

Group



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# Water Management and Biodiversity

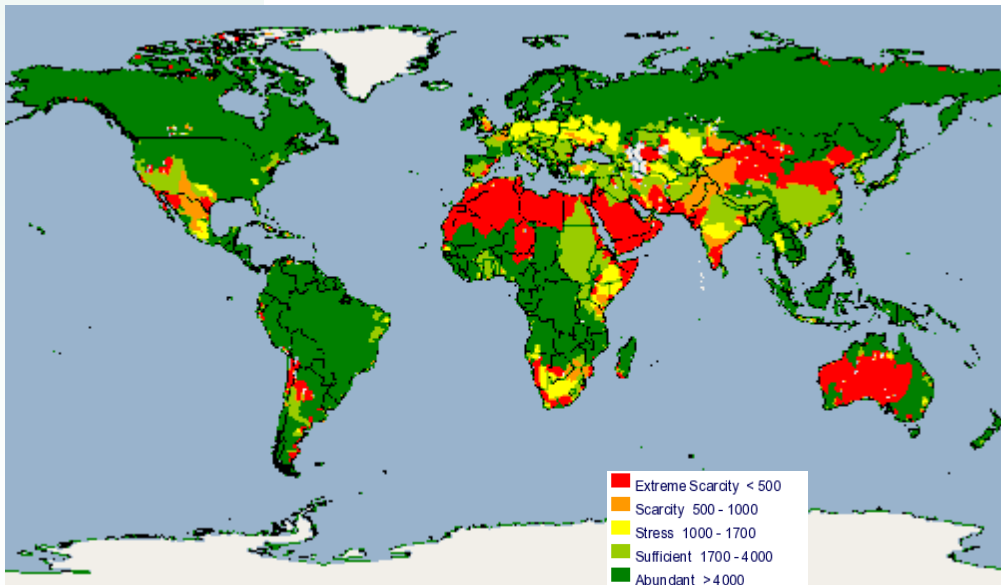
Jim Rushworth - 09/07/12

## Areas Covered by this Presentation:

- The Global Water Challenge
- Lafarge Approach to Water Management
- Biodiversity Management within Lafarge
- Lafarge Sustainability Ambitions for 2020 for Water and Biodiversity
- Development of Products for Urban Water Management.

# The Global Water Challenge

- 97% of the global water reserves are non potable and only 3% are potable water. Of the potable water only 16% is readily accessible, with most being present as glaciers.
- Available potable water represents 7,500,000 litres per person per year and we currently consume on average 3,800,000 litres. One third of the world's population are living in areas of water scarcity with less than 1,700,000 litres per person per year (consumption includes domestic, agricultural & industrial use).



- Only 55% of potable water is consumed, the rest is lost through leakage or evaporation.
- Consumption differs widely from @1000 litres per day in Australia, 100 – 200 litres per day in EU down a few litres per day in parts of Africa.

# Lafarge Water Consumption Data

- Lafarge has over 720 active quarries and over 1100 cement, ready-mix and asphalt plants worldwide.
- On average in 2011 we used 110 litres to produce a tonne of aggregates, 310 litres per tonne of cement and 120 litres to produce a tonne of concrete ( 290 litres per m3 of concrete).
- This compares favourably with many products such as cheese which typically requires 5000 litres to make 1 kg, one pair of jeans which requires 11000 litres and a car which requires 400000 litres\*.



Lafarge's British Caudon cement plant no longer needs to abstract fresh water from a nearby river, thanks to the creation of an artificial lake and a closed loop water recycling system. Caudon Cement / United Kingdom

- This however does not mean we can be complacent as annually we manufacture millions of tonnes of product worldwide.
- Some of our operations are situated near water courses and most sites have some interaction with water which is why Lafarge needs to manage its use of water.

\* Ends Report 392 Sept'08

# Lafarge Water Management

- Lafarge has had a partnership with WWF International since 2000 and this partnership has a dedicated work stream for water.
- In 2009 Lafarge joined the Water Footprint Network (WFN) which includes organisations such as UNESCO, WBCSD and WWF Int.
- Lafarge developed jointly with WWF a water program which consists of four steps:

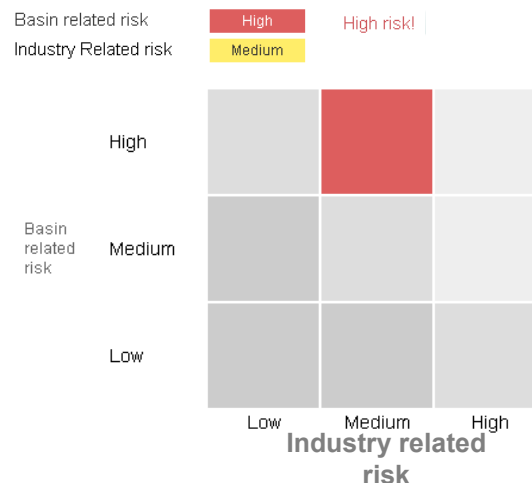
1. Mapping all its sites regarding water scarcity and water risk (regulatory & reputational) using the WWF Water Risk Filter.
2. Developing an inventory of water use for each operating site
3. Establishing pilot sites to develop best practices for managing and measuring water.
4. Collation and sharing of best practices on water management



# WWF Water Risk Filter - Example

An example showing the results of a screening with the Water Risk Filter Tool for a high risk cement site.

## Quick view - Example



## Results for Example

This facility heat map provides direct insight in the aggregated risk scores for the selected facility.



# Lafarge Water Management

- Prior to developing a new site (quarry, cement plant etc) or extending an existing site, Lafarge conducts an environmental and social impact assessment which will include hydrological and hydro-geological studies.
- This identifies the groundwater and surface water systems which are reviewed in combination with the studies on biodiversity/other ecosystems and local communities.
- In the case of a quarry, taking into account the findings of the studies, a mining plan will be developed together with the rehabilitation plan for the final restoration of the quarry.



## Romania

### MEDGIDIA PLANT

As part of its partnership with WWF, Lafarge has made the preservation of water resources one of its priorities. The Medgidia cement plant, in Romania, was one of the first sites to measure and reduce its water footprint. Medgidia Cement/Romania

#### OBJECTIVES

Despite being close to the Danube Black Sea canal, the Medgidia site is located in a zone where drinking water resources are scarce due to the fragility of the water table.

From this perspective, it was important:

that all the plant's employees and subcontractors should be aware of the scarcity and challenges affecting the resource, especially considering that the site recorded twice the average consumption of Lafarge cement plants;

- to identify all the uses of water at the site;
- to measure the local environmental impact;
- to plan ways of reducing this impact;
- to contribute to better management of water by all local users (communities, local government, etc.).

#### SUMMARY

The plant measured its "water footprint", i.e. its water consumption, as well as the amount of water lost into the air (evapor), into pipelines and into the canal. Although it complies with temperature, acidity and pollution standards, the discharged water has an impact on local resources since it does not directly return to the water table from which it was pumped.

The teams therefore considered practical changes they could make and a dialogue about water was initiated with users and local authorities.

#### RESULTS

In a few months, the site's water footprint was cut by 43% by improving processes and equipment, particularly the installation of water shut-off valves.

A communications campaign, in association with NGOs, raised awareness among local communities, particularly schools, of the scarcity of water resources in their region.

The Group also funded the drilling of a well in its limestone quarry, to enable the neighboring community to connect a drinking water network.

#### PROSPECTS

Teams are now considering ways to introduce even more efficient management of resources. For instance, there are plans to introduce a closed circuit for water, by creating shorter cooling loops to limit discharges, and to use steam to operate power turbines. As well as energy production, this work could reduce the quantity of water required to cool discharges. These measures will require investment.

#### PEOPLE CONCERNED

- Plant employees and subcontractors
- Local authorities and managers of the Danube Black Sea drainage basin
- Local communities
- NGOs

# Lafarge Water Management – Best Practices

- Best practice documents and water balance tools have been developed for each product line to both identify areas where improvements can be made, to improve mapping of systems and improve measurement of water used.
- Best practices also included awareness campaigns both internally and within local communities



## 15 levers for Water Efficiency Best Practices

	Levers
Safety & Environmental	1. Identify Hazards and Manage Risks 2. Prevent Contamination
Water flow	3. Identify all water in-flows and out-flows 4. Determine measurement / estimation points 5. Measure Water Flows 6. Estimate water flows: pump capacity 7. Record flow volumes
Recycling system	8. Recycle Water
Water losses and leakage	9. Prevent water losses and leakage 10. Capture water losses: drainage system 11. Reduce Evaporation
Manufacturing process	12. Optimize pumping 13. Ensure optimal water quantity in final product 14. Blend the feed
Ancillary Uses	15. Rationalize water usage





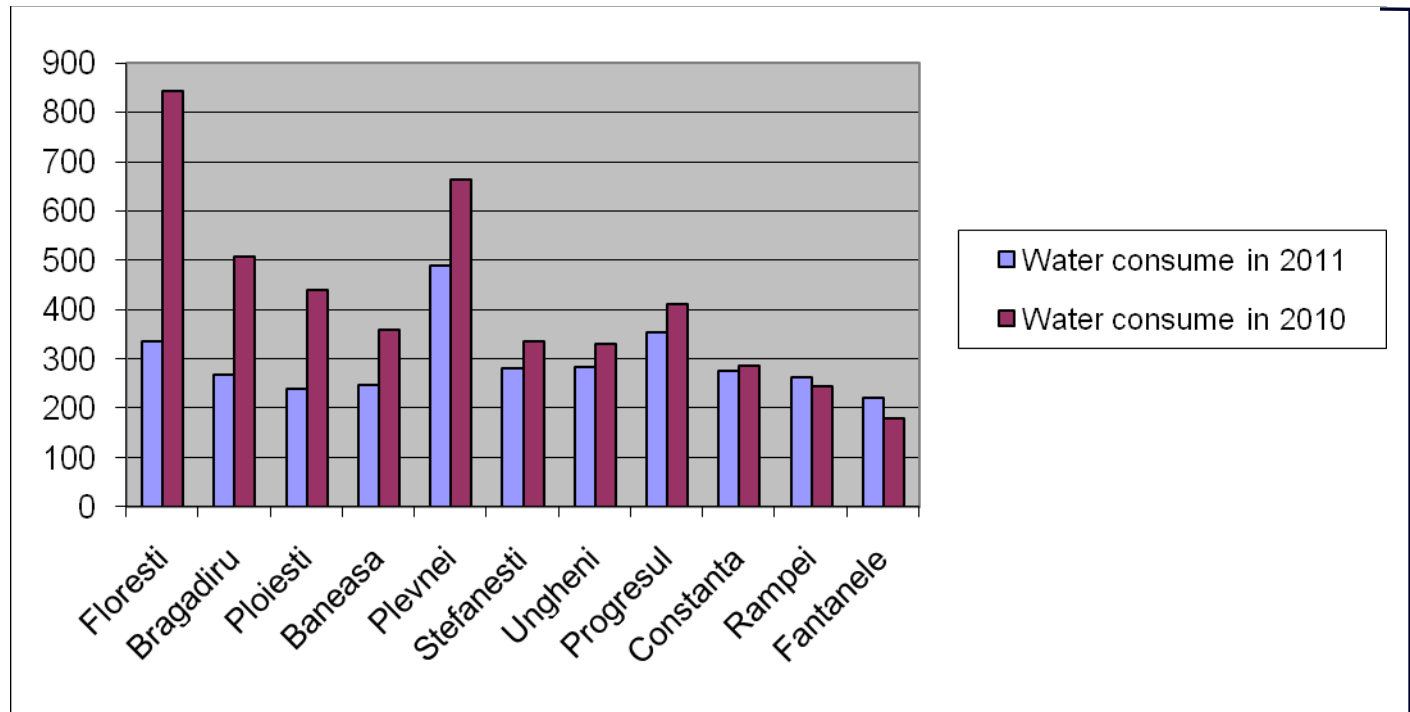
# Lafarge Water Management – Best Practices

- In Lafarge operations we try and recycle water to minimise the need for make up water. Nearly 70% of our locations recycle water.
- The majority of our ready-mix plants use recycled water or dry stone to clean the mixing drums between batches.
- Many of our operations collect and store rain water for use both within the process and to dampen roads within our quarries. In UK the 5 cement works use rain water as their sole supply saving over 1.25 Million m3 each year.



- To ensure our operations do not impact on local water courses we instigate several actions specific to the sites impact.
- During operation surface and ground water levels are regularly monitored and water discharge is monitored for quality (eg pH, COD, BOD, solids etc).




# Improvements in Water Footprints for Concrete Plants in Romania for 2011 vs 2010



This represents an overall reduction of 20% in water consumption in 2011 vs 2010

# Lafarge has been a Pioneer in Managing Biodiversity through Rehabilitation and Developing Partnerships

## THE KEY STAGES OF LAFARGE'S POLICY TO PROMOTE BIODIVERSITY

1970	1979	1980	1987	1992
<p>Since the early 1970's, Lafarge has taken environmental challenges into account at its sites, particularly quarries. The Group then adopted several measures anticipating regulations, including in France and Kenya.</p>	 <p>© DR. Modestine Lafarge</p> <p>The European Community adopted the Birds Directive to protect wild species. In the same year, the Berne Convention on the Conservation of European Wildlife and Natural Habitats was signed by the European community and 44 other countries.</p>	<p>During the 1980's Lafarge forged many partnerships, both official and informal, with local naturalist groups to address specific objectives, e.g. an ornithologist coming to count birds at a quarry, a botanist listing species of interest at a site, etc.</p>	<p>The Brundtland Report, from the United Nations World Commission on Environment and Development, created a new concept: "Sustainable development is a method of development which meets the needs of the present without compromising the ability of future generations to meet their own needs."</p>	<p>The first United Nations Environment Summit was held in Rio de Janeiro (Brazil). In particular, it resulted in the signing of the Convention on Biological Diversity.</p>
1995	1999	2000	2007	2009
 <p>© DR</p> <p>Lafarge signed its first partnership in France with the Muséum National d'Histoire Naturelle (National History Museum). The studies carried out contributed to developing expert knowledge of life in quarries.</p>	<p>Members of the World Business Council for Sustainable Development (WBCSD), Lafarge and Holcim set up the Cement Sustainability Initiative. This innovative sectoral initiative now includes 23 cement manufacturers from around the world, who work together on reducing the ecological impacts of their activities.</p>	 <p>WWF and Lafarge signed a partnership. This completely new association between an industrial company and a non-governmental organization involved in protecting the environment set a precedent.</p>	<p>Lafarge's Sustainable Development Ambitions 2012 plan set specific targets for reducing the environmental footprint of the Group's activities.</p>	<p>At the Presque Isle quarry in the United States, Lafarge launched its first study to analyze and assess the value of services provided by ecosystems on one of its sites.</p>

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FLORA AND FAUNA ON REDEVELOPED SITES



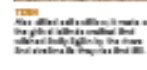
**THE 100th DAY**  
The 100th Day, the symbol of the United States, is in the heart of the nation's first state in some, including the state of

**BOTTLED**  
Hummus is a popular favorite among those who eat good natural foods: lentils, olives, etc. The popularity of lentils is mainly due to the gelatinous texture of the lentils, so other grains such as the European pearl barley are considered good substitutes. However, the lentils are the most common choice. It is sold up the whole country.



**AMITY-HILL AREA**  
 More than 100 of Englishville, spanning its Fallows Hill have been identified as an archaeological site, some of the 1000-year-old, the Mayan built on the hillside at the site.

Quarrying activities had their cultural impact on the hill, still for the friends, providing them with numerous archaeological sites.



# Biodiversity Management and Current Targets

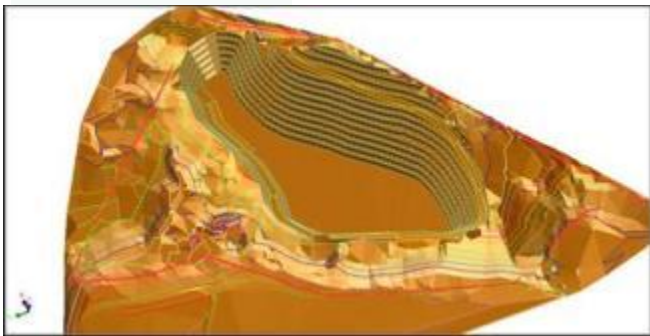
- **Lafarge Environmental Policy set Targets in 2003 for:**
  - Environmental impact assessment (now include social)
  - Landscape and biological diversity shall be preserved
  - Rehabilitation plan shall include wildlife and habitat conservation
- **WWF Partnership has progressively helped develop a Structured Management System for Biodiversity:**
  - Use of IBAT and checklists to assess the sensitivity of our environment
  - Development of guidance and management plan tools
  - Development of a toolbox of methods to measurement progress
- **Sustainability Ambitions 2012 include 3 Biodiversity Targets:**
  - Biodiversity checks to assess the local sensitivity – 100% by 2010 (2011 – 97% completed)
  - Biodiversity management programs to manage and monitor sensitive sites – 100% by 2012 (2011 - 49% completed)
  - Quarry rehabilitation plans on all active quarries – 85% by 2010 (2011 – 86% completed)



# Biodiversity is Integrated into our Rehabilitation Plan which links to the Quarry Mining Plan



A rehabilitation plan for a quarry in the Philippines which includes a nature area and housing estate



Mining plan for Nilai Quarry, Malaysia

- Quarry operations are developed using a mining plan to ensure safe and optimum extraction of raw materials. This is typically reviewed annually.
- Incorporated in the mining plan is a rehabilitation plan which indicates the final layout and use of the restored quarry. This will include progressive steps for the restoration process.
- Incorporated within the rehabilitation plan will be a biodiversity management plan (BMP) for all sites and information of the fauna/flora to be used and invasive species for less sensitive sites.
- When developing BMP's we try and involve local experts such as nature trusts, universities and NGOs who help recommend types of habitats that should be created and the native flora to be used in the rehabilitation.

# Local Expertise is Used to Select Correct Flora

- Local experts help to select the correct plants and trees to ensure good survival rates and most cost effective restoration.



# Rehabilitation Addressing Issues Related to Water for Quarries in Romania

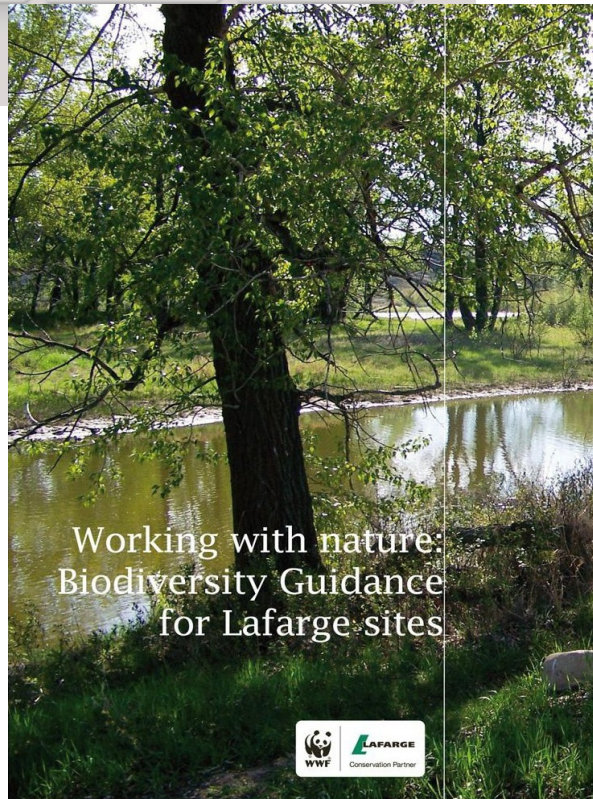
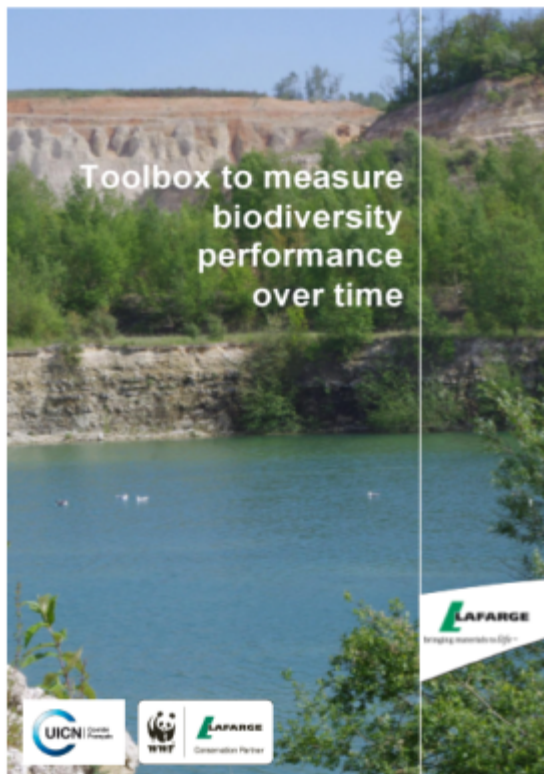
- Prevention of the formation of ravines in Sandominic quarry



- Rehabilitation in a floodplain in Fusea sand & gravel pit



# Biodiversity Management Tools



Client:	
Outline:	
BU:	
Site name:	

## Biodiversity Management Plan



### Advice:

Before beginning the Biodiversity Management Plan, we advise you to read the Lafarge Biodiversity Guidance which will help you understand the purpose of this work and also give you very good examples of risks, opportunities and actions on Biodiversity lead by Lafarge.

The national/regional biodiversity plan/strategy may also save you a lot of time. In fact, the species of interest, the invasive species, the impacts, the habitats may already be listed in these sort of documents.

### Purpose:

The BMP serves a number of purposes:

It facilitates the approval of future site permits, by showing how a site plans to avoid and minimize its impacts upon important habitats and species.

It serves as an excellent tool and point of reference for future or existing biodiversity projects, such as rehabilitation plans, calculation of biodiversity indices, etc.

BMPs are of implicit value when approaching prospective partners, such as NGOs, or community organisations, as they allow sites to demonstrate, both in qualitative and quantitative terms, the biodiversity measures it plans to take.

It allows the Group to show biodiversity competency at site level, which has the effect of improving our relationships with stakeholders both on a global and a local level.

### Objectives:

The BMP consists of two sections:

**Section 1: Assessment of biodiversity (1-5)**

This first section will be an assessment of the past, present and future biodiversity of the site. This includes and biodiversity inventory of the site, past impacts or improvements, current works-in-progress, partnerships with local stakeholders/NGOs, the regulator context of the site etc.

**Section 2: Objective and Action plan (6-7)**

This step identifies objectives based on the comprehensive biodiversity assessment that was completed in Section 1. Tasks will be listed, and given a priority according to urgency and who proposed them.

The combined results of these steps will be the creation of an extremely comprehensive and coherent biodiversity management plan, which acts as a 'vision' for the site, and addresses the risks and opportunities created by the site.

### How should you use this spreadsheet?

The main purpose of the BMP is to help your team with biodiversity management.

You should put explicit reference as often as you can to other existing documents and systems at the quarry, including the ESIA, EMS, Mining Plan and Rehabilitation Plan. Please feel also free to add any relevant worksheets to this file you wish. This could include land data, maps, tabulated data from the assessment phase of the BMP, etc.

In summary, personalise this spreadsheet, and make it work for you. However, we ask that you complete at a minimum, the pre-existing sheets 1,7, for sensitive sites by the end of 2012.

You do not need to complete all the data in one sitting; within the deadline, please take your time to ensure the data you enter is as accurate and comprehensive as possible.

### How will we use this spreadsheet?

At Group level, this data will be used to assess our biodiversity management processes, and to share advice based on best practices that we find at site level. As such, aggregated data may be used and shared internally. For instance, if a site has an excellent protocol for the inventory of nocturnal mammals, we may share those practices with sites with a similar biodiversity context.

In cases where data could be made available to stakeholders or our partners, sites will not be named or be personally identifiable.

### Technical Help

You should activate the macro to enable all the features of this excel file. If not already the case, please click on Help at the top of this page for instructions on enabling Macros.

**Customization:** This document is an internal document which exist to help you. You can add rows everywhere (to do it, please go on the middle of the table and insert lines), add sheets (eg. add the inventory plan) and change the format of each cell (eg. colors). You can't add columns and the cells that you don't have to fill are blocked. This will enable us to compile all the data centrally and justify our actions on biodiversity at the world level. If you need help, please contact your BU env. manager.

The drop-down menus are highlighted in green. They should help you to complete this fact sheet.

You will find a definition for each item by putting the cursor on cells with a red corner. If something is unclear, don't hesitate to contact : your environmental BU manager or Jim Rushworth.



# Group 2020 Ambitions

**3 new SD Pillars** **Building Sustainability**, **Building Communities**, and **Building the Circular Economy**

## BUILDING THE CIRCULAR ECONOMY

### NATURAL RESOURCES

**Our operations both affect ecosystems and rely on their regulatory services** (such as climate, flood control, waste treatment) and **provisioning services** (such as freshwater, food and fiber). The deterioration of ecosystems comes with a great cost to society. **It is incumbent on companies like Lafarge to take the lead in protecting and developing biodiversity** and therefore contributing to the enhancement of ecosystems.

#### Enhance Biodiversity and Raw material conservation

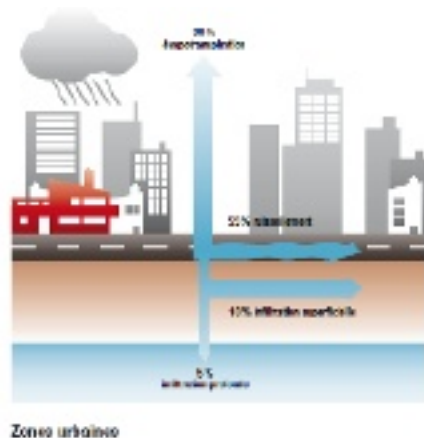
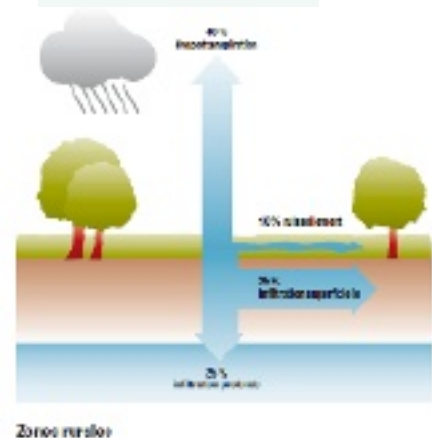
- 100% of quarries implementing rehabilitation plans in line with Lafarge criteria by 2015.
- 100% of quarries and cement plants implementing Biodiversity Management Plans in line with Lafarge criteria
  - 100% areas with local biodiversity sensitivity by 2015.
  - 100% of quarries and cement plants by 2020.


#### Enhance local watershed sustainability

- 100% of cement and aggregate operations completing water risk assessments in 2014
- 100% of operations in water impacted areas to engage local stakeholders in developing a local watershed sustainability plan and reduce water impact

# Development of Products for Urban Water Management

- For many years Lafarge has done research on developing concretes with low water demand.
- Lafarge has also conducted research to develop products to improve urban water management. Hydromedia combats against the problem of soil sealing which is adding to the risk of flooding in many towns and cities.
- Hydromedia allows rain water to be collected and stored for irrigation use later.



A scenic photograph of a calm river, likely the Danube, reflecting the sky and surrounding greenery. The water is a deep blue, and the banks are lined with trees and bushes. The sky is a pale, hazy blue.

Thank you for your attention

Any Questions

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