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Applying a novel methodology to decipher colonial collection practices: Uncovering the collecting motives of the TU Delft Geological Suriname Collection

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Abstract

During the first half of the twentieth century, a colonial natural history collection of nearly 4000 geological specimens from Suriname, accumulated at the Delft University of Technology. This collection is the focus of this study and was previously used at the university for both research and education on the geology and ores of the Dutch colony. A novel methodology was developed and tested to uncover the collecting motives of the collectors, with the aim to understand the processes behind the formation of the geological Suriname collection. This study has extensively examined the collection through archival, literature and collection research, using the obtained knowledge to create collecting motive categories. These categories were used to classify different parts of the collection, using literature sources that reveal the circumstances under which the objects were collected. The findings predominantly show the presence of economic collecting motives, highlighting the economic drive in colonial practices. This paper also critically assesses the used methodology. It has been found that the results are influenced by the information available and the researcher's interpretation of that information. On the other hand, the use of collecting motive categories allows for an analysis of drivers that played a key role in the colonial collecting processes. If interpreted with care, the results show the evolution of our understanding of the colonial context of natural history collections, supporting decolonizing practices and commence dialogues.

Keywords: colonial natural history collection; methodology; Suriname; collecting motives; TU Delft; Naturalis; decolonization

Introduction

In October 2022, the Netherlands received the first repatriation request for a natural history collection (NHC). The petition was submitted by Indonesia and involved the renowned Dubois collection (Van Nuland, 2022). This collection is most famous for the 'Java Man' fossils, which were, at the time of discovery, the oldest remains found of the *Homo erectus* (Dubois, 1893). Dubois first travelled to Indonesia in search of these fossils as a doctor enrolled with the Dutch East Indies army (Leakey and Slikkerveer, 1993). There is a great deal of controversy surrounding this history of the collection because during his search Dubois *"received a team which was completed by a group of fifty forced labourers*" (Leakey and Slikkerveer, 1993). This repatriation request gathered extensive media attention and triggered strong responses among Dutch citizens. An example of this are some of the reactions to a social media post by the Naturalis museum, housing the Dubois

collection. For instance, one of the responses stated: "*Give those items back to Indonesia, you bunch of thieves"*. This example illustrates the growing public awareness and sensitivity towards colonial heritage among the Dutch population.

Three months earlier, in July 2022, the Dutch government implemented policy following an advisory report titled '*Colonial collections and recognition of injustice'* (RVC, 2020). The policy primarily considers the unconditional return of looted colonial collections upon request, acknowledgement of injustice and the rectification of this injustice done (Uslu, 2022). While the government's decisions contribute to the recent developments in Dutch colonial collections, it is noteworthy that research output on this subject in the Netherlands has concurrently seen a substantial increase. One of the latest Dutch publications on the subject is from The Cultural Heritage Agency of The Netherlands. The agency wrote a guide that helps to locate collection objects in collection databases that are related to the Dutch history of slavery and colonies. A list with search terms is provided that can be used to search for such objects, including words such as 'servant', 'Dutch-Indies', Curiosities' or 'gold'. (RCE, 2021). Another recent Dutch report is titled '*Pilot project Provenance Research on Objects of the Colonial Era*' (Mooren, Stutje and Van Vree, 2022), which describes an extensive method that includes prioritisation, source criticism, finding sources, object research, approaching experts and reporting.

Apart from the ongoing developments in provenance studies, the research landscape for colonial NHCs is rapidly developing its own distinct methodological approaches (for example, Bewell, 2004; Das and Lowe, 2018; Green, 2019; Park *et al*., 2021; Weber, 2019; Ashby 2021), That shows a broad variety of examples how one can approach a colonial NHC collection. In the Manchester Museum, for instance, the influence of the British empire in the mineral collection was quantitatively assessed, highlighting a significant fraction of the objects originating from territories once under rule of the British empire or other colonial European empires (Gelsthorpe, 2021). Hearth and Robbins (2022) analyse the evolution of mineral displays, from Renaissance curiosity cabinets to contemporary museum exhibitions. Their research underscores how these presentations, while often focusing on scientific and aesthetic values, have historically overlooked the minerals' connections to human histories, particularly those related to colonialism. Ashby and Machin (2021) advise to target objects from specific individual collectors or locations as a starting point for colonial research. In their paper a gorilla and a springhare specimen are used to showcase examples of how military violence and colonial exploitation contributed to the formation of western natural history collections.

Building upon the existing literature and methodologies, this research introduces a novel approach to study colonial natural history collections. The methodology was developed during extensive research on the background of the geological collection from Suriname, South America (called the Suriname Collection) of the Delft University of Technology (TU Delft), which took place in the winter of 2021-2022. The collection is a subset of a larger collection of the TU Delft containing ~125.000 ores, rocks and minerals.

Established in 1864 by Professor Hermann Vogelsang (1838-1874), the collection initially served an educational purpose for mining engineering students at TU Delft (Mijnbouwkundige Vereeniging, 1992). Beyond its educational use, it was a research resource for the university. In 1911, the mining faculty and its vast collection moved to a new building, where the collection was exhibited on three different floors. In post-independence of the Dutch colonies, the collection of colonial ores lost its relevance to the university, leading to the discontinuation of its permanent exhibition. In 2001, it was relocated to the national natural history museum, Naturalis. During this transfer, the collection changed ownership and is currently part of the national collection owned by the Dutch government. The initiative for the investigation of the geological Suriname collection came from the TU Delft Science Centre which wanted to learn why this collection accumulated and which historic individuals from the university were involved. An extensive report was written (Versluis, 2022), and the method outlined in this paper was formulated during the report's development.

While existing literature provides valuable insights into methodologies for provenance research and colonial NHCs, there remains a gap in approaches specifically aimed at identifying trends in the collection process, which is a key focus of this study. This research proposes a novel approach to uncover the collecting motives behind the accumulation of colonial NHCs. The addition of this technique to the existing field of study can further broaden the spectrum of perspectives on colonial collections.

The method presented in this paper illustrates how to recognise the different processes behind

the formation of colonial collections. In order to accomplish that, this research has used literature sources to deduce the motives that drove the collectors, so that the intentions of the collection acquisition during the colonial-era becomes clearer. Having knowledge on the motives of collecting could:

1) influence collection management decisions,
2) assist with the assessment of restitution requests,
3) improve public education about colonial collecting practices
4) add academic value to the collection by augmenting its historical context and
5) improve or initiate the dialogue with the countries of origin by sharing information.

In this paper, the process and outcome of applying the newly developed methodology to discern colonial collecting motives is shared. Different insights that have been obtained during this process are presented and followed by a discussion. This paper follows from an extensive report that has been written on the investigated geological Suriname collection of the TU Delft (Versluis, 2022) and could serve as an example for exploring both the processes that shaped today's colonial NHCs and how our understanding of such processes evolves.

Methods

A novel methodology was applied to research the colonial geological Suriname collection of the TU Delft. The presented method aims to understand the collecting motives of the collectors. This can only be done by gathering as much information on the circumstances of the collecting process as possible and thoroughly studying the collection itself. The first step of the method involved an indepth analysis of archival materials, the collection itself, and literary sources. Following this, a collection hierarchy was created based on the acquisition circumstances of the collection items. This allowed for formulating collecting motive categories that could be matched to each part of the collection (Figure 1). The following section outlines the details of each step of this methodology.

1. Literature, archival and collection research

At the start of this research, all that was known regarding the content of the TU Delft geological Suriname collection was derived from the index page of the corresponding accession book. The first step of this research aimed to further expand

Figure 1. Flowchart of the methodology for recognition of collecting motives.

the knowledge of the collection history via literature and archival research. Various archives, including those of the Royal Dutch Geographical Society, TU Delft and Naturalis, were consulted for this research. Simultaneously, the accession books of the collection itself were researched. Notes on locations, names and dates found in the accession books were used to deduce the collection history. These leads were extensively studied using Delpher, an open access digital archive that contains Dutch books, magazines and newspapers that reach back to the 15th century.

Every box in the museum store room containing objects of the TU Delft geological Suriname collection was assessed, and each specimen and label visually checked for collector name and date (Figure 2). If original reports were available, the specimen information of the report was compared to the information on the label and the object itself. Due to its substantial size and suspected homogeneity, boxes labelled as the Lawa gold project were investigated for 33% via systematic sampling.

2. Collection hierarchy

With the obtained knowledge on the collection's context, a collection hierarchy was created, dividing the collection in subcollections and collection components that contain objects that were collected under the same circumstances. The division between different collecting circumstances was as detailed as possible and is limited by the knowledge derived from literature sources. This hierarchy is visualised in Table 1.

The collection encompasses 3868 rock specimens. The specimens were collected between 1853 and 1965, although the collection date is uncertain for some objects. With the exception of 88 specimens, every object could be connected to a collector, expedition, institute, mining company or project. The majority of the objects ended up at TU Delft due to its laboratory facilities available for geology and mining research, as well as through alumni. Such laboratory facilities were not available in Suriname during the collecting period, prompting the transportation of rock specimens from Suriname to Delft for analysis.

Table 1. The collection hierarchy of the geological Suriname collection from the TU Delft, reflecting the different collection circumstances. Components marked with an '' represent unexpected collection objects, as they were not listed in the Suriname accession book index. Abbreviations used: GMD (Geological- and Mining service of Suriname), TU Delft (Delft University of Technology), KNAG (Royal Dutch Geographical Society).*

Subcollection	*Collection Component*	*Amount objects*	*Year*	*Location*
Individuals	C.L.Van Nes	1	1905?	Gros placer, Suriname
	E. Essed	74	1924 - 1925	Coppename river, Suriname
	H. Roodenhuis*	17	1946?	Suriname river, Suriname
	A.H.Van Lessen	32	?	Saramacca river, Suriname
	B.P.F. Romer	12	?	Placer von Hemert, Suriname
	J.B. Harrison*	1	?	Marowijne river, Suriname
GMD	K*	29	1947?	Suriname
	F. d'Audretsch*	35	1949, 1951?	Suriname
	B*	32	1951?	Suriname
	H. Schols*	227	1953 - 1954?	Suriname
	Calcutta boring*	2	1965	Calcutta, Suriname
	V. De Munck*	4	?	Suriname, British Guiana
	AS*	2	?	Brokopondodam, Suriname
	J*	32	?	Jong Noord, Suriname
	KW*	2	?	Sabanpassi, Suriname
	L*	17	?	Suriname
	RM*	5	?	KM 62.5, Suriname
	Si*	19	?	Kabalebo, Suriname
	WK*	21	?	Suriname
Museums	K. Martin	60	1884 - 1885	Suriname river, Suriname
TU Delft	M.H. Caron*	2	?	Moengo, Suriname
	J.F. Holtrop*	162	1959 - 1961	Suriname, French Guiana, Brazilie, British Guiana

Table 1. (cont)

Subcollection	*Collection Component*	*Amount objects*	*Year*	*Location*
Expeditions	**Nickerie expeditions**	**206**	**1897 - 1900**	**Nickerie river, Suriname**
	KNAG - Coppename expedition	11	1901	Coppename river, Suriname
	KNAG - Saramacca expedition	99	1902 - 1903	Saramacca river, Suriname
	KNAG - Tapanahoni expedition	78	1904	Tapanahoni river, Suriname
	KNAG - Gonini expedition	78	1903 - 1904	Gonini river, Suriname
	KNAG - Toemoekhoemak expedition	21	1907 - 1908	Toemoekhoemak mountains., Suriname
	KNAG - Suriname expedition	67	1908	Suriname river, Suriname
	KNAG - Corantijn expedition	50	1910 - 1911	Corantijn river, Suriname
	Hendriktop expedition*	1	1922	Hendriktop, Suriname
	Border expedition*	37	1937	Suriname
	New York Botanical Garden Expedition*	24	1944	Tafelberg, Suriname
	Military expedition Coppename river*	23	1945	Coppename river, Suriname
	Coppename rubber expedition*	59	1943 - 1944	Coppename river, Suriname
	Emma range expedition*	61	1959	Emma range, Suriname
Mining business	Maatschappij Suriname - G.C. Dubois	281	1898 - 1899	Suriname
	Merkuur - G. Duyfjes	69	1915	Chinaqui, Nijbroek, Suriname
	Merkuur - G.E.J. Wiessing	25	1916 - 1917	Rosebel, Placer Toeval, Suriname
	NENIEM - J.A. Grutterink	114	1918 - 1919	Suriname
	NENIEM - E.A. Douglas	584	1918 - 1919	Suriname
	Sarakreek goudvelden N.V. - W. de Haan*	5	1953	Boschland, Suriname
	SBM	6	?	Moengo, Suriname
	Jannapau Mining Syndicate*	18	?	Jannapau, Suriname
Dutch government	German committee*	1	1853 - 1855	Nooit gedacht, Suriname
	Lawa	1074	1904 - 1907	Suriname
Unknown	Unknown	88	?	Suriname

In the subcollection 'Individuals', objects collected by individuals independently of any organization are found. Another subcollection has been identified as belonging to the Geological and Mining service of Suriname (GMD). These specimen bear specific markings related to this organization, and collectors are identified by either their full name or initials. Karl Martin (1851-1942) gathered as the director of the National Museum of Geology and Mineralogy. His collection is part of the subcollection 'Museums'. Two collectors, identified as researchers of the TU Delft, have collected specimens linked to their research. Additionally, a substantial part of the collection was amassed during various expeditions. The 'Mining business' subcollection contains objects collected by mining engineers, often TU Delft alumni. The collection also includes specimens from the German committee, which explored possibilities for German farmers to settle in

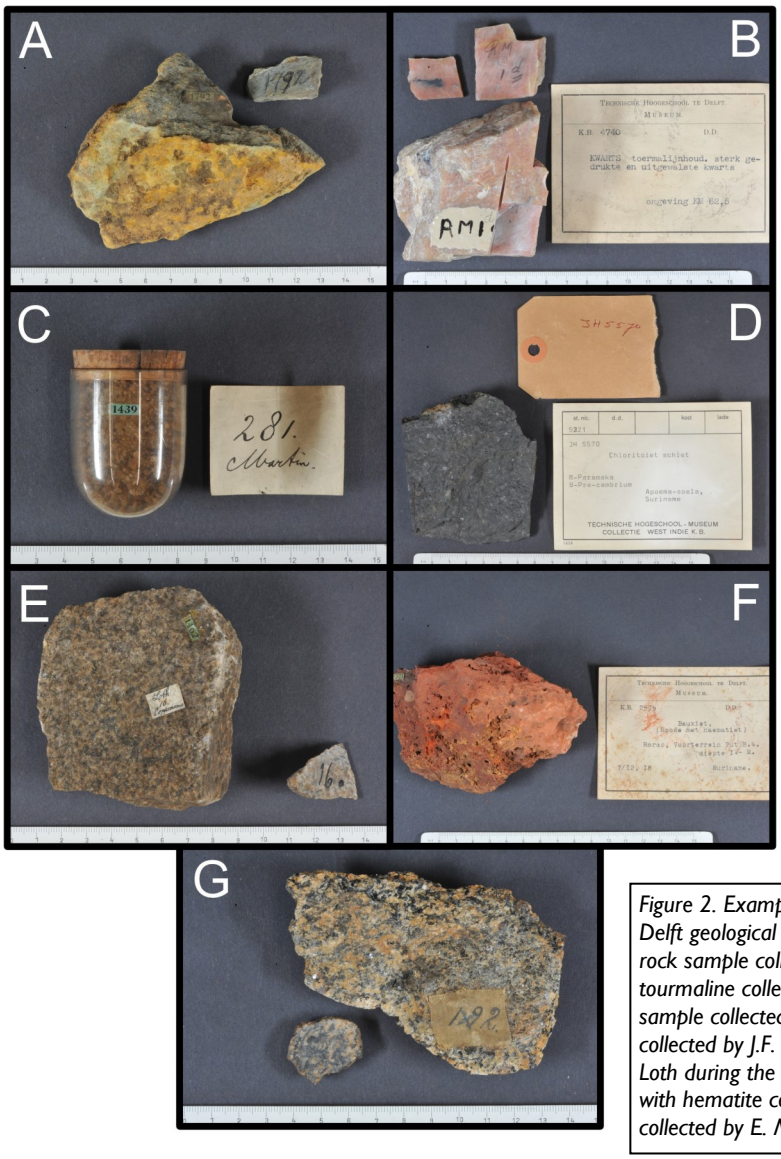

Figure 2. Examples of objects encountered in the TU Delft geological Suriname collection. A: unidentified rock sample collected by B.P.F. Romer; B: quartz with tourmaline collected by R.M.; C: unidentified sediment sample collected by K. Martin; D: chloritoid schist collected by J.F. Holtrop; E: granite collected by W.L. Loth during the Coppename expedition; F: bauxite with hematite collected by E.A. Douglas; G: granite collected by E. Middelberg for the Lawa gold project.

Suriname. Lastly, a significant number of samples relate to the Lawa gold project, a research initiative established to investigate the potential extraction of gold from the Lawa region in south Suriname. The research conducted by the German committee and the exploration of the Lawa region were both commissioned by the Dutch government.

3. Search collecting motives

Using the gathered sources, the next step focused on deducing collecting motives, which involved a thorough review of these sources for each component of the collection. The texts were scanned for phrases that stated as precisely as possible the aim or goal of the collecting process. In this way, all citations found that refer to the aim or goal of collecting the objects were noted and referenced for every collection component.

4. Create collecting motive categories

The most crucial step in this method concerns the appointment of collection objects to collecting motive categories. These categories were designed by reviewing all the citations found while attempting to identify trends. For every studied text the author tried to answer the question *'Why was this component of the collection collected?'* Often the answer to this question was: *'these objects were collected for science'* and so it was decided to create a scientific collecting motive category. These categories are entirely based on the information found in text sources. In this fashion, four distinct collecting motive categories were identified: 'scientific', 'economic', 'pure collecting' and 'intrinsic'. Definitions were then formulated for each of these categories:

The scientific motive

Objects collected with a scientific motive are collected with the aim to improve knowledge of the natural world. Specimens could be considered as collected with a scientific motive if the rocks, for instance, were collected for geological study. Indicators suggesting that objects were collected for science include instances where the collector published a scientific paper or geological map related to the object shortly after the collecting process. The collector often collects on behalf of a scientific institute or organization with the goal of addressing a specific research question.

The economic motive

An object is considered to have been collected with an economic motive if the collector's intentions were primarily focused on financial gain. An example could be a set of ore samples collected by an employee of a mining company. Ore, a natural rock containing valuable minerals, can be sold for profit. Hence, if the collected object is ore, there is a chance that it has been collected with an economic motive. Mineral samples can be sold for profit as well if the collected specimen has, for instance, an aesthetic value or even spiritual value. In many cases, a company is involved in the collecting process. Another indicator of an economic motive is evidence of the sale of the collected specimen shortly after the collecting date.

The pure collecting motive

An object is collected with a pure collecting motive when it was gathered with the goal of creating or expanding a professional collection. This may be the case when objects are collected on the instructions of a museum with the aim of adding them to the museum's collection. The affiliation of the collector with an institute that hosts collections could be an indicator that the object is collected for the collection of the same institute. Often, the goal of the specimen is to further complete a natural history collection, thereby improving the reputation of the institute hosting the collection.

The intrinsic motive

In contrast to the categories described above, objects collected with an intrinsic motive are gathered by a collector driven to collect for enjoyment or satisfaction rather than for a separable consequence. In other words, the collector was intrinsically motivated and moved to act for the fun or challenge entailed rather than because of external products, pressures or rewards. The collected object often ends up being a part of a personal collection instead of a professional collection, as is the case with a pure collecting motive. The collector is often an amateur, although professional collectors are not excluded from this category. An indicator of collecting with intrinsic motivation could be that the collector is on personal leave while collecting.

5. Categorization

The last step is to match the found citations on the purpose of collecting with the motive categories that are described above. For every match made, an argument is depicted to show why the researcher made the match. Of course, cases quickly become more complicated when multiple motives are thought to have played a role in the collecting process. In such cases an attempt was made to make a distinction between the main motive of collecting and the additional motive of collecting. It is assumed that without the main motive of collecting the collecting process would not have taken place at all (Table 2 for examples). Cases were encountered where it was impossible to match the collection component to a collecting motive category. Such collection components were assigned to the category 'Unknown'. In the result section, the arguments of every match made per motive category is presented together with the found context of the collection components. For the sake of this paper the original citations are translated into English. However, as translations can influence the interpretation of the text it is of utmost importance to use the original language of the citations during the application of this method.

6. Plot results

Finally, to obtain an overview of the different collecting motives that drove collectors, a graph is created by plotting the number of objects per (mixed) collecting motive category. Distinctions can be made between the different subcollections or collection components.

Results

During this research the newly developed method described above was applied to the TU Delft geological Suriname collection. The analysis followed a comprehensive review of archival records, literature sources and an examination of the collection itself. Different parts of the collection were assigned to various motive categories on the smallest scale possible, constrained by the available information. The section below details the trends uncovered in the collecting processes that shaped the studied colonial NHC. After presenting the obtained overview of recognised collecting motives, the

Table 2. Examples of mixed motives recognised in TU Delft's geological Suriname collection, applying the methodology for recognition of collecting motives.

	Example 1	*Example 2*
Subcollection	Expeditions	Dutch government
Component	Emma Range expedition	German committee
Collecting motive	Main: Scientific Additional: Economic	Main: Economic Additional: Scientific
Argument(s)	**Scientific:** The Emma Range expedition was a botanical expedition that aimed to travel to the Emma Range. The funding of the expedition came from the WOSUNA foundation (short for 'Scientific research in Suriname and the Dutch Antilles'), which finances scientific research in Suriname. The main goal during this expedition was to understand the processes that shaped the Emma range (Ijmuider Courant, 1959) **Economic:** During the expedition eyes were kept open for possible new sources of bauxite. (Ijmuider Courant, 1959)	**Economic**: Geologist Friedrich Voltz was sent to Suriname by the Dutch Government as a member of the 'German committee' to investigate the suitability of the soil for agriculture. (IJzerman, 1931; Kroonenberg, 2020). Furthermore the Dutch government included a geologist in the committee to learn more about the ores present in Suriname (Kroonenberg, 2020) **Scientific:** During his stay in Suriname Voltz had contact on a regular basis with Dutch geologist Winand Staring about his findings. At that time, Staring was the secretary of the head committee of Geological research of The Netherlands. Furthermore, Voltz sent his collected geological and botanical specimens to The Netherlands for research. (Kroonenberg, 2020)
Citation(s)	**Economic/Scientific:** "The soil expert and geomorphologist J.J. Wensink will collect soil samples, rocks and water samples and expose the geomorphology of the Emma Range to extensive research. Points of focus will be the tectonics, stratigraphy and character of the plateaus and terraces, and the measurement of the altitude of several peaks. Moreover, it will become clear whether the Emma Range hosts bauxite and whether the Roraima formation is present there." (Ijmuider Courant, 1959)	**Economic:** "He (Voltz) didn't make those journeys as an individual explorer. He was part of a committee that was send by the Dutch government to investigate the suitability of Suriname as settlement for German farmers. His travels were therefore limited and he had to apply with the instructions to investigate the coastal area and inland for the suitability of colonisation for Germans" (Kroonenberg, 2020) "The colonial government did, of course, select a geologist for the committee with a purpose. In the end it would be nice if valuable ores could be located" (Kroonenberg, 2020) **Scientific:** "During the planning stage, some members of the commission contacted the Dutch government, which arranged a contact between them and … Dr. W.C.H. Staring. It was arranged that Voltz would inform Staring by letter on the results of the German commission's work … Staring studied Voltz' letters of which he published excerpts" (Wong *et al.*, 1998) **Economic and Scientific**: "Voltz's work is characterized by purposeful and accurate research; he takes an interest in economical possibilities as well as in the advancement of science" (IJzerman, 1931)

used sources and arguments that led to the overview will be introduced per collecting motive category.

Recognised collecting motives

The studied colonial collection is described using subcollections which in its turn are divided into collection components, i.e. the most detailed division possible to group objects that were collected under the same circumstances or context. The developed method uses literature sources that describe the circumstances of collecting for every collection component to assign collecting motive categories. With the obtained data a visualisation was made of the relationship between the collecting motives and the

subcollections present in the collection: Individuals, Geological- and Mining Service of Suriname (GMD), Museums, TU Delft, Expeditions, Mining companies, Dutch Government and Unknown (Figure 3). As can be seen in Figure 3, the two primary collecting motives identified in the studied collection were the 'scientific' and the 'economic' motive (see the method section for category descriptions). In many cases, a mix of motives was identified, and efforts were made to distinguish between the primary and secondary motives. In this research the cases of mixed categories are denoted as follows: main motive/second motive/ third motive. The analysis depicted in Figure 3 reveals that the 'economic' motive emerges as the most prominent collecting motive in the NHC. More than half of the TU Delft geological Suriname collection was interpreted as being collected for economic purposes. The majority of collection objects that belong to this category are part of the 'Dutch government' subcollection (27.8%)

and the 'Mining business' subcollection (28.5%). This suggests that economic factors played a significant role in the collecting processes that took place in the early 20th century. Another 27.1% of the collection was understood to have been collected with a mixed scientific/economic motive. Specimens linked to this mixed motive were mainly gathered during expeditions, indicating that collecting during these voyages was not only done with the goal to gain (natural historical) knowledge but also for the purpose of, for instance, seeking exploitation possibilities. Examples of the 'pure collecting' and 'intrinsic' motives were also recognised, although these appeared far less frequently. Using the designed method it was possible to attribute 94.5% of the entire TU Delft geological Suriname collection to a collecting motive category. This left only 5.5%, or 213 objects, in the category 'Unknown'. From these objects, a total of 88 lacked any information about the collection year, location, or collector.

The economic motive

Within the TU Delft geological Suriname collection, literature sources indicate that more than half of the collected objects was collected with an economic motive. A total of 1102 objects linked to this motive were collected for the mining business, primarily by mining engineers, the majority of whom graduated from the mining faculty of the TU Delft. The engineers collected on behalf of the companies they worked for. Table 3 illustrates how the economic motive is deduced for three

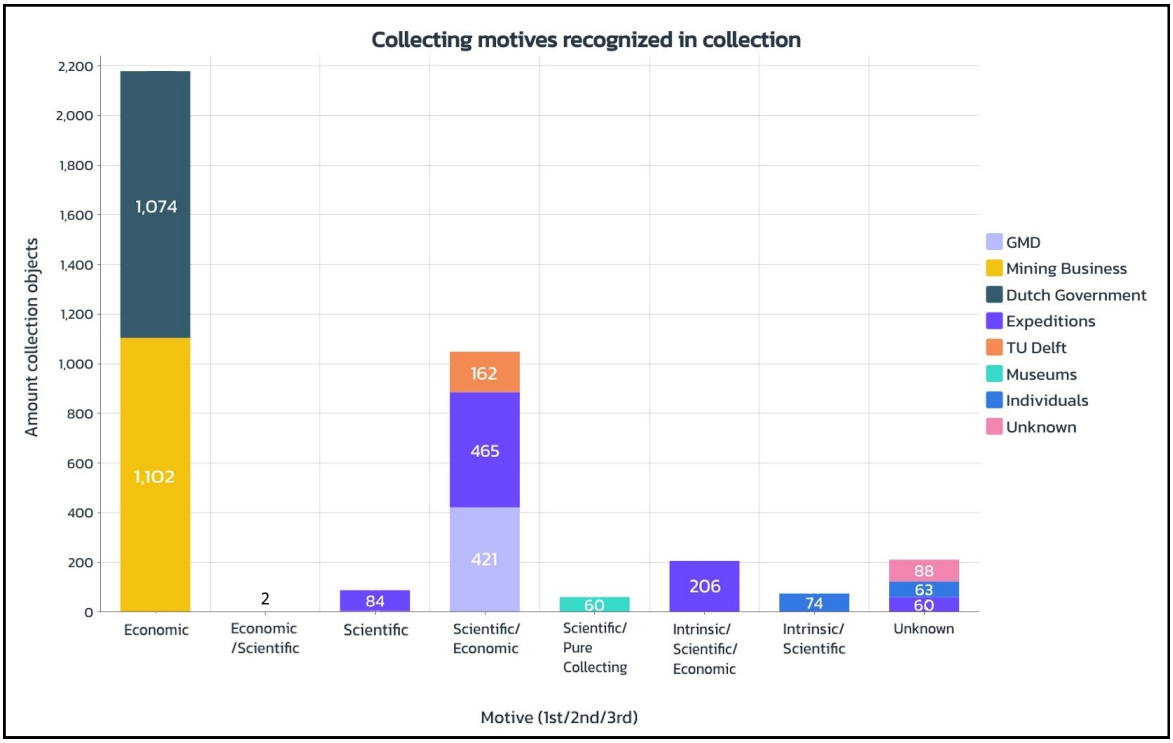

Figure 3. This graph shows how different collecting motives are interpreted in relation to the different subcollections of the TU Delft geological Suriname collection. The entire collection encompasses 3868 objects. A distinction has been made between a primary (1st) and secondary (2nd), or even third (3rd), motive when multiple collecting motives were thought to apply to a collection component.

Table 3. Three examples of collection components which have been collected by a mining engineer for a mining business, showing an economic collecting motive.

Collection component	Argument economic collecting motive	Citation(s)
Maatschappij Suriname – G.C. Du Bois	Du Bois was commissioned by the company 'Maatschappij Suriname' to investigate the plausibility of mining gold.	"A German geologist, G.C. Du Bois, visited Suriname in 1898-1899 as a gold prospector for the 'Maatschappij Suriname" (Wong *et al.,* 1998)
Merkuur – G. Duyfjes	Duyfjes was sent to investigate mercury deposits in Suriname by the Bonidoro exploration syndicate and Maatschappij Merkuur. (Duyfjes, 1915)	"We have succeeded in tracing the original location of the Chin A Qui terrain where cinnabar was found. This site cannot be considered for exploitation." (Duyfjes, 1915)
NENIEM – E.A. Douglas	Douglas was sent in 1918 to investigate the bauxite quality on the Rorac concession and the Nassau mountains on behalf of the NENIEM (Wong *et al.*, 1998)	"Interest in the mining of mineral resources in Suriname awakened in the meantime also in Europe. NENIEM (Nederlandsche Mijnexploitatie en Exploratie Maatschappij) was formed in 1917 … In 1918 E.A. Douglas … arrived in Paramaribo to investigate the NENIEM bauxite deposits" (Wong *et al.*, 1998)

collection components following the method for recognition of collecting motives.

The collection also contains over 1000 objects from the government-led Lawa gold project. The gold fields of the Lawa region were discovered in 1885. However, the fields were situated between two tributaries of the Marowijne River, which was considered the boundary between Suriname and French Guiana. A border dispute followed that concluded in favour of the Dutch. On what happened after, found citations in sources state the following:

> "*Towards the end of last century petitions were addressed to the Government for a systematic investigation by Mining experts. The petitioners pointed to the deficient geological knowledge, and maintained that a systematic investigation would open up new goldfields. They also set forth that traces of other minerals furnished support to their belief that Surinam would have a future as a Mining country, if the interior were opened and explored… The exploration of the Lawa basin was taken up by the Government"* (IJzerman, 1931)

> *"By order of the Minister of Colonies of 23 December 1902... the reporter was instructed to go... to Suriname and to make himself available there to the Governor of that Colony in preparation for an investigation into mineral-bearing sites in the Lawa area and the way in which they can be extracted"* (Van Loon, 1904)

On behalf of the Dutch minister of Colonies, Eduard Middelberg (1873-1948) and Carel Jan van Loon (1859-1915) (both TU Delft graduates) investigated the gold field area on the feasibility of gold exploitation. The results were unsatisfactory as large quantities of gold had been previously extracted or looted from the area, making the mining of the remaining ore unprofitable. (Van Loon, 1904; Middelberg, 1908; Duyfjes, 1910;

Wong *et al.*, 1998). In this case, collector Middelberg accumulated the rock specimens on behalf of the Dutch government. The citation indicates a purely economic motive due to the focus on exploring new goldfields. According to this text the exploration was a response to the petitions addressed to the government and implies a primary incentive to uncover and exploit valuable mineral resources for economic gain.

The economic/scientific motive

In a couple of particular fractions of the collection, sources regarding the collecting process were found that gave the impression that aside from an economic drive also a scientific motive played a

role. Hence, in these cases objects were assigned a primary economic motive with a secondary scientific motive. The case of geologist Friedrich Voltz (1828-1855), who collected samples as a member of the German committee, is shown in Table 2 in the method section. In a similar way, mixed motives were assigned to kaolin samples that have been linked to TU Delft professor Martinus Hendrik Caron (1883-1958). On the circumstances of his research the following has been written:

> "*However, the samples and the equipment available here did not allow us to assess the Surinamese kaolins for their usability. Hence, there was sufficient reason to conduct a more extensive investigation ... In addition to the investigation for usability as a ceramic material, the samples were also examined for their mineralogical composition ... it appears that the Surinamese kaolins are of a very varied character, both in terms of usability and raw material for the ceramic industry and in terms of the geological origin*" (Schols, 1949)

Whether Caron was the actual collector of the samples is not known, but he investigated the samples for the GMD both to assess the commercial feasibility for the ceramic industry and to understand the geological formation process. As the citation above explicitly mentions the need to assess the usability of the kaolin samples, this citation infers that the geological research regarding the kaolin formation would not have been conducted if kaolin had no value for the ceramic industry.

The scientific motive

Compared to the economic motive, there is a modest portion of the collection understood to have been collected solely for scientific purposes. Most of the objects associated with a scientific motive were collected to improve the knowledge of the geology of Suriname. But that was not always the case. A notable yet small component of the studied collection comprises three Pre-Columbian stone axes collected by Victor de Munck (1920-1957). These axes are ethnographic objects that have always been part of this NHC collection, and were described as rocks. Hence, prior to this research it was not known that these axes were present in the collection. De Munck worked for the GMD and therefore the axes are linked to a paper published by GMD geologist Salomon Kroonenberg in 1976 (Boomert and Kroonenberg, 1976). Their goal was stated as:

> *"We will try to reconstruct and describe one of the Amerindian trade networks, existing in the Guinanas during Pre-Colombian times and discuss its geographical limits, centre, radiation and dating…. In addition we will discuss the evidence for the trade of stone artifacts during Post-Columbian times in the Guianas"* (Boomert and Kroonenberg, 1976)

The mineralogy of the collected stone axes was investigated with the aim of uncovering Indigenous trade routes by tracing the origin of the stone axes (Boomert and Kroonenberg, 1976). The axes collected by De Munck bear the marks of mineralogical research and hence are most likely connected to the paper of Kroonenberg. To collect stone axes for the purpose of retracing Indigenous trade routes is an unusual example of collecting. In this research, the axes are matched to the scientific motive, although the cultural-historical dimension of the axes does not fit neatly in this category. The case is further elaborated in the discussion section.

The scientific/economic motive

The mixed scientific/economic collecting motive represents the second largest fraction in the TU Delft geological Suriname collection. A total of 1048 collection objects are understood to have been collected for scientific advancement, with distinct economic goals also playing a role. The line between this mixed motive category and the economic/scientific category is very fine. Nonetheless, an attempt was made to make the distinction between the two. An useful example concerns the majority of the GMD subcollection. Despite the fact that mining activity in Suriname was already present in 1875, it took decades before a geological survey was set up:

> *"The need for a systematic geological survey of the interior had already been recognized during the period of intensive gold mining but only in 1943, the Mining Section was established …the section was transferred into the Geological and Mining Service (GMD) in 1949… The tasks given to the GMD were: to survey and prepare a geological map of Suriname, to compile an inventory of mineral resources, to advise the Minister on mining legislation, exploration licenses and concessions,.. to render consulting services to government and private organizations. …The GMD activities at the time (1943) covered both mineral investigations (including water) and systematic reconnaissance mapping of the northeastern part of the country … These great efforts eventually led to the publication in 1977 of the .. geological map of Suriname …*

> *After having reached this milestone … the main activities shifted towards exploration"* (Wong *et al.*, 1998)

Although tasks of the GMD were linked to the mining sector, the first main goal of the organisation was to systematically map the country. Since the objects in the collection were gathered before 1977, the primary objective for collecting the rock specimens was to acquire knowledge to publish a geological map. Therefore, in this research this part of the collection has been appointed to the scientific motive with an additional economic motive. However, one could argue that the geological map was mainly produced for mining purposes. This demonstrates how applying the method can open up dialogues concerning colonial collecting circumstances.

Another significant subcollection assigned to the scientific/economic category includes rock specimens gathered during expeditions by the Royal Dutch Geographical Society. Similar to the GMD, these expeditions aimed at mapping the interior of Suriname, although there was plenty of room to conduct natural-historical research as well. Geological research during these journeys was especially mentioned as essential, not for science but for the possibility of uncovering economic deposits such as gold:

> "*The Society for Suriname considered in the course of 1897 the desirability of systematic scientific investigations of the lesser known parts of the 'Colony Suriname'. Favourable advice from a group of influential gentlemen, in 1897, was followed by a discussion of the proposal .... Positive reactions were received by April 1899, with the suggestion to commence with the Coppename/Saramacca river areas. The primary activity should be a topograpical survey with ample room for natural-historical investigations, and, in particular for the collection of rock samples and floral and faunal specimens.*" (Wong *et al.*, 1998)

> "*Furthermore, in this report great importance was attached to geological research with a view to finding rich mineral resources*" (Van Stockum, 1902)

The scientific/pure collecting motive

Collecting often results in the formation or enlargement of a collection, but the objects in the TU Delft Geological Suriname collection were not primarily gathered with the intention of being part of the university's collection. The only case of the pure collecting motive recognised in the collection are the 60 rock specimens of Karl Martin (1851-1942). As the director of the National museum of geology and mineralogy during his travels to Suriname, Martin's main purpose to collect was to gain more geological knowledge:

> "*The geological investigation was the actual purpose of my trip"* (Martin, 1887)

Indeed, a geological map resulted from Martin's journey (Martin, 1887), but a book published fifty years later to celebrate Martin's achievements, implied that the museum benefitted from his journey, suggesting the collected specimen were added to the museum collection:

> *"Martin undertook three important trips abroad to gain knowledge about the geology of the Dutch Colonies and to advance the geology of those colonies. The trips benefited the Leiden museum*" (Leidse geologische mededelingen, 1931)

While no proof has been found yet to support this, it is known that around 200 zoological objects collected during the same journey were donated to the museum by his fellow traveller Mr. Neervoort van de Poll (1862-1924):

> *"Mr. Neervoort van de Poll in Amsterdam collected all the animals on his trip to the West Indies ... gave them as a gift to the Museum"* (Gijzen, 1938).

This knowledge strengthens the theory that Martin's collection might have been obtained for a scientific purpose but with an additional pure collecting goal for the museum.

The intrinsic/scientific/economic motive

The 206 rock specimens collected during the Nickerie expeditions of 1897 and 1900 represent the most complex mix of motive categories identified during this study. From the expedition report it has been assumed that these two expeditions would not have taken place without the personal desire of the expedition leaders to experience an adventure and to explore. The first expedition, initiated by lieutenant Corstiaan Van Drimmelen (1860-1935) during his personal leave, was driven by a desire to explore uncharted territories:

> *"Wanting to follow the example of one of his [Van Drimmelen] predecessors... to travel some distance into the inland never before entered by a European, this diligent civil servant did not wish to return*

> *without some knowledge of mineral and geography, in order to bring together a collection of earth and stone types useful for research and to add notes that could reveal the general features of the geological condition of the area travelled through."* (Van Capelle, 1903)

From this citation it becomes evident that it was Van Drimmelen's wish to return to the Netherlands with knowledge relevant for geology. Hence, this research has appointed a scientific motive as a secondary motive of collecting. Afterwards, Van Drimmelen met Herman van Capelle (1857-1932) at the institute for agriculture in Wageningen. Sharing his expedition experience, Van Drimmelen ignited a childhood dream of Van Capelle, who wished to explore the tropics. This led to the organisation of a second expedition:

> "*During the meetings that I [Van Cappele] held with Van Drimmelen … the great desire for a research trip in the tropics, the dream of my youth, awoke again in me. This desire grew, when I had to consult ... the important writing of my former teacher. … not least the questions that the geological results of Van Drimmelens' journey had given rise to, aroused my desire more and more to go on an exploratory tour through the West of the colony of Suriname*" (Van Capelle, 1903)

Van Cappele found various investors, some of whom requested to include gold prospecting alongside the scientific objectives:

> "*a number of private individuals and companies had also selflessly promised me equal support ... I received a proposal from capitalists that, in addition to scientific research, I would also be responsible for research into exploitable minerals, more specifically gold. and to accept a significant amount of money for this purpose.*" (Van Capelle, 1903)

Hence, the economic motive was assigned to this part of the collection as a third reason for collecting.

The intrinsic/scientific motive

A minor amount of the TU Delft geological Suriname collection has been assigned an intrinsic/ scientific motive. E. Essed's collection of 74 rock specimens serves as an interesting example of intrinsic collecting intertwined with scientific motives. His story considers the scientific heritage of Friedrich Voltz. Voltz, previously mentioned as a collector who collected for the German committee, was also viewed upon as the first geologist to conduct geological research in Suriname. His collection of almost 900 rock specimens ended up in the collection of the National museum of geology and mineralogy. But information on the locations was minimal as Voltz' map was lost, together with a significant amount of specimen labels (Kroonenberg, 2020). In order to try and regain some of the lost knowledge, researchers tried to resample the same sites along the Coppename River that Voltz must have sampled, but the research led to more questions than answers (Bergt, 1901; Kroonenberg, 2020). Unsatisfied with this outcome, Essed embarked on a personal mission to the Coppename River to retrace Voltz's work himself:

> *"In the following pages I shall try to conclusively prove that Martin and Bergt were wrong in basing such a strong opinion on the results of the microscopic examination of only 16 rockspecimens … and to place this opinion against that of Voltz…"* (Essed, 1926)

Though the application of the collecting was scientific, Essed's reasoning has been emotional in his paper:

> *"It will give me great pleasure if this sketch … will lead to the restoration of Voltz into the place he really deserves amongst the men, who, bravely facing all the troubles and obstacles laid in their way by men and nature, assiduously worked, even laid down their lives as Voltz had done, apparently with no other aim in view than delivering, to the best of their ability, their fair share in the furtherance of human knowledge and scientific research."* (Essed, 1926)

This sentiment was also recognised by the scientific community at that time (Martin, 1926/1927). Thus, the objects in the collection are understood to not have been solely collected for geological knowledge since Essed might have had a personal concern for Voltz's heritage. Most likely Essed experienced satisfaction while trying to safeguard Voltz's heritage.

Discussion

In this research, a novel method was developed and tested to uncover the reasons for collecting the geological Suriname collection of the TU Delft. Since the method is designed to investigate cultural sensitive collections it is necessary to critically evaluate the process.

Creating collecting motive categories

A key point of discussion regards the process of creating collecting motive categories. It is evident

that the results that followed from the tested method are entirely dependent on the categories created, their definition, and the researcher's point of view. Of course, it is only possible to create relevant categories to the best of our knowledge and when information is limited, it will influence the quality of the results. The outcomes of this method should be interpreted as a visual representation of the current understanding of the examined collection.

As the stories behind every collection are unique, so should be the created collecting motive categories. The categories used in this research are based on the cases encountered in the studied TU Delft geological Suriname collection. Investigating another collection could reveal entirely different collecting motives. One can imagine that NHC objects might be collected with political or military motives. Or perhaps with religious or cultural drivers. The exploration of collecting motives is an ongoing process. The same is true for the description of the categories. Another study might wish to search for economic motives in their collection history as well, but with another understanding of what that encompasses. This poses no problem, provided the researcher explicitly outlines their definition of the category and offers justifications for its applicability to specific parts of the collection.

Applying collecting motive categories

During this study, it has often been challenging to distinguish between the scientific and economic motive. The challenge is inherent to the difference between collecting for geological research and for mining. Mining engineers practise applied science when collecting, while geologists practise basic, or natural science. At the same time, the geological research conducted in Suriname often supported mining operations. Recognising intrinsic collecting, defined here as collecting for personal joy or satisfaction, presents its own challenges. In the entire studied collection, no case was encountered that could be solely linked to intrinsic collecting. The category was primarily created to address the objects collected during the Nickerie expeditions. This part of the collection was assigned a partial intrinsic collecting motive, even though it is likely that the objects not find a place in a personal collection. Lieutenant Van Drimmelen can be seen as an amateur, given that his entire career path was not connected to science, geology or mining. Van Capelle, on the other hand, was teaching geology at the Wageningen institute were he met Van Drimmelen, and together they organized a second Nickerie expedition. Nonetheless, this research argues that the objects would not have been collected if both Van Drimmelen and Van Capelle did not have the desire to embark on an adventure.

These nuances highlight the difficulty of applying the tested method. The effectiveness of the method depends on transparently justifying each categorisation decision. In this way, the context of the collection is depicted to the best of our ability and the results may open up dialogues. If a dialogue follows that changes the categorisation decisions, the opportunity arises to replot the results. In this way it is possible to track the development of the understanding of the collection's context by replotting Figure 3 and observing the changes. Unfortunately, this study lacked cooperation with a Surinamese community. Otherwise, the changed perspective on the collections context after a dialogue with such a community could have been presented in this paper.

Use of literature sources

As evident from the result section, the method used in this research entirely relies upon the Available information. The usage of words gives us hints that allow us to form an opinion about the circumstances under which the objects were collected. For this paper, many of the quotes were translated into English. However, the matches with collecting motives were made using the original languages of the texts. Translations always involve an interpretation of the text from the translator's point of view and could hence influence the results of the method. Furthermore, while studying literature sources, it is important to practice source criticism: prior to using a source one must evaluate the reliability of that source and avoid presentism. This means that we must not use a present-day interpretation of texts that have been written in the past.

Repeatability

Whether the method is suited for other collections entirely depends on the used collecting motive categories. In this case the categories were especially designed for NHC objects. This has become evident from an encounter with Pre-Columbian stone axes in the studied geology collection. This research has tried to include these objects in the collection analysis, which has proven to be difficult. The axes cannot be linked to a motive category that is designed to study NHC objects, as they were gathered for their cultural-historical value. It is for this reason that this research intended to show this case, as it is an example of challenges encountered in colonial NHCs.

The abundance of background information enabled this research to match 94.5% of the collection to specific collecting motives. In this way the study showed that economic drivers played a major role in the collecting process. However, the absence of information could lead to misguided conclusions. Hence, the effectiveness of the method presented here relies on the accuracy and quantity of available information on the studied collection. It is hard to predict the effectiveness of the method when applied to another collection as it is difficult to determine a threshold on the amount of necessary information. Matching collection objects to a collecting motive requires information such as a year, affiliated collector or institute, and the context of collecting. Without such information at hand, the application of this method will prove to be ineffective.

Future research

As stated earlier, the method could be used to track changes in the perspective on the collection's historical context over time. This could be done for instance at the start and end of a study or after a dialogue with a relevant community where the first results of the applied method could be discussed. Perhaps the method could be used to gauge the opinion of the museum public on colonial collections as well. In an exhibition featuring a colonial collection, the public can be engaged at each display by offering a choice of collecting motive categories and providing space for their own interpretations, thereby gathering diverse perspectives on the context of the collection. Furthermore, it would be interesting to test the method on different types of colonial NHCs, such as a vertebrate or botanical collection. This could reveal varied motivations in colonial collection practices. It may be that the method can be applied to ethnographic colonial collections as well, when entirely different motive categories are developed.

Conclusion

This paper results from investigating the provenance and collecting motives of the geological Suriname collection of the Delft University of Technology. The investigation aimed to understand the processes behind the formation of the collection. After extensive archival, literature and collection research, an overview of different recognised collecting motives was made. The most significant motive identified in the collection was the economic motive, accounting for 56.3% of the collection. The collectors connected to this part of the collection were often TU Delft alumni and either employed by a mining company or by the Dutch government. Many objects collecting during expeditions were found to have dual motives, not only scientific but also economic. Hence, this research illustrates the significant role that economic factors played during the formation of the studied NHC. These findings align with Gelsthorpe's research on Manchester's museum mineral collection, reflecting the economic activities of colonial powers in their respective regions (Gelsthorpe, 2021).

When applied with clear definitions of the used categories and transparently presenting the arguments for every categorization choice, this method becomes a tool that visualises the processes that drove colonial collecting. A single application of the method provides results that could initiate dialogues about colonial collecting motives. A second application of the method, following dialogues that consider the initial results, might show how our understanding of colonial collecting processes evolves. Therefore, this research could assist decolonization efforts by making complex colonial collecting histories comprehensible and by encouraging dialogue and collaboration between the Netherlands and Suriname on colonial collections.

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