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Ministry of Mines

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SUMMING IT UP

Activities and outcomes of Canada's Supporting the Ministry of Mines Ethiopia (SUMM) project

2016–2022

TABLE OF CONTENTS

Ethiopia's mining sector is set for growth: open, sustainable and responsible growth.


Modernized mineral cadastre: online licensing from anywhere in the world
modern


The new Ethiopian National Mining Cadastre System allows for transparent, online mineral licensing and registration from around the globe. It offers accurate geological and administrative information, ease of use and fast turn-around. Licenses are granted in weeks, not months.
nization


Digital geosciences data
on vast resources: gold, gemstones
and more
transp

Improved geosciences data—online, publicly accessible, centralized—provides quality information on the type and location of the country's mineral resources. And these resources are vast. Ethiopia boasts more than 30 known minerals, from gold and gemstones to tantalum and potash.

arency


Artisanal mining roadmap:
safer, sustainable and more
equitable practices
formal

Ethiopia's roadmap to bring more artisanal and small-scale miners into the formal mining sector will generate revenues and promote safer and more environmentally sustainable practices. The aim is healthier, more economically secure communities that benefit both women and men.

iZation

THE SUMM PROJECT

Underpinning this modernization of Ethiopia's mining sector is Supporting the Ministry of Mines Ethiopia (SUMM), a six-year, $15-million project funded through Global Affairs Canada that winds up in 2022.

ETHIOPIA'S AMBITIOUS POVERTY-REDUCTION PLAN TARGETS GROWTH IN FIVE KEY SECTORS. MINING IS ONE OF THEM.

Ethiopia is a landlocked country in the Horn of Africa, with a 2020 population of roughly 115 million people. In 2015, Ethiopia set out an ambitious poverty-reduction target in its second Growth and Transformation Plan (GTP II): achieve status as a low middle-income country.

The GTP II committed the Ethiopian government to stimulating broad-based economic growth, while also empowering women and youth, strengthening democracy and good governance, and establishing a climate-resilient, green economy. The plan pointed to growth in five key sectors as essential to success.

Mining was one of them.

Ethiopia sits on more than 30 known minerals, including gold and other precious metals; base metals such as copper, lead and nickel; tantalum and other rare earths; iron ore; potash; gemstones such as opals, emeralds and more; and a wide range of industrial and construction minerals.

Yet, in 2015, Ethiopia's mining sector contributed less than one per cent to the country's GDP. Mining investors shied away because the country lacked a predictable licensing system and readily available geological data. Other revenues didn't show up on the books because artisanal mining worked largely outside of the formal mining sector.

Ethiopia turned to Canada for help.

The result was the SUMM project. With funding from Global Affairs Canada, the Canadian International Resources and Development Institute—housed at the University of British Columbia until its move to Canadian Executive Service Organization in March 2021—partnered with the Ethiopian Ministry of Mines (MoM) and the Geological Survey of Ethiopia (GSE), as it was then called, to develop program goals and objectives that aligned with the GTP II.

To support the overall goal of strengthening human resources and technical capacity within the MoM, SUMM's objectives included:

- establishing a predictable and transparent licensing system
- providing world-class geoscience information
- strengthening small-scale and artisanal mining
- incorporating gender equality, environmental and community sustainability, and good governance into all of the above.

As the project winds up this year, this report describes its main activities over the past six years and what it has achieved.

We have reached out to mining investors about the opportunities available in Ethiopia.

We have modernized Ethiopia's cadastre to provide a consistent, accountable and transparent mineral licensing system.

We have undertaken initiatives to formalize the artisanal and small-scale mining sector.

MESSAGE FROM THE MINISTER OF MINES

Growing and improving Ethiopia's mining sector is one of our top priorities in achieving our country's aim of becoming a middle-income country.

Ethiopia's strategy for growth was laid out by our Prime Minister, His Excellency Abiy Ahmed, in the 2019 Homegrown Economic Reform Agenda. The agenda sets a foundation for sustainable and inclusive growth that will transform Ethiopia from a largely agrarian low-income country to an industrialized lower middle-income country by 2030.

Mining is key to our success. The aim is to increase the mining sector's contribution to GDP to 10 per cent by 2030, up from less than one per cent in 2015. We are doing this by attracting external investors to help grow Ethiopia's large-scale mining sector, and by working with local communities and regions to help formalize and improve the country's artisanal and small-scale mining sector.

As we grow our mining sector in Ethiopia, we are fortunate to be supported by countries like Canada that have rich mining experience. I am grateful to Global Affairs Canada for its funding of the SUMM project. It allowed us to partner with the Canadian International Resources and Development Institute and, together, continue building a mining sector that incorporates environmental protection and sustainability, gender equality and good governance.

We have accomplished much. Here are a few of many examples in this report that illustrate what our partnership with SUMM has allowed us to do.

We have modernized Ethiopia's cadastre to provide a consistent, accountable and transparent mineral licensing system. It is one of the first in Africa to link a federal authority (the Ministry of Mines in Addis Ababa) to sub-national regions (our 11 regional states and two city administration mining bureaus) in a truly functional way. SUMM's support included not only the procurement of world-class software and hardware, but also an investment in training to ensure staff at the Ministry of Mines and in regional mining bureaus know how to use it. SUMM also procured laboratory equipment that will allow the MoM and Ethiopian Geological Institute (EGI) to better monitor compliance with environmental and R&D standards during the life cycle of a mining project.

We have reached out to mining investors about the opportunities available in Ethiopia. SUMM supported the annual participation of MoM and EGI staff at leading, international mining-industry conferences, such as the Prospectors and Developers Association Conference in Canada and Mining Indaba in South Africa. Our participation at these events allows us to reach important stakeholders from around the world, and position Ethiopia as a worthy destination for mining investments.

We have undertaken initiatives to formalize the artisanal and small-scale mining (ASM) sector as a way to address its many environmental, health, social and economic challenges. The SUMM project supported a pilot ASM formalization intervention that brought encouraging results. Scaling up the ASM formalization and replicating the pilot's success is now a top priority of the MoM and Government of Ethiopia.

As the SUMM project closes, we at the Ministry of Mines are committed to carrying forward the programs and initiatives started with SUMM's support—for the benefit of the sector and for the benefit of the people of Ethiopia overall. It will be a testament to the value of international support to developing countries.

Takele Uma Banti
Minister of Mines
Government of Ethiopia

CADASTRE SYSTEM

TRANSPARENT AND FAIR MINERAL LICENSING

A mining cadastre is the principal public tool that manages mining titles in a country. A well-developed cadastre integrates the regulatory, institutional and technological aspects of mineral rights administration and, thus, is the cornerstone of a country's efficient, transparent and accountable management of mineral resources. The Ethiopian National Mining Cadastre System, built with SUMM's financial and capacity-building support, is that cornerstone.

"WITH THE NEW CADASTRE SYSTEM, RELATIONS WITH CUSTOMERS HAVE IMPROVED. NOW THE SYSTEM IS TIME EFFECTIVE, AND IT'S EASY TO SOLVE PROBLEMS."

Kedir Shikur
Senior Mineral Licensing and Administration Expert
Ministry of Mines

CADASTRE SYSTEM TODAY

In December 2019, the Ethiopian National Mining Cadastre System (ENMCS) went live, making Ethiopia one of a few African countries with an online, publicly accessible cadastre system. And it was one of the first in Africa to functionally link a federal authority with regional states to offer comprehensive licensing of large-scale, small-scale and artisanal mining.

With new functions and upgrades since its 2019 launch, the ENMCS today allows registered users to:

- apply for and renew mineral licenses, certificates and permits
- view license details, obligations and contact information
- submit annual and quarterly work plans and reports, including environmental impact assessments
- under certain conditions, make payments online, including royalty payments
- apply for ownership transfers, area relinquishments and extensions, and work program modifications
- view embedded videos on how to carry out mineral-rights-related business online.

For investors from Ethiopia and around the globe, the ENMCS brings transparent and fair procedures, accurate geological and administrative information, ease of use and fast turn-around.

For Ethiopia, the ENMCS allows for real-time sharing of information between the Ministry of Mines in Addis Ababa and regional mining bureaus in 11 states and two city administrations. It allows the Ministry to assess how well it is achieving its GTP II and Homegrown Economic Reform Agenda objectives by monitoring, among other things, revenues generated in the sector and their contribution to the country's GDP; jobs created through foreign investors, national companies and artisanal mining; and compliance with environmental, health and safety, and other socially important goals.

Through its financial support and capacity-building expertise, SUMM was instrumental to the development of Ethiopia's new cadastre system.

OLD SYSTEM SLOW, MANUAL ONLY

Before the SUMM project, Ethiopia's mineral licensing system was very different. It was largely manual. People had to attend in person at the MoM or a regional mining office to deal with licensing matters. When they shared information, the MoM and regional offices relied on the mail service. The system was cumbersome, slow and time-consuming. And it was sometimes corrupt; manual licensing was vulnerable to bribery.

"The solar-based power back-up lets us use the cadastre system uninterrupted."

Muhibu Heyar
Senior Mineral Licensing and Administration Expert
SNNP Region, Ethiopia

In 2009, the Ministry of Mines tried implementing a cadastre system (Trimble's Flexicadastre), but it didn't take hold. A SUMM review pointed to a number of reasons.

The cadastre system was often unavailable during frequent power outages. Regional mining bureaus lacked the technology (e.g., software, hardware, networks) to run it. And too few people within the Ministry and mining bureaus were skilled in how to use it.

As a result, the regional mining bureaus sometimes relied on their own stand-alone, manual systems, which created mineral license data silos. This could lead to MoM issuing licenses to investors that overlapped with licenses issued by regional mining bureaus.

WORKFLOW PROCESSES ADAPTED FOR ETHIOPIA

In the modernization of Ethiopia's cadastre system, the MoM and SUMM were determined to make the new system a success.

The migration to the new cadastre system began with the MoM's decision to upgrade its software to Trimble's Landfolio. SUMM financed the new **cadastre software**, as well as its adaptation to the Ethiopian context. Much of that took place in February 2019, when the Ethiopian cadastre team—made up of eight federal and four regional representatives—spent two weeks at Trimble's African head office in Cape Town. There, the team designed clear step-by-step **workflow processes** for issuing and administering mineral rights both federally (at the MoM in Addis Ababa) and locally (at the regional mining bureaus).

The workflow processes, contextualized for Ethiopia's legal and administrative systems, were incorporated into the software system before ENMCS went live in December 2019. SUMM then continued to support the Ministry in adding new functions and upgrades. Notable among them was the addition of a **payment gateway**, integrated with the Commercial Bank of Ethiopia, to allow mineral licensing applicants and license holders to use an online account to transfer funds and make payments.

SUMM PROVIDES HARDWARE, SOFTWARE, SOLAR POWER

To support the use of this new cadastre system within the MoM and regional mining bureaus, SUMM procured, largely within Ethiopia but also internationally, the hardware and software needed to ensure the consistent use of the ENMCS throughout the country. The new **technology** included over 130 high-capacity desktop computers, as well as printers, uninterruptable power supply (UPS) battery back-ups, global positioning system (GPS) receivers, fixed and mobile internet 4G routers and a server.

After a COVID-related delay, enabling hardware and software were distributed from September 2021 to May 2022 to the federal licensing directorate at the MoM, to the regional mining bureaus and to selected "woredas" (i.e., administrative districts). SUMM also outfitted conference and meeting rooms at the MoM with large LED screens to enhance Ministry presentations and discussions on mineral licensing and administration.

To overcome the problem of grid power outages, SUMM procured easy-to-maintain **solar-based back-up power systems** that were installed in the regional mining bureaus. And to further ensure the ENMCS site and e-government portal are readily available to foreign and Ethiopian national investors, SUMM, Trimble and the MoM signed a five-year agreement to have Trimble **cloud-host the site and portal** through its Amazon Web Service.

BUILDING CAPACITY FOR FUTURE USE

Finally, SUMM took extensive measures during the final years of the project to ensure Ethiopia has the capacity to run the ENMCS now and in the future.

In May 2021, SUMM hosted a week-long **training** session of 24 regional and seven federal mineral licensing and administration experts on how to use the new cadastre system.

In November 2021, three information technology (IT) and five mineral licensing professionals from the Ministry of Mines received advanced training on administering and configuring the ENMCS.

And throughout the fall of 2021 and winter of 2022, week-long, on-the-job cadastre training sessions were delivered by Ministry staff to regional mining bureaus. Over 60 mineral licensing and administration directors, deputy directors and other regional experts have been trained on the consistent day-to-day use of the ENMCS. (As well, the Ministry staff who trained the mineral licensing and administration experts in the regions are available to provide **technical backstopping** during times of mineral licensing staff turnover at the regional mining bureaus.)

SITE HOUSES TRAINING SESSIONS, MANUALS

To ensure the proper use of the ENMCS going forward, SUMM worked with MoM and Trimble (the cadastre software supplier) to produce user, system administration, configuration and installation **manuals**. These manuals are backed up by **how-to video tutorials** for mineral licensing and administration officers on subjects ranging from granting a new license to administering existing licenses. They are also backed up by **recorded training sessions** for Ministry mineral licensing and IT professionals on advanced system/server administration and configuration, which allow them to amend the cadastre system's workflow processes to reflect changes in Ethiopia's mining proclamations and regulations. These advanced system administration training materials also help MoM professionals integrate the ENMCS with Ethiopia's geoscience information (see next section of this report). This, in turn, allows foreign and Ethiopian national investors to make informed investment decisions.

These user manuals, how-to tutorials and recorded training sessions are available through a dedicated ENMCS **training site**. This allows current staff to take refresher training as needed to keep their skills sharp and allows new staff to be quickly and properly trained in the consistent use of Ethiopia's new cadastre system.

"The online portal lets us know which areas are available and which are already taken in just a few seconds."

Yordanos Melaku
Ethiopia Country Management
Sun Peak Metals Corp.

GEOSCIENCES DATA

ACCURATE SCALE MAPS AND ONLINE METADATA

Accurate and reliable geosciences data is foundational to successful mineral exploration and extraction. Fortunately, Ethiopia has had the Geological Survey of Ethiopia—recently restructured and renamed the Ethiopian Geological Institute—providing this type of information since 1968. Now, with the support of the SUMM project, geosciences data for Ethiopia is more robust and more readily accessible than ever before.

"THIS TECHNOLOGY HAS IMPROVED THE QUALITY OF OUR MAPS. NOW WE ARE WORKING AT A LEVEL OF ZERO ERROR."

Basalefew Zenebe
Senior Basic Geoscience
Mapping Expert
EGI

GEOSCIENCES DATA TODAY

Consolidating, simplifying and providing easier access to accurate geosciences data on Ethiopia's 30-plus known minerals was identified as a priority in Ethiopia's 2019 Homegrown Economic Reform Agenda. Geosciences data is critical to both potential investors and the Ethiopian government. It is used to locate and determine the size of mineral deposits, and to determine if minerals can be extracted economically—with minimal health and environmental impacts.

The Ethiopian Geological Institute (EGI), still referred to sometimes as the Geological Survey of Ethiopia, is an autonomous institute accountable to the Minister of Mines. It is responsible for developing and disseminating geosciences data, as well as conducting geochemical and geophysical analyses at its laboratory. With the support of SUMM, the EGI has made important strides in the quality and dissemination of its information.

EGI is now in a position to provide harmonized 1:250,000 scale geological maps, identifying several target areas for metallic, industrial, energy and construction minerals. EGI's collection also includes maps on hydro-geology, airborne geophysics, ground gravity, engineering geology and geohazards, and mineral exploration—and the country now has the knowledge and skills to harmonize all of them and compile one harmonized map for the whole country.

EGI's maps and data from across Ethiopia's regions are centralized and, for the first time, available digitally through two portals. The Integrated Geoscience Information Management System (IGIMS), hosted by EGI, includes over 5,000 completed technical reports, progress reports and high-resolution maps, all of them searchable. The IGIMS data is integrated into the second portal, the Ethiopian National Mining Cadastre System. As a result, the cadastre system includes interactive maps showing information not only on licensing and administration, but also on geology and mineral occurrence.

OLD DATA SILOED, HARD TO ACCESS

For over 50 years, EGI has been producing various scale geological, geochemical and mineral-occurrence maps, with accompanying geotechnical reports. Nonetheless, at the outset of the SUMM project, it faced challenges in providing quality geoscience information.

According to a joint assessment by SUMM and EGI, Ethiopia's data was siloed because no centralized geoscience information system existed. As well, all maps and reports were only available for analysis and purchase in person. Together, these meant geosciences data was difficult to access by investors, researchers and the public.

A lack of training and standards left skills gaps in several areas, including geological map production; exploration and reserve estimation; technical report writing; promotional factsheet preparation; digitization; and quality assurance and quality control. As well, the results of EGI's geochemical laboratory analyses could be unreliable, in part due to poor equipment.

Canadian geoscience experts brought in by SUMM proposed a range of solutions based on international best practices. SUMM, working with EGI, set out to implement them.

SUMM OUTFITS DEDICATED TRAINING CENTRE

SUMM supported the development of a **geoscience information system (GIS) and training centre**, now established at EGI's office in Addis Ababa. SUMM supplied the centre with 12 high-capacity computers, a projector and a 50" LED Smart TV, as well as tables and chairs—all procured locally. The centre provides a dedicated environment for geodata processing, as well as for conducting in-house and virtual training by EGI geoscientists and consultants. The centre's remote-sensing and GIS capacity also allows it to act as a quality control and quality assurance unit for various scale maps produced by field geologists.

"Data collected from the field is sent in real time to EGI's server. This enables timely quality analysis and quality assurance by the geoscience experts at the EGI office in Addis Ababa."

Dr. Dejene Hailemariam
Director General, EGI

In the earlier years of the project, SUMM worked with EGI and a 14-member task force to create an inventory of the paper-based maps and data collected in the field over the previous 50 years. The task force captured **metadata**—i.e., a standardized description of the "who, what, where, when, why and how"—for each of the 5,000-plus inventoried technical reports and maps. This collected data was then ready to be reused and integrated with other data, making it an important building block in the creation of the integrated geoscience information system.

In 2019, SUMM engaged the services of a Canadian consulting firm with offices in Botswana, as well as an Ethiopian academic specializing in geosciences, to help develop an **integrated GIS implementation plan**. Working with four EGI experts, they recommended the hardware and software needed to run the system. They assessed current practices in field data collection, analysis and interpretation, as well as map-making. And, finally, they recommended changes, new protocols and training requirements to bring these practices in line with current international best practices.

ArcGIS SOFTWARE, TRAINING BY SUMM

To realize the GIS, SUMM procured two high-capacity servers, as well as the required **ArcGIS software**. ArcGIS, developed by Esri, is used to make, store, manage and analyze maps and related data. SUMM also supported the training needed to ensure capacity within the EGI and MoM to use the new software and system hardware. From September to December 2021, Esri experts came to the EGI training centre to offer role-based training on the ArcGIS Enterprise software. EGI representatives received training in field data collection using mobile devices, geodata analysis, data interpretation and web map publishing.

EGI geoscience and IT experts, with their new skills in hand, configured, deployed and used the ArcGIS system to produce web-based maps of Ethiopia and its mineral resources. These maps and related documents are now publicly and readily available over the internet through the **Integrated Geoscience Information Management System**. The IGIMS has been integrated with the Ethiopian National Mining Cadastre System, providing a constant supply of updated geoscience information.

"Collaboration with, and training from, Esri has been key to improving the quality of our data."

Abaynesh Mitiku
Engineering Geologist, EGI

GEOSCIENTISTS GAIN HARMONIZATION EXPERTISE

One of the biggest challenges facing the EGI was the lack of harmonization among the 1:250,000 scale maps that existed—and there were 72 of them. Consolidating these scale maps to cover all of Ethiopia—so that one centimetre on a map accurately represents 2.5 kilometres of actual land—would not be easy, given the inconsistencies among them. Through SUMM-supported training, which included six weeks of learning in the classroom and in the field, EGI geoscientists acquired the skills to harmonize regional scale maps. Today, accurate **1:250,000 scale geological maps** are publicly available for various regions through the IGIMS. This work will continue, with a target of harmonizing and making available one compiled 1:250,000 scale map for all of Ethiopia.

The SUMM project engaged a Canadian ISO (International Organization for Standardization) auditor to assess the **Ethiopian Geological Laboratory**, housed at the EGI offices. The auditor identified major gaps in the geochemical, mineralogical and geotechnical labs, and pointed to the need for capacity-building training, workplace safety improvements and an entire geochemical laboratory equipment upgrade.

SUMM helped address these gaps on all fronts. In early 2019, SUMM sent geochemical laboratory experts to get **training** on modern laboratory management, spectrometric methods, and analysis of gold and other precious metals at the African Mineral and Geoscience Center in Dar es Salaam, Tanzania. SUMM also procured the required **laboratory equipment**.

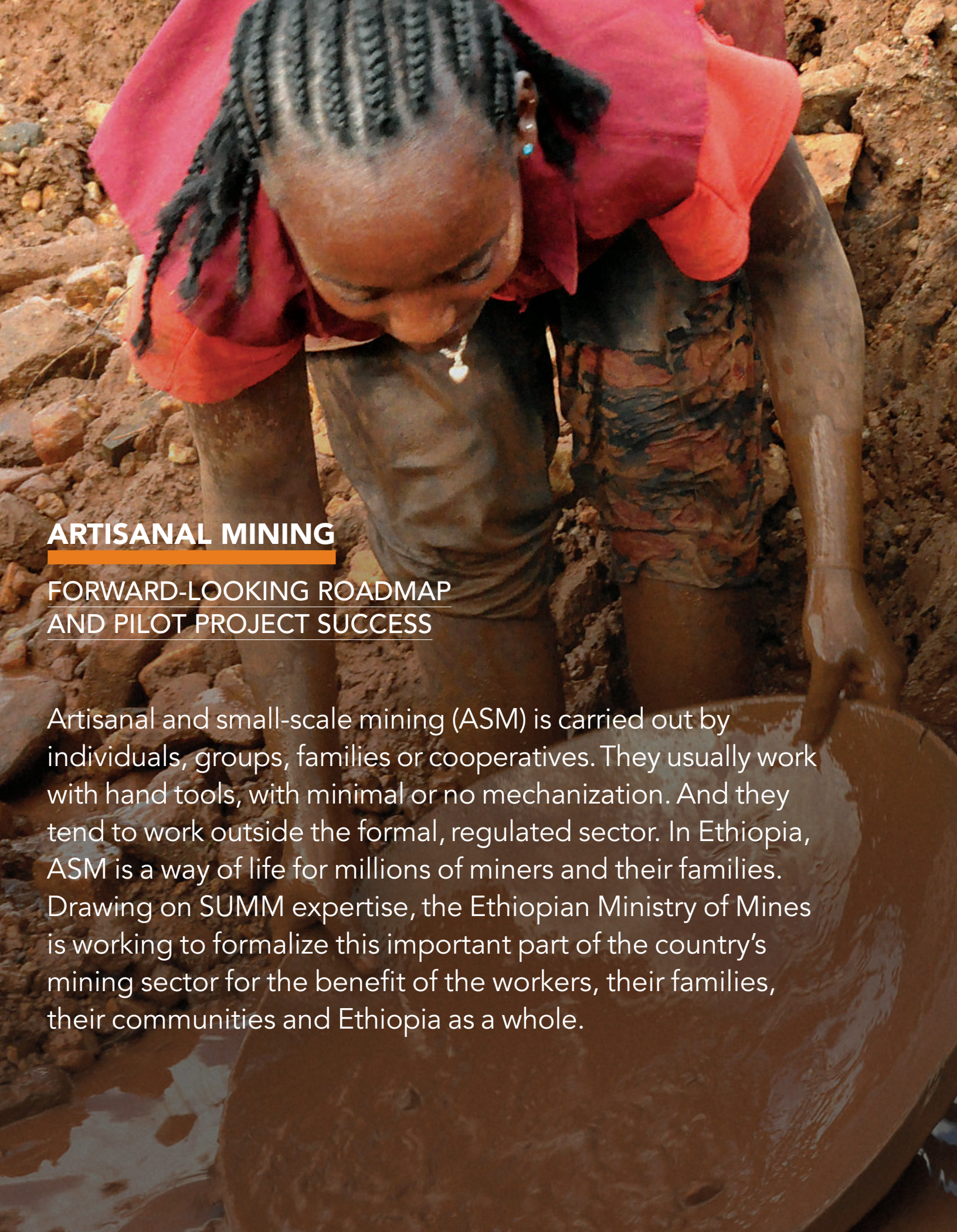
The lab equipment was finally set up in February 2022, after delays due to COVID-related global shortages and instability in Ethiopia. The Ethiopian Geological Laboratory is now capable of providing accurate chemical content, water, trace and physical analyses. Importantly, the lab has the equipment and capacity needed to monitor compliance with environmental standards. About 21,000 samples are collected and analyzed by the lab annually.

To help alert international investors to the mineral potential of Ethiopia, SUMM consultants developed a template and user manual for creating **promotional materials**. EGI now has promotional factsheets for over a dozen minerals, as well as a guide for investors and a marketing brochure to bring on trade missions and to international mining conferences. Using the templates, EGI can continue to produce more mineral factsheets and other promotional materials going forward.

OVER 800 TAKE PART IN GEODATA TRAINING

Overall, over the course of the project, SUMM supported over 25 **capacity-building workshops and training sessions**, involving more than 830 trainees (one person could have received more than one training), on a wide range of geodata subjects. These ranged from technical report writing to extracting metadata; from mineral exploration and reserve estimation to remote sensing and GIS; from occupational health and safety to ArcGIS use.

Related training videos and how-to manuals have also been developed for future use, and made readily available in a SUMM-created **knowledge portal**. All of this is to ensure Ethiopia has the ongoing capacity to produce and share high-quality geosciences data in the years to come.



ARTISANAL MINING

FORWARD-LOOKING ROADMAP AND PILOT PROJECT SUCCESS

Artisanal and small-scale mining (ASM) is carried out by individuals, groups, families or cooperatives. They usually work with hand tools, with minimal or no mechanization. And they tend to work outside the formal, regulated sector. In Ethiopia, ASM is a way of life for millions of miners and their families. Drawing on SUMM expertise, the Ethiopian Ministry of Mines is working to formalize this important part of the country's mining sector for the benefit of the workers, their families, their communities and Ethiopia as a whole.

"FORMALIZATION MAKES IT EASIER TO TRAIN ASM MINERS AND TO IDENTIFY THE AREAS THAT ASM MINERS NEED TRAINING IN."

Negash Worku
Geochemical Laboratory Director
EGI

ASM CONTRIBUTES TO RURAL ECONOMIES

Artisanal mining takes place throughout rural Ethiopia and accounts for most of the jobs and revenues generated by the country's mining sector. Roughly 60 to 80 per cent of the high-value minerals coming out of Ethiopia, such as gold and gemstones, are mined artisanally.

ASM directly employs at least 1.26 million people and indirectly provides a source of livelihood for another 7.5 million people. It's an important contributor to rural economies and helps stem the migration of people into cities. Although most artisanal mining still focuses on gold, gemstones (especially opals) and tantalum, ASM also produces clay, crushed stone, gypsum, salt, sand and silica.

INFORMAL SECTOR POSES CHALLENGES

Much of Ethiopia's artisanal mining activity—about 90 to 95 per cent—remains informal; that is, it takes place outside the regulated system. Even among those who are licensed and part of the formal system, only about 20 per cent of royalties owed are collected. Furthermore, much of the trade in artisanal mining is illegal. Most minerals produced through ASM, about 60 per cent, are sold through illegal channels.

And the work is hard. It involves long hours working manually, without personal protective equipment, shelter, access to proper sanitation or health care. The work degrades the environment, often eroding the soil, deforesting the land, and polluting scarce sources of waters. Gold ASM, in particular, is dangerous to the health of miners and their environments because of the potential use of mercury to capture the gold. ASM activity also increases crime rates and security risks.

With better oversight, ASM has the potential to increase government revenues from the sector and make important contributions to Ethiopia becoming a low middle-income country. Better oversight also has the potential to protect workers and communities by putting minimum environmental, occupational health and safety, and employment standards in place.

For these reasons and more, formalizing the ASM sector is a high priority of the Ministry of Mines and Ethiopia's Homegrown Economic Reform Agenda. With important and substantial contributions by the SUMM project, Ethiopia now has a roadmap for realizing its National Artisanal, Special and Small-Scale Mining Strategy. If implemented

"Legal gold sales increased thanks to the formalization pilot."

Jikssa Kidane
ASM Formalization Team Leader
Ministry of Mines

successfully—and SUMM's pilot studies indicate it can be—the roadmap will lead to increased mining revenues for Ethiopia; responsible and inclusive small enterprises that are safely and legally engaged in the mining sector; more jobs; collaborative coexistence between ASM and large-scale mining; and sustainable development.

SUMM/MoM ROADMAP POINTS WAY TO FORMALIZATION

SUMM's role in the formalization of ASM in Ethiopia began in mid-2018 when it worked with the MoM to establish a **task force** to develop a strategy and roadmap. The roadmap included five key aims: strengthen governance, laws and regulations surrounding ASM; provide artisanal and small-scale miners with greater access to geosciences data; increase the efficiency, productivity and competitiveness of the sector; increase opportunities to add value to ASM and generate greater wealth (e.g., sell polished as opposed to raw gemstones); foster environmentally and socially responsible mining practices in line with appropriate standards; and empower women in the ASM sector, and respect traditional knowledge.

To ensure the roadmap reflected leading practices that had been shown to be successful elsewhere, SUMM funded and led **study missions** to Canada (namely, Yukon), Kenya, Namibia, Chile and Peru. The study missions in 2018 and 2019 allowed task force members and selected regional mining bureau representatives to see and learn first-hand about ASM practices in other countries.

These best practices were contextualized and incorporated into the roadmap. SUMM also engaged **international consultants** with experience in developing ASM formalization strategies in other African countries to bring their expertise to the roadmap's development.

With the input gathered from the study missions and international consultants—and from consultations with regional mining bureau directors and other regional and federal level stakeholders—the task force unveiled a **roadmap** in July 2021 for formalizing Ethiopia's ASM sector. To ensure its ease of use and implementation in the field, SUMM translated the roadmap into Amharic.

The roadmap sets out over 40 interventions and, among them, over 150 activities for ASM formalization. These are grouped under four core themes: governance (policy and legislation, government institutions, ASM associations, geosciences data); business processes (capital and financing, mining technology, human capital); economic development (processing facilities, suppliers, markets); and social, environment, and health and safety improvement. Two issues cut across all four themes: equal opportunity and benefits for women in ASM, and recognition and incorporation of traditional knowledge into ASM.

PILOT PROJECT SHOWS POSITIVE RESULTS

Beginning in the fall of 2021, SUMM supported ASM formalization pilots in four gold-producing woredas: Gambella; Benishangul-Gumuz; Southern Nations, Nationalities and Peoples Region (SNNPR); and Oromia. The pilot involved over 7,700 artisanal and small-scale miners.

The pilot began with the MoM **training of trainers** (ToTs) on the challenges of ASM formalization and on how to establish district-level working groups. The ToTs were then deployed to the four pilot regions where, for the next three months, they worked with artisanal miners to develop and encourage a formal system of working.

To do this, they facilitated **local workshops** that brought together artisanal miners in the area with representatives of financial, mineral licensing, environmental, and peace and security institutions. The aim of these workshops was to sensitize artisanal miners to the problems with ASM and to engage them in discussions about the benefits of formalization.

The Ministry of Mines, in line with recommendations in the roadmap, also made a number of changes in the fall of 2021 to encourage the formalization of ASM. The MoM waved the seven per cent royalty licensed ASM miners were required to pay. It lifted the two-year limit on the period of ASM licenses to allow miners more time to establish themselves. It made bank procedures more accessible to artisanal miners to encourage them to sell their gold through the Commercial Bank of Ethiopia. The Ministry also provided selected regions with vehicles to improve their monitoring and evaluation of illegal mining, illegal trading, and mining practices that cause damage to the environment.

Results from the pilot were positive. Based on information from the Commercial Bank of Ethiopia (i.e., the formal system), total gold yields in the four pilot regions during the initial three-month ASM formalization period were 2,179.69 kg, valued at USD$154 million. This was an increase of USD$47 million compared to the previous three-month period, and this increase can reasonably be attributed to a greater number of artisanal miners engaging in the formal system. Because of these encouraging results, the pilot was extended another three months to further embed formalization measures in these regions.

The lessons learned by the ToTs during the pilot also resulted in the development of an **ASM formalization model** for Ethiopia. The model was then further refined after a SUMM-led study mission to Mongolia in May 2022, where selected ASM miners from the four pilot regions, as well as MoM and regional mining bureau delegates, gained insights into leading practices in gender-inclusive ASM formalization, mercury-free ASM gold extraction and ASM land rehabilitation.

CHALLENGES AND OPPORTUNITIES GOING FORWARD

The pilot clearly outlined for the Ethiopian Ministry of Mines the challenges and opportunities of ASM formalization. The challenges include:

- inconsistency in granting and administering ASM licenses
- mining activities that are unsupported by geoscience information
- lack of awareness and training in environmentally safe ASM practices
- lack of training on financial literacy and technologies needed to transform artisanal miners into owners or members of small- or mid-sized businesses
- lack of skill in business diversification
- lack of capacity and commitment to implement activities along the ASM value chain that put women into decision-making roles and empower them economically.

The opportunities are:

- the commitment of governments at both federal and regional levels to support ASM formalization
- the willingness of licensed ASM cooperatives to work closely with established regional and federal-level regulatory bodies to bring informal miners into the formal system
- the willingness of financial institutions to make loans available for licensed ASM miners to acquire technology that improves their safety and productivity.

These challenges and opportunities identified by the ASM formalization pilot, as well as the results of SUMM's Opportunities for Women in ASM study (see the next section), are important considerations as Ethiopia moves forward. They can help the Ethiopian government and development partners as they design and implement projects to reduce poverty and bring sustainable development to artisanal mining.

"Most donors from developed countries are not interested in supporting the ASM sector, but the Government of Canada, through the SUMM project, decided to make changes."

Merga Kenea
Director, ASM Directorate
Ministry of Mines

CROSS-CUTTING THEMES

GENDER, ENVIRONMENT AND GOVERNANCE

During its core work on the cadastre, geosciences data and artisanal mining, the SUMM project kept its eye on three overarching goals: gender equality, environmental protection and good governance.

Throughout the project, when contemplating strategies and activities, the SUMM team asked: Does it enhance the lives of women and ensure their equal treatment? Does it promote environmental sustainability and help address climate change? Does it promote transparent, fair and good governance?

Most importantly, it asked: Does it increase the capacity of governments and stakeholders to grow an equitable, sustainable and revenue-generating mining sector going forward, even after the SUMM project has wrapped up?

By keeping these questions at the forefront, SUMM made important contributions to advancing gender, environment and governance issues in Ethiopia's mining sector.

"Cultural norms hinder women in mining, but we are beginning to see improvement."

Helen Legesse, EITI Expert
Ministry of Mines

GENDER EQUALITY

The SUMM project, working with the Ministry of Mines, has worked diligently to include gender equality and women-empowerment goals in Ethiopia's plans to grow its mining sector.

SUMM and the MoM established the **Gender Equality Working Group** (GEWG) in July 2017, made up of representatives from the Ministry, Ethiopian Geological Institute and regional mining bureaus. The GEWG's mission is to ensure that women are increasingly represented and actively engaged in decision-making processes in the mining sector. GEWG members lead and advocate for effective gender mainstreaming and women-empowerment activities in their respective organizations.

SUMM hosted capacity-building activities to equip GEWG members with the knowledge, tools and skills they needed to bring a gender lens to the mining portfolio. For example, training on gender-based analysis "plus" (GBA+) enabled members to assess how diverse groups of women, men and people of all genders may experience policies, programs and initiatives in the mining sector. These GEWG members are now able to train MoM, EGI and regional mining office managers on how to ensure their departmental and regional plans incorporate gender parity.

With SUMM and MoM support and direction, GEWG members also played a key role in developing three gender resources that are designed to ensure gender mainstreaming and women's empowerment continue to grow in the sector after the SUMM project ends. These resources include a strategy, guide and training manual.

The **Gender Strategy for the Mineral Sector in Ethiopia to 2025 and Vision to 2030** maps out interventions, implementation mechanisms, accountabilities and measurable outcomes in three areas: developing gender-sensitive policies and programs; engaging the private sector (i.e., mining companies) in empowering women and improving their economic status; and reducing the negative effects of artisanal and small-scale mining on women and other vulnerable groups. The MoM is actively implementing the strategy.

The **Gender Mainstreaming Guide** provides how-to information on integrating a gender-equality perspective at all stages of developing MoM policies, programs and activities, including technical and administrative activities. It also includes information on monitoring and evaluation that will effectively indicate how well gender-parity objectives are being met.

The **Gender Training Manual** is designed for people who are educating MoM, EGI and regional mining bureau staff on gender issues. It helps trainers understand gender concepts, analysis and mainstreaming in the context of mining, and offers guidance on how to design, organize and conduct the training.

To assess if and how well gender mainstreaming was being implemented in regional mining bureaus, SUMM, along with the MoM and EGI, conducted the most comprehensive **gender audits** to date in Ethiopia and the first-ever in the mining sector. Following an audit, a regional mining bureau received written recommendations to address region-specific gaps, ranging from strengthening relationships with organizations supporting women (e.g., NGOs, microfinancing institutions) to addressing sexual harassment and violence faced by women working in the field. A follow-up workshop hosted by SUMM allowed the bureaus to share findings and plan activities for addressing identified gaps.

SUMM also commissioned a **study of opportunities for women in artisanal and small-scale gold mining**. Conducted in 2021-2022 by international and local researchers, the study examined the barriers to, and opportunities for, women participating in artisanal gold mining. It found that ASM has great potential for reducing poverty in Ethiopia. Women who have successfully entered the sector have substantially improved their livelihoods and improved the well-being of their families and the communities around them.

Yet, as the study pointed out, many barriers to women's participation in the sector must be dealt with first to realize these benefits. Their work can be very dangerous (e.g., washing gold with mercury). They lack access to good geodata and are often mining "in the dark." They earn less than men, lack access to financing, and don't get the same training opportunities or other supports. As a result, women are less able to join or create cooperatives and enter the formalized sector. The study recommends actions for overcoming these barriers.

ENVIRONMENTAL SUSTAINABILITY

Incorporating environmental sustainability into Ethiopia's plans to grow its mining sector has also been a priority of the SUMM project.

To build the capacity of the Ministry of Mines to assess the environmental and social impacts of mining in Ethiopia, SUMM partnered with the University of British Columbia (UBC)'s School of Public Policy in early 2019 to undertake a **comparative review** of government-agency responsibilities and best practices in reviewing and approving **environmental and social impact assessments** (ESIAs).

For governments and communities, good ESIAs ensure better protection and/or mitigation of local and downstream environments, improve site rehabilitation after a mine site is decommissioned, and help maintain local biodiversity and ecosystems. For mining companies, good ESIAs mean fewer unexpected problems during construction, operation and decommissioning, as well as improved relationships with government agencies and surrounding communities.

The UBC study team looked at ESIA legislation, policies and practices in Canada, Ghana, Chile and Peru. The research team identified gaps and opportunities for ESIA reform in Ethiopia in four areas: legal structures; transparency; compliance monitoring; and community engagement. Based on these gaps, opportunities and accompanying recommendations, SUMM created an **ESIA roadmap** for Ethiopia's mining sector, including the environmental guidelines that mining projects must meet to minimize and mitigate any adverse social, environmental and community health impacts. The roadmap is now being implemented.

As recommended in the roadmap, MoM, Environmental Protection Authority (EPA) and regional mining bureau representatives participated in SUMM-sponsored **environmental assessment training** in May 2019. Developed by the International Association of Impact Assessment, the training provided participants with a strong foundation in reviewing impact assessments and understanding the steps required of mining companies undergoing an ESIA.

SUMM provided more foundational training through a partnership with the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF)—a voluntary initiative supporting more than 75 nations committed to leveraging mining for sustainable development. Trainees from the MoM, EPA, regional mining bureaus and local universities received training in **ESIA and environmental and social management planning** (ESMP) in mining. The related training modules and manuals are available on the SUMM knowledge portal for future training and use. The IGF and Netherlands Commission for Environmental Assessment also developed a **self-assessment/diagnostic tool** for Ethiopia to identify and respond to gaps in ESIAs and ESMP. The tool is now regularly used to assess gaps and monitor mining companies' compliance to ensure sound environmental practice.

As proposed by SUMM and the federal auditors of Ethiopia, the authority to review and approve ESIA applications was transferred from the MoM to the **Ethiopian Environmental Protection Authority** in July 2020. This separation of responsibilities has minimized conflicts of interest, increased the level of expertise in reviewing and approving ESIAs, and increased accountability in the ESIA-approval process.

"Community development agreements let communities know how much they will receive based on current mandates. This has reduced conflicts between companies and communities."

Negash Worku
Geochemical Laboratory Director, EGI

Since then, ESIA guidelines have been further expanded and improved. More focused and mineral-specific questions are asked during the ESIA process. As well, government-licensed experts who conduct ESIA proposals for mining companies are now better able to provide more meaningful information, as opposed to very generic reports, and the EPA and MoM are better equipped to review them.

To ensure mining companies create lasting benefits for communities beyond the life of a mine, Ethiopia requires companies to contribute to a community development fund (held by the MoM) as part of its licensing agreement. In 2019, SUMM provided a leading expert on corporate social responsibility to design a directive on the allocation of monies through **community development agreements**. The detailed directive, along with tools and templates, outlines a clear process for communities to apply for funding.

As well, to ensure that local communities are gaining direct benefits from mining operations, the MoM is giving communities a voice in determining the benefits that will best contribute to their long-term viability. SUMM supported this initiative by providing **community development training** on how to negotiate and collaborate with mining companies to gain their support for local initiatives.

Protecting the safety of miners and other workers is the responsibility of the mining companies, while monitoring their compliance with **occupational health and safety** (OHS) standards is the responsibility of the MoM. SUMM reviewed Ethiopia's OHS legal framework, assessed OHS gaps, and provided training to increase the capacity of the MoM to monitor OHS. The training covered topics such as: common hazards and occupational diseases in the mining sector; hazard assessment and prioritization; OHS management standards and strategies; emergency planning; OHS monitoring and performance evaluation; and community health and safety. The MoM now has an active monitoring and compliance process in place.

"Training workshops have helped reduce the conflict between mining and the environment. Now they are working as one group during license issuing."

Merga Kenea
ASM Director, Ministry of Mines

GOOD GOVERNANCE

With an overall objective to improve resource governance and support the long-term management of a sustainable mining sector in Ethiopia, SUMM supported the MoM to develop inclusive stakeholder responsive frameworks, structures and processes. SUMM and the Ministry integrated their work plans to address MoM's five key reform areas: strategy implementation and policy improvement; legal framework revision and design; institutional capacity development; human resource development and deployment; and information and technology facilitation.

The MoM is determined to increase Ethiopia's revenue from a growing and sustainable mining sector. To this end, SUMM supported the Ministry in developing or revising a number of key **strategies and policies**. These included the Mineral Policy, Petroleum Policy, Gender Strategy for the Mineral Sector in Ethiopia, 10-Year Mining Sector Development Plan, and the Artisanal and Small-Scale Mining Strategy Roadmap. (Many of these have been discussed earlier in this report.)

SUMM also supported the MoM with codifying **sectoral legal frameworks** (i.e., simplifying and consolidating the hierarchy of laws applicable to mining operations). The codification of the country's mining legislation provides clarity, consistency and assurances to stakeholders, the public and investors, and is seen as a model for other government ministries. Underpinning SUMM's approach to revising and developing these strategies and policies was its insistence on **strong coordination** between the Ministry of Mines and the regional mining bureaus, and active consultation with key stakeholders, including other federal agencies, international development partners and universities.

To further institutional capacity development, SUMM supported the creation of the **Mineral Excellence Centre** (MEC) within the MoM. The Mineral Excellence Centre is a dedicated learning hub, fully equipped with modern IT equipment to host virtual meetings, online learning and research. It is a repository of international leading practices in mining, including technical and academic expertise, research findings, policy and system developments, and organizational and sector practices and procedures. It accommodates the type of connection needed for training, coaching, backstopping, e-meetings, consultation, and research and development.

"Codification in the mining sector is an exemplary action for other sectors."

Hana Mulugeta
Legal Advisor to Minister of Mines

Thanks to SUMM, access was offered to more than **180 on-demand courses** designed for the mining sector, and to more than 50 accredited certificates. The courses and certificates are available through Edumine, a Vancouver, B.C.-based online platform. The on-demand courses also support the MoM's retention strategy by allowing staff to easily pursue their professional development goals.

To ensure the institutional capacity gained through the SUMM project is not lost and, indeed, continues to grow, SUMM built a **knowledge portal**. Easily accessible to partners within Ethiopia's mining sector, the portal includes all the assessments, studies, guides, and training manuals and modules created as part of the SUMM project. The materials are organized by topic area: artisanal mining, cadastre, environment, gender, geosciences and governance.

SUMM supported **human resource development** following a restructuring of the Ministry of Mines. The Ethiopian Management Institute—a public institute and the leading management-development service provider in the country—reorganized the MoM, assessed its human resource needs, and developed job descriptions. The revised organizational structure outlined how activities are directed to achieve institutional goals; how roles, decision-making and responsibilities are assigned, controlled and coordinated; and how information flows across the Ministry and between the various institutions within it. SUMM provided international and national consultants to review the human resource requirements at both the MoM and EGI. Their review resulted in a **performance-enhancement strategy** that included modernizing human resource procedures, performance reviews and effective management, while incorporating and respecting local Ethiopian traditions and customs.

A newly developed **MoM website**, a SUMM-supported initiative, makes mining-sector information in Ethiopia easier to access by public- and private-sector stakeholders. The new site went live in February 2020, and it's a "one-stop shop" for learning about the country's resource potential and how to access it. The site includes key information, legislation, guidance documents and promotional materials—including the "Mining in Ethiopia: Investor Guide."

To share information about Ethiopia's growing mining sector, MoM and regional mining bureau representatives have been participating in leading **international mining conferences** for the last five years. These include the Prospectors & Developers Association of Canada (PDAC) Convention held annually in Toronto, Canada, and the Investing in African Mining Indaba conference held annually in Cape Town, South Africa.

SUMM's support included lining up high-profile speaking engagements for MoM and other mining-sector representatives; subsidizing the conference registration and travel costs for Ethiopian delegates; developing country presentations; procuring exhibit space; developing promotional materials; and producing a booth to showcase Ethiopia's mining potential. At these conferences, MoM representatives took part in meetings and side events—including networking events organized by Global Affairs Canada—to discuss Ethiopia's mining reforms and how they create a conducive business environment for investors and companies. As a result, many investors and mining companies reached out to the MoM to learn more.

PROJECT BY NUMBERS

MINING SECTOR

10,000
Value, in million Ethiopian Birr (ETB), of registered investment capital (national and international) in mining sector in 2021

540
In 2016

1,169
Value in million ETB of monthly salaries paid to Ethiopians employed in the mining sector in 2021

15
In 2016

116,938
Number of new jobs generated in the mining sector in 2021 (82,141 men, 34,797 women)

2,241
In 2016 (1,520 men, 721 women)

Source: Ethiopia Ministry of Mines

CADASTRE

130
Average number of mineral exploration licenses granted annually after launch of new cadastre (2020-2021)

49
Before December 2019 launch of new cadastre (2016-2019)

2,245
Average number of production/mining licenses granted annually after launch of new cadastre (2020-2021)

369
Before December 2019 launch of new cadastre (2016-2019)

Source: Mineral Licensing and Administration Directorate (MLAD), Ministry of Mines

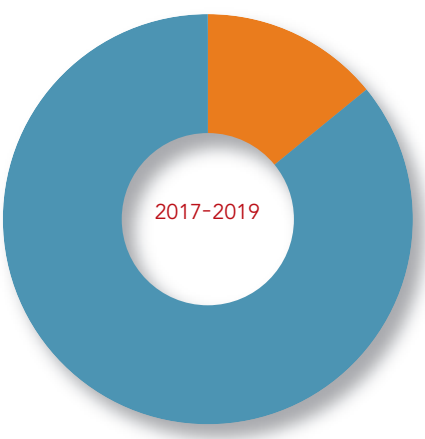
215,716
Page views of new cadastre since December 2019 launch (as of March 24, 2022)

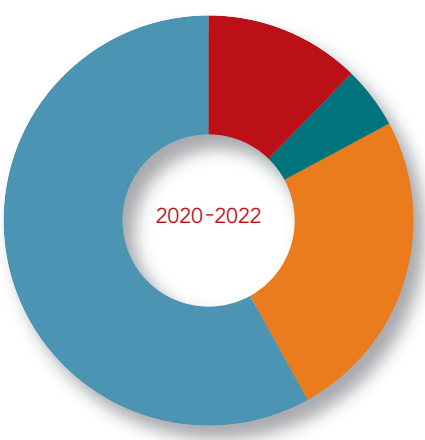
10,148
Users of new cadastre since December 2019 launch (as of March 24, 2022)

93
Percentage among the 15 of 30 mining companies currently operating in Ethiopia who responded to a survey saying they are, overall, very satisfied or satisfied with new online licensing service

100
Percentage who said procedure for submitting annual plans and reports is much easier and simpler compared to previous onsite system

Source: Supporting the Ministry of Mines Ethiopia (SUMM)





TIME TO PROCESS LICENSE APPLICATIONS 2017-2019

- From 11 days to less than 100 days 14%
- More than 100 days 86%

2020-MARCH 2022

- Within a day 12.3% (granted on date of application)
- From one day to less than 10 days 4.9%
- From 11 days to less than 100 days 24.7%
- More than 100 days 58%

Source: MLAD, Minister of Mines

Numbers as of April 2022, unless otherwise indicated

GEOSCIENCES

01

Number of Special Achievement in GIS (SAG) awards given to Ethiopian Geological Institute in 2022 by Esri founder and president, Jack Dangermond

5,000+

Number of technical reports and maps catalogued with metadata

Source: Supporting the Ministry of Mines Ethiopia (SUMM)

ARTISANAL MINING

7,721

Number of artisanal and small-scale miners who took part in formalization projects in Benishangal, Gambella, Oromio and SNNP

21

Percentage of participants who were women

Source: Artisanal and Small-Scale Mining (ASM) Teams, Ministry of Mines

GENDER

81

Percentage of regions in the country that have undergone a gender audit, conducted by the Gender Equality Working Group in collaboration with the regional mining bureau

374

Number of directors and other senior staff members from MoM, EGI and regional mining bureaus who took part in gender mainstreaming, governance or strategy development

Source: Gender Equality Working Group (GEWG) Ministry of Mines

ENVIRONMENT

62

Number of environmental and social impact assessments (ESIAs) for new large-scale, small-scale and exploration mining projects approved through the Environmental Protection Authority since January 2021

Source: Ethiopia Environmental Protection Authority

CAPACITY

148

Number of Edumine's online, mining-related professional development courses taken by MoM employees

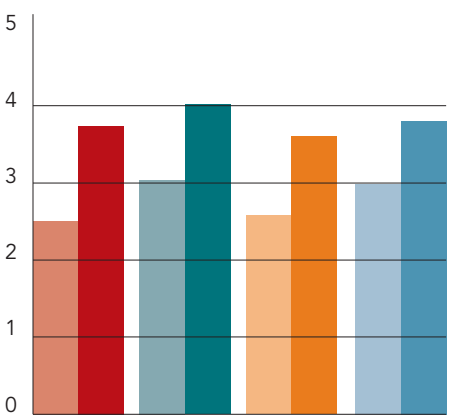
12,973

Number of people trained through the SUMM project since its inception

25

Percentage of these trainees who were women

Source: Supporting the Ministry of Mines Ethiopia (SUMM)

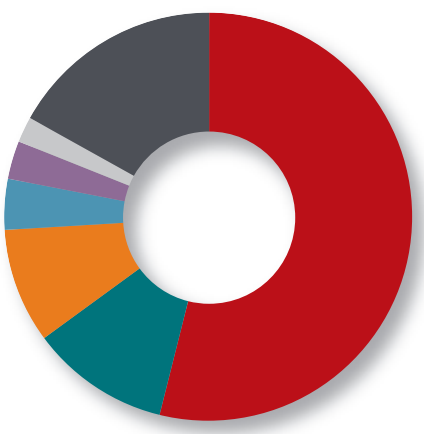


CAPACITY IMPROVEMENT BY TOPIC

- **Geoscience** Before 2.388 / After 3.784
- **Gender** Before 3.159 / After 4.01
- **Cadastre** Before 2.565 / After 3.66
- **Environment** Before 3.075 / After 3.875

(Self-assessed on a five-point scale)

Source: Supporting the Ministry of Mines Ethiopia (SUMM)



CADASTRE USERS BY COUNTRY SINCE DECEMBER 2019

- Ethiopia 54%
- United States 11%
- China 9%
- United Kingdom 4%
- South Africa 3%
- Canada 2%
- Others 17%

Source: MLAD, Minister of Mines

PROJECT GOVERNANCE

SUMM'S PARTICIPATING ORGANIZATIONS

ABOUT MoM AND EGI

Ethiopia's Ministry of Mines (MoM) is the federal government's executive body responsible for promoting and regulating the country's mining sector, including granting exploration and mining licenses, among other things. The Ministry includes a head office in Addis Ababa, and regional mining offices in 11 states and two city administrations. Working through the Ministry is the autonomous Ethiopian Geological Institute (EGI), previously known as the Geological Survey of Ethiopia (GSE), which focuses on generating and disseminating geosciences and mapping data, as well as on conducting laboratory analyses of drilling, environmental and other samples.
mom.gov.et

ABOUT SUMM

Supporting the Ministry of Mines Ethiopia (SUMM) is a six-year, $15-million project run by the Canadian International Resources and Development Institute with funding from Global Affairs Canada. Launched in April 2016, the project was a response to a request from the Government of Ethiopia for Canadian support and expertise in strengthening its emerging mining sector. The project, based in Addis Ababa, Ethiopia, closes in 2022.
cirdisumm.org

ABOUT CIRDI

The Canadian International Resources and Development Institute (CIRDI) is a centre of expertise on natural resource governance. It works at the request of governments that seek to strengthen their capacity to govern and manage their natural resources for the benefit of their people. Based in Vancouver, Canada, CIRDI was acquired by the Canadian Executive Service Organization from the University of British Columbia in March 2021.
cirdi.ca

ABOUT CESO

The Canadian Executive Service Organization (CESO) is one of Canada's leading development organizations, with capacity-building experience in more than 125 countries since its inception in 1967. A not-for-profit charity, CESO draws expertise from a roster of 1,400 Canadian advisors (mostly volunteers), each with an average of 25 years of experience in governance, gender equality, economic development, environmental sustainability, or small and medium-sized enterprise (SME) growth. Headquartered in Toronto, Canada, CESO currently manages a portfolio of Global Affairs Canada projects with a combined value of over $130 million, a team of project staff in over 20 countries, and an expansive network of local and Canadian consultants.
ceso-saco.com

ABOUT GAC

Global Affairs Canada (GAC) is the federal Government of Canada department that develops and implements foreign policy, manages diplomatic relations, promotes international trade, and provides consular support. It leads Canada's international development, humanitarian, and peace and security assistance efforts. It also contributes to national security and the development of international law. GAC is based in Ottawa, Canada.
international.gc.ca

ETHIOPIA MINING SECTOR RESOURCES

Ethiopia Ministry of Mines
http://www.mom.gov.et

Ethiopian National Mining Cadastre System
https://ethiopian.portal.miningcadastre.com

Geoscience Information System
http://gis.gse.gov.et

SUMM Knowledge Portal
https://cirdisumm.org

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