A PROSPECTORS' GUIDE MAP TO THE GEM DEPOSITS OF SRI LANKA

By C. B. Dissanayake and M. S. Rupasinghe

Sri Lanka is world famous for its gem wealth, but the actual extent of the deposits has never been determined. Recently, a geologic survey team gathered field data in order to compile the first gem prospectors' guide map of Sri Lanka. Using the criteria of lithology and topography, stream-drainage density, presence of alluvium, and the nature and abundance of heavy minerals, this team determined that approximately 20% of the land mass of Sri Lanka may be gem bearing. They also characterized the potential of specific regions.

Sri Lanka may have the greatest proportion of land surface underlain by gem deposits, as well as the widest variety of gem minerals (figure 1), of any country in the world. Yet there has been little scientific study of the true gem potential of this island nation. Most "prospecting" in Sri Lanka to date has been by independent miners who search broad areas, using only shovels and washing baskets (figure 2). The chance discovery of a gem by one miner will bring others into the region, and thus the haphazard exploration of the area continues. Although the number of fine gems produced in Sri Lanka over the course of more than 2,000 years supports the general effectiveness of these methods, the need to compile an inventory of the natural resources of the country cannot be disputed. In fact, gem minerals as a group are by far the most valuable mineral resource in Sri Lanka. According to the 1990 Central Bank *Annual Report,* gems represent 84% of the total value of minerals exported from this island nation. To meet the need for a more systematic assessment of the nation's gem resources, the senior author (CBD) led a research study to characterize known gem-producing regions and identify potential new areas. This article reviews that study and introduces the Prospectors' Guide Map that was compiled from the semiquantitative data gathered.

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GEOLOGIC SETTING

Sri Lanka, with an area of 25,325 square miles (65,845 km^2), is physically the southern continuation of the Indian subcontinent and geologically part of the Indian shield. More than 90% of the island is made up of Precambrian metamorphic rocks and can be divided into four major divisions: the Highland Group, Southwest Group, Eastern Vijayan Complex, and Western Vijayan Complex (figure 3). The Highland Group occupies the entire

Figure 1. Impressive in its variety and quality is this array of colored gems from Sri Lanka (top to bottom, from left): 30.77-ct yellow-green chrysoberyl, 1.37-ct cobalt spinel ring, orangy pink spinel (about 13 ct) and sapphire brooch, 1.12-ct purple sapphire ring, 11.90-ct pink spinel, 3.36-ct pink sapphire ring, 12.53-ct red spinel, 3.45-ct blue sapphire, 1.07-ct yellow sapphire, and 4.02-ct purple spinel. Courtesy of David Humphrey, Pacific Palisades, California; Mayer & Watt, Maysville, Kentucky; and Elise Misiorowski, Los Angeles, California. Photo by Shane F. McClure.

hill country of the island and is comprised of granulite facies (i.e., rocks formed under high pressure and high temperature) metamorphosed sediments. The Southwest Group is also made up of granulite facies rocks, but these probably formed under different pressure-temperature conditions. The Vijayan Complexes are composed of granitoids, migmatites, and migmatitic gneisses. Sri Lanka's gem deposits are located primarily in the Highland Group, within an area of approximately 6,000 square miles (15,540 km^2; again, see figure 3).

Over the past few million years, intense weathering and rapid erosion have given rise to thick and extensive accumulations of sediments in the flood plains of rivers, in lakes, and in now-buried river channels. It is within these weathering products that significant secondary—alluvial—gem deposits collected.

DETERMINING GEM POTENTIAL: CRITERIA AND METHODOLOGY

Four criteria were used to determine the gem potential of the various regions of Sri Lanka: lithology and topography, drainage density, presence of alluvium, and heavy-mineral concentrations in stream sediments.

Except for a few alluvial occurrences in the Eastern Vijayan Complex, virtually all Sri Lankan gem deposits have been found within the Highland and (to a lesser extent) Southwest Groups; in fact, it is presumed that the Eastern Vijayan gems originated from rocks in these two groups. Therefore, this investigation was conducted primarily within the Highland and Southwest Groups, in the areas indicated by the topographic sheets in figure 3. The topography of each of these areas was studied before field investigations, using existing aerial photographs and topographic sheets. The drainage basins were outlined, and the areas covered by alluvium were identified.

Because few gem minerals have been found in situ in Sri Lanka (to date, only corundum in the Bakamuna, Matara, and Rupaha areas; moonstone in Meetiyagoda; and aquamarine in Kegalle), this survey was limited to placer deposits.

Within the areas noted on figure 3, samples were taken from stream sediments at intervals of approximately one location per square mile. Each sample typically consisted of 2–3 kg of "pay gravel," that is, rounded or subangular pebbles or boulders of quartz and heavy minerals, including gemstones. A few samples were also taken at different stratigraphic levels at the same locality for comparison; analysis of these data showed that the heavy minerals generally are enriched in the lower stratigraphic levels. Some samples were obtained from existing gem pits, particularly in the gem-producing areas around Ratnapura and Elahera. The survey team collected about 1,450 stream sediment samples in total.

The samples were first washed to remove the clay, and then subjected to grain-size analysis using a sieve shaker. A mesh fraction of 0.177–0.125 mm was selected for this analysis, with bromoform (S.G. 2.90) used to separate out the heavy minerals. The magnetic bromoform sink products were removed with a hand magnet; the nonmagnetic residue was processed with a Frantz isodynamic separator to obtain different mineral concentrates. The nonmagnetic products were weighed and split using a multiple cone separator to obtain about 500 grains. The individual mineral grains were then identified and counted using a binocular microscope, after which the percentages of each mineral were computed. We believe that the distribution of these grain-size minerals represents the distribution of their larger counterparts.

Figure 2. A miner examines river gravel for various types of rough. Most "prospecting" in Sri Lanka to date has been by independent miners, who search broad areas using only shovels and washing baskets. Photo by Robert C. Kammerling.

ANALYSIS OF THE CRITERIA

For the final Prospectors' Guide Map (figure 4), we established five categories of gem potential: (1) highly probable, (2) probable, (3) moderate, (4) poor, and (5) no deposits. Classification of the various areas into one of the five categories was based on our analyses of all four criteria: lithology and topography, drainage density, presence of alluvium, and heavy-mineral concentrations. For instance, an area with abundant heavy minerals but without sites of accumulation was not classified as highly probable because it lacked the mechanism whereby economic deposits of alluvial gem materials could form. Following is a summary of the key considerations within each criterion that determined the probability assignments to the various regions.

Lithology and Topography. The Highland Group of rocks is particularly conducive to the formation of gem minerals (Hapuarachchi, 1975; Munasinghe and Dissanayake, 1979, 1982; Rupasinghe and Dissanayake 1985). However, even if the source rocks for the gem minerals are available in a certain area, the wrong topography may result in a paucity of gem deposits. A relatively flat topogra-

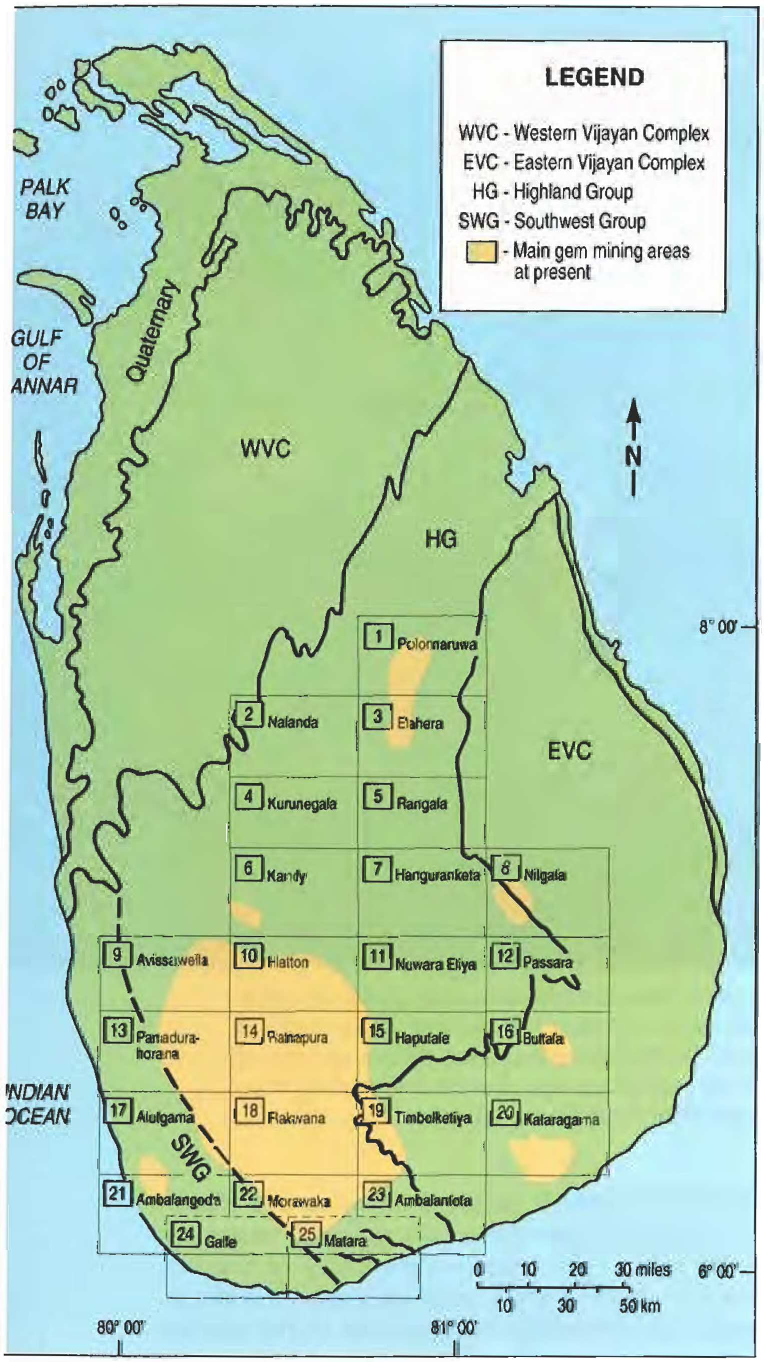


Figure 3. The Precambrian rocks that comprise most of Sri Lanka are divided into four groups: the Highland Group, Southwest Group, Eastern Vijayan Complex, and Western Vijayan Complex. To date, virtually all gem deposits have been found in the Highland and Southwest Groups. The boxed numbers on this simplified geologic map of Sri Lanka show which 1-inch (2.5-cm) topographic sheets correspond to study areas in tables 1 and 2, and figure 4. Artwork by Carol Silver.

phy—drained by wide, meandering streams—is most conducive to the formation of gem-bearing alluvial deposits.

Drainage Density. A good network of streams is prerequisite for the transportation and deposition of sediments derived from the weathering of the gem-mineral source rocks. The central and southern regions of the gem-bearing Highland and Southwest Groups are all supplied by a network of radial drainage systems.

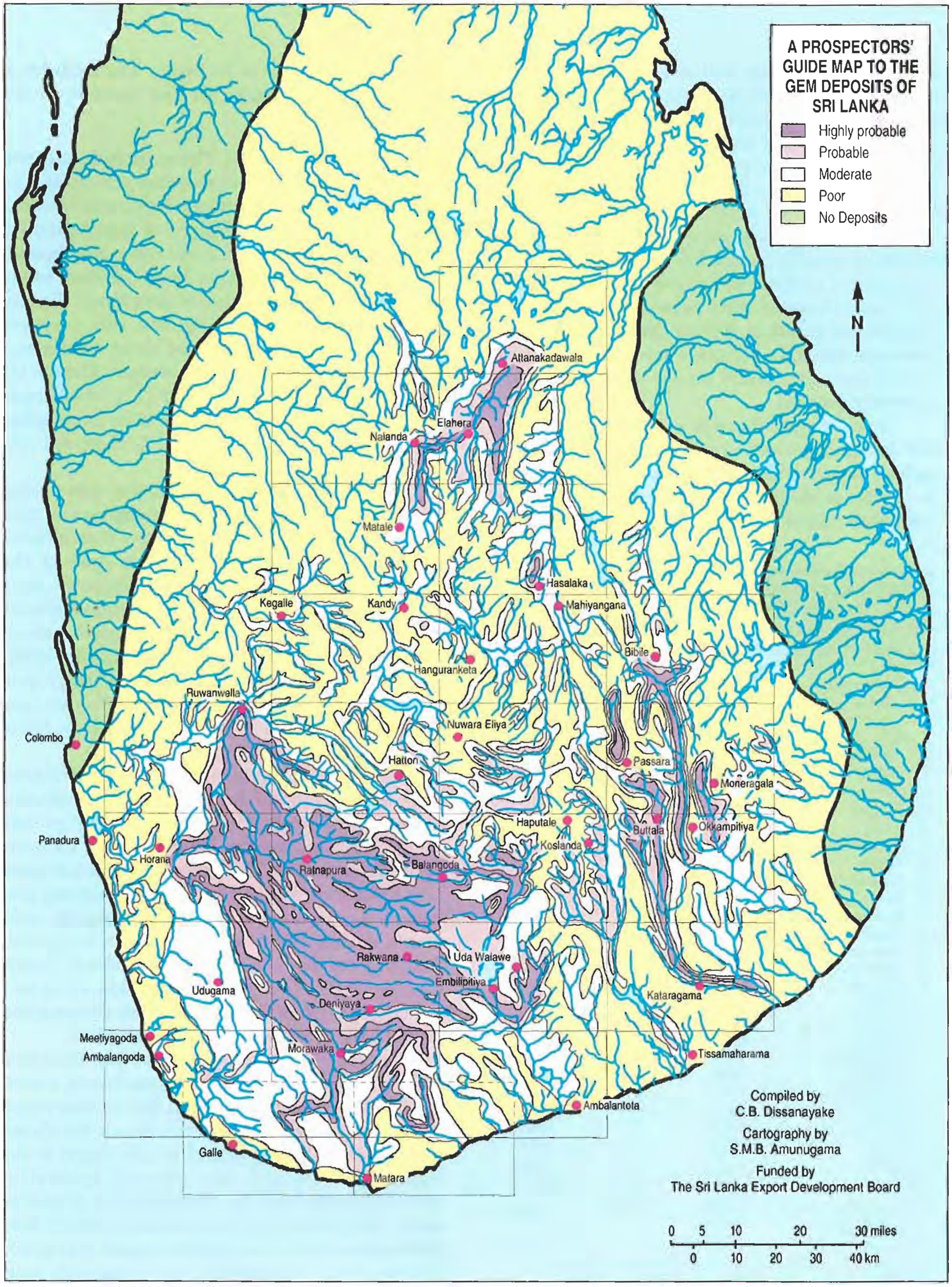
Presence of Alluvium. Large expanses of alluvial deposits have been extensively mined in the main Ratnapura and Elahera gem fields. Consequently, particular emphasis was placed on areas with thick layers of alluvium, either at sites adjacent to present streams or in the flood plains of ancient rivers.

Heavy-Mineral Concentrations. Heavy minerals in the sediments of streams draining source areas are the best indicators of gem potential. Our analyses of the approximately 1,450 sediment samples revealed the presence of garnet, spinel, zircon, corundum, beryl, topaz, tourmaline, sillimanite, and rutile, among other heavy minerals. Garnets, spinels, and zircon, in particular, were the most useful indicators of gem potential because of their abundance relative to other important gem minerals with which they are associated, such as corundum, topaz, and beryl. The latter often occur in such low concentrations that their presence or absence from a particular sample has no statistical value. To classify an area as at least probable, we required a minimum of 25% heavy minerals, including indicator minerals; samples from some areas were nearly 75% heavy minerals.

CLASSIFICATION OF GEM POTENTIAL

Areas were initially delineated on the basis of qualitative descriptions made during the field surveys. Suitable flat-lying topographic terrains with good

Figure 4. This Prospectors' Guide Map to the Gem Deposits of Sri Lanka was compiled by the senior author on the basis of the study discussed in the text. Areas are categorized as "highly probable," "probable," "moderate," "poor," and "no deposits" on the basis of their gem potential. An estimated 20% of Sri Lanka's land mass contains viable gem deposits. Artwork by Carol Silver.


A PROSPECTORS' GUIDE MAP TO THE GEM DEPOSITS OF SRI LANKA
Highly probable
Probable
Moderate
Poor
No Deposits
N
Attanakadawala
Elahera
Nalanda
Matale
Hasalaka
Kandy
Kegalle
Mahiyangana
Bibile
Hangurankela
Ruwanwella
Nuwara Eliya
Colombo
Hatton
Passara
Moneragala
Haputale
Buttala
Okkampitiya
Koslanda
Panadura
Horana
Ratnapura
Balangoda
Rakwana
Uda Walawe
Embilipitiya
Udugama
Deniyaya
Kataragama
Meetiyagoda
Ambalangoda
Morawaka
Tissamaharama
Ambalantota
Galle
Matara
Compiled by
C.B. Dissanayake
Cartography by
S.M.B. Amunugama
Funded by
The Sri Lanka Export Development Board
0 5 10 20 30 miles
0 10 20 30 40 km

networks of drainage and alluvial deposits were mapped, and the corresponding heavy-mineral concentrates of the stream sediments were analyzed. Areas that satisfied all of the above criteria were classified as "highly probable"; those that did not adequately satisfy at least some criteria were classified as "poor" or as having "no deposits." The intermediate categories of "probable" and "moderate" were assigned somewhat arbitrarily, since full quantitative analysis was not within the scope of this study. However, areas were classified as being of moderate potential if their lithology could produce gem minerals, but other factors (such as inadequate drainage) would hinder the formation of economic deposits.

Table 1 shows the areas in square miles classified as highly probable, probable, and moderate, as well as the percentage of land mass in each category relative to the total area of the island. Note that these three classifications together comprise about 20% of the land area of Sri Lanka. This probably is the highest percentage for any country in the world.

TABLE 1. Land surface (in square miles) of key areas in Sri Lanka found to be highly probable, probable, and of moderate probability for gem occurrences. Topographic sheet numbers are keyed to those shown on figure 3[a].

Topographic sheet No.	Name	Highly probable	Probable	Moderate
1	Polonnaruwa	7.9	21.9	14.9
2	Nalanda	9.9	9.9	54.7
3	Elahera	63.6	39.8	109.3
4	Kurunegala	9.9	7.9	79.0
5	Rangala	4.9	12.9	127.2
6	Kandy	—	5.0	149.0
7	Hanguranketa	—	—	157.2
8	Nilgala	14.9	14.9	79.5
9	Avissawella	79.5	49.7	99.4
10	Hatton	11.8	39.7	59.6
11	Nuwara Eliya	—	49.7	168.9
12	Passara	36.8	49.7	74.5
13	Panadura-horana	119.3	110.6	61.2
14	Ratnapura	248.0	164.0	60.0
15	Haputale	71.6	139.1	129.2
16	Buttala	54.7	84.5	208.7
17	Alutgama	49.7	29.8	198.8
18	Rakwana	367.0	100.0	5.0
19	Timbolketiya	79.5	129.2	159.0
20	Kataragama	14.9	39.8	59.6
21	Ambalangoda	—	19.9	159.0
22	Morawaka	94.4	49.7	308.4
23	Ambalantota	1.4	1.9	169.5
24	Galle	1.0	9.9	79.5
25	Matara	—	19.9	29.8
Total		1340.7	1199.4	2800.9
	Percentage relative to total land area	5.29	4.74	11.06

[a] *The total area of Sri Lanka is 25,325 square miles (about 65,845 km^2). A 1-inch topographic sheet = 472 square miles (about 1,222 km^2).*

Highly Probable Areas. These include present, newly discovered, and rediscovered gem fields. The areas described as new and not being mined at present are mostly at the periphery of existing mining regions. Rediscovered areas are those that historical records show to have been worked many decades ago and subsequently abandoned. Current mining regions that fall within this category include (relevant topographic sheet numbers—from figure 3—given in parentheses): Elahera (3), Hasalaka (5), Bibile (8), Passara (12), Moneragala (12), Buttala (16), Okkampitiya (16), Kataragama (20), Ratnapura (14), Rakwana (18), Deniyaya (18), and Morawaka (22).

Even though much of the current gem-mining activity is centered in the Elahera region, the main gem field covers an area much larger than hitherto anticipated—from the southern part of the Attanakadawala area in the Polonnaruwa topographic sheet (no. 1) and southwest and southward into the Kurunegala and Rangala topographic sheets (nos. 4 and 5; Gunawardene and Rupasinghe, 1986).

The Hasalaka area has a much larger gem potential than previously had been known, and detailed exploration is warranted along the tributaries of the Mahaweli River.

Bibile is a relatively unexplored area surrounded by known gem fields. The presence of euhedral (well-formed) crystals in the gravel samples indicates a source region nearby. The Passara, Moneragala, Buttala, Okkampitiya, and Kataragama gem fields form a major north-south trending gem belt along eastern Sri Lanka. Gem-bearing sediments in this region were brought in by streams draining the boundary of the Highland Group-Eastern Vijayan Complex, which is known to be a mineralized terrain (Munasinghe and Dissanayake, 1979; Dissanayake and Weerasooriya, 1986).

The Ratnapura (figure 5), Rakwana, Deniyaya, and Morawaka gem fields, in the southwest, constitute the largest and best-known gem mining region of Sri Lanka. The gem-minerals survey has shown that the actual gem potential of this region is also significantly broader than current exploitation would indicate, with good prospects in peripheral areas. The main gem field appears to stretch from Embilipitiya in the Uda Walawe region (topographic sheet 19) to Ruwanwella (on Avissawella topographic sheet 9) and south almost to the coast in the Imaduwa and Matara regions (sheets 24 and 25). Because the source rocks for many of the gem minerals are believed to be in this region, both the mountains and the alluvial plains should be explored, especially the weathered rock formations.

Probable Areas. Most of these "new" areas surround known gem deposits and the other "highly probable" areas (again, see figure 4). Large probable areas occur in the vicinity of the Elahera (around Attanakadawala and Pallegama) and Rakwana-Ratnapura gem fields. The latter include the southeast-trending river system that stretches from Koslanda (topographic sheet 15) through the western portion of topographic sheets 16 and 20 to Tissamaharama, near the southeast coast; the hills and valleys around Hatton (sheet 10) and eastward through sheet 11, including the towns (not shown in figure 4) of Welimada, Boralanda, and Bandarawela; and the upper catchment areas of the Walawe River, particularly around Godakawela and Uda Walawe (sheets 18 and 19, respectively).

Moderate Areas. The areas classified as "moderate" may yield viable gem deposits, especially with the aid of better exploration techniques. In general, the moderate areas border the more "probable" ones or occur where geomorphic conditions are suitable for the accumulation of gemstones. They include the stretch from Ruwanwella (topographic sheet 9) to Matara (sheet 25), in southwestern Sri Lanka, encompassing Agalawatta, Hiniduma, and Udugama; the regions south of the gem fields at Okkampitiya and Buttala (sheet 16); and the tributaries of Menik River as well as those of Mahaweli River in the Hanguranketa and Mahiyangana (sheet 7) regions.

Poor and No Deposit Areas. Areas classified as "poor" on figure 4 are within general geologic regions that have produced gem minerals, but to date have yielded no significant deposits. Those areas classified as "no deposit" are located well outside the Highland Group and are believed to be devoid of gems. It should be noted that samples were not taken from those areas classified as "no deposit," since these regions had not yielded gems in the past.

DISTRIBUTION OF GEM MINERALS IN SRI LANKA

Known Deposits. Table 2 indicates the distribution of gem minerals found thus far in Sri Lanka, some of which are illustrated in figure 6. Zwaan (1982) provided a general account of the gem fields of Sri Lanka, and Gunawardene and Rupasinghe (1986) gave a very detailed account of the mineralogy of gems in the Elahera gem field. Silva and Siriwardena (1988) described the corundum-bearing skarns in the Bakamuna area, near Elahera (topographic sheet 3). The two main gem fields—Ratnapura and Elahera—contain a wide variety of gem minerals, including corundum, chrysoberyl, zircon, tourmaline, kornerupine, garnet, spinel, and taaffeite, among others.

Topaz is abundant in Polwatta and elsewhere in the Rattota-Matale area (topographic sheet 4). Identified by this study as fluoride-rich, this gem field has also yielded significant amounts of other

Figure 5. Dozens of thatched canopies dot the countryside around the mining center of Ratnapura. The canopies cover alluvial mining pits that are worked by local miners. Photo by Robert C. Kammerling.

TABLE 2. Key gem minerals of Sri Lanka listed by locality[a]. Topographic sheet numbers are keyed to those shown on figure 3.

Topographic sheet No.	Name	Gem minerals
1	Polonnaruwa	Corundum, garnet
2	Nalanda	Apatite
3	Elahera	Chrysoberyl, corundum, garnet, iolite, kornerupine, sinhalite, sphene, spinel, zircon
4	Kurunegala	Amethyst, apatite, citrine, fluorite, iolite, topaz, tourmaline
5	Rangala	No known deposits
6	Kandy	Amethyst, aquamarine
7	Hanguranketa	Corundum
8	Nilgala	Corundum, garnet, spinel, tourmaline, zircon
9	Avissawella	Amethyst, andalusite, beryl, chrysoberyl, corundum, diopside, epidote, iolite, kornerupine, garnet, sinhalite, spinel, tourmaline, zircon
10	Hatton	Andalusite, corundum, garnet, iolite, spinel, topaz
11	Nuwara Eliya	Amethyst, corundum, spinel, zircon
12	Passara	Corundum, ekanite, garnet, kornerupine, spinel, taaffeite, topaz, tourmaline, zircon
13	Panadura-horana	Aquamarine, axinite, beryl, chrysoberyl, corundum, garnet, idocrase, phenakite, scapolite, sillimanite, spinel, taaffeite, topaz, tourmaline, zircon
14	Ratnapura	Amethyst, andalusite, apatite, beryl, chrysoberyl, citrine, corundum, diamond, danburite, diopside, ekanite, garnet, iolite, kornerupine, scapolite, sillimanite, sinhalite, spinel, taaffeite, topaz, tourmaline, zircon
15	Haputale	Andalusite, axinite, beryl, chrysoberyl, corundum, diopside, garnet, idocrase, spinel, topaz, tourmaline, zircon
16	Buttala	Corundum, ekanite, garnet, spinel, tourmaline
17	Alutgama	Chrysoberyl, corundum, spinel, zircon
18	Rakwana	Apatite, aquamarine, axinite, beryl, chrysoberyl, corundum, danburite, diopside, ekanite, enstatite, fluorite, garnet, kornerupine, spinel, tourmaline, zircon
19	Timbolketiya	Garnet
20	Kataragama	Corundum, hiddenite, sphene, spinel
21	Ambalangoda	Moonstone
22	Morawaka	Aquamarine, beryl, chrysoberyl, corundum, danburite, diopside, garnet, sillimanite, sphene, spinel, tourmaline, zircon
23	Ambalantota	Beryl, chrysoberyl, corundum, garnet, idocrase, iolite, scapolite, sillimanite, sinhalite, spinel, tourmaline, zircon
24	Galle	Beryl, chrysoberyl, corundum, sphene
25	Matara	Aquamarine, chrysoberyl, corundum, garnet, zircon

[a] *All data compiled by the authors and the State Gem Corporation of Sri Lanka.*

fluoride-bearing minerals such as fluorspar (fluorite), apatite, and tourmaline. Note that both topaz and fluorite have been found in primary pegmatite deposits (Rupasinghe et al., 1984; Dissanayake et al., 1992). The areas along the Highland-Vijayan boundary are also known to be fluoride-rich (Dissanayake and Weerasooriya, 1986).

Iolite is common in the Elahera and nearby Matale gem fields, whereas andalusite and scapolite are frequently found in the gem fields around Ratnapura. Meetiyagoda (topographic sheet 21) has an important deposit of moonstone; garnets are found in abundance in the region around Embilipitiya and Uda Walawe (sheet 19; Cooray, 1984).

Future Prospects. A comparison of the highly probable, probable, and moderate land masses (figure 4) with the present mining areas (figure 3) indicates the potential for identifying new colored gem deposits in Sri Lanka. In addition, recent reports of the discovery of alluvial diamonds within the granulite belt of the Highland Group have created interest in diamond exploration. As early as 1965, Gunaratne mentioned the occurrence of diamond in Sri Lanka. Subsequent reports of diamond finds, such as at Polonnaruwa and at Balangoda (Dissanayake and Rupasinghe, 1986), indicate the need for a thorough investigation into the geologic occurrence of diamond on this island.

In addition, the many rivers that drain the gem fields undoubtedly have transported large quantities of gem minerals mixed with sediments into the sea, particularly in the southwestern regions. Thus, the mouths of rivers and their near-shore regions are obvious targets for future gem prospecting.

CONCLUSIONS

Although government figures indicate that gem exports account for more than 80% of Sri Lanka's mineral export industry, they represent only 4% of the total foreign exchange earnings. Yet, as reported in this article, the vast gem potential of the country has been underexplored and underexploited. Present gem mining and prospecting are based largely on chance discoveries and subsequent "word-of-mouth" exploration. Scientific methods could significantly improve the accuracy of locating target areas. The Prospectors' Guide Map (figure 4) discussed in this article takes the first step toward further exploration by identifying new and expanded areas with gem potential.

Figure 6. Illustrating some of the many gems from Sri Lanka are these rough and faceted stones (top to bottom, from left): blue and yellow sapphire crystal, moonstone rough, 2.92-ct purple sapphire, pink spinel crystal, 1.79-ct orangy brown enstatite, yellow sapphire crystal, 5.50-ct moonstone cabochon, 1.02-ct yellow sapphire, purplish pink spinel crystal, hiddenite crystal, 1.65-ct green zircon, 1.23-ct brown sinhalite, yellow chrysoberyl crystal, 2.30-ct pink sapphire, 1.42-ct yellow zircon, pink sapphire crystal, 1.14-ct purplish pink spinel, pink sapphire crystal, pink spinel crystal, 1.26-ct orangy pink sapphire, 0.70-ct orange sapphire, moonstone beads, yellow sapphire crystal, 0.78-ct yellow sillimanite. Courtesy of David Humphrey and N. D. International, both of Pacific Palisades, California; and Evan Caplan & Co., Los Angeles, California; photo by Shane F. McClure.

REFERENCES

Cooray P.G. (1984) *An Introduction to the Geology of Sri Lanka (Ceylon).* National Museums Publication, Colombo, Sri Lanka.

Dissanayake C.B., Rupasinghe M.S. (1986) Possibilities for diamond occurrences in Sri Lanka. *Journal of the Gemmologists Association of Sri Lanka,* No. 3, pp. 2–6.

Dissanayake C.B., Rupasinghe M.S., Dharmaratne T. (1992) Fluorine hydrochemistry in a topaz-rich area in Sri Lanka. *Zeitschrift der Deutschen Gemmologischen Gesellschaft,* Vol. 41, No. 2/3, pp. 111–116.

Dissanayake C.B., Weerasooriya S.V.R. (1986) Fluoride as an indicator of mineralization—Hydrogeochemistry of a Precambrian mineralized belt in Sri Lanka. *Chemical Geology,* Vol. 56, pp. 257–270.

Gunaratne H.S. (1965) The discovery of a diamond from Ceylon. *Spolia Zeylanica,* Vol. 30, No. 2, pp. 51–52.

Gunawardene M., Rupasinghe M.S. (1986) The Elahera gem field in central Sri Lanka. *Gems & Gemology,* Vol. 22, No. 2, pp. 80–95.

Hapuarachchi D.J.A.C. (1975) *The Granulite Facies of Sri Lanka.* Geological Survey Department of Sri Lanka, Professional Paper No. 5.

Munasinghe T., Dissanayake C.B. (1979) Is the Highland—Eastern Vijayan boundary in Sri Lanka a possible mineralized belt? *Economic Geology,* Vol. 74, pp. 1495–1496.

Munasinghe T., Dissanayake C.B. (1982) A plate tectonic model for the geologic evolution of Sri Lanka. *Journal of the Geological Society of India,* Vol. 23, pp. 369–380.

Rupasinghe M.S., Banerjee A., Pense J., Dissanayake C.B. (1984) The geochemistry of beryllium and fluorine in the gem fields of Sri Lanka. *Mineralium Deposita,* Vol. 19, pp. 86–93.

Rupasinghe M.S., Dissanayake C.B. (1985) Charnockites and the genesis of gem minerals. *Chemical Geology,* Vol. 53, pp. 1–16.

Silva K.K.M.W., Siriwardena C.H.E.R. (1988) Geology and the origin of the corundum-bearing skarn at Bakamuna, Sri Lanka. *Mineralium Deposita,* Vol. 23, pp. 186–190.

Zwaan P.C. (1982) Sri Lanka: The gem island. *Gems & Gemology,* Vol. 18, No. 2, pp 62–71.