for better building

Promotion of Biodiversity at the Mineral Extraction Sites of HeidelbergCement

Valid for Europe

HEIDELBERGCEMENT

Contents

1 Preface

The principle of sustainability is deep-seated in the company strategy of HeidelbergCement. We provide a safe and healthy work environment for our employees and take on responsibility at all our locations worldwide. We understand sustainability to be a constant effort for improvements in the field of nature and environment protection. We do our best to keep the impact on the environment as low as possible through good management at our locations.

This Group guideline manifests the basic parameters for the promotion of biodiversity at our mineral extraction sites. This guideline aims at defining consistent standards for restoration and renaturation. These standards are to be deployed in all our business lines. Every after-use plan will take into account the economic, ecological and social needs of the respective community. All intended forms of after-use will support the preservation of species diversity and contribute to raising the variety of plants and animals wherever possible.

When extracting minerals, we change the landscape and make use of mineral resources which have developed over millions of years. Only if we manage to safeguard these resources and handle them carefully, we will be able to meet our own demands and those of future generations. We have set ourselves the goal of sustainable and long-term economic growth. We will contribute to this goal significantly by implementing this Group guideline consistently.

The Managing Board

2 Introduction

2.1 Biodiversity through Targeted Management

In roughly 50 countries around the world, the name HeidelbergCement stands for competence and quality. The international character of the company implies a worldwide responsibility for all of our activities. HeidelbergCement has a tradition of commitment to sustainability, and builds on the three pillars: ecology, economy and social responsibility. Our sustainable management is centred around clients, employees, shareholders and local partners at all locations.
The quarries and gravel pits from which we extract our raw materials are valuable habitats for a variety of animal and plant species. The dynamic nature of quarrying attracts a wide range of rare species. After activities there have ceased, our mineral extraction sites are professionally restored and returned to a natural state, or prepared for agricultural use or forestry. Our emphasis on natural succession has consistently increased over time, benefiting the development of broad biodiversity, adjusted to the native habitat.

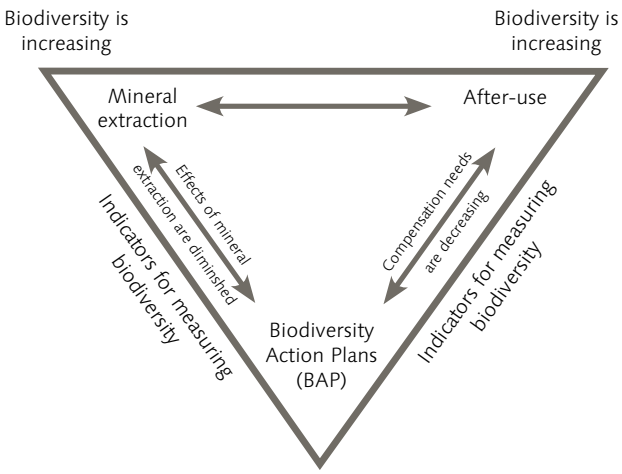
Our ambition is to strategically promote and conserve biodiversity at our mineral extraction sites worldwide. To meet this goal, HeidelbergCement is the first company in the industry to adopt a Group guideline for the promotion of biodiversity at mineral extraction sites. With immediate effect this guideline will be valid at all our locations throughout Europe. It is the basis for systematic implementation of consistent measures, as well as the realisation of our biodiversity ambitions.
The core of the guideline comprises ten principles geared towards promoting dialogue with key stakeholders, as well as increasing biological diversity during and after quarrying, in order to protect the native landscape and ecology. In addition, the guideline defines ambitious targets HeidelbergCement aims to successively achieve by 2020. It also sets out decisive principles for modern, professional restoration, which significantly contribute to the promotion of biodiversity.

2.2 Availability and Goals of this Guideline

This guideline, as well as many good practice examples as PDF-documents in the internet and intranet of HeidelbergCement, provides an all-embracing introduction to the specific new orientation of the company regarding "extraction sites and biological diversity" for employees and the public. This guideline is to be effective at our locations in Europe. Its worldwide implementation is currently being prepared.
For internal use there is an elaborate long version describing the restoration of distinct habitats.
The general advice in this guideline cannot be implemented completely in each and every extraction site. Thus it needs to be implemented using concerted action, taking mining needs as well as economic factors into account according to the specific conditions on location.

The future orientation of after-use planning is based on the following goals:

- This guideline aims at defining Group-wide global minimum standards for the restoration of mineral extraction sites, encompassing cement and aggregates as business lines.
- All forms of after-use ought to contribute to the preservation of biological diversity and to increase biodiversity where possible. Furthermore, they ought to be sustainable, long-lasting and efficiently usable for human beings.
- The global goal of after-use planning for each mineral extraction site is to reach a balance between economic, ecological and social requirements.
- In order to take into account the distinctive biological diversity features of the individual countries and continents, the guideline will successively become more detailed and will be adapted to the specific demands of various geographic areas by 2010.



3 HeidelbergCement and Biodiversity

3.1 The Impact of Mineral Extraction Sites on Biodiversity

Nature and landscapes have become increasingly exposed to a rapidly growing world population and an increasing utilisation impact over the last decades. This has lead to a considerable and ever increasing loss of animal and plant species worldwide as habitats are either chopped up or lost completely. Mineral extraction sites in particular are frequently regarded as destructive to the environment and therefore still present a predominantly negative image for the public and nature conservation organisations and authorities. Despite massive efforts of the industry to restore mineral extraction sites, the resentment remains unbroken to a large extent and poses serious problems for the provision of raw materials and future mineral extraction planning.

Scientific Data

This general disapproval is opposed by an understanding which has arisen since the end of the 1970s, namely that mineral extraction sites which have been closed down may take on important functions in the environment of intensely utilised land cultivated by man. Closed down mineral extraction sites which have not been restored by topsoil application, sowing and plantation, contribute to sustainably increase and safeguard biodiversity just through the existence of habitats significant within a habitat network system. They also stabilise the surrounding ecosystems. Closed down quarries contain high numbers of species with a high share of endangered animal and plant species. Various manifestations of habitat types appear meshed there, many of which are endangered, rare or threatened. This diversity is caused by long periods of development hardly ever influenced or disturbed by man. Thus a great variety of locations and structures have developed.

Research in the last two decades has proven convincingly, with a broad specialist foundation, that this insight also applies to operating extraction sites. They are characterised by a high number of animal and plant species, many of which are endangered (Figure 1). The findings are frequently comparable or even higher than in most habitats of the surroundings. This is due to the extreme environmental conditions in the extraction sites and their great habitat conditions. Characteristic habitats are e. g.

Biological diversity

Biological diversity – or biodiversity – is one of the keywords in nature conservation. It refers to the "abundance of life and its manifold structures" (European Commission).
The term biological diversity stands for more than the diversity of species, however. According to the Convention on Biological Diversity (CBD), biodiversity encompasses

- the diversity of species on earth (organism level),
- genetic diversity (diversity of genes within a species),
- diversity of habitats (ecosystem level).

Figure 1: Young initial vegetation at quarrying level

Figure 2: Colony of sand martins in old riverbed sediments in a steep face of an extraction site

Figure 3: The areas are colonised quickly

Figure 4: Young body of water as habitat for specialised animals and plants

rock faces (Figure 2), perennial bodies of water, temporary bodies of water as for instance in tracks and the refuse and spoil heaps (Figure 3, Figure 4).

Comparison of the factors accounting for the nature conservation significance of closed down and operating quarries:

Operating quarries
high diversity of structures and locations
rare habitat conditions at the location
very high numbers of species
number of endangered species almost always higher than that of most habitats in the surroundings
rare and endangered vegetation types, predominantly protosoil and pioneer locations

Closed down quarries
high diversity of structures and locations
rare habitat conditions at the location
high numbers of species
number of endangered species very high, partly higher than in the surroundings
rare and endangered vegetation types in various forms

Figure 5: Variegated coexistence of wanderbiotopes close to ongoing extraction

Figure 6: Near-natural rock face

Figure 7: Temporary water bodies at quarrying level

Wanderbiotopes

Extraction sites are very important for the protection of species and habitats due to the variety of sub-habitats interlocked at small-scale or the development areas for animals and plants of different ages within spatial and temporal interrelations (Figure 5). The combination of sometimes extreme contrasts in habitat conditions, which can hardly be found or not be found at all in the surrounding cultivated landscape, have developed into a great structural variety that is a prerequisite for the establishment of numerous plant and animal species (Figure 6).

The bare shallow temporary water bodies in the tracks of heavy duty lorries, which can appear within a very short time during the extraction process, are typical wanderbiotopes for amphibians such as the yellow-bellied toad (*Bombina variegata*) or the green toad (*Bufo calamita*) (Figure 7, Figure 8). The little ringed plover (*Charadrius dubius*) likes to settle on almost bare spacious stone leas, pebble leas or protosoil leas, but only during ongoing extraction and with temporary water bodies close by. Numerous cliff breeders such as the eagle owl (*Bubo bubo*) or the peregrine falcon (*Falco peregrinus*) use the quarry faces for breeding as long as there are suitable alcoves and as long as the walls do not erode too quickly due to soft rock material such as marl. Whenever the mining works move away from a freshly carved out quarry face, the birds settle fairly quickly, if the structure is suitable. They may even hatch only a few dozen metres away from ongoing extraction works.

The differences in flora are similarly obvious. Wetland habitats and topsoil or spoil dumps are specious-rich wanderbiotopes for many plant species and are settled very quickly (Figure 9, Figure 10), while dry or temporarily dry clay habitats need more

Figure 8: Temporary body of water – photographed in 1992

Figure 9: The same body of water in 2006

time until they become settled to a relevant extent due to the more extreme habitat conditions (Figure 11, Figure 12).
The extraction sites are characterised by pronounced dynamics. A comparison of old photographs to the current state proves how fast these presumably nutrient-poor protosoil locations are settled by specialised species (Figure 8, Figure 9). Modern extraction planning regards these results as an opportunity for new restoration and renaturation concepts. Dynamic processes get integrated and the after-use is adapted accordingly. Existing species populations are taken into account and habitats are optimised. The following chapters provide directions on how the various interests for the after-use can be balanced, while biodiversity is promoted at the same time.

Further Reading

Davis (1977; 1979; 1981a; b); Tränkle 1997; 2000; Böhmer & Rahmann (1997); Gilcher & Bruns 1999; Rademacher (2001); BDZ/VDZ (2001; 2003).

Wanderbiotopes

Spatial changes within the extraction areas may create areas predestined for the development of animals and plants. They are of various ages, show different structures and are closely connected to one another (succession zones). Whenever minerals are extracted once again from one of these areas, a substitute has already developed elsewhere. These habitats thus "wander", as the plants and animals wander from one end of the extraction site to the other. These succession zones which are continually renewed are called wanderbiotopes.

Figure 10: Settlement of a sedimentation basin

Figure 12: Succession areas on spoil dumps

Figure 8: Initial reeds in wetland area

Figure 11: Near-naturally settled belay

3.2 Principles for the Promotion of Biodiversity

3.2.1 Encouraging Dialogue

- HeidelbergCement promotes the increase of biodiversity in the planning and implementation of restoration through a structured approach, in dialogue with all stakeholders.
- The forms of after-use are to be discussed with environmental authorities, nature conservation organisations and other interested parties.

3.2.2 Increasing Biodiversity

- Each mineral extraction site should maximise the land area with ecological value.
- The ecological and economic value of land after-use need to be fully considered as they both can forward the promotion of biodiversity.
- The planning and implementation of subsequent after-use will be carried out by specialists.
- HeidelbergCement promotes a high degree of biodiversity even in working quarries. Areas temporarily out of use should be managed to maximise ecological benefit.
- Certain areas of each quarry should be left to develop naturally.

3.2.3 Protecting Nature and Environment

- Indigenous and regionally typical plant species will be favoured.
- It is imperative to protect the topsoil and subsoil. Soil resources need to be safeguarded, protected from erosion and to be either reused as soon as possible on restoration areas or to be stored for a transitional period to avoid damage or loss.
- Ground water and surface water must not be contaminated either during work or after-use.

3.3 Biodiversity Ambitions

3.3.1 Ambitions 2009

- This guideline will be further developed using an internal adjustment process in all points necessary and it will be made tangible on country or continental level.
- A compilation of other current or recent best practice projects of the company will be accomplished.
- Further mineral extraction sites will be included into the monitoring system for biodiversity in consideration of action plans.

3.3.2 Ambitions 2010

- The final version of this guideline will be available.
- The implementation will begin on country level, for instance through training courses and the provision of training materials.
- Integration of the guideline into the environmental management systems will be achieved.
- Further mineral extraction sites will be included in the monitoring system for biodiversity in consideration of action plans.
- The percentage of mineral extraction sites with an effective restoration plan will be increased to 85 %.

3.3.3 Ambitions 2012

- The percentage of mineral extraction sites with an effective restoration plan will be increased to 90 %.
- Further mineral extraction sites will be included in the monitoring system for biodiversity in consideration of action plans.

3.3.4 Ambitions 2020

- The percentage of mineral extraction sites with an effective restoration plan will be increased to 100 %.
- Active exploitations within or adjacent to areas designated for their high biodiversity value have actively implemented biodiversity management plans and biodiversity monitoring.

4 After-use

4.1 Foundations

The extraction of minerals always leaves hollow moulds all of kinds, be they in the shape of a funnel or a box-hole, in the form of offsetting mountainsides or expanding valleys, no matter if with or without water, steep rock faces, flat dumps or terraced with excavation beds. These artificial forms should be integrated into the landscape after the quarrying ends. They ought to be utilisable and left to natural resettlement. And so they are, already today. The resettlement of nature and landscapes is the last step of mining work. The term restoration points out the reference to the surrounding landscape – the extraction site needs to be fitted into the surrounding landscape and nature so that it will be integrated completely. Therefore, restoration requires focused landscape analysis. Then there are the varied wishes of the population for the after-use. All these actualities, wishes and demands, including taking into account the call for more biodiversity, need to be integrated in a reasonable after-use concept. The overall goal is the recreation of rare, near-natural habitats typical for the kind of excavation and ecologically significant. This encompasses establishing agricultural or forestry areas and settlement plots wherever reasonable. Fields, meadows, commercial forests and settlements will be located in the places best suitable, meaning the flat areas. Near-natural habitats will conquer the steep parts of the landscape, which are less apt for human usage. The conceptual aims and the planning of the restoration measures have to meet these demands as well as possible and with as little conflict as possible.
The priority of our conceptual aims is the maintenance and promotion of biological diversity. Depending on the specific surroundings of each extraction site, the restoration or the renaturation areas will prevail. It is on the agenda of HeidelbergCement to integrate areas within each extraction site, which contribute to biodiversity. Their share is supposed to increase gradually depending on the local conditions.

4.2 Definitions

The way we define restoration and other terms used in this context is already predetermined by the measures and ambitions we decided to put into practice. There are however considerable differences in the way different countries understand

certain terms. Because the practical usage of terms on site locally differs from the scientific terminology, we would like to explain the most important terms briefly in this chapter.

Restoration
Restoration means reestablishing the original ecosystem, the habitat or their functions in the undisturbed way in which they originally existed, including biological, chemical and physical elements.

Reclamation
Reclamation is the reconditioning for agricultural ends or the reestablishing of the natural scenery.
In most cases, the original soil as well as the original vegetation do not exist any more, but have to be reconditioned through soil application, fertilisation and sowing.
The term recultivation is predominantly used in Europe and mostly in connection with extraction sites.

Recreation
Recreation implies that it is not necessary to re-establish the exact same ecosystem as existed before the extraction work. It means that it is enough to create an ecological system of any kind. It is important however, that this ecosystem is ecologically significant.

Renaturation
Renaturation means the resettlement of man-made locations as, for instance, extraction sites (or of ecosystems influenced by men) through plants and animals. This leads to habitats autochthonous for the location and its climate. Renaturation is closely connected to reaching a high level of biological diversity.
Three forms can be distinguished on the basis of the intensity of human influence:

- Renaturation goes on without initiation or human regulation. We call this independent process natural succession.
- Renaturation is initiated by strategic planning and practical measures, which accelerate the process at least in the beginning. This process can be categorised as natural succession as well.
- The course of renaturation is systematically changed and controlled through planning, planting and subsequent maintenance. Controlled renaturation is very similar to restoration.

Succession

In ecology, succession denotes the chronology of plant and animal communities at one location in the progress of time. During a succession process, an ecosystem goes through a climax from an initial state containing only few species up to a nearly stable final species-rich stage. The areas change quickly in a kaleidoscopic way.
Free succession is the settlement of areas without any human supporting measures.
Controlled succession means that human support only takes place in the beginning in order to accelerate the first settlements by introducing initial species.

Rehabilitation, Reintroduction, Reestablishing and Habitat Improvement

The following terms differ inherently in their quality, but have distinct intersections in common. They all aim at improving a habitat type. The first three terms are aspects of restoration.

Rehabilitation: Rehabilitation is the restoration or improvement of certain aspects or functions of an ecosystem or habitat. It does not necessarily imply the complete restoration of an ecosystem or habitat.

Reintroduction: Reintroduction implies that only small parts of an ecosystem are substituted and not the whole ecosystem. Certain species are introduced into an existing, established, i.e. functioning ecosystem.

Reestablishing: Reestablishing comprises only the targeted reintroduction of plants and animals, for instance through sowing or planting or through catching and releasing in order to increase biological diversity.

Habitat Improvement: The improvement of habitat factors such as hydrological, physical or chemical conditions for instance by targeted fertilisation can enhance the quality of a habitat.

Further Reading

Bradshaw (1977); Cairns & Cairns Jr. (1995); Gore (1985); Kangas (2004); Kauffman et al. (1997); National Research Council (1992); Pfadenhauer & Maas (1991); Pfadenhauer (1990); Rana (1998); Roni et al. (2005); Tränkle et al. (1992).

Autochthonous species

Domestic species have or used to have a natural range extending partly over a whole nation. Species which were introduced by man and returned to the wild do not belong in this category.

We speak of indigenous or autochthonous species if they form genetically adapted tribes in one bio-geographic region. Such species are well-adapted to the regional environmental conditions.

We speak of autochthonous species if they have settled at a certain location due only to ecological principles – uninfluenced by man. In most cases the term autochthonous is used as a synonym of the term indigenous.

4.3 Best Practice for Project and Restoration Planning

The operation and extension of extraction sites inevitably leads to using up landscape areas. The emissions and immissions resulting from quarrying affect nature and the environment. Therefore, HeidelbergCement aims at following good professional practice all around the world for all processes, be they planning, quarrying or restoring. It is essential at planning stages to always check environmental compatibility. Employing a framework concept for after-use (UVU, EIA) is a minimal requirement.
Good professional practice needs to contain the following four essential steps:

- Detailed project planning in the run-up; all relevant natural and environmental factors need to be regarded including human beings.
- Analysing and examining the environmental compatibility; the impact on the environment needs to be avoided or minimised at best.
- The extraction phase.
- Restoration concentrating on a high level of biological diversity in all areas exploited.

The last point, the actual restoration of habitat types, contains the following basic steps:

- Choice of location.
- Developing a framework restoration plan under regional sustainability aspects (text and map).
- Developing a detailed restoration plan (text and map).
- Providing adequate habitat conditions.
- Maintenance.
- Monitoring.

It is essential to keep the public adequately informed during the whole process.
In numerous countries there are already legal regulations regarding restoration, but only some provide additional guidelines or directives on how to handle the whole planning process. Thus we list the most important documents to be consulted here:

- COP 6 Decisions, The Hague, 7 - 19 April 2002: Decision IV/7: Identification, monitoring, indicators and assessments
- IAIA Headquarter (1998): Environmental Methods Review: Retooling Impact Assessment for the New Century. Edited by Alan L. Porter and John J. Fittipaldi. Fargo, North Dakota, USA: The Press Club. March 1998. 309p.
- Council Directive (27 June 1985) on the assessment of the effects of certain public and private projects on the environment (85/337/EEC). The Council of the European Communities (as ammended from time to time).
- Vanclay, F.; Bronstein, D. A. (1995): Environmental and Social Impact Assessment. John Wiley and Sons Ltd. Hrsg.: Vanclay, F.; Bronstein, D. A. ISBN-10: 047195764X, ISBN-13: 978-0471957645. 352p.
- World Business Council for Sustainable Development (WBCSD) (2005): Environmental and social impact assessment (ESIA) guidelines. Land and communities. Version 1.0. April 2005. wbcsd@earthprint.com. 52p.

5 Management Measures in Operating Extraction Sites

Many extraction sites possess species-rich communities with numerous rare plants and animals without anyone's help even during the ongoing quarrying. The biodiversity is considerable. It is possible, however, to further enhance and preserve biological diversity by comparatively simple measures without disturbing the mining activity. In this way HeidelbergCement's ambitions for sustainability are supported throughout the Group.
The following general advice cannot be implemented completely in each and every extraction site. Thus it needs to be implemented using concerted action, taking mining needs as well as economic factors into account according to the specific conditions on location.

Alternating Operation of Extraction Sites
An alternating operation of the extraction work is especially favourable for biodiversity. It will generally only be realistic in bigger extraction sites. It means that the extraction should alternate in location – not everywhere at the same time, unless geological factors prevent this or the storing of the raw materials is problematic. In an alternating exploitation site, wanderbiotopes can develop (long-term pacified areas) with their highly specialised habitats and numerous rare plant and animal species.
If habitats with endangered species have developed within an extraction site and these areas are needed for further extraction, they may be relocated.

Temporary Establishment of Habitats
Autochthonous species can be sown or the development concept "distribution of freshly cut grass" can be implemented on parts of areas not used for a longer period of time. The establishment of a temporary habitat will result in the immigration of parts of the species into the succession areas of the quarry. This will enhance the biological diversity in the whole extraction site. Only autochthonous seed from specialised commercial plant centres ought to be used for sowing, however.

Establishment of Rest Zones
Areas, which are presumably not operated any longer, should be outsourced at an early point of time. This means that these areas neither get passed over nor used as storage areas or rack. In these rest zones the first species immigrate, which can settle the other areas after the complete closure of the

quarry. It is advisory to mark shallow dry areas or areas with temporary waters as rest zones. Rocks and steep faces may even be excluded from quarrying for a while. The separation of such rest zones from areas still active is achieved by ramparts made of spoil, by large rocks or linearly stapled wood clippings. This allows specialised habitat communities to develop slowly.

Selective Promotion of Species

The more cavities and holes in the plant buildings where birds can slip in, the more animal species can benefit. Animals such as bats or birds, and with some exceptions also reptiles and insects, should always be tolerated unless they provide any kind of danger for the staff. Special nesting aids on buildings, rock faces or in woods may lure in designated species.

Soil Management

Advice on soil management before, during and after quarrying is provided in section 4.4.

After-use Planning

Inflexible prescription and implementation of after-use planning needs to be replaced by a more flexible handling of after-use concepts. This makes it possible to take spontaneous development of biological diversity into account on site after the cessation of quarrying and when it comes to reclamation.

Further Reading

BDZ/VDZ (2002); Davis (ed.) (1981); Tränkle & Beisswenger (1999).

6 Indicators for Measuring and Controlling Biodiversity

6.1 Biodiversity – A Core Topic for HeidelbergCement

Conservation, promotion and reconstitution of biodiversity has become the most important goal of sustainable development world-wide. This was emphasised by the results of the UN World Summit on Sustainable Development in Johannesburg in August/September 2002. By 2010 the extinction of species is to be significantly slowed down as well as the diversity of fauna and flora to be retained.

What is Biodiversity?

Biodiversity is the abundance of life and the factors that account for it.

Biodiversity encompasses for instance:

- The number of plants and animals per area, per ecosystem, per habitat, per vegetation unit, per biocoenosis, per phytocoenosis, per zoocoenosis.
- The number of vegetation units and types, of habitat types, of phytocoenosis and zoocoenosis per spatial unit.
- The genetic diversity: the number of eco-breeds and eco-clines and the number of morpho-breeds.
- The number and length of structural elements and units (stepping-stone habitats) per spatial unit (this was the basis for the development of the habitat network concept).
- The number and the amount of eco-tone effects.

HeidelbergCement Makes Biodiversity Measurable

Numerous studies within the last two decades have shown that not only extraction sites which have closed down but also those which are still operating and show a high degree of biodiversity. Extraction sites are thus centres of biodiversity despite the undisputable negative effects on nature and environment. Therefore extraction sites have to be preserved while they are still operating, as well as in the after-use period in the sense of global efforts.

So-called indicators, especially biodiversity indicators are the appropriate instruments to make the development in the extraction sites qualitatively and quantitatively measurable, rateable and controllable with regard to sustainability.

Sustainable Development Indicators (SDI) for measuring biodiversity are also called Biodiversity Indicators (BI).

The term" indicator" derives from the Latin verb "indicare" which can be translated as "to show" or "to betray". The call for implementing sustainability indicators is based on chapter 40 of "Agenda 21" (UNCED, Rio de Janeiro 1992).

Further Reading

CBD (Convention on Biological Diversity); Malahide Conference 2004; SEBI 2010 (Streamlining European 2010 Biodiversity Indicators); World Summit on Sustainable Development 2002.

6.2 Indicator Systems

There are three indicator systems available at present. They shall be presented briefly in the following passage. HeidelbergCement strives for the implementation of its own indicators.

6.2.1 HeidelbergCement Indicators

HeidelbergCement AG was involved in the development of biodiversity indicators especially adapted for operating extraction sites and their after-use within the framework of a long-term research and development project. 56 biodiversity indicators were generated in this project. 10 indicators were finally chosen from this choice (cf. Tab. 1).
Three of these indicators deal with the issue of habitats in extraction sites, one indicator with "habitats" in general, one with "after-use" and one with "wanderbiotopes". The diversity of species is recorded by seven indicators, four of which belong to the sub-category "numbers of species" and three to the subcategory "ecologically significant species".
The project results can be looked up on the company homepage, where they are available in a long and a short text version.

Tab. 1: List of HeidelbergCement's own indicators for the representation of successful reconstruction measures and for the measuring of biodiversity

Indicator	Computation
Set of indicators "habitats"	
Subcategory habitats	
Habitats	Number of habitats per extraction site / area of the extraction site (ha)
Subcategory after-use	
After-use	Area of the extraction site with after-use nature conservation (ha) / area of the extraction site (ha) - area of the extraction site with after-use cultivated landscape (ha) / area of the extraction site (ha)
Subcategory wanderbiotopes	
Wanderbiotopes	Area of the wanderbiotopes in an extraction site (ha) / area of the extraction site (ha)
Set of indicators "number of species"	
Subcategory number of species	
Number of species plants A	Number of plant species in the extraction site / area of the extraction site (ha)
Number of species plants B	Number of plant species in the extraction site / number of plant species in the surroundings
Number of species animals A	Number of selected animal groups in the extraction site / area of the extraction site (ha)
Number of species animals B	Number of selected animal groups in the extraction site / number of selected animal groups in the surroundings
Subcategory ecologically significant species	
Endangered species A	Number of species in a given taxocoenosis based list of species / total number of species on the same given taxocoenosis based list of species
Endangered species B	Number of endangered species in an extraction site / number of endangered species in the surroundings
Species of the Species Action Plans	Occurrence and/or number of individuals of the species of the Species Action Plans

6.2.2 Global Reporting Initiative

From the 4th - 6th October 2006 the International Conference of the Global Reporting Initiative (GRI) was held in Amsterdam, in which globally applicable quality indicators for the reporting on sustainability were developed involving a broad selection of stakeholders.

- Among the numerous GRI-indicators there are 30 so-called ecological performance indicators altogether, of which only five (EN 11 to EN 15) deal with biodiversity.
- These indicators are, however, hardly suitable for the representation of successful restoration measures and for the measuring and control of biodiversity in operating extraction sites.

6.2.3 Cement Sustainability Initiative

The Cement Sustainability Initiative (CSI) is a consortium of cement companies. This consortium has set itself the target of combining the challenges of sustainable development and of developing an agenda on sustainability.

So-called key performance indicators (KPIs) were developed for five different fields within the framework of the CSI. In the sub-field local impacts on land and communities, there are currently only two indicators acknowledged by the members of the Initiative:

- KPI 1: Number of active quarries within, containing or adjacent to areas designated for their high biodiversity value, as defined by GRI 1.
- KPI 2: Percentage of sites with high biodiversity value (according to KPI 1) where biodiversity management plans are actively implemented.

The second indicator is apt to represent the activities in the context of reconstruction measures. These indicators are, however, not suitable for measuring or controlling biodiversity in operating extraction sites. We therefore apply our own indicators.

Further Reading

GRI (2000-2006); Tränkle et al. (2008); WBCSD (2005a; b).

7 Stakeholder Dialogue

Quarries and gravel pits are part of modern cultivated landscape and can be further utilised by man. The restoration and renaturation objectives should therefore be developed using dialogue with municipalities, local authorities and lobbies. An open dialogue with all persons concerned is necessary and recommended. This is the only way HeidelbergCement can be a vital part of society.

- Supporting the culture of open dialogue on all levels by hosting events and delivering presentations regularly is mandatory. Furthermore, offering guided tours through the extraction sites can be prudent. HeidelbergCement also participates actively in environmental education through lectures and publications.
- As members of a forward-looking concern, numerous plants within HeidelbergCement have already established close cooperation between industry and schools. Quarries and gravel pits are to be promoted as open classrooms. In order to allow interested persons insights into our extraction works, it is crucial to develop nature trails and films on nature conservation, mineral extraction and its history and make them available to a large audience.
- More and more extraction sites show interested citizens on presentation boards and viewing platforms how the workplace and the habitat quarry and gravel pit function. A quarry nature trail has been established in the Nussloch quarry near the German city of Heidelberg. In cooperation with specialised and qualified rangers of a Geopark, we offer regular guided tours there.
- HeidelbergCement intends its commitment to provide an active contribution to sustainable extraction of raw materials and it will thus also promote projects of this kind in the future.

8 Bibliography

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9 Glossary

abiotic factors	All physical and chemical influences in the inanimate environment such as climate, soil, relief.
all-year grazing	A grazing method: the cattle stays on the same pasture throughout the whole grazing period.
amphibians	Collective name for frogs, toads, newts and so on.
autochthonous	Indigenous, i.e. originating from the same area or habitat.
belay	Plane or slightly inclined upside of rock.
biocoenosis	Community of organisms of various species (animals, plants, fungi, etc.) within a definable → habitat.
biodiversity	Encompasses the diversity of species, the genetic diversity and the diversity of ecosystems.
Biodiversity Action Plan	The Biodiversity Action Plan is an internationally acknowledged instrument for the protection, promotion and development of species and habitats.
bioturbation	Relocation of soil layers by small-size organisms such as earthworms, gophers etc.
browsing	Food intake of wild animals such as deer, fallow deer etc.
bush fruit	Shrubs and trees of various genera producing edible berries, fruit, nuts or leaves.
cold air current	Cold air directed towards the valley or down a slope, streaming close to the ground; it forms especially at night in light wind situations and predominantly under high pressure weather conditions.
depth zoning	Characteristic layering of deep lakes with free water body, called Pelagial and bottom zone called Benthal. The bottom zone encompasses the shore (called Littoral) and the lightless area at the very bottom of the lake, called Profundal.
diaspore	Distributional units of plants such as seed, spores, fruit, tubers, bulbs etc.
diversity	Variety of biotic systems; diversity in species, in structure, in function may be distinguished in spatial and temporal coordinates.
domestic	Species which occur naturally only or, to a certain extent, in one state or at least used to do so.
drainage	The subterranean removal of water through tubes or hoses with holes in order to make agricultural land workable.
eco-race, eco-type	Different ecological conditions result in different populations of one species within a larger location, having genetically adapted to a certain environmental influence (e. g. heavy metal).
ecosystem	Network of organisms interacting with each other and their → habitat.
eco-tone	Transitional zone between different → habitats or landscapes.
edges	Linear plant stands connecting open lands and woody plant stands.
erosion	Abrasion of the earth's surface caused by water or wind.

exposition	Position of a location with regard to the direction; relevant for the energy balance, the climate balance and the water balance of an area.
fallow	An area which is temporarily, or for a longer period, not cultivated.
fauna	Entirety of all animal species of an area.
flood plain	Area along flowing water bodies characterised by alternating flooding and low water.
flora	Entirety of all plant species of an area.
grain size	Size of solid particles in → sediments.
grassland	Type of landscape and vegetation with a more or less closed cover of grasses and herbs; shrubs and trees are missing completely or are at least very rare.
green manuring	Supply with nutrients and organic material in soil by planting and ploughing in cultivated plants.
grove	Small wood dominated by tree species in between agricultural areas.
habitat	Place where an individual or a population lives.
habitat network	A network of → habitats and functional, ecological interrelations in a landscape in order to ensure the survival of species and → biocoenosis.
hedge	A kind of upright young wood (uniserial or pluiserial). The shrubs or bushes stand closely and densely together and are branchy.
indicator	An indicator shows the change or the achievement of a state, for instance indicators for measuring → biodiversity.
initial levelling work	Preparing the shaping of the → morphology of an area.
invertebrates	All animals without a spinal column such as insects, molluscs and worms.
loess	A kind of unconsolidated rock, made up of fine materials, originating in the ice-age, when it was transported and sedimented by the wind.
marge	Little used, linear edge or borderline in field areas, often with steps in the terrain
meadow	→ Grassland, mown as farmland (→ mowing/swath).
monoculture	An agricultural area that may also be used as a commercial forest on which only species of crop plants is cultivated for instance a heat or rice field, a spruce forest, a eucalyptus plantation.
moor	A wetland habitat, in which decomposition of plant remnants functions incompletely because of a constant surplus of water, leading to an accumulation of carbon-rich decomposition products (peat).
morphology	Description of the surface forms of an area.
mowing	Cuttings of meadows used as fodder or litter or bedding.
natural forest	Forest areas that are not utilised any longer but left to a natural development uninfluenced by man.

pasture	→ Grassland used as farmland for the grazing of domestic animals (→ all-year grazing → rotational grazing).
phytocoenosis	Symbiotic community of plants within a defined area (→ habitat).
pioneer forest	Succession stages in the reforestation of a location characterised by more or less short-lived woody plants needing a lot of light. Pioneer forests are substituted by and by as a consequence of → succession by species of the overmature forest.
plant community	Number of plant species occuring in a large area in similar composition (e.g. beech forests, semi-arid grassland).
pollard trees	Pollard trees possess a thick trunk branching out into lots of twigs so as to from a dense head of foliage. This typical form is a result of cutting back the tree to the trunk over many generations. The branches of poplars, ash trees or hornbeam were used to feed cattle earlier on, willows were used to make baskets and the like.
population	Entirety of all individuals of one species within a certain habitat.
primeval forest	Forests which have undergone no or only little interference by humans, having developed according to the → abiotic conditions.
protosoil	Protosoil is an initial stage of soil development with a small degree of humus and a high degree of not weathered original material.
reeds	→ Plant communities in shallow waters at river banks or lake shores, consisting of tall perennial grasses with hollow slender stems especially of the genera *Arundo*, *Typha* and *Phragmites.*
regenerative energies	Energy types such as wind energy, water power, solar power, biomass energy.
reproduction	Synonymous term for progeny of organisms.
reptiles	Collective name for such species as turtles, snakes, lizards etc.
rotational grazing	A grazing method: the pasture is divided up in parts, which are grazed in a regular rhythm with intermediate rest-periods for the unused parts.
sealing	Cover of the soil during construction works of streets, paths and building with asphalt (tarmac), concrete, pavement stones etc.
sedge	Plant which frequently occurs in wet habitats such as → swamps and → moors of the genus *Carex.*
sediment	Accumulation of materials in layers: we distinguish clastic s. (material such as sand and clay removed and transported by → erosion), chemical s. (material such as calcium carbonate, deposited by chemical processes in the water) and biogene s. (deposits of organic remnants such as corals).
shrubbery	Plane, irregular copses formed by shrubs in agricultural landscapes.
stepping-stone habitat	Insular habitats functioning as intermediate stages in the spreading of species (→ habitat network).

stoneworts	Characeae, small group of about 200 species of green alga, frequently embed calcium carbonate, predominantly in sweet water.
stratification	The treatment of seed e. g. by deep temperatures to promote or even enable germination.
subsoil	Lower layer of the soil, predominantly poor of humus; part of the ground between → topsoil and parent material.
succession	The change of plant and animal communities in the course of time in one location. → free succession is the uncontrolled development of nature at a location.
swamp	A wetland habitat with periodically very wet soil, which contains no peat contrary to → moors (e. g. because of the young age, due to droughts or oxygen-rich springwater).
tall forb vegetation	→ Plant communities on wet, nutrient-high soil, formed by high growing, perennial herbal plant species.
temporary waters	Water bodies which dry up completely for certain periods of time; opposite: perennial waters holding water all year round.
topsoil	Upper part of the soil containing a characteristic percentage of humus and microorganisms and thus darker than the → subsoil.
vegetation	Entirety of plant communities in an area.
vertebrates	All animals with a spinal column such as mammals, birds, amphibians, reptiles.
wanderbiotopes	Constantly new emerging succession zones in operating extraction sites due to the spatial and temporal change of quarrying sections.
water capacity	Maximum amount of water soil can hold if the water can run through freely.
wet meadow	A type of meadow in wetlands (→ swamps and → moors), grown with grasses, juncales, sedges and other herb-species, free of woody plants.
zoocoenosis	Symbiotic community of animals within a defined → habitat.

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