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Assessment of Mineral Potential, Geoscience Survey Capacity, Risk, and Geological Aid in Africa, Asia, Latin America, and the Pacific

Paul Kay, Dean Hoatson, Mike Huleatt, Bridgette Lewis

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Key Outcomes

- This report provides a comprehensive high-level assessment of the state of play with regards to the mineral potential of 138 developing countries as identified by the Development Assistance Committee (DAC: part of the Organisation for Economic Co-operation and Development).
- Countries are assessed using eleven sub-categories which can be grouped into four broad categories including: geological, geoscience survey capacity, socio-political risk, and geological aid.
- This report utilises and synthesises both international information available to the public and commercial information obtained by Geoscience Australia.
- The comprehensive data compiled in this report are largely presented graphically (coloured maps and barcode tables) to facilitate ready comparisons between countries and continents. Higher-level supportive information is provided in the appendices.
- Recommendations for targeting and structuring future programs for maximum program impact are provided.

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Acronyms

AusAID	Australian Agency for International Development
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe
BGS	British Geological Survey
CCOP	Coordinating Committee for Geoscience Programmes
DAC	Development Assistance Committee
GDP	Gross Domestic Product
GIS	Geographic Information Systems
JORC	Joint Ore Resources Code
M4D	Mining for Development
ODA	Official Development Assistance
UNESCO	United Nations Educational Scientific and Cultural Organisation
USGS	United States Geological Survey

1. Introduction

The mining sector is a significant contributor to economic growth in many countries, including Australia. It has considerable potential to help reduce poverty and accelerate human development, through increasing government and community revenues, generating employment, and providing physical and human infrastructure.

Many of Australia's development partners are endowed with substantial mineral resources that could propel them on a path to inclusive and sustainable development. However, if resources are not managed well they could initiate the wave of economic stagnation, corruption, and conflict known as the 'resource curse'. Grasping the opportunities offered by mining is a priority of many developing countries and is an area in which Australian development assistance can be most effective.

The Prime Minister of Australia announced a new package of assistance—the Mining for Development Initiative (AUS \$127.3 million)—in October 2011.

“Australia is an expert in developing mineral commodities using environmentally responsible practices. This initiative will draw on expertise from across government, industry and academia in Australia to help [...] address mining-related challenges.

[...]

Well-governed mining, gas and petroleum sectors can not only help reduce poverty but also reduce a developing country's dependency on aid.” (Source: PM's press release <http://www.pm.gov.au/press-office/launch-australian-mining-initiative>)

The Mining for Development (M4D) initiative works with developing countries that have significant mining sectors to maximise the benefits and opportunities of mining. This report is part of the M4D initiative. It informs the design and development of AusAID's broader M4D initiative, and provides background and baseline information to AusAID. This report compiles data on the mineral resource potential, geoscience data availability, geological aid and risk in developing countries in Africa, Asia, Latin America, and the Pacific.

The focus of this compilation is on geological data availability. It aims to avoid unnecessary duplication of effort by bringing together existing information sources and providing a depiction of the operating environment in the countries assessed.

AusAID is considering investing in strengthening the collection and dissemination of geological data in partner countries, and this report informs the design of those activities. When governments have highly skilled geoscience professionals, knowledge and data about their national mining potential and strong geoscience management arrangements (including licensing), it improves their ability to regulate mining exploration and attract investment in a sustainable manner and allows for long term economic, physical, and social planning.

Programs in the area of geosciences will not take place in isolation. AusAID's M4D initiative includes investments in improving mining regulation, strengthening revenue management and enhancing meaningful community participation in the mining process.

This report was prepared under Activity Schedule 29 to Record of Understanding Number 51172, in relation to co-operation between GA and AusAID for improving the capacity of partner governments for the management of geoscience data. The relevant milestone under this agreement is to: assess the geological potential and geoscience data availability in AusAID partner countries. GA will update their 2009 assessment of Africa's geological potential and extend the study to include partners in Asia, Latin America, and the Pacific ([Fig. 1.1](#)).

Utilising the data and analysis provided through this broad scoping study, Geoscience Australia will conduct further analysis on up to 12 countries, with the objective of maximising the impact of future M4D activities.

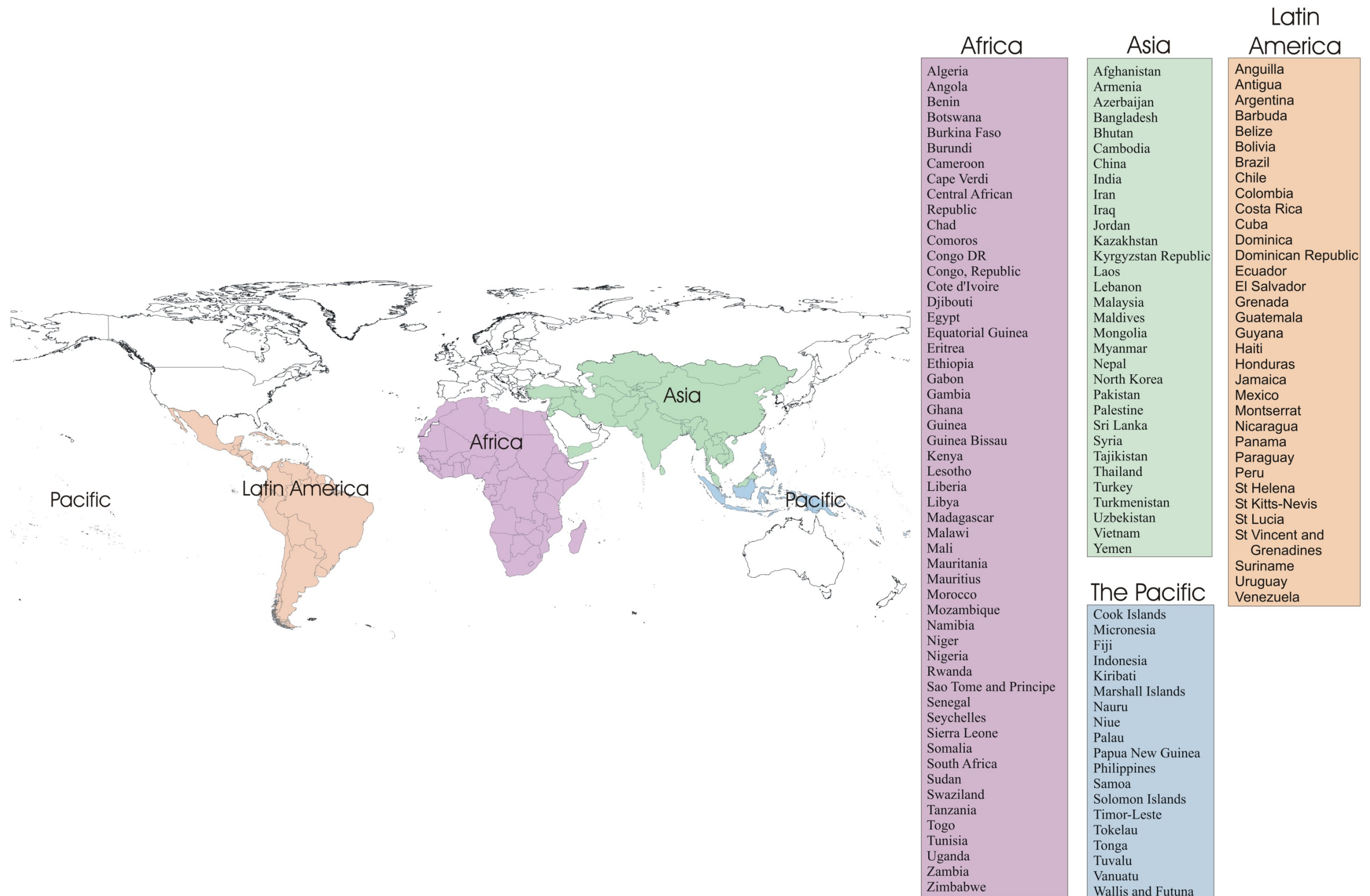


Figure 1.1. Regions and countries used in this assessment on the global map.

2. Study Scope

This report builds upon a previous GA study produced for AusAID in 2009 that focussed on developing countries in Africa—Potential Australian Assistance to Help Develop Sustainable Extractives Sectors in Africa (incorporated as Submission No 75 in the Review of Australia’s Relationship with the Countries of Africa—Joint Standing Committee on Foreign Affairs, Defence and Trade 2010: <http://www.aph.gov.au>. The 2009 report¹ made the following major conclusions:

- Australia’s extractives industry and services sector have the expertise and capacity to provide assistance to African countries to develop sustainable minerals and energy resources sectors;
- the assistance that Australia makes available should be offered in the context of an overall approach to the sustainable development of the state, and should target the gaps that are identified by applying a template developed in the report for systematic assessment of capacity gaps, and following acceptance of the outcomes by the states;
- a sound case is shown for assistance through bilateral arrangements, which would achieve significant profiles in the countries that have sought Australian aid;
- the report recommended against directing Australian assistance at legacy problems from earlier mining, as this raises additional complications, such as existing social or environmental problems; and
- finally, the report ruled out assistance to infrastructure, IT/technology programs, and conducting geoscience surveys.

The Development Assistance Committee (DAC) is part of the Organisation for Economic Co-operation and Development, which is a unique international forum of the largest aid funding agencies, including the World Bank, International Monetary Fund, and the United Nations Development Programme. In consultation with AusAID, the DAC selection of countries and Territories based upon eligibility to receive Official Development Assistance (ODA) provided the basis for country selection in this study. The DAC list of ODA recipients ([Appendix 2.1](#)) consists of low- and middle-income countries based on Gross National Income per capita as published by the World Bank.

One hundred and thirty-eight countries and territories from four generalised geographic regions: Africa; Asia; Latin America, and the Pacific, form the basis of this study. For ease of display purposes, small offshore Asian countries (e.g. Indonesia) have been included with the Pacific. These regions are intended for display purposes only, and are independent of any perceived geopolitical affiliations. Some countries in the Latin American and Pacific regions are too small to be shown at this map scale, and are therefore listed as ‘Not Shown’ in the figures as appropriate. Countries not assessed this study are not included in the figures, this is particularly evident on the far western Asia/north east Africa region where Saudi Arabia and Oman do not appear. Also note that Western Sahara has not been assessed this study and appears as a blank region in the middle of north western Africa. South Sudan has been assessed as part of greater Sudan, as no data for newly independent South Sudan is available.

¹ Potential Australian assistance to help develop sustainable extractives sectors in Africa, by Lambert, I., Geoscience Australia report to AusAID, September 2009 (AusAID’s Activity Schedule No. 1 to the Record of Understanding (ROU) No. 51172).

As these assessments have been carried out using a variety of different sources, at times assessments can appear contradictory when viewed collectively. An example of this is the Angolan Geological Survey assessment which has a 'no data' result as no geological survey website was detected, yet the geological aid assessment indicates there has been survey-survey collaboration. This is the result of information being obtained from websites independent of the Angolan Geological Survey, which while they indicate that some geological assistance has occurred, do not provide reliable performance indicators, and so cannot be used directly to assess the performance or capability of the survey. This has also notably occurred for the Indonesian Geological Survey, which, while being a very well reputed and effective survey, has no active English website, and so their performance has not been able to be effectively assessed this study. While this methodology may seem limited, the majority of companies seeking to invest in the assessed countries would be utilising non-Bahasa speaking staff, and so would be unable (without significant effort) to utilise the website. Thus non-English, and indeed non-French and Spanish, websites are an active deterrent to many would-be investors, and so the methodology has not been extended to include websites outside these most commonly internationally utilised languages at this stage.

3. Assessment of Mineral Potential and Mineral Resources

3.1. Introduction

This study assesses the mineral resources and potential of developing countries and should be regarded as indicative only. It is based on existing mineral production for the countries covered and where possible the national mineral resource inventories for those countries. In addition, a brief investigation into the availability of geological data in the countries studied was undertaken. The study cannot anticipate undiscovered resources, particularly where limited geoscience data or capacity exists.

To help maintain a degree of consistency across the large number of countries assessed, data have been sourced only from the authoritative United States Geological Survey (USGS) publications (<http://minerals.usgs.gov/minerals/>): the Minerals Yearbook (<http://minerals.usgs.gov/minerals/pubs/myb.html>) and the Mineral Commodity Summaries (<http://minerals.usgs.gov/minerals/pubs/mcs/>).

This section of the study deals primarily with mineral resources and production. However, a country's status as a producer of crude oil and natural gas has been noted. Countries that have refinery production of petroleum products, but no production of raw refinery feedstock are shown as having no petroleum resources.

3.2. Methodology

Data used to assess the production, national resource inventories, and geological potential to host mineral resources of countries have been drawn from the sources described below. These sources were selected to ensure consistency in reported data. Production data were largely sourced from the 2010 USGS Minerals Yearbook. Where 2010 data were not available, the 2009 data, also from the Minerals Yearbook series were used and were noted as such.

The following definitions (see [Appendix 3.1](#)) were used to rank countries in terms of mineral production.

1. Very large-scale production of internationally-traded commodities (production of ten or more commodities rank in world top ten producing countries).
2. Large-scale production of numerous commodities (production of five or more commodities rank in world top ten producing countries).
3. Medium-scale production of one or more commodities (production of zero to four commodities rank in world top ten producing countries).
4. Small-scale production of a limited range of commodities.
0. No data or limited data of uncertain quality.

Data on national resource inventories of the commodities assessed were sourced from the USGS Minerals Commodity Summaries. The availability of these data is variable with comprehensive

information available for countries having major mineral resource industries but limited information for others. Ranking of countries on this item has been based on the five definitions (see [Appendix 3.1](#)) below, which reflect the availability of resource data.

1. Very large national resource tonnages (resources of ten or more commodities rank in world top ten countries).
2. Large national resource tonnages (may include ranking of resources in world top ten countries for five or more commodities).
3. Moderate national resource tonnages (may include ranking of resources in world top ten countries for zero to four commodities).
4. Known resource tonnages for individual deposit(s) or resources inferred because a commodity is produced.
0. No data or limited data of uncertain quality.

The assessment of a country's geological potential to host mineral resources has been based on the definitions in [Appendix 3.1](#). For many countries, particularly the smaller countries, there was often no information available on which to make a reasonable assessment. The following three categories were used to classify resource potential.

1. Proven potential with substantial resources and production of mineral commodities
3. Potential with some known resources or production of mineral commodities
0. No data or limited data of uncertain quality

Note: Only selected commodities were included to indicate the availability of resources and production capability to support development of essential infrastructure for a viable future mining industry. Similarly, various commodities have been included that are traded internationally and that may have potential to generate export income for the country in the future. Thus, the commodities lists in this report cannot be regarded as an exhaustive indication of a country's resource production.

3.3. Assessments

Africa

A summary of the level of known mineral resources, existing minerals industry, and the geological potential for more resources to be identified in the African region is given in [Table 3.1](#). Data on which these assessments are based are given in [Appendix 3.2](#). The existing minerals industry and known resources are spread across the continent but tend to be more established and better known in the southern half of the region. In the northern and western regions the minerals industries are less well developed and resources less well known, but good potential exists for the discovery of significant resources on which current small industries may develop further or new industries may be established.

Known Mineral Resources ([Fig. 3.1](#))

- Very few countries are ranked as having no known mineral resources and in those cases, that ranking may be due solely to the lack of data in the source documents used.
- Countries in the northern half of the continent generally have lower rankings in terms of known resources than those of the south, but do have resources for some individual commodities that are of international significance, e.g., the rutile resources in Sierra Leone are the fourth largest in the world and its bauxite resources are the thirteenth largest while Niger has the world's fourth largest uranium inventory.
- The Democratic Republic of Congo has resources of copper and cobalt that rank in the world's top ten inventories for those commodities.
- South Africa is in the world's top ten nations for resources of many commodities and has by far the largest national resource inventory of any nation in the African region.

Existing Mineral Industry ([Fig. 3.1](#))

- As would be expected the distribution of the existing minerals industry in Africa is similar to the distribution of known resources.
- Generally countries in the south have larger minerals industries than those in the north.
- However, although the industries in the north may be smaller and less well developed than in the south there is important production with Niger being the fourth largest uranium producer in the world and Egypt is the eighth largest producer of phosphate rock.
- The Democratic Republic of Congo is in the world's top ten producers of cobalt, copper, germanium, tantalum, and tin.
- South Africa is a major producer and supplier of minerals to the world with production of at least ten minerals being in the world's top ten.
- Almost all countries produce industrial minerals and construction materials that would be essential for the provision of infrastructure to future development of mineral resources—albeit on a very small scale in many instances.

Geological Potential for Mineral Resources ([Fig. 3.2](#))

- All but a few countries, e.g., Somalia, have potential for or proven resources of internationally-traded mineral commodities.
- It is likely that countries with an unknown ranking will ultimately prove to have some resources as modern exploration can be facilitated or further, more detailed reviews are undertaken.
- Those countries currently ranked as having potential are likely to yield the most abundant new resources should they be open to modern exploration and should modern high-quality pre-competitive geoscientific data be provided by government agencies.
- That is not to say however, that countries with a proven national resource inventory do not provide opportunities for significant discoveries with the further delivery of high-quality pre-competitive geoscientific data, e.g., countries such as Burkina Faso, Mozambique, and Sierra Leone.

Existing Petroleum Industry (excluding refinery activity) ([Fig. 3.3](#))

- An overview of those countries producing crude petroleum commodities is given in [Figure 3.3](#).

Table 3.1. Known mineral resources, mineral industries, and geological potential for additional mineral resources in the African region.

Country	Geological Potential for Mineral Resources	Known Mineral Resources	Existing Mineral Industry	Existing Petroleum Industry (not refinery activity)	
Algeria	3	3	4	1	Mineral Resources 0 No or limited data 4 Minor 3 Moderate 2 Large 1 Very large
Angola	3	3	3	1	
Benin	0	4	4	0	
Botswana	1	3	3	0	
Burkina Faso	1	4	4	0	
Burundi	1	4	4	0	Mineral Industry 0 No or limited data 4 Small 3 Medium 2 Large 1 Very large
Cameroon	3	4	4	1	
Cape Verde	0	0	4	0	
Central African Republic	1	4	4	0	
Chad	3	4	4	1	
Comoros	0	0	0	0	Geological Potential 0 Unknown 3 Potential 1 Proven
Congo DR	1	3	2	1	
Congo, Republic	3	4	4	1	
Cote d'Ivoire	3	4	4	1	
Djibouti	0	0	0	0	
Egypt	1	3	3	1	Petroleum Industry 0 None 1 Existing
Equatorial Guinea	3	4	4	1	
Eritrea	3	4	4	0	
Ethiopia	1	3	4	0	
Gabon	3	3	3	1	
Gambia	3	4	4	0	
Ghana	3	4	3	1	
Guinea	3	3	3	0	
Guinea Bissau	0	4	4	0	
Kenya	3	3	3	0	
Lesotho	3	4	4	0	
Liberia	3	4	4	0	
Libya	0	4	4	1	
Madagascar	1	3	3	0	
Malawi	3	4	4	0	
Mali	3	4	4	0	
Mauritania	3	3	3	1	
Mauritius	0	0	4	0	
Morocco	1	3	3	1	
Mozambique	1	3	3	0	
Namibia	1	3	3	0	
Niger	1	3	3	0	
Nigeria	3	4	4	1	
Rwanda	3	4	3	1	
São Tomé et Príncipe	0	0	0	0	
Senegal	3	3	3	0	
Seychelles	0	0	4	0	
Sierra Leone	1	3	3	0	
Somalia	0	0	0	0	
South Africa	1	1	1	1	

Country	Geological Potential for Mineral Resources	Known Mineral Resources	Existing Mineral Industry	Existing Petroleum Industry (not refinery activity)
Sudan	3	4	4	1
Swaziland	3	4	4	0
Tanzania	1	4	3	0
Togo	1	4	4	0
Tunisia	3	4	3	1
Uganda	3	4	4	0
Zambia	1	3	3	0
Zimbabwe	1	3	3	0

Known Mineral Resources Assessment



Existing Industry Assessment



Figure 3.1. Overview of the status of known mineral resources and the minerals industries of the African region.

Geology Potential for Mineral Resources Assessment



Figure 3.2. Overview of the geological potential for mineral resources in the African region.

Petroleum Industry Capacity Assessment



Figure 3.3. Overview of the existing petroleum resource industries in the African region.

Asia

A summary of the level of known mineral resources, existing minerals industry, and the geological potential for more resources to be identified in the Asian region is given in [Table 3.2](#). Data on which these assessments are based are given in [Appendix 3.2](#). The existing minerals industry and known resources are spread across the region with only Palestine and the Maldives having no resources or industry, or at least no available data to confirm that ranking. The geological potential for more resource discoveries is generally high with the lowest ranking countries requiring additional data to better establish their potential.

Known Mineral Resources (Fig. 3.4)

- Only the Maldives and Palestine are ranked as having no known minerals resources, or for which there are no data available.
- Many of the countries ranked as having minor known resources have production of a range of internationally-traded commodities.
- Exploration and assessment of resources in those countries has been restricted for non-geological reasons for extended periods.
- In recent years, exploration in Mongolia has delineated world-class resources of metals and coal and ongoing work is likely to yield further discoveries.
- China, India, and Kazakhstan have proven large or very large resource inventories.

Existing Mineral Industry (Fig. 3.4)

- The distribution of the existing minerals industry in the Asian region is similar to the distribution of known resources.
- Turkey, Iran and Kazakhstan all rank higher in terms of their established minerals industry than they do for known resources.
- As was noted for Africa, countries with medium or small industries can be important suppliers of mineral commodities, e.g., Vietnam is a significant supplier of ilmenite and tin.
- Major mineral producers China and India have well established industries supplying raw materials mainly for domestic consumption.
- Development of new mining industries in countries near to these major mineral consumers would almost certainly have a ready market for their output.
- As in Africa, almost all countries produce industrial minerals and construction materials that would be essential for infrastructure and the future development of mineral resources.

Geological Potential for Mineral Resources (Fig. 3.5)

- Almost all countries in the Asian region have proven significant resources or potential for the delineation of major resources of internationally-traded mineral commodities.
- Only Cambodia, Lebanon, Maldives, Iraq, Yemen, and Lebanon are ranked as having unknown potential.
- Of these Cambodia is in a geological setting that is likely to yield resources with further work.
- Those countries currently ranked as having potential are likely to yield the most abundant new resources should they be open to modern exploration based on modern high-quality pre-competitive geoscientific data provided by government agencies.

- That is not to say, however, that countries with a proven national resource inventory do not provide opportunities for significant discoveries with the further delivery of high-quality pre-competitive geoscientific data.

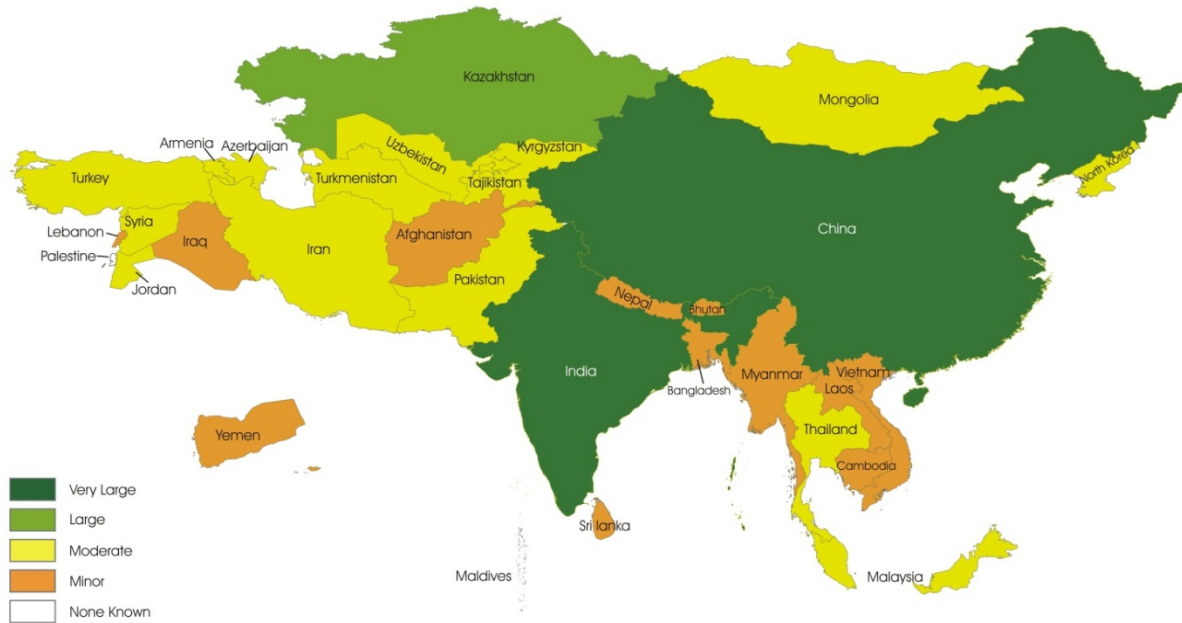
Existing Petroleum Industry (excluding refinery activity) ([Fig. 3.6](#))

- An overview of those countries producing crude petroleum commodities is given in [Figure 3.6](#).

Table 3.2. Known mineral resources, mineral industries, and geological potential for additional mineral resources in the Asian region.

Country	Geological Potential for Mineral Resources	Known Mineral Resources	Existing Mineral Industry	Existing Petroleum Industry (not refinery activity)	
Afghanistan	3	4	4	1	Mineral Resources 0 No or limited data 4 Minor 3 Moderate 2 Large 1 Very large
Armenia	3	3	3	1	
Azerbaijan	3	3	3	1	
Bangladesh	3	4	4	1	
Bhutan	3	4	4	0	
Cambodia	0	4	4	0	Mineral Industry 0 No or limited data 4 Small 3 Medium 2 Large 1 Very large
China	1	1	1	1	
India	1	1	1	1	
Iran	1	3	2	1	
Iraq	0	4	4	1	
Jordan	3	3	3	1	Geological Potential 0 Unknown 3 Potential 1 Proven
Kazakhstan	1	2	1	1	
Korea, North	3	3	3	0	
Kyrgyzstan	3	3	3	1	
Laos	3	4	4	0	
Lebanon	0	4	4	0	Petroleum Industry 0 None 1 Existing
Malaysia	1	3	3	1	
Maldives	0	0	0	0	
Mongolia	3	3	3	1	
Myanmar	3	4	4	1	
Nepal	3	4	4	0	
Pakistan	1	3	3	1	
Palestine	0	0	0	0	
Sri Lanka	3	4	3	0	
Syria	3	3	3	1	
Tajikistan	3	3	3	1	
Thailand	3	3	3	1	
Turkey	1	3	2	1	
Turkmenistan	3	3	3	1	
Uzbekistan	3	3	3	1	
Vietnam	3	4	3	0	
Yemen	0	4	4	1	

Known Mineral Resources Assessment



Existing Industry Assessment

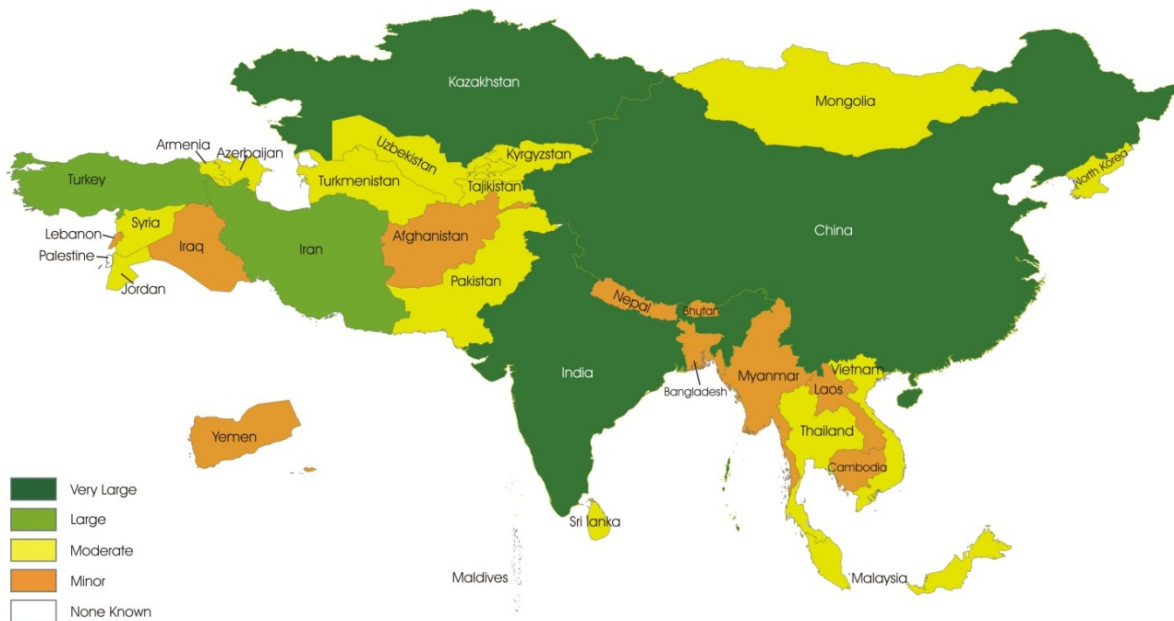


Figure 3.4. Overview of the status of known mineral resources and the minerals industries of the Asian region.

Geology Potential for Mineral Resources Assessment



Figure 3.5. Overview of the geological potential for mineral resources in the Asian region.

Petroleum Industry Capacity Assessment



Figure 3.6. Overview of the existing petroleum resource industries in the Asian region.

Latin America

A summary of the level of known mineral resources, existing minerals industry, and the geological potential for more resources to be identified in the Latin American region is given in [Table 3.3](#). In general, Mexico and many South American countries are well endowed with mineral resources and have strong minerals industries. Data and information on the mineral resources of the Caribbean nations are limited and their minerals industries are, in most cases, not well developed. Data on which these assessments are based are given in [Appendix 3.2](#).

Known Mineral Resources (Fig. 3.7)

- The size of national resource inventories is variable with five countries having large or very large inventories and eight having no resources, or for which there is no data available.
- South America dominates resources with the substantial inventories in Chile, Peru, Brazil, and Bolivia.
- In the Central American region, Mexico has a very large resource inventory.
- Countries with moderate-sized resource inventories are spread across the region and it is reasonable to expect that additional resources will be delineated in them.
- Many countries are assessed as having minor resource inventories and while it is not unreasonable to expect further discoveries there may be a need for major geoscientific data acquisition and interpretation before the potential can be fully explored.

Existing Mineral Industry (Fig. 3.7)

- The size and importance of minerals industries in the region generally reflects the levels of known mineral resources in each country.
- Major minerals industries have been established in South America and Mexico that are important to the world minerals trade, e.g., iron ore in Brazil and copper in Chile.
- Early-stage minerals industries in Central America (other than Mexico) suggest that potential exists for further development providing adequate resource inventories are delineated.
- Islands in the Caribbean region, with the exceptions of Cuba and Jamaica, generally have local scale or no reported minerals industries.
- Cuba is in the world top ten producers of cobalt and nickel and Jamaica is in the top ten bauxite producers.
- Many of the countries rated as having minor industries produce construction related commodities for local use.

Geological Potential for Mineral Resources (Fig. 3.8)

- Most countries in the region have potential for, or proven resources of, internationally-traded mineral commodities.
- Countries in South America currently ranked as having potential for further resource discoveries have similar geology to the top ranked countries on the continent. It is likely that further exploration of these countries will be successful.
- Many of the small islands of the Caribbean have limited surface areas and this, while not prohibitive, does limit the potential for further discoveries.

Existing Petroleum Industry (excluding refinery activity) (Fig. 3.9)

- An overview of those countries producing crude petroleum commodities is given in [Figure 3.9](#).

Table 3.3. Known mineral resources, mineral industries, and geological potential for additional mineral resources in the Latin American region.

Country	Geological Potential for Mineral Resources	Known Mineral Resources	Existing Mineral Industry	Existing Petroleum Industry (not refinery activity)	
Anguilla	0	0	0	0	Mineral Resources 0 No or limited data 4 Minor 3 Moderate 2 Large 1 Very large
Antigua & Barbuda	0	0	0	0	
Argentina	1	3	3	1	
Belize	0	4	4	1	
Bolivia	1	2	2	1	
Brazil	1	1	1	1	Mineral Industry 0 No or limited data 4 Small 3 Medium 2 Large 1 Very large
Chile	1	1	1	1	
Colombia	1	4	3	1	
Costa Rica	0	4	4	1	
Cuba	3	3	3	1	
Dominica	0	0	0	0	Geological Potential 0 Unknown 3 Potential 1 Proven
Dominican Republic	3	4	4	0	
Ecuador	3	4	4	1	
El Salvador	0	4	4	0	
Grenada	0	0	0	0	
Guatemala	3	4	4	1	Petroleum Industry 0 None 1 Existing
Guyana	3	3	3	0	
Haiti	0	4	4	0	
Honduras	3	3	3	0	
Jamaica	0	3	3	0	
Mexico	1	1	1	1	
Montserrat	0	0	0	0	
Nicaragua	3	4	4	0	
Panama	0	4	4	0	
Paraguay	3	4	4	0	
Peru	1	2	2	1	
St Helena	0	0	0	0	
St Kitts-Nevis	0	4	4	0	
St Lucia	0	0	0	0	
St Vincent and Grenadines	0	0	0	0	
Suriname	3	3	3	1	
Uruguay	3	4	4	0	
Venezuela	1	3	3	1	

Known Mineral Resources Assessment



Existing Industry Assessment



Figure 3.7. Overview of the status of known mineral resources and the minerals industries of the Latin American region.

Geology Potential for Mineral Resources Assessment



Figure 3.8. Overview of the geological potential for mineral resources in the Latin American region.

Petroleum Industry Capacity Assessment



Figure 3.9. Overview of the existing petroleum resource industries in the Latin American region.

The Pacific

A summary of the level of known mineral resources, existing minerals industry, and the geological potential for more resources to be identified in the Pacific region is given in [Table 3.4](#). Only Fiji, Indonesia (included here for presentation purposes only), Papua New Guinea, and the Philippines have significant mineral resources, mineral industries, and potential for further discoveries. In addition, Timor-Leste and the Solomon Islands are recognised as having potential to host significant resources. The low ranking for the remainder of the countries in the region may reflect, in part at least, the lack of consistent wide-spread modern geological surveying. In summary, data and information on the mineral resources of almost all of the Pacific nations are limited and their minerals industries are in most cases not well developed. Data on which these assessments are based are given in [Appendix 3.2](#).

Known Mineral Resources ([Fig. 3.10](#))

- The size of national resource inventories is variable with five countries having large or very large inventories and eight having no resources, or for which there is no data available.
- In the region only Indonesia, Papua New Guinea, Fiji, and the Philippines have reported resource inventories.
- The lack of mineral inventories in other countries may be due to a lack of data reported rather than a lack of resources and if this is the case it reflects a need for more work to identify the presence or absence of resources in those countries.
- Indonesia has substantial resources of many commodities including coal, copper, tin, and nickel.

Existing Mineral Industry ([Fig. 3.10](#))

- The size and importance of minerals industries in the region generally reflect the levels of known mineral resources in each country.
- Indonesia has an important minerals industry which produces a range of commodities including tin, nickel, copper, gold, and coal for which production is in the world top ten.
- Papua New Guinea produces gold, copper, and silver while Fiji has small gold and silver output.
- The Philippines production of nickel and cobalt is in the world top ten and a number of other metals are mined as are small tonnages of coal.

Geological Potential for Mineral Resources ([Fig. 3.11](#))

- Only Indonesia has a proven large mineral resource inventory.
- Papua New Guinea, Philippines, Solomon Islands, and Timor-Leste have potential for significant resource discoveries.
- All other countries of the region currently have unknown potential for hosting significant mineral resources. This ranking, for many countries, could be due more to the lack of data than to any true lack of potential.

Existing Petroleum Industry (excluding refinery activity) ([Fig. 3.12](#))

- An overview of those countries producing crude petroleum commodities is given in [Figure 3.12](#).

Table 3.4. Known mineral resources, mineral industries, and geological potential for additional mineral resources in the Pacific region.

Country	Geological Potential for Mineral Resources	Known Mineral Resources	Existing Mineral Industry	Existing Petroleum Industry (Not Refinery Activity)	
Cook Islands	0	0	0	0	Mineral Resources 0 No or limited data 4 Minor 3 Moderate 2 Large 1 Very large
Fiji	3	4	4	0	
Indonesia	1	2	2	1	
Kiribati	0	0	0	0	
Marshall Islands	0	0	0	0	
Micronesia, Federated States	0	0	0	0	Mineral Industry 0 No or limited data 4 Small 3 Medium 2 Large 1 Very large
Nauru	0	0	0	0	
Niue	0	0	0	0	
Palau	0	0	0	0	
Papua New Guinea	3	3	4	1	
Philippines	3	3	3	1	Geological Potential 0 Unknown 3 Potential 1 Proven
Samoa	0	0	0	0	
Solomon Islands	3	4	4	0	
Timor-Leste	3	0	0	1	
Tokelau	0	0	0	0	
Tonga	0	0	0	0	Petroleum Industry 0 None 1 Existing
Tuvalu	0	0	0	0	
Vanuatu	0	0	0	0	
Wallis and Futuna	0	0	0	0	

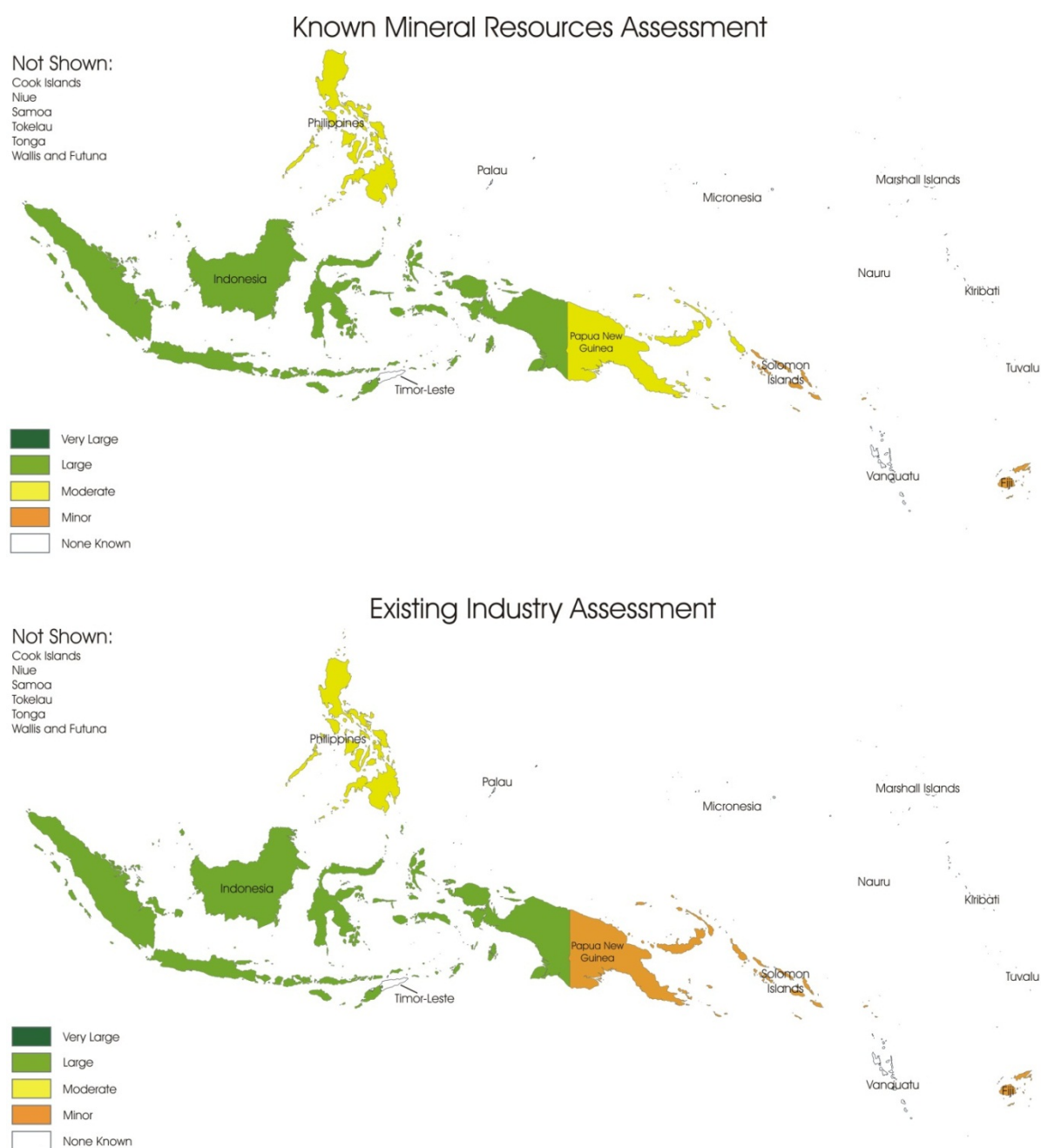


Figure 3.10. Overview of the status of known mineral resources and the minerals industries of the Pacific region. Small Pacific countries are best assessed using the assessment summary tables.

Geology Potential for Mineral Resources Assessment



Figure 3.11. Overview of the geological potential for mineral resources in the Pacific region. Small Pacific countries are best assessed using the assessment summary tables.

Petroleum Industry Capacity Assessment



Figure 3.12. Overview of the existing petroleum resource industries in the Pacific region. Small Pacific countries are best assessed using the assessment summary tables.

3.4. Geological Reports and Maps of Developing Countries and Territories

Some of the geological reports and maps used to develop this report that are particularly useful include:

1. Geology of African countries (<http://www.springerlink.com/content/978-3-540-29144-2/?MUD=MP>);
2. OneGeology (<http://www.onegeology.org/participants/app/1gCountries.cfc?method=viewCountries>);
3. Geology of the World (<http://www.geology-of-the-world.com/>);
4. Perry-Castañeda Library Map Collection (<http://www.lib.utexas.edu/maps/>);
5. Mineral commodities data (<http://minerals.usgs.gov/minerals/pubs/country/index.html#pubs>);
6. Government geological surveys (<http://www.uni-mainz.de/FB/Geo/Geologie/GeoSurv.html> and <http://www.seamic.org/gso.php#6>);
7. Directory of Geoscience Organisations of the World (<http://www.gsj.jp/information/gsj-link/dir/a.pdf>); and
8. Major geoscience organisations (<http://www.cgi-iugs.org/links.html>).

4. Assessment of Geoscience Survey Capacity

4.1. Introduction and Methodology

The capacity of national geoscience organisations is considered crucial to a country's ability to utilise the mining sector to further advance development. Geoscience organisations provide a first contact service to investors by hosting nationally held geoscientific data sets and pertinent expertise. Geoscientific organisations are also often responsible for implementation of minerals and petroleum licensing and other legislative roles.

Geological surveys were assessed on the basis of their ability to actively acquire data, and to disseminate geoscientific data acquired by private industry in order to promote investment and development of mining industries. Geoscience surveys were assessed for this study on the basis of information hosted on their websites using the twelve categories: geology, geophysics, marine, hydrogeology, risk/hazard, remote sensing, mapping, mining, energy, publications, publications, and English website availability. Using these categories surveys were classified into five degrees of assessed capability:

1. strong capacity to collect and disseminate high quality geoscientific data and information;
2. capacity to undertake major geoscientific surveys and disseminate data efficiently;
3. some capacity to undertake major geoscientific surveys and to disseminate data;
4. limited capacity to undertake geoscientific surveying; and
0. no geological survey detected, or no information available.

Surveys with no active English, Spanish, or French website have been automatically classified as '0's as no, or limited information on survey capacity was discoverable. Where obviously well-developed surveys had temporarily inactive (e.g., Egypt) or maliciously altered-'hacked' (e.g., Syria) websites, and significant information on the survey's capacity was available elsewhere, these alternative information sources have been used to rate the survey's performance.

The final assessment of geological survey capacity can be seen in [Figure 4.1](#) to [Figure 4.4](#), and is summarised in [Table 4.1](#). A more detailed summary of the geoscience survey capacity analysis can be seen in [Appendix 4.1](#); and a summary of website details of geological surveys (where found) are in [Appendix 4.2](#).

4.2. Assessments

Africa

African geological surveys are highly variable, but the majority of surveys have been classified with 3 to 4 with some to limited capacity, and 0 where no data is available or no survey was detected. Only five surveys were classified as 2, and the Council for Geoscience (South African Geological Survey) was classified as 1 with strong capacity. Most central western and northwestern African countries (excluding Morocco) have limited geological survey capacity. More developed geological surveys are concentrated on the eastern seaboard and in southern Africa. Many government websites for the identified countries suggest national geological surveys are present, but there are no active websites, and so no direct information is available. The geological survey capacity assessment for Africa can be seen in [Figure 4.1](#).

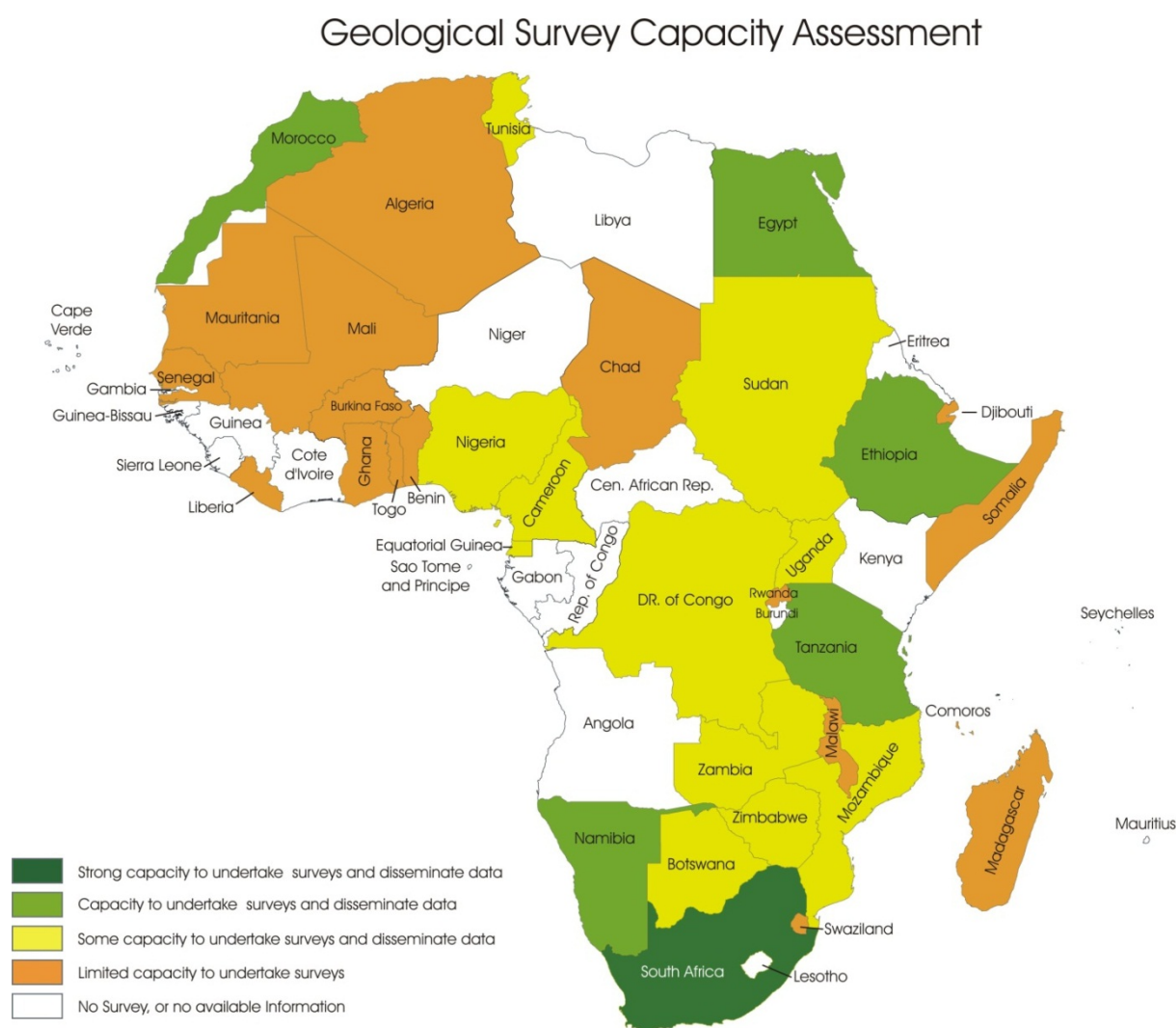


Figure 4.1. Geological Survey capacity in the African region.

Asia

The Asian–Eurasian region has generally well-developed geoscientific surveying capability with the vast spatial area well served by the highly developed Chinese, Indian, and Iranian geological surveys. Very poorly developed survey capability is found in the north and northwest of the region, while the western-Eurasia and southern Asian regions show more mixed capability. Many of these countries are actively being assisted by the ‘Coordinating Committee for Geoscience Programmes’ (CCOP) to better establish surveys and geoscience for development programs. The geological survey capacity assessment for Asia can be seen in [Figure 4.2](#).

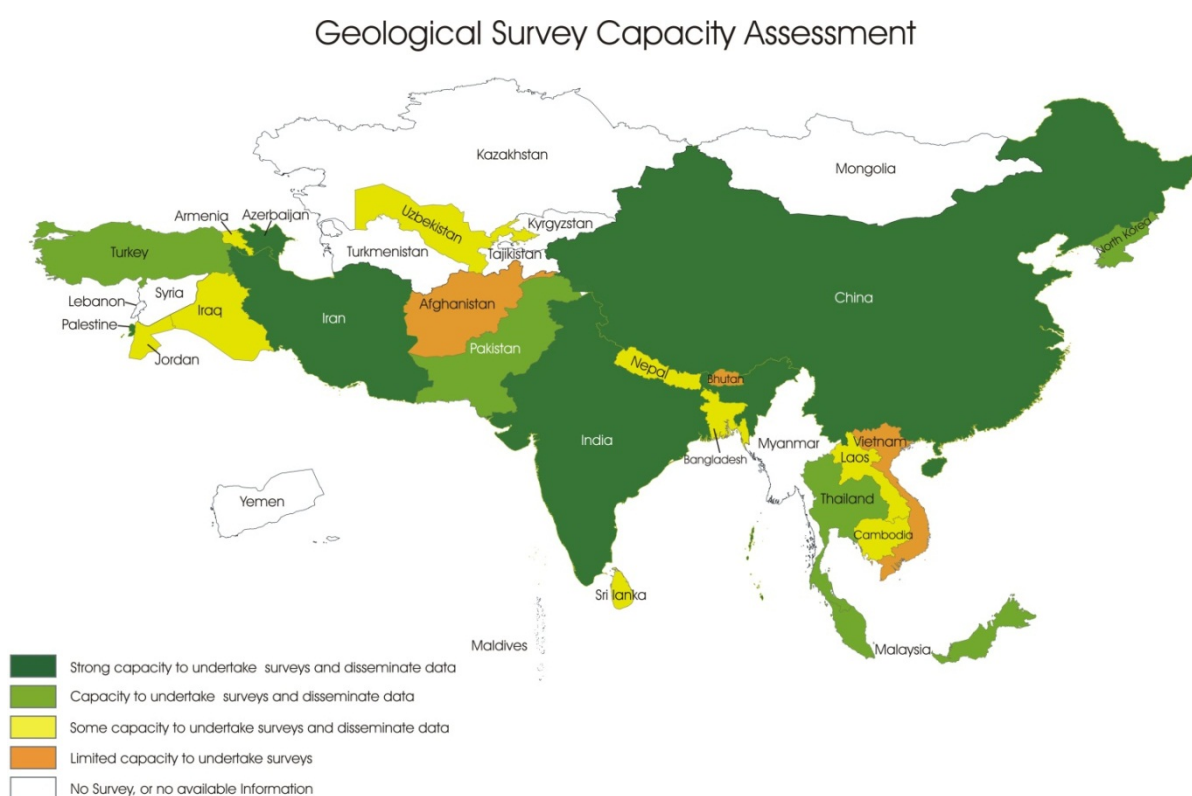


Figure 4.2. Geological Survey capacity in the Asian region.

Latin America

Latin American geological surveys are generally quite advanced, with much of the region being classified as 1 or 2 with strong geoscientific capacity. Smaller and less-developed countries in the north of South America and many of the smaller Caribbean countries typically have less well-developed, or no, geological survey capabilities. Many of the surveys websites are available only in Spanish or Portuguese. The geological survey capacity assessment for Latin America can be seen in [Figure 4.3](#).



Figure 4.3. Geological Survey capacity in the Latin American region.

The Pacific

The Pacific region has poorly-developed geoscientific surveying capability with only the Philippines and Papua New Guinea showing highly developed capabilities as based on the data available via websites. The Indonesian survey is well developed, but the lack of an English survey website hindered a full assessment. The smaller island nations almost universally have no active geological surveys, but as in the Asian region several are being actively assisted by the Coordinating Committee for Geoscience Programmes in East and South East Asia (CCOP, <http://www.ccop.or.th/>) and the geoscience and technology division of the Secretariat of the Pacific Community (SOPAC, <http://www.sopac.org/>). The geological survey capacity assessment for the Pacific can be seen in Figure 4.4.

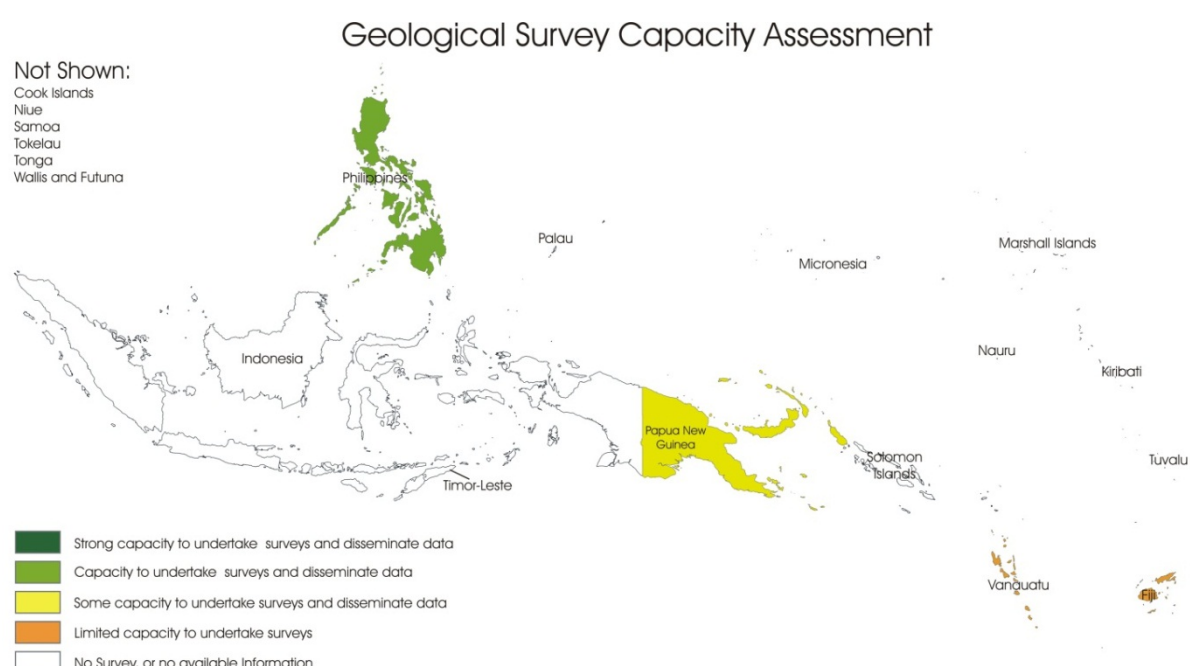


Figure 4.4. Geological Survey capacity in the Pacific region. Note the absence of far-eastern Pacific nations that were assessed in this study, but are not able to be visualised at this scale. Capacities of small Pacific countries are best captured using the assessment summary tables (Table 4.1).

Table 4.1. Geological survey capacity assessments.

Africa	Geological Survey Capacity	Asia	Geological Survey Capacity	Latin America	Geological Survey Capacity	The Pacific	Geological Survey Capacity
Algeria	4	Afghanistan	4	Anguilla	0	Cook Islands	0
Angola	0	Armenia	3	Antigua	0	Micronesia	0
Benin	4	Azerbaijan	1	Argentina	2	Fiji	4
Botswana	3	Bangladesh	3	Barbuda	0	Indonesia	0
Burkina Faso	4	Bhutan	4	Belize	0	Kiribati	0
Burundi	0	Cambodia	3	Bolivia	2	Marshall Islands	0
Cameroon	3	China	1	Brazil	1	Nauru	0
Cape Verdi	0	North Korea	2	Chile	2	Niue	0
Central African Republic	0	India	1	Colombia	2	Palau	0
Chad	4	Iran	1	Costa Rica	3	Papua New Guinea	3
Comoros	4	Iraq	3	Cuba	3	Philippines	2
Congo DR	3	Jordan	3	Dominica	0	Samoa	0
Congo, Republic	0	Kazakhstan	0	Dominican Republic	3	Solomon Islands	0
Cote d'Ivoire	0	Kyrgyzstan Republic	0	Ecuador	0	Timor-Leste	0
Djibouti	4	Laos	3	El Salvador	0	Tokelau	0
Egypt	2	Lebanon	0	Grenada	0	Tonga	0
Equatorial Guinea	3	Malaysia	2	Guatemala	0	Tuvalu	0
Eritrea	0	Maldives	0	Guyana	4	Vanuatu	4
Ethiopia	2	Mongolia	0	Haiti	0	Wallis and Futuna	0
Gabon	0	Myanmar	0	Honduras	0		
Gambia	0	Nepal	3	Jamaica	3		
Ghana	4	Pakistan	2	Mexico	2		
Guinea	0	Palestine	1	Montserrat	0		
Guinea Bissau	0	Sri Lanka	3	Nicaragua	0		
Kenya	0	Syria	0	Panama	0		
Lesotho	0	Tajikistan	0	Paraguay	4		
Liberia	4	Thailand	2	Peru	3		
Libya	0	Turkey	2	St Helena	0		
Madagascar	4	Turkmenistan	0	St Kitts-Nevis	0		
Malawi	4	Uzbekistan	3	St Lucia	0		
Mali	4	Vietnam	4	St Vincent and Grenadines	0		
Mauritania	4	Yemen	0	Suriname	0		
Mauritius	0			Uruguay	3		
Morocco	2			Venezuela	3		
Mozambique	3						
Namibia	2						
Niger	0						
Nigeria	3						
Rwanda	4						
Sao Tome and Principe	0						
Senegal	4						
Seychelles	0						
Sierra Leone	0						
Somalia	4						
South Africa	1						
Sudan	3						
Swaziland	4						
Tanzania	2						
Togo	4						
Tunisia	3						
Uganda	3						
Zambia	3						
Zimbabwe	3						

5. Assessment of Political and Social Risk

5.1. Introduction and Methodology

During the past four decades there have been marked increases in the industrialisation status of many developing countries in the world. Developing countries are those which are in the process of industrialisation, and have surpassed undeveloped countries that are dominantly pre-industrial and agrarian-based. In contrast, developed countries have post-industrial economies that have service sectors providing more wealth than the industrial sectors. Notable examples of rapidly developing countries are China, India, and Indonesia, which are characterised by large industrial production systems, rapid economic growth, global trade impacts, and marked increases in corporate and personal wealth. The ten poorest countries in 'The World 2012', based on gross domestic product (GDP) per capita, are all largely undeveloped in Africa (the lowest GDP per capita country is the Democratic Republic of the Congo, followed by Liberia, Zimbabwe, Burundi, Eritrea, Central African Republic, Niger, Sierra Leone, Malawi, and Togo: <http://www.therichest.org/world/poorest-countries-in-the-world/>).

Some African nations have taken advantage of their abundant mineral and petroleum resources (see [Section 3](#)). For example, the Republic of South Africa is one of the world's leading mining and mineral-processing countries with significant world production and reserves of platinum-group elements, chromium, manganese, vanadium, gold, zirconium, nickel, and several other metals (<http://minerals.usgs.gov/minerals/pubs/country/2009/myb3-2009-sf.pdf>). Nigeria is also one of the largest oil-producing nations in the world and Niger has vast resources of uranium (see [Section 3](#)). Whereas other African countries with significant natural resources like the Democratic Republic of Congo, do not have access to the capital needed to create an infrastructure that could exploit its resources.

The prospects of such poor countries in parts of Africa, Asia, Latin America, and the Pacific are often very much dependent on their vulnerability to global-scale impacts or forces that are largely outside their control. Such external impacts may be of natural or cultural origin and include such forces as extreme climatic conditions that can initiate wide-scale famines and floods, and the volatility in world prices for oil and other primary mineral commodities. In addition, many of these countries are also vulnerable to political and social risks within their borders, i.e., of which they have more control. Such risks can be characterised under the four broad categories of Political, Operational, Security, and Terrorism. Within these groups there are many complex aspects of risk that cut across all levels of society. The assessment of these risks is important since the 'capability' of a particular country to exploit its mineral resource wealth (see [Section 3](#)) may be significantly reduced if, for example, there is a perceived high risk of internal security or terrorism in that country. It is therefore recommended that social-political risk profiles of countries should be integrated with assessments of mineral resources potential, as done for this study. For example, [Tables 7.1 to 7.4](#) summarise the integration of socio-political-cultural risks of a country with mineral potential and geological aid criteria. This composite dataset approach can therefore provide an overall 'rating' of the exploration attractiveness of that country, which in turn can be an indicator for potential financial and service aid support.

This chapter summarises the Political, Operational, Security, and Terrorism Risk profiles of 138 'developing' countries and territories in Africa (53 countries), Asia (32), Latin America (34), and the Pacific (19). These data are reproduced with permission from the Control Risks Group Limited 2012 (www.control-risks.com), which can be sourced by paid licence through Intierra Resource Intelligence (www.intierra.com). These assessments are entirely the view of the global consultancy group Control Risks, and do not represent the view of Geoscience Australia, AusAID, or the Australian Government.

Four types of Risk were used in this study, as defined by the Control Risks Group Limited ([Appendix 5.1](#)).

1. Political Risk: evaluates the likelihood of state (e.g., domestic and foreign governments, parliament, the judiciary, and the security forces) or non-state (insurgent groups, secessionist movements, lobbies, other companies, organised criminal groups) political actors negatively affecting business operations in a country through regime instability or direct/indirect interference.
2. Operational Risk: evaluates the influence of societal and structural factors on business activity in a country, and the likelihood of state (judiciary, regulatory bodies, state and local administration) and non-state (labour forces, campaign and protest groups, as well as international organisations) actors either facilitating or impeding efficient business operations.
3. Security Risk: evaluates the likelihood of state or non-state actors (political extremists, direct action groups, the security forces, foreign armies, insurgents, petty and organised criminals, computer hackers, protesters, workforces, local communities, indigenous groups, corrupt officials, business partners) engaging in actions that harm the financial, physical, and human assets of a company, and the extent to which the state is willing and able to protect those assets.
4. Terrorism Risk: evaluates the likelihood that acts of terrorism (bombings, murder, hostage-taking, attacks using chemical, biological, or radioactive agents, and use of non-conventional weapons, or threats of attacks) directly or indirectly affect business operations in a country. Terrorism is the use or threat of violence by non-state actors against state or civilian targets to advance an ideological cause by influencing a wider audience.

These four types of risk are assigned a particular level of risk, ranging upwards from Insignificant, Low, Moderate, High, to the highest level of Extreme. The Moderate rating level equates to the Medium rating used by the Control Risks Group Limited—all other rating levels are the same. The details and implications of these five levels are defined in [Appendix 5.1](#). Due to the large dataset of countries and the importance of rapidly 'digesting' the data, it was decided to present the data graphically in coloured barcode plots and regional maps. These two visual products facilitate ready comparisons of risk rankings both within, and between countries, and between continent regions.

Another indicator of the risk status of a particular country is provided by the Australian Government's Department of Foreign Affairs and Trade 'Smartraveller Advice' at <http://www.smartraveller.gov.au/zw-cgi/view/Advice/Index>. Travel advisories are graded across four different levels. The level allocated to a specific country reflects the overall assessment of the security situation in the destination and is designed to assess the level of risk you would face in that country. Four levels of risk are identified: Level 1—Exercise normal safety precautions, Level 2—Exercise a high degree of caution, Level 3—Reconsider your need to travel, and Level 4—Do not travel.

5.2. Assessments

The following section summarises some observations concerning the major geographical distribution of risk evident in the barcode profiles of [Table 5.1](#) to [5.4](#) and the maps of [Figures 5.1](#) to [5.4](#).

Throughout this report, the basis for the order of reporting for the four regions (Africa, Asia, Latin America, the Pacific) and the countries contained in these regions, is purely alphabetical, and does not reflect any preferences or biases. Three small countries and Territories (Niue, St Helena, Tokelau) in [Tables 5.3](#) and [5.4](#) do not have risk data. The risk profile of Australia is provided as a comparison with the developing countries.

Africa

The African region displays significantly higher risk rankings for Political, Operational, Security, and Terrorism relative to the Latin America and Pacific regions. Only the Asian region has a comparable status of Extreme to High rankings for the four types of risk. Within Africa, the northern and northwestern regions are generally classified High Risk for Political and Security issues. Operational risks are most prominent in central and western Africa, whereas Terrorism risk has Moderate to High ratings in the northern half of the continent (notably Algeria, Mali, and Somalia). Two countries, Somalia and Zimbabwe, record Extreme ratings, with the former country having the highest level of determined risk for the 138 nations assessed in this study—Extreme for Political, Operational, and Security, and High for Terrorism.

Countries with the lowest risk (Insignificant to Low) profiles include Botswana, Namibia, Seychelles, and Mauritius. In general, developing countries in the southern part of Africa, and isolated coastal nations in western Africa (Ghana, Morocco, and to a lesser degree Benin and Senegal) have the lowest risk profiles, and hence using this criterion alone, are more attractive for exploration opportunities. The risk assessments for the African region are summarised in [Table 5.1](#) and [Figure 5.1](#).

Table 5.1. Risk assessment profiles for developing countries and territories in Africa.

Source: with permission from Control Risks Group Limited 2012 (www.control-risks.com) via Intierra Resource Intelligence (www.intierra.com).

Legend: Level of Risk	No Data (ND)	Insignificant	Low	Moderate	High	Extreme
	0	1	2	3	4	5

Country	Political Risk	Operational Risk	Security Risk	Terrorism Risk
Algeria	4	3	4	4
Angola	3	4	3	2
Benin	3	3	2	1
Botswana	2	2	2	1
Burkina Faso	3	3	3	2
Burundi	3	4	3	2
Cameroon	3	4	3	2
Cape Verde	2	3	2	1
Central African Republic	4	4	4	2
Chad	4	4	3	2
Comoros	4	4	2	2
Cote d'Ivoire	4	4	4	2
Democratic Repub. of Congo	4	4	4	2
Djibouti	3	3	3	3
Egypt	4	3	3	3
Equatorial Guinea	4	4	3	2
Eritrea	4	4	3	3
Ethiopia	3	3	3	3
Gabon	3	3	2	1
Gambia	4	3	2	1
Ghana	2	3	2	1
Guinea	4	4	3	2
Guinea-Bissau	4	4	3	2
Kenya	3	3	3	3
Lesotho	3	3	3	1
Liberia	3	4	3	2
Libya	4	3	4	3
Madagascar	4	3	3	2
Malawi	3	3	2	1
Mali	4	4	3	4
Mauritania	4	4	3	3
Mauritius	2	2	2	2
Morocco	2	3	2	2
Mozambique	3	3	3	2
Namibia	2	2	2	1
Niger	4	4	3	3
Nigeria	3	3	4	3
Republic of the Congo	3	3	3	1
Rwanda	3	3	2	2
São Tomé et Príncipe	3	4	2	1
Senegal	3	3	2	2
Seychelles	2	2	1	2
Sierra Leone	3	4	3	2
Somalia	5	5	5	4

Country	Political Risk	Operational Risk	Security Risk	Terrorism Risk
South Africa	3	3	3	2
Sudan	4	4	2	3
Swaziland	3	3	3	1
Tanzania	2	3	2	3
Togo	3	3	3	2
Tunisia	3	3	2	2
Uganda	3	3	2	2
Zambia	3	3	2	1
Zimbabwe	5	4	4	1

Reference Country

Australia	2	1	2	2
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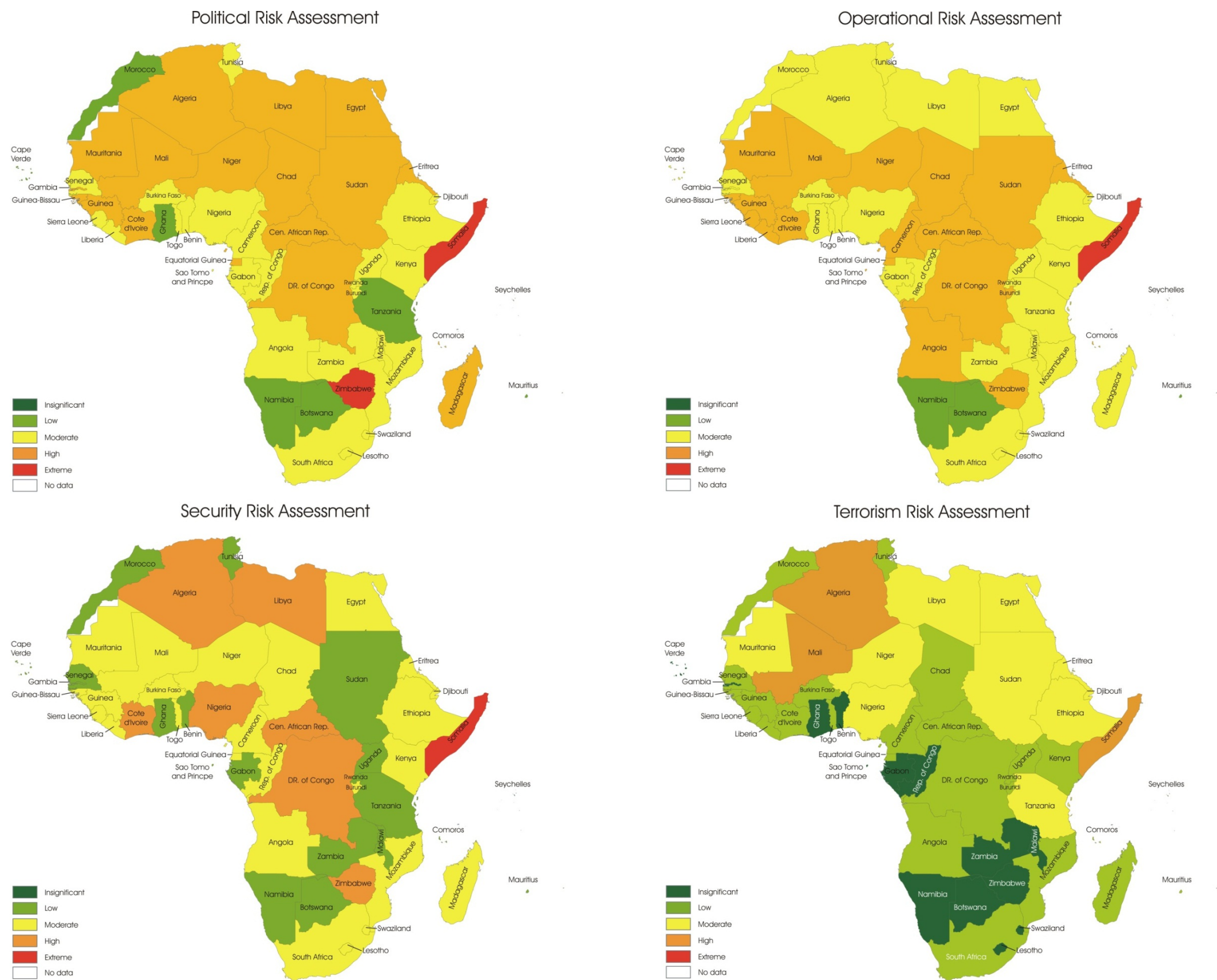


Figure 5.1. Risk assessments for the African region.

Asia

The Asian region (includes Eurasia and the Middle East for this study) has marginally higher risk ratings than Africa, and significantly higher ratings compared to Latin America and the Pacific. This regional feature is more representative in the barcode distribution ([Table 5.1](#)) since the visual impact of the map ([Fig. 5.2](#)) can be biased by the extensive expanses of the larger countries China, Kazakhstan, and India. Political and Operational risks are generally higher (Moderate to High) for most countries relative to those for Security and Terrorism (Low to Moderate). China, India, Vietnam, and Malaysia generally have lower risk ratings than those of contiguous countries. Countries that record the highest risk classifications of Extreme include Afghanistan (Operational and Security), Iraq (Security and Terrorism), North Korea (Operational), and Syria (Political). The risk of Terrorism is highest in Iraq, followed by Afghanistan, Pakistan, and Yemen. Iraq is the country in this study of 138 countries that has recorded an Extreme rating for Terrorism. The risk assessments for the Asian region are summarised in [Table 5.2](#) and [Figure 5.2](#).

Table 5.2. Risk assessment profiles for developing countries and territories in Asia.

Source: with permission from Control Risks Group Limited 2012 (www.control-risks.com) via Intierra Resource Intelligence (www.intierra.com).

Legend: Level of Risk	No Data (ND)	Insignificant	Low	Moderate	High	Extreme
	0	1	2	3	4	5

Country	Political Risk	Operational Risk	Security Risk	Terrorism Risk
Afghanistan	4	5	5	4
Armenia	3	3	3	1
Azerbaijan	3	3	3	2
Bangladesh	3	4	3	3
Bhutan	2	3	2	1
Cambodia	3	3	3	3
China	3	3	2	2
India	2	3	3	3
Iran	4	4	2	2
Iraq	4	4	5	5
Jordan	3	3	2	3
Kazakhstan	3	3	2	2
Kyrgyzstan Republic	4	4	4	3
Laos	3	3	2	2
Lebanon	3	3	3	3
Malaysia	2	3	2	2
Maldives	2	3	2	2
Mongolia	3	3	3	1
Myanmar	4	4	3	2
Nepal	4	4	3	2
North Korea	4	5	2	1
Pakistan	3	4	4	4
Palestine	4	3	3	2
Sri Lanka	3	3	3	3
Syria	5	4	4	3
Tajikistan	4	4	4	3
Thailand	3	3	2	3
Turkey	3	3	2	2
Turkmenistan	3	3	3	2
Uzbekistan	4	4	3	3
Vietnam	2	3	2	2
Yemen	4	4	4	4

Reference Country

Australia	2	1	2	2
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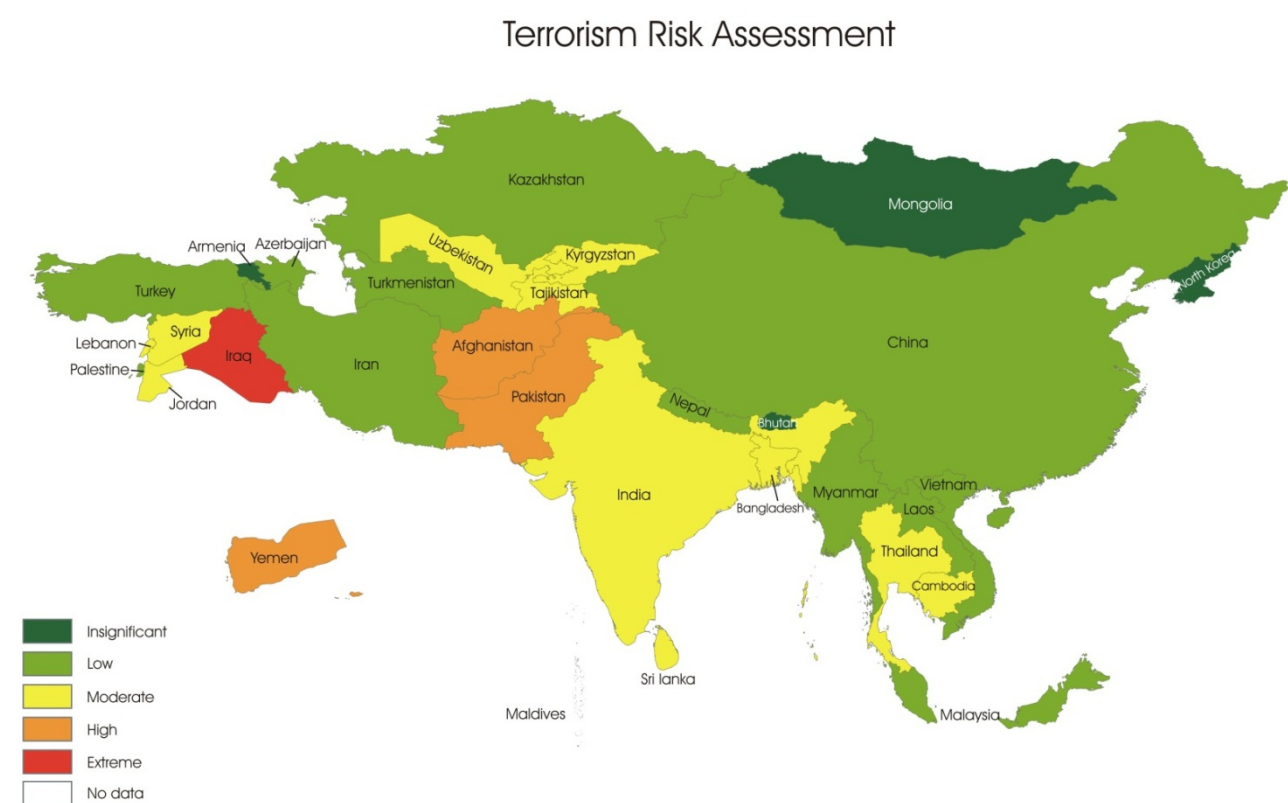
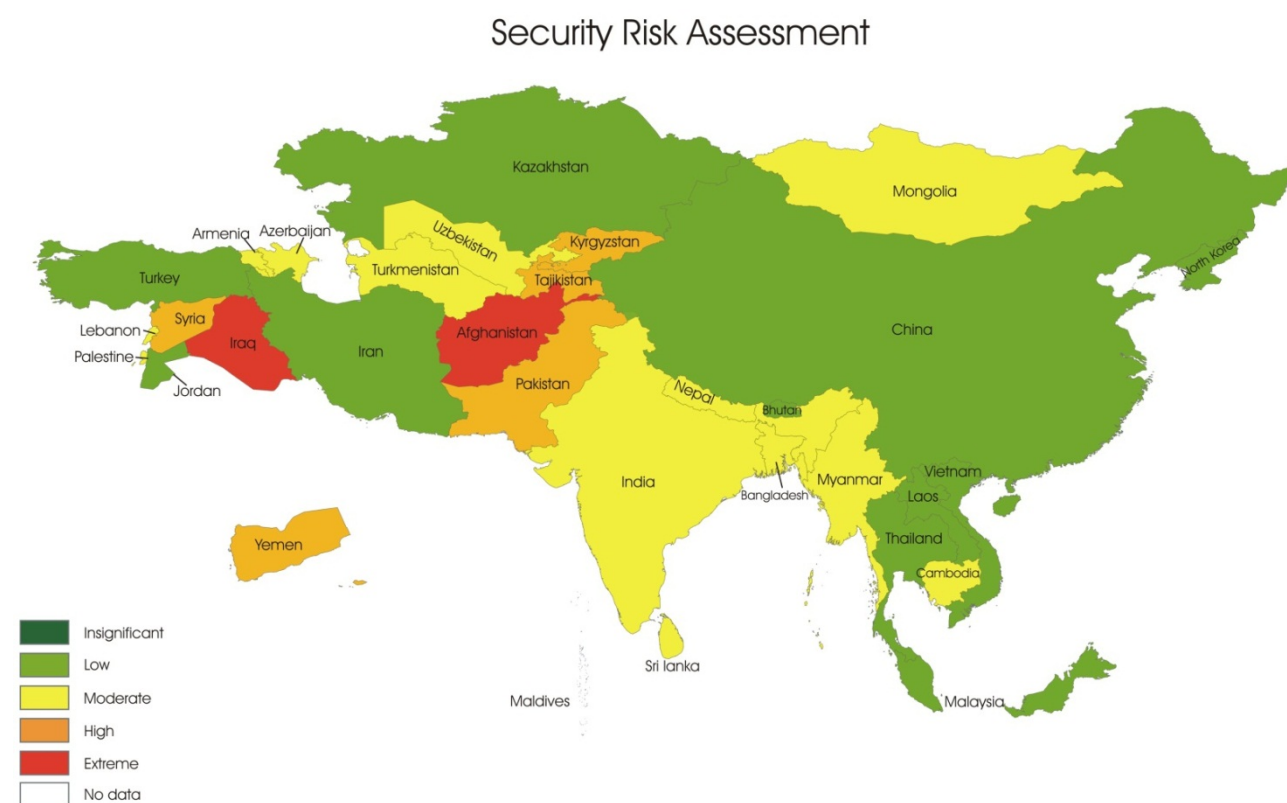
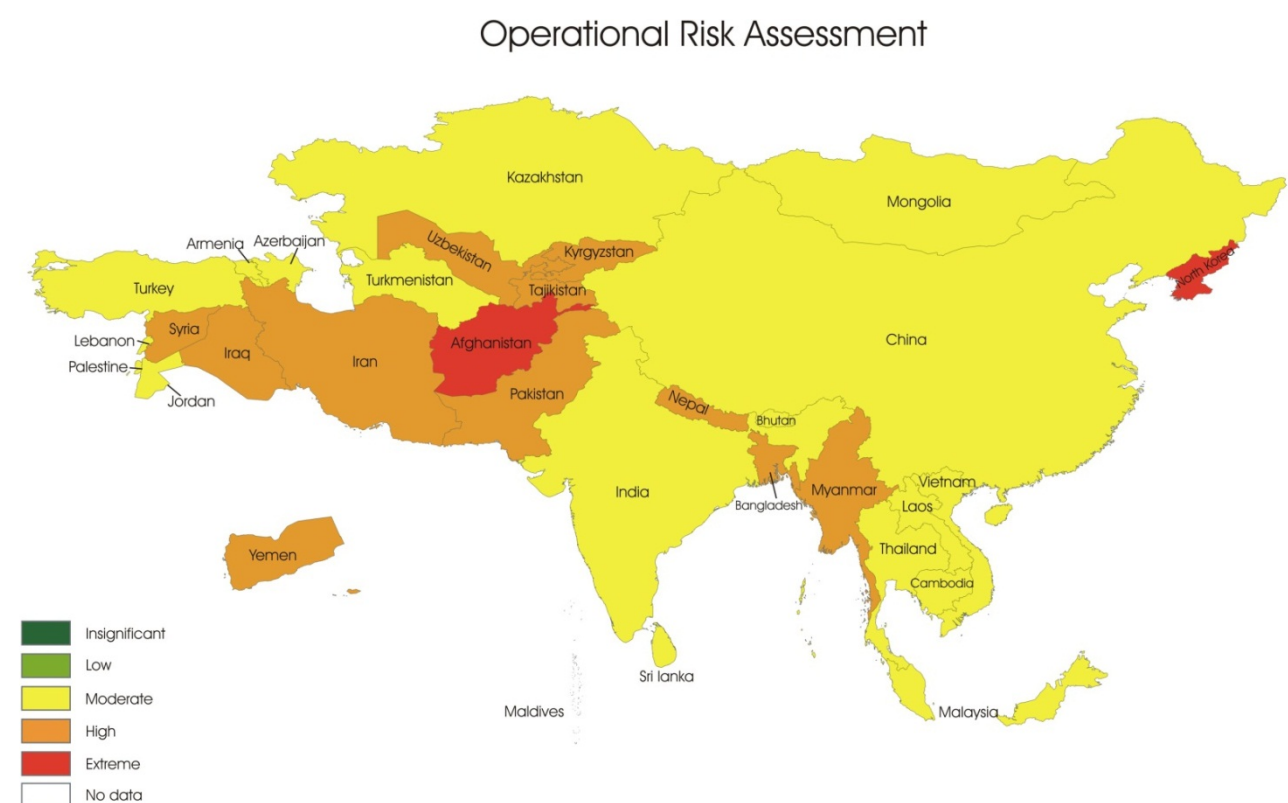


Figure 5.2. Risk assessments for the Asian region.

Latin America

The risk profile for the Latin American region can generally be described as having a Low to Moderate status, with isolated countries (Bolivia, Ecuador, Haiti, Nicaragua, and Venezuela) in the northern half of the region classified High Risk for Political and Operational issues. Interestingly, for two of the most prominent and largest countries in Latin America—Argentina and Brazil—they have identical Operational and Terrorism risk ratings, but they have the reverse Low to Moderate scenario for Political and Security risks. The Extreme (Operational) and two High (Political and Security) ratings for the small Caribbean coastal country of Haiti are geographically anomalous and are in response to the devastating 2010 earthquake that damaged much of the operational infrastructure for foreign businesses, and the country's high levels of political instability and violence. With the exception of Colombia (Moderate), all countries in the Latin American region have Insignificant to Low ratings for Terrorism risks. The risk assessments for the Latin American region are summarised in [Table 5.3](#) and [Figure 5.3](#).

Table 5.3. Risk assessment profiles for developing countries and territories in Latin America.

Source: with permission from Control Risks Group Limited 2012 (www.control-risks.com) via Intierra Resource Intelligence (www.intierra.com).

Legend: Level of Risk	No Data (ND)	Insignificant	Low	Moderate	High	Extreme
	0	1	2	3	4	5

Country	Political Risk	Operational Risk	Security Risk	Terrorism Risk
Anguilla ¹	1	1	1	1
Antigua	2	2	2	1
Argentina	3	3	2	2
Barbuda	2	2	2	1
Belize	2	2	2	1
Bolivia	4	4	3	2
Brazil	2	3	3	2
Chile	2	2	2	2
Colombia	2	3	3	3
Costa Rica	2	2	2	1
Cuba	3	3	2	1
Dominica	1	2	1	1
Dominican Republic	2	3	3	1
Ecuador	4	4	3	2
El Salvador	2	3	3	2
Grenada	2	2	2	1
Guatemala	3	3	3	2
Guyana	2	3	3	2
Haiti	4	5	4	2
Honduras	3	3	3	2
Jamaica	2	3	3	2
Mexico	2	3	3	2
Montserrat ¹	1	3	2	1
Nicaragua	4	3	3	2
Panama	2	3	3	2
Paraguay	3	3	2	2
Peru	3	3	3	2
St Helena ¹ (ND)	0	0	0	0
St Kitts-Nevis	1	2	2	1
St Lucia	1	2	2	1
St Vincent and Grenadines	1	2	2	1
Suriname	3	3	2	2
Uruguay	2	2	2	1
Venezuela	4	4	3	2

¹ Territory

Reference Country

Australia	2	1	2	2
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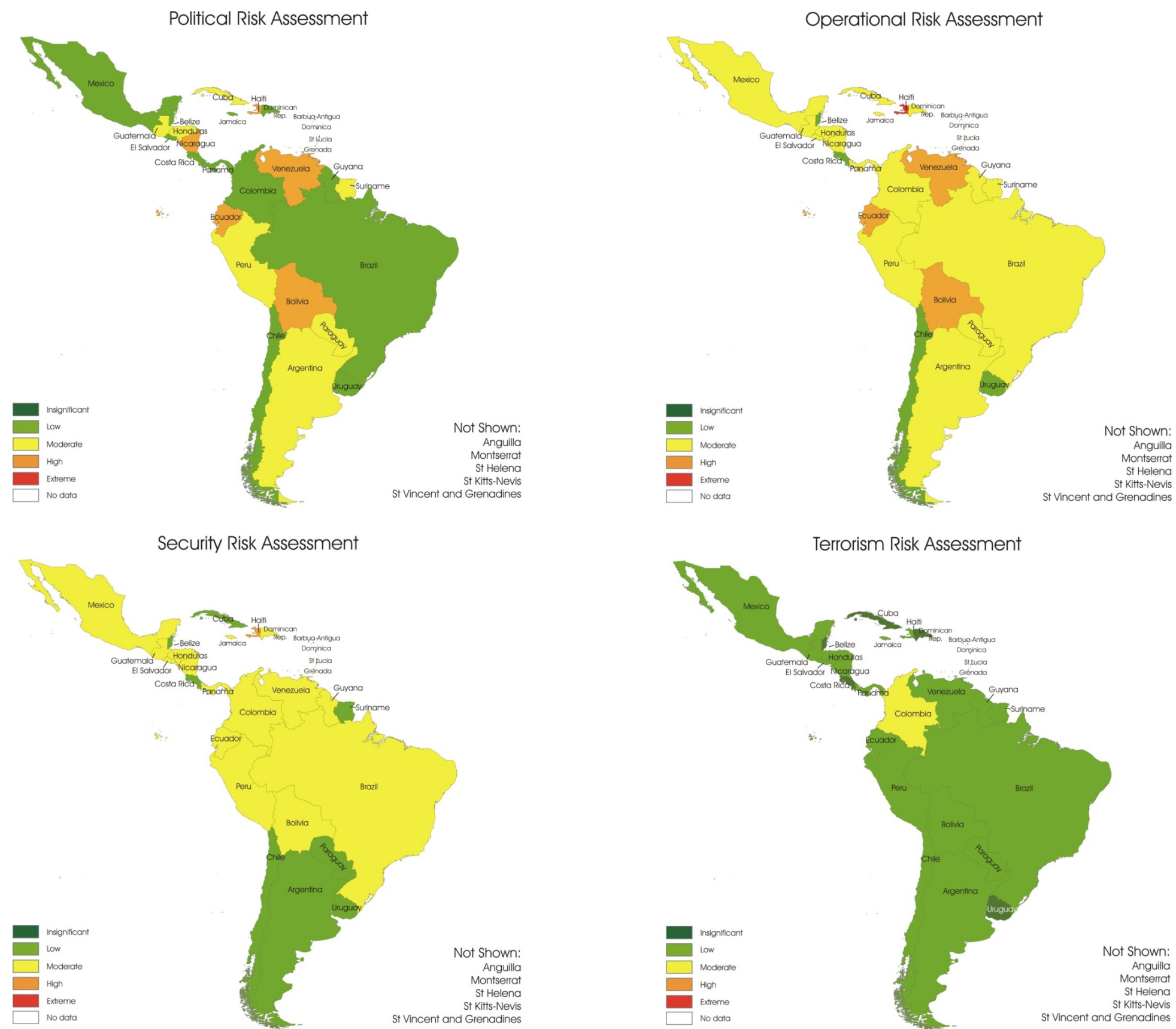


Figure 5.3. Risk assessments for the Latin American region.

The Pacific

In accord with the steadily decreasing risk profile from the Asian and African regions, through to Latin America, the Pacific region displays the lowest levels of perceived risk for the four assessed 'continents'. No Extreme ratings are recorded, and the highest risks (High) are restricted to three countries, namely Papua New Guinea (Operational and Security), Philippines (Terrorism), and the Solomon Islands (Political). The Solomon Islands nation has experienced considerable Political instability in the past few years, including riots in 2006 in the capital Honiara. Some of the smallest nineteen countries and territories assessed in the Pacific region (Cook Islands, Palau, Wallis and Futuna) record the lowest rankings for all four risks of Insignificant—the lowest for all countries investigated in this study. As a general model, the larger islands of the Pacific region record Moderate to locally High ratings for the four Risk Criteria, whereas the smaller, and often lower profile, islands and archipelagos are characterised by Insignificant to Low ratings. The risk assessments for the Pacific region are summarised in [Table 5.4](#) and [Figure 5.4](#).

Table 5.4. Risk assessment profiles for developing countries and territories in the Pacific Islands.

Source: with permission from Control Risks Group Limited 2012 (www.control-risks.com) via Intierra Resource Intelligence (www.intierra.com).

Legend: Level of Risk	No Data (ND)	Insignificant	Low	Moderate	High	Extreme
	0	1	2	3	4	5

Country	Political Risk	Operational Risk	Security Risk	Terrorism Risk
Fed. States of Micronesia	1	2	1	2
Fiji	3	3	3	2
Indonesia	3	3	3	3
Kiribati	1	2	1	1
Marshall Islands	1	2	1	1
Nauru	2	3	1	1
Niue (ND)	0	0	0	0
Palau	1	1	1	1
Papua New Guinea	3	4	4	2
Philippines	3	3	3	4
Samoa	2	2	2	1
Solomon Islands	4	3	3	2
Timor-Leste	3	3	3	2
Tokelau ¹ (ND)	0	0	0	0
Tonga	2	2	2	1
Tuvalu	1	2	1	1
Vanuatu	2	3	2	1
Wallis and Futuna ¹	1	1	1	1

¹ Territory

Reference Country

Australia	2	1	2	2
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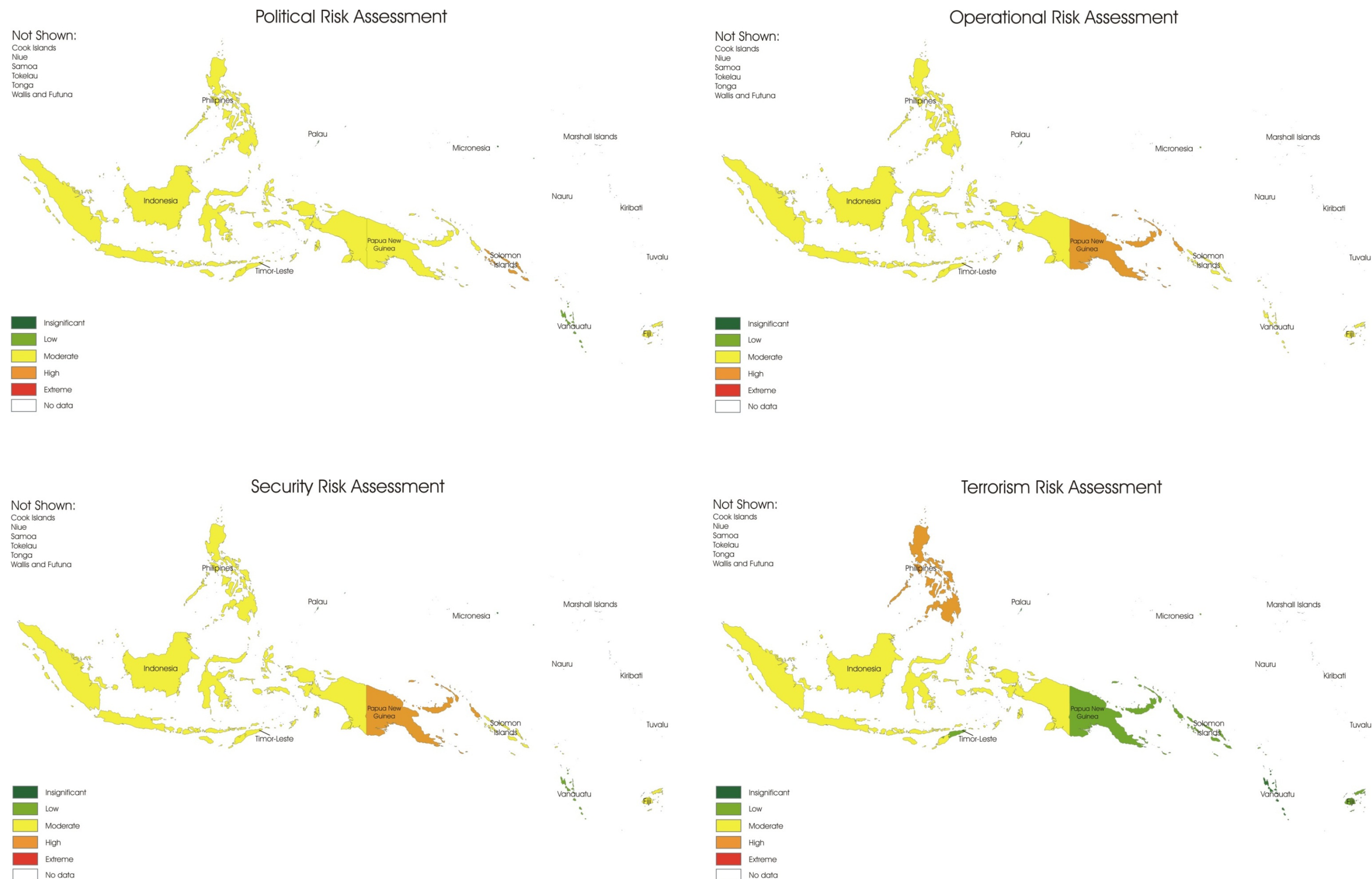


Figure 5.4. Risk assessments for the Pacific region. Note the absence of far-eastern Pacific nations that were assessed this study but are not able to be visualised at this scale. Small Pacific countries are best assessed using the assessment summary tables.

6. Assessment of Geological Assistance Received

6.1. Introduction and Methodology

The degree of geologically pertinent assistance/aid provided to countries that is directly pertinent to the development of geological industries has been assessed using two measures: (1) World Bank funding, and (2) the degree of direct survey-survey (or survey-government) collaboration and assistance. World Bank funding has been assessed using the presence or absence of active (as at July 2012) 'energy and mining', or 'water, sanitation, and flood protection' programs. These two funding streams were selected, as they are directly relevant to the development of minerals industries. Water is a critical requirement in the mining industry as it is used in the processing and extraction phases, particularly if ore is processed on site. Water quality is also vital to the health of the mining staff. Thus, the availability and management of water resources are deemed relevant to this assessment. Other sectors of aid that are also potentially highly relevant, but have not been included in this assessment include legislation development and road rail and port infrastructure. The degree of survey-survey collaboration was assessed using USGS, British Geological Survey (BGS), and Bundesanstalt für Geowissenschaften und Rohstoffe (BGR) data primarily, though significant contributions by Japan, Norway, Czech Republic, Sweden, Switzerland, France, China, India, and others have also been identified. The likelihood of many of these programs being carried out by external geological surveys under the auspices of higher-level funding agencies, such as the World Bank, or UNESCO is also acknowledged. Collaboration activities range from decades long technical agreements, to intensive two- to five-year mapping programs, and weeks-long training workshops. The degree of survey-survey collaboration has been classified using five categories:

1. major collaborative projects, particularly current projects;
2. substantial collaborations, particularly current projects;
3. significant collaborations, including more recent or current projects;
4. minor collaboration, or in distant past; and
0. no known external collaboration.

The recency of collaborative projects with other organisations has been included in the rating system, as this parameter very often reflects the quality and modern-day applicability of the research, technological, and training outcomes. The final assessment of geological aid can be seen in [Figure 6.1](#) to [Figure 6.4](#), and is summarised in [Table 6.1](#). A more detailed summary of the World Bank funding assessment including currently active projects in each of the funding streams can be found in [Appendix 6.1](#), and a summary of the collaborative assistance provided to countries can be found in [Appendix 6.2](#).

6.2. Assessments

Africa

The vast majority of African countries are currently receiving World Bank funding in geologically pertinent funding streams, with only eight of the fifty-three African countries not receiving funding. These currently unfunded countries are concentrated in northern Africa and include Algeria, Libya, Chad, Sudan, Somalia, Gabon, together with Namibia and Swaziland in the south. Survey-survey collaboration has been offered to most African countries, but is concentrated in southern and northern Africa; with central Africa receiving much more limited assistance. The most extensive assistance had been extended to Morocco, Namibia, Zambia, and Zimbabwe. The Africa geological aid assessment can be seen in [Figure 6.1](#).

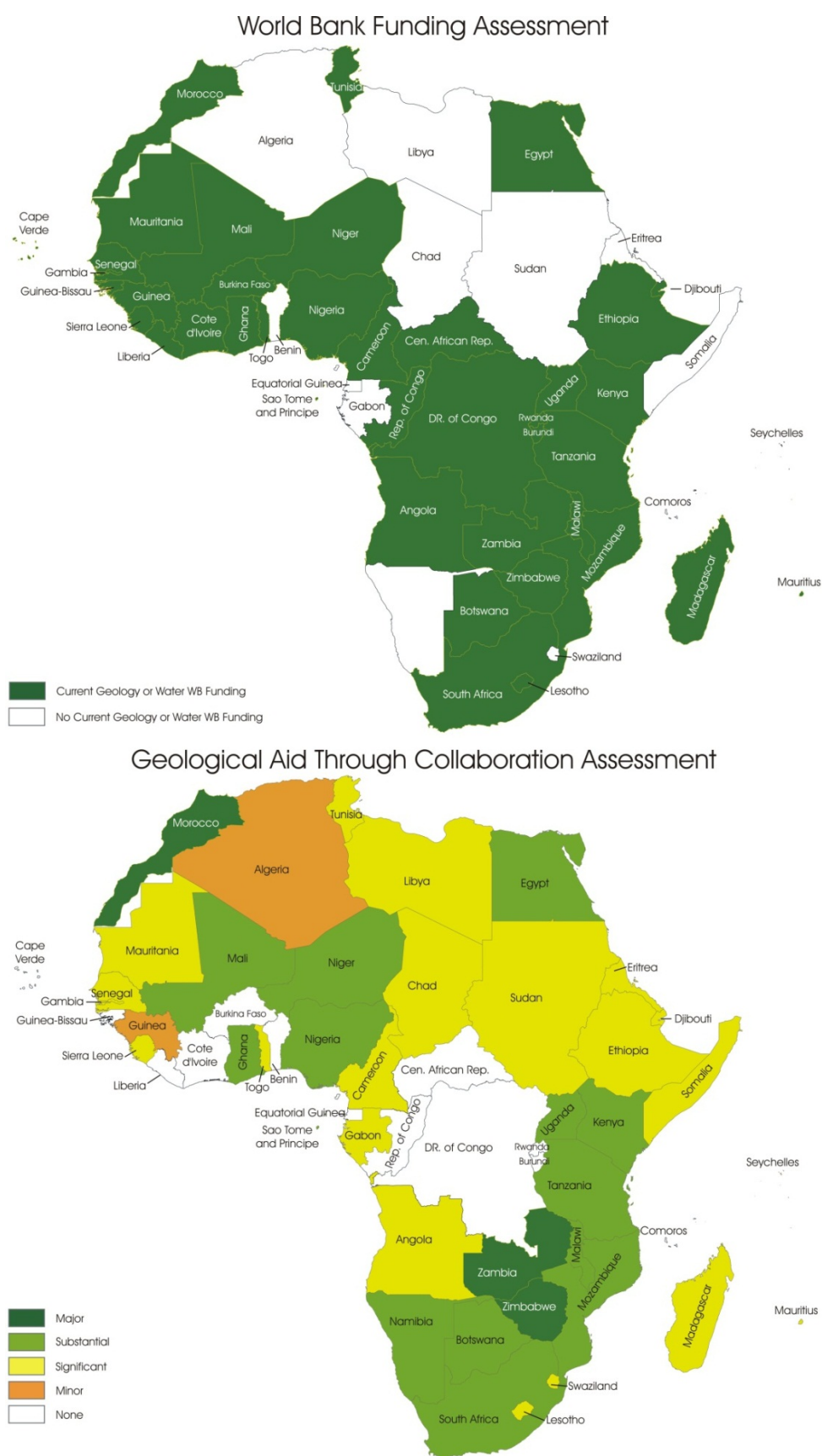


Figure 6.1. Geological aid assessment for the African region, with World Bank (WB) funding status (upper map), and collaborative projects assessment (lower map).

Asia

As in Africa, most countries in the Asia–Eurasia region are currently receiving World Bank funding, with just seven of thirty-two Asian region countries not receiving funding in geologically pertinent funding streams. The unfunded countries are spatially widespread and include Syria, Iran, Turkmenistan, Bhutan, Myanmar, Cambodia, and North Korea. Survey-survey collaboration is highly variable in the greater Asian region, but most countries have received at least moderate levels of collaborative assistance, particularly across Asia. Much more variable levels of survey-survey collaboration are seen in southern Asia and Eurasia. Countries that have received minimal or no identified collaborative assistance are: Myanmar, Tajikistan, Uzbekistan, Turkmenistan, and Syria. The Asia geological aid assessment can be seen in [Figure 6.2](#).

World Bank Funding Assessment



Geological Aid Through Collaboration Assessment

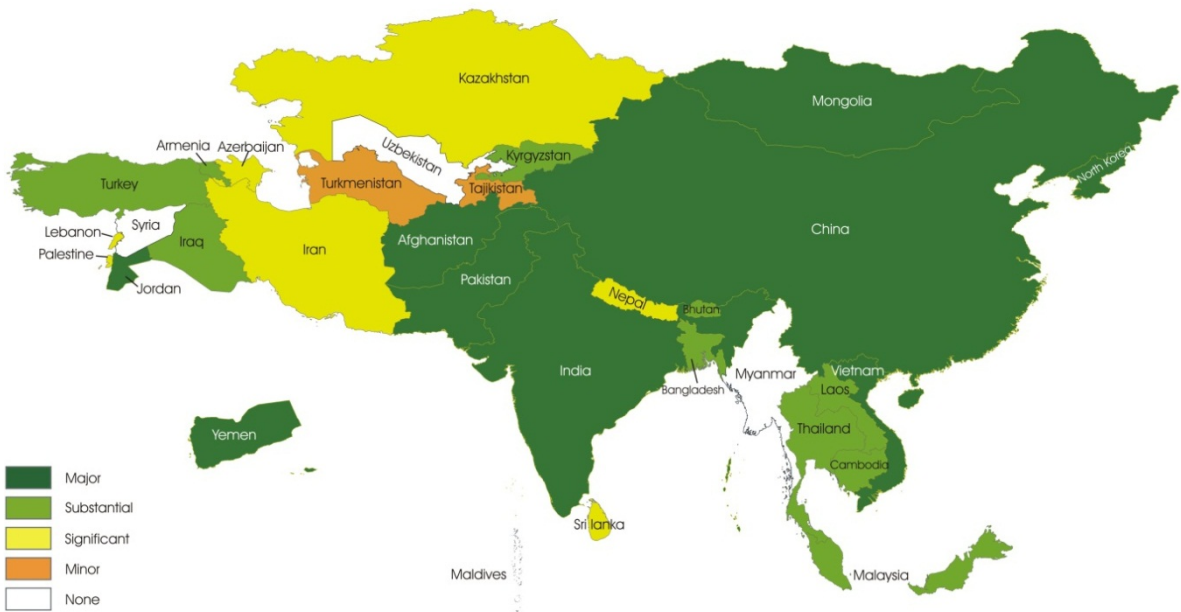


Figure 6.2. Geological aid assessment for the Asian region, with World Bank (WB) funding status (upper map), and collaborative projects assessment (lower map).

Latin America

All large countries in Latin America, except Venezuela receive World Bank funding; however, many of the small Caribbean countries do not, the largest of these being mainland Suriname, and island-state Cuba. All countries in South America except Uruguay have received either major or significant survey-survey assistance. The small Caribbean isthmus and island states have generally received much less collaborative assistance, but all have received at least minor assistance. The Latin America geological aid assessment can be seen in [Figure 6.3](#).



Figure 6.3. Geological aid assessment for the Latin American region, with World Bank (WB) funding status (upper map), and collaborative projects assessment (lower map).

The Pacific

Of the many small island states in the Pacific region, only Fiji, Indonesia, the Philippines, the Solomon Islands, and Vanuatu receive any geologically pertinent World Bank funding. These same larger island states also receive the majority of survey-survey-collaborative assistance with Indonesia, the Philippines, Fiji, and Samoa receiving major-substantial assistance, and the Solomon Islands, Tonga, and Vanuatu receiving significant assistance. The Pacific geological aid assessment can be seen in [Figure 6.4](#).

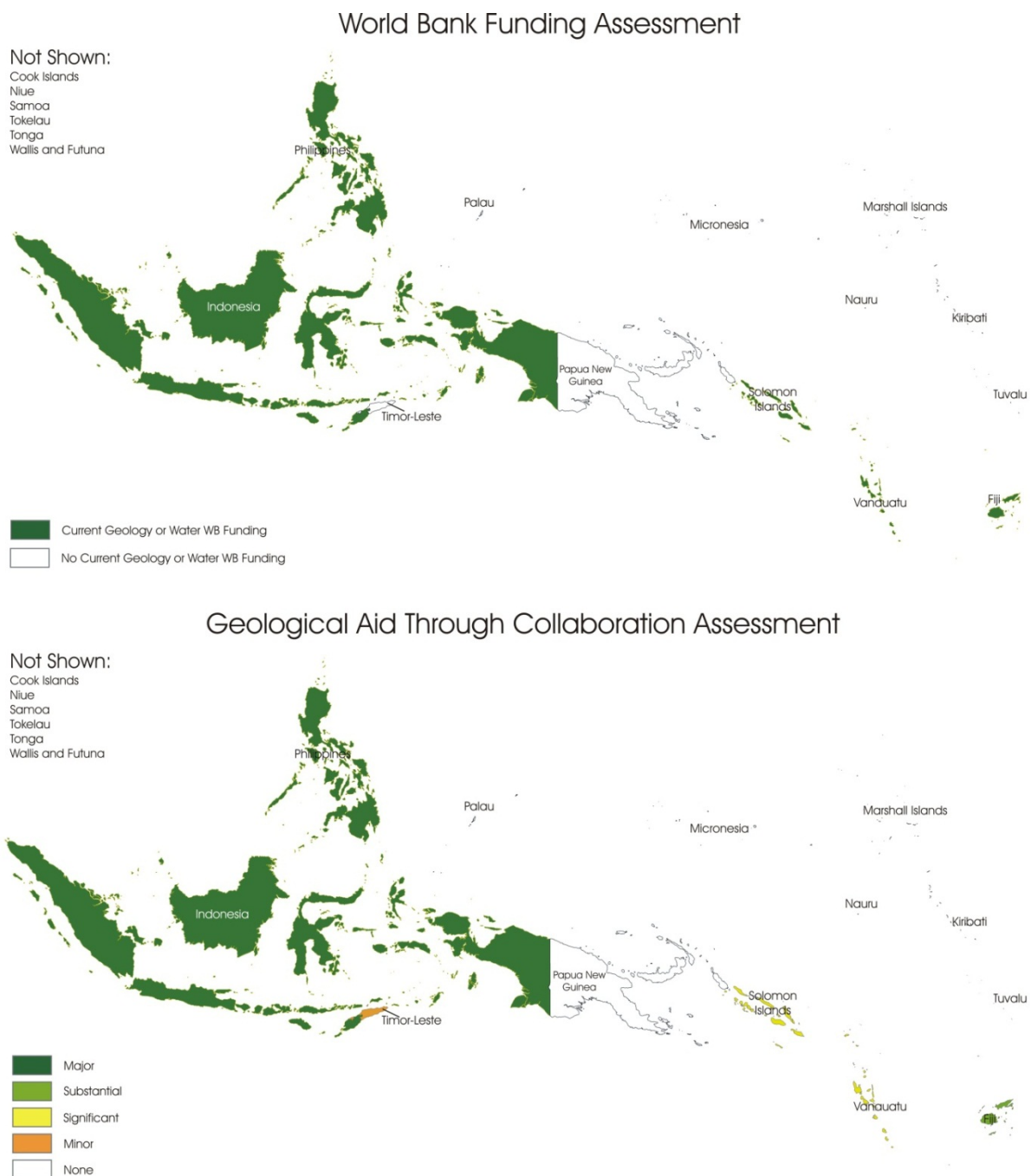


Figure 6.4. Geological aid assessment for the Pacific region, with World Bank (WB) funding status (upper map), and collaborative projects assessment (lower map). Small Pacific countries are best assessed using the assessment summary tables.

Table 6.1. World Bank funding and collaborative projects (Col. Projects) assistance for the four regions Africa, Asia, Latin America, and the Pacific.

Africa	Geological Aid	
	World Bank Funding	Col. Projects
Algeria	0	4
Angola	1	3
Benin	0	0
Botswana	1	2
Burkina Faso	1	0
Burundi	1	0
Cameroon	1	3
Cape Verdi	1	0
Central African Republic	1	0
Chad	0	3
Comoros	0	0
Congo DR	1	0
Congo, Republic	1	0
Cote d'Ivoire	1	0
Djibouti	1	3
Egypt	1	2
Equatorial Guinea	0	0
Eritrea	0	3
Ethiopia	1	3
Gabon	0	3
Gambia	1	3
Ghana	1	2
Guinea	1	4
Guinea Bissau	1	0
Kenya	1	2
Lesotho	1	3
Liberia	1	0
Libya	0	3
Madagascar	1	3
Malawi	1	2
Mali	1	2
Mauritania	1	3
Mauritius	1	3
Morocco	1	1
Mozambique	1	2
Namibia	0	2
Niger	1	2
Nigeria	1	2
Rwanda	1	0
Sao Tome and Principe	1	2
Senegal	1	3
Seychelles	0	3
Sierra Leone	1	3
Somalia	0	3
South Africa	1	2
Sudan	0	3
Swaziland	0	3
Tanzania	1	2
Togo	1	3
Tunisia	1	3
Uganda	1	2
Zambia	1	1
Zimbabwe	1	1

Asia	Geological Aid	
	World Bank Funding	Col. Projects
Afghanistan	1	1
Armenia	1	2
Azerbaijan	1	3
Bangladesh	1	2
Bhutan	0	2
Cambodia	0	2
China	1	1
North Korea	0	1
India	1	1
Iran	0	3
Iraq	1	2
Jordan	1	1
Kazakhstan	1	3
Kyrgyzstan Republic	1	2
Laos	1	2
Lebanon	1	3
Malaysia	1	2
Maldives	1	0
Mongolia	1	1
Myanmar	0	0
Nepal	1	3
Pakistan	1	1
Palestine	1	3
Sri Lanka	1	3
Syria	0	0
Tajikistan	1	4
Thailand	1	2
Turkey	1	2
Turkmenistan	0	4
Uzbekistan	1	0
Vietnam	1	1
Yemen	1	1

Latin America	Geological Aid	
	World Bank Funding	Col. Projects
Anguilla	0	3
Antigua	0	3
Argentina	1	2
Barbuda	0	3
Belize	1	0
Bolivia	1	2
Brazil	1	2
Chile	1	2
Colombia	1	1
Costa Rica	1	2
Cuba	0	3
Dominica	0	3
Dominican Republic	1	3
Ecuador	1	2
El Salvador	0	2
Grenada	0	3
Guatemala	1	3
Guyana	1	1
Haiti	1	4
Honduras	1	3
Jamaica	1	2
Mexico	1	1
Montserrat	0	3
Nicaragua	1	2
Panama	1	3
Paraguay	1	2
Peru	1	1
St Helena	0	4
St Kit- Nevis	0	4
St Lucia	0	4
St Vincent and Grenadines	0	4
Suriname	0	2
Uruguay	1	4
Venezuela	0	1

Pacific	Geological Aid	
	World Bank Funding	Col. Projects
Cook Islands	0	0
Micronesia	0	0
Fiji	1	2
Indonesia	1	1
Kiribati	0	0
Marshall Islands	0	0
Nauru	0	0
Niue	0	0
Palau	0	0
Papua New Guinea	0	0
Philippines	1	1
Samoa	0	2
Solomon Islands	1	3
Timor-Leste	0	4
Tokelau	0	0
Tonga	0	3
Tuvalu	0	4
Vanuatu	1	3
Wallis and Futuna	0	0

7. Conclusions

The data generated for the Africa, Asia, Latin America, and Pacific regions for this study are collated in [Tables 7.1 to 7.4](#). These data collectively represent a snapshot of the state of geological knowledge and industrial capacity for the countries assessed at the time of publishing.

Australian expertise with the minerals sector provides an opportunity for assistance to be provided to developing countries with resources potential, enabling them to make informed choices about how to maintain a sector that is profitable, technologically appropriate, and environmentally and socially responsible. Existing global connections between Australia and developing nations have resulted in a bank of considerable experience regarding work in these countries.

In addition to the expertise available in the Federal Government, Australia's states and territories have considerable expertise in developing regulatory frameworks, benchmarks, and standards for mining, while the commercial industry has significant expertise in more technical areas. Any support for capacity building from Australia should consider the involvement of all these resources to ensure the required outcomes are met.

Examples of the types of education and training that could be provided by government (and private) organisations are:

- advising on satisfactory legislative and regulatory frameworks for effective resource management; sound fiscal regimes and implementing sophisticated public financial management systems to deal transparently with large revenue streams;
- establishing or strengthening Departments of Mines and Energy (or equivalents);
- advising on Geological Survey and Environmental Protection agencies;
- advising on obtaining and maintaining relevant geological and environmental information and making it available (i.e., accessible to clients);
- enhancing communication infrastructure and digital delivery capabilities;
- advising on marketing and promotion strategies for products;
- facilitating effective decision making involving communication with all stakeholders; and
- providing environmental, fiscal, and safety services and oversight, conducting monitoring and interpreting results such as reserve estimation and reporting, the Joint Ore Resources Code (JORC), and advising on mining-related infrastructure and enhancing capacity to negotiate with large resource companies.

Potential core services and skills provided by a large geoscientific agency, such as GA, can cover many disciplines, e.g., geology, geophysics, satellite imagery, geochronology, geochemistry, mineralised systems, energy, and risk analysis ([Appendix 4.1](#)). The findings of such geoscientific disciplines can be integrated to make informed decisions on: the use and management of resources; management of the environment; wellbeing of populations; and sustainable energy opportunities.

Several key recommendations have been identified during the course of this assessment with regard to any ongoing Mining for Development work with developing countries. Collectively Australia's

extractives industry and services sector has the expertise and capacity to provide assistance to developing countries to expand sustainable minerals and energy resources sectors. These resources should be utilised jointly to facilitate the best outcome with any future partner developing countries. Any assistance that Australia makes available should be offered in the context of an overall approach to the sustainable development of the state, and should target capacity gaps that are identified using a template for systematic assessment of geoscientific capacity. Bilateral arrangements are a preferred mechanism for provision of assistance to developing countries, as these high-level agreements would achieve significant profiles in the partner countries, and enable comprehensive assistance to be provided. Directing Australian assistance at major infrastructure projects or legacy problems from earlier mining is not recommended, as these projects often have associated existing social or environmental problems, which are usually beyond the mandate of geoscientific assistance programs.

Table 7.1. Composite assessment for the African region.

Africa	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Algeria	3	4	3	1	0	4	4	4	3	4	4
Angola	3	3	3	1	1	3	0	3	4	3	2
Benin	0	4	0	0	0	0	4	3	3	2	1
Botswana	0	3	1	0	1	2	3	2	2	2	1
Burkina Faso	4	4	1	0	1	0	4	3	3	3	2
Burundi	4	4	1	0	1	0	0	3	4	3	2
Cameroon	4	4	3	1	1	3	3	3	4	3	2
Cape Verdi	0	4	0	0	1	0	0	2	3	2	1
Central African Republic	4	4	1	0	1	0	0	4	4	4	2
Chad	0	4	3	1	0	3	4	4	4	3	2
Comoros	0	0	0	0	0	0	4	4	4	2	2
Congo, Republic	4	4	1	1	1	0	0	3	3	3	1
Congo DR	3	2	3	1	1	0	3	4	4	4	2
Cote d'Ivoire	4	4	3	1	1	0	0	4	4	4	2
Djibouti	0	0	0	0	1	3	4	3	3	3	3
Egypt	3	3	1	1	1	2	2	4	3	3	3
Equatorial Guinea	4	4	3	1	0	0	3	4	4	3	2
Eritrea	4	4	3	0	0	3	0	4	4	3	3
Ethiopia	3	4	1	0	1	3	2	3	3	3	3
Gabon	3	3	3	1	0	3	0	3	3	2	1
Gambia	4	4	3	0	1	3	0	4	3	2	1
Ghana	4	3	3	1	1	2	4	2	3	2	1

Africa	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Guinea	3	3	3	0	1	4	0	4	4	3	2
Guinea Bissau	4	4	0	0	1	0	0	4	4	3	2
Kenya	3	3	3	0	1	2	0	3	3	3	2
Lesotho	0	4	3	0	1	3	0	3	3	3	1
Liberia	4	4	3	0	1	0	4	3	4	3	2
Libya	4	4	0	1	0	3	0	4	3	4	3
Madagascar	3	3	1	0	1	3	4	4	3	3	2
Malawi	4	4	3	0	1	2	4	3	3	2	1
Mali	0	4	3	0	1	2	4	4	4	3	4
Mauritania	3	3	3	1	1	3	4	4	4	3	3
Mauritius	0	4	0	0	1	3	0	2	2	2	2
Morocco	3	3	1	1	1	1	2	2	3	2	2
Mozambique	3	3	1	0	1	2	3	3	3	3	2
Namibia	0	3	1	0	0	2	2	2	2	2	1
Niger	3	3	1	0	1	2	0	4	4	3	3
Nigeria	4	4	3	1	1	2	3	3	3	4	3
Rwanda	4	3	3	1	1	0	4	3	3	2	2
São Tomé et Príncipe	0	0	0	0	1	2	0	3	4	2	1
Senegal	3	3	3	0	1	3	4	3	3	2	2
Seychelles	0	4	0	0	0	3	0	2	2	1	2
Sierra Leone	3	3	1	0	1	3	0	3	4	3	2
Somalia	0	0	0	0	0	3	4	5	5	5	4
South Africa	1	1	1	1	1	2	1	3	3	3	2
Sudan	4	4	3	1	0	3	3	4	4	2	3

Africa	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Swaziland	0	4	3	0	0	3	4	3	3	3	1
Tanzania	4	3	1	0	1	2	2	2	3	2	3
Togo	4	4	1	0	1	3	4	3	3	3	2
Tunisia	4	3	3	1	1	3	3	3	3	2	2
Uganda	0	4	3	0	1	2	3	3	3	2	2
Zambia	3	3	1	0	1	1	3	3	3	2	1
Zimbabwe	3	3	1	0	1	1	3	5	4	4	1

Table 7.2. Composite assessment for the Asian region.

Asia	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Afghanistan	4	4	3	1	1	1	4	4	5	5	4
Armenia	3	3	3	1	1	2	3	3	3	3	1
Azerbaijan	3	3	3	1	1	3	1	3	3	3	2
Bangladesh	4	4	3	1	1	2	3	3	4	3	3
Bhutan	4	4	3	0	0	2	4	2	3	2	1
Cambodia	4	4	0	0	0	2	3	3	3	3	3
China	1	1	1	1	1	1	1	3	3	2	2
North Korea	3	3	3	0	0	1	2	4	5	2	1
India	1	1	1	1	1	1	1	2	3	3	3
Iran	3	2	1	1	0	3	1	4	4	2	2
Iraq	4	4	0	1	1	2	3	4	4	5	5
Jordan	3	3	3	1	1	1	3	3	3	2	3
Kazakhstan	2	1	1	1	1	3	0	3	3	2	2
Kyrgyzstan Republic	3	3	3	1	1	2	0	4	4	4	3
Laos	4	4	3	0	1	2	3	3	3	2	2
Lebanon	4	4	0	0	1	3	0	3	3	3	3
Malaysia	3	3	1	1	1	2	2	2	3	2	2
Maldives	0	0	0	0	1	0	0	2	3	2	2
Mongolia	3	3	3	1	1	1	0	3	3	3	1
Myanmar	4	4	3	1	0	0	0	4	4	3	2
Nepal	4	4	3	0	1	3	3	4	4	3	2
Pakistan	3	3	1	1	1	1	2	3	4	4	4
Palestine	0	0	0	0	1	3	1	4	3	3	2

Asia	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Sri Lanka	4	3	3	0	1	3	3	3	3	3	3
Syria	3	3	3	1	0	0	0	5	4	4	3
Tajikistan	3	3	3	1	1	4	0	4	4	4	3
Thailand	3	3	3	1	1	2	2	3	3	2	3
Turkey	3	2	1	1	1	2	2	3	3	2	2
Turkmenistan	3	3	3	1	0	4	0	3	3	3	2
Uzbekistan	3	3	3	1	1	0	3	4	4	3	3
Vietnam	4	3	3	0	1	1	4	2	3	2	2
Yemen	4	4	0	1	1	1	0	4	4	4	4

Table 7.3. Composite assessment for the Latin American region.

Country	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Anguilla	0	0	0	0	0	3	0	1	1	1	1
Antigua	0	0	0	0	0	3	0	2	2	2	1
Argentina	3	3	1	1	1	2	2	3	3	2	2
Barbuda	0	0	0	0	0	3	0	2	2	2	1
Belize	4	4	0	1	1	0	0	2	2	2	1
Bolivia	2	2	1	1	1	2	2	4	4	3	2
Brazil	1	1	1	1	1	2	1	2	3	3	2
Chile	1	1	1	1	1	2	2	2	2	2	2
Colombia	4	3	1	1	1	1	2	2	3	3	3
Costa Rica	4	4	0	1	1	2	3	2	2	2	1
Cuba	3	3	3	1	0	3	3	3	3	2	1
Dominica	0	0	0	0	0	3	0	1	2	1	1
Dominican Republic	4	4	3	0	1	3	3	2	3	3	1
Ecuador	4	4	3	1	1	2	0	4	4	3	2
El Salvador	4	4	0	0	0	2	0	2	3	3	2
Grenada	0	0	0	0	0	3	0	2	2	2	1
Guatemala	4	4	3	1	1	3	0	3	3	3	2
Guyana	3	3	3	0	1	1	4	2	3	3	2
Haiti	4	4	0	0	1	4	0	4	5	4	2
Honduras	3	3	3	0	1	3	0	3	3	3	2
Jamaica	3	3	0	0	1	2	3	2	3	3	2
Mexico	1	1	1	1	1	1	2	2	3	3	2
Montserrat	0	0	0	0	0	3	0	1	3	2	1
Nicaragua	4	4	3	0	1	2	0	4	3	3	2

Country	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Panama	4	4	0	0	1	3	0	2	3	3	2
Paraguay	4	4	3	0	1	2	4	3	3	2	2
Peru	2	2	1	1	1	1	3	3	3	3	2
St Helena	0	0	0	0	0	4	0	0	0	0	0
St Kitts-Nevis	4	4	0	0	0	4	0	1	2	2	1
St Lucia	0	0	0	0	0	4	0	1	2	2	1
St Vincent and Grenadines	0	0	0	0	0	4	0	1	2	2	1
Suriname	3	3	3	1	0	2	0	3	3	2	2
Uruguay	4	4	3	0	1	4	3	2	2	2	1
Venezuela	3	3	1	1	0	1	3	4	4	3	2

Table 7.4. Composite assessment for the Pacific region.

Country	Mineral Potential			Petroleum Potential	Geological Aid		Geological Survey Capacity	Risk			
	Known Mineral Resources	Existing Mineral Industry	Geological Potential for Mineral Resources		World Bank Funding	Collaborative Projects		Political Risk	Operational Risk	Security Risk	Terrorism Risk
Cook Islands	0	0	0	0	0	0	0	1	1	1	1
Federated States of Micronesia	0	0	0	0	0	0	0	1	2	1	2
Fiji	4	4	3	0	1	2	4	3	3	3	2
Indonesia	2	2	1	1	1	1	0	3	3	3	3
Kiribati	0	0	0	0	0	0	0	1	2	1	1
Marshall Islands	0	0	0	0	0	0	0	1	2	1	1
Nauru	0	0	0	0	0	0	0	3	3	1	1
Niue	0	0	0	0	0	0	0	0	0	0	0
Palau	0	0	0	0	0	0	0	1	1	1	1
Papua New Guinea	3	4	3	1	0	0	3	3	4	4	2
Philippines	3	3	3	1	1	1	2	3	3	3	4
Samoa	0	0	0	0	0	2	0	2	2	2	1
Solomon Islands	0	0	3	0	1	3	0	4	3	3	2
Timor-Leste	0	0	3	1	0	4	0	3	3	3	2
Tokelau	0	0	0	0	0	0	0	0	0	0	0
Tonga	0	0	0	0	0	3	0	2	2	2	1
Tuvalu	0	0	0	0	0	4	0	1	2	1	1
Vanuatu	0	0	0	0	1	3	4	2	3	2	1
Wallis and Futuna	0	0	0	0	0	0	0	1	1	1	1

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Appendix 2.1. Development Assistance Committee (DAC) selection of official development assistance countries used in this study



Effective for reporting on 2011, 2012 and 2013 flows.

LEAST DEVELOPED COUNTRIES	OTHER LOW-INCOME COUNTRIES (per capita GNI <= USD 1 005 in 2010)	LOWER MIDDLE-INCOME COUNTRIES AND TERRITORIES (per capita GNI USD 1 006-3 975 in 2010)	UPPER MIDDLE-INCOME COUNTRIES AND TERRITORIES (per capita GNI USD 3 976-12 275 in 2010)
Afghanistan Angola Bangladesh Benin Bhutan Burkina Faso Burundi Cambodia Central African Rep. Chad Comoros Congo, Dem. Rep. Djibouti Equatorial Guinea Eritrea Ethiopia Gambia Guinea Guinea-Bissau Haiti Kiribati Laos Lesotho Liberia Madagascar Malawi Mali Mauritania Mozambique Myanmar Nepal Niger Rwanda Samoa São Tomé and Príncipe Senegal Sierra Leone Solomon Islands Somalia Sudan Tanzania Timor-Leste Togo Tuvalu Uganda Vanuatu Yemen Zambia	Kenya Korea, Dem. Rep. Kyrgyz Rep. South Sudan Tajikistan Zimbabwe	Armenia Belize Bolivia Cameroon Cape Verde Congo, Rep. Côte d'Ivoire Egypt El Salvador Fiji Georgia Ghana Guatemala Guyana Honduras India Indonesia Iraq Kosovo ¹ Marshall Islands Micronesia, Federated States Moldova Mongolia Morocco Nicaragua Nigeria Pakistan Papua New Guinea Paraguay Philippines Sri Lanka Swaziland Syria *Tokelau Tonga Turkmenistan Ukraine Uzbekistan Vietnam West Bank and Gaza Strip	Albania Algeria *Anguilla Antigua and Barbuda Argentina Azerbaijan Belarus Bosnia and Herzegovina Botswana Brazil Chile China Colombia Cook Islands Costa Rica Cuba Dominica Dominican Republic Ecuador Former Yugoslav Republic of Macedonia Gabon Grenada Iran Jamaica Jordan Kazakhstan Lebanon Libya Malaysia Maldives Mauritius Mexico Montenegro *Montserrat Namibia Nauru Niue Palau Panama Peru Serbia Seychelles South Africa *St. Helena St. Kitts-Nevis St. Lucia St. Vincent and the Grenadines Suriname Thailand Tunisia Turkey Uruguay Venezuela *Wallis and Futuna

*Territory.

(1) This is without prejudice to the status of Kosovo under international law.

NATURE AND PURPOSE OF THE LIST

The **DAC¹ List of ODA Recipients** shows the countries and territories eligible to receive official development assistance (ODA). These consist of all low- and middle-income countries based on gross national income (GNI) *per capita* as published by the World Bank, with the exception of G8 members, European Union (EU) members and countries with a firm accession date for entry into the EU. The list also includes all of the Least Developed Countries (LDCs) as defined by the United Nations (UN).

This list is designed for statistical reporting purposes. Only flows to or for the benefit of the countries and territories on the list may be reported as ODA. It is not designed as guidance for the provision of aid or other preferential treatment. The list presents countries and territories in groups, with the LDCs in the first column. The other columns show all other ODA recipients according to their GNI *per capita*.

Membership of the OECD or the DAC does not affect eligibility to receive ODA. Several OECD members have been on the DAC List for many years and continue to receive ODA. Currently, no DAC members are on the list, but the DAC has made clear that leaving the list is not a requirement for DAC membership. Likewise, the provision of statistics to the DAC Secretariat has no bearing on a country's eligibility to receive ODA. Today, there are a number of countries that are both significant providers and recipients of ODA - *e.g.* Turkey and Thailand, both of which report their aid flows to the DAC.

ORIGINS AND HISTORY

The DAC has collected data on aid flows since its inception in 1961. In the early years, receipts were recorded to all countries and territories in Africa except South Africa; in America except the United States and Canada; non-communist Asian and Oceanic countries except Australia, Japan and New Zealand; and the following in Europe: Cyprus, Gibraltar, Greece, Malta, Spain, Turkey and Yugoslavia. All these recipients were eligible for ODA after this concept was introduced in 1969.

During the 1970s and 1980s, communist countries in Asia, particularly China and Vietnam, started to receive large amounts of aid and so were added to the data collection. Spain left the list at its request in 1983.

The end of the Cold War led to new aid programmes for the transition economies of eastern Europe, while rapid progress in East Asia reduced aid needs there. A new two-part list introduced in 1993 included "more advanced" developing and Eastern European countries, though aid to them did not qualify as ODA. From 2005 the DAC has reverted to a single List of ODA Recipients.

UPDATES TO THE LIST

The DAC revises the list every three years. Countries that have exceeded the high-income threshold for three consecutive years at the time of the review are removed. In line with this review process, the DAC last revised the list in October 2011. The next review of the DAC List will take place in the second half of 2014.

Changes in the DAC List of ODA Recipients reflect substantial improvements in global prosperity over recent decades. Compared to the list as it stood in 1970, only 17 countries have been added, 11 of these being former republics of the Soviet Union. By contrast, 55 countries have left the list, essentially because of increases in their *per capita* income. The trend towards higher income has continued despite the financial crisis. In the latest revision of the list in 2011, five countries left the list and 25 countries that remained on it rose into a higher income category, whereas only two fell into a lower category.

For a more detailed history of the DAC List, including a list of changes in coverage from 1989 to 2011, please visit: www.oecd.org/dac/stats/daclist.

VARYING CONCEPTS OF "DEVELOPING COUNTRIES"

In DAC usage, the term "developing country" employed without qualification has generally been taken to mean a country eligible for ODA. Other organisations have their own definitions. For example, the World Bank usually uses the term to refer to low- and middle-income countries, assessed by reference to *per capita* GNI. Fortunately, however, the differences in coverage are usually minor.

DAC statistics, based on the DAC List, provide an authoritative guide to aid flows that is accepted and used by donors, recipients and international bodies.

1. The DAC is the Development Assistance Committee of the OECD. It was established in 1961 and its present members are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, the United States and the European Union Institutions.

Disclaimer

Any reference in the present or past DAC Lists to states, entities or territories shall neither imply recognition by OECD member states nor approval by OECD member states of the designations used. The designations "countries" and "territories" are used as generic terms and do not carry any special meaning as to the political or legal classification of the recipients concerned.

Appendix 3.1. Definitions and rating classifications used in geological assessments

Mineral Industry

0	No data or limited data of uncertain quality
4	Small-scale production of a limited range of commodities
3	Medium-scale production of one or more commodities (production of zero to four commodities rank in world top ten producing countries)
2	Large-scale production of numerous commodities (production of five or more commodities rank in world top ten producing countries)
1	Very large-scale production of internationally traded commodities (production of ten or more commodities rank in world top ten producing countries)

Mineral Resources

0	No data or limited data of uncertain quality
4	Known resource tonnages for individual deposit(s) or resources inferred because a commodity is produced
3	Moderate national resource tonnages (may include ranking in world top ten countries for zero to four commodities)
2	Large national resource tonnages (may include ranking in world top ten countries for five or more commodities)
1	Very large national resource tonnages (resources of ten or more commodities in rank in world top ten countries)

Geological Potential for Mineral Resources

0	No data or limited data of uncertain quality
3	Potential with some known resources or production of mineral commodities
1	Proven substantial resources and production of mineral commodities

Petroleum Industry (excluding refineries)

0	No industry
1	Existing industry

Appendix 3.2. Selected mineral production and mineral resources tables

Table Headers and Glossary for Appendix 3.2

Commodity: Rock, mineral or element that is produced by mining.

Unit: The unit of mass or volume used to report the production and reserve estimates for each commodity.

Production

Production: The output of a commodity recorded for a country from mining operations reported in the specified units of mass or volume.

Country: The tonnage or volume of the commodity produced by mining operations in the country in the year specified.

World: The tonnage or volume of the commodity produced by mining operations in the world in the year specified.

Country %: The proportion of total world production of the commodity produced in the country for the year specified.

Country Rank: The ranking of the country as a producer of the commodity in relation to all other countries producing that commodity in the specified year.

Reserves

Reserve: That part of the total resources of a commodity which could be economically extracted or produced at the time of determination.

Country: The tonnage or volume of the commodity that is classified as a reserve in the country in the year specified.

World: The tonnage or volume of the commodity that is classified as a reserve in the world in the year specified.

Country %: The proportion of total world reserves of the commodity that the country held in the year specified.

Country Rank: The ranking of the country as a holder of reserves of the commodity in relation to all other countries having reserves of that commodity in the specified year.

Africa

Algeria 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	0.723	2,560	0.14	NA	NA	51,000	-	-
Iron ore	million tonnes	1.469	2,590	0.06	NA	NA	170,000	-	-
Silver	tonnes	0.147	23,100	0.00	NA	NA	530,000	-	-
Barite	000 tonnes	42	7,850	0.54	11	29,000	240,000	12.08	3
Cement	000 tonnes	19,100	3,310,000	0.58	NA	NA	NA	-	-
Bentonite	000 tonnes	34	10,600	0.32	NA	NA	Large	-	-
Fullers Earth	000 tonnes	23	3,290	0.70	NA	NA	Large	-	-
Kaolin	000 tonnes	71	33,100	0.21	NA	NA	Large	-	-
Diatomite	000 tonnes	2,231	1,820	0.12	NA	NA	Large	-	-
Gypsum	000 tonnes	1,610	147,000	1.10	19	NA	Large	-	-
Phosphate Rock	000 tonnes	1,525	181,000	0.84	13	2,200,000	71,000,000	3.10	4
Silica Sand	000 tonnes	95	NA	NA	NA	NA	NA	-	-
Gravel	cubic metres	46,304	NA	NA	NA	NA	Large	-	-

Angola 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	1,500	3,310,000	0.05	NA	NA	NA	-	-
Diamonds (gem)	000 carats	13,000	79,900	16.27	3	NA	NA	-	-
Granite	cubic metres	50,000	NA	-	-	NA	NA	-	-
Gypsum	000 tonnes	200	147,000	0.14	NA	NA	Large	-	-
Marble	cubic metres	100	NA	-	-	NA	NA	-	-
Salt	000 tonnes	45	280,000	0.02	NA	NA	Large	-	-

Benin 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	1,500	3,310,000	0.05	NA	NA	NA	-	-
Clay	tonnes	77,000	NA	-	-	NA	NA	-	-
Gold	tonnes	0.02	2,560	0.00	-	NA	51,000	-	-
Gravel	cubic metres	25,000	NA	-	-	NA	NA	-	-
Limestone	000 tonnes	1,000	NA	-	-	NA	NA	-	-
Marble	tonnes	300	NA	-	-	NA	NA	-	-
Sand	000 cubic m*	55,000	NA	-	-	NA	NA	-	-

* metres.

Botswana 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Clay	tonnes	50,000	NA	-	-	NA	Large	-	-
Coal (bituminous)	000 tonnes	780	6,185,000	0.01	NA	NA	675,000,000	-	-
Copper (Cu in ore)	000 tonnes	28	15,900	0.18	NA	NA	690,000	-	-
Gold	tonnes	1.8	2,560	0.07	NA	NA	51,000	-	-
Diamond (gem)	000 carats	21.0	79,900	0.03	1	NA	Large	-	-
Nickel (Ni in ore)	000 tonnes	28	1,590	1.76	13	NA	80,000	-	-
Salt	000 tonnes	240	280,000	0.09	NA	NA	Vast	-	-
Soda Ash	000 tonnes	225	12,800	1.76	4	NA	24,000,000	-	-

Burkina Faso 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	30,000	3,310,000	0.91	NA	NA	NA	-	-
Dolomite	000 tonnes	3,000	NA	NA	NA	NA	NA	-	-
Gold	tonnes	24.1	2,560	0.94	NA	NA	51,000	NA	-
Granite	cubic metres	300,000	NA	NA	NA	NA	NA	-	-
Manganese	000 tonnes	18	13,900	0.13	NA	NA	630,000	NA	-
Phosphate Rock	000 tonnes	2	181,000	0.00	NA	NA	71,000,000	NA	-
Pumice	000 tonnes	10	17,300	0.06	NA	NA	NA	-	-
Salt	000 tonnes	5	280,000	0.00	NA	NA	Vast	-	-
Stone (marble)	tonnes	100,000	NA	NA	NA	NA	NA	-	-

Burundi 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	0.75	2560	0.03	NA	NA	51,000	-	-
Tantalum	tonnes Ta	13.1	681	1.92	NA		120,000	0.00	-
Niobium	tonnes Nb	13.2	62,900	0.02	NA	4,400	3,000,000	0.15	-
Peat	000 t.* Peat	13.1	23,400	0.05	NA	NA	10,000,000	-	-
Tin	tonnes Sn	12	265,000	0.04	NA	NA	4,800,000	-	-
Tungsten	tonnes W	107	68,800	0.00	NA	NA	3,100,000	-	-

* tonnes.

Cameroon 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Aluminium (metal)	000 tonnes	59.6	40,800	0.15	NA	NA	NA	-	-
Cement	000 tonnes	1,100	3,310,000	0.03	NA	NA	NA	-	-
Clay	000 tonnes	10	NA	-	NA	NA	NA	-	-
Diamond	million carats	0.012	64	0.02	NA	NA	600	-	-
Gold	tonnes	2	2,560	0.07	NA	NA	51,000	-	-
Pozzolana	tonnes	600,000	NA	-	NA	NA	NA	-	-
Sand & Gravel	000 tonnes	600	NA	-	NA	NA	NA	-	-
Sapphire	kilograms	1,000	NA	-	NA	NA	NA	-	-
Silica Sand	tonnes	14,000	NA	-	NA	NA	NA	-	-
Limestone	000 tonnes	100	NA	-	NA	NA	NA	-	-
Marble	tonnes	500	NA	-	NA	NA	NA	-	-

Cape Verde 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	160	3,310,000	0.00	NA	NA	NA	-	-
Salt	000 tonnes	2	280,000	0.00	NA	NA	Vast	-	-

Central African Republic 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Clay		NA	NA	-	NA	NA	NA	-	-
Diamond (gem)	000 carat	301.6	79,900	0.38	11	NA	NA	-	-
Gold	tonnes	0.06	2,560	0.00	NA	NA	51,000	-	-
Limestone	tonnes	NA	NA	-	NA	NA	NA	-	-
Sand & Gravel	tonnes	NA	NA	-	NA	NA	NA	-	-

Chad 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Aggregate	tonnes	350	NA	-	-	NA	NA	-	-
Gold	tonnes	0.10	2,560	0.00	NA	NA	51,000	-	-
Salt	tonnes	10	280,000,000	0.00	NA	NA	Large	-	-
Soda Ash	tonnes	12	128,000,000	0.00	NA	NA	Large	-	-

Comoros, The 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Clay*		NA	NA	NA	NA	NA	NA	NA	NA
Stone*		NA	NA	NA	NA	NA	NA	NA	NA
Gravel*		NA	NA	NA	NA	NA	NA	NA	NA
Sand*		NA	NA	NA	NA	NA	NA	NA	NA

* Believed to be small local production for construction. No details available.

Congo, Democratic Republic of 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cobalt	tonnes	61,000	89,500	68.16	1	3,400,000	7,500,000	45.33	1
Diamond (gem + Ind)	000 carats	16.8	143,000	0.01	NA	NA	680,000	-	-
Stone crushed	000 tonnes	250	NA	-	-	NA	680,000	-	-

Congo, Republic of 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	80	3,310,000	0.00	-	NA	NA	-	-
Diamond	000 carats	381	79,964	0.48	NA	NA	Large	-	-
Gold	tonnes	0.15	2,560	0.14	NA	NA	51,000	-	-
Lime	000 tonnes	0.4	311,000	0.00	NA	NA	Large	-	-

Cote d'Ivoire 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	283	3,310,000	0.01	NA	NA	NA	-	-
Niobium (Colum)	tonnes	NA	6,290	-	NA	NA	120,000	-	-
Tantalum	tonnes	NA	681	-	NA	NA	3,000,000	-	-
Diamond*	000 carat	0	79,900	-	-	NA	NA	-	-
Gold	tonnes	5	2,560	0.21	NA	NA	51,000	NA	NA
Gravel	tonnes	NA	NA	-	-	NA	NA	NA	NA
Manganese Ore	000 tonnes	177	40,000.0	0.44	NA	NA	1,623,000	-	-
Sand	tonnes	NA	NA	-	-	NA	NA	NA	NA

* UN Sanctions prohibit production.

Djibouti 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Salt	000 tonnes	80	280,000	0.03	NA	NA	Large	-	-

Egypt 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	4.607	2,560	0.14	NA	NA	51,000	-	-
Iron ore	million tonnes	0.256	2,590	0.01	NA	NA	170,000	-	-
Ilmenite	000 tonnes	11.000	5,800	0.19	NA	NA	650,000	-	-
Barite	000 tonnes	6.1	7,850	0.08	NA	NA	240,000	-	-
Cement	000 tonnes	43,874	3,310,000	1.33	10	NA	NA	-	-
Fluorspar	000 tonnes	0.47	6,010	0.01	NA	NA	240,000	-	-
Gypsum	000 tonnes	840	147,000	0.57	NA	NA	Large	-	-
Lime	000 tonnes	800	311,000	0.26	NA	NA	Large	-	-
Phosphate Rock	000 tonnes	4,622	181,000	2.55	8	100,000	71,000,000	0.14	15
Salt	000 tonnes	2,800	280,000	1.00	NA	NA	Large	-	-
Talc	000 tonnes	48	7,210	0.67	NA	NA	Large	-	-
Coal	000 tonnes	300	6,185,000	0.00	NA	NA	675,000,000	-	-

Equatorial Guinea 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	0.20	2,560	0.14	NA	NA	51,000	-	-

Eritrea 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Granite	000 tonnes	25	NA	NA	NA	NA	Large	-	-
Basalt	000 tonnes	50	NA	NA	NA	NA	Large	-	-
Sand	000 tonnes	2,200	NA	NA	NA	NA	Large	-	-
Cement	000 tonnes	45	3,310,000	0.00	-	NA	NA	-	-
Kaolin	tonnes	200	33,100,000	0.00	-	NA	Large	-	-
Quartz	tonnes	100	NA	NA	NA	NA	NA	-	-
Salt	000 tonnes	7.8	280,000	0.00	NA	NA	Vast	-	-

Ethiopia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	2,900	3,310,000	0.09	-	NA	NA	-	-
Brick Clay	000 tonnes	140	NA	-	-	NA	Large	-	-
Niobium	tonnes	17	62,900	0.03	NA	NA	3,000,000	-	-
Tantalum	tonnes	73.5	681	10.79	NA (in top 10)	NA	120,000	-	-
Opal	kilograms	3,147	NA	-	-	NA	Large	-	-
Gold	tonnes	5.936	2,560	0.14	NA	NA	51,000	-	-
Gypsum	000 tonnes	36.0	147,000	0.02	NA	NA	Large	-	-
Platinum	kilograms	8	192,000	0.00	NA	NA	66,000,000*	-	-
Salt	000 tonnes	550.486	280,000	0.20	NA	NA	Vast	-	-
Pumice	000 tonnes	350	17,300	2.02	NA	NA	Large	-	-
Silica Sand	tonnes	70,250	NA	-	NA	NA	NA	-	-

* Reserves for all Platinum-Group Elements.

Gabon 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	200	3,310,000	0.01	NA	NA	Large	-	-
Gold	tonnes	0.30	2,560	0.01	NA	NA	51,000	-	-
Manganese	000 tonnes	1,500	13,900	10.79	4	21,000	630,000	3.33	7
Diamond (gem + Ind)	000 carats	0.5	143,000	0.00	NA	NA	680,000	-	-

Gambia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Ilmenite	000 tonnes	69,940*	5800**	NA	NA	NA	650,000	-	-
Laterite	000 tonnes	174	NA	NA	NA	NA	NA	-	-
Silica Sand	000 tonnes	1,121	NA	NA	NA	NA	NA	-	-

* Ilmenite ore of unknown TiO₂ grade.

** Contained TiO₂.

Ghana 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	512	209,000	0.24	NA	NA	29,000,000	-	-
Cement	000 tonnes	2,400	3,310,000	0.07	NA	NA	NA	-	-
Diamond (gem)	000 carats	334.0	79,900	0.42	10	NA	NA	-	-
Manganese (Mn content)	000 tonnes	420	13,900	3.02	8	NA	630,000	-	-
Silver (Ag content)	tonnes	4	23,100	0.02	NA	NA	530,000	-	-

Guinea 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	17,400	209,000	8.33	5	7,400,000	29,000,000	25.52	1
Cement	000 tonnes	237	3,310,000	0.01	NA	NA	NA	-	-
Gold	tonnes	15.217	2,560	0.14	NA	NA	51,000	-	-
Diamond (gem)	000 carats	280.5	79,900	0.35	10	NA	NA	-	-
Diamond (Ind)	000 carats	93.5	64,000	0.15	NA	NA	600	-	-

Guinea Bissau 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Granite	000 tonnes	NA	NA	-	-	NA	NA	-	-
Clay	000 tonnes	NA	NA	-	-	NA	Large	-	-
Sand & Gravel	000 tonnes	NA	NA	-	-	NA	Large	-	-
Limestone	000 tonnes	NA	NA	-	-	NA	Large	-	-
Phosphate Rock	000 tonnes	0	181,000	-	-	NA	71,000,000	-	-
Bauxite	000 tonnes	0	280,000	-	-	NA	29,000,000	-	-

Kenya 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	3,710	3,310,000	0.11	NA	NA	NA	-	-
Kaolin	tonnes	900	33,100,000	0.00	NA	NA	NA	-	-
Fluorspar	000 tonnes	44.5	6,010	0.74	11	2,000	240,000	0.83	7
Gold	tonnes	2	2,560	0.08	NA	NA	51,000	NA	NA
Gypsum & Anhydrite	000 tonnes	11	147,000	0.01	NA	NA	Large	-	-
Lime	000 tonnes	47	311,000	0.02	NA	NA	Large	-	-
Salt	000 tonnes	25	280,000	0.01	NA	NA	Large	-	-
Soda Ash	000 tonnes	473.689	47,500	0.997	3	7,000	24,000,000	0.03	6
Dimension Stone	000 tonnes	40.38	NA	-	-	NA	NA	-	-
Shale	000 tonnes	250	NA	-	-	NA	NA	-	-

Lesotho 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Fire Clay	cubic metre	15,000	NA	-	NA	NA	NA	-	-
Diamond (gem)	000 carats	100	79,900	0.13	14	NA	NA	-	-
Dimension Stone	cubic metre	1,000	NA	-	NA	NA	NA	-	-
Gravel	cubic metre	300,000	NA	-	NA	NA	NA	-	-

Liberia 2010

Commodity	Unit	Production				Reserves			
		Liberia	World	Liberia %	Liberia Rank	Liberia	World	Liberia %	Liberia Rank
Cement	000 tonnes	67	3,310,000	0.00	NA	NA	NA	-	-
Diamond (Ind)	million carats	0.025	64	0.04	NA	NA	600	-	-
Gold	kilograms	0.8	2,560	0.03	NA	47	51,000	0.09	NA
Sand	tonnes	110,000	NA	-	NA	NA	NA	-	-
Stone (crushed)	tonnes	3,000	NA	-	NA	NA	NA	-	-
Iron Ore	million tonnes	0	2,590	0.00	NA	3.4	170,000	0.00	NA

Libya 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	7,000	3,310,000	0.21	NA	NA	NA	-	-
Gypsum	000 tonnes	250	147,000	0.17	NA	NA	Large	-	-
Lime	000 tonnes	250	311,000	0.08	NA	NA	Large	-	-
Salt	000 tonnes	40	280,000	0.01	NA	NA	Vast	-	-

Madagascar 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Chromite	000 tonnes	90	23,700	0.38	NA	NA	>480,000	-	-
Cobalt	tonnes	700	89,500	0.78	NA	NA	7,500,000	-	-
Gold	tonnes	0.07	2,560	0.14	NA	NA	51,000	-	-
Nickel	tonnes	7,500	1,590,000	0.47	NA	NA	80,000,000	-	-
Cement	000 tonnes	410.00	3,310,000	0.01	NA	NA	NA	-	-
Mica	000 tonnes	2	1,070	0.19	NA	NA	Large	-	-
Salt	000 tonnes	75	280,000	0.03	NA	NA	Large	-	-
Limestone	000 tonnes	360	NA	-	-	NA	NA	-	-
Ilmenite	000 tonnes	172.0	5,800	2.97	11	40,000	650,000	6.15	6
Rutile	000 tonnes	5.7	670	0.85	7	NA	42,000	-	-
Zirconium	000 tonnes	9.6	1,250	0.77	NA	NA	52,000	-	-

Malawi 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bentonite	tonnes	1,020	10,600,000	0.01	NA	NA	Very Large	-	-
Cement	000 tonnes	250	3,310,000	0.01	NA	NA	NA	-	-
Coal (bituminous)	000 tonnes	79.186	6,185,000	0.00	NA	NA	675,000,000	-	-
Gemstones	tonnes	206	NA	-	NA	NA	NA	-	-
Lime	000 tonnes	31.79	311,000	0.01	NA	NA	NA	-	-
Ornamental Stone	tonnes	435	NA	-	NA	NA	NA	-	-
Stone, crushed	tonnes	989,750	NA	-	NA	NA	NA	-	-
Limestone	tonnes	57,296	NA	-	NA	NA	NA	-	-
Uranium	tonnes U ₃ O ₈	790	66,187	1.19	NA	NA	4,100,000	-	-

Mali 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	36.344	2,560	1.42	NA	NA	51,000	-	-
Salt	000 tonnes	6	280,000	0.00	NA	NA	Vast	-	-
Semi-precious stones	tonnes	10,000	NA	-	-	NA	NA	-	-

Mauritania 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper	000 tonnes	37	15,900	0.23	NA	NA	690,000	-	-
Gold	tonnes	8	2,560	0.14	NA	NA	51,000	-	-
Iron Ore	million tonnes	11.5	2,590	0.44	15	1,100	170,000	0.65	13
Cement	000 tonnes	340.00	3,310,000	0.01	NA	NA	NA	-	-
Gypsum	000 tonnes	70.694	147,000	0.05	NA	NA	Large	-	-
Salt	000 tonnes	0.45	280,000	0.00	NA	NA	Large	-	-

Mauritius 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Salt	000 tonnes	2.40	280,000	0.00	NA	NA	Large	-	-
Sand	000 tonnes	88	NA	-	-	NA	NA	-	-

Morocco 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cobalt (Co content)	tonnes	3,130	89,500	3.50	8	20,000	7,500,000	0.27	11
Copper (Cu content)	000 tonnes	14	15,900	0.09	NA	NA	690,000	-	-
Gold	tonnes	0.65	2,560	0.14	NA	NA	51,000	-	-
Iron ore	million tonnes	0.045	2,590	0.00	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	32.461	4,140	0.78	NA	NA	85,000	-	-
Mercury	tonnes	10	2,250	0.44	NA	NA	93,000	-	-
Silver	tonnes	243	23,100	1.05	NA	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	43.68	12,000	0.36	NA	NA	250,000	-	-
Barite	000 tonnes	572.429	7,850	7.29	4	10,000	240,000	4.17	6
Cement	000 tonnes	14,000	3,310,000	0.42	NA	NA	NA	-	-
Phosphate Rock	000 tonnes	26,603	181,000	14.70	2	50,000,000	71,000,000	70.42	1
Fluorspar	000 tonnes	89.68	6,010	1.49	8	NA	240,000	-	-

Mozambique 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	11	209,000	0.01	NA	NA	29,000,000	-	-
Aluminium	000 tonnes	557	40,800	1.37	13	NA	NA	NA	NA
Coal (bituminous)	000 tonnes	50	6,185,000	0.00	NA	NA	675,000,000	-	-
Gold	tonnes	0.08	2,560	0.00	NA	NA	51,000	-	-
Niobium	tonnes Nb	31	62,900	0.05	NA	NA	3,000,000	-	-
Tantalum	tonnes Ta	120	681	17.62	3	3,200	120,000	2.67	3
Salt	000 tonnes	110	280,000	0.04	NA	NA	Large	-	-
Ilmenite	000 tonnes	678.4	5,800	11.70	4	16,000	650,000	2.46	9
Rutile	000 tonnes	4.7	670	0.70	8	480	42,000	1.14	7
Zirconium	000 tonnes	37.1	1,250	2.97	6	1,200	52,000	2.31	6

Namibia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	2.683	2,560	0.10	NA	NA	51,000	-	-
Lead (in cons)	000 tonnes	10.14	4,140	0.24	NA	NA	85,000	-	-
Zinc (in cons)	000 tonnes	53.624	12,000	0.45	NA	NA	250,000	-	-
Silver (in cons)	tonnes	30	23,100	0.13	NA	NA	530,000	-	-
Diamond	000 carats	1,693	79,900	2.12	7	NA	Large	-	-
Fluorspar	000 tonnes	104.49	6,010	1.74	7	NA	240,000	-	-
Salt	000 tonnes	770.636	280,000	0.28	NA	NA	Vast	-	-
Uranium	tonnes U ₃ O ₈	5,473	66,187	8.27	4	NA	4,100,000	-	-

Niger 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	40	3,310,000	0.00	-	NA	NA	-	-
Coal (bituminous)	000 tonnes	225	6,185,000	0.00	NA	NA	675,000,000	-	-
Gold	tonnes	1.9	2,560	0.14	NA	NA	51,000	-	-
Gypsum	000 tonnes	19.7	147,000	0.01	NA	NA	Large	-	-
Limestone	000 tonnes	29.7	NA	-	-	NA	Large	-	-
Salt	000 tonnes	1.30	280,000	0.00	NA	NA	Large	-	-
Tin (Sn content)	tonnes	1.20	265,000	0.00	NA	NA	4,800,000	-	-
Silver	000 tonnes	0.200	23,100	0.00	NA	NA	530,000	-	-
Uranium	tonnes U ₃ O ₈	4,949	66,187	7.48	4	290,000	4,100,000	7.07	4

Nigeria 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	0.600	2,560	0.14	NA	NA	51,000	-	-
Iron ore	million tonnes	0.05	2,590	0.00	NA	NA	170,000	-	-
Niobium	tonnes	73	62,900	0.12	NA	NA	3,000,000	-	-
Tin (Sn content)	tonnes	180	265,000	0.07	NA	NA	4,800,000	-	-
Barite	000 tonnes	19	7,850	0.24	NA	NA	240,000	-	-
Kaolin	000 tonnes	100	33,100	0.30	NA	NA	Large	-	-
Gypsum	000 tonnes	320	147,000	0.22	NA	NA	Large	-	-
Coal (bituminous)	000 tonnes	450	6,185,000	0.01	NA	NA	675,000,000	-	-

Rwanda 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	95.1	3,310,000	0.00	NA	NA	NA	-	-
Niobium	tonnes	120	62,900	0.19	NA	NA	3,000,000	-	-
Tantalum	tonnes	93	681	13.66	3	NA	120,000	-	-
Gold	tonnes	0.02	2,560	0.14	NA	NA	51,000	-	-
Peat	000 tonnes	22	23,400	0.09	NA	NA	10,000,000	-	-
Tin	tonnes	1,440	265,000	0.54	NA	NA	4,800,000	-	-
Tungsten	tonnes	430	68,800	0.63	NA	NA	3,100,000	-	-

São Tomé et Príncipe 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Senegal 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	4,066	3,310,000	0.12	NA	NA	NA	-	-
Clay (Fullers Earth)	000 tonnes	204*	3,290	?	?	NA	Large	-	-
Gold	tonnes	4.38	2,560	0.17	NA	NA	51,000	-	-
Limestone	tonnes	1,248	NA	-	-	NA	Large	-	-
Phosphate Rock	000 tonnes	976	181,000	0.54	15	180,000	71,000,000	0.25	13
Salt	000 tonnes	231	280,000	0.08	NA	NA	Large	-	-

* Inconsistent figures in different USGS sources. This figure seems high and would account for over 6% of world production if correct.

Seychelles 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Aggregate	000 tonnes	130	NA	NA	-	NA	NA	-	-
Dimension Stone	tonnes	150	NA	NA	-	NA	NA	-	-
Gravel	000 tonnes	140	NA	NA	-	NA	NA	-	-
Sand	000 tonnes	8.1	NA	NA	-	NA	NA	-	-

Sierra Leone 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	1,090	209,000	0.52	13	180,000	29,000,000	0.62	13
Cement	000 tonnes	300.984	3,310,000	0.01	NA	NA	NA	-	-
Diamond (gem)	000 carats	262.5	79,900	0.33	12	NA	NA	-	-
Diamond (Ind)	000 carats	175.0	64,000	0.27	NA	NA	600	-	-
Ilmenite	000 tonnes	18.206	5,800	0.31	NA	NA	650,000	-	-
Rutile	000 tonnes	68.198	670	10.18	3	3,800	42,000	9.05	4

Somalia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

South Africa 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Aluminium metal	000 tonnes	809	40,800	1.98	10	-	-	-	-
Chromite	000 tonnes	10,900	23,700	45.99	1	200,000	>480,000	42.00	2
Cobalt	tonnes	400	89,500	0.45	NA	NA	7,500,000	-	-
Copper	000 tonnes	105.00	15,900	0.66	NA	NA	690,000	-	-
Gold	tonnes	189.0	2,560	0.14	5	6,000	51,000	11.76	2
Iron Ore	million tonnes	59	2,590	2.28	7	1,000	170,000	0.59	14
Lead	000 tonnes	50	4,140	1.21	12	300	85,000	0.35	13
Nickel	tonnes	40,000	1,590,000	2.52	11	3,700,000	80,000,000	4.63	7
Palladium	kilograms	82,200	202,000	40.69	2	63,000,000	66,000,000*	95.45	1
Platinum	kilograms	148,000	192,000	77.08	1	63,000,000	66,000,000*	95.45	1
Ilmenite	000 tonnes	952.0	5,800	16.41	2	63,000	650,000	9.69	4
Rutile	000 tonnes	145.0	670	21.64	2	8,300	42,000	19.76	2
Diamond (gem)	000 carats	3,500	79,900	4.38	6	NA	NA	-	-
Diamond (Ind)	million carats	5	64	7.81	5	70	600	11.67	4
Phosphate Rock	000 tonnes	2,500	181,000	1.38	12	1,500,000	71,000,000	2.11	6
Coal (bituminous)	000 tonnes	248,924	6,185,000	4.02	NA	NA	675,000,000	-	-

* total PGE reserves.

Sudan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	2,113	3,310,000	0.06	NA	NA	NA	-	-
Chromite	000 tonnes	56.823	23,710	0.24	NA	NA	480,000	-	-
Gold	tonnes	26.317	2,560	1.03	NA	NA	51,000	-	-
Gypsum	000 tonnes	31.000	147,000	0.02	NA	NA	Large	-	-
Kaolin	000 tonnes	32.696	10,600	0.31	NA	NA	Large	-	-
Manganese Ore	000 tonnes	378.99	40,000.0	0.95	NA	NA	1,623,000	-	-
Marble	cubic metres	16	NA	-	-	NA	NA	-	-
Salt	000 tonnes	1,418	280,000	0.51	NA	NA	Vast	-	-
Silver	tonnes	0.631	23,100	0.00	NA	NA	530,000	-	-

Swaziland 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Coal (anthracite)	tonnes	145,903				NA		-	-
Ferrovandium	tonnes	500	NA	-	NA	NA	NA	-	-
Stone	cubic metres	304,544	NA	-	NA	NA	NA	-	-

Tanzania 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	130	209,000	0.06	NA	NA	29,000,000	-	-
Calcite	tonnes	152	NA	-	NA	NA	NA	-	-
Cement	000 tonnes	2,312	3,310,000	0.07	NA	NA	NA	-	-
Copper (contained)	000 tonnes	5.300	15,900	0.03	NA	NA	690,000	-	-
Diamond (gem)	000 carats	80	79,900	0.10	17	NA	NA	-	-
Gems (other)	tonnes	1,160	NA	-	NA	NA	NA	-	-
Gold	tonnes	39.448	2,560	1.54	-	665	51,000	1.30	NA
Gypsum	000 tonnes	18.568	147,000	0.01	NA	NA	Large	-	-
Kaolin	000 tonnes	42.649	10,600	0.40	NA	NA	Large	-	-
Lime	000 tonnes	30	311,000	0.01	NA	NA	Adequate	-	-
Phosphate Rock	000 tonnes	0.8	181,000	0.00	NA	NA	71,000,000	-	-
Salt	000 tonnes	24.281	280,000	0.01	NA	NA	Large	-	-
Silver (contained)	tonnes	12.040	23,100	0.05	NA	NA	530,000	-	-

Togo 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	1,000	3,310,000	0.03	NA	NA	NA	-	-
Diamond Gem	carats	96	79,900,000	0.00	NA	NA	NA	-	-
Gold	tonnes	13	2,560	0.51	NA	NA	51,000	-	-
Phosphate Rock	tonnes	720	181,000	0.40	NA	60,000	71,000,000	0.08	14
Limestone	000 tonnes	1,700	NA	NA	NA	NA	NA	-	-

Tunisia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Iron ore	000 tonnes	150	2,590,000	0.01	NA	NA	170,000,000	-	-
Cement	000 tonnes	7,200	3,310,000	0.22	NA	NA	NA	-	-
Clays	000 tonnes	6,450	NA	-	-	NA	NA	-	-
Phosphate Rock	000 tonnes	7,281	181,000	4.02	5	100,000	71,000,000	0.14	15
Salt	000 tonnes	1,300	280,000	0.46	NA	NA	Vast	-	-
Gypsum	000 tonnes	360	147,000	0.24	NA	NA	Large	-	-
Lime	000 tonnes	370	311,000	0.12	NA	NA	NA	-	-

Uganda 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Aggregate	tonnes	14,338	NA	-	-	NA	NA	-	-
Cement	000 tonnes	1,347	3,310,000	0.04	NA	NA	NA	-	-
Kaolin	tonnes	27,237	33,100,000	0.08	NA	NA	Large	-	-
Clay (other)	tonnes	50,000	NA	-	-	NA	Large	-	-
Cobalt (refined)	tonnes	624	NA	-	-	NA	NA	-	-
Iron Ore	000 tonnes	3.795	2,590,000	0.00	NA	NA	170,000,000	-	-
Lime	000 tonnes	10	311,000	0.00	NA	NA	Adequate	-	-
Limestone	tonnes	634,673	NA	-	-	NA	Large	-	-
Niobium	tonnes	0.001	62,900	0.00	NA	NA	3,000,000	-	-
Tantalum	tonnes	0.001	681	0.00	NA	NA	120,000	-	-
Pozzolan material	tonnes	446,315	NA	-	-	NA	NA	-	-
Salt	000 tonnes	1.50	280,000	0.00	NA	NA	Large	-	-
Tin (contained)	tonnes	19	265,000	0.01	NA	NA	4,800,000	-	-
Tungsten (cont)	tonnes	28	68,800	0.04	NA	NA	3,100,000	-	-
Vermiculite	000 tonnes	1.121	536	0.21	NA	NA	NA	-	-

Zambia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cobalt	tonnes	5,700	89,500	6.37	4	27,000	7,500,000	0.36	5
Copper	000 tonnes	690	15,900	4.34	8	20,000	690,000	2.90	10
Gold	tonnes	3.4	2,560	0.14	NA	NA	51,000	-	-
Nickel	tonnes	2,809	1,590,000	0.18	NA	NA	80,000,000	-	-
Silver	tonnes	6.5	23,100	0.03	NA	NA	530,000	-	-
Cement	000 tonnes	1,126.73	3,310,000	0.03	NA	NA	NA	-	-
Sand & Gravel	000 tonnes	350	NA	-	-	NA	NA	-	-
Coal (bituminous)	000 tonnes	200	6,185,000	0.00	NA	NA	675,000,000	-	-

Zimbabwe 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Chromite	000 tonnes	510	23,700	2.15	NA	NA	>480,000	-	-
Cobalt	tonnes	60	89,500	0.07	NA	NA	7,500,000	-	-
Copper	000 tonnes	4.70	15,900	0.03	NA	NA	690,000	-	.-
Gold	tonnes	9.1	2,560	0.14	NA	NA	51,000	-	-
Nickel	tonnes	6,200	1,590,000	0.39	NA	NA	80,000,000	-	-
Palladium	kilograms	7,000	202,000	3.47	4	NA	66,000,000*	-	-
Platinum	kilograms	8,800	192,000	4.58	3	NA	66,000,000*	-	-
Silver	tonnes	0.4	23,100	0.00	NA	NA	530,000	-	-
Asbestos	tonnes	2,400	2,010,000	0.12	NA	NA	Large	-	-
Cement	000 tonnes	800.00	3,310,000	0.02	NA	NA	NA	-	-
Graphite	000 tonnes	5	925	0.54	NA	NA	77,000	-	-
Diamond (all)	000 carats	8,435.0	143,000	5.90	NA	NA	680,000	-	-
Limestone	000 tonnes	50	NA	-	-	NA	NA	-	-
Coal (bituminous)	000 tonnes	2,400	6,185,000	0.04	NA	NA	675,000,000	-	-

* total PGE reserves.

Asia

Afghanistan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Barite	000 tonnes	2	7,850	0.03	NA	NA	240,000	-	-
Cement	000 tonnes	35.6	3,310,000	0.02	NA	NA	NA	-	-
Chromite	000 tonnes	6	23,700	0.03	NA	NA	480,000	-	-
Coal (bituminous)	000 tonnes	724.9	6,185,000	0.00	NA	NA	675,000,000	-	-
Gypsum	000 tonnes	63.1	147,000	0.04	NA	NA	Large	-	-
Marble	000 tonnes	28.9	NA	NA	-	NA	NA	-	-
Salt	000 tonnes	186.1	280,000	0.07	NA	NA	Large	-	-

Armenia 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	19	15,900	0.12	NA	NA	690,000	-	-
Gold	tonnes	1.4	2,560	0.05	NA	NA	51,000	-	-
Rhenium	tonnes	1.20	47	2.54	7	95	2,500	3.80	5
Cement	000 tonnes	467.0	3,310,000	0.01	NA	NA	NA	-	-
Bentonite	000 tonnes	38	10,600	0.36	NA	NA	NA	-	-
Gypsum	000 tonnes	40.00	147,000	0.03	NA	NA	Large	-	-
Limestone	000 tonnes	15,000	NA	NA	-	NA	Large	-	-
Perlite	000 tonnes	35	1,670	2.10	NA	NA	700,000	-	-
Molybdenum (Mo content)	tonnes	4,150	242,000	1.71	7	200	10,000	2.00	7

Azerbaijan 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bentonite	000 tonnes	7	10,600	0.07	NA	NA	NA	-	-
Bromine	000 tonnes	3.5	450	0.78	6	300	Large	-	4
Cement	000 tonnes	1,283.4	3,310,000	0.04	NA	NA	NA	-	-
Gypsum	000 tonnes	45.63	147,000	0.03	NA	NA	Large	-	-
Iodine	tonnes	300	28,700	1.05	4	170	15,000	1.13	4
Limestone	000 tonnes	1,000	NA	NA	-	NA	Large	-	-
Sand	000 tonnes	801	NA	NA	-	NA	Large	-	-

Bangladesh 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	5,000	3,310,000	0.03	NA	NA	NA	-	-
Kaolin	000 tonnes	8.5	33,100	0.03	NA	NA	NA	-	-
Coal (bituminous)	000 tonnes	850	6,185,000	0.00	NA	NA	675,000,000	-	-
Salt	000 tonnes	360	280,000	0.13	NA	NA	Large	-	-
Granite (crushed)	000 tonnes	275	NA	NA	-	NA	Large	-	-
Limestone (crushed)	000 tonnes	70	NA	NA	-	NA	Large	-	-

Bhutan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	200	3,310,000	0.01	NA	NA	NA	-	-
Coal (bituminous)	000 tonnes	87.814	6,185,000	0.00	NA	NA	675,000,000	-	-
Ferrosilicon	000 tonnes	276	NA	NA	-	NA	-	-	-
Gypsum	000 tonnes	344.034	147,000	0.23	NA	NA	Large	-	-
Limestone	000 tonnes	715.956	NA	NA	-	NA	Large	-	-
Quartzite	000 tonnes	104.580	NA	NA	-	NA	NA	-	-
Talc	000 tonnes	26.302	7,210	0.36	NA	MA	Large	-	-

Cambodia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	789.1	3,310,000	0.05	NA	NA	NA	-	-
Gravel	000 tonnes	82.5	NA	NA	-	NA	Large	-	-
Laterite (blocks)	000 tonnes	1,612.5	NA	NA	-	NA	Large	-	-
Sand	000 tonnes	38,367.5	NA	NA	-	NA	Large	-	-
Limestone	000 tonnes	1,000	NA	NA	-	NA	Large	-	-
Gold	tonnes	?	2,560	-	NA	-	51,000	-	-
Iron Ore	000 tonnes	?	2,590	-	-	-	170,000	-	-

?USGS believe there was production but cannot ascertain tonnage.

China 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	44,000	209,000	21.05	2	830,000	29,000,000	2.86	8
Antimony (Sb content)	000 tonnes	150	167	89.82	1	950	1,800	52.78	1
Bismuth (Bi content)	tonnes	6,500	8,900	73.03	1	240,000	320,000	75.00	1
Chrome ore	000 tonnes	200	23,700	0.84	NA	NA	480,000	-	-
Cobalt (Co content)	tonnes	6,000	89,500	6.70	2	80,000	7,500,000	1.07	9
Copper (Cu content)	000 tonnes	1,160	15,900	7.30	3	30,000	690,000	4.35	6
Gold	tonnes	345	2,560	13.48	1	1,900	51,000	3.73	8
Iron Ore	million tonnes	1,070	2,590	41.31	1	23,000	170,000	13.53	4
Lead (Pb content)	000 tonnes	1,850	4,140	44.69	1	14,000	85,000	16.47	2
Mercury	tonnes	1,600	2,250	71.11	1	21,000	93,000	22.58	2
Nickel (Ni content)	tonnes	81,000	1,590,000	5.09	7	3,000,000	80,000,000	3.75	9
Niobium (Nb content)	tonnes	32	62,900	0.05	NA	NA	3,000,000	-	-
Tantalum (Ta content)	tonnes	95	681	13.95	NA	NA	120,000	-	-
Tin (Sn content)	tonnes	115,000	265,000	43.40	1	1,500,000	4,800,000	31.25	1
Tungsten (W content)	tonnes	59,100	68,800	85.90	1	1,900,000	3,100,000	61.29	1
Coal (all)	million tonnes	3,240							

India 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	18,000	209,000	8.61	4	900,000	29,000,000	3.10	6
Chromite	000 tonnes	3,800	23,700	16.03	3	54,000	480,000	11.25	3
Copper (Cu content)	000 tonnes	33	15,900	0.21	NA	NA	690,000	-	-
Gold	tonnes	3	2,560	0.11	NA	NA	51,000	-	-
Iron Ore	million tonnes	230	2,590	8.88	4	7,000	170,000	4.12	5
Lead (Pb content)	000 tonnes	95	4,140	2.29	7	2,600	85,000	3.06	7
Silver (Ag content)	tonnes	92	23,100	0.40	NA	NA	530,000	-	-
Titanium Minerals									
Ilmenite Cons	000 tonnes	540	5,800	9.31	5	85,000	650,000	13.08	3
Rutile Cons	000 tonnes	24	670	3.58	5	7,400	42,000	17.62	3
Zirconium cons	000 tonnes	38	1,250	3.04	5	3,400	52,000	6.54	4
Zinc (Zn content)	000 tonnes	700	12,000	5.83	5	12,000	250,000	4.80	=5
Barite	000 tonnes	1,100	7,850	14.01	2	32,000	240,000	13.33	2
Diamond (gem)	000 carats	13	79,900	0.02	NA	NA	NA	NA	-
Coal (bituminous)	million tonnes	480	6,185	7.76	-	NA	675,000,000	-	-
Coal (brown)	million tonnes	27							

Iran 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	600	209,000	0.29	-	160,000	29,000,000	0.55	14
Copper (Cu content)	000 tonnes	265	15,900	1.67	NA	NA	690,000	-	-
Gold	tonnes	0.341	2,560	0.01	NA	NA	51,000	-	-
Iron Ore	million tonnes	35	2,590	1.35	10	2,500	170,000	1.47	11
Lead (Pb content)	000 tonnes	35	4,140	0.85	NA	NA	85,000	-	-
Molybdenum (Mo content)	tonnes	3,900	242,000	1.61	9	50	10,000	0.50	12
Silver (Ag content)	tonnes	15.00	23,100	0.06	NA	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	65.0	12,000	0.54	NA	NA	250,000	-	-
Barite	000 tonnes	400	7,850	5.10	5	NA	240,000	-	-
Bentonite	000 tonnes	400	10,600	3.77	5?	NA	NA	-	-
Kaolin	000 tonnes	900	33,100	2.72	8	NA	NA	-	-
Gypsum	000 tonnes	13,000	147,000	8.84	2	NA	Large	-	-
Mica	000 tonnes	7	1,070	0.65	=9	NA	Large	-	-
Limestone	000 tonnes	55	NA	NA	-	NA	Large	-	-
Talc	000 tonnes	80	7,210	1.11	NA	NA	Large	-	-
Coal	million tonnes	2.30							

Iraq 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bentonite	000 tonnes	6,127	10,600	0.06	NA	NA	NA	-	-
Cement	000 tonnes	6,500	3,310,000	0.20	NA	NA	NA	-	-
Gypsum	000 tonnes	583	147,000	0.40	NA	NA	Large	-	-
Kaolin	000 tonnes	20.6	33,100	0.06	NA	NA	NA	-	-
Limestone	000 tonnes	986	NA	NA	-	NA	Large	-	-
Sand & Gravel	000 tonnes	10,139	NA	NA	-	NA	Large	-	-

Jordan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bromine	tonnes	329	450,000	0.07	8	NA	Large	-	-
Cement	000 tonnes	3,929	3,310,000	0.12	NA	NA	NA	-	-
Kaolin	000 tonnes	115	33,100	0.35	NA	NA	NA	-	-
Gypsum	000 tonnes	292	147,000	0.20	NA	NA	Large	-	-
Limestone	000 tonnes	559	NA	NA	-	NA	Large	-	-
Phosphate Rock	000 tonnes	6,529	181,000	3.61	6	1,500,000	71,000,000	2.11	6
Dimension Stone	000 cubic m.*	6,356	NA	NA	-	NA	NA	-	-

* metres.

Kazakhstan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	5,310.4	209,000	2.54	8	160,000	29,000,000	0.55	14
Chromite	000 tonnes	3,760	23,700	15.86	2	220,000	480,000	45.83	1
Copper (Cu content)	000 tonnes	380	15,900	2.39	11	7,000	690,000	1.01	12
Gallium	tonnes	18.702	216	8.66	3	NA	NA	-	-
Gold	tonnes	30.272	2,560	1.18	NA	NA	51,000	-	-
Iron Ore	million tonnes	24	2,590	0.94	13	3,000	170,000	1.76	11
Lead (Pb content)	000 tonnes	36	4,140	0.87	NA	NA	85,000	-	-
Rhenium	tonnes	2	47.2	4.24	5	190	2,500	7.60	4
Silver (Ag content)	tonnes	552.06	23,100	2.39	11	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	404.5	12,000	3.37	8	12,000	250,000	4.80	=5
Uranium (U ₃ O ₈)	tonnes	20,995	66,187	31.72	1	NA	4,100,000	-	-
Coal (bit.* & lignite)	million tonnes	106.568							
Asbestos	000 tonnes	214.10	2,010	10.65	4	NA	Large	-	-
Gypsum	000 tonnes	700	147,000	0.48	NA	NA	Large	-	-
Fluorspar	000 tonnes	67.0	6,010	1.11	9	NA	240,000	-	-
Boron	000 tonnes	30	4,080	0.74	8	NA	210,000	-	-

* bituminous.

Korea, North 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	12	15,900	0.08	NA	NA	690,000	-	-
Gold	tonnes	2	2,560	0.08	NA	NA	51,000	-	-
Iron Ore	million tonnes	5.3	2,590	0.20	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	13	4,140	0.31	NA	NA	85,000	-	-
Silver (Ag content)	tonnes	20	23,100	0.09	NA	NA	530,000	-	-
Tungsten (W content)	tonnes	100	68,800	0.15	NA	NA	3,100,000	-	-
Zinc (Zn content)	000 tonnes	70	12,000	0.58	NA	NA	250,000	-	-
Cement	000 tonnes	6,400	3,310,000	0.00	NA	NA	NA	-	-
Fluorspar	000 tonnes	13	6,010	0.21	NA	NA	240,000	-	-
Graphite	000 tonnes	30	925	3.24	4	NA	77,000	-	-
Talc	000 tonnes	50	7,210	0.69	NA	MA	Large	-	-
Coal (anthracite)	000 tonnes	41,000							

Kyrgyzstan 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Antimony (Sb Content)	tonnes	10	167,000	0.01	-	NA	1,800,000	-	-
Gold	tonnes	16.95	2,560	0.66	NA	NA	51,000	-	-
Mercury (Hg content)	tonnes	250	2,250	11.11	2	7,500	93,000	8.06	3
Molybdenum (Mo content)	tonnes	250	242,000	0.10	13	100	10,000	1.00	11
Cement	000 tonnes	1,100	3,310,000	0.03	NA	NA	NA	-	-
Kaolin	000 tonnes	400	33,100	1.21	NA	NA	NA	-	-
Salt	000 tonnes	1.1	280,000	0.00	NA	NA	Large	-	-
Coal	million tonnes	1							
Uranium (U ₃ O ₈ content)	tonnes	3,035	66,187	4.59	NA	NA	4,100,000	-	-

Laos 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Barite	000 tonnes	29	7,850	0.37	NA	NA	240,000	-	-
Cement	000 tonnes	400	3,310,000	0.01	NA	NA	NA	-	-
Coal (brown)	000 tonnes	600							
Gold	tonnes	5.061	2,560	0.20	NA	NA	51,000	-	-
Gypsum	000 tonnes	775	147,000	0.53	NA	NA	Large	-	-
Limestone	000 tonnes	750	NA	NA	-	NA	Large	-	-
Sand	000 tonnes	100	NA	NA	-	NA	Large	-	-
Silver (Ag content)	tonnes	15.788	23,100	0.07	NA	NA	530,000	-	-
Tin (Sn content)	tonnes	350	265,000	0.13	NA	NA	4,800,000	-	-
Zinc (Zn content)	000 tonnes	3.40	12,000	0.03	NA	NA	250,000	-	-

Lebanon 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	5,227	3,310,000	0.16	NA	NA	NA	-	-
Gypsum	000 tonnes	105	147,000	0.07	NA	NA	Large	-	-
Limestone	000 tonnes	7,000	NA	NA	-	NA	Large	-	-
Salt	000 tonnes	20	280,000	0.01	NA	Na	Large	-	-

Malaysia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	3.766	2,560	0.15	NA	NA	51,000	-	-
Iron Ore	million tonnes	3.466	2,590	0.13	NA	NA	170,000	-	-
Rare Earth Oxide	tonnes	30	133,000	0.02	4	30,000	110,000,000	0.03	7
Silver (Ag content)	tonnes	0.354	23,100	0.00	NA	NA	530,000	-	-
Tin (Sn content)	tonnes	2,668	265,000	1.01	10	250,000	4,800,000	5.21	7
Titanium Minerals									
Ilmenite Cons	000 tonnes	19.064	5,800	2.97	14	40,000	650,000	6.15	NA
Rutile Cons	000 tonnes	7.567	670	0.85	6	NA	42,000	-	-
Zirconium	000 tonnes	1.261	1,250	0.77	NA	NA	52,000	-	-
Cement	000 tonnes	19,762	3,310,000	0.60	NA	NA	NA	-	-
Kaolin	000 tonnes	530.331	33,100	1.60	NA	NA	NA	-	-
Silica Sand	000 tonnes	932	NA	-	-	NA	NA	-	-
Coal	000 tonnes	2,397	6,185,000	0.00	NA	NA	675,000,000	-	-

Maldives 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Mongolia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	323	3,310,000	0.00	NA	NA	NA	-	-
Coal	million tonnes	25.246							
Copper (Cu content)	000 tonnes	124.985	15,900	0.79	NA	NA	690,000	-	-
Fluorspar	000 tonnes	400	6,010	6.66	3	22,000	240,000	9.17	4
Gold	tonnes	6.037	2,560	0.24	NA	NA	51,000	-	-
Molybdenum (Mo content)	tonnes	2,198	242,000	0.91	10	160	10,000	1.60	8
Silver (Ag content)	tonnes	28.71	23,100	0.12	NA	NA	530,000	-	-
Stone (crushed)	000 tonnes	101	NA	NA	NA	NA	NA	-	-
Tungsten (W content)	000 tonnes	0.02	68.8	0.03	NA	NA	3,100,000	-	-
Zinc (Zn content)	000 tonnes	112.6	12,000	0.94	NA	NA	250,000	-	-

Myanmar 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	8	15,900	0.05	NA	NA	690,000	-	-
Gold	tonnes	0.1	2,560	0.00	NA	NA	51,000	-	-
Lead (Pb content)	000 tonnes	7.5	4,140	0.18	NA	NA	85,000	-	-
Nickel (Ni content)	000 tonnes	0.01	1,590	0.00	NA	NA	80,000	-	-
Silver (Ag content)	tonnes	0.249	23,100	0.00	NA	NA	530,000	-	-
Tin (Sn content)	tonnes	672	265,000	0.25	NA	NA	4,800,000	-	-
Tungsten (W content)	tonnes	87	68,800	0.13	NA	NA	3,100,000	-	-
Barite	000 tonnes	7.623	7,850	0.10	NA	NA	240,000	-	-
Cement	000 tonnes	669.941	3,310,000	0.00	NA	NA	NA	-	-
Bentonite	000 tonnes	1	106,000	0.00	NA	NA	NA	-	-
Gypsum	000 tonnes	97.518	147,000	0.07	NA	NA	Large	-	-
Jade	000 tonnes	25.427	NA	NA	-	NA	NA	-	-
Limestone	000 tonnes	4,000	NA	NA	-	NA	Large	-	-
Coal (brown)	000 tonnes	245.418							

Nepal 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	295	3,310,000	0.00	NA	NA	NA	-	-
Clay, red	000 tonnes	9	NA	NA	-	NA	NA	-	-
Coal (bituminous)	000 tonnes	16	6,185,000	0.00	NA	NA	675,000,000	-	-
Limestone	000 tonnes	580	NA	NA	-	NA	Large	-	-
Quartzite	000 tonnes	3	NA	NA	-	NA	NA	-	-
Talc	000 tonnes	9	7,210	0.12	NA	MA	Large	-	-

Pakistan 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	36	209,000	0.02	NA	NA	29,000,000	-	-
Chrome Ore	000 tonnes	120	23,700	0.51	NA	NA	480,000	-	-
Iron Ore	million tonnes	0.290	2,590	0.01	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	26	4,140	0.63	NA	NA	85,000	-	-
Zinc (Zn content)	000 tonnes	0.01	12,000	0.00	-	NA	250,000	-	-
Barite	000 tonnes	55	7,850	0.70	11	1,000	240,000	0.42	=9
Copper (Cu tonnes)	000 tonnes	18	15,900	0.11	NA	NA	690,000	-	-
Cement	000 tonnes	30,000	3,310,000	0.91	NA	NA	NA	-	-
Bentonite	000 tonnes	35	10,600	0.33	NA	NA	NA	-	-
Feldspar	000 tonnes	40	206,000	0.02	NA	NA	Large	-	-
Gypsum	000 tonnes	800	147,000	0.54	NA	NA	Large	-	-
Phosphate Rock	000 tonnes	4	181,000	0.00	NA	NA	71,000,000	-	-
Dolomite	000 tonnes	250	NA	NA	NA	NA	NA	-	-
Limestone	000 tonnes	36	NA	NA	NA	NA	NA	-	-
Coal (All)	million tonnes	4	-	-	-	NA	NA	-	-

Palestine 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Sri Lanka 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	2,000	3,310,000	0.06	NA	NA	NA	-	-
Kaolin	000 tonnes	8.207	33,100	0.02	NA	NA	NA	-	-
Feldspar	000 tonnes	75.495	206,000	0.04	NA	NA	Large	-	-
Graphite	000 tonnes	3.437	925	0.37	10	NA	77,000	-	-
Phosphate Rock	000 tonnes	47.778	181,000	0.03	NA	NA	71,000,000	-	-
Limestone	000 tonnes	1,192	NA	NA	NA	NA	NA	-	-
Ilmenite	tonnes	52,637	5,800,000	0.91	NA	NA	650,000,000	-	-
Rutile	tonnes	2,568	670,000	0.38	NA	NA	42,000,000	-	-

Syria 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	6,000	3,310,000	0.18	NA	NA	NA	-	-
Gypsum	000 tonnes	540.00	147,000	0.37	NA	NA	Large	-	-
Phosphate Rock	000 tonnes	3,765	181,000	2.08	9	1,800,000	71,000,000	2.54	5
Sand & Gravel	000 tonnes	1,445	NA	NA	-	NA	NA	-	-
Dolomite (refractory grade)	000 tonnes	5,000	NA	NA	-	NA	NA	-	-
Gravel	000 tonnes	6,000	NA	NA	NA	NA	NA	-	-

Tajikistan 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	1.361	2,560	0.05	NA	NA	51,000	-	-
Antimony (Sb content)	tonnes	2,000	167,000	1.20	5	50,000	1,800,000	2.78	4
Lead (Pb content)	000 tonnes	0.80	4,140	0.02	NA	NA	85,000	-	-
Silver Ag content)	tonnes	4.50	23,100	0.02	NA	NA	530,000	-	-
Coal (bituminous)	million tonnes	0.142							
Coal (lignite)	million tonnes	0.035							
Salt	000 tonnes	52	280,000	0.02	NA	NA	Large	-	-
Fluorspar	000 tonnes	8.5	6,010	0.14	NA	NA	240,000	-	-
Gypsum	000 tonnes	8.50	147,000	0.01	NA	NA	Large	-	-

Thailand 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	4.125	2,560	0.16	NA	NA	51,000	-	-
Iron Ore	million tonnes	0.969	2,590	0.04	NA	Na	170,000	-	-
Silver (Ag content)	tonnes	17.092	23,100	0.07	NA	NA	530,000	-	-
Manganese Ore	000 tonnes	50.450							
Tin (Sn content)	000 tonnes	0.291	265	0.11	11	170	4,800	3.54	9
Tungsten (W content)	000 tonnes	0.6	68.8	0.87	6	NA	3,100,000	-	-
Zinc (Zn content)	000 tonnes	25.529	12,000	0.21	-	NA	250,000	-	-
Barite	000 tonnes	9	7,850	0.11	-	NA	240,000	-	-
Diatomite	000 tonnes	4	1,820	0.22	-	NA	Large	-	-
Dolomite	000 tonnes	1,200	NA	NA	-	NA	Large	-	-
Fluorspar	000 tonnes	20	6,010	0.33	-	NA	240,000	-	-
Talc & Pyrophyllite	000 tonnes	203	7,210	2.82	-	NA	Large	-	-
Gypsum	000 tonnes	9,985	147,000	6.79	4	NA	Large	-	-
Coal (brown)	000 tonnes	17,907							

Turkey 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Antimony (Sb content)	tonnes	1,700	167,000	1.02	NA	NA	1,800,000	-	-
Bauxite	000 tonnes	1,500	209,000	0.72	NA	NA	29,000,000	-	-
Copper (Cu content)	000 tonnes	97	15,900	0.61	NA	NA	690,000	-	-
Gold	tonnes	17	2,560	0.66	NA	NA	51,000	-	-
Iron Ore	million tonnes	5.188	2,590	0.20	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	35	4,140	0.85	14	NA	85,000	-	-
Silver (Ag content)	tonnes	350	23,100	1.52	NA	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	460	12,000	3.83	9	NA	250,000	-	-
Barite	000 tonnes	250	7,850	3.18	5	NA	240,000	-	-
Cement	000 tonnes	62,737	3,310,000	1.90	4	NA	NA	-	-
Gypsum	000 tonnes	3,200	147,000	2.18	10	NA	Large	-	-
Perlite	000 tonnes	530	1,670	31.74	1	NA	700,000	-	-
Zeolite	000 tonnes	150	2,800	5.36	3	NA	Large	-	-
Talc	000 tonnes	8	7,210	0.11	NA	NA	Large	-	-
Coal (hard)	million tonnes	3.667							
Coal (lignite)	million tonnes	74,437							

Turkmenistan 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bentonite	000 tonnes	50	10,600	0.47	NA	NA	NA	-	-
Bromine	tonnes	150.00	450,000	0.03	10	300	Large	-	3
Cement	000 tonnes	1,100	3,310,000	0.03	NA	NA	NA	-	-
Gypsum	000 tonnes	100.00	147,000	0.07	NA	NA	Large	-	-
Iodine	tonnes	270	28,700	0.94	7	170,000	15,000,000	1.13	4
Salt	000 tonnes	215	280,000	0.08	NA	NA	Large	-	-

Uzbekistan 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	100	15,900	0.63	NA	NA	690,000	-	-
Gold	tonnes	85	2,560	3.32	9	1,700	51,000	3.33	10
Rhenium	tonnes	0.90	47	1.91	8	NA	2,500	-	-
Silver	tonnes	83	23,100	0.36	NA	NA	530,000	-	-
Kaolin	000 tonnes	550	33,100	1.66	1	NA	NA	-	-
Fluorspar	000 tonnes	90	6,010	1.50	NA	NA	240,000	-	-
Iodine	tonnes	2	28,700	0.01	8?	NA	15,000	-	-
Phosphate Rock	000 tonnes	600	181,000	0.33	NA	NA	71,000,000	-	-
Coal (lignite)	million tonnes	2.30							
Uranium (U ₃ O ₈ content)	tonnes	2,400	66,187	3.63	NA	NA	4,100,000	-	-

Vietnam 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	80	209,000	0.04	14	2,100,000	29,000,000	7.24	4
Chrome ore	000 tonnes	37.105	23,700	0.16	NA	NA	480,000	-	-
Copper (Cu content)	000 tonnes	12	15,900	0.08	NA	NA	690,000	-	-
Gold	tonnes	3	2,560	0.12	NA	NA	51,000	-	-
Sand & Gravel	000 tonnes	200,000	NA	NA	-	NA	Large	-	-
Lead (Pb content)	000 tonnes	7.70	4,140	0.19	NA	NA	85,000	-	-
Tin (Sn content)	tonnes	5,400.000	265,000	2.04	8	NA	4,800	-	-
Ilmenite	tonnes	686,800	5,800,000	11.84	4	1,600	650,000	0.25	12
Rutile	tonnes	620	670,000	0.09	NA	NA	42,000,000	-	-
Zinc (Zn content)	000 tonnes	45.60	12,000	0.38	-	NA	250,000	-	-
Fluorspar	000 tonnes	4	6,010	0.07	-	NA	240,000	-	-
Graphite	000 tonnes	2	925	0.22	-	NA	77,000	-	-
Phosphate Rock	000 tonnes	1,896	181,000	1.05	NA	NA	Large	-	-
Stone (building)	000 tonnes	351,237	NA	NA	NA	NA	Large	-	-
Coal (anthracite)	000 tonnes	43,715							

Yemen 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	3,500	3,310,000	0.11	NA	NA	NA	-	-
Gypsum	000 tonnes	100.00	147,000	0.07	NA	NA	Large	-	-
Salt	000 tonnes	75.0	280,000	0.03	NA	NA	Large	-	-
Sand & Gravel	000 tonnes	1,500	NA	NA	-	NA	Large	-	-

Latin America

Anguilla 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Antigua and Barbuda 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Argentina 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cadmium	tonnes	124	21,100	0.59	NA	NA	640,000	-	-
Copper (Cu content)	000 tonnes	140.001	15,900	0.88	NA	NA	690,000	-	-
Gold	tonnes	63.138	2,560	2.47	11	NA	51,000	-	-
Lead (Pb content)	000 tonnes	22.554	4,140	0.54	NA	NA	85,000	-	-
Silver	tonnes	723.238	23,100	3.13	10	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	32.556	12,000	0.27	NA	NA	250,000	-	-
Bentonite	000 tonnes	204.209	19,600	1.04	NA	NA	Large	-	-
Feldspar	000 tonnes	217.213	20,600	1.05	19	NA	Large	-	-
Perlite	000 tonnes	27.182	1,670	1.63	NA	NA	700,000	-	-
Stone (basalt)	000 tonnes	1,652.032	NA	NA	-	NA	Large	-	-
Coal (bituminous)	000 tonnes	140							

Belize 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Clay	000 tonnes	400	NA	-	-	NA	Large	-	-
Silica sand	cubic metres	12,000	NA	-	-	NA	NA	-	-
Sand	cubic metres	800,000	NA	-	-	NA	NA	-	-
Stone	000 tonnes	300	NA	-	-	NA	NA	-	-

Bolivia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Antimony (Sb content)	tonnes	4,980	167,000	2.98	2	310,000	1,800,000	17.22	3
Bismuth (Bi content)	tonnes	87	8,900	0.98	5	10,000	320,000	3.13	3
Copper (Cu content)	000 tonnes	2.063	15,900	0.01	NA	NA	690,000	-	-
Gold	tonnes	2.063	2,560	0.08	NA	NA	51,000	-	-
Indium (In content)	tonnes	60	NA*	-	-	NA	NA	-	-
Lead (Pb content)	000 tonnes	72.803	4,140	1.76	8	1,600	85,000	1.88	9
Silver (Ag content)	tonnes	1,259	23,100	5.45	7	22,000	530,000	4.15	8
Tin (Sn content)	tonnes	20,190	265,000	7.62	4	400,000	4,800,000	8.33	4
Tungsten (W content)	tonnes	1,204	68,800	1.75	3	53,000	3,100,000	1.71	5
Zinc (Zn content)	000 tonnes	411.409	12,000	3.43	9	5,000	250,000	2.00	8
Barite	000 tonnes	7.485	7,850	0.10	NA	NA	240,000	-	-
Gypsum	000 tonnes	0.556	147,000	0.00	NA	NA	Large	-	-
Cement	000 tonnes	2,414	3,310,000	0.07	NA	NA	NA	-	-
Tantalum (Tantalite)	tonnes	3,416	NA	NA	NA	NA	NA	-	-
Amethyst	tonnes	485.39	NA	NA	NA	NA	NA	-	-
Quartz, pink	tonnes	10	NA	NA	NA	NA	NA	-	-

* World refinery production of Indium in 2010 was 609 tonnes. Bolivian production is mine production.

Brazil 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	31,700	209,000	15.17	3	580,000	3,600,000	16.11	3
Cobalt	tonnes	1,600	89,500	1.79	9	87,000	7,500,000	1.16	8
Copper (Cu content)	000 tonnes	213.548	15,900	1.34	NA	NA	690,000	-	-
Gold	tonnes	59.552	2,560	2.33	12	2,400	51,000	4.71	7
Iron Ore	million tonnes	372.12	2,590	14.37	3	29,000	170,000	17.06	2
Lead (Pb content)	tonnes	19.65	4,140	0.47	NA	NA	85,000	-	-
Nickel (Ni content)	000 tonnes	108.983	1,590	6.85	10	8,700,000	80,000,000	10.88	3
Silver	tonnes	68.50	23,100	0.30	NA	70,000	530,000	-	-
Ilmenite	000 tonnes	166	5,800	2.86	12	43,000	650,000	6.62	5
Rutile	000 tonnes	2.50	670	0.37	9	1,200	42,000	2.86	6
Graphite	000 tonnes	72.623	925	7.85	3	360	77,000	0.47	5
Potash	000 tonnes	417.990	33,700	1.24	10	300,000	9,500,000	3.16	4
Rare-Earth Elements	000 tonnes	500	130,000	0.38	3	48,000	110,000,000	0.04	6
Talc	000 tonnes	655.436	72,100	0.91	4	230,000	Large	-	1
Coal (bituminous)	million tonnes	13.60							

Chile 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	5,419	15,900	34.08	1	190,000	690,000	27.54	1
Gold	tonnes	39,494	2,560	1.54	14	3,400	51,000	6.67	4
Iron Ore	million tonnes	9.130	2,590	0.35	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	0.695	4,140	0.02	NA	NA	85,000	-	-
Molybdenum (Mo content)	tonnes	37,186	242,000	15.37	3	1,200	10,000	12.00	3
Rhenium	tonnes	25	47.20	52.97	1	1,300	2,500	52.00	1
Selenium	tonnes	90	2,120	4.25	5	20,000	93,000	21.51	=1
Silver	tonnes	1,287,000	23,100	5.57	5	70,000	530,000	13.21	3
Cement	000 tonnes	3,871	3,310,000	0.12	NA	-	-	-	-
Boron (borates)	000 tonnes	504	4,080	12.35	2	35,000	210,000	16.67	2
Iodine (elemental)	tonnes	15,793	28,700	55.03	1	9,000,000	15,000,000	60.00	1
Phosphate Rock	000 tonnes	9.019	181,000	0.00	NA	NA	71,000,000	-	-
Molybdenum (Mo content)	tonnes	37,200	242,000	15.37	3	1,200,000	10,000,000	12.00	3
Coal (bit.* & lignite)	million tonnes	0.619							
Lithium	tonnes	10,510	28,100	37.40	1	7,500,000	13,000,000	57.69	1
Arsenic (trioxide)	tonnes	11,000	52,800	20.83	2	NA	NA	-	-

* bituminous.

Colombia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	3.555	15,900	0.02	NA	NA	690,000	-	-
Gold	tonnes	53.606	2,560	2.09	NA	NA	51,000	-	-
Nickel (Ni content)	tonnes	70,200.00	1,590,000	4.42	8	720,000	80,000,000	0.90	13
Platinum	tonnes	0.970	192	0.51	6	NA	66,000*	-	-
Silver (Ag content)	tonnes	15.300	23,100	0.07	NA	NA	530,000	-	-
Cement	000 tonnes	10,000	3,310,000	0.30	NA	-	-	-	-
Salt	000 tonnes	654.473	280,000	0.23	NA	NA	Large	-	-
Sulphur	000 tonnes	59.556	68,100	0.09	NA	NA	Large	-	-

Costa Rica 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	2,500	3,310,000	0.08	NA	NA	NA	-	-
Clays	000 tonnes	350	NA	-	-	NA	NA	-	-
Diatomite	000 tonnes	1	1,820	0.05	NA	NA	NA	-	-
Crushed Rock	000 tonnes	10,000	NA	-	-	NA	Large	-	-
Sand & Gravel	000 tonnes	3,500	NA	-	-	NA	Large	-	-
Sandstone	000 tonnes	150	NA	-	-	NA	Large	-	-

Cuba 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cobalt	tonnes	6,800	89,500	7.60	3	500,000	7,500,000	6.67	3
Gypsum	000 tonnes	111	147,000	0.08	NA	NA	Large	-	-
Limestone	000 tonnes	2,600	NA	-	-	NA	Large	-	-
Cement	000 tonnes	1,631	3,310,000	0.05	NA	NA	NA	-	-
Nickel (Ni content)	000 tonnes	71	1,590	4.47	9	5,500	80,000	6.88	5
Salt	000 tonnes	272	280,000	0.10	NA	NA	Large	-	-
Silica Sand	cubic metres	11,100	NA	-	-	NA	NA	-	-
Zeolites	tonnes	30,900	2,800,000	1.10	NA	NA	NA	-	-
Bentonite	tonnes	228	10,600,000	0.00	NA	NA	NA	-	-

Dominica 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Dominican Republic 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	3,200	3,310,000	0.10	NA	NA	Large	-	-
Copper (Cu content)	000 tonnes	9	15,900	0.06	NA	NA	690,000	NA	-
Gold	tonnes	0.5	2,560	0.02	NA	NA	51,000	NA	-
Gypsum	000 tonnes	195	147,000	0.13	NA	NA	Large	-	-
Marble	cubic metres	6,000	NA	NA	-	NA	Large	-	-
Salt	000 tonnes	50	280,000	0.02	NA	NA	Large	-	-
Silver (Ag content)	tonnes	20.3	23,100	0.09	NA	NA	530,000	NA	-

Ecuador 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	1.30	2,560	0.05	NA	NA	51,000	-	-
Silver (Ag content)	tonnes	0.80	23,100	0.00	NA	NA	530,000	-	-
Cement	000 tonnes	5,000	3,310,000	0.15	NA	-	-	-	-
Feldspar	000 tonnes	60	20,600	0.29	NA	NA	Large	-	-
Sand	000 tonnes	800	NA	NA	-	NA	Large	-	-
Limestone	000 tonnes	6,000	NA	NA	-	NA	Large	-	-

El Salvador 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	1,200	3,310,000	0.04	NA	NA	NA	-	-
Limestone	000 tonnes	1,200	NA	NA	-	NA	NA	-	-

Grenada 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
NIL									

Guatemala 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	9.21	2,560	0.36	NA	NA	51,000	-	-
Iron ore	000 tonnes	1.604	2,590,000	0.00	NA	NA	170,000,000	-	-
Silver (Ag content)	tonnes	194.683	23,100	0.84	NA	NA	530,000	-	-
Cement	000 tonnes	1,500	3,310,000	0.05	NA	NA	NA	-	-
Bentonite	000 tonnes	22.425	10,600	0.21	NA	NA	NA	-	-
Kaolin	000 tonnes	2.143	33,100	0.01	NA	NA	NA	-	-
Gypsum	000 tonnes	59	147,000	0.04	NA	NA	Large	-	-
Limestone	000 tonnes	4,910	NA	NA	-	NA	NA	-	-
Silica Sand	000 tonnes	62.098	NA	NA	-	NA	NA	-	-

Guyana 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	1,760	209,000	0.84	12	850,000	29,000,000	2.93	7
Diamond	000 carats	49.920	79,900	0.06	NA	NA	NA	-	-
Gold	tonnes	9.594	2,560	0.37	NA	NA	51,000	-	-
Sand	000 tonnes	652.175	NA	NA	NA	NA	Large	-	-
Stone crushed	000 tonnes	514.932	NA	NA	NA	NA	Large	-	-

Haiti 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	290	3,310,000	0.01	NA	NA	NA	-	-
Gravel	cubic metres	45,000	NA	NA	-	NA	NA	-	-
Sand	cubic metres	2,000,000	NA	NA	-	NA	NA	-	-
Marble	tonnes	200	NA	NA	-	NA	NA	-	-

Honduras 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	1,800	3,310,000	0.05	NA	NA	NA	-	-
Clays	000 tonnes	14	NA	-	-	NA	NA	-	-
Gold	tonnes	2.197	2,560	0.09	NA	NA	51,000	-	-
Lead (Pb content)	000 tonnes	16.90	41,400	0.04	NA	NA	85,000	-	-
Limestone	000 tonnes	1,200	NA	NA	-	NA	NA	-	-
Salt	000 tonnes	40	280,000	0.01	NA	NA	NA	-	-
Silver (Ag content)	tonnes	48.61	23,100	0.21	NA	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	36.37	12,000	0.30	NA	NA	250,000	-	-

Jamaica 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	8,540	209,000	4.09	6	2,000,000	29,000,000	6.90	5
Cement	000 tonnes	740	3,310,000	0.02	NA	NA	NA	-	-
Gypsum	000 tonnes	230	147,000	0.16	NA	NA	Large	-	-
Pozzolan material	000 tonnes	124	NA	-	-	NA	NA	-	-
Salt	000 tonnes	19	280,000	0.01	NA	NA	Large	-	-
Sand & Gravel	000 tonnes	3	NA	-	-	NA	Large	-	-
Shale (for cement)	000 tonnes	175	NA	-	-	NA	NA	-	-
Silica Sand	000 tonnes	4	NA	-	-	NA	NA	-	-

Mexico 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Barite	000 tonnes	154	7,800	1.97	8	7,000	240,000	2.92	7
Bismuth	tonnes Bi	1,000	8,500	11.76	2	10,000	320,000	3.13	3
Cadmium	tonnes Cd	1,500	21,500	6.98	5	48,000	640,000	7.50	4
Copper	000 tonnes Cu	365	16,100	2.27	12	38,000	690,000	5.51	4
Diatomite	000 tonnes	80	1,800	4.44	5	NA	NA	-	-
Feldspar	000 tonnes	440	20,700	2.13	=14	NA	NA	-	-
Fluorspar	000 tonnes	1,080	6,200	17.42	2	32,000	240,000	13.33	2
Gold	tonnes Au	85	2,700	3.15	11	1,400	51,000	2.75	11
Gypsum	000 tonnes	3,500	148,000	2.36	=8	NA	NA	-	-
Iron Ore	million tonnes	14	2,800	0.50	14	700	170,000	0.41	15
Lead	000 tonnes Pb	225	4,500	5.00	5	5,600	85,000	6.59	6
Manganese Ore	000 tonnes	170	14,000	1.21	8	4,000	630,000	0.63	8
Molybdenum	tonnes Mo	12,000	250,000	4.80	5	130	10,000	1.30	=9
Perlite	000 tonnes	50	1,900	2.63	7	NA	700,000	-	-
Phosphate Rock	000 tonnes	1,620	191,000	0.85	15	30,000	71,000,000	0.04	18
Silver	tonnes Ag	4,500	23,800	18.91	1	37,000	530,000	6.98	6
Strontium	tonnes Sr	35,000	380,000	9.21	2	NA	NA	-	-
Zinc	000 tonnes Zn	630	12,400	5.08	7	17,000	250,000	6.80	4

Montserrat 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Nicaragua 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	530	3,310,000	0.02	NA	NA	NA	-	-
Gold	tonnes	5	2,560	0.19	NA	NA	51,000	-	-
Gypsum	000 tonnes	20.33	147,000	0.01	NA	NA	Large	-	-
Limestone	tonnes	1,083	NA	NA	-	NA	NA	-	-
Salt	000 tonnes	30	280,000	0.01	NA	NA	NA	-	-
Silver (Ag content)	tonnes	7	23,100	0.03	NA	NA	530,000	-	-
Stone (crushed)	cubic metres	7,445,000	NA	-	NA	NA	NA	-	-

Panama 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Gold	tonnes	0.87	2,560	0.03	NA	NA	51,000	-	-
Salt	000 tonnes	17	280,000	0.01	NA	NA	NA	-	-
Limestone	000 tonnes	270	NA	NA	-	NA	NA	-	-

Paraguay 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	600	3,310,000	0.02	NA	-	-	-	-
Kaolin	000 tonnes	66	33,100	0.20	NA	NA	NA	-	-
Gypsum	000 tonnes	4.5	147,000	0.00	NA	NA	Large	-	-
Sand	000 tonnes	25.5	NA	NA	-	NA	Large	-	-
Limestone	000 tonnes	16	NA	NA	-	NA	Large	-	-
Talc	000 tonnes	0.2	72,100	NA	-	NA	Large	-	-

Peru 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	1,094.162	15,900	6.88	1	190,000	690,000	27.54	1
Gold	tonnes	145.085	2,560	5.67	6	2,000	51,000	3.92	8
Iron Ore	million tonnes	9.16	2,590	0.35	NA	NA	170,000	-	-
Lead (Pb content)	000 tonnes	261.978	4,140	6.33	4	7,900	85,000	9.29	4
Molybdenum (Mo content)	tonnes	16,963	242,000	7.01	4	450	10,000	4.50	4
Silver (Ag content)	tonnes	3,640	23,100	15.76	2	120,000	530,000	22.64	1
Tin (Sn content)	000 tonnes	33.848	265	12.77	3	310	4,800	6.46	6
Zinc (Zn content)	000 tonnes	1,470.450	12,000	12.25	3	19,000	250,000	7.60	3
Boron (Borates)	000 tonnes	293	4,080	7.18	5	4,000	210,000	1.90	6
Cement	000 tonnes	8,100	3,310,000	0.24	NA	-	-	-	-
Bentonite	000 tonnes	119.945	10,600	1.13	NA	NA	NA	-	-
Kaolin	000 tonnes	9.437	33,100	0.03	NA	NA	NA	-	-
Phosphate Rock	000 tonnes	38	181,000	0.02	NA	NA	71,000,000	-	-
Limestone	000 tonnes	10,500	NA	NA	-	NA	Large	-	-
Talc	000 tonnes	13.296	7,210	0.18	NA	NA	Large	-	-
Coal (anthracite & bituminous)	million tonnes	91.96							

St Helena 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

St Kitts and Nevis 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Sand & Gravel	000 tonnes	223	NA	-	-	NA	NA	-	-
Stone (crushed)	000 tonnes	131	NA	-	-	NA	NA	-	-

St Lucia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

St Vincents and Grenadines 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Suriname 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	4,000	209,000	1.91	9	580,000	29,000,000	2.00	10
Cement	000 tonnes	65	3,310,000	0.00	NA	-	-	-	-
Gold	tonnes	12.286	2,560	0.48	NA	NA	51,000	-	-
Gravel	000 tonnes	35	NA	NA	-	NA	Large	-	-
Sand	000 tonnes	160	NA	NA	-	NA	Large	-	-
Stone (crushed)	000 tonnes	50	NA	NA	-	NA	Large	-	-

Uruguay 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Barite	000 tonnes	0.015	7,850	0.00	NA	NA	240,000	-	-
Cement	000 tonnes	515	3,310,000	0.02	NA	-	-	-	-
Feldspar	000 tonnes	2.5	20,600	0.01	NA	NA	Large	-	-
Gold	tonnes	1.736	2,560	0.07	NA	NA	51,000	-	-
Iron Ore	million tonnes	0.0155	2,590	0.00	NA	NA	170,000	-	-
Sand	000 tonnes	2,000	NA	-	-	NA	Large	-	-
Gravel	000 tonnes	68.4	NA	-	-	NA	Large	-	-
Limestone	000 tonnes	1,200	NA	-	-	NA	Large	-	-
Granite (crushed)	000 tonnes	700	NA	-	-	NA	Large	-	-
Talc	000 tonnes	1.150	72,100	NA	-	NA	Large	-	-

Venezuela 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	1,900	209,000	0.91	10	320,000	29,000,000	1.10	11
Gold	tonnes	12	2,560	0.47	NA	NA	51,000	-	-
Iron ore	million tonnes	14.90	2,590	0.58	13	2,400	80,000	3.00	6
Nickel (Ni content)	tonnes	20,000	1,590,000	1.26	NA	NA	80,000,000	-	-
Cement	000 tonnes	11,000	3,310,000	0.33	NA	-	-	-	-
Diamond (gem)	000 carats	45	79,900	0.06	NA	NA	NA	-	-
Diamond (Ind)	000 carats	70	64,000	0.11	NA	NA	600,000	-	-
Phosphate Rock	000 tonnes	400	181,000	0.22	NA	NA	71,000,000	-	-
Limestone	000 tonnes	18,000	NA	NA	-	NA	Large	-	-
Sand & Gravel	000 tonnes	600	NA	NA	-	NA	Large	-	-
Silica Sand	000 tonnes	500	NA	NA	-	NA	Large	-	-
Coal (bituminous)	000 tonnes	7,500							

The Pacific

Cook Islands 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Fiji 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Cement	000 tonnes	120	3,310,000	0.00	NA	NA	NA	-	-
Gold	tonnes	1.856	2,560	0.07	NA	NA	51,000	-	-
Limestone	000 tonnes	50	NA	NA	-	NA	Large	-	-
Sand & Gravel	cubic metres	300,000	NA	NA	-	NA	Large	-	-
Silver	tonnes	0.5	23,100	0.00	NA	NA	530,000	-	-

Indonesia 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Bauxite	000 tonnes	1,050	209,000	0.50	NA	NA	29,000,000	-	-
Chromite	000 tonnes	1	23,700	0.00	NA	NA	480,000	-	-
Copper (Cu content)	000 tonnes	878.376	15,900	5.52	5	28,000	690,000	4.06	8
Gold	tonnes	106.316	2,560	4.15	7	3,000	51,000	5.88	=5
Nickel (Ni content)	000 tonnes	210	1,590	13.21	2	3,900	80,000	4.88	7
Silver (Ag content)	tonnes	271.534	23,100	1.18	NA	NA	530,000	-	-
Tin (Sn content)	000 tonnes	43.258	265	16.32	2	800	4,800	16.67	2
Zirconium cons	000 tonnes	62	1,250	4.96	4	NA	52,000	-	-
Diamond (gem)	000 carats	7	79,900	0.01	NA	NA	NA	NA	-
Diamond (Ind)	million carats	0.030	64	0.05	NA	NA	600	-	-
Gypsum	000 tonnes	7	147,000	0.00	NA	NA	Large	-	-
Phosphate Rock	000 tonnes	0.6	181,000	0.00	NA	NA	71,000,000	-	-
Cement	000 tonnes	28,000	3,310,000	0.85	17	NA	NA	NA	-
Limestone	000 tonnes	1,900	NA	NA	-	NA	Large	-	-
Coal (anthracite)	million tonnes	0.1190							
Coal (bituminous)	million tonnes	137.801	6,185	2.23	-	NA	675,000,000	-	-

Kiribati 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Marshall Islands 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Micronesia, Federated States of 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Nauru 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Niue 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Palau 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Papua New Guinea 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Copper (Cu content)	000 tonnes	160	15,900	1.01	NA	NA	690,000	-	-
Gold	tonnes	62.90	2,560	2.46	12	1,200	51,000	2.35	13
Silver (Ag content)	tonnes	46	23,100	0.20	-	NA	530,000	-	-

Philippines 2009

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Chromite	000 tonnes	16	23,700	0.07	NA	NA	480,000	-	-
Cobalt	tonnes	1,500	89,500	1.68	9	NA	7,500,000	-	-
Copper (Cu content)	000 tonnes	49	15,900	0.31	NA	NA	690,000	-	-
Gold	tonnes	37.047	2,560	1.45	NA	NA	51,000	-	-
Nickel (Ni content)	tonnes	137,351	1,590,000	8.64	5	1,100,000	80,000,000	1.38	12
Silver (Ag content)	tonnes	33.808	23,100	0.15	-	NA	530,000	-	-
Zinc (Zn content)	000 tonnes	10.035	12,000	0.08	-	NA	250,000	-	-
Cement	000 tonnes	14,865	3,310,000	0.45	-	NA	NA	-	-
Bentonite	tonnes	1,413	10,600,000	0.01	-	NA	NA	-	-
Silica Sand	000 tonnes	284	NA	NA	-	NA	NA	-	-
Limestone	000 tonnes	33,090	NA	NA	-	NA	NA	-	-
Tuff	tonnes	18,830	NA	NA	-	NA	NA	-	-
Coal (all)	000 tonnes	4,687	-	-	-	NA	NA	-	-

Samoa 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Solomon Islands 2010*

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

* NB gold production in Solomon Islands resumed in 2011.

Timor-Leste 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Tokelau 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Tonga 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Tuvalu 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Vanuatu 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Wallis and Futuna 2010

Commodity	Unit	Production				Reserves			
		Country	World	Country %	Country Rank	Country	World	Country %	Country Rank
Nil									

Appendix 4.1. Geological survey assessment summary by country

Geological surveys were assessed using eleven categories each evaluating a different capability expected to be well developed in advanced geological surveys. Categorising the activities an advanced geological survey (e.g., the USGS) performs is always going to be an imperfect exercise, as the array of services offered is vast, and is at least partly dependent on government agency structure and also on the legislative environment. For example, countries which have active environmental or meteorological agencies, are unlikely to have advanced biological or meteorological monitoring capabilities within the geological survey, regardless of how advanced the survey is. Countries can choose to actively perform exploration for a completely nationalised mining or petroleum sector, or to provide exploration and geotechnical services, such as drilling and dam construction services to more privatised sectors. The eleven categories used for this study have been chosen to reflect the core services expected from advanced surveys and are briefly described below.

Geological Survey assessment criteria and some typical advanced geological survey capabilities

Category	Description
Geology	Basic geological mapping and physical assessment capability. More advanced capabilities may include advanced work in sub-disciplines such as geochronology, geochemistry, geological system specific expertise, integrated data assessment capabilities (2D–4D).
Geophysics	Onshore seismic surveying, gravity, magnetics, magnetotellurics, seismology, radiometrics, etc.
Marine	Marine geology oceanography, and associated advanced surveying capability, e.g., bathymetry, offshore seismic, sub-bottom profiler, physical seabed sampling for micropaleontological and biological assays, and interpreted marine sedimentology
Hydrogeology	Groundwater and surface hydrogeological systems assessment capability.
Risk/Hazard	Assessment of a range risk and natural hazard phenomenon, such as volcanic, earthquake, subsidence, flood, tsunami inundation, etc, and integrated modelling and mitigation strategies product development. In addition anthropogenic hazards such as extractive industries associated pollution, groundwater contamination, waste leachate, urban development, etc, may also be conducted by geological surveys.
Remote Sensing	Acquisition, processing, and interpretation of passively or actively remotely acquired data from a variety of platforms, e.g., aerial photography, radar, LiDAR, and geodetic, multi-spectral, or hyperspectral satellite data.
Mapping	Production of map-based products. Ranges from traditional hand-drawn and interpreted products to fully digitally integrated and digitally assisted interpretations. Digital availability of products was of particular interest for this study.
Mining	Generation of mining industry specific products, e.g., mineral indices and mineral deposits maps.
Energy	Generation of petroleum and geothermal specific products, e.g., seeps or other petroleum signatures maps, temperature at depth maps.
Publication	Assessment of the degree of publications generated by the geological survey itself. This assessment had a particular emphasis on publications by the host country survey and digital availability, and was intended to assess the capability of the host survey—not the capability of, or level of assistance given by, the many foreign geological surveys active in developing countries.
English Website	The geological survey assessment has been entirely based on data available via online geological survey websites. This provides a good preliminary indication of the degree of preparedness of a country to engage in particularly, but not exclusively, mining and petroleum collaboration and development, whereas countries without English-option websites are limiting their foreign investment potential by not hosting digitally accessible geological datasets.

As used in the context of exploration stimulation, these datasets are used collectively to locate and delineate potentially economic and commercially viable mineral or petroleum deposits at the surface, and under younger rock or alluvium cover. No one data acquisition program plan can be applied to every potential exploration target as differences in the geological system being investigated, spatial location, available infrastructure, and funding will dictate how data acquisition is best conducted in order to provide the most informative and importantly least expensive collective dataset. However, geological datasets are traditionally acquired first, though increasingly remote sensing and geophysical techniques are being utilised in conjunction with very coarse-resolution geological data to

narrow the search field remotely before expensive high-resolution geological and geochemical data are acquired. All data acquired needs to be of good quality, at appropriate resolution for the desired assessment technique, generated in commercially accessible formats, and be delivered in a timely and easily accessible fashion. The ability to continually update datasets as more and often improved quality information becomes available is essential, as is the ability to generate raw data and data-products at a variety of scales to suit a range of exploration purposes. Value-added products where higher-level interpretation, particularly those interpretations that rely on the integration of multiple datasets in 3D or 4D are useful ways of increasing the commercial uptake of geological survey acquired data. In addition, laboratory-based study findings, such as geochronology and geochemistry, are often used in these integrated assessments to better understand the extent and commercial viability of mineralised- or petroleum-bearing zones. Once potential exploration targets have been identified, later stage datasets provided by some geological surveys may include environmental impact assessments, and the analysis of risks associated with, and natural hazards that may impact upon, extractive industry activities. These types of datasets may be generated for both individual projects (small-scale), and at larger regional scales (e.g., submarine landslide risk to offshore drilling platforms, large-scale aquifer contamination potential, etc), and can be required at any or all stages of the exploration life cycle.

Geological survey assessment summary by country

Country	Continent	Ranking	Geology	Geophysics	Marine	Hydro-geology	Risk Hazard	Remote Sensing	Mapping	Mining	Energy	Publication	English Website Available
Algeria	Africa	4	Y	N	N	N	N	N	N	N	N	Y	N
Angola	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Benin	Africa	4	Y	N	N	N	N	N	N	N	N	N	N
Botswana	Africa	3	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y
Burkina Faso	Africa	4	Y	N	N	Y	N	N	Y	Y	Y	Y	Y
Burundi	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Cameroon	Africa	3	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Cape Verde	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Central African Republic	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Chad	Africa	4	Y	N	N	N	N	N	N	Y	Y	Y	Y
Comoros	Africa	4	N	N	N	N	N	N	N	N	N	Y	N
Cote d'Ivoire	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Democratic Republic of Congo	Africa	3	Y	N	N	Y	Y	N	Y	Y	N	Y	Y
Djibouti	Africa	4	Y	N	N	N	N	N	N	N	N	N	N
Egypt	Africa	2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Equatorial Guinea	Africa	3	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y
Eritrea	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Ethiopia	Africa	2	Y	Y	N	Y	N	N	Y	Y	Y	Y	Y
Gabon	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Gambia	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Ghana	Africa	4	Y	Y	N	Y	Y	N	Y	Y	Y	N	Y
Guinea	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Guinea-Bissau	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Kenya	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Lesotho	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Liberia	Africa	4	N	N	N	N	N	N	N	N	N	Y	N
Libya	Africa	0	N	N	N	N	N	N	N	N	N	N	N

Country	Continent	Ranking	Geology	Geophysics	Marine	Hydro-geology	Risk Hazard	Remote Sensing	Mapping	Mining	Energy	Publication	English Website Available
Madagascar	Africa	4	Y	N	N	N	N	N	N	N	N	Y	N
Malawi	Africa	4	Y	N	N	N	N	N	N	N	N	N	N
Mali	Africa	4	Y	N	N	N	N	N	Y	Y	Y	N	Y
Mauritania	Africa	4	N	N	N	N	N	N	N	N	N	Y	N
Mauritius	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Morocco	Africa	2	Y	Y	Y	N	N	Y	Y	T	Y	Y	Y
Mozambique	Africa	3	Y	Y	N	N	N	N	Y	Y	N	Y	Y
Namibia	Africa	2	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y
Niger	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Nigeria	Africa	3	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Republic of the Congo	Africa	0	N	N	N	N	N	N	N	N	N	N	Y
Rwanda	Africa	4	Y	N	N	N	N	N	N	N	N	Y	Y
São Tomé et Príncipe	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Senegal	Africa	4	Y	Y	N	N	N	N	Y	Y	N	Y	N
Seychelles	Africa	0	N	N	N	N	N	N	N	N	N	N	N
Sierra Leone	Africa	0	N	N	N	N	N	N	N	N	N	N	Y
Somalia	Africa	4	Y	N	N	N	N	Y	Y	N	N	Y	N
South Africa	Africa	1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Sudan	Africa	3	Y	Y	N	N	Y	N	Y	N	N	Y	N
Swaziland	Africa	4	Y	N	N	Y	N	N	N	Y	Y	Y	Y
Tanzania	Africa	2	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y
Togo	Africa	4	Y	N	N	N	N	N	Y	Y	Y	Y	Y
Tunisia	Africa	3	Y	Y	N	N	N	N	Y	Y	N	Y	Y
Uganda	Africa	3	Y	Y	N	N	N	Y	Y	Y	N	Y	Y
Zambia	Africa	3	Y	Y	N	N	N	N	Y	Y	N	Y	N
Zimbabwe	Africa	3	Y	N	N	N	N	N	Y	Y	N	Y	N
Afghanistan	Asia	4	N	N	N	N	N	N	N	Y	Y	Y	Y
Armenia	Asia	3	Y	Y	N	N	Y	Y	Y	N	N	Y	Y
Azerbaijan	Asia	1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bangladesh	Asia	3	Y	Y	N	N	Y	Y	Y	Y		Y	Y
Bhutan	Asia	4	Y	Y	N	N	Y	N	Y	N	N	Y	Y

Country	Continent	Ranking	Geology	Geophysics	Marine	Hydro-geology	Risk Hazard	Remote Sensing	Mapping	Mining	Energy	Publication	English Website Available
Cambodia	Asia	3	Y	Y	Y	N	N	N	Y	N	Y	Y	N
China	Asia	1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
North Korea	Asia	2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
India	Asia	1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Iran	Asia	1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Iraq	Asia	3	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Jordan	Asia	3	Y	?	?	?	Y	?	?	Y	Y	?	Y
Kazakhstan	Asia	0	N	N	N	N	N	N	N	N	N	N	Y
Kyrgyzstan Republic	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Laos	Asia	3	Y	N	N	N	N	N	Y	Y	N	Y	Y
Lebanon	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Malaysia	Asia	2	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Maldives	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Mongolia	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Myanmar	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Nepal	Asia	3	Y	N	N	N	Y	N	N	N	Y	Y	Y
Pakistan	Asia	2	Y	Y	N	Y	Y	N	N	Y	Y	Y	Y
Palestine	Asia	1	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y
Sri Lanka	Asia	3	Y	Y	N	N	Y	N	Y	Y	N	Y	Y
Syria	Asia	0	N	N	N	N	N	N	N	N	N	N	Y
Tajikistan	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Thailand	Asia	2	Y	Y	N	Y	Y	N	Y	Y	N	Y	Y
Turkey	Asia	2	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Turkmenistan	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Uzbekistan	Asia	3	Y	Y	N	Y	Y	N	N	N	N	N	N
Vietnam	Asia	4	Y	N	N	N	N	N	N	Y	N	Y	Y
Yemen	Asia	0	N	N	N	N	N	N	N	N	N	N	N
Anguilla	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Antigua	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Argentina	Latin America	2	Y	Y	N	N	N	Y	Y	Y	N	Y	N
Barbuda	Latin America	0	N	N	N	N	N	N	N	N	N	N	N

Country	Continent	Ranking	Geology	Geophysics	Marine	Hydro-geology	Risk Hazard	Remote Sensing	Mapping	Mining	Energy	Publication	English Website Available
Belize	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Bolivia	Latin America	2	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N
Brazil	Latin America	1	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Chile	Latin America	2	Y	Y	N	N	Y	N	Y	Y	N	Y	N
Colombia	Latin America	2	Y	Y	N	Y	Y	N	Y	Y	Y	Y	Y
Costa Rica	Latin America	3	Y	N	N	N	Y	N	N	N	N	Y	N
Cuba	Latin America	3	Y	Y	N	Y	N	N	Y	Y	Y	Y	N
Dominica	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Dominican Republic	Latin America	3	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N
Ecuador	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
El Salvador	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Grenada	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Guatemala	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Guyana	Latin America	4	Y	N	N	N	N	N	Y	Y	N	Y	Y
Haiti	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Honduras	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Jamaica	Latin America	3	Y	N	N	N	Y	N	N	Y	N	Y	Y
Mexico	Latin America	2	Y	Y	N	N	Y	N	Y	Y	Y	Y	Y
Montserrat	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Nicaragua	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Panama	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Paraguay	Latin America	4	N	N	N	N	N	N	N	Y	Y	Y	N
Peru	Latin America	3	Y	Y	N	Y	Y	N	Y	Y	N	Y	N
St Helena	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
St Kitts and Nevis	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
St Lucia	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
St Vincent and the Grenadines	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Suriname	Latin America	0	N	N	N	N	N	N	N	N	N	N	N
Uruguay	Latin America	3	Y	Y	N	Y	N	N	N	N	N	Y	N
Venezuela	Latin America	3	Y	Y	N	N	N	N	N	Y	N	Y	N
Cook Islands	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N

Country	Continent	Ranking	Geology	Geophysics	Marine	Hydro-geology	Risk Hazard	Remote Sensing	Mapping	Mining	Energy	Publication	English Website Available
Federated States of Micronesia	The Pacific	0	N	N	N	N	N	N	N	N	N	N	Y
Fiji	The Pacific	4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Indonesia	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Kiribati	The Pacific	0	N	N	N	N	N	N	N	N	N	N	Y
Marshall Islands	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Nauru	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Niue	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Palau	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Papua New Guinea	The Pacific	3	Y	Y	N	Y	Y	N	Y	N	N	Y	Y
Philippines	The Pacific	2	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Samoa	The Pacific	0	N	N	N	N	N	N	N	N	N	N	Y
Solomon Islands	The Pacific	0	N	N	N	N	N	N	N	N	N	N	Y
Timor-Leste	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Tokelau	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Tonga	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Tuvalu	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N
Vanuatu	The Pacific	4	N	Y	N	N	Y	N	N	N	N	Y	Y
Wallis and Futuna	The Pacific	0	N	N	N	N	N	N	N	N	N	N	N

Appendix 4.2. Geological surveys or parent departments identified in this study

Country	Continent	Survey Name	Website
Algeria	Africa	Service Geologique National Algeria	http://www.mem-algeria.org/english/index.php
Angola	Africa	Direccao de Servicos de Geologia	
Benin	Africa	Office Béninois des Recherches Géologiques et Minières (OBRGM)	http://www.bj.refer.org/benin_ct/eco/moralisation/site/secsite/mine.htm
Botswana	Africa	Department of Geological Survey	http://www.gov.bw/en/Ministries--Authorities/Ministries/Ministry-of-Minerals-Energy-and-Water-Resources-MMWER/Departments1/Department-of-geological-surveys/Introduction/
Burkina Faso	Africa	Bureau des Mines et de la Geologie du Burkina (BUMIGEB)	http://www.bumigeb.bf
Burundi	Africa	Directorate General of Geology and Mines	http://www.burundi-gov.bi/Composition-du-Gouvernement-de-la
Cameroon	Africa	The Institute for Geological and Mining Research, MINRESI	http://www.irgm-cameroun.org/
Cape Verde	Africa	Ministerio do ambiente, agricultura e pesca (MAAP - DGASP)	
Central African Republic	Africa	Ministere des mines de l'energie et de l'Hydraulique	
Chad	Africa	Direction des Mines et de la Géologie	http://www.dmg-tchad.org/index.php
Comoros	Africa	Recherche de la Minière	
Cote D'Ivoire	Africa	Direction des Mines et de la Géologie	
Democratic Republic of Congo	Africa	Centre de Recherche Géologique et Minière (C.R.G.M.)	http://www.drcmining.com/en/crgm/presentation.htm
Djibouti	Africa	Institut Supérieur d'Études et de Recherches Scientifiques et Technique (ISERST)	

Country	Continent	Survey Name	Website
Egypt	Africa	Egyptian Mineral Resources Authority (EMRA), Sector of Geological Survey	http://www.egsma.gov.eg/default2.htm
Equatorial Guinea	Africa	Department of Mines and Hydrocarbons	http://www.equatorialoil.com/
Eritrea	Africa	Ministry of Land, Water and Environment (MoLWE - WRD)	
Ethiopia	Africa	Geological Survey of Ethiopia	http://www.geology.gov.et
Gabon	Africa	Ministère de l'agriculture, de l'élevage et du développement rural (MAEDR)	
Gambia	Africa	Geological Department Office of the President	
Ghana	Africa	Geological Survey Department Ghana	
Guinea	Africa	Ministry of Mines and Geology Guinea	
Guinea-Bissau	Africa	Secrétariat d'Etat de l'Industrie, des Ressources Naturelles et de l'Environnement (S.E.I.R.N.A.)	
Kenya	Africa	Mines and Geological Department of Kenya	
Lesotho	Africa	Department of Mines & Geology	
Liberia	Africa	Liberian Geological Survey	
Libya	Africa	Geological Research and Mining Department	
Madagascar	Africa	Service de la Géologie	
Malawi	Africa	The Geological Survey Department of Malawi	
Mali	Africa	Direction Nationale de la Geologie et des Mines	http://www.bgs.ac.uk/mali/
Mauritania	Africa	Service Géologique	
Mauritius	Africa		
Morocco	Africa		http://www.onhym.com/
Mozambique	Africa	National Directorate of Geology	http://www.dng.gov.mz/index.htm
Namibia	Africa	Geological Survey Department, Ministry of Mines and Energy	http://www.mme.gov.na/gsn
Niger	Africa	Geological Survey in Niger	
Nigeria	Africa	Nigerian Geological Survey Agency	http://ngsa-ng.org/index.htm

Country	Continent	Survey Name	Website
Republic of the Congo	Africa	Ministère des mines, de l'énergie et de l'hydraulique (MMEH - DGH)	http://www.mmeh-rca.com/site_fr/
Rwanda	Africa	Rwanda Geology and Mines Authority	
Sao Tome and Principe	Africa	Ministère des ressources naturelles et de l'environnement	
Senegal	Africa	Direction of Mines and Geology (DMG)	
Seychelles	Africa		
Sierra Leone	Africa	Geological Survey Division	http://www.mmr-sl.org
Somalia	Africa	Geological Survey Department	http://www.faoswalim.org/
South Africa	Africa	Council for Geoscience	http://www.geoscience.org.za/index.php?option=com_content&view=frontpage&Itemid=1
Sudan	Africa	Geological Research Authority of the Sudan (GRAS)	http://www.gras-sd.com/
Swaziland	Africa	Geological Survey and Mines Department	
Tanzania	Africa	Geological Survey of Tanzania	http://www.gst.go.tz/about.html
Togo	Africa	Direction Générale des Mines et de la Géologie (DGMG)	http://www.mme.tg/?page=simple&idscat=12&idart=12
Tunisia	Africa	Office National des Mines	http://www.onm.nat.tn/en/index.php
Uganda	Africa	Geological Survey and Mines Department Uganda	http://www.uganda-mining.go.ug/magnoliaPublic/en/home.htm
Zambia	Africa	Geological Survey Department (GSD)	http://www.zambia-mining.com/
Zimbabwe	Africa	Zimbabwe Geological Survey	
Afghanistan	Asia	Afghanistan Geological Survey	http://www.bgs.ac.uk/AfghanMinerals/Index.htm
Armenia	Asia	Armenian National Survey for Seismic Protection	http://www.nssp-gov.am/index_eng.htm
Azerbaijan	Asia	Institute of Geology Azerbaijan, National Academy of Sciences	http://www.gia.az/view.php?lang=en&menu=0
Bangladesh	Asia	Geological Survey of Bangladesh	http://www.gsb.gov.bd
Bhutan	Asia	Geological Survey of Bhutan	http://www.moea.gov.bt/DGM/Pages/DGM.html

Country	Continent	Survey Name	Website
Cambodia	Asia	General Department of Mineral Resources and Cambodian National Petroleum Authority	http://www.cnpa.gov.kh/
China	Asia	China Geological Survey	http://old.cgs.gov.cn/Ev/english.htm
North Korea	Asia	Korea Institute of Geosciences Mineral Resources (KIGAM)	http://www.kigam.re.kr/english/index.asp
India	Asia	Geological Survey of India	http://www.portal.gsi.gov.in/portal/page?_pageid=108,1109821&_dad=portal&_schema=PORTAL
Iran	Asia	Geological Survey of Iran	http://www.gsi.ir
Iraq	Asia	State Company of Geological Survey and Mining for Iraq	http://www.geosurviraq.com/en/index.html
Jordan	Asia	Natural Resources Authority	http://www.nra.gov.jo/index.php
Kazakhstan	Asia	Ministry of Energetics and Mineral Resources Kazakhstan	http://mgm.gov.kz/index.php?option=com_content&view=frontpage&Itemid=1&lang=en
Kyrgyzstan Republic	Asia	Kyrgyz Geological Survey	http://www.kgs.bishkek.gov.kg/
Laos	Asia	Department of Geology	http://www.dgm.gov.la/
Lebanon	Asia		
Malaysia	Asia	Minerals and Geoscience Department Malaysia	http://www.jmg.gov.my/en.html
Maldives	Asia		
Mongolia	Asia	Mineral Resources Authority of Mongolia	http://www.mram.mn/
Myanmar	Asia	Department of Geological Survey & Mineral Exploration	http://www.mining.com.mm/7.DGSE/Default.asp
Nepal	Asia	Department of Mines and Geology, Ministry of Industry, Commerce and Supplies	http://www.dmgnepal.gov.np
Pakistan	Asia	Geological Survey of Pakistan	http://www.gsp.gov.pk
Palestine	Asia	Geological Survey of Israel	http://www.gsi.gov.il/eng/
Sri Lanka	Asia	Geological Survey and Mines Bureau Sri Lanka	http://www.gsmb.gov.lk/web/index.php?lang=en
Syria	Asia	General Corporation of Geology and Mineral Resources	www.mopmr-sy.org/
Tajikistan	Asia		
Thailand	Asia	Department of Mineral Resources	http://www.dmr.go.th/main.php?filename=web_en

Country	Continent	Survey Name	Website
Turkey	Asia	Central Directorate of Mineral Research and Exploration (MTA)	http://www.mta.gov.tr
Turkmenistan	Asia		
Uzbekistan	Asia	Institute of Hydrogeology and Engineering Geology Uzbekistan	http://uzgeolcom.uz/index.php?lang=en
Vietnam	Asia	Department of Geology and Minerals	http://www.dgmv.gov.vn/Default_EN.aspx?tabid=163
Yemen	Asia	Yemeni Geological Survey	http://www.ygsmrb.org.ye
Anguilla	Latin America		
Antigua	Latin America		
Argentina	Latin America	Servicio Geoloacutegico Minero Argentino	http://www.segemar.gov.ar/
Barbuda	Latin America		
Belize	Latin America		
Bolivia	Latin America	Servicio Nacional de Geología y Técnico de Minas, SERGEOTECMIN	http://sergeotecmin.gob.bo/inicio.php
Brazil	Latin America	Serviço Geológico do Brasil	http://www.cprm.gov.br
Chile	Latin America	Gobierno de Chile, Servicio Nacional de Geologiacutea y Minera	http://www.sernageomin.cl
Colombia	Latin America	El Instituto Colombiano de Geologia y Minería "INGEOMINAS"	http://www.ingeminas.gov.co
Costa Rica	Latin America	Dirección General de Geología y Minas	http://www.geologia.go.cr/index.html
Cuba	Latin America		http://www.onrm.minbas.cu/
Dominica	Latin America		

Country	Continent	Survey Name	Website
Dominican Republic	Latin America	Directorate General of Mines	http://www.sgn.gov.do/geoamb.html
Ecuador	Latin America	Ministerio de Minas y Petroleos	http://www.mrnrr.gob.ec/
El Salvador	Latin America	Dirección de Hidrocarburos y Minas	http://www.minec.gob.sv/index.php?option=com_content&view=article&id=1869:hidrocarburos&catid=108:funcionarios&Itemid=104
Grenada	Latin America		
Guatemala	Latin America	Dirección General de Minería	http://www.mem.gob.gt
Guyana	Latin America	Guyana Geology and Mines Commission	http://www.ggmc.gov.gy/
Haiti	Latin America		
Honduras	Latin America	Dirección Ejecutiva de Fomento a la Minería, DEFOMIN	
Jamaica	Latin America	Mines and Geology Division, Ministry of Energy and Mining	http://www.mgd.gov.jm/
Mexico	Latin America	Servicio Geologico Mexicano	http://www.sgm.gob.mx/
Montserrat	Latin America		
Nicaragua	Latin America	Dirección General de Minas, and Petrolero	http://www.mem.gob.ni/index.php?s=1
Panama	Latin America	Dirección General de Recursos Minerales	http://www.mici.gob.pa/subcategoria.php?cid=16&sid=53
Paraguay	Latin America	Dirección de Recursos Minerales	http://www.ssme.gov.py
Peru	Latin America	Instituto Geologico Minero y Metalurgico	http://www.ingemmet.gob.pe
St Helena	Latin America		

Country	Continent	Survey Name	Website
St Kitts and Nevis	Latin America		
St Lucia	Latin America		
St Vincent and the Grenadines	Latin America		
Suriname	Latin America	Geological Survey of the Netherlands	
Uruguay	Latin America	Geological Survey Of Uruguay (MIEM DINAMIGE), Dirección Nacional De Minería Y Geología	http://www.miem.gub.uy/gxpsites/hgxpp001?5,8,44,O,S,0,MNU;E;30;4;MNU;,:/adm
Venezuela	Latin America	Servicio Geológico de Venezuela, INGEOMIN	http://www.ingomin.gob.ve
Cook Islands	The Pacific		
Federated States of Micronesia	The Pacific	FSM Department of Resources and Development	http://www.fsmrd.fm/
Fiji	The Pacific	Mineral Resources Department of Fiji	http://www.mrd.gov.fj/gfiji/
Indonesia	The Pacific	Indonesian Geological Survey (sub-agency of Badan Geologi, Indonesian Directorate General of Geology and Mineral Resources (Ministry of Mines and Energy))	http://www.esdm.go.id/index.html (Ministry of Mines and Energy) http://www.bgl.esdm.go.id/ (Badan Geologi, Geology Agency) http://psg.bgl.esdm.go.id/ (Pusat Survei Geologi, Geological Survey Centre)
Kiribati	The Pacific	Ministry of Fisheries and Marine Resources Development - Government of Kiribati	http://www.mfmr.gov.ki/
Marshall Islands	The Pacific		
Nauru	The Pacific		
Niue	The Pacific		
Palau	The Pacific		
Philippines	The Pacific	Mines and geosciences Bureau, Department of Environment and Natural Resources	http://www.mgb.gov.ph/

Country	Continent	Survey Name	Website
Samoa	The Pacific	Lands and Survey Department	http://www.mnre.gov.ws/index.htm
Solomon Islands	The Pacific	Ministry of Energy, Mines & Minerals	http://www.commonwealth-of-nations.org/Solomon_Islands/Ministry/Ministry_of_Mines%60_Energy_And_Rural_Electrification/welcome
Timor-Leste	The Pacific	Energy and Minerals, Ministry of Development and Environment	
Tokelau	The Pacific		
Tonga	The Pacific	Ministry of Lands, Survey and Natural Resources	
Tuvalu	The Pacific		
Vanuatu	The Pacific	Department of Geology and Mines Vanuatu and Vanuatu Geohazards Observatory	http://www.governmentofvanuatu.gov.vu/index.php?option=com_content&view=article&id=97&Itemid=212
Wallis and Futuna	The Pacific		

Appendix 5.1. Definitions of risk ratings

Source: with permission from Control Risks Group Limited 2012 (www.control-risks.com) via Intierra Resource Intelligence (www.intierra.com).

Political Risk Definition

Political risk evaluates the likelihood of state or non-state political actors negatively affecting business operations in a country through regime instability or direct/indirect interference. State actors can include domestic and foreign governments, parliament, the judiciary, and the security forces; non-state actors can include insurgent groups, secessionist movements, lobbies, other companies, organised criminal groups, ethnic and indigenous groups, as well as international organisations. The impact of political risk on companies can include changes to fiscal or licence conditions, imposition of currency controls, judicial insecurity, high-level corruption, reputational damage, expropriation and nationalisation, contract uncertainty, and international sanctions. Political risk may vary for companies and investment projects because of factors such as industry sector and investor nationality.

Extreme Political Risk

Political conditions are hostile for business. For example, direct intervention such as nationalisation or expropriation of assets is likely, systemic political instability leads to the absence of rule of law, or the nature of the regime brings severe reputational risks.

High Political Risk

The political environment presents persistent and serious challenges for business. For example, there is a credible risk of contract repudiation or re-negotiation by state actors, political instability threatens fundamental alterations to the nature of the state, or government policy is capricious or harmful to business.

Medium Political Risk

While the political environment provides generally sound conditions for business, significant challenges can and do emerge. For example, hostile lobby groups exert disproportionate influence over government policy, political instability delays essential reforms, or contracts are subject to uncertainty or occasional change.

Low Political Risk

Political conditions are broadly positive and occasional and/or low-level challenges do not significantly impede business. For example, government policies are investor friendly with some exceptions, contracts are generally respected, or non-state actors have little adverse influence over government decisions.

Insignificant Political Risk

The environment for business is benign. For example, political stability is assured, investor-friendly policies are entrenched, and there is no threat of contract re-negotiation or repudiation.

Operational Risk Definition

Operational risk evaluates the influence of societal and structural factors on business activity in a country, and the likelihood of state and non-state actors either facilitating or impeding efficient business operations. State actors can include the judiciary, regulatory bodies, state and local administration; non-state actors can include labour forces, campaign and protest groups, as well as international organisations. Societal and structural factors can include corruption, infrastructure, ease of establishing and maintaining a functioning business, ease of recruiting and retaining skilled workers, and bureaucratic and business culture. The impact of operational risk on companies can include exposure to corrupt officials, judicial and bureaucratic delay, partiality in contract and tender awards, campaigns and protests, reputational damage, and deficient infrastructure. Operational risk may vary for companies and investment projects because of factors such as industry sector, investor nationality, and geographic location.

Extreme Operational Risk

Operating conditions are approaching a level where business is untenable. For example, Government structures are inadequate, infrastructure is almost entirely deficient or major reputational damage is certain.

High Operational Risk

The operating environment presents persistent and serious challenges for business. For example, corruption is endemic across all levels of officialdom, there are significant infrastructure deficiencies or regulations are onerous and their implementation is capricious.

Medium Operational Risk

Business routinely faces operational difficulties; occasionally these may pose serious challenges. For example, inadequacies within the regulatory, judicial and bureaucratic systems result in obstruction or delays to business procedures, elements of the infrastructure are deficient or the activity of unions or protest groups impede operations.

Low Operational Risk

The environment is broadly positive and occasional and/or low-level operating challenges do not significantly impede business. For example, interactions with government entities, labour unions and business partners are usually straightforward and options for redress are satisfactory, infrastructure is generally robust and there is little risk of reputational damage.

Insignificant Operational Risk

The environment for business is favourable and benign with any difficulties easily resolved. For example, official bodies are efficient and transparent, infrastructure for business is excellent and labour conditions are conducive to successful and sustainable investment.

Security Risk Definition

Security risk evaluates the likelihood of state or non-state actors engaging in actions that harm the financial, physical, and human assets of a company, and the extent to which the state is willing and able to protect those assets. Actors that may pose a security risk to companies can include political extremists, direct action groups, the security forces, foreign armies, insurgents, petty and organised criminals, computer hackers, protesters, workforces, local communities, indigenous groups, corrupt officials, business partners, and in country company management and staff. The impact of security risk on companies can include war damage, theft, injury, kidnap, death, destruction of assets, information theft, extortion, fraud, and loss of control over business. Security risk may vary for companies and investment projects because of factors such as industry sector, investor nationality, and geographic location.

Extreme Security Risk

Security conditions are hostile and approaching a level where business is untenable. For example, there is no law and order, there is outright war or civil war, or personnel constantly face the threat of targeted and potentially life-endangering violence.

High Security Risk

The security environment presents persistent and serious challenges for business; special measures are required. For example, state protection is very limited, insurgents are engaged in a sustained campaign affecting business or kidnap poses a severe and persistent threat to foreign personnel.

Medium Security Risk

Aspects of the security environment pose challenges to business, some of which may be serious. For example, there are some deficiencies in state protection, organised criminal groups frequently target business through fraud, theft and extortion, or personnel are occasionally exposed to physical threat.

Low Security Risk

Security conditions are broadly positive and occasional and/or low-level challenges do not significantly impede business. For example, the authorities provide adequate security, organised crime only marginally affects business and protest activity rarely escalates into threatened or actual violence.

Insignificant Security Risk

The security environment for business is benign. For example, the authorities provide effective security, there is virtually no political violence and public disorder is rare.

Terrorism Risk Definition

Terrorism risk evaluates the likelihood that acts of terrorism directly or indirectly affect business operations in a country. Terrorism is the use or threat of violence by non-state actors against state or civilian targets to advance an ideological cause by influencing a wider audience. Terrorist acts may include bombings, murder, hostage-taking, attacks using chemical, biological, or radioactive agents, and use of non-conventional weapons, or threats of attacks. The impact of terrorism risk on companies can include damage to assets, death or injury of personnel, and disruption to operations caused by damage or denial of access to buildings or vital infrastructure caused by attacks, threats or official responses. Terrorism risk may vary for companies and investment projects because of factors such as industry sector, investor nationality, and geographic location.

Extreme Terrorism Risk

Terrorism poses sustained critical risks to business. For example, a terrorist group (or groups) is staging a sustained, high-intensity campaign that severely hinders business, terrorists frequently target foreign personnel or business activity, or ineffectual security forces or other conditions present a highly favourable environment for terrorist activity.

High Terrorism Risk

Terrorism poses persistent and serious challenges to business. For example, terrorist groups stage regular attacks against foreign or business assets and personnel, a sustained terrorist campaign mars the environment in which business operates, or weak security forces are incapable of dealing with the terrorist activity.

Medium Terrorism Risk

Terrorism is a common and occasionally serious threat to business. For example, domestic terrorist groups stage regular attacks that cause disruption to (but do not target) business, there are infrequent large-scale attacks and/or opportunistic small-scale attacks on foreign or business assets and personnel, or the country holds attractive targets for transnational terrorists with the capability and intent to attack, and the security forces' capacity to counter the threat is limited.

Low Terrorism Risk

Terrorism causes infrequent or low-level risks to business; in some countries rare attacks may be of a more serious nature. For example, rare but large-scale attacks pose indirect threats to personnel or assets or cause temporary disruption to business, domestic terrorist groups stage low-level attacks that do not target business and are not aimed at causing casualties, or transnational terrorists with capability and intent to attack may be present in the country, but security conditions or other factors significantly hamper their operations.

Insignificant Terrorism Risk

Terrorism poses little or no risk to business. For example, there are no known active domestic groups or issues likely to fuel terrorism, transnational terrorists are very unlikely to have the capability and intent to target the country, or the security forces or other factors render the country a highly difficult location for terrorists to operate.

Appendix 6.1. World Bank funding assessment summary

Note current funding status applies only the 'Energy and Mining', and 'Water, Sanitation, and Flood Protection' funding streams.

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Algeria	Africa	0		
Angola	Africa	1		P124511, P096360
Benin	Africa	1	P115064, P111019, P119962, P110075, P079633	P113145
Botswana	Africa	1	P112516, P116784	
Burkina Faso	Africa	1	P111210, P078091, P069126	P126109, P106909
Burundi	Africa	1	P117225, P122217, P097974	
Cameroon	Africa	1	P114077, P121742, P122153, P110177, P104456	P106794, P117102, P084002, P121027
Cape Verde	Africa	1	P115464	
Central African Republic	Africa	1	P109087, P117777	P104595, P117616
Chad	Africa	0		
Comoros	Africa	0		
Cote d'Ivoire	Africa	1	P103241, P112573	P110020
Democratic Republic of Congo	Africa	1		P091092
Djibouti	Africa	1	P130493, P112253, P086379	P088876, P120190, P119878
Egypt	Africa	1	P095392, P116194, P100047, P113416, P116198	P119805, P110935, P098737, P095925, P094311, P120161
Equatorial Guinea	Africa	0		
Eritrea	Africa	0		
Ethiopia	Africa	1	P125487, P105651, P074011, P120040, P120172, P119893, P101556, P097271, P049395	P090789, P107139, P096323, P118533, P129174, P076735, P101473
Gabon	Africa	0		
Gambia	Africa	1	P120024	

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Ghana	Africa	1	P120016, P105617, P124678, P074191, P070970	P056256, P129544, P082373, P120026
Guinea	Africa	1	P114943, P098844, P077317, P129148, P074288, P098742, P042055	
Guinea-Bissau	Africa	1	P128793, P120039, P125374, P120910, P097975	
Kenya	Africa	1	P125388, P106635, P103458, P106636, P122671, P083131, P103037, P110173	P104075, P113542, P066488, P096367, P126637, P107314
Lesotho	Africa	1		P108143, P123199
Liberia	Africa	1	P124014, P129097, P120660	P124664, P115664
Libya	Africa	0		
Madagascar	Africa	1	P105735	P110453
Malawi	Africa	1	P099626	P117617, P124486, P096336
Mali	Africa	1	P106052, P108440	P124481
Mauritania	Africa	1	P122367, P100078, P078383	
Mauritius	Africa	1	P103467	
Morocco	Africa	1	P122028, P045615, P104265	P100397, P098459, P086877
Mozambique	Africa	1	P126354, P082308, P084404, P120033, P127115, P108444	P104945, P125225, P124755, P104566, P120546, P107350
Namibia	Africa	0		
Niger	Africa	1	P126186	P117365
Nigeria	Africa	1	P114277, P126182, P126190, P106172, P111179	P112329, P098638, P115565, P124905, P071075, P115658, P071391, P071340
Republic of the Congo	Africa	1	P129383	
Rwanda	Africa	1	P111331, P111567	
São Tomé et Príncipe	Africa	1		P111669
Senegal	Africa	1	P107167, P093202, P070530, P085708	P128137, P122841, P109986
Seychelles	Africa	0		
Sierra Leone	Africa	1	P128653, P122622, P126185, P086903	
Somalia	Africa	0		
South Africa	Africa	1	P122329, P120878, P120029, P116410, P073322, P080600	
Sudan	Africa	0		

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Swaziland	Africa	0		
Tanzania	Africa	1	P131330, P117260, P101645, P125824, P111598, P092154	P111155, P087154
Togo	Africa	1	P115066, P117906	P125049, P113415
Tunisia	Africa	1	P115314, P104266	P099811, P069460, P117082, P118131, P064836, P099670, P099672, P095012
Uganda	Africa	1	P126594, P120108, P098743, P078024, P120042, P089659, P112340, P119737	P098012, P093856, P104943, P111366, P123204
Zambia	Africa	1	P121325, P077452, P076320	P121986, P110458, P071259
Zimbabwe	Africa	1		P121848
Afghanistan	Asia	1	P117077, P116651, P106654, P083908, P111943	P117103
Armenia	Asia	1	P116680, P114409, P116748	P118912, P094225, P126722
Azerbaijan	Asia	1	P093483	P110679, P109961, P096213
Bangladesh	Asia	1	P118605, P119547, P119549, P106135, P095965, P071794, P009551, P126724, P078707, P112963, P065131	P040712, P103999, P122269, P093988
Bhutan	Asia	0		
Cambodia	Asia	0		
China	Asia	1	P111325, P101521, P102568, P084874, P116852, P088106, P087291, P087292, P094795, P087153, P105046, P096556, P119087, P099224, P108516, P114069, P123239, P113766, P119357, P120664, P100968, P098915	P090377, P098078, P101829, P114107, P106956, P086035, P108592, P087224, P096926, P095315, P081776, P075732, P075730, P115695, P096812, P108627, P117819, P077752, P112626, P081348, P096923, P096925, P116656, P092618
North Korea	Asia	0		
India	Asia	1	P107069, P105618, P115566, P110051, P100101, P112798, P101653, P121013, P119295, P095114, P101274, P122727, P105152, P100530, P096124, P100584, P102790, P100531	P117047, P097985, P100352, P121464, P091031, P120652, P090592, P083187, P092217, P079675, P119882, P121774, P101650, P050653
Iran	Asia	0		
Iraq	Asia	1	P117511, P099059, P121980, P111074, P087734	P094650, P087910, P087912
Jordan	Asia	1	P094306, P108064, P093201	P107410, P104960, P070958
Kazakhstan	Asia	1	P116919, P098452, P114766	P078342
Kyrgyzstan Republic	Asia	1	P126736, P123044, P083235, P112775	P126819, P104994, P122811, P110267

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Laos	Asia	1	P076445, P110978, P105331, P117177, P109736	
Lebanon	Asia	1	P104774, P049707	P103063
Malaysia	Asia	1		P106857
Maldives	Asia	1	P126591, P128268	P128278, P108078
Mongolia	Asia	1	P122320, P126994, P126994, P040907, P116166	P122966
Myanmar	Asia	0		
Nepal	Asia	1	P095978, P090038, P112893, P043311, P116190	P110463, P071285
Pakistan	Asia	1	P120589, P040547, P069043, P101640, P095982, P115893	P106652, P110099, P126833, P125414, P083929
Palestine	Asia	1	P116854, P116199, P084461	P117443, P105404, P091314, P074595, P123322, P117446
Sri Lanka	Asia	1	P093132, P122735, P126697	
Syria	Asia	0		
Tajikistan	Asia	1	P122141, P120834, P110555, P089244	P118196, P079027, P127130
Thailand	Asia	1	P057578, P128965, P107716	P110095
Turkey	Asia	1	P093765, P096801, P124898, P112578, P009060, P110841	P110770, P081880
Turkmenistan	Asia	0		
Uzbekistan	Asia	1	P118737, P122773, P119939	P111760, P112719
Vietnam	Asia	1	P116846, P124174, P113495, P099211, P084871, P074688, P080074, P067973, P114875, P066396, P084773, P120540, P103238, P099460	P127175, P119684, P070197, P090374, P073361, P115897, P113904, P116398, P119077, P113496, P077287, P082295, P122940
Yemen	Asia	1	P121430, P106017, P110603, P086865, P092211	P122687, P070092, P109219, P111757
Anguilla	Latin America	0		
Antigua	Latin America	0		
Argentina	Latin America	1	P090119, P110462, P110498, P006043	P101253, P093491, P089926, P088220, P105680, P114081, P125151, P120211, P060484
Barbuda	Latin America	0		
Belize	Latin America	1		P111928
Bolivia	Latin America	1	P102479	P104092, P125156, P083979, P109057, P106449
Brazil	Latin America	1	P114204, P091407, P081023, P055924, P079182	P124663, P121881, P105389, P088966, P125829, P006553, P089929, P112074, P106703, P108654, P094315, P089011

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Chile	Latin America	1	P074619, P092015, P081743	P096469
Colombia	Latin America	1	P074426, P078220	P101279, P082429, P111479, P096965
Costa Rica	Latin America	1	P076421	P085539, P122206, P111926
Cuba	Latin America	0		
Dominica	Latin America	0		
Dominican Republic	Latin America	1	P089866	P126840, P109932, P054221
Ecuador	Latin America	1	P080093, P116720	P113500
El Salvador	Latin America	0		
Grenada	Latin America	0		
Guatemala	Latin America	1	P125451, P087979	
Guyana	Latin America	1	P090044	P103539
Haiti	Latin America	1	P098531	P106699, P114936
Honduras	Latin America	1	P090113, P104034	P102474, P125903, P103881
Jamaica	Latin America	1		P116471, P091299
Mexico	Latin America	1	P106424, P080104, P066426, P077717, P120654, P095038, P088546	P100438, P126487, P121195
Montserrat	Latin America	0		
Nicaragua	Latin America	1		P110092, P106283
Panama	Latin America	1		P082419, P119694
Paraguay	Latin America	1	P114971	P095235
Peru	Latin America	1	P092834, P081954, P117864, P090110, P090116, P094739	P101471, P120860, P117314, P117293, P065256
St Helena	Latin America	0		
St Kitts and Nevis	Latin America	0		
St Lucia	Latin America	0		
St Vincent and the Grenadines	Latin America	0		
Suriname	Latin America	0		
Uruguay	Latin America	1	P102341	P118064, P127455, P101432

Country	Continent	World Bank Funding Current (2012)	Energy and Mining Projects	Water, Sanitation, and Flood Protection Projects
Venezuela	Latin America	0		
Cook Islands	The Pacific	0		
Federated States of Micronesia	The Pacific	0		
Fiji	The Pacific	1		P121843
Indonesia	The Pacific	1	P084860, P112158, P077175, P113078, P112632, P096677, P117323, P106050, P099757, P126138, P063913, P116855, P092218	P111034, P109733, P104022, P099679, P104482, P090991, P105590, P102529, P096532, P101785, P116884, P085375, P116236, P118909
Kiribati	The Pacific	0		
Marshall Islands	The Pacific	0		
Nauru	The Pacific	0		
Niue	The Pacific	0		
Palau	The Pacific	0		
Papua New Guinea	The Pacific	0		
Philippines	The Pacific	1	P114119, P066532, P098572, P087464, P066397, P113159	P117470, P070899, P130444, P115080, P106885, P122565, P089082, P064925, P114048, P077012, P088002, P113844, P106775
Samoa	The Pacific	0		
Solomon Islands	The Pacific	1	P117978, P100311	P129375
Timor-Leste	The Pacific	0		
Tokelau	The Pacific	0		
Tonga	The Pacific	0		
Tuvalu	The Pacific	0		
Vanuatu	The Pacific	1	P103873	
Wallis and Futuna	The Pacific	0		

Appendix 6.2. Survey-survey collaborative assistance summary

Country	Continent	Collaborative Assistance Rating	Survey-Survey Collaboration Summary	Collaborative Programs
Algeria	Africa	4	USGS (99-00)	Scientific and technical cooperation agreement with USGS
Angola	Africa	3	BGS (1991, 96-99)	Geophysical and technical assistance BGS
Benin	Africa	0		
Botswana	Africa	2	BGS (1981-2005)	Numerous gravity, groundwater, mineral resource estimate, technical drilling studies with BGS.
Burkina Faso	Africa	0		
Burundi	Africa	0		
Cameroon	Africa	3	Japan (06-15), USGS (88-2005), BGS (1965-1990, 98-99), UNESCO (12)	Japanese Society for the Promotion of Science (JSPS), Cameroon Volcanic Line East African Rift Valley Volcanoes and the Underlying Mantle (CVLEARVVUM).
				Japanese Society for the Promotion of Science (JSPS), Asia-Africa Science Platform Program at Misasa
				UNESCO etc., agronomy development programs
				SATREPS. Magmatic Fluid Supply into Lakes Nyos and Monoun, and Mitigation of Japanese Government, Natural Disasters in Cameroon. Volcanic associated risk research.
				BGS technical and scientific agreements
Cape Verde	Africa	0		
Central African Republic	Africa	0		
Chad	Africa	3		
Comoros	Africa	0		
Cote d'Ivoire	Africa	4	BGR (92-03)	BGR mineral potential development
Democratic Republic of Congo	Africa	4	BGR (09-12)	BGR certification system for metals
Djibouti	Africa	3	USGS (93-01), BGS (90-91)	Scientific and technical cooperation agreement with USGS
				BGS geothermal studies

Country	Continent	Collaborative Assistance Rating	Survey-Survey Collaboration Summary	Collaborative Programs
Egypt	Africa	2	USGS (94-10), BGS (81-97)	MOU with USGS BGS/ODA decade program, remote sensing for mineral exploration in arid environments, groundwater studies
Equatorial Guinea	Africa	0		
Eritrea	Africa	3	USGS ((5-96), BGS (88-90)	Geothermal Feasibility Study (USGS) BGS radiometric surveying
Ethiopia	Africa	3	USGS (99-03), BGS (81-91, 95-10)	Scientific and technical cooperation agreement, and seismic acquisition with USGS BGS/ODA decade program, groundwater, tenement management, geological laboratory outfitting studies
Gabon	Africa	3	USGS (95-03)	Scientific and technical cooperation agreement, and seismic data exchange with USGS
Gambia	Africa	3	BGS (65-90)	Scientific and technical cooperation agreement, and groundwater geochemistry with BGS
Ghana	Africa	2	BGS (81-10), BGR (81-12)	BGS geological aid program, groundwater infrastructure and studies, data management programs BGR geological mapping, gold prospecting and mineralisation, training, small scale mining development, hazard methodology development, GIS systems
Guinea	Africa	4	BGS (96-97)	BGS gold prospectivity studies
Guinea-Bissau	Africa	0		
Kenya	Africa	2	USGS (07-09), BGS (65-01)	Scientific and technical cooperation agreement with USGS Numerous BGS technical agreements, ODA decade program, environmental impact studies, artisanal quarrying and construction aggregate studies
Lesotho	Africa	3	BGS (65-91)	BGS/ODA decade study, long term technical agreement, reconnaissance mineral surveying
Liberia	Africa	0		
Libya	Africa	3	USGS (09-18), BGS (65-91)	Scientific and technical cooperation agreement with USGS BGS long term technical agreement
Madagascar	Africa	3	USGS (03-03), BGS (05,10)	Mineral Resource Estimation workshop with USGS BGS technical assistance, aero-geophysics interpretation training
Malawi	Africa	2	BGS (63, 89-99, 10)	BGS ODA decade agreement, early geological mapping, groundwater, data management, archaeology, industrial aggregates, agrogeology
Mali	Africa	2	USGS (96-06), BGS (07)	Scientific and technical cooperation agreement, and seismic data exchange with USGS BGS kimberlite exploration
Mauritania	Africa	3	USGS (03-03), BGS (03-04)	Mineral Resource Estimation workshop with USGS BGS website development for survey, gold exploration, geological mapping

Country	Continent	Collaborative Assistance Rating	Survey-Survey Collaboration Summary	Collaborative Programs
Mauritius	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990
Morocco	Africa	1	USGS (86-91, 00-08), BGS (65-90, 98-03)	Major geochemical mapping program and scientific and technical cooperation agreement with USGS BGS technical cooperation agreement 1965-1990, iodine geochemistry and health studies
Mozambique	Africa	2	USGS (86-91), BGS (84-91, 98-10)	Scientific and technical cooperation agreement with USGS BGS mineral resource development aid program, geological mapping, seismic hazard studies, geophysics interpretation and training
Namibia	Africa	1	USGS (95-01), BGS (89-03), Czech Rep. (99-02), BGR (05-12)	Scientific and technical cooperation agreement, and seismic station building with USGS BGS agrogeology, remote sensing for exploration, minerals from waste studies Czech Rep. (CGS). Glass making resource studies BGR survey development, geological mapping, training
Niger	Africa	2	BGS (65-90, 04-10)	BGS technical cooperation agreement 1965-1990, geological mapping, prospectivity analysis, aero-geophysical data, geological aid program
Nigeria	Africa	2	BGS (81-90, 96-98, 02-10)	BGS ODA decade agreement, groundwater, geochemical mapping, geology training aid
Republic of the Congo	Africa	0		
Rwanda	Africa	0		
São Tomé et Príncipe	Africa	2	BGS (08-10)	BGS petroleum exploration in EEZ
Senegal	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990, and ODA decade program
Seychelles	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990, and ODA decade program
Sierra Leone	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990, and geochemistry health studies
Somalia	Africa	3	BGS (1960, 1981-90)	BGS ODA decade project, early geology mapping
South Africa	Africa	2	USGS (87-06), BGS (89-92, 97, 10)	Seismic data acquisition and infrastructure, groundwater capability, mining contamination studies with USGS BGS groundwater studies, hydrothermal gold exploration, general survey
Sudan	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990, and ODA decade program
Swaziland	Africa	3	BGS (65-90)	BGS technical cooperation agreement 1965-1990, and ODA decade program, agrogeology
Tanzania	Africa	2		
Togo	Africa	3	BGS (84-91)	BGS mineral resource development in the third world
Tunisia	Africa	3	BGS (65-90, 97)	BGS technical cooperation agreement 1965-1990, and groundwater

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Uganda	Africa	2	BGS (65-00, 10)	BGS technical cooperation agreement 1965-1990, and ODA decade program, groundwater, geochemistry and health studies, mineral resource assessment
Zambia	Africa	1	BGS (65-06), Czech Rep. (99-12)	Numerous BGS technical cooperation agreement 1965-1990, and ODA decade program, groundwater, geochemistry and health studies, mineral resource assessment (coal, agrogeology), map generation, small scale mining development aid program Czech Rep. (CGE). Emerald mineralisation studies, environmental contamination monitoring, geological mapping.
Zimbabwe	Africa	1	BGS (65-90, 90-02, 10)	Numerous BGS technical cooperation agreement 1965-1990, and ODA decade program, groundwater, geochemistry and health studies, mineral resource assessment (coal, agrogeology, alluvial gold), environmental impact of mining studies, geophysics, remote sensing
Afghanistan	Asia	1	USGS (51-99, 88-07), BGS, Czech Rep. (05-08)	USGS hydrocarbon and water resource surveys, long term scientific agreements Czech Rep. (CGS) redevelopment of geological services including training and industry stimulus
Armenia	Asia	2	USGS (98-08), BGS (65-90, 99-01)	USGS seismic data acquisition, MOU and technical agreements BGS technical agreement 65-90, earthquake studies
Azerbaijan	Asia	3	BGS (97-98)	BGS offshore oil field rehabilitation
Bangladesh	Asia	2	USGS (82-90, 00-03), BGS (65-90, 81-00, 07), BGR (05-10), JDCF (09-11)	USGS mineral resources and survey modernisation, groundwater contamination studies BGS 65-90 agreement, 81-90 ODA agreement, As groundwater contamination, coalbed methane and CO2 sequestration studies Japan debt cancellation fund, survey enhancement and modernisation program BGR ground information systems development, 3D modeling, high resolution DEM generation
Bhutan	Asia	2	BGS (91-95, 02-03), BGR (02-09), India GS (81-02)	BGS industrial minerals for development program, landslide risk assessment BGR slope stability and environmental analysis, glacial lake outburst hazard analysis, Geological Survey of India, all geological mapping until 2002
Cambodia	Asia	2	BGS (65-90, 92,01-02), Poland, China, Russia Surveys (60-90)	BGS 65-90 agreement, embedded minerals advisor 68-70, landmine assistance, agrogeology Polish, Chinese, and Russian surveys conducted geological mapping until the late 1980s
China	Asia	1	USGS (80-16), BGS (65-90, 92-03, 07-10)	Numerous USGS seismology, hydrology, surveying, mapping, sedimentary gold, technical agreements, mineral resources, mapping, remote sensing infrastructure and expertise. Numerous BGS programs, 65-90 agreement, geology and health-I and Se, minerals in developing countries, environmental rehabilitation and exploitation of groundwater, seismology, coalbed methane, basin studies

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North Korea	Asia	1	USGS (62-14), BGS (02)	USGS metallogenesis, groundwater, geomagnetics, mineral resources, technical agreements BGS environmental impact of metalliferous mining
India	Asia	1	USGS (59-99, 05-15), BGS (65-90, 88-98, 00, 07), BRGM (80s), Canada (03), Other (00-20)	USGS groundwater training, technical agreements, geophysical research, drought and species loss studies, BGS 65-90 agreement, 81-90 ODA agreement, coal industry assistance, agrogeology, groundwater, saline intrusion, seismic hazard, environmental impact (coal power), artisanal quarrying assistance, CO2 sequestration France BRGM Indo-France working group on mineral exploration and development, electronic data processing, oceanographic and laboratory equipment supply, Canada MOU, geology and health, crustal evolution studies Other, Australia, South Africa, Netherlands, Russia, China, Japan, Iran, Nepal,
Iran	Asia	3	Czech Rep. (07-09)	Czech Rep. (CGS). Geological mapping and training of Iranian scientists, map products output
Iraq	Asia	2	USGS (99-20)	MOU and scientific and technical cooperation agreement with USGS
Jordan	Asia	1	USGS (84-27), BGS (94-99, 10), BGR (58-14)	MOU, seismic acquisition, and scientific and technical cooperation agreement with USGS BGS environmental geology and GIS, landfill leachate hazard and groundwater contamination, geology, geophysics, mineral resources, water, surveying BGR survey development, groundwater extraction and management
Kazakhstan	Asia	3	USGS (94-01, 10-20)	Scientific and technical cooperation agreement, and carbonate studies with USGS
Kyrgyzstan Republic	Asia	2	BGS (98-02), SNSF (01-08), ISTC (05-08)	BGS groundwater protection and management for urban environments Swiss national science fund, major geological mapping program ISTC high (international science and tech. centre) performance computing and geoinformation system
Laos	Asia	2	BGS 65-90, 68-70), JICA Japan (07), Vietnamese and Thai surveys (95-07)	BGS 65-90 agreement, provision of minerals advisor 68-70, UNESCO funded major mapping project 1990 JICA geological mapping grant Vietnam GS major geological mapping program 95-00, and 03
Lebanon	Asia	3	BGR (09-12)	BGR water security, several other technical agreements
Malaysia	Asia	2	BGS (65-90, 57-61, 81-95, 02)	Numerous BGS programs, 65-90 agreement, 81-90 ODA agreement, geophysical and radiometric surveying, geoscience databases, gold and alluvial gold characterisation, mining impact, license system provision, industrial minerals for development
Maldives	Asia	0		

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Mongolia	Asia	1	USGS (94-06), BGS (99, 02), Czech Rep. (03-07), BGR (92-12)	USGS mineral resources, seismic data acquisition, metallogenesis, tectonics, agrogeology, technical agreements BGS low cost geological mapping with remote sensing, As groundwater contamination Czech Rep. (CGS). Geological mapping BGR training and development of government geoscience institutions, geochemistry laboratory support, mineral resource evaluation,
Myanmar	Asia	0		
Nepal	Asia	3	BGS (01-05)	BGS glacial and landslide hazard, groundwater and artificial recharge, agrogeology (phosphate) studies
Pakistan	Asia	1	USGS (08-13), BGS (65-90, 83, 89-93, 99-02, 07), BGR (83-99, 09-12)	Scientific and technical cooperation agreement with USGS BGS 65-90 agreement, 81-90 ODA agreement, agrogeology, solid waste disposal studies, saline intrusion, water quality mapping, CO2 sequestration potential. BGR hydrology and hydrocarbon dept. support, disaster management,
Palestine	Asia	3	BGS (00-03)	BGS sustainable aquifer management
Sri Lanka	Asia	3	BGS (65-90, 89-03, 07)	BGS 65-90 agreement, 81-90 ODA agreement, agrogeology, geological survey strengthening, groundwater contamination, health geology-Se, I, CO2 sequestration potential, major mapping program 1994
Syria	Asia	0		
Tajikistan	Asia	4	BGS (10)	BGS international activities including fuel, geology, geophysics, mineral deposits, mining, natural resources, surveys, and water
Thailand	Asia	2	USGS (99-08), BGS (65-90, 81-00, 02, 05)	USGS geoinformatics and space technology development, technical agreements, training, major mapping phase 1950s Numerous BGS programs, 65-90 agreement, ODA 81-90 decadal program, As soil contamination, mining contamination, groundwater contamination, tsunami hazard and response, industrial minerals for development, agrogeology, provision of minerals advisor 68-70, basin studies
Turkey	Asia	2	USGS (84-89, 99-20), BGS (81-90)	Seismological infrastructure and risk studies, mineral resource estimates, dinoflagellate studies with USGS BGS 81-90 ODA agreement
Turkmenistan	Asia	4	BGS (02-04)	BGS natural gas and industrial minerals assessment
Uzbekistan	Asia	0		

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Vietnam	Asia	1	USGS (99-20), BGS (65-90, 68-70, 89-96), BGR (93-14), Czech Rep. (06)	USGS MOU agreements BGS 65-90 agreement, agrogeology for development, groundwater and groundwater extraction, provision of minerals advisor 68-70 BGR German collaboration (some with JICA), work safety, mine management program, resource evaluation and exploration, groundwater protection. Czech Rep. (CGS). Industrial minerals deposits identification specifically for glass and ceramics industry
Yemen	Asia	1	BGS (81-92), BGR (75-15)	BGS ODA agreement 81-90, geology and mineral resources, geophysical training, resistivity and hydrology studies. BGR water security, survey training in mapping and geological areas
Anguilla	Latin America	3	BGS (65-90)	BGS saline intrusion in coastal aquifers, technical agreement
Antigua	Latin America	3	USGS (99-06), BGS (65-90)	USGS MOU, seismological equipment for Caribbean tsunami warning system BGS technical agreement 65-90
Argentina	Latin America	2	BGS (65-90, 97-99), JICA (01-05)	BGS technical agreement 65-90, mining contamination studies - As in groundwater JICA remote sensing and mapping project
Barbuda	Latin America	3	USGS (99-06), BGS (65-90)	USGS MOU, seismological equipment for Caribbean tsunami warning system BGS technical agreement 65-90
Belize	Latin America	0		
Bolivia	Latin America	2	USGS (75-99), BGS (65-98, 02)	USGS seismic network infrastructure, mineral resources assessment and mapping, technical agreements Numerous BGS, 65=90 agreement, decade ODA program 81-90, agrogeology, and geochemistry, data management system provision, health geology,
Brazil	Latin America	2	USGS (83-12), BGS (65-90, 97, 00), JICA (06)	USGS seismograph station infrastructure, technical agreement, manatee research BGS 65-90 agreement, agrogeology, As groundwater contamination, coastal environmental monitoring JICA laboratory equipment provision
Chile	Latin America	2	USGS (82-15), BGS (65-90, 95,02), BGR (90s-12)	USGS mapping, seismological data, volcanic hazards, technical agreements BGS 65-90 agreement, 81-90 ODA agreement, environmental impact of mining, petrology and geochemistry BGR contaminated mine site studies and legislative development

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Colombia	Latin America	1	USGS (62-13), BGS (65-90, 98-02), BGR (60-12)	USGS petroleum exploration, technical agreements BGS 65-90 agreement, 81-90 ODA agreement, industrial minerals for development workshops, agrogeology, construction materials development BGR exploration of metallic and non-metallic, and energy resources exploration, environmental protection processes
Costa Rica	Latin America	2	BGS (65-90, 92-96, 01-04)	BGS 65-90 agreement, 81-90 ODA agreement, gas geochemistry studies (volcanic risk), volcanic hazard for urban planning, river mining, mine waste studies, volcanics for construction
Cuba	Latin America	3	USGS (06-16)	USGS domestic MOU with USGS and Guantanamo Naval station
Dominica	Latin America	3	BGS (65-90, 93)	BGS 65-90 agreement, engineering geology studies
Dominican Republic	Latin America	3	USGS (84-89, 99-06)	USGS geological and scientific technical agreements
Ecuador	Latin America	2	USGS (97-02, 09-13), BGS (65-90, 89-01)	USGS seismological infrastructure, technical agreements BGS 65-90 agreement, agrogeology, alluvial gold studies, Hg contamination, volcanics for construction, geological mapping program 95-00
El Salvador	Latin America	2	USGS (84-05), Czech Rep. (03-04)	USGS seismological and volcanic hazards, CAMI, earthquake research Czech Rep. (CGS). Geological mapping, remote sensing, natural hazards assessment
Grenada	Latin America	3	USGS (99-05), BGS (65-90)	USGS MOU agreement BGS 65-90 agreement
Guatemala	Latin America	3	USGS (04-09)	USGS volcanic and earthquake monitoring systems, online databases - coffee
Guyana	Latin America	1	USGS (93-99), BGS (65-90, 98-02)	USGS technical agreement in earth and mapping sciences Comprehensive BGS 65-90 agreement, 81-90 ODA agreement, license system development, remote sensing for low cost resource development in developing countries, geological mapping technology, gold, small scale mining assistance program
Haiti	Latin America	4	USGS (05)	USGS hazards systems recommendations
Honduras	Latin America	3	USGS (99-08), BGS (65-90)	USGS hydrological hazard mitigation, monitoring, and infrastructure, MOU, BGS 65-90 agreement

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Jamaica	Latin America	2	USGS (99-07), BGS (65-90, 98-04), Czech Rep. (12?), UNDP (03-04)	USGS seismological infrastructure, technical agreements, MOU BGS 65-90 agreement, 81-90 ODA agreement, industrial minerals for development, river mining and sustainability, landslide hazard mapping, United nations development program (UNDP) landslide hazard mapping program Czech republic mineral resource development program non-metallic minerals for industrial development
Mexico	Latin America	1	USGS (79-12), BGS (65-90, 91-99)	Numerous USGS digital geological mapping, spatial data, geochemistry, seismology infrastructure and operation, radiometric dating, MOU and technical agreements BGS 65-90 agreement, 81-90, groundwater hazard from urban waste and saline intrusion studies, hydrothermal gold, land-ocean contamination studies, regional geochemical mapping
Montserrat	Latin America	3	BGS (65-90, 03-04)	BGS 65-90 agreement, volcanic hazard monitoring and technological assistance, groundwater resource assessments
Nicaragua	Latin America	2	USGS (99-04), Czech Rep. (97-01), Sweden (81-91)	USGS digital mapping services, risk studies, technical agreements Czech Rep. (CGS) natural hazard assessment study Sweden geological survey and SAREC, plate tectonics, ore deposit genesis, gold prospectivity, student researcher training
Panama	Latin America	3	USGS (99-11)	USGS technical agreements, earthquake and other hazards studies, environmental and spatial data for biodiversity BGS 65-90 agreement
Paraguay	Latin America	2	BGR (85-12)	BGR water, raw materials, environmental studies, urban planning, waste management
Peru	Latin America	1	USGS (90-99, 11), BGS (65-90, 89-92, 02-03), Czech Rep. (?)	USGS earth and mapping sciences, technical agreements BGS 65-90 agreement, 81-90 ODA agreement, hydrothermal gold, glacial hazard and risk, agrogeology Czech Rep. (CGS) natural hazard assessment study and generation of GIS digital mapping
St Helena	Latin America	4	BGS (65-90)	BGS 65-90 agreement
St Kitts and Nevis	Latin America	4	BGS (65-90)	BGS 65-90 agreement
St Lucia	Latin America	4	BGS (65-90)	BGS 65-90 agreement
St Vincent and the Grenadines	Latin America	4	BGS (65-90)	BGS 65-90 agreement

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Suriname	Latin America	2	USGS (95-99), BGS (97-98, 03)	USGS scientific and technical cooperation agreement BGS minerals institute creation, licensing system and cadastral databases
Uruguay	Latin America	4	BGS (65-90)	BGS 65-90 agreement
Venezuela	Latin America	1	USGS (80-12), BGS (65-90, 02)	USGS numerous technical agreements, spatial and geospatial data capability building BGS 65-90 agreement, agrogeology-phosphate resources for development studies
Cook Islands	The Pacific	0		
Federated States of Micronesia	The Pacific	0		
Fiji	The Pacific	2	BGS (65-90, 91-95)	BGS 65-90 agreement, 81-90 ODA agreement, alluvial gold characterisation, engineering geology studies, industrial minerals for development, landslide hazard mapping, hydrogeology
Indonesia	The Pacific	1	USGS (92-11), BGS (65-90, 91-99, 05-08), BGR (03-12)	USGS natural hazard recognition technical assistance, training, and agreements Numerous BGS, 65-90 agreement, decade ODA program 81-90, groundwater, tsunami, and coastal hazards, engineering geology studies, industrial minerals for development, agrogeology, land-ocean contamination, health geochemistry, basin studies, BGR assessment and evaluation of geological hazards
Kiribati	The Pacific	0		
Marshall Islands	The Pacific	0		
Nauru	The Pacific	0		
Niue	The Pacific	0		
Palau	The Pacific	0		
Papua New Guinea	The Pacific	0		
Philippines	The Pacific	1	USGS (02-09), BGS (92-02)	USGS mining impact studies, coalbed methane-coal resource estimates, technical agreements. Numerous BGS programs, Hg water contamination and Au/Sulphide mining, small scale mining assistance, agrogeology, offshore geophysics for heavy mineral exploration, gold recovery technology for development, volcanic gas hazard studies
Samoa	The Pacific	2	USGS (99-09)	USGS seismograph station infrastructure, technical agreement
Solomon Islands	The Pacific	3	BGS (65-90, 82-92)	BGS 65-90 agreement, 81-90 ODA agreement, geochemistry, OSAS work,
Timor-Leste	The Pacific	4	UN (02)	UN geological mapping program

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Tokelau	The Pacific	0		
Tonga	The Pacific	3	BGS (65-90, 93-95, 02)	BGS 65-90 agreement, aggregate and sand resources, coastal erosion studies, industrial minerals for development.
Tuvalu	The Pacific	4	USGS (99-01)	USGS seismic acquisition, technical agreement
Vanuatu	The Pacific	3	BGS (65-90, 67-78)	BGS 65-90 agreement, OSAS systematic geological mapping and mineral exploration program with hydrogeological maps and national well archive establishment
Wallis and Futuna	The Pacific	0		