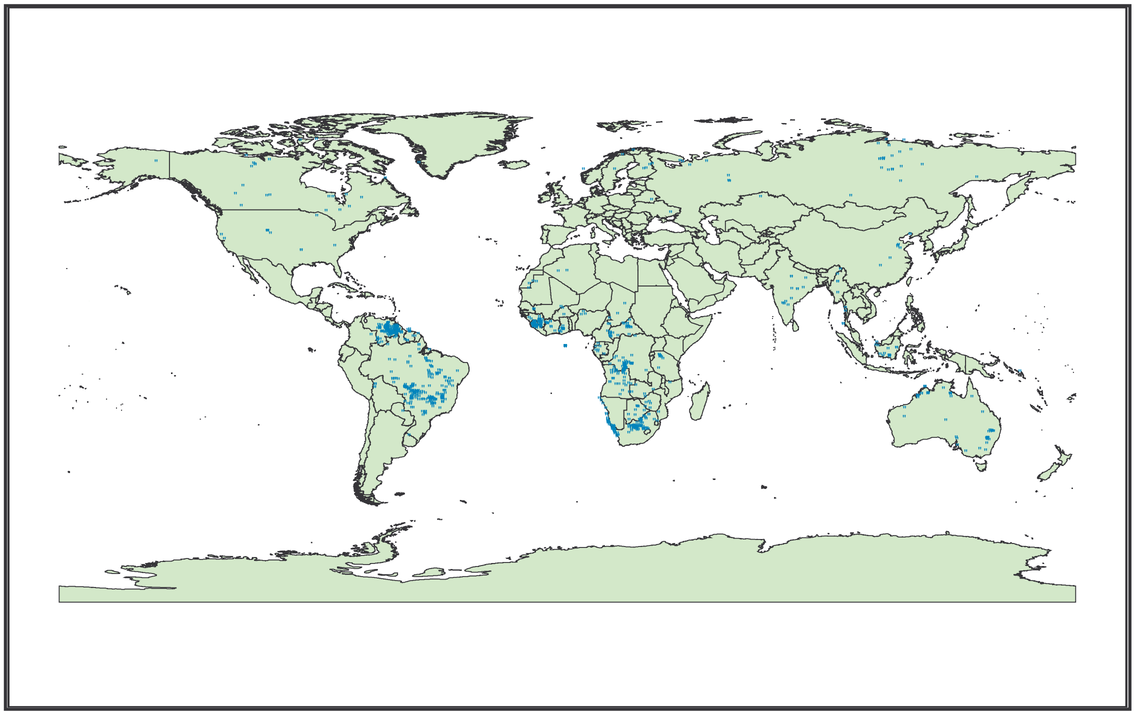
THE DIAMOND DATASET CODEBOOK



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This document is part of the background documentation for (to date) two articles:

Gilmore, Elisabeth, Nils Petter Gleditsch, Päivi Lujala & Jan Ketil Rød, 2005. 'Conflict Diamonds: A New Dataset', *Conflict Management and Peace Science* 22(3): 257–292.

Lujala, Päivi; Nils Petter Gleditsch & Elisabeth Gilmore, 2005. 'A Diamond Curse? Civil War and a Lootable Resource', *Journal of Conflict Resolution* 49(4): 538–562.

The complete diamonds dataset, the reduced set, and the replication data for the JCR article are all available on www.prio.no/cscw/datasets.

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SUMMARY

This document describes both the original and compact version of the diamond datatset, DIADATA. DIADATA is a comprehensive list of diamond occurrences throughout the world accompanied by geographic coordinates, the geological form of the diamond, and the discovery and production dates[1]. It is specifically designed for display, manipulation and analysis in geographic information systems (GIS), although the attribute table can be viewed separately. DIADATA was compiled for the purpose of investigating the relationship between conflict and resources, but could also be used to study other consequences of natural resource endowment.

A diamond occurrence is broadly defined as any site with known activity, meaning production (either commercial or artisan) or confirmed discovery. The list of sites was compiled through an intensive literature search of academic databases and journals, national geological survey reports, and industry databases and reports. Geographic coordinates were assigned from a reliable source, from a resource map or from the nearest landmark. An important characteristic for conflict studies is the geological form of the diamond deposit. Diamonds occur in two main forms: primary (e.g. kimberlitic structures) and secondary (e.g. alluvial or other placer deposits). A subset of secondary deposits, marine deposits (e.g. beach or submerged diamond deposits), is coded separate from the other secondary deposits as the characteristics (e.g. production techniques, accessibility) vary significantly from other secondary deposits. In addition to the geological form, the production status of each site is indicated. As conflicts occur both in space and in time, an explicit time component was also required for the dataset. The date of discovery and the date of first production are recorded for each site. The end date for production was not recorded, as the end of production is too highly dependent on the industry conditions and may also be endogenous to conflict in a given country. The coding in DIADATA is designed to be compatible with the structure of the PRIO/Uppsala Armed Conflict Dataset[2].

A compact version of DIADATA is also available. This dataset was generated to reduce the number of records with missing discovery and production dates. In the compact version, subsets of all primary diamond, primary diamonds with production, all secondary diamonds, and secondary diamonds with production were selected and for each subset, all sites within 50 km were aggregated. The sites are grouped into multipoints, and each multipoint shares the same attributes, and fewer variables (attributes) are associated with each entry. The result is significantly fewer records with lack of temporal information. A description of the procedure used to generate the compact dataset and the attributes of the dataset are provided.

[1] DIADATA is part of a more extensive data collection project of several natural resources related to conflict. While the codebook is written specifically for DIADATA, the basic structure and coding of datasets for other resources will be similar for consistency and ease of manipulation.

[2] See Gleditsch et al. (2002) and Strand et al. (2005) for a description of the PRIO/Uppsala Armed Conflict Dataset. The most recent update is Harbom & Wallensteen (2005).

1. Introduction

This document describes the original and compact versions of the diamond dataset, DIADATA. This work is part of a larger data collection project conducted within Working Group 3 (Environmental Aspects of Civil War) of the International Peace Research Institute, Oslo (PRIO) and the Norwegian University of Science and Technology (NTNU). The objective of this project is to collect spatial information on environmental features relevant to conflict research (e.g. natural resources and land cover such as mountains).

2. Definition of Diamond Occurrence

For DIADATA, a diamond occurrence is very broadly defined as a site with known *activity*. Activity is defined as follows:

- Organized mining activities such as industrial or commercial mining;
- Small scale mining activities such as artisanal mining[3];
- Exploration on concessions with confirmed diamonds; or,
- Advertisement of concessions by host government for prospecting and exploration activities with confirmed diamonds.

There are a small number of sites in the dataset that are included even through no prospecting or production has occurred. These sites were judged to have diamond potential. In addition, a few sites of unknown status are also included in the dataset for completeness. In all cases, the status of the site is clearly indicated (see MINEINFO for the coding structure).

This definition was employed as the criterion for inclusion in the dataset as standard categories (e.g. size) were not strictly relevant for the investigation of the relationship between conflict and resources. To date, there are no clear guidelines for classifying resources to assess how economic incentives and opportunities for armed or violent conflict differ for various resources. Lujala (2003) suggests that features such as geological form, geographical concentration[4], ease of extraction and value to weight ratio may all be important in features in promoting and prolonging conflict. It has also been suggested that the expectation of a resource may promote conflict; as a result, locations of diamond exploration may also be relevant for certain analyses. Practical concerns also dictated the use of a definition that is easily interpreted. Only limited data on size, diamond quality and value is readily accessible, and terminology can vary greatly between references.

DIADATA consists of 1175 entries for diamond occurrences in 53 countries. Of these countries, 33 have some form production[5]. The remaining 20 countries are included due to commercial exploration or significant activity on the part of the government to promote

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[3] Small scale or artisanal mining refers to people working with simple tools and equipment, usually in the informal sector, outside of the legal and regulatory framework for the mineral extraction industry. In many cases, the deposits that are worked in this manner are marginal and/or dangerous to extract (Hentschel, Hruschka & Preister, 2002).

[4] In this context, geographic concentration refers to whether the resource is classified as point or diffuse. A point resource is highly concentrated and does not have significant areal extent on a map (e.g. a mine). By contrast, a diffuse resource covers significant areas such as a stretch of placer diamonds along a riverbank.

[5] 31 of these countries have known or likely production, while two others are significantly less likely to have production. This is reflected in the country profiles in Appendix C.

diamond concessions in the area. (See Appendix B for different ways of visualising the dataset.)

3. Data: collection, sources and limitations

3.1. Data collection and sources

The list of diamond occurrences and associated information (e.g. discovery and production dates) were compiled from a variety of sources including academic databases and journals, national geological survey reports, and industry databases and reports. In the following section, the major data sources are reviewed. All references employed in the construction of this dataset are listed by country in Appendix C, and a full list is provided at the end of the document. Additional information about each country is also presented in Appendix C.

The primary database used for this project was GeoRef. Established by the American Geological Institute, the GeoRef database contains geoscience literature from around the world since 1933. The database includes over 2.2 million references to geoscience journal articles, books, maps, conference papers, reports and theses. GeoRef also provides English language abstracts for some foreign language references.

The following academically oriented review sources provided the majority of the information for the dataset:

1. Bardet, M.G., 1973. *Géologie du Diamant. Première partie: Généralitiés*. Mémoires du B.R.G.M. no. 83. Paris: Editions B.R.G.M.
2. Bardet, M.G., 1974. *Géologie du Diamant. Deuxième partie: Gisements du diamant d'Afrique*. Mémoires du B.R.G.M. no. 83. Paris: Editions B.R.G.M.
3. Bardet, M.G., 1977. *Géologie du Diamant. Troisième partie: Gisements de diamants d'Asie, d'Amérique, d'Europe et d'Australie*. Mémoires du B.R.G.M. no. 83. Paris: Editions B.R.G.M.
4. Janse, A.J.A. (Bram) & Patrica A. Sheahan, 1995. 'Catalogue of worldwide diamond and kimberlite occurrences: a selective and annotative approach', *Journal of Geochemical Exploration* 53(1–3): 73–111.

The three publications by Bardet provide comprehensive global coverage of diamonds and kimberlite occurrences. Janse & Sheahan (1995) is an important update on the Bardet series. These references were supplemented with the *Minerals Yearbook* issued by the United States Geological Survey (USGS). The *Minerals Yearbook* is an annual publication that reviews the mineral and material industries of the United States and foreign countries. Country summaries from 1994 to present are available in electronic form from the USGS website at http://minerals.er.usgs.gov. For some countries, in particular those with poor internal records, this is the most reliable source for present mining and exploration activities.

In addition, a significant amount of information was culled from the Internet. The Internet sources provided up-to-date information about companies and their operations. In many cases, the most extensive records on mining operations are available through the annual reports of these companies. Standard Internet search engines and directories were used to find the online information along with industry-based websites.

Three spatial datasets (i.e., containing geographical coordinates) were reviewed both for records to add to the list of sites and for geographic coordinates. One of the most extensive listing of mineral resources in a spatial format is the Mineral Resource Data System (MRDS) produced by the USGS. MRDS contains 111,955 records of metallic and nonmetallic mineral resources of the world. Each record contains descriptive information about mineral deposits and commodities. Deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, potential resources, and references are included for each entry. The entries, however, have not been systematically verified and reflect only countries where the USGS has been active or has formal links with their counterparts (Mason Jr. & Arndt, 1996). There are 441 entries for diamonds. These records were extracted, and all attempts were made at independent verification. All entries that remained unverified are indicated as originating solely from Mason Jr. & Arndt (1996).

Environmental Systems Research International has also developed a spatial dataset for mineral resources in *ArcAtlas: Our Earth* (ESRI, 1996). The ESRI dataset is a commercial product containing 75 records for diamond deposits. The data was collected by the Russian Research Institute of Geology of Foreign Countries. Deposits were included in this dataset based on size as a predictor of economic value, and no additional information on site activity is provided. These sites were also included in DIADATA; however, visual inspection of the geographic coordinates suggests that most records are an amalgamation of several diamond occurrences in the same region. As a result, the geographic coordinates in the ESRI dataset were used only in the absence of other more site-specific information.

The third major spatial source that was employed was the commercial database, Infomine (2002). Infomine contains detailed information on thousands of mineral properties and, in many cases, includes the geographic coordinates or landmark of the sites. The purpose of the Infomine dataset is to track the activity of mining companies publicly listed in Canada or the United States and the mineral properties that they hold worldwide. Almost all the information is obtained from documents companies file to various stock exchanges. 224 records were extracted from Infomine.

After the list of locations was compiled, geographic coordinates were assigned to the entries. All attempts were made to find precise coordinates. The primary references listed above and the three spatial datasets provided most of the geographic coordinates[6]. Maps were used to verify the locations, and in some cases, the geographic coordinates were read directly from the map. Most of the maps obtained for this work were not precise and rather designed for illustrative purposes. When it was not possible to find coordinates for the site, the geographic coordinates were assigned based on a landmark (nearby village, lake, mountain and etc.) and other descriptive information. The coordinates of the landmarks were derived from The United States National Imagery and Mapping Agency's (NIMA) online Geospatial

[6] Spatial datasets tend to suffer from some biases and errors. All attempts were made to verify the geographic coordinates, although this was not always possible. The source for the coordinates and their derivation is clearly indicated.

Engine[7]. The accuracy of the Geospatial Engine has not been verified, and there is some ambiguity for the coordinates assigned to rivers. The derivation method and the source of the geographic coordinates are clearly indicated for all sites. See Section 4.10 for a description of the coding.

3.2. Completeness and reliability

All attempts were made to collect a comprehensive list of diamond occurrences with accurate geographic coordinates; there are, however, several known sources of biases in the dataset. Biases and omissions may be due to: 1) the lack of records; 2) the falsification of records; 3) a country's unwillingness to disclose records; and, 4) language barriers. Countries that have experienced significant conflict, political turmoil or are underdeveloped are less likely to have comprehensive listings of mining activity, for example for rebel held areas or remote rural areas. Industry information is not available as, for a variety of reasons, established mining companies are not active in these countries (e.g. Angola, Sierra Leone, Liberia, the Democratic Republic of Congo). Illegal diamond smuggling and falsification of records is particularly prevalent in several African countries. Several countries with insignificant diamond deposits have been exporting substantial quantities of diamonds (e.g. Congo–Brazzaville). Liberia, by contrast, has some diamond deposits and a history of diamond workings, although the official productions figures are highly misleading of the true level of domestic production. Bardet (1974) estimates that annual production never surpassed the range of ten thousand carats; all production estimates for diamonds derived from Liberian deposits are speculative (Bardet, 1974; Janse & Sheahan, 1995). Other problems arise for countries that do not widely release information about their mineral production. For example, production locations in China are only approximate. A final bias is language barriers, as, for example, records from Russia and China are rarely translated. This also led to difficulties in accessing the geological data produced by the European colonial powers (e.g. the Portuguese records from Angola).

Another limitation of this dataset is that not all sites in the dataset represent a distinct location. As the information for this dataset has come from a wide range of sources, some sites in the list of occurrences may represent an amalgamation of locations rather than a single occurrence. Occurrences that were used to construct the amalgamated sites may also be listed separately with either the same coordinates or distinct coordinates. When this was known, the sub-sites were listed in a separate variable field (NAMEINFO) attached to the amalgamated site. The amalgamated site was also listed in the NAMEINFO fields for the sub-sites. Entries were not been systematically investigated for these cases. For strict visualization purposes, this can be handled by viewing the map at as small a scale as practical. Data manipulation

[7] NIMA's Geoengine is an online searchable database of geographical features throughout the world. Extensive coverage of administrative regions, cities, rivers, lakes, mountains and valleys is available. The level of detail varies by country. For some countries, some mines and oil fields are also included in the database (See http://geoengine.nima.mil).

techniques in GIS, such as converting the data to a raster form[8], can also be used to minimize this problem.

3.3. Time series data

While it was desirable to collect a time series for all production sites, this effort was hampered by a lack of information. Additional information about discovery dates and production patterns is provided in Appendix B and Appendix C to assist in constructing a complete time series for the dataset. Dates have only been collected for the first instance of production, regardless of whether production was continuous or intermittent since that time. Accordingly, information on a sites production status is static rather than temporal. This decision was driven by both practical considerations and concerns about interpretability of the data. Given the difficulties in locating the discovery and first production dates, it would not be possible to develop complete production histories for a sufficient number of sites. Closures at a given production site can be due a variety of factors (e.g. market value of diamonds, depletion of economic reserves). Additionally, in many diamond-producing countries, production (at least organized commercial production) ended due to conflict, rendering the production end dates endogenous to the dependent variable of interest.

4. Variable definitions and coding structure

Table 1: Definition of variables

NO.	VARIABLE	LABEL	DESCRIPTION	FORMAT
1	**PRIMKEY**	Primary key	The unique identifier for all observations.	String
2	**COUNTRY**	Country of location	The name of the country where the deposit is located.	String
3	**FIPSCODE**	FIPS code for location	FIPS abbreviation for country location	String
4	**COWCODE**	COW numbers of location	COW country number	Number (Integer)
5	**CONTCODE**	Continent of location	The continent corresponding to the geographically defined COW numbers	Number (Integer)
6	**SITENUM**	Number of location	The unique identifier number for each site by country	Number (Integer)
7	**NAME**	Name of location	Either the name of the mine or the name of nearest major landmark	String
8	**NAMEVAR**	Variant names of location	Alternative spellings or prior names of location	String
9	**NAMEINFO**	Name information	Information about the type of name and/or information about amalgamation of sites	String
10	**LAT**	Latitude of location	First component of the geographic coordinates in decimal degrees	Number (two decimal places)

[8] Raster data represent geographic features by dividing the world into discrete squares called cells in a grid form. Vector data represents geographic features with points, lines and polygons (Minami, 2000).

11	**LONG**	Longitude of location	Second component of the geographic coordinates in decimal degrees	Number (two decimal places)
12	**LOCDER**	Location derivation technique	Coding for the technique used to derive the geographic coordinates	String
13	**LOCSOURCE**	Source of geographic coordinates	Reference for geographic coordinates.	String
14	**LANDMARK**	The nearest known landmark	The nearest known landmark with cardinal direction and distance (in km) due to the site listed in NAME	String
15	**LOCINFO**	Other location information	Other information for location such as administrative region	String
16	**RES**	Natural resource code	Natural resource of interest	String
17	**RESINFO**	Resource attributes	Qualitative information on the resource	String
18	**DIAINFO**	Diamond form	Geological structure of the diamond occurrence	String
19	**MINEINFO**	Mining information	Qualitative information on mining or production at this site	String
20	**SIZEINFO**	Size information	Qualitative information the size or importance of a site	String
21	**DISC**	Discovery date	Date when the resource deposit was discovered	Date (dd/mm/yyyy)
22	**DISCPRES**	Discovery date precision	Precision coding for the discovery date	Number (Integer)
23	**PROD**	Production date	First confirmed instance of production	Date (dd/mm/yyyy)
24	**PRODPRES**	Production date precision	Precision coding for the production date	Number (Integer)
25	**DATEINFO**	Date information	Additional information on the date fields	String
26	**OTHERINFO**	General information	Any additional information about this record	String
27	**SOURCEINFO**	Reference(s)	All references used for that record.	String
28	**VERSION**	Version number	The current version of the dataset	Number (Decimal)

4.1. Primary Key (PRIMKEY)

Each observation has a unique primary key. This variable is used in database management. It is built by three components from each entry: the FIPS country code, the site number and the resource code[9]. For example, the first (1) observation of a diamond occurrence (DIA) in Canada (CA) is assigned a primary key of CA001DIA.

[9] The resource code is included, as datasets for other resources will also be constructed.

4.2. Country Name (COUNTRY)

The assigned country is the country in which the deposit exists at the present time. See Appendix A for a full list of acceptable countries with the corresponding FIPS code, COW numbers and continent. Some manipulation will be required to arrange the dataset by country for data structures with an explicit time component as the geographical extent of the country may change, the country may change names or the status of the country may change (e.g. independence).

4.3. FIPS code (FIPSCODE)

For analytical use, the FIPS (Federal Information Processing Standards) code corresponding to the country is provided. The FIPS code is provided for compatibility with datasets from ESRI which frequently use the FIPS code.

4.4. COW code (COWCODE)

For compatibility with the PRIO/Uppsala Armed Conflict Dataset, the countries are also coded with their Correlates of War (COW) number (Russett, Singer & Small, 1968). For countries without a COW number, -9999 is assigned to the field.

4.5. Continent (CONTCODE)

Each country is assigned to a continent by the following definition used by the PRIO/Uppsala Conflict Dataset (Gleditsch et al., 2002; Strand et al., 2005):

1. Europe: Geographic definition, including the states in the Caucasus, COW numbers [200,395]
2. Middle East: Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Syria, Turkey, and the states of the Arabian Peninsula, COW numbers [630,698]
3. Asia: Geographic definition, including Oceania, Australia, and New Zealand, and excluding states in the Middle East, COW numbers [700,990]
4. Africa: Geographic definition, excluding states in the Middle East (see above), COW numbers [400,625]
5. Americas: Geographic definition, including states in the Caribbean, COW numbers [2,165]

All countries not covered by these definitions were assigned continent codes based on the region listed in the *World Factbook* (Central Intelligence Agency, 2002). See Appendix A for these listings.

4.6. Site Number (SITENUM)

The site number is randomly assigned and is used for identification purposes in the primary key.

4.7. Site Name (NAME)

The site name is the identifying name for the site. It should not be treated as a definitive listing as the site name may be a mine, an identifying landmark (e.g. a river basin or port) or a region.

4.8. Other Known Names (NAMEVAR)

The name of a site can change with time or due to translation. Other identifying names are listed in this field.

4.9. Additional Information for Site Name (NAMEINFO)

Information regarding the derivation of the site name will be included in this field. If the site name represents an amalgamation of sites, this field will include a list of the sites included in this listing. Conversely, if the site is included in an amalgamated site, this site will be identified in NAMEINFO. This information, however, is not systematically cross-referenced and has only been included for known cases.

4.10. Latitude (LAT)

Geographic coordinates give the location of diamond site. Decimal degrees on 360° scale are used for the latitude and longitude, and southern latitudes and western longitudes are assigned negative values. The coordinates are expressed with two decimal points. The positional accuracy of the geographic coordinates, however, is variable among records, as the coordinates have been derived through a variety of methods and with multiple sources. It is recommended that the data be viewed on the smallest scale conducive to the required analysis.

4.11. Longitude (LONG)

See Section 4.10 Latitude (LAT).

4.12. Location Derivation Technique (LOCDER)

The geographic coordinates are derived from a variety of sources and through a variety of techniques. While all efforts were made to find the coordinates in a reliable source, this was not always possible. The following classification system is used to explain the derivation technique. The scale is not meant to reflect any ranking of techniques.

Table 2: Coding for LOCDER

Value	Definition
A1	Coordinates found directly in a reliable source
B1	Coordinates estimated from a map with clear geographic coordinates
B2	Coordinates estimated from a map with no clear geographic coordinates
C1	Coordinates are a distance from a landmark listed in LANDMARK
C2	Coordinates are a cardinal direction (e.g. N, E, S, W) from a landmark listed in LANDMARK
C3	Coordinates are the landmark listed in LANDMARK
D1	Coordinates are a cardinal direction in an administrative region listed in LOCINFO
D2	Coordinates are the centre of the administrative region listed in LOCINFO
E1	Coordinates are a cardinal direction in the country
E2	Coordinates are the centre of the country
F	Other derivation of coordinates (specified)
G	Insufficient information to determine coordinates

4.13. Location Source (LOCSOURCE)

The source of the coordinates is listed in this field. In the majority of cases, the geographic coordinates for landmarks and regions are determined from NIMA's Geospatial Engine. Alternative coordinates may also be listed in this field.

4.14. Landmark Information (LANDMARK)

The name of the nearest landmark is recorded in this field. When available, the distance and cardinal direction from this landmark to the mine site is also recorded.

4.15. Location Information (LOCINFO)

Administrative regions and other location information are recorded in this field.

4.16. Resource Code (RES)

Resources codes are derived from the Mineral Resource Data System (MRDS). For diamonds, the code is DIA[10].

4.17. Information about Resource Properties (RESINFO)

Information about the qualities of the resource is recorded in this field. For DIADATA, a description of the subtype of a primary or secondary deposit is often indicated in this field.

4.18. Geological form of diamonds (DIAINFO)

It is postulated that the geological form of the diamond deposit is relevant to conflict. The following codes have been developed to capture the different geological forms:

Table 3: Coding for DIAINFO

CODE	DEFINITION
P	Primary: kimberlite or lamproite
S	Secondary: alluvial or other placer deposits
M	Marine: underwater ocean deposits
U	Unknown

Primary sources for diamonds are kimberlite and lamproite pipes, while secondary sources are derived from the primary sources through erosion. The secondary deposits (also called placers) include surface scatterings around a pipe, concentrations in river channels, and marine deposits formed as water fluxes from rivers and are moved by wave action along ocean coasts. Due to the emphasis on the theoretical argument that secondary sources are more likely to be implicated in conflicts, primary and secondary deposits found at the same location are listed as two separate entries.

Kimberlite is one of the principal host rocks for commercial diamond deposits. However, only about 10% of all kimberlites are diamondiferous and less than 2% have commercial amounts of diamond (Hausel, 1995). The other primary rock that hosts

[10] A full list of the MRDS resource codes can be found at http://minerals.usgs.gov/sddp/mrds/mrdsmeta.html.

commercial quantities of diamonds is lamproite[11]. The first step in mining a diamond-bearing pipe is to excavate a pit into the pipe. The loose and ore material is removed from the 'open pit' or 'open cast' mine with large hydraulic shovels and ore trucks. If the pipe is sufficiently diamond rich, the mining continues underground.

Secondary deposits were the first diamonds discovered. Prior to more sophisticated analytical and exploration techniques, kimberlite pipes were discovered by following secondary diamond trends. These deposits are actively exploited using methods ranging from primitive to highly sophisticated. A basic mining operation (artisanal method) is as simple as using a shovel and a pan or sieve. Where diamonds are present in high concentrations, commercial operations are also undertaken with large earth moving machines and other industrial scale equipment.

Marine deposits are a variation on secondary deposits. These deposits are mined by three different means: 1) submerged diamond rich sands are dragged onto the shore; 2) diamonds are removed from up to 20 m of water using suction pipes; and 3) deep-sea marine vessels use remote underwater tractors or large underwater excavators to remove overlying sediments and extract the diamonds. Marine deposits that are offshore will be listed separately as exploitation strategies are significantly different than those for other secondary deposits.

For more information on the origin of diamonds and mining techniques, see Erlich & Hausel (2002).

4.19. Mine Information Field (MINEINFO)

Mine information indicates whether production has occurred at a given location. In addition, all attempts have been made to confirm that diamonds have been found at any given site (not just indicators of diamonds). Coding is sufficiently flexible to capture ambiguous cases.

Table 4: Coding for MINEINFO

CODE	DEFINITION
Y	Known production
YA	Known production: small scale or artisanal mining
YC	Known production: commercial scale
P1	Probable production (artisanal or commercial)
P2	Possible production (mainly artisanal)
N	No known production
U	Unknown

4.20. Size Information (SIZEINFO)

Qualitative (and in some cases, quantitative) information regarding size or importance is recorded in this field. In most cases, the information is only of a descriptive nature and should not be over interpreted. This variable field is sparsely populated, as this information was difficult to obtain and interpret.

[11] See Mitchell (1995) for full descriptions of these rock types.

4.21. Discovery Date (DISC)

Discovery date is coded as the first confirmed occurrence of the resource in an area or property. For all sites where discovery occurred prior to 1946, 1 January 1946 (01/01/1946) is entered.

4.22. Discovery Precision (DISCPRES)

For certain sites, the discovery and production dates can be pinpointed to a specific day, month and year. Currently, very few sites have this level of precision. In most cases, only year of discovery is provided. The following coding scheme is applied to distinguish between these different cases:

1. Day, month and year are precisely coded from information found in a reliable source.
2. Conflicting information on day is presented in different sources, and month and year are precisely coded from information found in a reliable source. In these cases, day is assigned based on subjective judgment from the available information.
3. Month and year are precisely coded, but day is unknown. Day is then set to the first day of the month.
4. Conflicting information on month is presented in different sources, and year is precisely coded from information found in a reliable source. In these cases, month is assigned based on subjective judgment from the available information.
5. Information for month is presented as a season, and year is precisely coded from information found in a reliable source. A month is assigned which roughly corresponds to the season.
6. Information for month is presented as a time of year (e.g. early/middle/late), and year is precisely coded from information in a reliable source. A month is assigned which roughly corresponds to the time of year.
7. Year is precisely coded, but day and month are unknown. The day and month are coded as January 1st.
8. Conflicting information on year is presented in different sources. The year is then assigned based on subjective judgment from the available information.
9. Year is unknown. No information on date is available. Corresponds to a blank entry for date.

4.23. Production Date (PROD)

Production date is coded as the first instance of artisanal or commercial production. For all sites where production began prior to 1946, 1 January 1946 (01/01/1946) is entered.

4.24. Production Precision (PRODPRES)

See 4.22 Discovery Precision. An additional code was added for production.

0. No production has occurred at the site. This corresponds to a blank entry for date.

4.25. Date Information (DATEINFO)

All additional information about discovery and production dates is recorded in this field.

4.26. Additional Information (OTHERINFO)

This field gives additional information for the site.

4.27. Source Information (SOURCEINFO)

A complete listing of sources that were consulted for the corresponding listing is included in this field. All references are provided by country in Appendix C.

4.28. Version

The current version of this dataset is 1.0. The version number consists of a major and minor indicator. A change in the minor indicator indicates that errors have been corrected. A change in the major indicator indicates that new data has been added.

5. Compact version of DIATATA

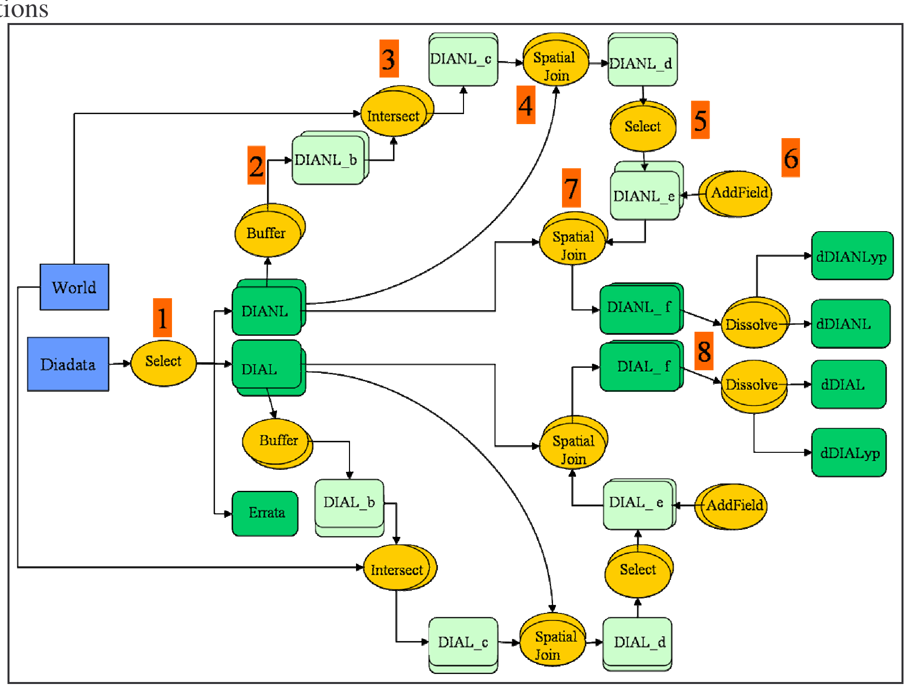
A compact version of DIADATA was created by using ArcGIS version 8.3. In the compact datasets, there are fewer variables (attributes) and diamond sites within 50 km have been grouped into multipoints. Each multipoint shares the same attributes. For example the discovery date for the multipoint is assigned based on the earliest discovery among the sites in the group. On the map all the individual sites and their location have been preserved but the attributes attached to them are generalized and are identical for each site in the multipoint. The compact datasets are also version 1.0.

5.1. Description of the simplication process

The following is a description of the eight step procedure used to generate the compact dataset. A schematic overview of all the GIS operation used to generate the compact version of the dataset DIADATA_1a_evi is given in Figure 1.

Figure 1: Schematic overview of the simplification process

Blue boxes are input datasets, dark and light green rounded rectangles are intermediates of final results for point and polygon features, respectively, and yellow ellipses are GIS operations



DIADATA 1.0 is un-projected data. Most GIS operations, however, demand that the input themes consist of projected co-ordinates. As a result, we defined a projection for the diamond dataset. We used an equal area projection (more specific: the Eckert VI projection based on a WGS84 datum). This can easily be projected to other projections if required. The projected data was saved as *DIADATA 1a_evi* and is used to make the compact version.

- **Step 1: Defining and selecting the subsets**

Four subsets of the original dataset are of interest: primary (or non-lootable) diamond sites, primary (or non-lootable) diamond sites with production, secondary (or lootable) diamond sites, and secondary (or lootable) diamond sites with production[12].

To generate the non-lootable and lootable datasets, information from either the DIAINFO or RESINFO variables was employed. In most cases, DIAINFO clearly indicates whether the geological form of the diamonds is primary (P) or secondary (S). Marine (M) diamonds and sites of unknown (U) geological form were reclassified using the information in RESINFO. This resulted in three subsets as shown by "1" in Figure 1: non-lootable diamond sites (DIANL), lootable diamond sites (DIAL) and errata (ERRATA). Of the 1175 records in the original version of DIADATA, 247 records (mostly primary diamonds) correspond to the non-lootable category, 844 records (mostly secondary diamonrs) correspond to the lootable category, and 84 records were classified as errata due to insuffient information on their geological form.

The subsets were generated based on attribute selection using Structured Query Language (SQL). The code can be found in Appendix E. The general selection rules are as follows:

- If the record does not have geographical coordinates (LAT = 0 OR LONG = 0), it is assigned the errata sub dataset (ERRATA).

- The records where the DIAINFO variable have values of 'P' is assigned to the non–lootable sub dataset (DIANL) and values of 'S' is assigned to the lootable sub dataset (DIAL).

- The records with value 'M' for the DIAINFO variable are assigned primary, secondary or errata depending on the text in the RESINFO. Generally offshore sites are assigned to the non–lootable sub dataset, beach sites are assigned to the lootable and marine placers are assigned to errata due to lack of more specific information.
    - 'alluvial' → errata sub dataset
    - 'marine placers' → errata sub dataset
    - 'beach deposits' → lootable sub dataset
    - 'offshore deposits' → non–lootable dataset
    - 'diamond in marine gravel; offshore' →non–lootable dataset

- The 28 records with value 'U' for the DIAINFO variable are assigned primary, secondary or errata depending on the text in the RESINFO.
    - 'probable primary' (10) → non–lootable
    - 'probable secondary' (7) → lootable
    - other text strings[13] (11) → errata

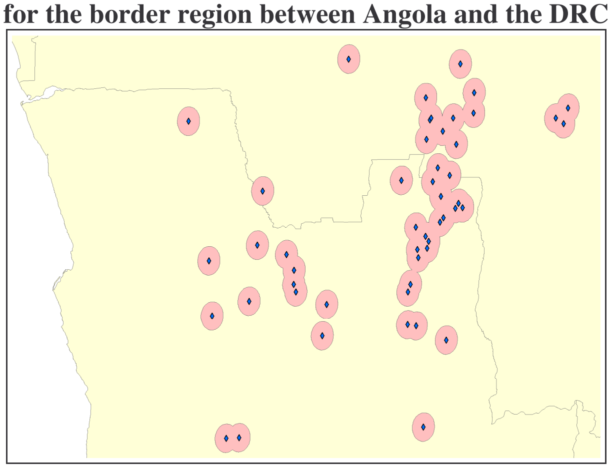
[12] In conflict literature, primary diamonds are classified as lootable and secondary diamonds are classified as non-lootable. This classification is used for the compact datasets.

The non-lootable and lootable subsets are then further divided into those with known production. Based on production information available in the MINEINFO variable, sites with diamond production were extracted from DIAL and DIANL subsets. The records were extracted into the production sets if the variable MINEINFO was coded as having known production either artisanal or commercial ('Y', 'YA', 'YC'), probable ('P1') or possible ('P2') production. This resulted in 135 non-lootable records with production (DIANLyp) and 669 lootable records with production (DIALyp). In Figure 1, these two subsets are illustrated by the rounded rectangles lying under the DIANL and DIAL datasets. Since the same operations are performed on the subsets with known production as with the datasets on non–lootable (DIANL) and lootable (DIAL) diamond sites, the former subsets are shown with rounded rectangles under the latter ones in Figure 1. These subsets are then grouped and aggregated through steps 2 through 8 in Figure 1.

- **Step 2: Buffering**[14]

To reduce the number of records in the dataset and minimise the cases with missing information, diamond sites within a zone of 50 km were grouped together. The result of the buffer operation is a shapefile with polygon features where the polygon border is 25 km from the neareat diamond site (see Figure 2).

Figure 2: A map of the subset of secondary diamonds (DIAL) and the buffer polygons for the border region between Angola and the DRC

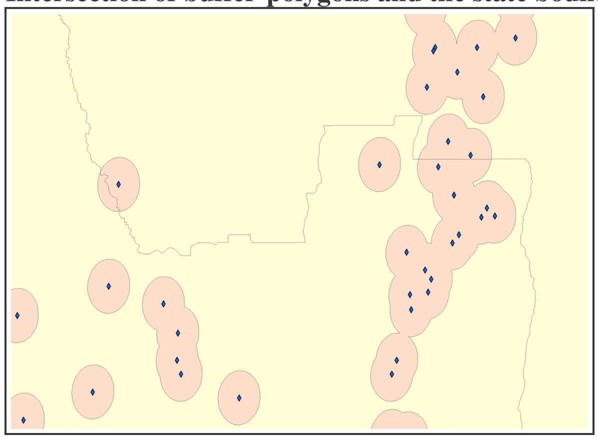


[13] These are '<empty>' (9), diamondiferous (1) or unknown (1).
[14] No buffer polygons were generated (for the secondary diamond set) around the two diamond site points with primkeys BM005DIA and BM007DIA. They are, however, neither near to other diamond sites nor to each other but will be grouped to the same multipoint if no manual coding is done before the dissolve operation (see below). Similar problems occurred for the subsets with known production for lootable sites (IN007DIA) and non-lootable sites (AS048DIA and AS049DIA).

- **Step 3: Intersect**

The buffer-polygons were then intersected with a state boundary map (WORLD) (Figure 3). The buffer polygons have been'clipped' along state boundaries and shorelines so that each grouping can be assigned to a country.

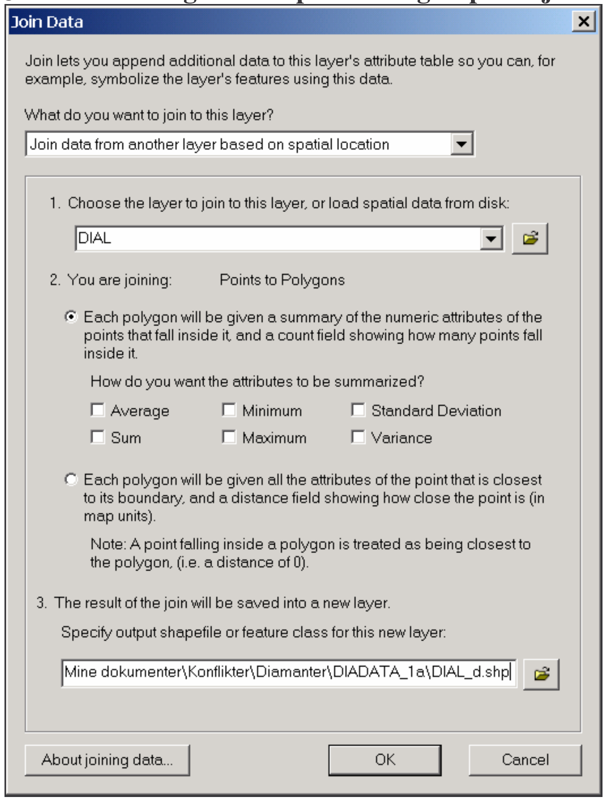
Figure 3: Intersection of buffer-polygons and the state boundary map



- **Step 4: Spatial Join**

The 'clipping' leaves polygon features that do not correspond to "real" diamond sites. For example, if the polygon-buffer intersects with a state border, we want to delete the part of the polygon that does not contain the point diamond site. This polygon without the diamond site needs to be identified. This was done by spatially joining the diamond sites (point features) to the intersected buffers (polygon features). This generates a summary of the numeric attributes of the points that fall within each polygon. As we are only interested in the count field since this allows us to identify the polygons that do not contain at least one diamond site, the summary fields are left unchecked (Figure 4).

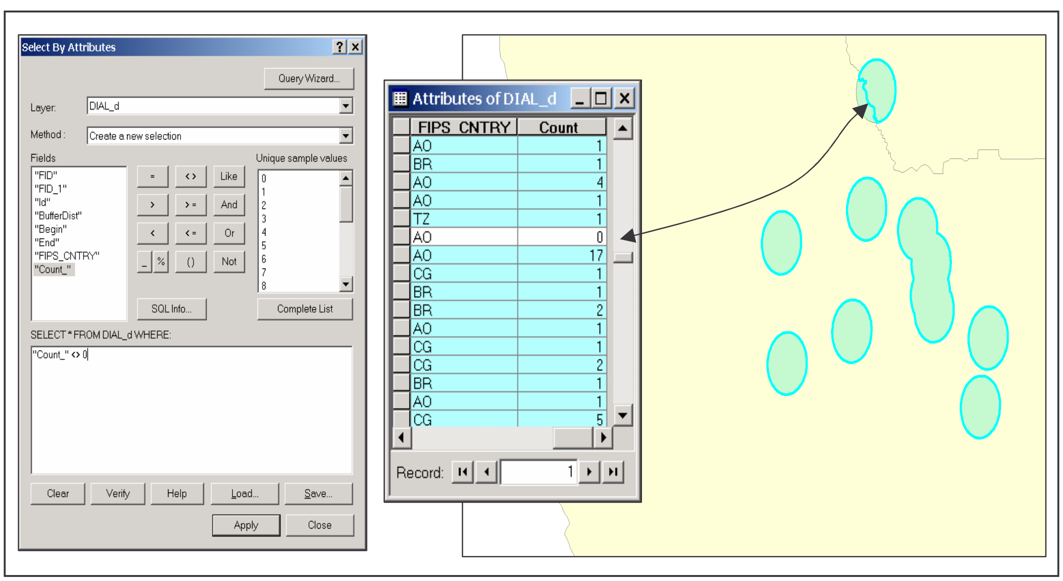
Figure 4: The Join Data dialog box for performing a spatial join in ArcView 8.3



- **Step 5: Select the polygons for removal**

If no diamond points fall inside the polygon boundaries (i.e., COUNT_ <> 0), then that polygon was eliminated. In Figure 5, the attribute table shows a polygon feature that does not contain a diamond site on the Angolan side of the border. That part of the buffer polygon is removed from the dataset.

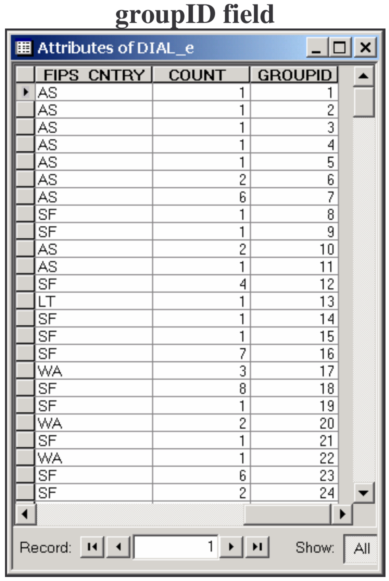
Figure 5: Selection of the polygons that do not contain diamond points



- **Step 6: Add field**

We want to aggregate the diamond features based on a specified attribute. For aggregation, a GroupID field is added to the table, and it uniquely identifies each group (see Figure 6). The GIS operation'dissolve' can be used for this purpose. Dissolve results in multipart features being created. A multipart feature is a single feature that contains separate elements and is represented in the attribute table as one record. A common application of multipart features is for the representation of an administrative region containing several islands. All islands are separate objects on the map, but are represented by one row in the attribute table. As a result, an attribute such as population is the total population of all islands in the administrative unit rather than that of a single island.

Figure 6: The attribute table showing multipart features and the corresponding groupID field



Attributes of DIAL_e

FIPS_CNTRY	COUNT	GROUPID
AS	1	1
AS	1	2
AS	1	3
AS	1	4
AS	1	5
AS	2	6
AS	6	7
SF	1	8
SF	1	9
AS	2	10
AS	1	11
SF	4	12
LT	1	13
SF	1	14
SF	1	15
SF	7	16
WA	3	17
SF	8	18
SF	1	19
WA	2	20
SF	1	21
WA	1	22
SF	6	23
SF	2	24

Record: 1 Show: All

- **Step 7: Spatial Join**

The preparation of the polygon features for grouping the diamond sites is finished. The next step is to perform another spatial join to give each of the point an attribute value indicating which polygon it falls within and thus which group it will belong to (see Figure 7).

Figure 7: Three diamond sites with equal GROUPID. These three points are grouped

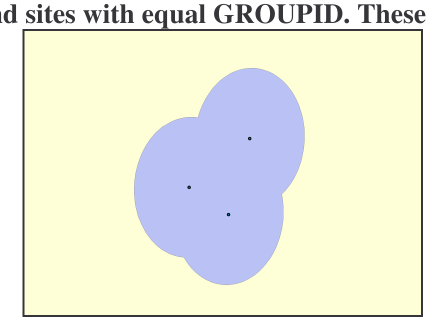
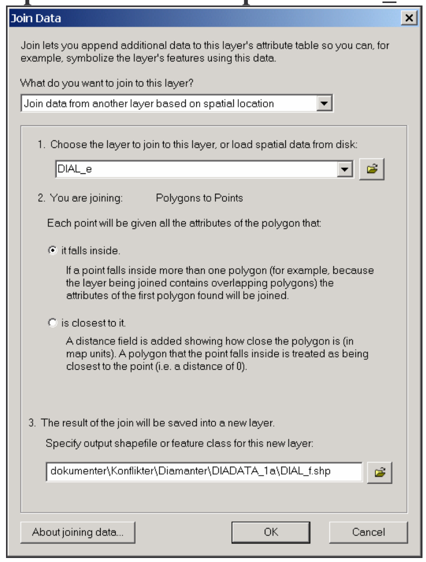


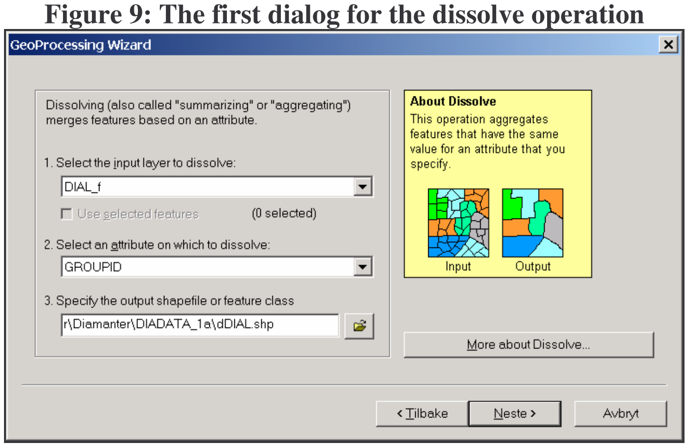
Figure 8: The Join Data dialog to join DIAL_e with DIAL based on spatial location to produce a new shapefile DIAL_f



- **Step 8: Dissolve**

Dissolve is an aggregate command that based on a grouping variable (GroupID), groups together the records in that attribute table and their corresponding geometric shape (points). In the resulting shapefiles (e.g. dDIAL.shp), there are now several points represented with one record in the table. The values for the variables in the input theme are aggregated according to one of the aggregation functions: sum, average, first, last, min or max. The aggregate functions applied to each variable are presented in Table 5. The minimum function is used for the Min_DISCY and MIN_PRODY variables and that the average function is used for the LAT and LONG variables. The output variable names are generated automatically. Only the input variables indicated in Table 5 are selected. The compact dataset thus does not only contain fewer rows, but also fewer columns (variables).

Figure 9: The first dialog for the dissolve operation



5.2. Variable definitions and coding structure

The variable definitions and the coding structure of the compact datasets are presented in Table 5.

Table 5: Definition of variables and aggregate functions for generating the compact datasets

No.	Variable	Description	Aggregate function used	Format
1	GROUPID	The variable used to group the diamond sites	---	Numeric (Integer)
2	COUNT	Give the number of diamond sites within the group	Minimum	Numeric (Integer)
3	COUNTRY	Country of location	First[15]	String
4	FIPSCODE	FIPS code for location	First[15]	String
5	COWCODE	COW numbers of location	Minimum[15]	Numeric (Integer)
6	LAT	First component of the geographic coordinates in decimal degrees	Average	Numeric (Two decimal places)
7	LONG	Second component of the geographic coordinates in decimal degrees	Average	Numeric (Two decimal places)
8	DISC_YEAR	Year when the resource deposit was discovered	Minimum	Numeric (Integer)
9	PROD_YEAR	Year for first confirmed instance of production	Minimum	Numeric (Integer)
10	VERSION	The current version of the dataset	---	Numeric (One decimal)
11	PRIMKEYLST	A list of the primkey values for the site grouped.	First	String

The variables follow the definitions provided in section 4 with the following exception. In the original dataset, the discovery and production dates were coded in a dd/mm/yyyy format. In the compact version, only the year was extracted[16]. The variables DISC and PROD were both string variables and thus cannot be aggregated with ArcView functions other than 'first' and 'last'. The variables DISC_YEAR and PROD_YEAR are defined as integer types. The aggregation functions 'minimum', 'maximum', 'average', 'sum', 'standard deviation' and 'variance' can now be applied. Missing values were assigned a value of 9999 rather than zero, so that the aggregate function 'minimum' could be used for the aggregation. In order to identify which sites have been grouped, we also made a variable to hold the list of primkeys for the sites being grouped.

[15] All candidates for a group will have the same value for COUNTRY, FIPSCODE and COWCODE thus the dissaggregated value will be equal when one of the aggregating function first, last, minimum, maximum is used

5.3. Properties of the compact dataset

A drawback with the original dataset was the many records had missing values for discovery date ('DISC') and production date ('PROD'). The purpose of the grouping and aggregation was to reduce the number of records with incomplete information, in particular, those with incomplete discovery and production dates. The effect of the grouping and aggregation is shown in Figure 10 and Figure 11.

Figure 10: Lootable diamond sites near the border between Angola and DRC in the original dataset

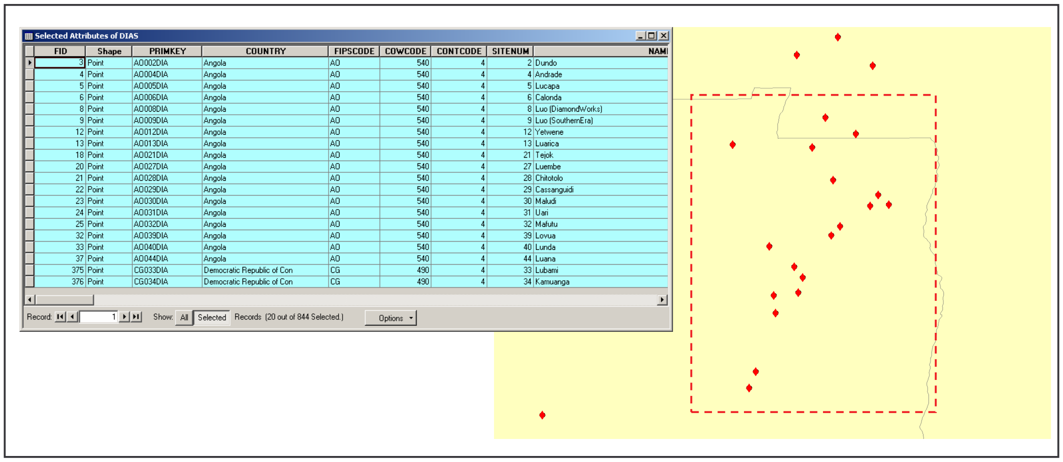
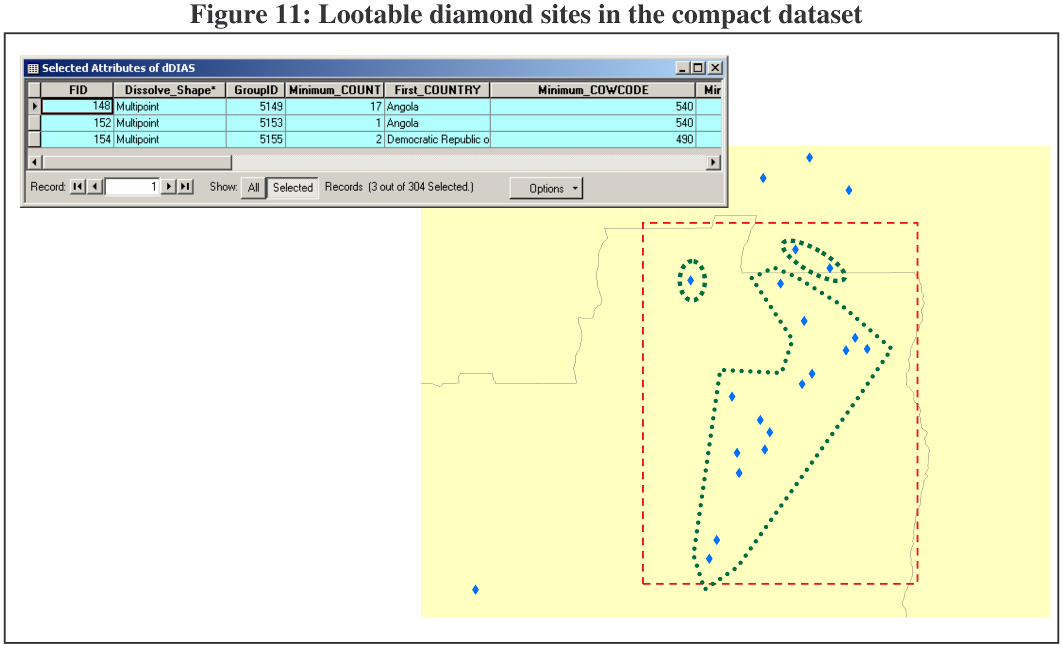


Figure 11: Lootable diamond sites in the compact dataset



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[16] The following equations were entered in the field calculator to extract the discovery and production years: DISC_YEAR = Right ([DISC],4) and PROD_YEAR = Right([PROD],4)

In Figure 10, for the 20 points in the rectangle[17], there are 20 rows in the original attribute table, thus one corresponding row for each point. In Figure 11, the 20 records are reduced to three. Each group of points (multipoints) corresponds with one row in the attribute table. Points are not grouped to other points if they are further away than 50 km (thus the point in the upper left corner of the frame is not grouped with the other as the distance to this point exceeds the threshold). In addition, points are not grouped with other points if they are situated on the opposite side of a state boundary (thus the two points in D.R. of Congo are not grouped with the other points in Angola).

By generating information for sites that are located within 50 km from each other, the number of sites with missing information for discovery and production year has been reduced substantially. For discovery date, 464 of 1175 records have this information (39%). Of the 1175 records, there are 861 records with known, probable or possible mining (MINEINFO = Y, YA, YC, P1 or P2). Of these 861 records, 332 records have entries for production date (39%). In Table 6, a summary of the aggregation and the improvement in the completeness of the dates is shown.

Table 6: Summary of aggregation and completeness of discovery and production dates

Description	Records in original dataset	Records in compact dataset	Completeness of discovery dates	Completeness of production dates
All non-lootable (dDIANL)	247	151	67% (166/247)	40%(100/247)
Non-lootable with production (dDIANLyp)	135	70	79% (106/135)	67% (91/135)
All lootable (dDIAL)	844	310	76% (640/844)	69% (583/844)
Lootable with production (dDIALyp)	669	253	79% (527/669)	67% (448/669)

The following maps are provided to visualise how the dates were assigned and what sort of improvements were observed in the completeness of the dates. Figures 12 and 13 show how the dates were assigned. The red symbols in Figure 12 show lootable diamond sites with production (DIALyp, see Figure 1). The horizontal lines show sites having missing value for production year. The light blue circles shows missing production values after aggregating. For this area, the number of missing values regarding production year are thus significantly decreased. See Figure 13 for an enlargement of framed area. The GIS operation ‘dissolve’ groups points based on a common attribute to a multipoint. We have assigned a common attribute to all points that are closer than 50 km to other points. The ‘dissolve’ operation also aggregates the attribute table. For the variable discovery year, the minimum function was applied. Thus, for instance as in Figure 12, one of five observations have discovery year, and

[17] You can only count 18 within the frame in Figure 8. For two of the positions, two points are overlapping.

its value is assigned to the multipoint group. If there is more than one observation among the candidates to a multipoint group, the earliest date for discovery year is assigned.

Figure 12: Lootable diamond sites in Sierra Leone and Liberia

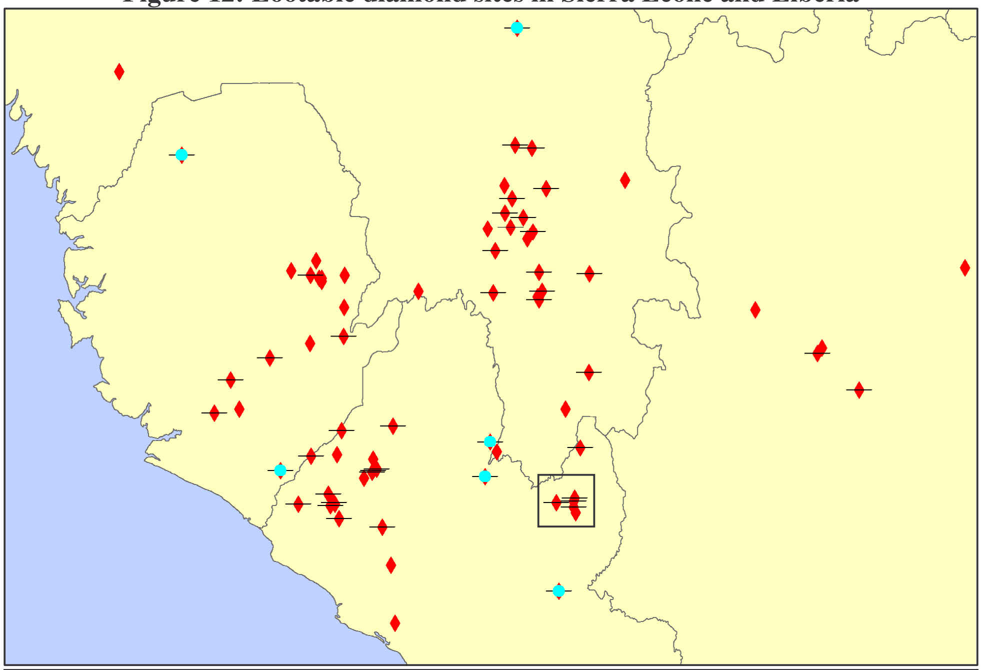
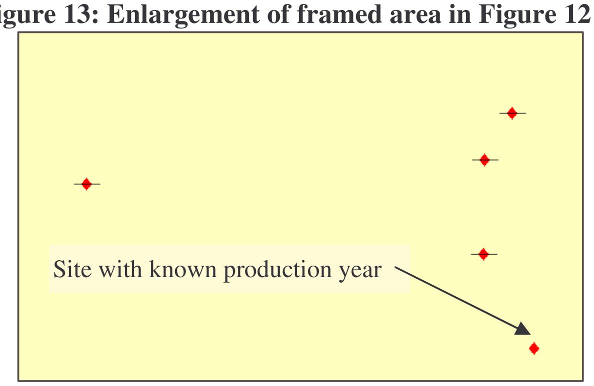
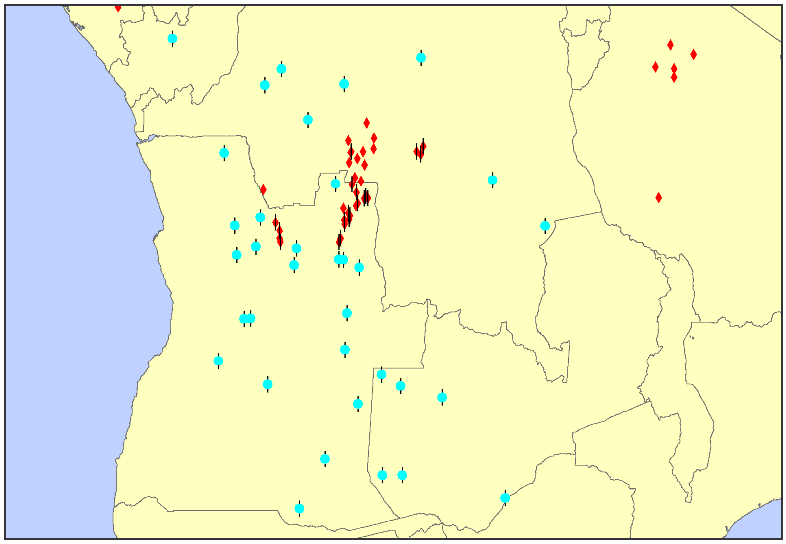


Figure 13: Enlargement of framed area in Figure 12



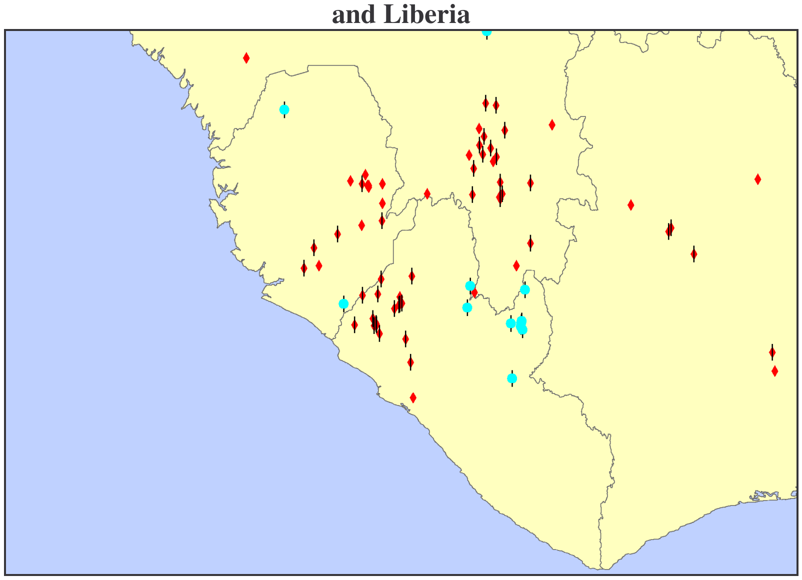
In Figure 14, the area of Angola and DRC is shown. The red symbols show secondary diamond sites. The horizontal lines show sites having missing value for discovery year. The light blue circles shows missing discovery values after aggregating. For this area, the number of missing values regarding discovery year have unfortunately not decreased significantly (except for the area in the centre of the map). A similar trend was observed for production values as there is a correlation between missing discovery and production dates as a reference without a discovery date is likely to also lack a production date.

Figure 14: Results of aggregation on completeness of discovery dates for Angola and DRC



In Figure 15, an example of an area where the number of missing values for discovery values are significantly decreased. The red symbols show secondary diamond sites. The vertical lines show sites with missing value for discovery year. The light blue circles shows missing values for discovery years after aggregating. The aggregation worked well for the region of Sierra Leone and Liberia.

Figure 15: Results of aggregation on completeness of discovery dates for Sierra Leone and Liberia



6. Technical Information

All datasets are stored in Microsoft Excel 2000 and Microsoft Access 2000. In addition, all datasets are available for ArcView use as a shapefile.

APPENDIX A: Country and corresponding COW number, FIPS code and continent[18]

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Afghanistan	700	AF	3
Albania	339	AL	1
Algeria	615	AG	4
Andorra	232	AN	1
Angola	540	AO	4
Anguilla	-9999	AV	5
Antarctica	-9999	AY	0
Antigua & Barbuda	58	AC	5
Argentina	160	AR	5
Armenia	371	AM	1
Aruba	-9999	AA	5
Ashmore and Cartier Islands	-9999	AT	3
Australia	900	AS	3
Austria	305	AU	1
Azerbaijan	373	AJ	1
Bahamas	31	BF	5
Bahrain	692	BA	2
Bangladesh	771	BG	3
Barbados	53	BB	5
Bassas da India	-9999	BS	4
Belarus	370	BO	1
Belgium	211	BE	1
Belize	80	BH	5
Benin	434	BN	4
Bermuda	-9999	BD	5
Bhutan	760	BT	3
Bolivia	145	BL	5
Bosnia-Herzegovina	346	BK	1
Botswana	571	BC	4
Bouvet Island	-9999	BV	0
Brazil	140	BR	5
British Indian Ocean territory	-9999	IO	0
British Virgin Islands	-9999	VI	5
Brunei	835	BX	3
Bulgaria	355	BU	1
Burkina Faso	439	UV	4
Burma	775	BM	3
Burundi	516	BY	4
Cambodia	811	CB	3
Cameroun	471	CM	4
Canada	20	CA	5
Cape Verde	402	CV	4
Cayman Islands	-9999	CJ	5

[18] The continent definition follows the one presented in Section 4.4. A few additions have been made based on geographic location from Central Intelligence Agency (2002). If a 0 is assigned for continent, the country is located either in the Arctic, Antarctica, or in an ocean. Areas that are not independent countries but have with FIPS codes, are included in this list.

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Central African Republic	482	CT	4
Chad	483	CD	4
Chile	155	CI	5
China	710	CH	3
Christmas Island	-9999	KT	0
Clippeton Island	-9999	IP	3
Cocos (Keeling) Islands	-9999	CK	3
Colombia	100	CO	5
Comoros	581	CN	4
Congo	484	CF	4
Cook Islands	-9999	CW	3
Coral Sea Islands	-9999	CR	3
Costa Rica	94	CS	5
Cote D'Ivoire/Ivory Coast	437	IV	4
Croatia	344	HR	1
Cuba	40	CU	5
Cyprus	352	CY	1
Czech Republic	316	CZ/EZ	1
Democratic Republic of Congo/Zaire	490	CG	4
Denmark	390	DA	1
Djibouti	522	DJ	4
Dominica	54	DO	5
Dominican Republic	42	DR	5
East Timor	-9999	TT	3
Ecuador	130	EC	5
Egypt	651	EG	2
El Salvador	92	ES	5
Equatorial Guinea	411	EK	4
Eritrea	531	ER	4
Estonia	366	EN	1
Ethiopia	530	ET	4
Europa Island	-9999	EU	4
Falkland Islands (Islas Malvinas)	-9999	FK	5
Faeroe Islands	-9999	FO	1
Fiji	950	FJ	3
Finland	375	FI	1
France	220	FR	1
French Guiana	-9999	FG	5
French Polynesia	-9999	FP	3
French Southern and Antarctic lands	-9999	FS	0
Gabon	481	GB	4
Gambia	420	GA	4
Gaza Strip	-9999	GZ	2
Georgia	372	GG	1
Germany	255	GM	1
Ghana	452	GH	4
Gibraltar	-9999	GI	1
Glorioso Islands	-9999	GO	4
Greece	350	GR	1
Greenland	-9999	GL	0
Grenada	55	GJ	5

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Guadeloupe	-9999	GP	5
Guatemala	90	GT	5
Guernsey	-9999	GK	1
Guinea	438	GV	4
Guinea-Bissau	404	PU	4
Guyana	110	GY	5
Haiti	41	HA	5
Heard Islands and McDonald Islands	-9999	HM	0
Honduras	91	HO	5
Hong Kong	-9999	HK	3
Hungary	310	HU	1
Iceland	395	IC	1
India	750	IN	3
Indonesia	850	ID	3
Iran	630	IR	2
Iraq	645	IZ	2
Ireland	205	EI	1
Isle of Man	-9999	IM	1
Israel	666	IS	2
Italy	325	IT	1
Jamaica	51	JM	5
Jan Mayen Island	-9999	JN	0
Japan	740	JA	3
Jersey	-9999	JE	1
Jordan	663	JO	2
Juan de Nova Island	-9999	JU	4
Kazakhstan	705	KZ	3
Kenya	501	KE	4
Korea, North	731	KN	3
Korea, South	732	KS	3
Kingman Reef	-9999	KQ	3
Kiribati	-9999	KR	3
Kuwait	690	KU	2
Kyrgyz Republic	703	KG	3
Laos	812	LA	3
Latvia	367	LG	1
Lebanon	660	LE	2
Lesotho	570	LT	4
Liberia	450	LI	4
Libya	620	LY	4
Liechtenstein	223	LS	1
Lithuania	368	LH	1
Luxemburg	212	LU	1
Macau	-9999	MC	3
Macedonia	343	MK	1
Madagascar/Malagasy Republic	580	MA	4
Malawi	553	MI	4
Malaysia	820	MY	3
Maldive Islands	781	MV	3
Mali	432	ML	4
Malta	338	MT	1

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Marshall Islands	983	MH	3
Martinique	-9999	MB	5
Mauritania	435	MR	4
Mauritius	590	MP	4
Mayotte	-9999	MF	4
Mexico	70	MX	5
Moldova	359	MD	1
Monaco	221	MN	1
Mongolia	712	MG	3
Montenegro[19]	-9999	MW	1
Montserrat	-9999	MH	5
Morocco	600	MO	4
Mozambique	541	MZ	4
Namibia	565	WA	4
Nauru	-9999	NR	3
Nepal	790	NP	3
Netherlands	210	NL	1
Netherlands Antilles	-9999	NT	5
New Caledonia	-9999	NC	3
New Zealand	920	NZ	3
Nicaragua	93	NU	5
Niger	436	NG	4
Nigeria	475	NI	4
Niue	-9999	NE	3
Norfolk Island	-9999	NF	3
Norway	385	NO	1
Oman	698	MU	2
Pakistan	770	PK	3
Palau	986	PS	3
Panama	95	PM	5
Papua New Guinea	910	PP	3
Paracel Islands	-9999	PF	3
Paraguay	150	PA	5
Peru	135	PE	5
Philippines	840	RP	3
Pitcairn Islands	-9999	PC	3
Poland	290	PL	1
Portugal	235	PO	1
Qatar	694	QA	2
Republic of China	713	TW	3
Reunion	-9999	RE	4
Rumania	360	RO	1
Russia	365	RS	1
Rwanda	517	RW	4
Western Samoa	990	WS	3
San Marino	331	SM	1
Sao Tome-Principe	403	TP	4
Saudi Arabia	670	SA	2
Senegal	433	SG	4

[19] Now Serbia and Montenegro.

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Serbia	-9999	SR	1
Seychelles	591	SE	4
Sierra Leone	451	SL	4
Singapore	830	SN	3
Slovakia	317	LO	1
Slovenia	349	SI	1
Solomon Islands	940	BP	3
Somalia	520	SO	4
South Africa	560	SF	4
South Georgia and South Sandwich Islands	-9999	SX	5
Spain	230	SP	1
Spratly Islands	-9999	PG	3
Sri Lanka	780	CE	3
St. Helena	-9999	SH	4
St. Kitts-Nevis	60	SC	5
St. Lucia	56	ST	5
St. Pierre and Miquelon	-9999	SB	5
St. Vincent and the Grenadines	57	VC	5
Sudan	625	SU	4
Surinam	115	NS	5
Svalbard	-9999	SV	1
Swaziland	572	WZ	4
Sweden	380	SW	1
Switzerland	225	SZ	1
Syria	652	SY	2
Tajikistan	702	TI	3
Tanzania	510	TZ	4
Thailand	800	TH	3
Togo	461	TO	4
Tokelau	-9999	TL	3
Tonga	-9999	TN	3
Trinidad and Tobago	52	TD	5
Tromelin Island	-9999	TE	4
Tunisia	616	TS	4
Turkey	640	TU	2
Turkmenistan	701	TX	3
Turks and Caicos Islands	-9999	TK	5
Tuvalu	-9999	TV	3
Uganda	500	UG	4
Ukraine	369	UP	1
United Arab Emirates	696	AE/TC	2
United Kingdom	200	UK	1
United States of America	2	US	5
Uruguay	165	UY	5
Uzbekistan	704	UZ	3
Vanuatu	935	NH	3
Vatican City	-9999	VT	1
Venezuela	101	VE	5
Vietnam, Dem. Rep. of	816	VM	3
Wallis and Futuna	-9999	WF	3
West Bank	-9999	WE	2

COUNTRY	COWCODE	FIPSCODE	CONTCODE
Western Sahara	-9999	WI	4
Yemen	679	YM	2
Zambia	551	ZA	4
Zimbabwe	552	ZI	4

APPENDIX B

The information in DIADATA can be transformed to fit various data structures. Below the diamond dataset has been manipulated to fit the Correlates of War (COW) system membership list. The list only includes years after independence. For example, diamonds were found in Namibia prior to 1990.

COUNTRY	DISC_PRIM	DISC_SEC	PROD_PRIM	PROD_SEC	DIA_PRIM	DIA_SEC	PROD_PRIM	PROD_SEC	PROD_SIG	START DATE
Algeria	N	1957	N	N	N	Y	N	N	N	1946
Angola	1975	1975	1975	1975	Y	Y	Y	Y	Y	1975
Australia	1972	1946	1979	1946	Y	Y	Y	Y	Y	1946
Belarus	1991	N	N	N	Y	N	N	N	N	1991
Bolivia	N	1946	N	N	N	Y	N	N	N	1946
Botswana	1966	1966	1971	*N*	Y	Y	Y	*N*	Y	1966
Brazil	N	1946	N	1946	N	Y	N	Y	Y	1946
Burkina Faso	U	N	N	N	Y	N	N	N	N	1960
Burma	N	1948	N	1948	N	Y	N	Y	N	1948
Cameroun	N	*1960*	N	*1960*	N	Y	N	Y	N	1960
Canada	1948	1946	1998	N	Y	Y	Y	N	Y	1946
Central African Republic	N	1960	N	1960	N	Y	N	Y	Y	1960
Chad	N	*1960*	N	*1960*	N	Y	N	Y	N	1960
China	1965	1946	1970	1955	Y	Y	Y	Y	Y	1946
Colombia	N	U	N	N	N	Y	N	N	N	1946
Congo	N	*1961*	N	*1961*	N	Y	N	Y	N	1961
Cote d'Ivoire	1960	1960	1965	1960	Y	Y	Y	Y	Y	1960
Democratic Republic of Congo/Zaire	1960	1960	1960	1960	Y	Y	Y	Y	Y	1960
Finland	1994	N	N	N	Y	N	N	N	N	1946
Gabon	1969	1960	N	1960	Y	Y	N	Y	N	1960
Ghana	N	1957	N	1957	N	Y	N	Y	Y	1957
Guinea	1958	1958	*1958*	1958	Y	Y	Y	Y	Y	1958
Guyana	N	1966	N	1966	N	Y	N	Y	Y	1966
India	1947	1947	1947	1947	Y	Y	Y	Y	Y	1947

COUNTRY	DISC_PRIM	DISC_SEC	PROD_PRIM	PROD_SEC	DIA_PRIM	DIA_SEC	PROD_PRIM	PROD_SEC	PROD_SIG	START DATE
India	1947	1947	1947	1947	Y	Y	Y	Y	Y	1947
Indonesia	N	1946	N	1946	N	Y	N	Y	N	1946
Kazakhstan	1991	N	N	N	Y	N	N	N	N	1991
Lesotho	1966	1966	1966	1966	Y	Y	Y	Y	Y	1966
Liberia	1955	1946	N	1950	Y	Y	N	Y	Y	1946
Malaysia	N	1957	N	1957	N	Y	N	Y	N	1957
Mali	1960	1960	N	1960	Y	Y	N	Y	N	1960
Mauritania	1999	N	N	N	Y	N	N	N	N	1960
Mozambique	U	1975	N	N	Y	Y	N	N	N	1975
Namibia	1990	1990	N	1990	Y	Y	N	Y	Y	1990
Nigeria	N	1960	N	N	N	Y	N	N	N	1960
Norway	1995	N	N	N	Y	N	N	N	N	1946
Paraguay	N	*1946*	N	N	N	Y	N	N	N	1946
Russia (Soviet Union)	1954	1946	1957	1946	Y	Y	Y	Y	Y	1946
Sierra Leone	1961	1961	1961	1961	Y	Y	Y	Y	Y	1961
Solomon Islands	*1978*	N	N	N	Y	N	N	N	N	1978
South Africa	1946	1946	1946	1946	Y	Y	Y	Y	Y	1946
Surinam	N	1975	N	1975	N	Y	N	Y	N	1975
Swaziland	1973	N	1984	N	Y	N	Y	N	Y	1968
Sweden	1994	N	N	N	Y	N	N	N	N	1946
Tanzania	1961	1961	1961	1961	Y	Y	Y	Y	Y	1961
Thailand	N	1946	N	1946	N	Y	N	Y	N	1946
Ukraine	*1991*	N	N	N	Y	N	N	N	N	1991
United States of America	1946	1946	1946	1946	Y	Y	Y	Y	N	1946
Uruguay	N	N	N	N	N	Y	N	N	N	1946
Venezuela	N	1946	N	1946	N	Y	N	Y	Y	1946
Zambia	N	*1964*	N	N	N	Y	N	N	N	1964
Zimbabwe	1965	1965	*1990*	*1965*	Y	Y	Y	Y	Y	1965

Entries in italics have somewhat higher uncertainty.

APPENDIX C: COUNTRY PROFILES FOR DIADATA

Due to the wide variety of quantity and quality of information available for diamond occurrences in various countries, country profiles have been prepared to capture this information. When available, discovery and production dates and summaries, supplemental information on the geographical distribution of the diamond occurrences (e.g. the importance of a given region) and notes on the quality of the diamonds are provided. In addition, the derivation, completeness and limitations of the dataset are documented by country; a full list of references for each country is provided. This part of the document can be navigated from the links below as you would a webpage.

PRODUCERS

1. Angola
2. Australia
3. Botswana
4. Brazil
5. Burma (Myanmar)
6. Canada
7. Central African Republic
8. China
9. Congo - Brazzaville
10. Cote d'Ivoire
11. Democratic Republic of Congo
12. Gabon
13. Ghana
14. Guinea
15. Guyana
16. India
17. Indonesia
18. Lesotho
19. Liberia
20. Mali
21. Namibia
22. Russia
23. Sierra Leone
24. South Africa
25. Suriname
26. Swaziland
27. Tanzania
28. Thailand
29. United States of America
30. Venezuela
31. Zimbabwe

OTHERS IN DATASET

1. Algeria
2. Belarus
3. Bolivia
4. Burkina Faso
5. Cameroon
6. Chad
7. Colombia
8. Finland
9. French Guiana
10. Greenland
11. Kazakhstan
12. Malaysia
13. Mauritania
14. Mozambique
15. Nigeria
16. Norway
17. Paraguay
18. Solomon Islands
19. Sweden
20. Ukraine
21. Uruguay
22. Zambia

OTHERS

1. Argentina
2. Czech Republic
3. France
4. Kenya
5. Malawi
6. Senegal
7. Spain
8. Togo
9. Uganda
10. United Kingdom
11. Exploration & Other

ALGERIA

There are two entries in the dataset for Algeria. The Algerian government is actively promoting prospecting in the Bled el Mass and Djebel Aberraz and are indicating that over 1500 macrodiamonds have been found (Mobbs, 2001; Office National de Recherche Géologique et Minière, 2003). Janse & Sheahan (1995) include this alluvial diamond deposit corresponding in their work. Webster (1975) indicates that in 1957, French uranium prospectors found six diamonds in the Hoggar area. No primary source has been found, but there is some interest in potential kimberlite or lamproite structures (MBendi, 2000). By contrast, Bardet (1974) raises doubts that the claims of diamonds in Algeria are legitimate.

References

The following references were consulted to construct the dataset: Janse & Sheahan (1995); Mobbs (2001); Office National de Recherche Géologique et Minière (2003); Touahri et al. (1996); Webster (1975).

Additional references

The following reference is suggested for further reading: Kaminskiy et al. (1990).

ANGOLA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1912
First primary host rock	1952
First formal production	1916
First 100,000 carats produced	1922
Total production up to 1990 (in millions of carats)	60
% of total world production up to 1990	3
Production 1992 (in millions of carats)	2.5

Discovery history

The first diamonds were discovered in 1912 along the border with the Democratic Republic of Congo (de Kun, 1987). In 1952, the first kimberlite pipe, Camafuca, was discovered in the Chicapa River drainage area in the Lunda district, northeastern Angola (Janse & Sheahan, 1995).

Production history

Diamond mining started in 1916. By 1921, annual production reached over 100,000 carats. By 1940, annual production was 800,000 carats. After 1945, annual production reached 1 million carats and peaked in 1973 at 2.4 million carats (Janse & Sheahan, 1995). The war to gain independence from Portugal did not greatly impact the mining operations. By contrast, immediately before and after independence in 1975, production was ‘virtually paralysed’ (Helmore, 1984). By 1986, official production had fallen to 270,000 carats annually, although in 1990–92, annual production rebounded to 900,000 million. Illegal production has been rampant in Angola. In the 1992, it is estimated that illegal production was at least as high as official production (Janse & Sheahan, 1995). For a full historical overview of diamond mining in Angola, see Dietrich (2000).

At present, all production is derived from alluvial deposits with some limited production from the eluvial and colluvial deposits of some pipes located in river valleys. While some operations are mechanized, a significant amount of the mining is done in an artisanal manner. Another method that is employed in Cuango is that of river diversions. By diverting the river, the diamonds in the empty riverbed can be easily mined (Helmore, 1984). In 1995, a Russo-Sakha enterprise began to develop the Catoca kimberlite (Janse & Sheahan, 1995).

Geographical distribution

Mining occurs primarily in the Andrada and Lucapa areas of the northeastern Lunda district. Since the late 1970s, the Cuango area in western Lunda has become an important producer (Janse & Sheahan, 1995). In 1983, gem production from these divisions was: Lucapa (443,000 carats); Andrada (295,000 carats); and, Cuango (296,000 carats) (Helmore, 1984). Diamonds are also found in the central, southeastern and southwestern parts of the country. These areas include kimberlite pipes clustered around Huambo, Andulo, Saurimo and Mavinga (Dietrich, 2000).

Quality

The average yields of the alluvial mining in Andrada and Lucapa is estimated at 0.2 to 0.3 carats/m^3. The deposits in the Cuango river diversions average from 2 to 5 carats/m^3 and in some cases have yields up to 100 carats/m^3 (Helmore, 1984)

Angola diamonds are ranked among the top three countries for quality, and in 1983, fetched 91 US$ / carat (Helmore, 1984) with gems averaging 8 to 10 carats (de Kun, 1987). Smuggling, however, has depressed the prices for commercial producers.

Derivation of dataset

There are 52 entries for Angola. The dataset for Angola is derived from a variety of references. The main difficulty with this dataset was problems sorting references that grouped several sites into one listing and the separate diamond occurrences that compose that listing. It is not known to what extent this will lead to inaccuracies and potential double counting. Additional problems are due to name changes and variations in spelling.

The geographic coordinates for this dataset were derived primarily from the coordinates listed in the National Imagery Mapping Agency's (NIMA) Geospatial Engine. In addition, a significant number of sites were read from maps in Dietrich (2000). Due to the scarcity of information, it was very difficult to assign dates to the diamond fields in Angola. It is suggested that it is appropriate to assign a default date of 01/01/1946 to all alluvial sites in the Lunda area.

References

The following references were consulted to construct the dataset: Bardet (1974); Coakley (1996a); Coakley (1997a); Coakley (2000a); de Kun (1987); Dietrich (2000); ESRI, 1996); Helmore (1984); Infomine (2002); Janse & Sheahan (1995); Jennings (1995); MBendi (2002a); MINDAT (2003); Thole (2003); World Investment News (2003).

In addition, the following industry websites were consulted: Caledonia Mining Corporation; Petra Diamonds Ltd; Southern Era Resources.

Additional references

The following references are suggested for further reading: Freire de Andrade (1953); Polinard (1951).

ARGENTINA

Despite some suggestion of prospecting activity in the Infomine database at Sierra de Tandil in Buenos Aires Province (Infomine, 2002), it is unlikely that there are any diamond occurrences in Argentina (Bardet, 1977).

AUSTRALIA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1852
First primary host rock	1972
First formal production	Approx 1883
First 100,000 carats produced	1981
Total production up to 1990 (in millions of carats)	184
% of total world production up to 1990	8
Production 1992 (in millions of carats)	40

Discovery history

The first diamonds were found near Sutter's Bar on the Macquarie River near Bathurst in New South Wales as a byproduct of gold mining. In 1867, diamonds were found at the Two Mile Flat on the Cudgegong river northwest of Mudgee. In 1872, an important diamond field was found in the Bingara-Tingha district near the Queensland border. Occurrences of alluvial diamonds were also found in Western Australia in 1895 near Nullagine (Webster, 1975).

In the late 1960s, exploration for primary host rocks began in Australia. In 1972, the first diamondiferous kimberlites were found on the northern part of the Kimberley plateau and diamondiferous lamproites in the Ellendale area (these pipes were not economic at that time). In 1979, the Argyle diamond lamproite deposit was discovered (Janse & Sheahan, 1995). There is ongoing prospecting activity in Australia (Infomine, 2002).

Production history

Early production in Australia was not considered important (Webster, 1975). From 1884 to 1957, 200,000 carats were extracted from the Copeton field in New South Wales. From 1958 until the late 1970s, production from Australia was almost nonexistent (Bardet, 1977). Since the discovery of the Argyle mine, production in Australia has increased substantially. In 1992, the annual production from the Argyle mine amounted to 40% of world production in volume and 7% in value (Janse & Sheahan, 1995).

Geographic distribution

Diamond occurrences have been reported from small alluvial gold, tin and sapphire workings scattered through eastern Australia extending from northern Queensland to Tasmania, and the southern part of Australia. Small diamonds have been found in southern, central and northern Queensland. Diamonds have been recovered while washing for sapphire in the Ruby Vale district. In the far north of Queensland, diamonds have turned up during panning for gold and tin at the source of the Gilbert River (Webster, 1975). For more information about the scattered diamond occurrences, see the additional references.

Quality

Australian diamonds are small in size, and usually yellow or off-coloured. Some white and many fancy stones have been reported from the alluvial deposits (Webster, 1975). A large proportion of the diamonds in the Argyle pipe are of industrial quality with only 5% being of gem quality. Higher gem counts are found at the Merlin mine (MBendi, 2002b).

Derivation of dataset

There are 67 entries for Australia. The diamond resources of Australia are well characterized. GIS datasets produced by geological surveys in Australia were used to derive most of the entries. Not all the sites listed were reproduced in the dataset. Information on the full dataset can be found at https://www.ga.gov.au/ (Ewers, Evans & Kilgour (complier), 2001) and at http://www.dme.nt.gov.au (Northern Territory Geological Survey, 2002). Additional occurrences are also listed in (Office of Minerals and Energy Resources South Australia, 2001).

Since the coordinates are for the most part taken from the Australian government GIS datasets, a high amount of confidence is placed in the geographic coordinates. As many of the diamond discoveries in Australia occurred after the 1980s, dates are, by comparison to other countries, very specific. Most sites with primary deposits were discovered after 1980, while most secondary deposits were known prior to 1946.

References

The following references were consulted to construct this dataset: Bardet (1977); Davies, O'Reilly & Griffin (1998); ESRI (1996); Ewers, Evans & Kilgour (2001); Infomine (2002); Janse & Sheahan (1995); Jennings (1995); MINDAT (2003); New South Wales Department of Mineral Resources (2000); Nixon (1995); Northern Territory Geological Survey (2002); Office of Minerals and Energy Resources South Australia (2001);

In addition, the following industry websites were consulted: Diamond Rose NL; Flinders Diamonds.

Additional references

For a detailed description of diamond occurrences in Australia prior to 1975, see Bardet (1977). For a full description of all diamond occurrences in South Australia, see Office of Minerals and Energy Resources South Australia (2001)

BELARUS

The only reference for this site is in Janse & Sheahan (1995), and the geographic coordinates were taken directly from this source. There is no known production in Belarus.

Additional references

The following references are suggested for further reading: Nikitin et al. (1994).

BOLIVIA

Webster (1975) indicates that diamonds have been found in the foothills of the Andes. Specifically, the diamonds were discovered in the river gravels of the Rio Tuichi and have been reported from the Rio Tequeje, Rio Unduma and other tributaries of the Rio Beni. It is possible that these diamonds are byproducts of the alluvial gold deposits in Bolivia. Bolivian diamonds are also mentioned in Bardet (1977), but no descriptions of the occurrences are presented.

There are 4 entries for Bolivia. The geographic coordinates for this dataset were derived from the coordinates listed in the National Imagery Mapping Agency's (NIMA) Geospatial Engine. Only one site has a date, but it is assumed that all four sites were discovered prior to 01/01/1946. The lack of production in this case most likely indicates that these diamond sources are marginal.

References

The following references were consulted in constructing this dataset: Bardet (1977); Webster (1975).

Additional references

The following references are suggested for further reading: Olivo (1989); Oppenheim (1934).

BOTSWANA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1955
First primary host rock	1966
First formal production	1960s
First 100,000 carats produced	1970
Total production up to 1990 (in millions of carats)	152
% of total world production up to 1990	7
Production 1992 (in millions of carats)	16

Discovery history

In 1955, diamonds were first found in the Makloutsi River at Foley in the Bamangwato tribal territory (Webster, 1975). The large and important Orapa pipe was discovered in 1966; other large kimberlite pipes followed this discovery (Janse & Sheahan, 1995).

Production history

Diamond production in Botswana is almost completely from three major kimberlite mines: Orapa, Lethlhakane and Jwaneng. Scatterings of secondary diamonds associated with the primary kimberlite were mined prior to mining the kimberlite; there are no independent secondary mining operations in Botswana. A new mine at Damtshaa will be starting up soon (expected in 2003) (Malerna, 2002). Smaller pipes are also being exploited at Martin's Drift, and exploration activities are continuing at other kimberlite pipes (MBendi, 2002c).

Quality

Botswana is the leading producer of gem quality diamonds (MBendi, 2002c). Only 10% of the diamonds from Orapa are of gem quality. By contrast, the diamonds from Lethlakane are 75% gem quality, and the diamonds from Jwaneng are 35–40% gem quality (de Kun, 1987).

Derivation of dataset

There are 9 entries in the Botswana dataset. Given the small number of well-defined mining activities in Botswana, a high level of confidence can be placed in the listings. While the coordinates are derived from a variety of sources, the coordinates are believed to have a high level of accuracy.

References

The following references were consulted in constructing this dataset: de Kun (1987); Infomine (2002); Janse & Sheahan (1995); Jennings (1995); Malerna (2002); Mason Jr. & Arndt (1996); MBendi (2002c); Mobbs (1997).

In addition, the following industry websites were consulted: Debswana; Firestone Diamonds; Trivalence Mining Corporation.

Additional references

Additional sites not included in the dataset are listed in de Kun (1987). These sites are Tshane, Mabuasebuke, Foley (in 1959), Motloutse, Mopipi, and Lake Makgadikgadi; the status of these sites is unknown.

The following reference is suggested for further reading: Baldock (1977).

BRAZIL

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1721
First primary host rock	1968
First formal production	1730
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	–
% of total world production up to 1990	–
Production 1992 (in millions of carats)	–

Discovery history

In 1727, diamonds were found at Diamantina, Minas Gerais. In 1771, diamonds were found at Grao Mogol. In 1968, kimberlites were found in the Coromandel-Patrocinio field in Minas Gerais, although the kimberlites appear to be non-diamondiferous (Janse & Sheahan, 1995; Bardet, 1977).

Production history

Until the discovery of the Kimberley formation in South Africa, Brazil was the major diamond producer of the world. In the Diamantina region, diamonds have been produced since the 1700s. In Grao Mogol, diamond production began in the late 1700s. For a historical account of early diamond mining in Brazil, see Machado & de M. Figueiroa (2001). Certain areas including the Rio Tocantins and Vargem Bonita only began producing in the 1940s. In 1973, with the exception of commercial dredging at Rio Jequitinhonha and at Maria Nunes, all production was derived from artisanal workings (called garimpos) at alluvial deposits (Bardet, 1977). These alluvial deposits are often worked regardless of the diamond content. Artisanal mining is active in the following states: Piaui, Para, Rio Branco, Mato Grosso and Amazonas. In the early 1990s, production increased in Mato Grosso and Amazonas (Janse & Sheahan, 1995).

It is difficult to determine the actual level of diamond production from Brazil. Many rough diamonds are sold domestically, and others leave the country unofficially. Through until the 1950s, production was estimated at 100,000 carats/year. The average annual production for the late 1980s to the early 1990s is estimated at 1 million carats (Janse & Sheahan, 1995). In 1997, 15 active mines, 3 abandoned mines, 365 active garimpos, and 293 abandoned garimpos were recorded (Machado & de M. Figueiroa, 2001).

Geographic distribution

Diamond mineralization is dispersed over 6 million square kilometers. Significant deposits of alluvial diamonds have been found in seven of the 25 states of Brazil: Minas Gerais, Bahia, Mato Grosso, Goias, Parana, Rio Branco and Piaui, and scattered smaller deposits occur in several other states: Amazonas, Amapa, Rondonia, Mato Grosso do Sul and Sao Paulo (Janse & Sheahan, 1995). The best-documented alluvial deposits are located in Minas Gerais: 1) near Diamantina, nearly depleted; 2) in the present streambed of the Jequitinhonha River; and 3) in the Coromandel area.

Quality

The alluvial deposits in Brazil are not very rich, and most cannot support industrial mining; however, rich pockets with large stones are present. The quality of the diamonds varies greatly by deposit. 80% of the stones from Diamantina are of gem quality, while those at Grao Mogol, are smaller and of lower quality. By contrast, the Bahia region is known for its carbonados stones, which were highly valued before World War II but have not retained this value (Bardet, 1977).

Derivation of dataset

There are 239 entries for Brazil in the dataset. The entries for Brazil are largely extracted from the MRDS dataset (Mason Jr. & Arndt, 1996). Sites may be listed both as a single occurrence and as part of an amalgamated listing extracted from another reference. It is not known to what extent this will lead to inaccuracies and potential double counting. Additional problems arose due to name changes, variations in spelling and the use of similar names for more than one location. It should be noted that Bardet (1977) lists several diggings not currently in the database. It is believed, however, that the addition of these sites will not significantly change the overall picture of diamond occurrences in Brazil.

In general, all diamonds were discovered in Brazil prior to 01/01/1946.

References

The following references were consulted in constructing this dataset: Bardet (1977); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Mason Jr. & Arndt (1996); MINDAT (2003); Svisero (1995).

In addition, the following industry websites were consulted: Canabrava Diamond Corporation; Venema Minerals Corporation; Zarcan

Additional references

The following references are suggested for further reading: Gonzaga & Tompkins (1991); Shobbehaus (1981); Tompkins & Gonzaga (1989).

BURKINA FASO

There is no known production from Burkina Faso. There appears to be some evidence of kimberlites in the region, although the diamond content is unknown. Nixon (1995) indicates that four out of the 25 kimberlitic bodies yielded 23 diamonds. There is some prospecting activity underway in Burkina Faso (Infomine, 2002).

There are 4 listing in the dataset. All geographic coordinates are derived from NIMA's Geospatial Engine. It is also unclear when the kimberlitic bodies were discovered.

References

The following references were consulted to construct this dataset: de Kun (1987); Infomine (2002). The following industry website was also consulted: Orezone Resources Inc.

BURMA (MYANMAR)

The occurrence of diamonds has been known of internationally since the early 1970s. Secondary diamonds occur in several locations, although no primary source has been established. Momeik in the northern part of the country and Theindaw in the southern part have yielded significant numbers of diamonds. Scatterings have also been found in the Taungoo–Htantabin area (Win et al., 2001). Annual production in the 1990s has been negligible at less than 200 carats in the early 1990s, falling to only 5 carats by 1998 (Wu, 1994; Wu, 1998).

There are seven entries for Burma. Four of the sites are listed in (Win et al., 2001), and their geographic coordinates were verified on a map in that same reference. The geographic coordinates for the other three entries are less certain.

References

The following references were consulted to construct this dataset: MINDAT (2003); Win et al. (2001); Wu (1994). In addition, the following industry site was also consulted: GemLab Inc.

CAMEROON

Bardet (1974) writes that Cameroon is not a diamondiferous country. By contrast, the USGS identifies diamonds as a natural resource in Cameroon. Further, the USGS indicates that a small number of diamonds are produced by artisanal methods each year (Szczesniak, 2000a). Some stones have been found in the Vina River (Bardet, 1974; Censier & Lang, 1999). This site is included in the dataset.

References

The following references were consulted to construct this dataset: Bardet (1974)); Censier & Lang (1999).

CANADA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1911 (?)
First primary host rock	1948
First formal production	1998
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	–
% of total world production up to 1990	–
Production 1992 (in millions of carats)	–

Discovery history

While diamond occurrences were mentioned early in the 20th century, as of 1975, Webster (1975) writes that diamonds had not been confirmed in Canada. Janse (1995) indicates that the diamondiferous kimberlites have been discovered in the Saskatchewan and in the Hudson Bay/James Bay area, although it is unknown whether these are economic diamond deposits (Janse & Sheahan, 1995). An important find was the diamondiferous kimberlites in the Northwest Territories in 1991. Since 1991, there has been a significant amount of diamond exploration in Canada (Werniuk, 2002a). In 2002, production was 5 million carats (Birchfield, 2002). For list of the most promising new discoveries, see (Canadian Intergovernmental Working Group on the Mineral Industry, 1999).

Production history

The first diamond mine in Canada, Ekati, began commercial production in October 1998. With the Ekati mine, Canada produces 6% of the world's diamonds by value. This is projected to rise to 10% when the Diavik Mine commences production (Werniuk, 2002a).

Geographic distribution

Currently, there is diamond exploration in almost every province in Canada, with large exploration efforts in the northern part of the country, Saskatchewan, Manitoba, Ontario, Quebec and British Colombia (Infomine, 2002). Janse & Sheahan (1995) indicates that the chance of finding an economic kimberlite is high.

Quality

Canadian diamonds are of gem quality.

Derivation of dataset

There are 23 entries in the dataset for Canada. At this point, there is a significant amount of exploration, and the full potential of many sites is unknown. The geographic coordinates, as a result, are somewhat approximate of the general exploration region. Additional exploration records can be found in Infomine (2002) and in Canadian Intergovernmental Working Group on the Mineral Industry (1999).

References

The following references were consulted in constructing this dataset: Canadian Intergovernmental Working Group on the Mineral Industry (1999); Infomine (2002); Janse & Sheahan (1995); Nixon (1995); Werniuk (2002a); Werniuk (2002b).

CENTRAL AFRICAN REPUBLIC (CAR)

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1914
First primary host rock	–
First formal production	1931
First 100,000 carats produced	1947
Total production up to 1990 (in millions of carats)	14 (18 including unofficial production)
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.5

Discovery history

The first diamonds were found in 1914, west of Ippy at 150 km from the present mining area (Bardet, 1974).

Production history

Production started in 1931. Until 1961, small French companies carried out production. After independence, syndicates of local miners replaced these companies. In 1947, official annual production reached over 100,000 carats. From 1961-1991, annual production, including unofficial production, has been estimated at 500,000 carats (Janse & Sheahan, 1995). Bardet (1974) indicates that diamond production from the CAR peaked between 1950 and 1957. Currently, almost all production is conducted by artisanal methods (MBendi, 2002d).

Geographic distribution

The major diamond producing regions are located in the southwestern and northeastern part of the country. No kimberlite has been found in the region, despite detailed exploration (Janse & Sheahan, 1995).

Quality

All diamond deposits are alluvial, small and dispersed. The stones are big and of good quality. The diamonds are ranked 5th in the world in terms of quality (MBendi, 2002d).

Derivation of dataset

There are 27 entries in the dataset for the Central African Republic. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. In addition, several sites are identified by geographic coordinates provided by ESRI (1996) which are often groupings of several sites and do not appear to represent only the name attributed to the site. The majority of the production sites started prior to 01/01/1946.

References

The following references were consulted to construct this dataset: Bardet (1974); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Mason Jr. & Arndt (1996); MBendi (2002d); Mobbs (1998); Webster (1975).

The industry website, Vaaldiam Resources Ltd, was also consulted.

Additional references

For additional information on production figures and a map of alluvial workings, see Bardet (1974).

CHAD

The mineral resources of Chad are in general poorly characterized (MBendi, 2002e). There have been a few scattered reporting of diamonds in Chad, which were probably recovered by artisanal methods in conjunction with gold production (Bermúdez, 1999). There are 5 entries in the dataset accompanied by very approximate geographic coordinates. Dates and production status are unknown.

References

The following references were consulted to construct this dataset: Bermúdez (1999); MBendi (2002e).

CHINA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1870
First primary host rock	1965
First formal production	–
First 100,000 carats produced	1955 (?)
Total production up to 1990 (in millions of carats)	11
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.25

Discovery history

The first diamonds in China were found in Shandong province in the period from 1825 to 1850. The first diamondiferous kimberlite, the Hongqi dyke, was found in 1965 in the Mengyin area in central Shandong. The first diamondiferous pipe, Shengli, was found in 1969 in the same general area. Recently, diamonds have been found in eclogites in the Dabie Mountains in southern Anhui and in ophiolites in Tibet (Janse & Sheahan, 1995).

Production history

The Shandong deposits were evaluated in 1899–1907 by German companies and again from 1962 by Chinese geologists and were found to be uneconomic (Janse & Sheahan, 1995). Other alluvial deposits were found in Yuan River in western Hunan province where production of small stones for industrial purposes started in the mid-1950s. Historically, the Changma diamond mine (Project 701) in the Mengshan area in the Shandong province has been important. Since 1975, over 1 million carats have been produced from this deposit. In 2000, an estimated 160,000 carats were produced (MBendi, 2001a).

Geographic distribution

At present, diamonds and kimberlitic or lamproitic rocks are reported from 14 out of 27 provinces and autonomous regions (Janse & Sheahan, 1995). There are known diamondiferous kimberlites in Ordos Basin in the Inner Mongolia and Shaanxi provinces (MBendi, 2001a).

Quality

Little is known about the quality of the diamonds produced in China (MBendi, 2001a).

Derivation of dataset

There are 10 entries for China in the dataset. A variety of references were employed to derive this dataset. Most data was extracted from Infomine (2002) and Janse & Sheahan (1995), although industry websites were also consulted. The completeness or accuracy of the dataset for this country is unknown.

References

The following references were consulted to construct this dataset: Bardet (1977); Infomine (2002); Janse & Sheahan (1995); MBendi (2001a); MINDAT (2003).

The industry website, Astro Mining NL, was also consulted. The mention of the Dingjiagang Diamond Mine was found on www.hubgem.com.

COLOMBIA

The existence of diamonds in Colombia is unclear. Svisero (1995) indicates that alluvial diamonds are found in Colombia. No additional information is available.

Reference

The following reference was consulted to construct this dataset: Svisero (1995).

CONGO–BRAZZAVILLE

The status of Congo–Brazzaville as a diamond producing country has been in doubt for decades. There are small alluvial deposits such as the Komono deposit (Bardet, 1974), which is the one entry for Congo in the dataset. The Komono deposit is listed in ESRI (1996). The geographic coordinates were taken from this dataset. Production from this deposit, however, has never been strong. By 1974, only 1,150 carats had been produced from the Komono deposits (Bardet, 1974).

References

The following references were consulted to construct this dataset: Bardet (1974); ESRI (1996).

Additional references

The following references are suggested for further reading: Nicolini (1961); Yeliseyev (1971).

CÔTE D'IVOIRE

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1928
First primary host rock	1960
First formal production	1949
First 100,000 carats produced	1949
Total production up to 1990 (in millions of carats)	6
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.02

Discovery history

The first diamonds were found at Séguéla in 1928. Diamonds were found at Tortiya in 1930. Neither discovery generated much interest. In 1935 through 1937, a systematic exploration process was undertaken (Bardet, 1974). In 1947, the Tortiya deposit was discovered followed by the Séguéla field in 1948. In 1960, a lamproite dyke was found at Toubabouko, and in 1963, the Bobi dyke was found at Séguéla (Janse & Sheahan, 1995).

Production history

Formal production began in 1949 on the alluvial placers, and later on the Toubabouko dyke. To 1970, a total of 240,000 carats were produced from these workings. From 1965 to 1969, 400,000 carats were produced from the Bobi dyke (Janse & Sheahan, 1995). In 1957 to 1965, like its neighbours, the Côte D'Ivoire also experienced a growth in illegal artisanal mining. It is estimated that over 1 million carats were illegally mined at Séguéla. The government, however, managed to disrupt the illegal mining (Bardet, 1974). Organized production halted in 1970, although workings were reopened in the early 1980s (de Kun, 1987). Presently, production is derived only from the alluvial deposits at Tortiya and Séguéla. While most estimates place annual production at 20–30,000 carats, the reported figure is 300,000 carats/year (Janse & Sheahan, 1995; Szczesniak, 2000b).

Geographic distribution

There are two main alluvial deposits in Côte d'Ivoire: Tortiya and Séguéla. The diamonds from Tortiya are small but of reasonably high quality, while the diamonds from Séguéla are bigger, but of a lower quality (Bardet, 1974).

Quality

At Tortiya, 40 % of the diamonds are of gem quality (de Kun, 1987).

Derivation of dataset

There are 17 entries in the dataset for the Ivory Coast. Of these records, four records do not have geographic coordinates. Many sites are given the same coordinates, as more specific spatial information was not available.

References

The following references were consulted to construct this dataset: Bardet (1974); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Szczesniak (2000b).

CZECH REPUBLIC (BOHEMIA)

Janse & Sheahan (1995) report that only vague and unreliable reports exist on diamonds in what is now the Czech Republic. Bardet (1977) notes a diamond find in 1869, and a few additional finds in the following years. Starting in the 1950s, there were significant explorations for kimberlite pipes performed by Soviet geologists. It appears, however, that the pipes are not kimberlites. The source of the diamonds that were found remains unknown (Bardet, 1977).

DEMOCRATIC REPUBLIC OF CONGO (DRC)

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1907
First primary host rock	1946
First formal production	1912
First 100,000 carats produced	1917
Total production up to 1990 (in millions of carats)	718
% of total world production up to 1990	32
Production 1992 (in millions of carats)	15

Discovery history

In 1907, the first diamond was found in Kasai in the Tshiminina stream near Tshikapa. In 1913, the Bushmai diamond fields and in 1916, the Kasai diamond fields were discovered. In 1948, the Bakwanga kimberlite was discovered (Bardet, 1974).

Production history

In the Kasai field, production began as early as 1912, and by 1945, annual production had reached 10 million carats. In the early 1960s, the commercial exploitation companies abandoned the Kasai fields, as the artisanal production could not be controlled. Millions of carats were sold illegally to the Rwanda and Congo–Brazzaville. In 1957, there were 53 mines: seven on land, 42 on riverbeds, and four tailings operations. In 1960, there were only 37 mines on 22 rivers (Bardet, 1974).

Industrial mining methods are used at the Mbuji-Mayi (Bakwanga) mine and the surrounding region, as the associated alluvial deposits are negligible. Production from this area is also hard to determine due to contraband. Official production in 1970 was 390 million carats, with an estimated additional 20 to 30 million carats in contraband (Bardet, 1974).

In 2000, the USGS estimated that 18.2 million carats were produced (Coakley, 2001), although the current situation is far from clear (Mayala, 2002). For a full history of production in the DRC up to the 1970s, see Bardet (1974).

Geographic distribution

In addition to the rich deposits of Tshikapa and Bakwanga, there are several other occurrences that have raised very little or no interest, probably due to a lack of economic value (Bardet, 1974). There appears to be diamonds found to the west of the country near Congo – Brazzaville. Diamonds have also been found in the southeast (Lukemie and Lomela river basins) and in the 'Province Orientale'. According to Bardet (1974), three favourable regions are: Bondo, Aketi, and Poko.

Kimberlites in Kundelunhu (Katanga) were discovered in the early 1900s. These kimberlites, however, are low in diamonds, and therefore are not of economic importance. Diamonds have been recovered from kimberlites in the western part of the Kundelunhu field (Chimbue, Gondolo, M'Bo, Liasa). In the eastern part of the field, the Kamboli, Luanza, Talala, Mafwa, Shilonga and Kiando pipes have shown small diamonds of little value (Bardet, 1974).

Quality

The stones from the Kasai are of good quality (65% gem), but they are very small. Bakwanga diamonds are generally of industrial quality with only 2 to 3% of gem quality (Bardet, 1974).

Derivation of dataset

There are 36 entries in the dataset for the Democratic Republic of Congo. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. Additional problems arose due to name changes and variations in spelling. Geographic coordinates are derived either from regions or read from maps. As a result, accuracy is only moderate. In addition, there are several sites only mentioned in ESRI (1996), and their production status is unclear.

References

The following references were consulted to construct this dataset: Anonymous (2001); Bardet (1974); Coakley (2001); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Mayala (2002); Mason Jr. & Arndt (1996); MINDAT (2003); Sénat de Belgique (2002); United Nations (2002a).

Additional references

The following references are suggested for further reading: Murdock (1955); Passau (1945); Polinard (1951); Ray (1943).

FINLAND

There are three entries in the dataset for Finland. All three entries were taken from the Geological Survey of Finland with the coordinates taken from NIMA's Geospatial Engine. The diamonds in Finland are all in kimberlite form and have not been exploited (Geological Survey of Finland, 2003). There is, however, ongoing prospecting (Poplar Resources Inc., 2003).

References

The following reference was consulted to construct this dataset: Geological Survey of Finland (2003). In addition, the industry website, Poplar Resources Inc., was used.

FRANCE

There have been reports of diamonds in France, although these are surely erroneous based on early investigations that were poorly conducted (Bardet, 1977).

FRENCH GUIANA

There are four entries in the dataset of which three have geographic coordinates. Two sites were found through the MRDS (Mason Jr. & Arndt, 1996). Since 1955, there has been prospecting activity French Guiana. Several creeks were investigated for diamonds. There is no known production (Bardet, 1977). The diamonds that were found were of high quality, but small. There is ongoing prospecting in the area (Infomine, 2002; Szczesniak, 2000c).

References

The following references were consulted to construct this dataset: Bardet (1977); Infomine (2002); Mason Jr. & Arndt (1996); Szczesniak (2000c).

The following industry website was also consulted: Golden Star Resources Ltd.

Additional references

The following reference is suggested for further reading B.R.G.M. (1980).

GABON

Diamonds are widespread in Gabon and are of high quality, although the tenor of the deposits is poor (0.07 carats/m^3) (Bardet, 1974). Despite exploration efforts, only two or three small deposits were found by the 1970s. There has never been substantial production from Gabon (Bardet, 1974). In the 1950s, annual production was less than 40,000 carats with 36,000 carats from Makongonio between N'Dende and M'Bigou. Recently, the USGS reports approximately 500 carats/year from Gabon of mixed industrial and gem quality (Mobbs, 1995a). Some companies are currently evaluating the diamond resources of Gabon (Southern Era, 2000).

There are seven entries in the dataset for Gabon. All geographic coordinates are derived from NIMA'a Geospatial Engine with some verification from a map in Bardet (1974). The date for the discovery of the deposits was set largely by the dates for the references.

References

The following references were consulted to construct this dataset: Bardet (1974); Choubert (1946); Mobbs (1995a).

Additional references

For a map with diamond fields and occurrences in Gabon, see Bardet (1974).
The following reference is suggested for further reading: Gondo Ibimi (1983)

GHANA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1919
First primary host rock	–
First formal production	1921
First 100,000 carats produced	1925
Total production up to 1990 (in millions of carats)	101
% of total world production up to 1990	5
Production 1992 (in millions of carats)	0.7

Discovery history

Diamonds were discovered in 1919 at Abomoso on the Birim River near Kibi and at Nkawkaw (Bardet, 1974).

Production history

First production occurred in 1921 (Janse & Sheahan, 1995). In 1924, production began at the Akwatia field near Kade, and in 1925, the nearby Kokotintin field was also opened (Bardet, 1974). Annual production quickly rose to 60,000 carats and by 1933, 1 million carats/year were being produced. In 1958, over 3 million carats were exported with almost 2 million carats from artisanal production. Bardet notes that in the 1970s, the artisanal production had decreased, at least officially. Since before World War II, there have been significant artisanal mining workings in the Bonsa diamond field (Bardet, 1973).

During the period 1920–68, approximately 72 million carats were produced with approximately 53 million carats (or slightly over 2/3) coming from commercial (primarily European) mining companies and the remaining 19 million coming from artisanal mining (Bardet, 1974). Over the past few years, production has been approximately 700,000 carats/year with the majority of the stones being of gem quality (Coakley, 2000b). There is ongoing exploration in the country (Infomine, 2002).

Geographic distribution

There are two major diamond fields in Ghana: the Birim region and the Bonsa region (Bardet, 1974). By comparison to the Birim region, the Bonsa region is small with poor diamond counts. No kimberlitic bodies have been discovered (Janse & Sheahan, 1995).

Quality

Diamonds from Ghana are small and approximately 24% are of gem quality (Bardet, 1973). Their current value is only US$10 to US$20 per carat (Janse & Sheahan, 1995). De Kun (1987) indicates that less than 10 % of the stones are of gem quality.

Derivation of dataset

There are 20 entries in the dataset for Ghana. Many of these records are grouped around major sites, and in many cases are assigned the same coordinates. There are isolated incidences of diamonds scattered over Ghana that are not recorded in the dataset. Some of the entries are not given dates or are assigned the same dates as the major sites.

References

The following references were consulted to construct this dataset: Bardet (1974); Coakley (2000b); de Kun (1987); Grubaugh (2003); Infomine (2002); Janse & Sheahan (1995).

Additional references

For a map with diamond fields and occurrences in Gabon, see Bardet (1974).

The following reference is suggested for further reading: Junner (1943); Junner (1936).

GREENLAND (DENMARK)

There is one entry in the dataset for Greenland. The entry was taken from Infomine and represents an ongoing exploration project (Infomine, 2002). Nixon (1995) also lists the area as one with a high potential for economic diamondiferous kimberlites.

References

The following references were consulted to construct this dataset: Infomine (2002); Nixon (1995).

GUINEA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1932
First primary host rock	1952
First formal production	1935
First 100,000 carats produced	1950
Total production up to 1990 (in millions of carats)	9
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.7

Discovery history

In 1932, diamonds were found in the upper part of the Makona River, and the Baradou fields (Bardet, 1974). The kimberlite pipes were found in 1952 in the Folomba valley, near the village of Fenaria (Kérouané region), and they were found to be uneconomic (Armstrong, 2002; Bardet, 1974).

Production history

Production began in Guinea in 1935, stopped during World War II, and then continued with a French company until 1960. Starting in the late 1950s, artisanal miners (some arriving from Sierra Leone) began to illegally produce diamonds in Guinea (Bardet, 1974). After independence in 1958, the official production shifted to national companies to which Russian geologists provided technical assistance. By 1973, commercial operations ceased due to a lack of expertise and equipment (Ellis, 1987). In 1984, the alluvial deposit downstream from the Aredor opened, but it was closed in 1993 due to intrusive artisanal mining (Izon, 1994).

There is currently a large amount of prospecting and assessment work in Guinea (Infomine, 2002). For a review of the prospecting activity, see (MBendi, 2002f). Artisanal small-scale diamond mining concentrated in the Banankoro area (and lately in the Kindia region) is still the dominant form of diamond production (Armstrong, 2002).

Geographic distribution

The principal diamond fields in Guinea are found in the 'Haute Guinée' around Kissidougou, Macenta and Beyla. The Haute Guinee is located near the northwestern border with Liberia, and 200 km east of the mines in Sierra Leone. Another diamond occurrence is near Forecariah near Sierra Leone, and a final diamond find has been suspected in the Fouta near Senegal (Bardet, 1974).

Quality

The diamonds are of 93% gem quality, and sold at an average price of about US$300 per carat (Izon, 1994). The Aredor mine produced some large, good quality stones (Janse & Sheahan, 1995). Many large gemstones, from 200 to 400 carats, have been marketed in recent years (Armstrong, 2002). Interestingly, Bardet (1974) describes Guinean diamonds as poor with the exception being those from the Banankoro region.

Derivation of dataset

There are 54 entries in the dataset for Guinea, although many are given the same coordinates for lack of more detailed spatial information. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. Additional problems arose due to name changes and variations in spelling.

References

The following references were consulted to construct this dataset: Armstrong (2002); Bardet (1974); de Kun (1987); Ellis (1987); ESRI (1996); Infomine (2002); Izon (1994); Janse & Sheahan (1995); MBendi (2002f); Webster (1975).

The following industry websites were also consulted: Arena Gold; Diabras; Hymex Diamond Corporation; Search Gold Resources; Simco Ltd; Trivalence Mining Corporation.

Additional references

The following reference is suggested for further reading: Sutherland (1993).

GUYANA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1887
First primary host rock	–
First formal production	1890
First 100,000 carats produced	1921
Total production up to 1990 (in millions of carats)	4
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.02

Discovery history

Diamonds were discovered in 1887 as a byproduct of placer gold mining in the Puturi district in a tributary of the Mazaruni River (Janse & Sheahan, 1995).

Production history

After discovery in 1887, small-scale production began but it has been small and intermittent. Annual production was greatest in the 1920s at approximately 160,000 carats, followed by the 1960s when production was about 100,000 carats/year (Janse & Sheahan, 1995). During 1948, a diamond deposit was found along the Ireng river (on the Guyana – Brazil border), leading a 'miniature rush' in the area (Webster, 1975).

All of the ongoing production is conducted by artisanal methods. Mechanized dredging was attempted on the Mazaruni river, but the quality of the stones was too low and results have not been positive (Janse & Sheahan, 1995). Janse & Sheahan indicate that interest in Guyana's diamond resources is increasing along the Mazaruni River, and new prospecting is occurring in the relatively unexplored southern part of the country.

Geographic distribution

Alluvial fields are distributed in the Northern part of the country (the Roraima plateau) with the Mazaruni River being the most productive (Bardet, 1977).

Quality

The diamonds are of high quality, but small (Bardet, 1977). All known deposits are alluvial (Janse & Sheahan, 1995).

Derivation of dataset

There are 93 entries in the dataset for Guyana. The majority of the entries were extracted from the MRDS dataset. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. The basic distribution of sites was validated against a map in Bardet (1977).

References

The following references were consulted to construct this dataset: Bardet (1973); Bardet (1977); Infomine (2002); Janse & Sheahan (1995); Mason Jr. & Arndt (1996); Svisero (1995); Webster (1975).

In addition, the industry website, Vanessa Ventures, was consulted.

INDIA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	300 BC
First primary host rock	1870
First formal production	800 AD
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	21
% of total world production up to 1990	1
Production 1992 (in millions of carats)	0.02

Discovery history

Most of the diamond areas in India were discovered early in the first millennium. The exploitation of kimberlite pipes, by contrast, has been more recent. The diamond potential of several primary bodies remains unclear.

Production history

Diamond mining started at 800 AD. It is widely believed that the diamond deposits in India are depleted (Bardet, 1977). Current production is small and primarily artisanal. For example, in the Wairagarh area no production occurred in the 20th century despite intensive exploration by artisanal workers (Sashidharan, Mohanty & Gupta, 2002). Several companies are currently reviewing the diamond potential of historic diamond producing regions (Australian Trade Commission, 1998).

Geographic distribution

Bardet (1977) lists seven diamond districts in India (compared to the three major regions listed by Janse & Sheahan (1995). These districts are from north to south: the Panna region (the most important region, and possibly the only region with ongoing diamond production); the northeastern group of Sambalpur, Gangpur and Sumelpur; the Wairagarh district; the southeastern group of Kollur; the middle Kistnah group of Karnul; the Panar River group of Cuddapah and Kundapette; and the Bellary group (Bardet, 1977).

Quality

The diamonds from the Majhgawan pipe are 40% to 60% industrial quality. The alluvials yield 60% to 80% gem quality diamonds (Bardet, 1977).

Derivation of dataset

There are 14 entries for India. The collection of data for India was complicated by the significant historical production in the country. The current quality and exploitation status of many deposits are unclear. As a result, several sites are listed as exploited, but no date is entered for production, as it is likely that no production has occurred since 1946. A small number of sites are currently being worked or are undergoing exploration.

References

The following references were consulted to construct this dataset: Bardet (1977); ESRI (1996); Janse & Sheahan (1995); Lyday (1997); MINDAT (2003); Sashidharan, Mohanty & Gupta (2002).

Additional references

The following reference is suggested for further reading: Ray (1976).

INDONESIA

Overview, adapted from (Janse & Sheahan, 1995)

First diamond found	800 AD
First primary host rock	–
First formal production	1700s
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	1.0
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.02

Discovery history

Diamonds have been known and mined since the 1700s. There are occasional new discoveries of small fields. The existence of a kimberlitic body (Pamali/ Pomali) in Indonesia was generally accepted from 1930 to 1987, although recently it appears that this is not a kimberlitic body and is not the source of diamonds in the Martapera region (Janse & Sheahan, 1995).

Production history

In the 1830–1840s, thousands of diggers were working in the Tanah Laut fields, and a dozen other mines were also active at Landak (Bardet, 1977). Exploitation of the Martapera and Pleihari fields began in the 1900s, but the annual production never exceeded a few thousands carats. Bardet indicates that the artisanal mining continued. No mechanized, commercial production has occurred (Janse & Sheahan, 1995).

Geographic distribution

There are diamondiferous districts in the southeast and west of Indonesia. There is ongoing exploration of offshore deposits in the Sunda shelf, although no production has occurred (Kuo, 1994).

Quality

There are some high quality stones, although they are considered small (Bardet, 1977).

Derivation of dataset

There are 16 entries for Indonesia. The list of locations in Indonesia is believed to be reasonably complete. All coordinates derived from the Geospatial engine were confirmed with maps in Bardet (1977). Ongoing production at these sites, however, cannot be completely confirmed, although it is probable that sporadic artisanal mining is occurring.

References

The following references were consulted to construct this dataset: Bardet (1977); Hutchison (1996); Infomine (2002); Janse & Sheahan (1995); Kuo (1994); Mason & Arndt (1996); Spencer et al., (1988); Webster (1975).

KAZAKHSTAN

There is one entry in the dataset for Kazakhstan. The deposit in Kazakhstan is listed in ESRI (1996). It does not appear that this is deposit has been exploited. 80% of the diamonds are microdiamonds. Reserves, however, appear to be substantial (Nixon, 1995).

References

The following references were consulted to construct this dataset: ESRI (1996); Nixon (1995).

KENYA

Kenya is not currently represented in the dataset. The lack of ongoing exploration suggests that there are no economic diamond sources in the country. Nixon (1995) indicates a few diamond occurrences in Kenya, specifically at Losogoroi, southeast of Nairobi. Bardet (1974) notes that in the extreme southeast of Kenya, south of Mombasa, there are non-diamondiferous kimberlites in the Mrima Hills.

LESOTHO

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1958
First primary host rock	1939
First formal production	
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	0.4
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.01

Discovery history

Webster (1975) indicates that the first diamonds were found in 1958 in a valley in the Maluti Mountains of the Mokhotlong area, which lie west of the Drakensberg Mountain range. Bardet (1974) notes that in Lesotho, unlike other countries in Africa, artisanal miners were aware of the kimberlites prior to industrial mining companies. Industrial mining companies identified the primary host rocks in the later 1950s, although it appears that production was already occurring (Bardet, 1974).

Production history

In 1959, 9,000 carats were produced, and by 1969, annual production rose to 30,000 carats. From 1977–82, between 40,000 and 70,000 carats were produced annually, although in most years, production did not exceed 10,000 carats (de Kun, 1987). Artisanal workers do the majority of the work in Lesotho, although there are some commercial operations at the Letseng-la-terai kimberlite pipe. There is ongoing commercial interest in the diamond deposits of Lesotho (Infomine, 2002). Currently, the United States Geological Survey (USGS) indicates that only 1,500 carats/year are being produced by artisanal methods (Coakley, 2000c).

Geographic distribution

There are several kimberlite pipes in Lesotho, but the main producer is Letseng-la-terai pipe (de Kun, 1987).

Quality

20% of the diamonds from the Letseng-la-terai pipe are of gem quality and more than 12% are larger than 10 carat (de Kun, 1987).

Derivation of dataset

There are 10 entries in the dataset. The majority of the records were found in de Kun (1987) and are accompanied by coordinates from NIMA'a Geospatial Engine. One site is only identified by ESRI (1996); no other reference could be found. The dates for discovery and exploitation of the sites in Lesotho are not known.

References

The following references were consulted to construct this dataset: Bardet (1974); Coakley (2000c); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995).

Additional references

The following references are suggested for further reading: Fairbairn (1978); Janse (1995); Janse (1996); Thabane (1995).

LIBERIA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1910
First primary host rock	1955
First formal production	1950s
First 100,000 carats produced	1955
Total production up to 1990 (in millions of carats)	18
% of total world production up to 1990	1
Production 1992 (in millions of carats)	0.05

Discovery history

Diamonds were first discovered in central Liberia near Monrovia in 1910, and in the western Liberia in the Morro and Lofa River basins in the late 1920s. Kimberlite dykes and two small pipes were discovered in western Liberia in the early 1950s (Janse & Sheahan, 1995). The kimberlites are, however, considered to be barren (de Kun, 1987).

Production history

It is very difficult to determine the actual production from Liberia. Bardet (1974) notes that for a long time, Liberia, was a 'fictive' producer, re-exporting diamonds from Sierra Leone and Guinea, and there is significant illegal mining activity in the country. Bardet suggests that actual diamond production never surpassed a couple of ten thousands carats per year. He also indicates that the Mining Journal suggested 270,000 carats in 1967. Fairbarn (1981) provides a summary of the official historical exports in Liberia. It is generally estimated that approximately 300,000 carats were produced during the period of 1986–90 with negligible production in 1992 due to the civil war (Janse & Sheahan, 1995). There is little prospecting in Liberia due to the unstable political situation; Mano River Resources Inc. (2003b), however, is revisiting the kimberlite potential in the region.

Geographic distribution

There are two significant diamond fields: the western fields around the Mano and Lofa; and the northeastern fields around Mt Nimba (Bardet, 1974). There are also diamond diggings in the Sankole (Cavally) area near the border with Guinea and the Ivory Coast (Fairbairn, 1981).

Quality

Little is known about the quality of stones in Liberia. Most likely, a significant proportion of the stones are of gem quality.

Derivation of dataset

There are 32 entries in the dataset for Liberia. The majority are extracted from Fairbairn (1981) with the accompanying coordinates from the Geospatial Engine. In addition, there are maps of some workings in Fairbairn, which were used to confirm the location of some sites.

References

The following references were consulted to construct this dataset: Bardet (1974); de Kun (1987); Fairbairn (1981); Janse & Sheahan (1995).

In addition, the industry website, Mano River Resources Inc., was consulted.

MALAWI

There are no entries for Malawi in the dataset. Bardet (1974) notes the possibility of kimberlites near Rumpi.

MALAYSIA

There is one entry in the dataset for Malaysia. The diamonds are yellow and sometimes reddish (Bardet, 1977). There is some known artisanal production, although it is unknown whether there are still workings in this area.

References

The following references were consulted to construct this dataset: Bardet (1977); Hutchison (1996).

MALI

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1955
First primary host rock	1956
First formal production	–
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	–
% of total world production up to 1990	–
Production 1992 (in millions of carats)	–

Discovery history

The first diamonds were officially reported in 1955 (Janse & Sheahan, 1995). Intensive exploration of the country followed. In 1956, the first kimberlite pipes were found, although they were quickly deemed uneconomic (Bardet, 1974).

Production history

The United States Geological Survey's country profile indicates that Mali is producing diamonds, but there is insufficient information to estimate the production level (Szczesniak, 2001). Janse & Sheahan cite a report by the United Nations stating that since 1954, local miners have found about 70 diamonds of gem quality. No diamonds have been produced by commercial operations in Mali (Janse & Sheahan, 1995). There is a small amount of ongoing exploration around the Kenieba kimberlites (van Oss, 1994a).

Geographic distribution

Diamonds appear to be found in a very small region in the east.

Quality

Diamonds from Mali are of high quality (Bardet, 1974).

Derivation of dataset

There are three entries in the dataset for Mali. The geographic coordinates are derived from NIMA's Geospatial Engine. A map of the region is provided by Bardet (1974), and was used to confirm the coordinates.

References

The following references were consulted to construct this dataset: Bardet (1974); de Kun (1987); Janse & Sheahan (1995); van Oss (1994a).

MAURITANIA

There are four entries in the dataset for Mauritania extracted from Infomine (2002). Diamond exploration is being undertaken over most of Northern Mauritania. Concessions include the Arouedil, the Char, the Choum, the Chegga, the Ouassat, and the Tourine properties (Bermúdez & Mobbs, 1999). For an updated description of the activities, see MBendi (2001b).

References

The following references were consulted to construct this dataset: Bermúdez & Mobbs (1999); Infomine (2002).

MOZAMBIQUE

There are six entries in the dataset of which five have geographical coordinates. Due to the general scarcity of information on diamonds in Mozambique, the coordinates assigned to the sites are very inaccurate and are only a general indication of potential diamondiferous regions.

Bardet (1974) discusses a diamondiferous zone close to Zimbabwe, in the Zambezi valley near the Zambian border at Zumbo and suggests that there is a reasonable potential for diamondiferous kimberlites in Mozambique. There are current exploration activities in the country (Yager, 2001; Trade Partners UK, 2002).

References

The following references were consulted to construct this dataset: Bardet (1974); Trade Partners UK (2002); Yager (2001).

NAMIBIA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1908
First primary host rock	1925
First formal production	Mid-1920s
First 100,000 carats produced	1909
Total production up to 1990 (in millions of carats)	63
% of total world production up to 1990	1.5
Production 1992 (in millions of carats)	1.5

Discovery history

Diamonds were discovered in Namibia in 1908 in the raised beach deposits along the coast near Luderitz. Kimberlites have been found, but do not appear to be diamondiferous. Except for the well-documented deposits along the coast and along the north bank of the lower Orange River, there are no reliable records of diamond finds in Namibia (Janse & Sheahan, 1995).

Production history

Prior to World War I, the annual production reached 1 million carats, but declined during the war. After the war, production resumed and peaked in 724,000 carats in 1927. After World War II, mining activities moved to the Orange River deposits. Production peaked at over 2 million carats in 1977. Throughout of 1990s, annual production has been reasonably steady at 1 million carats. Recovery of diamonds from the drowned beaches and from the sea floor started in 1961. Initial production ended in 1965, and did not recommence until 1974. New mines are still being developed. In 1992, production from onshore was 1.2 million carats, 60,000 carats from near shore operations, and 260,000 carats from submarine deposits (Janse & Sheahan, 1995). For a detailed description of the production of the beach deposits and under water deposits, see Bardet (1974).

Quality

All diamonds from the coastal area are of a consistent high quality (Bardet, 1974). Bardet (1973) indicates that the marine placers in Southwest Africa could constitute the largest reserve of gem quality diamonds in the world. He notes that these rich placers are difficult and expensive to mine.

Derivation of dataset

There are 22 entries in the dataset for Namibia. A large portion of this dataset was derived from industry sources such as Infomine (2002). The available maps show diamond deposits all along the Namibian coastline. There are three sites in the dataset that are only present in ESRI (1996); no additional references could be found. In some cases, the classification of the deposits as marine placers (M) is tentative, although the proximity to the shore or off the coast suggests that the diamonds occur in this form.

References

The following references were consulted to construct this dataset: Bardet (1974); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Webster (1975).

In addition, the following industry sites were consulted: Afri-Can Marine Minerals Corporation; Bryson Burke Ltd; Namdeb; Reefton Mining NL.

Additional references

The following reference is suggested for further reading: Garnett (2000).

NIGERIA

There are three entries in the dataset for Nigeria representing three diamond occurrences. The accuracy of the coordinates is very approximate as they were derived from a map without grid or known projection from the Ministry of Solid Minerals Development (Ministry of Solid Minerals Development, 2003). The Nigerian government is actively advertising its diamond potential, although no other references seem to indicate the potential for exploitation diamond fields in the country. Non-diamondiferous kimberlites have been noted in the northwest of Nigeria (Bardet, 1973).

References

The following references were consulted to construct this dataset: Ministry of Solid Minerals Development (2003).

NORWAY

There are two entries in the dataset for Norway. There has been no production, and these are probably isolated, non-economic occurrences.

References

The following reference was consulted to construct this dataset: MINDAT (2003); van Roermund et al. (2002).

PARAGUAY

There is one entry in the dataset for Paraguay. This site is listed as an occurrence of placer (detrital) diamonds in Svisero (1995). Bardet (1977) does not record any diamonds in Paraguay, although he raises the potential for diamondiferous areas. The status of this site is unknown, and no additional references were available.

References

The following reference was consulted to construct this dataset: Svisero (1995).

RUSSIA (USSR)

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1829
First primary host rock	1954
First formal production	Pre-World War II (1945?)
First 100,000 carats produced	1960
Total production up to 1990 (in millions of carats)	272
% of total world production up to 1990	12
Production 1992 (in millions of carats)	11.25

Discovery history

Diamonds were found in 1829 in the Ural Mountains region (Webster, 1975). The first diamonds of Siberia were found in 1898 in the basin of Ienissei (Yenisei) with the first important deposit found in 1937 (Bardet, 1977). The first prospecting began in 1945–46. It was not until 1953 that the alluvial deposits of R. Viliuj in Yakutia-Sakha were discovered. The following year (1954), the first kimberlite pipe was found (Webster, 1975).

Production history

Few diamonds were recovered in Russia prior to World War II (Webster, 1975). Bardet (1973) suggests that early production figures were on the magnitude of 1 to 1.5 million carats/year with annual production surpassing 8 million carats by the 1970s. He also suggests that diamonds from secondary deposits in Siberia and the Urals were reaching the global market. The Ural mountain deposits, however, did not yield significant production (Bardet, 1977). Currently, almost 100% of the production comes from the Mirnyy area in Yakutia-Sakha region (Levine, 1998).

Geographic distribution

There are about 20 kimberlite pipes in the Siberian platform of which seven have been shown to be diamondiferous. These pipes occur in two fields: the Malo Botuobiya field and the Daldyn–Alakit field (Janse & Sheahan, 1995). Economic placer deposits are generally found directly adjacent to kimberlite pipes (Bardet, 1977). Very small diamonds have been found in the Pre-Sayan range, although there is very little information on these diamond occurrences. There are also diamondiferous kimberlites in the Olenek Archon, but their grades and sizes are apparently insufficient for economic exploitation (Janse & Sheahan, 1995).

Quality

It seems that the diamonds from Siberia are very small (Bardet, 1977). In 2000, Russia was one of the largest producers of gem quality diamonds (MBendi, 2002g).

Derivation of dataset

There are 34 entries in the dataset for Russia. The dataset is derived from a variety of references. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. Additional problems arose due to name changes and variations in spelling. Many of the geographic coordinates for Russia diamonds are extracted from ESRI (1996). In addition, the exploitation status of some sites is unknown.

References

The following references were consulted to construct this dataset: Bardet (1977); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Levine (1998); MBendi (2002g); Nixon (1995); Spetius (1995); Webster (1975).

In addition, the following industry websites were consulted: Alrosa; Archangel Diamond Corporation.

Additional reference

There are additional references available in Russian listed in Janse & Sheahan (1995).

SENEGAL

Bardet (1974) notes that there have been indicators of diamonds near Kedougou in Senegal. The origin of these diamonds would most likely be in Guinea. Bardet also suggests that Russian geologists may have continued this exploration.

SIERRA LEONE

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1930
First primary host rock	1948
First formal production	1932
First 100,000 carats produced	1935
Total production up to 1990 (in millions of carats)	52
% of total world production up to 1990	3
Production 1992 (in millions of carats)	0.4

Discovery history

Diamonds were discovered in 1930 on the River Gbororo near Fotingaia, 225 km east of Freetown in the area that later became the Yengema lease. The first kimberlite pipes were discovered in 1948 near Koidu. Two additional pipes were found in 1952 in the Tongo area, 50 km to the south of Yengema (Bardet, 1974).

Production history

Production began in 1932 with 749 carats. In the 1950s and 1960s, the annual production peaked at 2 to 3 million carats (Conciliation Resources, 1997). Current annual production is estimated at approximately 250,000 carats (Mobbs, 1996a). In 1952–53, artisanal exploitations started to flourish in Sierra Leone and surpassed the commercial production. At this time, tens of thousands of Guineas and immigrants from other neighbouring countries came to the Kono district to mine diamonds, and the network for illegal trading between Sierra Leone and Liberia was established (Bardet, 1974). For a comprehensive history of diamond mining in Sierra Leone, see Department of International Development (DFID) (2002).

The kimberlitic dykes have high diamond grades, but they have a narrow width (about 30 cm), which precludes economic mining by mechanized equipment. The Koidu pipe has been scheduled for underground development since 1965, but the political instability has held back all commercial mining (Janse & Sheahan, 1995). It appears that there has been some recent commercial activity (Mano River Resources Inc., 2003).

Geographic distribution

Most diamonds in Sierra Leone are found in the south of the country, in the basin of the Sewa River and the Moa and Moro Rivers. These are alluvial deposits that are fed from kimberlite dykes (Bardet, 1974). It has been indicated, however, that several of the alluvial deposits in the Kono area such as Yengema and Tongo are largely depleted (DeBeers Consolidated Mines Ltd., 2000). There is some ongoing exploration of marine placers in the Moa and Mano River mouths (Infomine, 2002).

Quality

Diamonds from Sierra Leone are large and of incredibly high quality (Bardet, 1973). The average value of the diamonds is US$ 250/carat (Conciliation Resources, 1997).

Derivation of dataset

There are 26 entries in the dataset for Sierra Leone. The dataset is derived from a wide variety of references. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. Many sites have been given the same geographic coordinates for lack of more specific information. The accuracy of the coordinates is variable. The completeness of dataset is unknown. There is a rough map in Sullivan (2000), which includes sites not present in this dataset.

References

The following references were consulted to construct this dataset: Bardet (1973); Bardet (1974); DeBeers Consolidated Mines Ltd. (2000); de Kun (1987); Infomine (2002); Janse & Sheahan (1995); Kawa (2002); MBendi (2003); MINDAT (2003); Mobbs (1996a); Sullivan (2000); United Nations (2002b); Webster (1975).

In addition, the following industry websites were consulted: Mano River Resources; Rex Diamond Mining Corporation.

Additional references

The following references are suggested for further reading: Grantham & Allen (1960); Hageluekem (1985); Morel (1976); Pollet (1951).

SOLOMAN ISLANDS

In 1962, the possibility of diamonds on the Malaita Island was indicated, although no diamonds have been found (Bardet, 1977). Currently, there is ongoing exploration on the island (Infomine, 2002). This occurrence is indicated in the dataset.

References

The following references were consulted to construct this dataset: Bardet (1977); Infomine (2002).

SOUTH AFRICA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1866
First primary host rock	1871
First formal production	1869
First 100,000 carats produced	1870
Total production up to 1990 (in millions of carats)	447
% of total world production up to 1990	20
Production 1992 (in millions of carats)	10

Discovery history

The first diamond was discovered in 1866 at Hopetown near Kimberley (Bardet, 1974).

Production history

The annual production reached 1 million carats during World War II and rose to 2.5 million carats in the 1950s and to 7–8 million carats in the 1970s (de Kun, 1987). Currently, 10 million carats are produced annually. Production occurs from open pit and closed pit kimberlite pipe/dyke/fissure mines, alluvial mines and onshore and offshore marine mines (MBendi, 2002h). A summary of historical production, opening and closing of mines and changeover from open pit to underground workings is given in Janse (1995) and Janse (1996). In 2001, 52 workings were currently producing diamonds, along with at least 1,500 officially registered alluvial diggings (Department of Minerals and Energy, 2001).

Geographic distribution

Diamonds show throughout South Africa. Major regions are the lower Orange terraces, twenty kimberlites between Postmasburg and Lesotho, and at the Premier Mine. Alluvial diggings cluster around three areas: Kimberley, Beitsbank and Barkly West in the South; in the Schweizer Reineke district west of Klerksdorp; and north in the Lichtenburg district near Botswana (de Kun, 1987). The most famous region for diamond deposits associated with kimberlites is the town of Kimberley where five pipes are mined within a circle of 8 km in diameter (Janse & Sheahan, 1995).

Quality

Given the large number of diamond deposits in South Africa, the quality of diamonds from each region can vary significantly. The majority of the diamonds are of gem quality (MBendi, 2002h).

Derivation of dataset

There are 114 entries in the dataset. In the case of South Africa, there are a prolific number of diamond mines; as a result, it is likely that the list of mines is far from complete. The geographic coordinates are often derived from Infomine (2002) resulting a relatively high accuracy. Some deviations can be observed in the coordinates from the Geospatial Engine as there are often several localities by the same name. In most cases, all attempts were made to verify the location with a map. In some cases, this was not possible, and the entries remain without geographic coordinates. It is generally believed that most of the entries listed in the dataset have produced diamonds after World War II. Given the extensive mining in South

Africa prior to that date, however, there is a possibility that some of these mines did not produce after World War II.

References

The following references were consulted to construct this dataset: Bardet (1973); Bardet (1974); de Kun (1987); Department of Minerals and Energy (2001); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Mason Jr. & Arndt (1996); MINDAT (2003); (National Imagery and Mapping Agency (NIMA), 2003); Nixon (1995); Webster (1975).

In addition, the following industry websites were consulted: Caledonia Mining; County Diamonds; Diamcor; Firestone Diamonds; Majestic Resources; MPH Consulting; Petra Diamonds; Rex Diamond Mining Corporation; Southern Era Resources.

Additional references

The following references are suggested for further reading: Garnett (2000); Janse (1995); Janse (1996).

SPAIN

Bardet (1977) records a strange diamond find in a village near Malaga. After significant investment, the ‘diamonds’ were correctly identified as spinelles.

SURINAME

There are nine entries for Suriname of which four are from the MRDS system. Two of the entries from the MRDS have no name and cannot be verified. Diamonds were discovered in 1880 at Berg-en-Dal on the Surinam River. In the 1920s, diamonds were also found in the Groote Luis Kreek. There has never been significant production in Suriname, although the Rosebel deposit has produced diamonds as a byproduct of gold mining (Bardet, 1977). Diamonds are mainly found between the Suriname and the Saramacca River, North West of Afobakka (Schonberger, 1974). There is also the possibility of diamonds in the South of the country where there is some exploration (Forest Peoples Programme, 1997). The diamonds are small (1/4 to 1/2 carat), but the quality is quite high (Bardet, 1977). Schonberger (1974) indicates that the grades are too low to be economic.

References

The following references were consulted to construct this dataset: Bardet (1977); ESRI (1996); Forest Peoples Programme (1997); Mason Jr. & Arndt (1996); Schonberger (1974); Svisero (1995).

Additional references

The following reference is suggested for further reading: Bosma, Len Fat & Welter (1973).

SWAZILAND

There is one entry in the dataset for Swaziland. Diamonds were first discovered in the Dolowayo kimberlitic pipe in Swaziland in 1973. The total production amounts to about 300,000 carats (Janse & Sheahan, 1995). Until the Dolowayo pipe closed in 1996, annual production in the 1990s averaged 55,000 carats/year (van Oss, 1994b).

References

The following references were consulted to construct this dataset: de Kun (1987); Janse & Sheahan (1995); van Oss (1994b).

SWEDEN

There are two entries in the dataset for Sweden. Both of the sites have been identified as containing kimberlite pipes. The kimberlite pipes in Sweden were identified early in the 1900s, although their diamond content remains unknown (Bardet, 1977). Currently, exploration activity is occurring in these regions (Infomine, 2002). The interest in the pipes in Sweden follows on the successful mining of kimberlite pipes in the far north of Canada (Poplar Resources Inc., 2003).

References

The following reference was consulted to consult this dataset: Infomine (2002). The industry website, Poplar Resources Ltd., was also consulted.

TANZANIA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1910
First primary host rock	1925
First formal production	1925
First 100,000 carats produced	1950
Total production up to 1990 (in millions of carats)	19
% of total world production up to 1990	1
Production 1992 (in millions of carats)	0.1

Discovery history

Alluvial diamonds were first discovered in 1910 in the region south of Lake Victoria. Several kimberlites were found in this area between 1922 and 1939. The large Williamson (also known as Mwadui) kimberlite was discovered in 1940s near Shinyanga (Janse & Sheahan, 1995).

Production history

In mid-1920s, small production started from the eluvial and alluvial gravels in the Mabuki area (Janse & Sheahan, 1995). The Williamson/Mwadui mine started production in 1945, reaching 100,000 carats/year in 1950. In the 1970s, annual production reached over 700,000 carats which has since dropped to 100,000 carats. Five diamond deposits were mined in the Shinyanga District in the 1920s and 1930s, but are currently of little economic importance (Bardet, 1974; Keller, 1992). A large number of kimberlite pipes have been found in the Singida area. To date, these pipes have not proven to be economic, although Keller lists Singida as a highly promising area.

Currently, the only operating mine in Tanzania is Williamson/Mwadui mine. In 1961, the total production from this mine surpassed 11 million carats making Tanzania, at that time, the ninth largest producer producing 2.03% of the world's diamonds (Bardet, 1974).

Geographic distribution

Kimberlites start to the south of Lake Victoria and are spread towards the south-southeast to the centre of the country, west of Dodoma. Indications of kimberlites also show in the south near Malawi and Mozambique.

Quality

50% of the diamonds from the Williamson mine are of gem quality. From 1995 to 1999, gem-quality diamond accounted for about 85% of total diamond production in Tanzania (Yager, 2000).

Derivation of dataset

There are 12 entries in the dataset for Tanzania. Almost all of the workings are found around Mwadui, and additional sites are grouped under that record. General verification of location was done using maps in Bardet (1974) and Keller (1992).

References

The following references were consulted to construct this dataset: Bardet (1974); Coakley (1996b); Coakley (1997b); de Kun (1987); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Keller (1992); Mason & Arndt (1996); Nixon (1995).

THAILAND

The majority of the production in Thailand is derived from alluvial tin mining at Phuket and Phengma (Bardet, 1977). There are four entries in the dataset, although only those at Phuket have been assigned coordinates.

References

The following references were consulted to construct this dataset: Bardet (1977); Hutchison (1996).

TOGO

There are no entries in the dataset for Togo. The United States Geological Survey indicates that there was exploration for diamonds in the Akposso plateau and in the surrounding alluvial basins, about 50 km north of Kpalime (Mobbs, 1996b).

UGANDA

Uganda is not currently represented in the dataset, as no exploration work is ongoing in Uganda suggesting that there are no economic diamond sources in the country. Nixon (1995) indicates that there is a potential for kimberlitic bodies. In the southwest of the country, sporadic diamonds were found in gold alluvials over the period of 1938–56. In addition, two diamonds were found in alluvials on the southwestern slopes of Moroto Mountain in northeastern Uganda (Nixon, 1995). Bardet (1974) also notes that some diamonds have been found in 100 km southeast of the Ruwenzori mountain in the Buhwezu region, but indicates that these diamonds do not appear to represent an economic source.

UKRAINE

There is one entry for the Ukraine in the dataset as mentioned in Janse & Sheahan (1995). No additional information was found for this location.

UNITED KINGDOM

Janse & Sheahan (1995) note that there are a few unreliable and vague reports of diamond finds in Ireland and Scotland.

UNITED STATES OF AMERICA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1843
First primary host rock	1885
First formal production	Prior to 1946
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	–
% of total world production up to 1990	–
Production 1992 (in millions of carats)	–

Discovery history

Most of the early diamond finds in the United States are byproducts of gold panning. The most important locality is the Mufreesboro, Pikes County, Arkansas. The pipe was first investigated in 1889, but diamonds were not found until 1906 (Webster, 1975).

Production history

The mine in Mufreesboro was operated until 1919 when the plant was burned down. Currently, the site is operated as a tourist centre where visitors are invited to pan for diamonds (Webster, 1975). There is some indication that a new diamond mine will be opened at Kelsey Lake (Dunn, 2003).

Geographic distribution

Diamondiferous kimberlites are found in the Colorado–Wyoming State Line district and Michigan. Diamonds have been recovered from lamproites in Arkansas. There are many unverified reports of diamonds in the United States. Possible primary deposits include diamondiferous kimberlite in Kansas, peridotite in New York, and peridotite in Maryland (Hausel, 1995). Secondary diamond deposits are widespread, and diamonds have been discovered in almost every state of the United States (Webster, 1975). The most notable deposits are in the Appalachian Mountain region and the Pacific Coast region. Other deposits can be found in the Great Lakes region, the Continental Interior, the Gulf Coast, and the Great Basin (Hausel, 1995).

Quality

Very few diamonds have been reported in the United States.

Derivation of dataset

A limited number of sites are included from the United States. These sites are meant to represent the most established diamond sites of some importance. These sites have been selected from Hausel (1995). Janse & Sheahan (1995) was used to derive the generalized coordinates. The MRDS system also lists sites that have not been included in the dataset (Mason Jr. & Arndt, 1996).

References

The following references were consulted to construct this dataset: Dunn (2003); Hausel (1995); Mason Jr. & Arndt (1996); Infomine (2002); Janse & Sheahan (1995).

Additional references

Hausel (1995) includes a comprehensive list of all diamonds reported in the United States. Most reports are of only a few scattered diamonds, although some have been large in size and of high quality. In addition, most of these diamonds were found prior to World War II, and no organized prospecting as occurred.

URUGUAY

Bardet (1977) does not note any diamond occurrences in Uruguay. In 2001, the USGS indicates that diamond exploration is occurring in Uruguay (Velasco, 2001). This project is listed in the dataset.

References

The following reference was consulted to construct this dataset: Velasco (2001).

VENEZUELA

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1883
First primary host rock	1982
First formal production	1883 (?)
First 100,000 carats produced	1955
Total production up to 1990 (in millions of carats)	14
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.5

Discovery history

The first application to mine diamond dates from 1883. In 1912, diamonds were found near Paviche along the middle course of the Caroni River. In 1982, a primary host rock was discovered, but the existence of kimberlite pipes in Venezuela appears to be somewhat controversial (Janse & Sheahan, 1995). For more information, see Themelis (1997).

Production history

The first official recovery of diamonds in Venezuela dates from 1913 (Janse & Sheahan, 1995). In 1926, continuous production officially began on the Rio Caroni, followed in 1931, on the Rio Surukum (Bardet, 1977). The majority of the production in Venezuela is of an artisanal nature. In 1963, some mechanized production was introduced, and production increased substantially. In 1968, production began in the Guaniamo area on the Quebrada Grande River and its tributaries (Kaminsky et al., 2000). From 1978 to 1988, diamond production continued to increase, however, no reliable production figures exist for Venezuela for the 1990s (Themelis, 1997).

Janse & Sheahan (1995) indicate that production in Venezuela has never been high, although in the 1970s, the annual production was estimated at 1 million carats. Presently, the annual output from the Guaniamo River amounts to an estimated 500,000 carats. Themelis (1997) mentions that there are no operations dedicated exclusively to diamonds; the main focus is gold. There appears to be some limited interest in the Venezuelan diamond deposits (Infomine, 2002).

Geographic distribution

All of Venezuelan diamond (and gold) mining districts are situated within the Guyana Sector that occupies nearly 423,000 km^2 (roughly 45% of the total area of the country) (Themelis, 1997). Most of the production has occurred on the Rio Caroni (Bardet, 1977).

Quality

Venezuelan diamonds are fancy coloured stones. Recently, black diamonds found in Venezuela fetched a very high price. Most of the gem quality diamonds are from 1 to 1.5 carats. From 1970 to 1978, Guianiamo produced 85% of the gem quality diamonds mined in Venezuela (Themelis, 1997).

Derivation of dataset

There are 134 entries in the dataset for Venezuela. Most of the locations and coordinates were taken from the MRDS (Mason Jr. & Arndt, 1996). The dataset is derived from a wide variety of references. The main difficulty with this dataset was problems sorting references that grouped several sites into a region and separate diamond occurrences in those regions. It is not known to what extent this will lead to inaccuracies and potential double counting. The production status and the dates for most sites are not available. It is likely that small production has occurred or has been attempted at all the sites.

References

The following references were consulted to construct this dataset: Baptista & Svisero (1978); Bardet (1977); ESRI (1996); Infomine (2002); Janse & Sheahan (1995); Kaminsky et al. (2000); Mason Jr. & Arndt (1996); Nixon (1995); Themelis (1997).

In addition, the following industry websites were consulted: Vanessa Ventures; Mena Resources.

Additional references

The following reference is suggested for further reading: Baptista & Svisero (1978).

ZAMBIA

There are six entries in the dataset for Zambia. All coordinates are very general, and some were read off a map on the Caledonia website (see Appendix E). Diamonds have been found throughout the western parts of Zambia. To date, all diamonds have been alluvial (MBendi, 2002i). Bardet (1974) notes the potential for kimberlites in Zambia, and there is ongoing exploration for primary sources (Antonides, 1994; Coakley, 2000d). No additional references have been located.

References

The following references were consulted to construct this dataset: Antonides (1994); Coakley (2000d). In addition, the industry website, Caledonia Mining Corporation, was consulted.

ZIMBABWE

Overview, adapted from Janse & Sheahan (1995)

First diamond found	1903
First primary host rock	1907
First formal production	
First 100,000 carats produced	–
Total production up to 1990 (in millions of carats)	0.1
% of total world production up to 1990	–
Production 1992 (in millions of carats)	0.04

Discovery history

The first alluvial diamonds were found in 1903 in the Somabula Forest, West of Gwelo in Matabeleland (Webster, 1975). The first diamondiferous but uneconomical kimberlite, Colossus pipe, was found in 1907 (Janse & Sheahan, 1995). According to the USGS, there has been active exploration through the 1990s (Mobbs, 1995b).

Production history

At present, the River Ranch mine is the only producing kimberlite. There are no alluvial productions, but investigations along the Limpopo River and other gravels are ongoing (Janse & Sheahan, 1995). In his 1975 book, Webster (1975) indicates that the diamond deposits in Zimbabwe are of little commercial importance. It appears that except for limited production prior to World War II, production began in the 1990s (Veasey, 1997).

Geographic distribution

Diamonds occur primarily in the southwest of the country, although large parts of the country remain relatively unexplored (Mobbs, 1995b). For an update account of activity in Zimbabwe, see (MBendi, 2002j). No information on the quality of the gems was found.

Derivation of dataset

There are eight entries in the dataset of which six have coordinates. Diamond mining is relatively new in Zimbabwe (Veasey, 1997).

References

The following references were consulted to construct this dataset: Bardet (1974); Infomine (2002); Janse & Sheahan (1995); MBendi (2002j); Mobbs (1995b); Veasey (1997); Webster (1975).

EXPLORATION & OTHER

Other countries are also seeing some exploration including Equatorial New Guinea and Guinea – Bissau. See the USGS Mineral Yearbooks at http://minerals.er.usgs.gov for more information.

APPENDIX D: Industry websites

A significant amount of information for this dataset was found on the websites of companies involved with diamond exploration and production. The following is a list of the company homepages that were consulted in this project. *It is not a list of the most important companies working in a given country.* As websites are frequently updated, copies of all webpages used in this project are available both as in an electronic form and as a hardcopy.

Company Name	Homepage	Countries
Afri-Can Marine Minerals Corporation	http://www.afri-can.com/	Namibia
Alrosa	http://eng.alrosa.ru/	Russia
Archangel Diamond Corporation	http://www.archangeldiamond.com/	Russia
Arena Gold	http://www.arenagold.ca/	Guinea
Astro Mining NL	http://www.aro.com.au/	China
Bryson Burke	http://brysonburke.com/	Namibia
Caledonia Mining Corporation	http://www.caledoniamining.com/	Angola, South Africa, Zambia
Canabrava Diamond Corporation	http://www.canabrava.ca/	Brazil
County Diamond	http://www.countrydiamonds.com.au/	South Africa
Debswana	http://www.debswana.com/	Botswana
Diabras	http://www.diabras.com/	Guinea
Diamcor	http://www.diamcor.com	South Africa
Diamond Rose NL	http://www.diamondrose.com.au/	Australia
Firestone Diamonds	http://www.firestonediamonds.com/	Botswana, South Africa
Flinders Diamonds	http://www.flindersdiamonds.com/	Australia
Gem Lab Inc	http://www.themelis.com/	Burma
Golden Star Resources Ltd.	http://www.gsr.com/	French Guiana
Hymex Diamond Corporation	Information at: http://www.mine.mn/	Guinea
Majestic Resources	http://www.majesticresources.com.au/	South Africa
Mano River Resources Inc.	http://www.manoriver.com/	Liberia, Sierra Leone
Mena Resources Inc.	http://www.menareources.com/	Venezuela
MPH Consulting Ltd.	http://www.mphconsulting.com/	South Africa
Namdeb	http://www.namdeb.com/	Namibia
Orezone Resources Inc.	http://www.orezone.com/	Burkina Faso
Petra Diamonds Limited	http://www.petradiamonds.co.za/	Angola, South Africa
Poplar Resources Ltd.	http://www.poplarresources.com/	Finland, Sweden
Reefton Mining NL	http://www.reeftonmining.com.au/	Namibia
Rex Diamond Mining Corporation	http://www.rexmining.com/	Sierra Leone
Search Gold Resources	http://www.searchgold.ca/	Guinea
Simco Ltd.	http://www.simco-ltd.com/	Guinea
Southern Era Resources	http://www.southernera.com/	Angola, South Africa
Trivalence Mining Corporation	http://www.trivalence.com/	Botswana, Guinea
Vaaldiam Resources Ltd	http://www.vaaldiam.com/	Central African Republic
Vanessa Ventures	http://www.vanessaventures.com/	Guyana, Venezuela
Verena Minerals Corporation	http://www.verena.com/	Brazil
Zarcan	http://www.zarcan.com/	Brazil

APPENDIX E: Structured Query Language code for selection of subsets

Selecting Non-Lootable

```
NOT ( 'LAT' = 0 AND 'LONG' = 0) AND
    ('DIAINFO' ='P' OR ('DIAINFO' ='M' AND
        ('RESINFO' ='offshore deposits' OR
        'RESINFO' ='diamonds in marine gravel; offshore' )) OR
    ('DIAINFO' ='U' AND
        ('RESINFO' LIKE'probable primary' OR
        'RESINFO' LIKE'primary')))
```

Result saved as DIANL.shp 247 records

Selecting Lootable

```
NOT ('LAT' =  0 AND'LONG' = 0 ) AND
    ('DIAINFO' ='S' OR ('DIAINFO' ='U' AND
        ('RESINFO' ='probable secondary' OR
        'RESINFO' ='secondary')) OR
    'DIAINFO' ='M' AND
        ('RESINFO' ='beach deposits') OR
        ('RESINFO' ='beach deposits submerged in gravel'))
```

Result saved as DIAL.shp 844 records

Selecting Errata

```
('LAT' = 0 AND'LONG' = 0) OR
    ('DIAINFO' ='U' AND NOT
        ('RESINFO' ='primary' OR
        'RESINFO' ='probable primary' OR
        'RESINFO' ='probable secondary' OR
        'RESINFO' ='secondary' ) ) OR
    ('DIAINFO' ='M' AND
        ('RESINFO' ='marine placers' OR
        'RESINFO' ='alluvial' ))
```

Result saved as ERRATA.shp 84 records

Sum records: 1175

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