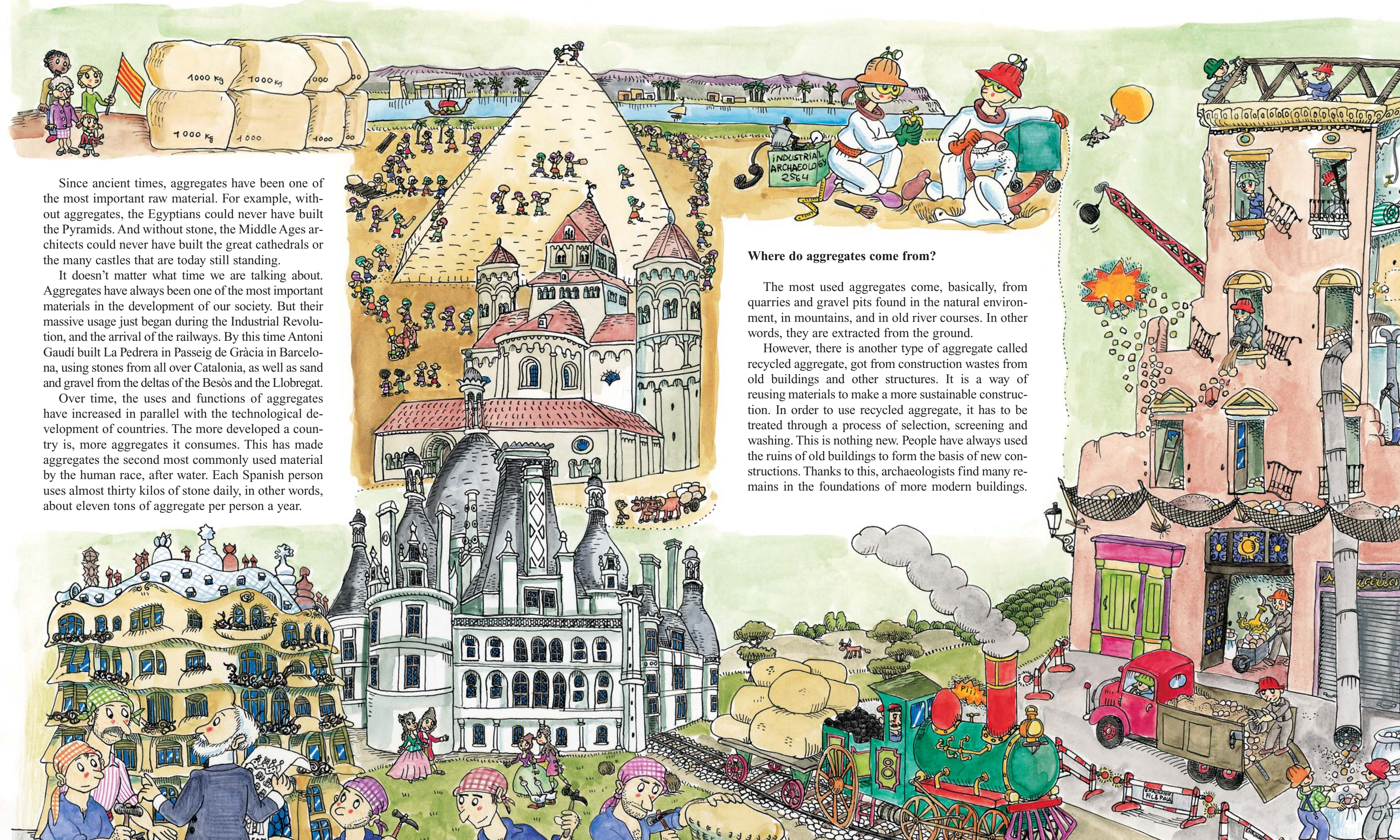


What are aggregates?

Aggregates are raw mineral materials extracted from the ground to be used. They are materials everybody is familiar with: sand, stones and gravel. Almost everything around us contains or is made of aggregates: streets and pavements, the walls of the houses we live in, the most daily items like the glass in spectacles, even aspirins and toothpaste.

The use of aggregates is nothing new. The relationship between human beings and aggregates began with the extraction of rocks to build houses and paths. In ancient times, aggregates were extracted using picks and shovels. Afterwards, master craftsmen shaped them or broke them up for use in different constructions. That was how our ancestors got the mortar and stones they needed to build hermitages, churches, towers, houses and palaces, to make roads and bridges.





Since ancient times, aggregates have been one of the most important raw material. For example, without aggregates, the Egyptians could never have built the Pyramids. And without stone, the Middle Ages architects could never have built the great cathedrals or the many castles that are today still standing.

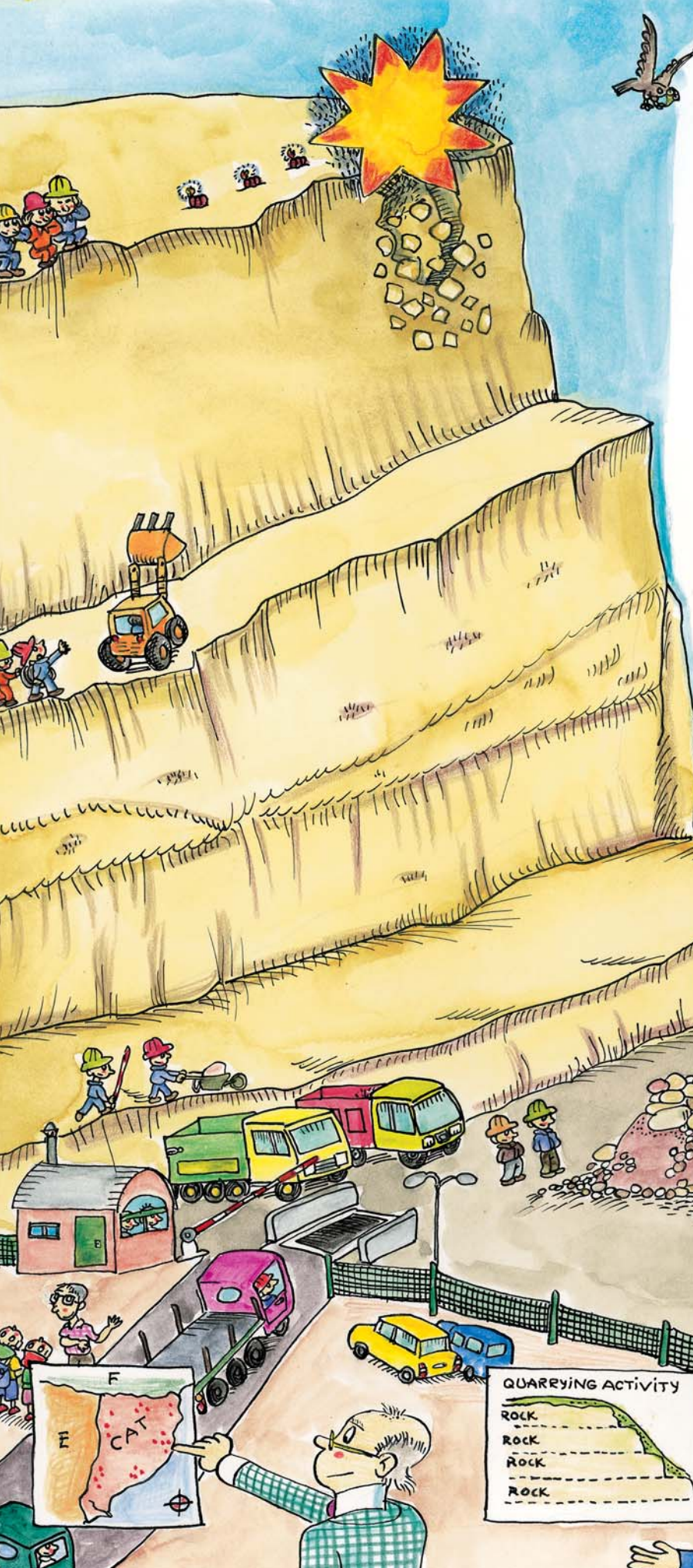
It doesn't matter what time we are talking about. Aggregates have always been one of the most important materials in the development of our society. But their massive usage just began during the Industrial Revolution, and the arrival of the railways. By this time Antoni Gaudí built La Pedrera in Passeig de Gràcia in Barcelona, using stones from all over Catalonia, as well as sand and gravel from the deltas of the Besòs and the Llobregat.

Over time, the uses and functions of aggregates have increased in parallel with the technological development of countries. The more developed a country is, more aggregates it consumes. This has made aggregates the second most commonly used material by the human race, after water. Each Spanish person uses almost thirty kilos of stone daily, in other words, about eleven tons of aggregate per person a year.

Where do aggregates come from?

The most used aggregates come, basically, from quarries and gravel pits found in the natural environment, in mountains, and in old river courses. In other words, they are extracted from the ground.

However, there is another type of aggregate called recycled aggregate, got from construction wastes from old buildings and other structures. It is a way of reusing materials to make a more sustainable construction. In order to use recycled aggregate, it has to be treated through a process of selection, screening and washing. This is nothing new. People have always used the ruins of old buildings to form the basis of new constructions. Thanks to this, archaeologists find many remains in the foundations of more modern buildings.



Aggregates of natural origin

As we said, these materials are extracted from quarries in mountains or from gravel pits found next to rivers. To do this, the surface of the ground has to be temporarily manipulated in order to get at what lies underneath. This means that for a certain period (while the quarrying activity takes place) the appearance of the mountain will change.

There are two ways of extracting aggregates: using explosives to break the mass of rock or using machines that 'scrape' the earth and collect the material in a scoop. Depending on which method we use, these aggregates can be classified into two main groups:

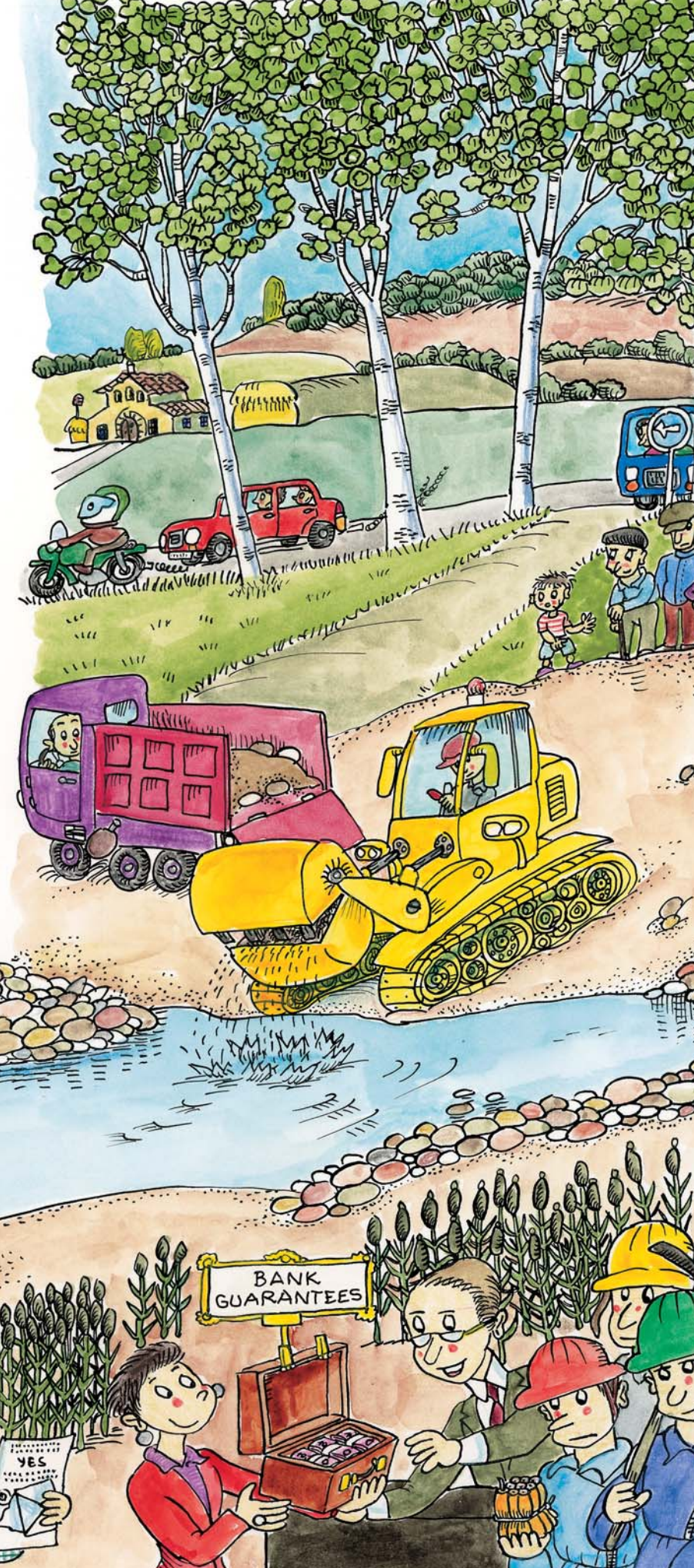
- Gravel pit aggregates, which are sand and gravel that can be extracted using machines and then classified by size and type of material.
- Quarry aggregates, which are extremely compact, hard materials that have to be extracted from the mountain using explosives or mechanical systems, and which tend to have very sharp edges.

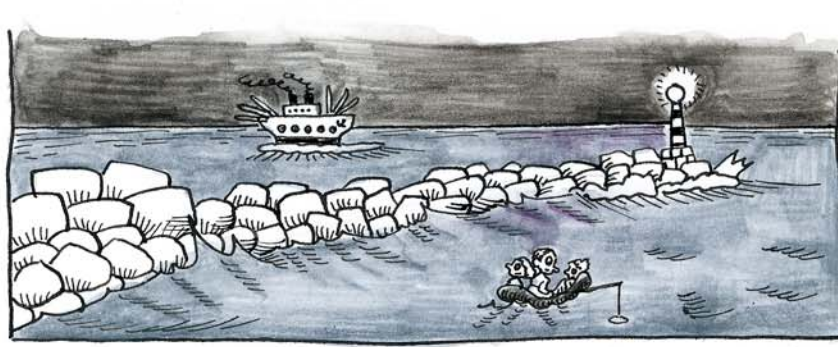
And what do we need to start an aggregate quarry?

For a company, in order to set up a quarry or gravel pit, they first need the permission of the Public Authorities. First, a study has to be made to find out where the stone is, because although they can be found everywhere, not all stones can be used to make aggregates. Then, a quarrying project and a restoration project are presented. Opencast quarrying involves quarries with highly characteristic benches and are very easy to identify.

The restoration project has to guarantee that the used land will be recuperated once the work is over. That is why a series of corrective measures are implemented in order to limit the effects of the quarrying activity, to reduce the damage to the surrounding area and to guarantee the sustainability of the quarry.

Once the engineers have designed the quarrying project and have checked where the aggregate reserves lie, before the material can be extracted, an Environmental Impact Study (EIS) has to be made. The aim of this study is to find out what impact a quarry could have on the environment in the area. The quarry will only be opened if the study is favourable. Once all the permissions have been obtained, the company can place a bank guarantee and start quarrying for aggregates.





What happens in a quarry?

Once the quarrying of aggregates has started, work begins on transformation. First, the aggregate has to be crushed. This operation takes place in the quarry itself, in the treatment plant. The large masses of stone that were not broken as a result of the blasting process, are used to construct dikes or to channel rivers and streams. This is called rockfill. The materials with no social purpose are kept aside to refill the quarry when it is restored.

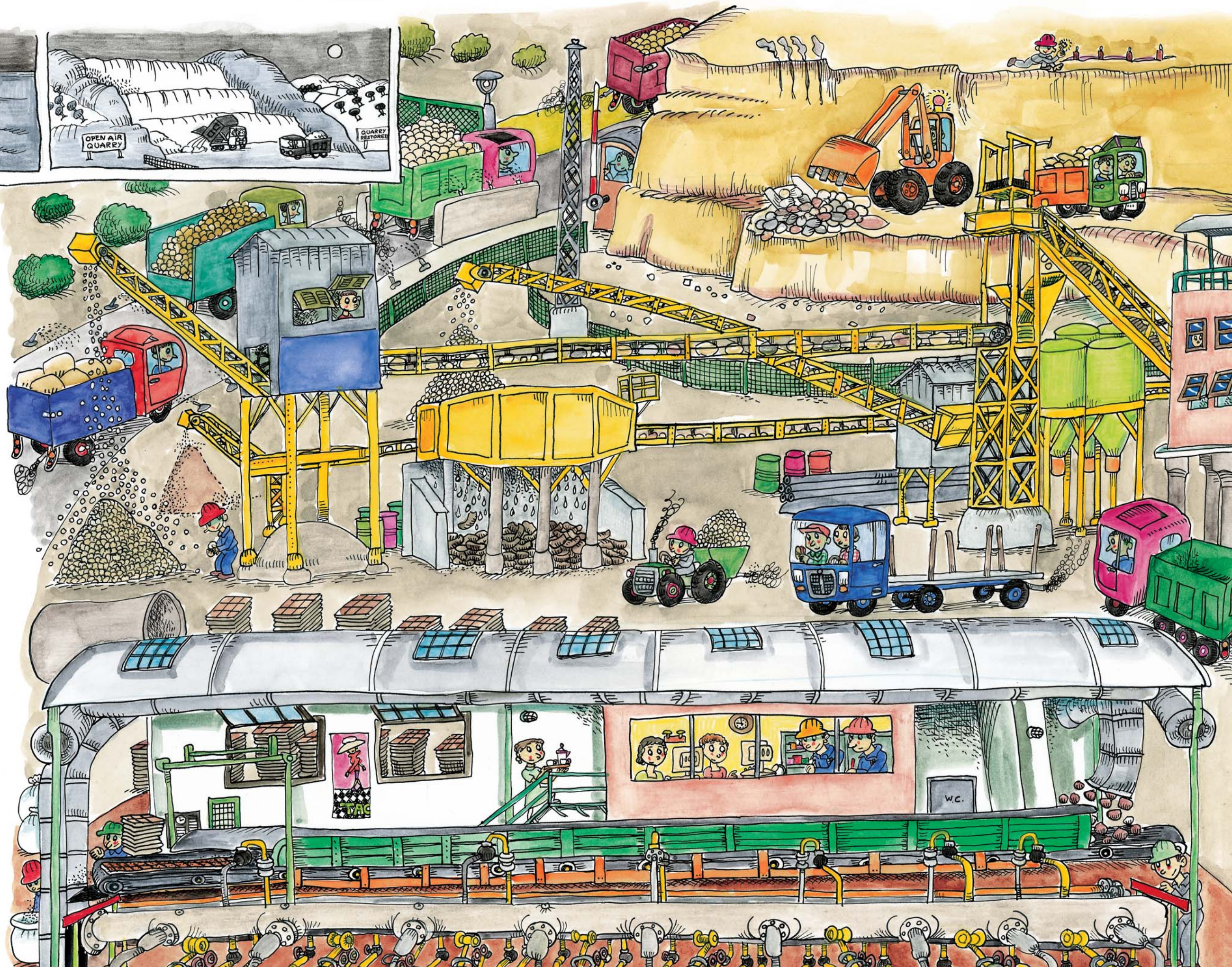
When the diggers collect the shovelfuls of stone, they are mixed up with large amounts of earth and are in all kinds of sizes. Depending on the use to be made of this aggregate, and in accordance with its characteristics, the treatment can involve the use of two types of facilities:

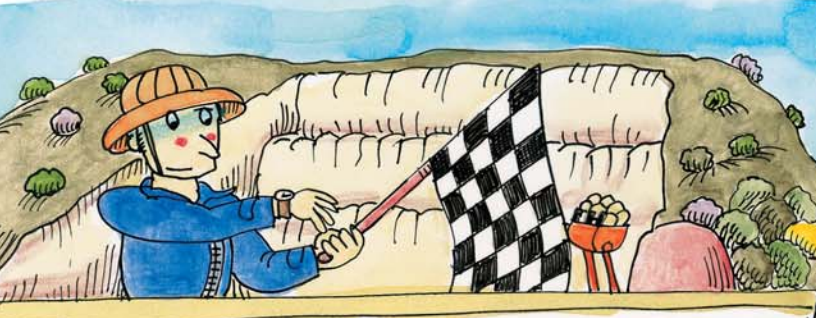
- Dry plants, which do not use water.
- Wet quarries, which do use water.

Once the aggregate has received the right treatment, they are grouped by size and potential uses. They have to be screened and classified by diameters, forming small piles that are called stockpile.

When all aggregate has been crushed and classified, it has to be transported. But, how? In countries with good rail networks (like the United Kingdom) or with navigable rivers and canals (like France), trains and boats are used to take the aggregate from one place to another. But in Spain, where these systems are not possible, the aggregate is transported by truck.

Companies always try to make sure their quarries are near to the places of consumption. The ideal location would be as near as possible to the place where the aggregate is to be used. Why? Because this reduces the CO2 emissions made by the trucks transporting them, and thus helps respect the environment. This also helps reduce the cost of aggregates, because although it is a fairly low cost product, the added costs of transport and fuel can make them considerably more expensive.





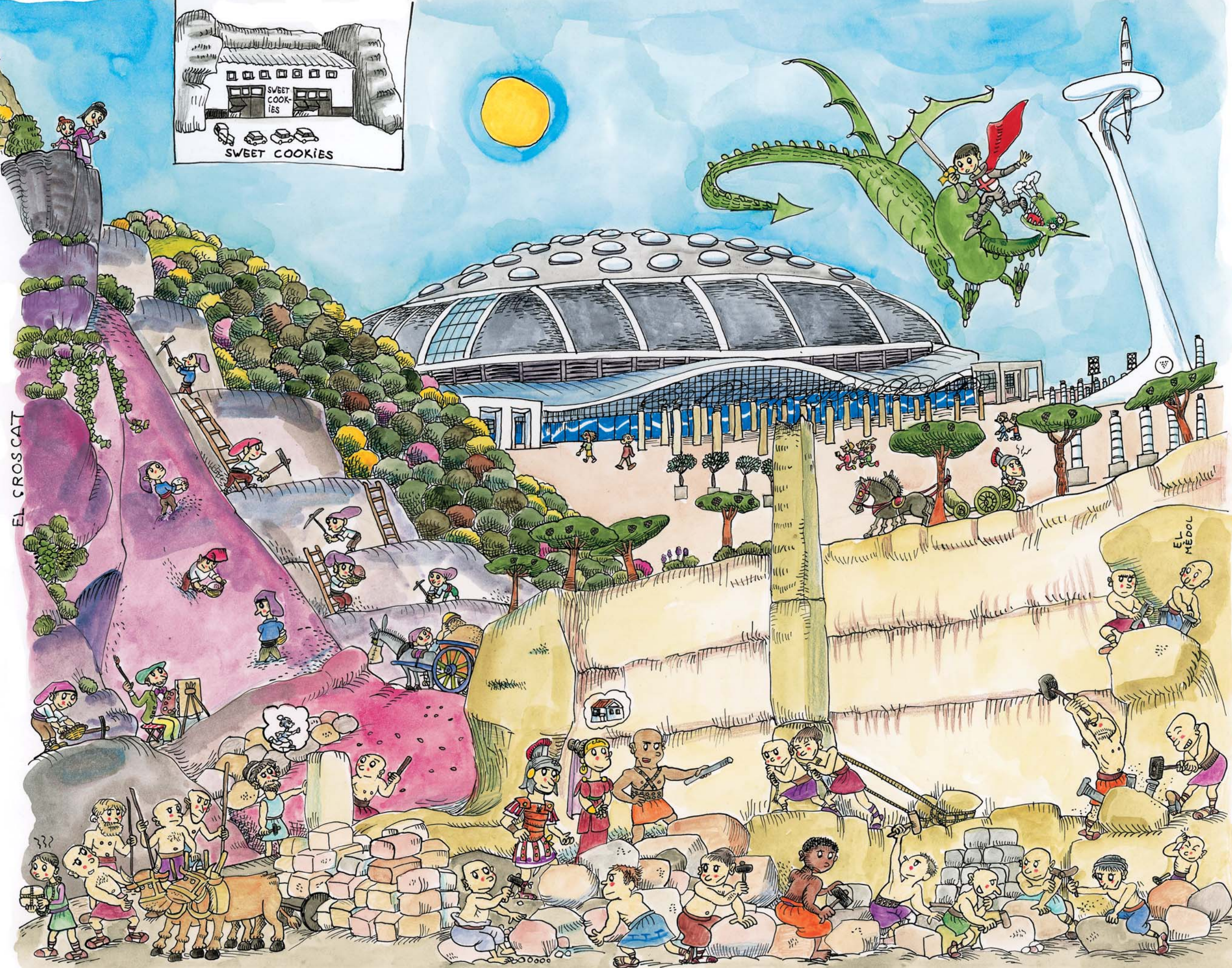
And what happens to a mountain that has a quarry?

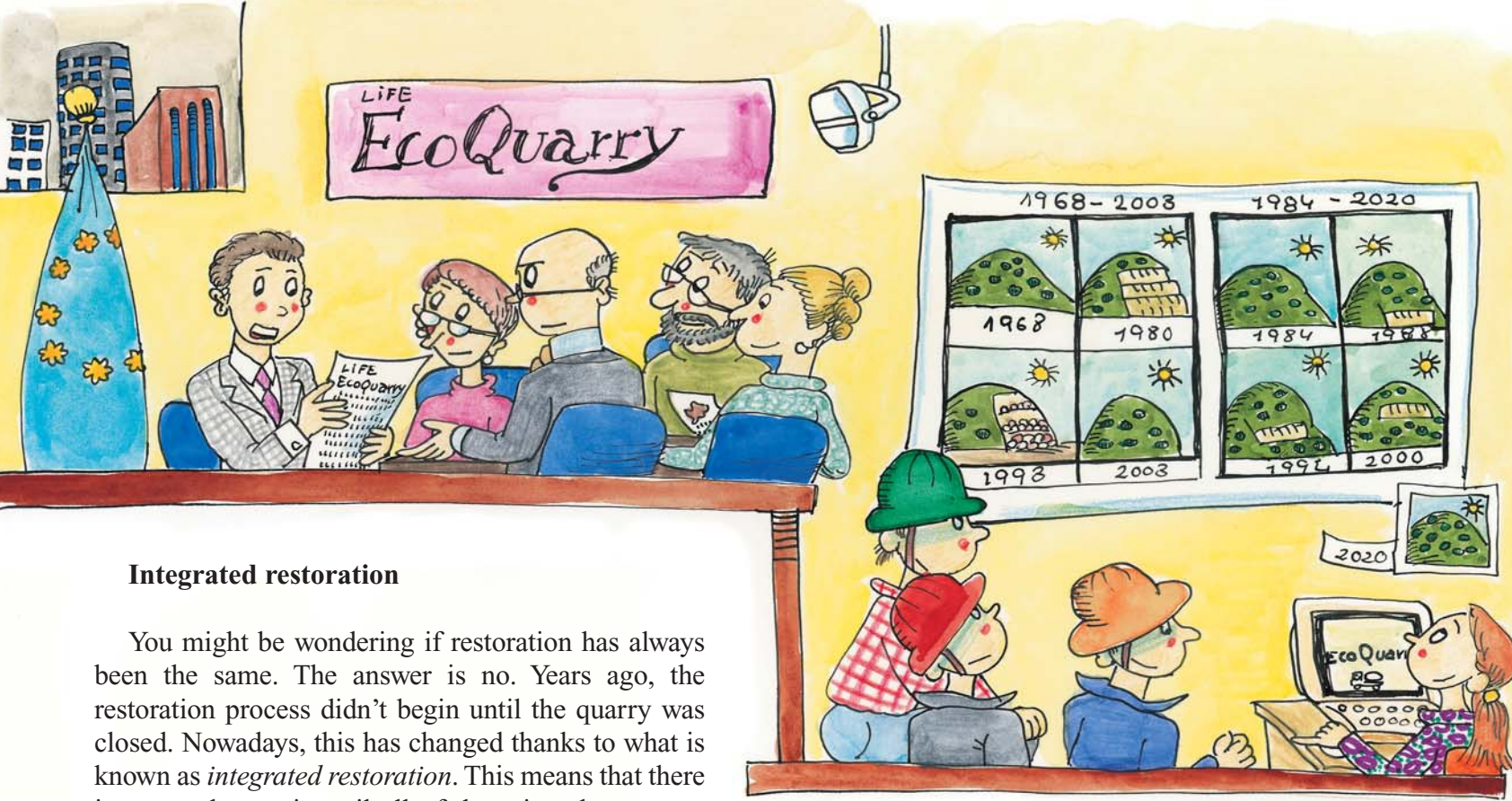
As we said, quarrying activities are only temporary. That means that the land is only exploited for a certain period of time, which tends to be no longer than twenty or thirty years and sometimes just six months, especially in the case of gravel pits. But once all the aggregates we need have been extracted, what happens to the land left behind by the quarry?

Nowadays, the whole quarried area is recuperated. That means a series of measures are implemented to reduce the effect on the environment in such a way that, after a certain time, you would never be able to tell that a quarry had ever been there. This is what we call *restoring*. To be restored properly, all quarries have to design an Environmental Restoration Plan. The aim of this plan is that the affected land recovers its previous uses or to fit for newland uses.

But which are these uses and what can an old quarry be converted into? There are many possibilities. Some quarries have gone back to being forests, others are used for agriculture, and some have been used as controlled waste deposits or as industrial parks. There are even quarries nowadays used for leisure purposes. Some of the most emblematic locations in a city like Barcelona were actually built upon old quarries. A good example of this is the Olympic Area of Montjuïc and, especially, the Palau Sant Jordi, which was built on the precise location of a former quarry. In Tarragona, an auditorium was built. And one of the most scenically restored sites was built on the Croscat volcano, in the Garrotxa region.

When a quarry is turned into a forest, trees and native vegetation are planted there. It is also common to reintroduce into these areas characteristic regional animal species. In some cases, old quarries and mines have also been turned into museums, where schools and families can learn how hard the lives of miners and quarrymen were in the old days.





Integrated restoration

You might be wondering if restoration has always been the same. The answer is no. Years ago, the restoration process didn't begin until the quarry was closed. Nowadays, this has changed thanks to what is known as *integrated restoration*. This means that there is no need to wait until all of the mineral resources have been extracted before starting to restore, but rather that restoration is an ongoing process, which takes place at the same time that the area is exploited.

This kind of restoration takes place in successive stages with different characteristics depending on the final use to be made of the land. Catalonia has set standards for this type of integrated restoration, as it was one of the first places in Europe to start working in this way. The main advantage of integrated restoration is that the land is recuperated much sooner. So, when the quarry is closed, the first stages of restoration are already practically complete.

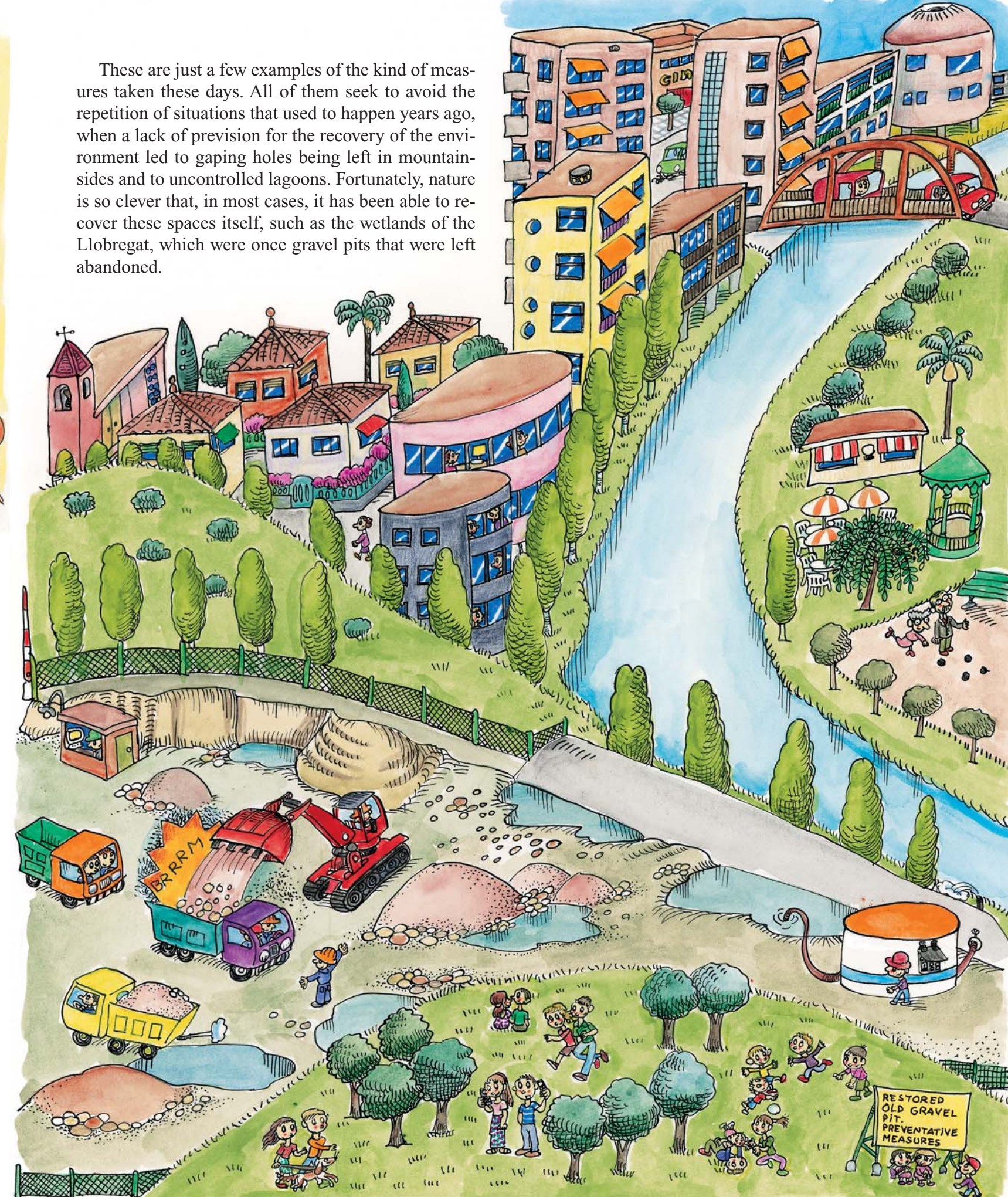
Increasingly, more efforts are made to minimise the environmental impact of quarrying activities. That is why so many studies have been made to try to improve the quality of restorations. One of the most important is the *Life* programme, called *Ecoquarry*. This is a European project that seeks to promote the rational use of natural resources and uses the latest generation techniques to restore the quarries of the Mediterranean region. Among other things, different types of land are examined in order to find out which are the most suitable for new trees to take root better and quickly. Through projects like this, involving universities and several companies is aimed the objective of making the extraction of aggregates more compatible with the respectful for the environment.

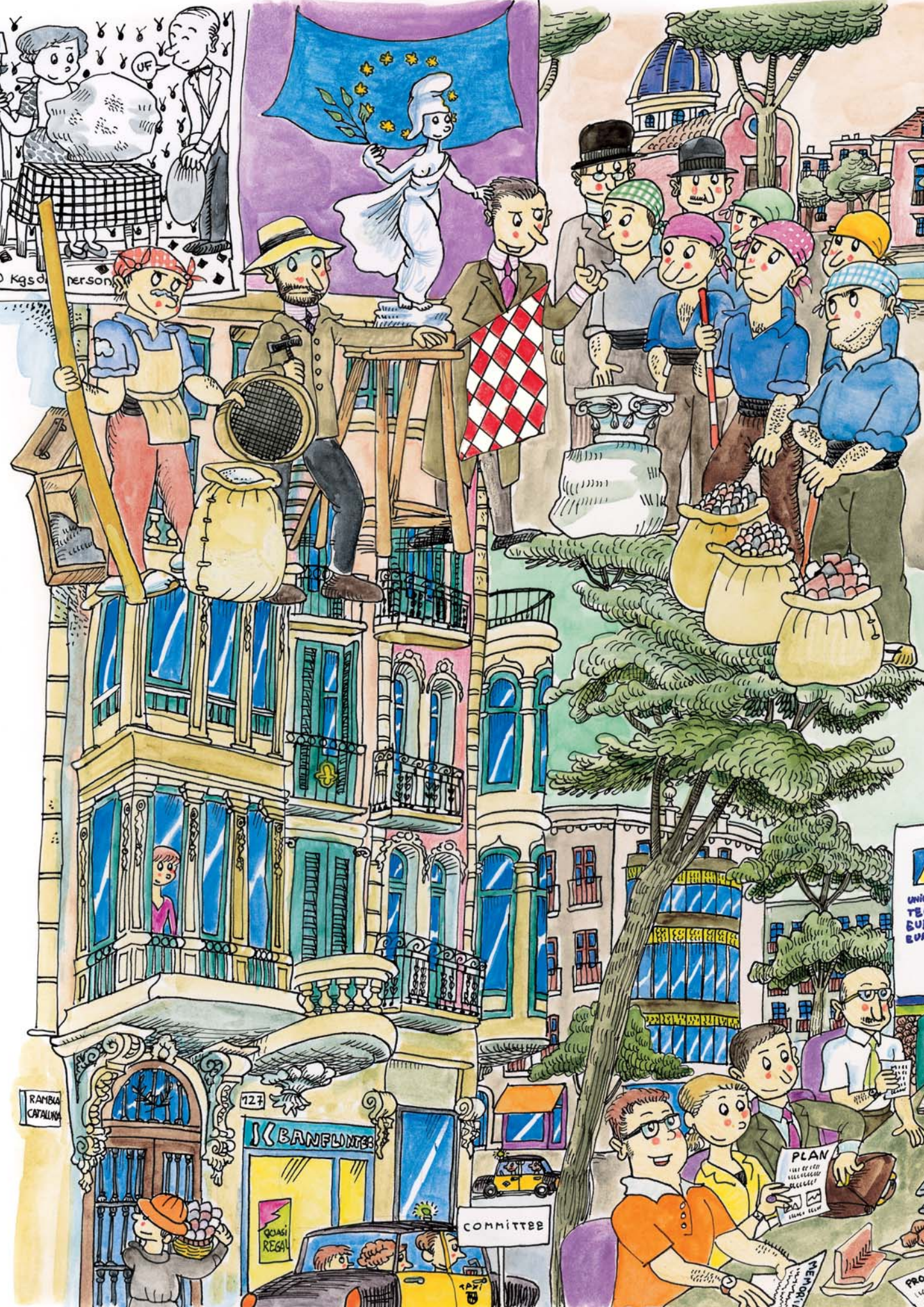
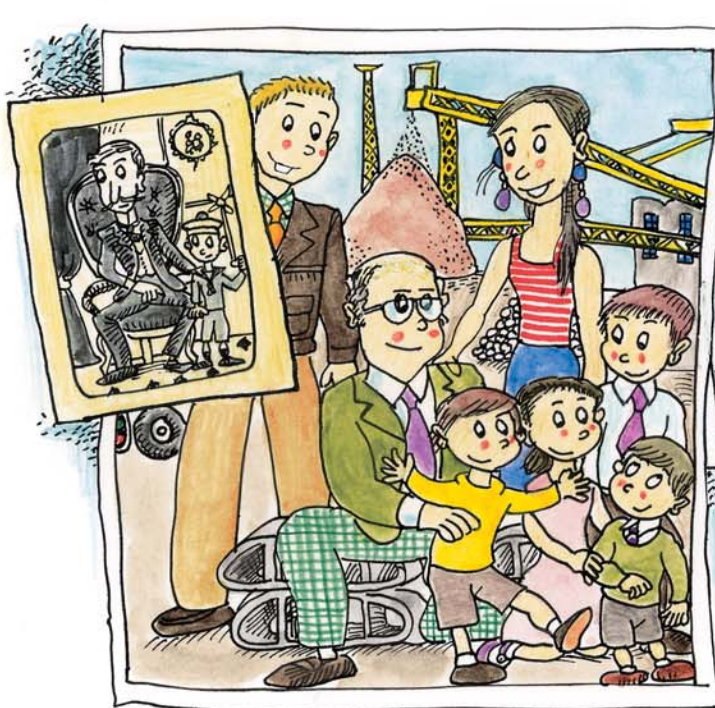
Environmental quarry restoration projects involve much more than just the restoration of the land once the activity is over. They also mean taking the necessary precautions to reduce the effects produced while the activity is taking place. There are two general types of measure: preventive and corrective. The aim is to protect different scopes, such as the atmosphere, groundwater, surface water, the soil, the fauna, the flora and the landscape.

For example, quarries try to make sure that noise and dust generated does not affect the people living close to the quarry. That is why quarries are always established as far away from built up areas as possible. But this is not always feasible because mineral resources are not always in the places we would prefer them to be, but are located where nature has put them.

Another example of corrective measures is the visual screens. The idea is to plant trees around the activity so that they cannot be seen from outside, which would spoil the landscape. In the case of gravel pits, which tend to be near rivers, special care is taken to respect and protect both ground and surface water. So, among other things, a safe distance is established from the river and the water used to wash the aggregates is recycled using a closed circuit and just then is fed back into the aquifer.

These are just a few examples of the kind of measures taken these days. All of them seek to avoid the repetition of situations that used to happen years ago, when a lack of prevision for the recovery of the environment led to gaping holes being left in mountain-sides and to uncontrolled lagoons. Fortunately, nature is so clever that, in most cases, it has been able to recover these spaces itself, such as the wetlands of the Llobregat, which were once gravel pits that were left abandoned.



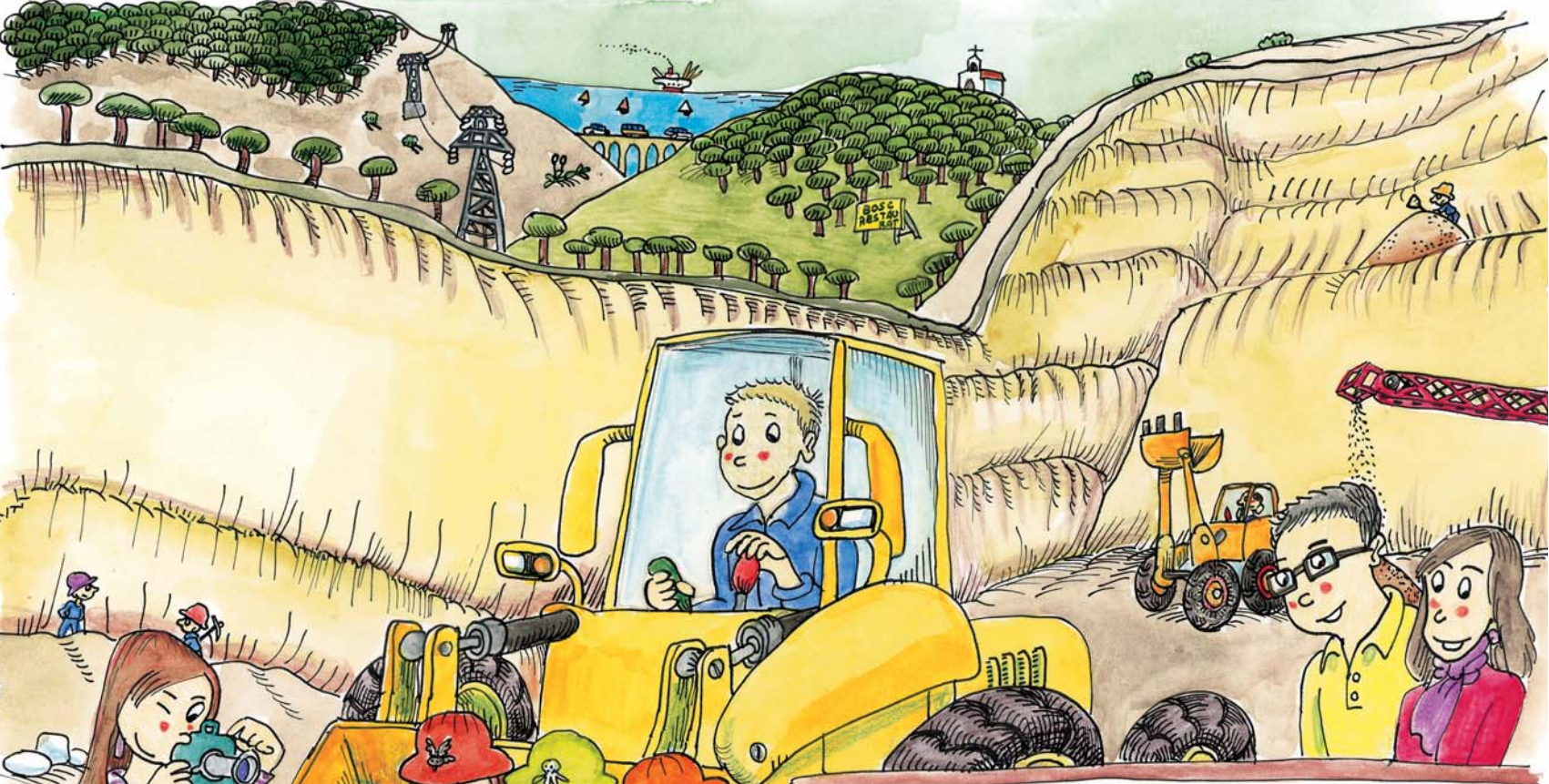


The Federaci3n de  ridos – FdA

In Spain there are different company associations that work together in relation to aggregates quarrying. The main role of the Federaci3n de  ridos – FdA (Aggregates Federation) is to represent its members and to act as a voice when dealing with the authorities and other institutions. So, for example, when the government needs to know if it will need more or less stones for its future projects, it asks the FdA for its opinion in representation of everybody. The Aggregates Federation, is member of UEPG, the European Union of Aggregates Producers, association that gather together the main aggregates associations of the whole Europe.

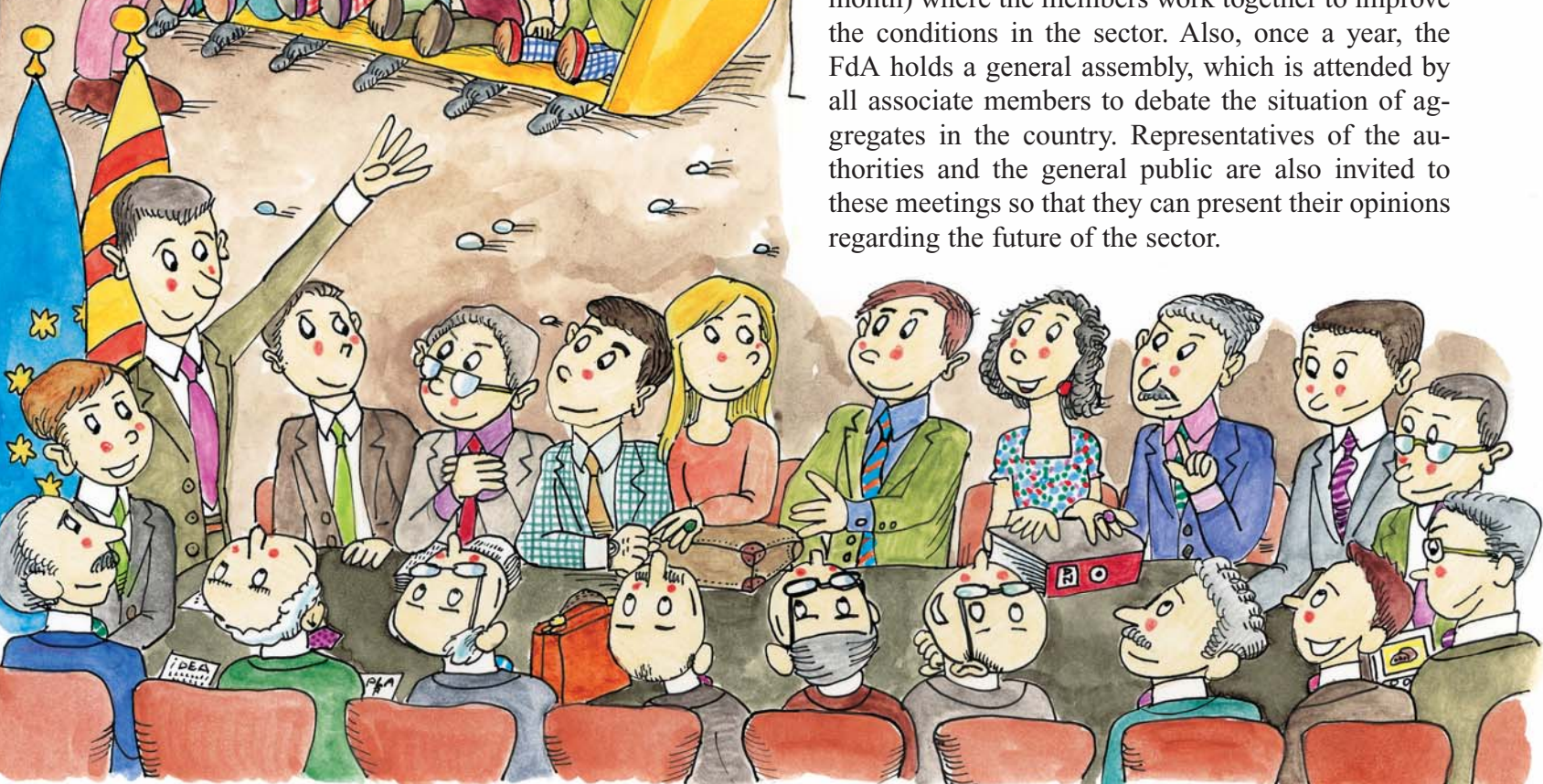
Also, by its own initiative, the FdA promotes different investigations of issues that may be of interest either to the companies forming it, or to general society. For instance, economic analyses are made of the quantities of aggregate that are produced and the quantities that are expected to be consumed. But they also make studies of ways to reduce the impact of quarries on the environment and organise educational and cultural projects to explain to society about the need for aggregates to make our lives what they are. And, though it might seem impossible, we all use more than 20 kilos of stone a day, to build houses, parks, squares, streets, schools and many other structures. After water, aggregates is the product that humans make the most use of.

The Federaci3n de  ridos – FdA is working more and more to ensure that companies join to good practices. One example of this is the way schools are invited



to visit quarries. This is a way for boys and girls to see on firsthand how the aggregates industry works and to understand more about what they are trying to do.

Like most organisations like this, the FdA has a Board made up of a president, several vice presidents and a certain number of other board members. Board meetings are held fairly frequently (usually once a month) where the members work together to improve the conditions in the sector. Also, once a year, the FdA holds a general assembly, which is attended by all associate members to debate the situation of aggregates in the country. Representatives of the authorities and the general public are also invited to these meetings so that they can present their opinions regarding the future of the sector.



**Editorial
Mediterrània**

Little Stories in English

- 1 Dalí
- 2 Joan Miró
- 3 Gaudí
- 4 Picasso
- 21 Pau Casals
- 77 Josep M. Subirachs
- 110 Cor Vivaldi. The little singers of Catalonia
- 140 Montserrat
- 145 Costa Daurada
- 175 Barça
- 176 Monestir de Santa Maria de Ripoll
- 206 Vall de Núria
- 216 Aggregates
- 233 Tibidabo
- 236 Antoni Tàpies
- 238 Josep Puigmarí

You can order our items
at www.editorialmediterrania.cat

