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# *Global Resource Management*

**Conflict Potential and  
Characteristics of a  
Global Governance Regime**

Policy Paper 27

From time immemorial, the Earth's resources have played a vital role for human communities. Indeed, natural resources have given their name to entire epochs (e.g. the "Bronze Age"). Today, it is technology and information which are viewed as important. Yet every civilization and every technical advance is still reliant on raw materials. Resource-rich developing countries, in particular, can acquire development capital urgently needed by extracting and trading mineral raw materials. Nowadays, the management of our natural resources has become an urgent issue at both national and international level. Due to the rising demand from emerging economies such as China and India, safeguarding access to raw materials is more difficult than before; as a result, resource prices are at an all-time high and resource conflicts are escalating in various regions of the world. The extraction and use of natural resources are also causing environmental problems, which require urgent solutions. Climate change and the overexploitation of natural resources are two sides of the same coin.

There is growing interest, in both the business community and politics, in a global resource management regime. In spring 2007, the Federation of German Industries (BDI) held a conference on this issue, and the German Government unveiled its "Elements of a Natural Resource Strategy" at around the same time. The European Commission, in its Thematic Strategy on the Sustainable Use of Natural Resources published in 2005, proposed the establishment of an International Panel for Sustainable Resource Management, to commence work by the end of 2007. As with the Intergovernmental Panel on Climate Change (IPCC) in the climate process, this body would collate current knowledge from around the world and prepare appropriate policy recommendations.

Against this backdrop, the purpose of the present Policy Paper is to review current thinking on the issue of global resource management and outline key options for action.

## I. Resource management as a field of conflict

### 1. Access to natural resources and security of supply in globalized markets

The availability of natural resources is determined by supply and demand. According to forecasts by Germany's Federal Institute for Geosciences and Natural Resources (BGR) and the US Geological Survey, a general and absolute scarcity of natural resources due to limited deposits is unlikely to occur for the foreseeable future. However, due to relative scarcity, there may be some supply bottlenecks for certain resources such as lead, copper, tin and zinc. So for key industrial sectors such as electronics and steel, the issue of scarcity remains acute. The situation is especially critical in relation to certain strategic metals which will continue to be essential for the growth of key technologies for the foreseeable future; here, steep price hikes can be observed (1000 % and more over the last five years). At the same time, due to a concentration on a small number of supplier countries and on a handful of countries in the value chain, the supply is exposed to high risks. Antimony and indium are two examples. Antimony is mainly used as an alloying element to harden metals, as an additive in rubber, as a flame retardant in synthetics, and in dyes. Significant reserves are located in China, Russia and Bolivia. Indium is used in a variety of applications in information and communications technology (ICT) products, e.g. liquid crystal displays and flat screens. It is a scarce metal, with China being the main source of supply.

The reliance on politically unstable regions creates geo-strategic risks. As is well-known, around 70 % of the world's known oil and gas reserves fall inside a "strategic ellipse" extending from the southern tip of the Arabian Peninsula across the Caspian region into northern Russia and up to the Jamal Peninsula. Although metal reserves

are by far more evenly spread over the world, there are also certain dependencies. Euromines—the European Association of Mining Industries—forecasts an increase in metal import rates from six developing and newly industrializing countries: Brazil, Chile, Peru, South Africa, the Democratic Republic of Congo and Zambia. These six countries will increasingly dominate the supply of mineral resources in future (Figure 1).

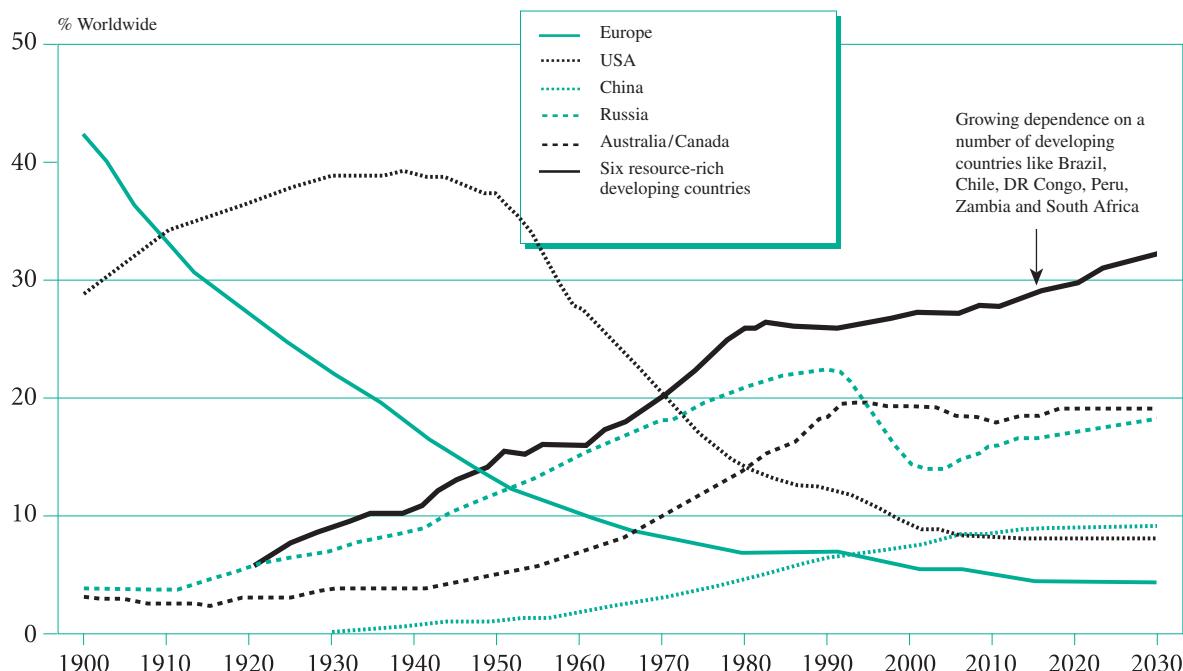
The cooperation between Brazil, Russia, India and China (the "BRIC" countries) and other emerging economies is creating a new geography of the raw materials trade, with these countries increasingly influencing funding policies and the resource markets. Cooperation agreements are being concluded between them which confer exclusive rights on this group of countries. China and Chile, for example, have signed a free trade agreement which gives China long-term access to around 50 % of Chile's copper output.

Prices on the international resource markets are currently at their highest levels for many years. Record highs are being recorded for nickel in particular, which is used in the production of high-grade steel, and for steel scrap; above-average price increases are also occurring in the markets for tin, copper and lead. Overall, the raw materials price index based on the US dollar rose to a value of around 244 points in July 2007 (compared with 100 in 2000); in other words, resource prices have more than doubled. This is apparent from the increases in the prices of specific resources between 2000 and July 2007: a price rise of 188 % for non-ferrous metals, 200 % for iron ore and steel scrap, and 148 % for energy resources.

The continuing high demand of industrial countries together with the growing demand from emerging eco-

**Figure 1: The increasing importance of developing countries in raw materials supply**

Production of mineral resources by country/country group 1900—2030



nomicies, particularly China, has been a crucial factor for the price increases since 2000. A few figures illustrate the Chinese economy's resource hunger: over the last 12 years, China has attained an average annual growth rate in excess of 10%, and accounts for nearly 30% of the world's GDP growth since 1992. Despite some successful strategies to decouple resource consumption from GDP growth, and despite increasing its domestic mining activities, China is now the world's largest importer of raw materials, including steel, copper, coal and cement, and the second largest importer of crude oil after the USA. Even if growth rates were to tail off, Chinese demand is likely to remain high in the coming years. Key factors here are the demand for capital goods, the urbanization trend, industrialization and the development of consumer demand. Analysts predict that the demand for raw materials will double or even treble by 2020—2025.

The demand from other emerging economies with high growth rates, such as India and Brazil, and from Russia and the CIS countries is also important. Unlike the situation in the 1980s, when the relatively small East and South-East Asian "Tigers" were achieving high rates of growth, the current demand for raw materials comes from populous countries with a high level of purchasing power which are investing in industries and infrastructure. The demand from the Asian emerging countries is stimulating additional growth in the supplier countries. Forecasts indicate that these countries have good prospects of development with above-average rates of growth.

However, focussing on the emerging economies ignores the major source of pressure on finite resources. The industrialized countries which belong to the Organisation

for Economic Co-operation and Development (OECD) are home to just 15% of the world's population but account for around 56% of its total oil consumption, around 60% of total gas consumption and approximately 50% of the consumption of other mineral resources. Average per capita consumption of natural resources in the industrialized countries is still more than twice as high as in China. It should also be borne in mind that the emerging economies are integrated into the world market and that many companies located in these countries import raw materials in order to produce goods for export.

Overall, this means that resource access is likely to remain tense for the foreseeable future. Europe has no option but to consider new strategies to deal with this situation. Poorer developing countries are at risk of becoming further decoupled from world economic development, while resource conflicts are increasing.

## 2. Environmental impacts of resource use

An expert report published by the World Bank in 2004 (Final Report of the Extractive Industries Review, also known as the Salim Report) considered the environmental impacts of resource use to be so serious that it recommended a freeze on new World Bank lending for extractive industry projects in developing countries for the foreseeable future. Resource extraction not only has a massive impact on ecosystems. It also releases pollutants contained in the rock, and consumes large amounts of water and energy. The transportation of resources from remote areas requires an ecologically intensive transport infrastructure.

Due to the progressive exploitation of mineral deposits and the use of new technologies, deposits with an ever-lower ore content are now being mined. This means that an increasing amount of ore and other non-usable material has to be extracted to produce the same amount of metal. This impacts even more severely on ecosystems and water resources and increases the volume of mining waste, resulting in ever more radical changes to entire landscapes.

The rising global demand for resources accelerates this trend. If the emerging economies and developing countries were to adopt Western-style resource consumption patterns wholesale, resource extraction would increase as much as fivefold worldwide over the long term. Even in the medium term, current market trends harbour considerable risks: exploration and mining are increasingly taking place in areas which are highly sensitive in ecological and geological terms, e.g. in nature conservation areas, in the deep sea and on the continental shelves, i.e. the underwater perimeter of the continents descending to the sea floor.

After extraction, the subsequent stages in the raw materials' life cycle entail further environmental pollution. Comparative analyses of industrial sectors show that the highly resource-intensive industries are associated with above-average levels of emissions of greenhouse gases and other pollutants. It is estimated that around 15 % of global energy-related CO<sub>2</sub> emissions comes from the production of cement and steel. Climate change and resource use are interlinked in a variety of ways.

The EU is increasingly turning to other countries to supply its resources and the primary inputs whose production is so ecologically intensive. As a consequence, the volumes of mining waste, especially in the least developed countries, are increasing, while the newly industrializing countries have to contend with the environmental load associated with the primary industries. In general, people in poorer countries draw a larger percentage of their income from natural capital: poverty reduction and environmental protection are mutually reinforcing.

Current trends in the use of renewable resources are dominated by the growing demand for biofuels. In Germany, the EU and other countries, these are being heavily promoted on climate and structural policy grounds, and biofuel-exporting nations such as Brazil and Indonesia are hoping to increase their revenues in this way. However, recent analyses show that the contribution that biofuels can make to climate change mitigation is limited and in some cases may even be negative. As neither Germany nor the EU can meet their current target quotas from domestic sources, it is very likely that areas in the tropics will be cleared to make way for the cultivation of biofuel crops. The ensuing competition for land between food and energy production puts pressure on the savannas and tropical rainforests. Brazil, for example, has announced plans for a dramatic increase in soy cultivation (an additional 100 million hectares) and sugar cane (an additional three million hectares), while Indonesia plans to create more palm oil plantations

(an extra 20 million hectares). For the purposes of comparison, Germany has a total area of 36 million hectares.

### **3. Resources—blessing or curse for developing countries?**

For many developing countries, mining and the extraction of crude oil and natural gas are an opportunity to further economic and social development. The development economist Jeffrey Sachs, however,—based on many years of observation—has popularized the “resource curse” hypothesis, focussing on the negative impacts of resource wealth. This is based on the fact that growth rates in resource-rich countries in Africa and Central Asia are generally weak. Overall, the extractive industries (energy and minerals) are a major—and often the dominant—economic factor in some 50 developing countries worldwide. Yet for the period 1980—2002, the countries belonging to the Organization of the Petroleum Exporting Countries (OPEC) achieved growth rates below the average for the other developing countries, emerging and transitional economies.

An often-cited example of this resource curse is Nigeria. Thanks to the oil boom, the country regularly achieves real economic growth above 5 % (6.9 % in 2005, according to World Bank figures) and high government revenues (a positive current account balance in 2005, amounting to USD 12.4 billion). Yet around 70 % of its population still lives in extreme poverty and the violent conflicts in the oil-producing regions of the Niger Delta are increasing.

There are two main explanations for this empirically observed phenomenon of “poverty in spite of resource wealth”:

■ Macroeconomic deficits: “Dutch Disease” should be mentioned in particular here. In the 1960s, the discovery of natural gas in the North Sea resulted in a decline of exports of industrial goods and services for a time. In this scenario, the negative economic impacts of resource exports are caused by an appreciation of the currency, worsening the export prospects of other goods. The situation is exacerbated by a shift of investments and a wage differential because the booming sector is able to pay higher wages than other sectors, leading to migration of productive labour. A further problem in many developing countries is that there is no „trickle-down“ of higher incomes to the population at large, resulting in prosperity only for a select few.

■ Political and institutional deficits: economic success or failure has political and institutional causes. Successful countries use their revenues from raw material extraction for investments in physical and human capital. They also invest in improving their social welfare and legal systems. Part of their revenues from the extraction of non-renewable resources is invested in renewable alternatives. By contrast, in less successful countries, corruption and lobby groups exert considerable influence.

Nonetheless, there are some developing countries—albeit still too few—which have benefited from their resource wealth. There are various reasons for this. Success factors include development-oriented good governance, prudent economic policies and good cooperation between the government, the private sector and civil society.

Chile is profiting from the strong increases in the price of its main export product, namely copper. In the last three years, Chile's export revenue has more than doubled. One reason for this is undoubtedly that Chile is now a stable democracy, with the government committed to a clear separation between the state and the private sector. However, it also has a strong social policy focus, with government revenues being invested in development. In recent years, Chile has also been able to reduce its dependency on exports of this one resource: from 80 % in 1970 to around 50 % today. Chile is thus emerging as a model for the other Latin American countries—both in terms of its economic growth and in its efforts to combat corruption.

Botswana is currently one of the few middle-income countries in sub-Saharan Africa, yet 40 years ago, it was

still one of the 10 poorest African countries. Botswana has been successful in utilizing revenue from its diamond exports (around 50 % of its total exports) to good effect in the interests of development. Its success stems from the positive cooperation between the state and the private sector (the diamond monopoly Debswana is a 50:50 joint venture between Botswana's government and De Beers), its functioning legal system which affords protection to property, and responsible government policies.

### Recommendation

- In order to break the vicious circle of resource extraction, state failure and poverty, a new approach is required from all stakeholders: business, the financial institutions and the governments of resource-producing but also resource-importing countries. At the same time, there must be a shift towards sustainability criteria as the basis for environmentally and socially compatible extraction and processing, with revenues being invested in sustainable development.

## II. Towards a global resource management regime

Against this background, and based on the identifiable success factors, a road map for a global resource management regime can be developed. The main target groups are the resource-rich developing countries (through “resource funds”), bi- and multilateral cooperation (“resources for development” programmes), and countries and the corporate sector („increasing resource productivity“). However, there is of course a role for other actors as well. Transparency and standards are identified as overarching elements. The individual steps towards a global resource management strategy are outlined below.

### 1. National resource funds

Resource funds are of relevance for parts of Asia and Latin America, but especially for Central Africa. Major reserves of natural resources are believed to exist here, and if undertaken simultaneously with the start of democratization processes, the harnessing of these resources can open up new development opportunities. The costs of extraction in this region are also likely to be lower than the global average. In view of this price differential, a great many actors are showing a growing interest in the long-term sustainable management of these resources, which would allow suppliers to generate revenue and industry to access additional resources at low cost.

A proportion of the revenue generated in this way should be channelled into a fund to promote technological development (resource efficiency and environmental protection), social services (healthcare, pensions) and human capital (education). Resource funds thus offer the opportunity to mitigate the “resource curse” through

appropriate governance mechanisms. Norway can be viewed as a perfect example of a successful resource-rich country, but Botswana, Russia and Chile also have relevant experience from the recent past. To be successful, the resource funds must meet the following criteria:

- independent management, including effective public control,
- transparent management of revenue and expenditure, and safeguards against corruption (see below)
- earmarking of revenue for the purposes of sustainable and diversified development.

In the interests of stability and credibility, the funds should be embedded in an institutional framework with participation by the international organizations (e.g. the Organization of American States OAS, the United Nations Development Programme UNDP or the United Nations Environment Programme UNEP). Industry can be encouraged to participate through investment agreements; as it benefits from better access to resources, industry should have no difficulty in committing to compliance with the relevant standards (such as those established by the International Council on Mining and Metals ICMM or the Mining, Minerals and Sustainable Development MMSD project) and the Extractive Industries Transparency Initiative (EITI) criteria. There is likely to be interest not only among mining companies but also in the processing industry, which will thus be able to secure its access to resource inputs via shareholdings. Within the framework of international cooperation, the fund solutions could help to ensure that other develop-

ment policy goals, e.g. establishment of processing industries in the mining countries, long-term supply contracts with producer countries, or technology transfer to increase resource productivity, could be agreed.

## Recommendation

- German and European development cooperation should promote and support the establishment of resource funds in resource-rich countries, with a focus on transparency in the deployment of the funds and earmarking of revenues for the purposes of sustainable development.

## 2. Increasing transparency

Transparency of payments and revenues is an important goal of good governance. Through anti-corruption measures, a contribution can also be made to development, which benefits the public as well as small and medium-sized companies. Initiatives such as the Extractive Industries Transparency Initiative (EITI) and “Publish What You Pay” are working with great commitment on this issue, while the Global Reporting Initiative sets out the principles and indicators for the reporting of economic, environmental, and social performance. Knowing the payment flows between governments of resource-rich countries and companies is extremely important. This transparency should therefore extend to all taxes, levies and fees as well as spending from public budgets. It should also cover procedures for the awarding of concessions, as experience of the timber industry in Liberia shows, for example.

Politically, every opportunity should be utilized to ensure that the emerging economies implement the EITI’s transparency criteria. A key factor, in this context, is involving the local communities in line with the principle of “prior informed consent” (PIC). The Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters provides a legal basis for binding commitments.

In the medium term, full transparency should be established in the contractual relations between the extractive industries, the authorities and banks and along the value chains, i.e. with the processing and supplier industries. In 2005, the International Institute for Sustainable Development (IISD) produced a model contract and guidance for negotiations which comprehensively regulates rights and responsibilities in relations between foreign companies and mining countries.

It must be borne in mind that due to the complexity of value chains, product manufacturers find it hard to monitor all the channels through which metals and other materials find their way into their products. The problems associated with coltan mining in Central Africa are just one example of how international conflicts can arise as a result of companies’ lack of knowledge. With a better understanding of the situation, companies would often not take the risk. Greater transparency along the metals supply chain—e.g. through certification—is therefore

desirable. There are viable models in other sectors, such as product labelling schemes (e.g. Forest Stewardship Council, Marine Stewardship Council, or the Kimberley Process for the diamond trade), as well as various research projects on this issue. Certification should be practicable for metal producers and product manufacturers alike, and should also be clear and comprehensible for customers/consumers. The options are therefore: a) to establish a global „risk radar“ system, or b) to aim for certification.

By contrast, a classification of raw materials as “conflict resources” by the United Nations Security Council, as proposed by the NGO Global Witness, for example, is not without its problems. Resource conflicts are generally regional in scope (Congo, Liberia, Sierra Leone, Cambodia); and the resources concerned are often available from other sources as well. A better option is therefore to offer prompt access to relevant information via a “risk radar” system, to raise companies’ awareness, and increase the UN’s capacity to take action in response to regional conflicts. If these criteria are met, classification as a regional conflict resource could be useful. Moreover, if research capacities are available allowing geochemical tracing of the resources’ origin to take place, mechanisms for monitoring and sanctions could even be established.

## Recommendation

- The German Federal Government and the EU should continue to support existing initiatives such as EITI as a means of improving transparency. They should also facilitate implementation processes and, in particular, work towards greater ownership of such initiatives in the emerging economies and industry. In the medium term, full transparency in the contractual relations between the extractive industries, authorities and banks and along the value chain with processing and supplier industries should be established.

## 3. Appropriate sustainability standards and certification

Initial steps in the establishment and implementation of environmental and social standards for luxury commodities such as diamonds and gold have already been taken. Furthermore, the International Council on Mining and Metals (ICMM) has formulated ten principles for sustainable development performance for the mining industry which its member companies pledge to uphold. The intention is to develop these principles and align current practices to the relevant international conventions and guidelines, establish an external verification system and agree specific consequences in the event of non-compliance, such as the publication of the names of non-complying companies. At the same time, incentives should be created to ensure maximum possible participation by mining companies, e.g. by extending the scheme to the purchase of materials in the processing industry, through creditworthiness ratings, or recommendations on public procurement. Certification of selected natural re-

sources for which researchers intend to develop geo-ecological footprints in the medium term can also be used in order to support the effects of industry and consumers throughout the life cycle. Appropriate standards must also be developed and implemented for recycling and disposal. A responsible approach to products and raw materials must apply throughout the life cycle.

### **Recommendation**

- Companies should comply with appropriate sustainability standards all along the supply chain and also support certification processes. They should also establish a „risk radar“ scheme for strategic metals.

## **4. “Resources for development”**

“Resources for development” programmes can be established within the framework of bi- and multilateral development cooperation. There are various models for this, one example being the Norwegian “Oil for Development” programme. Oil for Development builds on three main thematic pillars: resource management, revenue management and environmental protection. The initiative focusses on promoting development objectives such as good governance and the rule of law, transparency, participation and financial accountability. One option is for individual donor countries to focus on a specific region. This would minimize the risk of unproductive competition arising in the allocation of funding and optimize the use of regional expertise.

The European Union currently derives much of its supply of metal ores from South America. Based on the good relations between the EU and the South American countries and in light of the fact that the institutional environment in these countries is conducive to such co-operation, the EU should step up its engagement in South America. Individual EU member states could, in turn—in conjunction with the European Union—press ahead with pilot projects on other continents which are important for the future resource supply. Africa could be a key focus of activity by Germany in cooperation with other EU countries.

The programmes should contain elements of resource conservation: they could aim, for example, to avoid the overexploitation of natural resources, protect the regional environment and improve socio-economic, political and institutional conditions. In this context, it is important to bear in mind that large-scale extraction and processing of natural resources, both minerals and renewables, require know-how, technologies and capital which are generally only available to the larger companies. In many developing countries, these companies usually recruit the requisite personnel and obtain their technologies from the industrialized countries, while profits tend to be concentrated in private hands and are not available for development projects in the producer region. Funding programmes should therefore help to improve skills and develop human capital and technologies in the countries concerned.

In view of the specific extraction conditions in Central Africa, it is important to determine to what extent this type of programme can also address artisanal and small-scale mining and small-scale enterprises. It is essential to avoid a “gold-digger mentality” which yields short-term profits and devastates large tracts of the country. Assuming favourable geological conditions, decentralized coordination, purchasing and processing agencies are beneficial which, via development cooperation, could support people and enterprises through the provision of equipment and training, e.g. in the use of equipment, occupational health and safety and environmental protection. Through the provision of microcredit, these mining actors could acquire the status of cooperatives and small enterprises. Measures can also be taken to cushion price fluctuations, e.g. through insurance-type mechanisms. Relevant initiatives should also be carried out in cooperation with the provincial governments. On this basis, contracts can then be developed and legal regulation pursued in conjunction with international actors; otherwise, asymmetries between small-scale mining firms and larger companies would remain. In general, bottom-up and top-down approaches should be combined.

It is also useful to promote agricultural cooperatives which cultivate a renewable resource base through settled structures. Here, it is important to promote the productivity of agricultural areas through know-how and appropriately adapted technological inputs. This facilitates the production of surpluses which can be used to supply regional markets and, if appropriate, can be processed into biomass (e.g. cotton or other textile crops). Based on this biomass, other supply chains can then develop (e.g. in the textiles sector), provided that local skills are enhanced accordingly. In this way, the local economy grows organically on a renewable basis and in an environment which is conducive to social development. As part of this process, technological advances can be achieved, e.g. farmsteads could be supplied with energy produced by biogas fermentation plants or decentralized photovoltaic systems.

### **Recommendation**

- European development cooperation should establish and expand „resources for development“ programmes. These programmes would build on three main thematic pillars: resource management, revenue management and environmental protection. Promoting cooperatives in the field of small-scale mining and agricultural resources may be especially helpful.

## **5. Increasing material efficiency and resource productivity**

Material efficiency entails adopting targeted measures to improve the efficient use of material inputs. Studies undertaken by the Federal Statistical Office suggest that there is a great incentive for companies to improve their material efficiency, as the costs of materials in Germany account for around 40 % of the gross production value of manufacturing companies. While some firms do achieve

**Table 1: Material input and savings potential in the next 7—10 years in four selected sectors in Germany**

Sector	Material input (€ billion)	Estimated savings potentials (€ billion)
Manufacture of metal products	18.6	0.8—1.5
Manufacture of systems for electricity	10.2	1.5—3.0
Chemical industry (excluding primary industry)	11.1	1.8—3.4
Manufacture of synthetic goods	10.8	1.0—2.0

Source: Arthur D. Little / Wuppertal Institute / FHG ISI (2005): Study for the Conception of a Programme to Increase Material Efficiency in Small and Medium Sized Enterprises, final report for the Federal Ministry of Economics and Labour (BMWA), p. 7.

success, the long-term average increase in material and resource productivity is nonetheless lower than the increase in labour productivity. While labour productivity has increased in e.g. Germany by around 270 % since 1960, material productivity has only risen by around 75 %. It seems that high innovations potentials are not being utilized here (Table 1).

Companies can increase material efficiency and resource productivity in every country, including emerging economies and developing countries. As a rule, material- and energy-saving go hand in hand. A cost analysis should be carried out not only within the company concerned but across the entire life cycle of the goods produced, and should include every stage in the value chain. The Marrakech Process supports these endeavours at international level. The Japanese “3R” Initiative (Reduce—Reuse—Recycle) aims to improve resource management in East Asia by focussing on waste. China has launched an ambitious Circular Economy (CE) initiative and is seeking partners to provide financing and technological know-how; the formation of open recycling markets governed by sustainability principles will feature on the agenda in the medium term.

Impulse programmes to promote material efficiency and resource productivity can help to improve the information base, especially in small and medium-sized enterprises, and facilitate market entry. In the medium term, economic incentives should also be utilized. Due to its high ecological intensity, the construction industry should take priority here, as the potential for resource- and energy-saving in both new builds and existing buildings is immense. This should be combined with other instruments. The levy on the quarrying and import of aggregate for construction purposes, introduced by the United Kingdom in 2002 and charged at the rate of £ 1.60 per tonne, has resulted, inter alia, in process optimization in the cement industry and the recycling of building materials. A similar tax on construction materials in e.g. Germany—depending on the assessment basis used—could generate up to € 1.4 billion in revenue. This could be used, for example, to fund a building modernization programme and associated campaign to encourage energy and material efficiency and create jobs in the construction, crafts and manufacturing sectors at the same time.

For developing countries and emerging economies, an impulse programme would offer economic incentives as a means of optimizing the requisite development of a

construction infrastructure which meets material and energy standards while basing the taxation system on all production factors, i.e. resource inputs (including land), capital and labour. The bias in the taxation system towards factor labour is resulting in the non-utilization of productive labour capacities and overexploitation of the natural environment. Longer-term perspectives for economic incentives could be offered by a material input tax for (primary) materials extracted at home and imported from abroad.

### Recommendation

Companies in the manufacturing industry should undertake comprehensive analyses of their potentials for material efficiency and act on the findings. This should extend along the value chain. Governments should support this process through impulse programmes and incentive schemes. Regional initiatives are especially valuable in this context.

### 6. Limiting resource consumption to a sustainable level

Numerous measures can be adopted to influence the quality of resource consumption and guard against especially problematical excesses. However, they cannot prevent the general quantitative growth in demand and the problems that this creates. As a result of this boomerang effect, problem shifts may occur and the problems may even increase. For example, the news that diamonds are no longer “blood-stained” may trigger an increase in demand, resulting in more extraction of these resources with all the inevitable consequences of mining activities, i.e. mining waste and energy consumption.

The situation can become even more complex in relation to the certification of renewable products. The current debate about the introduction of sustainability criteria for biofuel imports is a case in point. Of course, it can be demonstrated that a specific hectare of land is being cultivated without any major environmental pollution and that this land has not been in a natural state for many years. This is certainly possible in the core areas of intensively cultivated plantation-based agriculture. However, certification signals a supposedly high quality and thus stimulates demand, creating incentives for large-scale land owners (e.g. in Brazil and Indonesia) to acquire additional tracts of land on the margins of the cultivated zones, some

of which may have previously been degraded through use for cattle-breeding (in some cases by the same companies). As a result, savannas and rainforests are coming under increasing pressure.

Measures to increase material and energy efficiency—vital though they are under the present circumstances—are not enough, in the long term, to limit resource consumption to a sustainable level. The boomerang effect means that as the efficiency of products increases, so does demand for these more efficient goods, cancelling out the savings achieved per unit and even driving up resource consumption.

The growth of the world economy—even with the partial decoupling of growth from resource consumption, which can currently be observed to varying degrees in all the countries studied—is very likely to result in a further increase in the volumes of resources being extracted and processed. From the perspective of material flow analysis, the ensuing environmental burdens can hardly be reduced, and certainly cannot be avoided (see, for example, the growing volume of mining waste as a result of declining ore content) through conventional environmental protection instruments such as pollution control.

Effective restrictions on the absolute amounts of resources extracted are therefore unavoidable in the long term. This should take place at a level which can be viewed as sustainable in the countries and regions con-

cerned, taking account of environmental and social conditions. A key factor, in this context, is to develop the current legal procedures further—notably the extraction licences for individual resources—and take a holistic and integrated view of a country's total resource use. This is the only way to make the cumulative effects of mining visible, and only then can land-use competition between agriculture, forestry, mining, nature conservation, tourism, urban development etc. be identified promptly.

Far-sighted countries and companies will therefore have no option but to produce comprehensive resource management plans in future. These could include the allocation of integrated licences for mining, forestry and agriculture, for example. Furthermore, in addition to increase resource productivity, absolute targets to manage resource use could be established. As a general principle, objectives and instruments for sustainable resource management should not focus on individual or selected materials such as coltan or steel. Instead—and to avoid problem shifts, among other things—they should concentrate on resource groups (metals, strategic minerals, biomass etc.) and types of land use.

### Recommendation

- Countries and companies should develop strategies to limit and lower absolute demand for resource use.

## III. Cornerstones of a global resource management regime

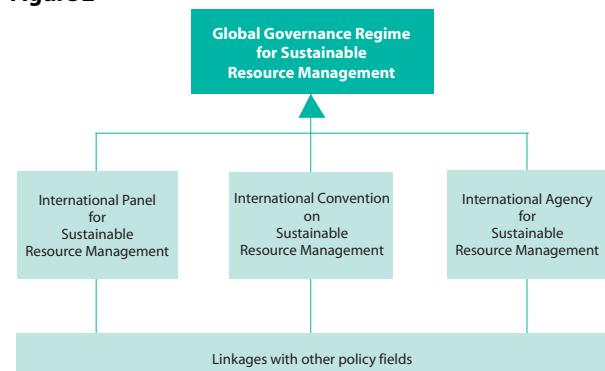
The current global resource management structures are inadequate. Their main deficits relate to the following:

- the growing conflict potential in mining and cultivation countries as a result of inequitable access internationally, the new trade geography, and rising global demand for resources,
- inadequate consideration of environmental aspects and the failure to internalize follow-up costs,
- viewing individual resources and mining/cultivation activities in isolation without considering usage competition and interdependencies,
- distortions in the recycling and disposal sectors,
- the sporadic and high-risk nature of exploration activities.

A global governance regime for the management of the world's natural resources must be developed on a progressive basis, tying in with existing initiatives and drawing on companies' and countries' vested interest in the sustainable management of resources. However, this

must be supported and embedded in an internationally coordinated approach. Overall, it is important to strengthen the interests of weak population groups and future generations against short-term profit motives. The following institutional pillars are important in this context (Figure 2):

**Figure 2**



Source: Authors' own (Bleischwitz/WI 2007)

- the International Panel for Sustainable Resource Management
- an international convention
- an international agency.

## 1. International Panel for Sustainable Resource Management

The road map for the establishment of the International Panel for Sustainable Resource Management, agreed at the initiative of the European Commission, outlines a set of key tasks for the Panel. These include gathering international knowledge, independent scientific expertise and information on the use of natural resources and formulating recommendations on:

- the environmental impacts of resources from a life cycle perspective,
- strategies and approaches to decouple these impacts from production and consumption in growth regions,
- support for the development of know-how in developing countries and emerging economies and for the Marrakech Process.

Unlike other international commissions (e.g. Mining, Minerals and Sustainable Development or the World Bank's Extractive Industries Review), this Panel will have international legitimacy and can thus have a more powerful and binding political impact in supplier and recipient countries. It is very welcome that the Panel will develop principles for sustainable resource management, especially for metals and biofuels. These principles should not only focus on mining but should be based on the life cycle approach and global resource management. This must include linkages with water resources and land management, greenhouse gas emissions, guidelines for product design, the cascade use of materials in products, and closed loop processes. A systems approach needs to be applied. The Panel should also develop guidelines and policy options for selected areas, such as biofuels or recycling processes. By its very nature, there are limits to what this type of Panel can achieve; for example, it cannot take decisions or assume responsibility for implementation. For that reason, while the Panel is important, it must be supplemented by institutional mechanisms.

### Recommendation

- The Federal Government and the EU should vigorously support the establishment of the proposed Panel and work to ensure that the Panel establishes a high reputation and that its work is guided by a life cycle and problem-solving approach.

## 2. Linkages with other agreements and policy fields

A global resource management regime must be embedded in existing international agreements and policy fields. Possible approaches could refer to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal and the climate process, for example, where energy-intensive industries are regulated through the European Union Emissions Trading Scheme (EU ETS). In general, the closed substance cycle, climate protection and resource management are highly compatible. Strategic and systemic innovation processes—e.g. the development of biofuels—must take account of the need for a substantial reduction in environmental loads and for minimization of risks. Industrial policy goal conflicts could also arise if Europe were to develop its pioneering role in such a way that energy-intensive production (cement, steel, paper etc.) and recycling processes were outsourced to countries with lower environmental standards. Here, programmes and public-private contracts can ensure that these industries are pro-active drivers of structural change towards sustainability.

In addition, the existing WTO rules, which treat extractive and production processes as trade-neutral, must be reviewed. As much as material efficiency can generate competitive advantages: if companies or governments externalize costs through the predatory exploitation and cheap disposal of resources and foist these costs on to the general public, the international community must have tools available to charge these follow-up costs to the polluters concerned. In the medium term, a binding system is required so that any circumvention of guard rails governing sustainable resource use can be sanctioned through trade restrictions. There is nothing in the current WTO rules to prevent the application of this type of approach—which could, for example, require consumer countries to limit the import of products that jeopardize the survival of human communities, flora and fauna and put finite natural resources at risk. However, unilateral measures should only ever be a secondary option.

The role and tasks of the United Nations Security Council should also be reviewed. Furthermore, the work of the United Nations Environment Programme (UNEP) should be supported and strengthened; its upgrading to the status of a UN specialized agency is recommended. The implementation of the proposal for the establishment of a high-level Council on Global Development and Environment within the UN system would strengthen the United Nations' capacities in this area.

### Recommendation

- Climate protection and resource conservation should be viewed holistically by all actors. The current WTO rules, which treat extraction and production processes as trade-neutral, should therefore be reviewed. Furthermore, the United Nations Environment Programme (UNEP) should be supported and strengthened; its upgrading to the status of a UN specialized agency is recommended.

### 3. International convention on sustainable resource management

In the longer term, an international convention on sustainable resource management will be required for the following reasons:

- existing initiatives and institutions are not legally binding, are based on voluntary participation and lack continuity,
- competitive advantages resulting from material efficiency are undermined by overexploitation, environmental dumping and cheap disposal,
- the pressure of problems and thus the conflict potential are increasing due to growth processes.

An international convention would aim to establish a sustainable global resource management regime which promotes peace and is based on resource conservation principles. The preamble could draw attention to the common heritage of mankind, which holds that individual states and present generations may use these resources, provided that they are not compromised irreversibly but can be passed on to future generations. The convention should support and strengthen existing initiatives and programmes, but should also contain provisions which ensure that revenue generated at every stage in the product life cycle—from the extraction and use of natural resources to recycling and disposal—promotes the development of sustainable production and consumption structures and, through sound and effective governance, is utilized for the public interest. A convention should also contain binding provisions on transparency and better access to information. It should provide a legal basis for the establishment and management of national and regional resource funds and—as in the climate process—facilitate the introduction of economic instruments. At the same time, it is important to institutionalize negotiation processes in order to build a consensus on resource use objectives—including targets for material efficiency, resource productivity and resource conservation. The convention should also establish conflict resolution mechanisms and possible compensation measures for developing countries with ecologically intensive resource extraction and processing.

An international convention should also serve as a framework for bilateral programmes and agreements. In this context, “road maps for sustainable resource management” agreed on the basis of partnership between the G8 and the BRIC countries are of particular interest.

And while it might sound utopian at present, in the medium term, it should be possible to levy user charges on internationally traded resources and agree targets and road maps for resource conservation. User charges on aviation fuel, diesel used by international shipping and on airports and ports would be useful steps in the right direction. User charges for selected resource-intensive luxury goods could be integrated into this system in order to create incentives for changed behaviour. If long-term usage objectives for resources are agreed, tradable licences—akin to emissions permits—are also an appropriate instrument.

#### Recommendation

- The Federal Government and the EU should take the initiative to develop an international convention on sustainable resource management.

### 4. International agency for sustainable resource management

An international agency for sustainable resource management is required to ensure that the agreed tasks can be performed effectively and sustainably. Unlike an international convention, its primary focus would not be the continuous development of an international legal and economic order, but the implementation of the agreed agenda. The Agency’s remit would include the following:

- exchange of practical experience and success criteria for resource extraction and the processing of mineral resources, including recycling processes, renewable resources and biofuels;
- exchange of experience and delivery of training on resource productivity in small and medium-sized enterprises, in developing countries and emerging economies;
- provision of environmental data on resource extraction and processing, and on internationally traded resources and semi-finished goods, in cooperation with national agencies, including basis economic data;
- establishment of working groups to develop scenarios and exchange information on research and development activities (including recycling and storage);
- fostering dialogue on regional, national and international resource management programmes; establishing criteria for successful action plans and implementation processes;
- a global information and early warning system on regional and national resource management, especially for conflict prevention and to support conflict regions.

#### Recommendation

- The Federal Government and the EU should launch an initiative to establish an international agency for sustainable resource management; this should be linked with initiatives in the renewable energy sector.

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