



Creating Opportunities – Shaping the Future

Geo-Expertise in Technical Cooperation





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« Planet Earth forms
the basis for all our lives –
its resources are limited. »

PREFACE



Without water, no life; without soil, no food; without resources, no technology. Georesources are the foundation for our existence and of global development.

The sustainable use of georesources is not only the principal focus of the Federal Institute for Geosciences and Natural Resources (BGR). It is also the guiding principle for the work that the BGR carries out globally within the scope of technical cooperation (TC) projects commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ).

BGR deploys its internationally acknowledged geoscientific competencies to achieve the objectives of the federal government's development policies. Jointly with our partners, we work to overcome barriers to development; and as practical geoscientists we are used to overcoming serious problems.

Through our work in technical cooperation projects, we contribute to improving the livelihoods of the people in our partner countries.

The quality of our advice and the information that we provide is based on our scientific expertise and the results of geoscientific research and development. This encompasses the full range of applied geosciences.

We share our experience and knowledge with our project partners. In doing so, we especially value professional cooperation. Our mutual objective is to promote development processes, thereby laying the foundations for our partner countries to improve their living conditions by their own efforts over the medium to long term.

On the following pages we present our core areas of expertise and describe the goals and motivation behind our work. We are globally engaged and intend to expand technical cooperation in the geosciences.

Prof. Dr. Ralph Watzel

*President of the Federal Institute for
Geosciences and Natural Resources (BGR)*



AT A GLANCE

BGR in Technical Cooperation

- We implement technical cooperation projects commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ).
- We provide the geoscientific expertise for German development cooperation. Our focus lies in the fields of groundwater, soil, mineral and energy resources, mining consultancy, georisk and environmental geology.
- In addition to bilateral and regional projects, we also offer policy advice in a variety of geo-themed sectors.
- Since 1958 we have contributed to sustainable development by implementing more than 500 technical cooperation projects in over 130 countries.

Table of Contents

Georesources for Sustainable Development	6
GROUNDWATER	
Treasure from the Depths	14
Project example: Clean water for Zambia	18
MINERAL AND ENERGY RESOURCES/MINING CONSULTANCY	
A Chance for Development	20
Project example: Certified natural resources from the African Great Lakes Region	24
NATURAL DISASTER MANAGEMENT/GEORISKS	
The Struggle against Forces of Nature	28
Project example: Living more safely with forces of nature in Indonesia	32
ENVIRONMENTAL GEOLOGY	
Geosciences as a Foundation for Protecting Communities and the Environment	34
Project example: Environmentally friendly spatial planning in Paraguay	38



Georesources for Sustainable Development

The Federal Institute for Geosciences and Natural Resources (BGR) has been engaged in technical cooperation (TC) projects around the world for more than five decades. We are currently involved in around 50 bilateral, regional and sectoral TC projects in developing countries on direct behalf of the Federal Ministry for Economic Cooperation and Development (BMZ). These include projects in georesource management, covering the topics water, soil, mineral resources and energy resources. Other projects focus on mining, environmental geology and georisks.

We have set ourselves the target of supporting good governance through our TC projects. Responsibility and self-reliance in the developing countries are also promoted. In the framework of our technical expertise we support the federal government in achieving its development, stability and foreign trade policy objectives.

We are committed to the international development targets. In accordance with the United Nations' 2030 Agenda, we pursue the goal to globally secure sustainable development.



Technical Cooperation – what is it?

The joint efforts of industrial and developing countries to provide long-term, independent living for the world's population, free of material poverty, is referred to as development cooperation (DC).

Technical cooperation (TC) is one component of development cooperation. Its task is to enhance the capabilities of communities, organisations and societies in our partner countries (capacity development).

The aim of this cooperation is to enable our partners to improve living standards under their own power and to set and meet their own targets. The efficient and sustainable use of resources plays an important role in this aim.

TC is free of charge and is primarily provided by consulting services and payment in kind.

The Federal Ministry for Economic Cooperation and Development (BMZ) assigns its implementation organisations, among others government agencies such as the Federal Institute for Geosciences and Natural Resources (BGR), with TC tasks.



Securing and Improving Living Conditions in Partner Countries



Impact

For example, organisational development, awareness raising, responsible use of natural resources



Decision level

For example, policy advice, cooperation with decision makers, decision support



Evaluations and recommendations

For example, water management plans, resource management papers, georisk maps



Application of geoscientific methods

For example, groundwater modelling, identifying resource potentials, assessing earthquake risks



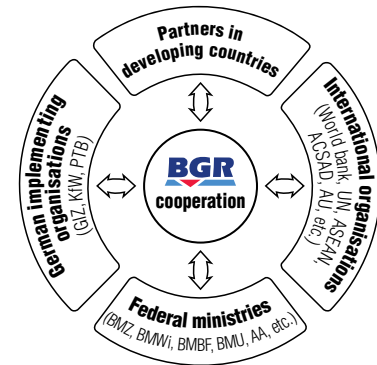
Geoscientific expertise through research and development



Geosciences

BGR's Technical Cooperation

« Globally, georesources such as soil, water and other natural resources represent the elementary foundation for the survival of current and future generations. »



In many countries around the world poor management of important georesources leads to multi-faceted social and ecological problems. Resources such as water and soil are overexploited and often cannot be accessed by the poor. The societies in our partner countries expect answers from government institutions on how to solve these problems. Many of these difficulties will probably be exacerbated in future.

Some of the questions posed may include:

How can clean drinking water be provided in sufficient quantities? How can mineral resources be produced in an ecologically friendly, economical and socially acceptable way? How can regions susceptible to natural disasters be protected from the consequences of these disasters?

To find answers to these questions we provide our partner countries with competent advice based on the most recent geoscientific knowledge available.



In the early period of Technical Cooperation, BGR concentrated purely on applying geoscientific methods. Today, we also apply our expertise on other levels, extending much further. This grants our partners far greater independence and self-reliance. For example, BGR introduces its evaluations and recommendations to the decision making level and advises policy makers. This ensures that project results acquired on the basis of geoscientific knowledge are actually utilised to sustainably improve living standards in our partner countries.

We support our partners by scientifically evaluating existing georesources, for example. Targeted training and CPD measures are also an element of our work.

We strengthen government decision making structures and promote society participation in regional development decisions. In our partner countries our projects provide important contributions in the fight against poverty and to economical development.

Environmental and resource conservation, and sustainable resource management are also promoted. BGR contributes in this way to conflict prevention and to the development of environmentally friendly and socially just societies with a sense of responsibility for their natural resources.

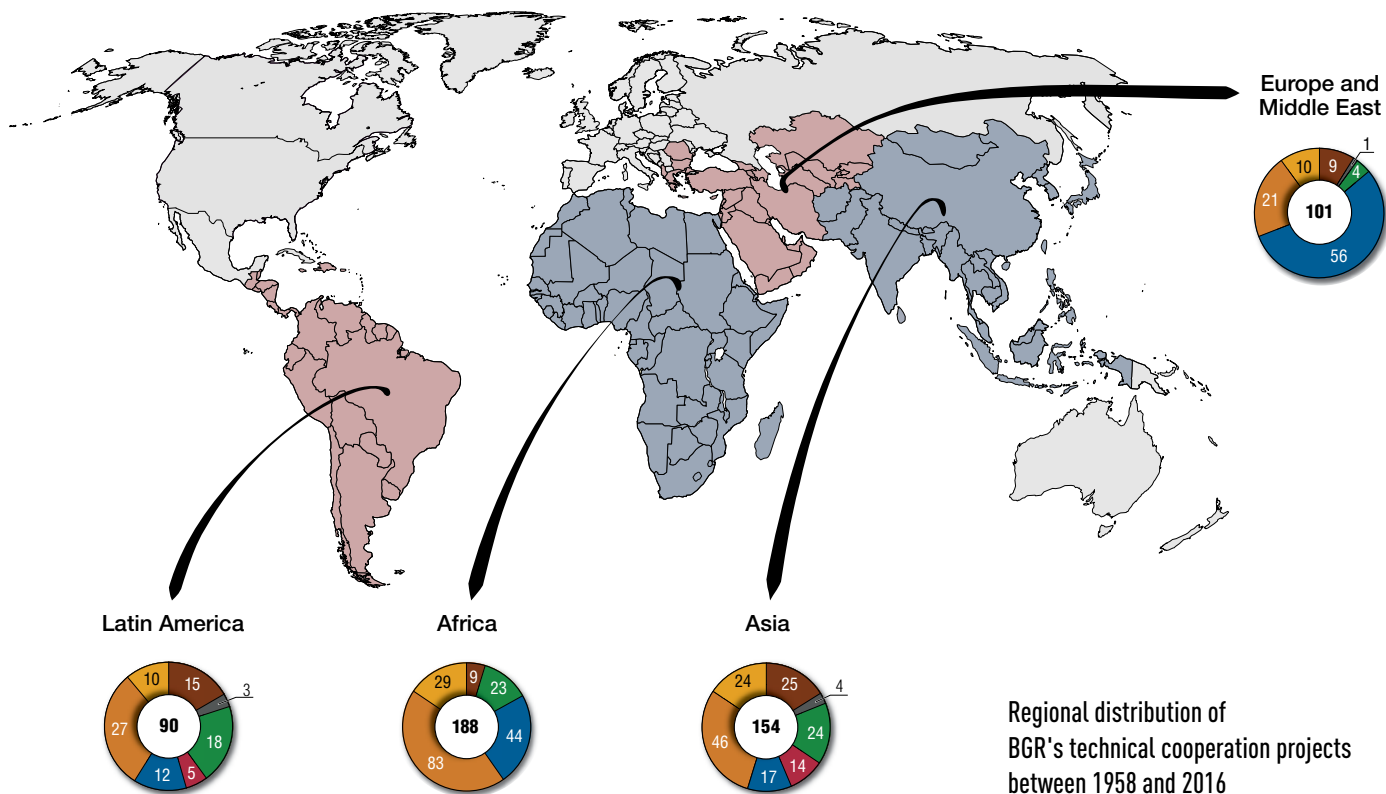
Our work supports our partner countries in protecting the basis for life for current and future generations.

The Focuses of BGR's Technical Cooperation over the course of time

Since 1958, BGR has been active in technical co-operation in the geosector.

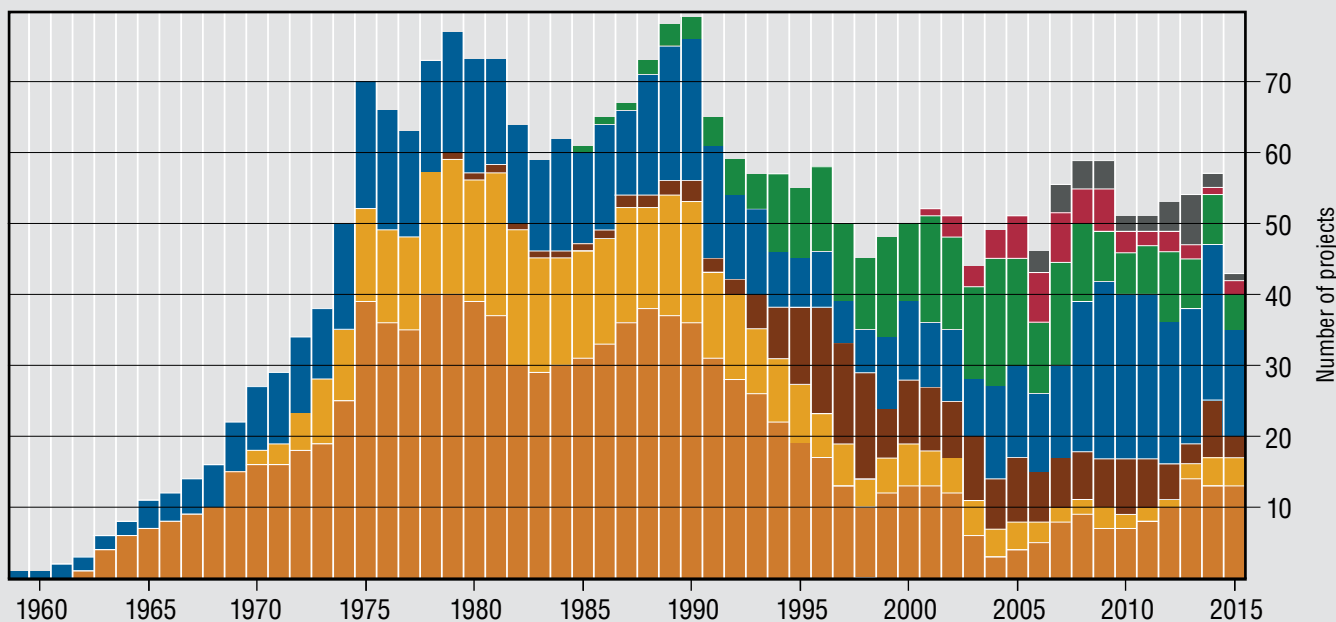
Our focus, both thematically and regionally, has changed numerous times in the past. These changes have taken into account the global challenges of the time and especially aligned them with the goals of national development cooperation.

- Mineral resources
- Energy resources
- Mining consultancy
- Groundwater
- Environmental geology/ spatial planning
- Georisiks
- Miscellaneous



Regional distribution of BGR's technical cooperation projects between 1958 and 2016

Annual breakdown of BGR's technical cooperation projects by sector between 1958 to 2016



Germany's Economic Miracle

Assessment of mineral resources in partner countries to sustain Germany's resource security

Environmental Policy

Promotion of environmental geology and spatial planning measures

IPCC Reports

Accounting for climate change

High Natural Resource Demand from Emerging Markets

Natural resources as a development factor

Oil Crisis

Increased activity in the energy resources sector

UN Decade of Water

Focus on groundwater management

UN International Decade for Natural Disaster Reduction

Adding the topic of georisk management



The scientific focus of BGR's Technical Cooperation





Treasure from the Depths



Groundwater is probably not the first thing that comes to mind when the term "natural resources" is mentioned. Yet, water stored underground is the most widespread and the most exploited natural resource.

Groundwater is the most important source of drinking water for the local population in many dry regions. However, as a result of climate change, many regions must face new challenges, for example the consequences of more frequent drought periods or flood events. The sustainable management of this resource is therefore of increasing importance.

Groundwater lowering is a major problem in many densely populated regions. Especially in dry regions groundwater is generally not a renewable resource. However, it is still often heavily exploited. Because many countries do not have functioning sanitary facilities and lack a regulated wastewater disposal system, aquifers are often contaminated by infiltrating wastewater. Therefore, many communities have no access to clean drinking water. The use of contaminated groundwater is especially widespread in the poor settlements and slums. As a consequence, massive health problems, for example, cholera epidemics, are commonplace.



In order for BGR's partner countries to sustainably manage their groundwater resources, they must know the structure of the subsurface as precisely as possible. They must be aware of the quality of their groundwater, the quantity available, and whether it is renewable in the long term. We, therefore, support and train our partners using our hydrogeological expertise.

We focus on the following tasks:

- hydrogeological investigations and evaluations;
- groundwater quality and quantity monitoring;
- compiling hydrologic balances;
- formulating and implementing guidelines for groundwater protection;
- science-based policy advice at the national level (water ministries or geological surveys) and internationally at a regional level (river basin commissions), including advice on climate-change adaptation.



On this basis and in cooperation with local communities and decision makers we develop utilisation concepts and water management planning instruments. These concepts also take ecological and socio-economic conditions into consideration.

Together, we introduce groundwater related topics into our partner countries' development strategies. We sensitise decision makers and local agencies for hydrogeological interactions. We support them in formulating and implementing guidelines, and we work towards an effective, integrated water resources management (IWRM) that incorporates groundwater.

Sustainable groundwater management that is promoted in this way can solve several problems at once. It provides access to clean drinking water to many communities. It provides sufficient water for suitable agriculture and industry, and contributes to the prevention of water-related conflicts.



Project example



Clean water for Zambia

In terms of water, Zambia is regarded as the most water-rich country in southern Africa. And yet many communities still have no access to clean drinking water. Up to two thirds of Zambia's potable water is derived from groundwater. Because sanitary facilities are practically non-existent, large parts of the country's groundwater are prone to contamination. Rapid population growth, agricultural development, commerce, industry and tourism all contribute further to diminishing groundwater reserves. The future of this valuable resource is now threatened.

In the past, Zambia's groundwater resources have not been sufficiently researched and were barely protected.

BGR cooperates with the Ministry of Energy and Water Development to collect data on groundwater reserves in the South of Zambia and in the vicinity of the capital Lusaka. The compiled data is fed into a groundwater information and management system developed by BGR in cooperation with their local partner.



Using this information base, local agencies themselves can estimate how much groundwater is available to supply potable water, and assess its quality. Through our partners, we have trained and developed Zambian personnel to perform these tasks. They are also aware of hydrogeological and geophysical groundwater investigation methods, and have been introduced to GIS and database applications. This allows our partners to independently expand their database and keep it updated.

The project is accompanied by joint public relations work. At a variety of institutional levels and among the population at large, awareness is enhanced

about the risk of water contamination through certain forms of land use and unadjusted practices of water use.

In addition to important tools such as the groundwater information and management system, the enhanced awareness of critical interactions also means that the correct decisions for groundwater and surface water protection are made.

The project contributes to sustainable land use planning by identifying such zones with a high vulnerability of the groundwater resources. Together with our Zambian partners, we provide a foundation for keeping groundwater clean in the future and making it available to the population in sufficient quantities and in good quality.



A Chance for Development

Mineral and energy resources are essential for the satisfaction of basic human needs. They are important for building construction, as well as numerous other products of daily life – ranging from toothpaste and fertilisers to a wide variety of recent technological developments.

The global demand for mineral and energy resources has increased constantly over the last decades driven by economic and population growth. At the same time mineral and energy resources constitute crucial exports. They represent a vital economic factor in around 50 developing countries.

However, their use is often fraught with challenges: In many countries corruption and mismanagement lead to a situation where only a small percentage of the population benefits from the abundance of natural resources. In the worst case, revenue derived from mineral and energy resources is used to fund armed conflicts.

Moreover, resource production is always associated with environmental impacts. Last but not least, many countries depend on natural resource exports and are, therefore, strongly exposed to the consequences of fluctuating world market prices.



BGR provides support and training to the responsible partner organisations. Applying our expertise, we assist selected resource-rich developing countries in their efforts to improve the administration of the mining sector.

Our focus:

- establishment and advising of public institutions in the mining sector (mining ministries, geological surveys, mining inspectorates) and assistance in the development of appropriate legislation aligned with international standards;
- consultancy on the implementation of occupational health and safety standards, as well as on the application of sustainability principles in mining;
- consultancy on certifying resource supply chains and formalising small-scale mining;
- economic evaluation of resource deposits and development potentials;
- geological mapping.

Due to the increase in global resource demand, resource management based on the principles of sustainability offers enormous economic growth potential to countries rich in natural resources. Chile, Botswana and Indonesia provide good examples.



However, sustainable development depends on the responsible management of mineral and energy resources. This, in turn, requires transparent mechanisms to award concessions, responsible management of natural resource revenues, appropriate public participation and subsequent recultivation of mining areas.

Positive developments in the natural resources sector can also lead to improvements in the national infrastructure, increased employment and the creation of additional economic sectors. In combination, these factors can result in an improvement of people's standard of living in our partner countries.



Project example

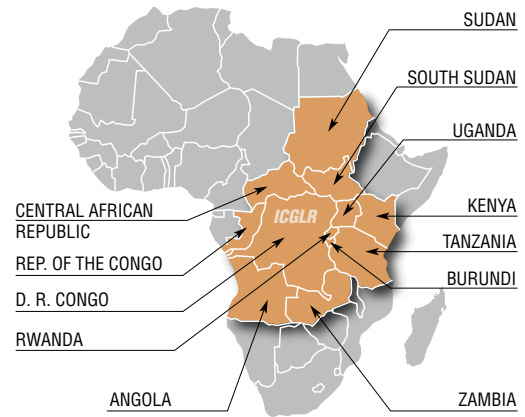


Certified natural resources from the African Great Lakes Region

In central Africa mineral resources are sometimes mined illegally and under inhuman conditions. Production and trade have thus perpetuated regional conflicts for years. The ores are hence known as "conflict resources". In the Great Lakes region these ores are cassiterite, wolframite, coltan and gold. Among other uses, they are required for the production of consumer and household electronics. BGR supports the affected countries in introducing certified trading chains for mineral resources.

The planned measures aim to contribute to cutting off armed groups from their financial base in mining, improving working conditions for mineworkers and increasing regular state revenues.

The mines are regularly inspected upon the initiative of the BGR project. It is recorded under whose control the mines are and whether the minimum standards in terms of working conditions, safety and environmental protection are adhered to.



Certified trading chains contribute to greater transparency in natural resources trade. The route of the ore from the mine to export shall be traceable, and the proper national duties and taxes be paid. Resources and mines that are not conflict-free or do not correspond to standards, are — over the long term — excluded from trading. This gradually denies the conflicting parties in the troubled region part of their source of income.

These measures contribute directly to improving living standards for local communities. Government structures are strengthened, smuggling is repressed, work safety improved and a fair wage level striven for.

Indirectly, a further change can be seen: The mining sector is increasingly formalised and controlled. Through formalisation, the state gains better control over the quantities and origins of the mined resources. This, in turn, provides a more reliable basis for taxation.

BGR has, moreover, developed a method for determining the geographic origin of the ores.

This verification of origin, referred to as the analytical fingerprint (AFP), can differentiate between ores based on their mineral and geochemical properties. Thus, the reliability of origin declarations made in the context of certified trading chains can be examined. For consumers, it guarantees they are dealing with conflict-free, fair products.





At the national level we are currently supporting the government of the Democratic Republic of the Congo in their efforts to establish certified trading chains for mineral resources.

We train mining inspectors and help to develop the infrastructure for exchanging data between government agencies and the various levels of administration. In addition, we promote dialogue between Congolese institutions at all levels — for example between civil society, mineworkers, government agencies and enterprises.

Information exchange with other countries also forms an important element of the programme. This is facilitated by the regional organisation ICGLR (International Conference on the Great Lakes Region). In addition to the Democratic Republic of the Congo it includes Angola, Burundi, Kenya, the Republic of the Congo, Rwanda, Zambia, Sudan, South Sudan, Tanzania, Uganda and the Central African Republic.

At the regional level BGR supports ICGLR in its efforts to develop national, traceable natural resource trading chains. These coordinated measures are aimed at making regional trade more transparent by adhering to defined standards. National efforts are thus soundly flanked by regional measures. This allows the entire region and its population to profit economically from the trade with natural resources.



The Struggle against Forces of Nature

Society is becoming increasingly susceptible to extreme natural events. The main reasons for this are population growth and urbanisation. Other reasons include overexploitation of natural resources and the impacts of climate change.

In recent decades the number of recorded natural disasters with large numbers of victims and damage in the millions has multiplied. Among other things, the triggers are geological events such as earthquakes and tsunamis, volcanic eruptions, landslides or land subsidence.

Developing countries are particularly hard hit: 85 % of the victims of natural disasters live in the poorest countries. Not only the extent of natural disasters is increasing, perception of their socio-economic impacts has also changed.

This has consequences for natural disaster management. It no longer consists of hazard mitigation and disaster response and recovery, but also considers risks at the planning stage. The aspect of disaster prevention moves increasingly to the forefront.





In this context we advise and train our partners in the following areas of natural disaster management:

- analysing and evaluating possible geological hazards (hazard analysis);
- analysing and evaluating risks to communities, infrastructure and economic goods exposed to these hazards (risk analysis);
- elaborating tools, methods and standardised operating procedures that help to objectively evaluate geological hazards and risks;
- compiling user-oriented hazard and risk maps to aid decision making in natural disaster management;
- creating the necessary administrative structures in the field of natural disaster management;
- policy advice for government spatial planning and natural disaster management agencies;
- raising awareness of the affected population with regard to geological hazards and risks.

We utilise the newly gained knowledge to develop, together with our partners, locally adapted concepts for natural disaster management.

Another objective is tailored spatial planning, implemented on a variety of administrative levels. In this way we strengthen the responsible agencies in their duties.

If geological hazards are taken into consideration at the planning stage, the risk to communities, infrastructure and economic goods can be reduced from the outset. Moreover, the local population in the endangered areas learn how best to behave in an emergency.

In cooperation with its partners, BGR provides an important contribution for better protection of the population and economic goods, as well as general public services in our partner countries.



Project example



Living more safely with forces of nature in Indonesia

Earthquakes, landslides, volcanic eruptions and flooding are part of everyday life on the entire Indonesian archipelago. However, until now it has been generally unclear where, when and how badly the population was exposed to natural hazards and the resulting risks. Special investigations are, therefore, needed to evaluate the hazard potential, including both current and historical events.

If the results of such geoscientific investigations are used in spatial planning, the population's standard of living can be drastically improved.

However, the causes of natural hazards are complex. The risks for developed areas and economic zones emanating from these hazards are also difficult to determine.



BGR scientists, together with their Indonesian partners, have therefore developed and implemented concepts for assessing individual or compound natural hazards. In this way the risks to society, such as the number of possible victims or economic damage, can be better assessed.

Together with our Indonesian partners we have created exemplary geoscientific hazard and risk information bases at various administrative levels. The information allows developed areas and essential infrastructure in threatened regions to be suitably planned with appropriate preventive measures in mind in a natural disaster management framework.

In addition to spatial planning taking risks into consideration, an appropriate response by the population can be vital for survival in case of a natural disaster. Together with our partners we develop teaching and information materials specific to each topic, such as flyers, displays or videos, to help develop this awareness among the population. We also organise events and campaigns focused on geological forces.

An excellent example of an educational campaign is a minibus, the "Geomobil", touring the Indonesian province of Aceh on the island of Sumatra. At primary schools across the island the geoscientists touring with the Geomobil give elementary instruction on the geological forces in the Earth's interior and on its surface. They explain the effects of natural forces using easily understandable teaching materials. In playful exercises they teach the children how to react properly in case of an earthquake or some other natural event.



Geosciences as a Foundation for Protecting Communities and the Environment



The environment in developing countries is often severely strained. There are many reasons for this: The population is growing rapidly, waste disposal and the extraction of natural resources are not regulated, and there are no environmental protection constraints for households and industry.

As a consequence the vital resources water, soil and air are contaminated. This impairs the standard of living of large parts of the population.



BGR supports local, regional and national government agencies in environmental geology projects. Our scientific-technical advice is specially tailored to the needs of developing countries. Our work in this field is process- and planning-oriented.

We focus in particular on the interfaces between geology, groundwater protection, resource extraction and land use planning.

Where concepts and strategies require formulation, we are at our partners' sides with a wide variety of services:

- geological mapping / assessments, remote sensing;
- scientific and institutional underpinning of geological surveys;
- ground investigations;
- identifying geologically suitable landfill sites ;
- formulating the necessary licensing and operating procedures;
- integrating geological information in environmentally friendly spatial planning;
- developing geographical information systems (GIS).



The aim of our work is to establish regulated spatial planning in our partner countries, incorporating water, soil and landscape conservation.

We promote the effective implementation of environmental geology recommendations by involving cooperation partners such as ministries, enterprises and civil society.

If waste management, mining and spatial planning are optimally organised, there will be benefits beyond environmental protection. The population also profits, for example through improved health and long-term, sustainable regional development.



Project example



Environmentally friendly spatial planning in Paraguay

Paraguay is a country with a rapidly growing population. However, for a long time there was no operating spatial or environmental planning in this South American country. Urban and rural settlements were generally allowed to expand without regulation. The consequences for the environment were problematic: Large-scale illegal dumping occurred, contaminants and wastewater entered water bodies uncontrolled, land consumption was high.

BGR supported the Paraguayan environmental secretariat in the environment ministry, the *Secretaría del Ambiente*, in adapting its spatial and environmental planning to meet the challenges of rapid population growth. The focus of the project was to identify sites for landfill.



To put in place the appropriate framework, together with our partners, we drafted an environmental spatial planning law and developed guidelines for selecting and designing landfill sites, which have now been implemented in national law.

In four selected towns, planning and environmental departments were established with our support. Together with the project partners we analysed satellite images and produced natural resources conservation maps. Based on these data it was then possible to develop and adopt environmentally friendly land use plans.

A major element of the cooperation consisted of investigating landfill sites and their subsequent licensing.

Environmentally friendly spatial planning plays an extremely important role in protecting surface and groundwater bodies and preventing excessive land consumption. Another central duty of environmental agencies comprises regulating waste disposal and locating suitable landfill sites.

We advised the authorities in Paraguay on scientific and organisational problems, provided equipment and trained personnel in the partner organisations. This ensures that important resources such as water and soil are considered and protected during future planning, and thus remain available to the people in the future.



Have we aroused your interest?

You can find more information on our website at www.bgr.bund.de/TZ

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The Federal Institute for Geosciences and Natural Resources (Bundesanstalt für Geowissenschaften und Rohstoffe, BGR) is the centre of geoscientific expertise of the Federal Republic of Germany and a technical agency subordinate to the Federal Ministry for Economic Affairs and Energy (Bundesministerium für Wirtschaft und Energie, BMWi). It contributes, through research and consultation, to maintaining or improving living conditions by responsibly utilising geo-potentials.

BGR employs more than 700 staff. Core topics are energy and mineral resources, the georesources groundwater and soil, and the subsurface as a storage and economic medium.

BGR is involved in international cooperation in Central and South America, Africa and Asia. On behalf of the Federal Republic of Germany it monitors adherence to the international Comprehensive Test Ban Treaty and registers global seismic activity. Since October 2010 BGR's Deutsche Rohstoffagentur (German Mineral Resources Agency) has advised German industry within the context of the Federal Government's natural resources strategy on the availability and sustainable use of natural resources and on current market developments.



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