Global Webinar on Geospatial and Other Data Sources for Environment Statistics: Assessing the Impact of the Economy on the Environment

18-19-20 April 2023

WEBINAR REPORT

Image source : https://intercontinentalcry.org/yanomami-issue-goldminers-an-ultimatum/

Webinar recording link: [WS2.4 Second Global Webinar on Geospatial and Other Data Sources for Environment Statistics | WESR (unep.org)]

BACKGROUND

The Global Webinar on Geospatial and Other Data Sources for Environment Statistics: Assessing the Impact of the Economy on the Environment for Asia, Europe and North Africa was organized as a series of online meetings on 18, 19 and 20 April 2023.

The webinar is part of the activities of workstream 2.4 "Assessing the Impact of the Economy on the Environment" of the Statistics and Data Project *"Resilient and agile National Statistical Systems to meet post-COVID-19 data needs to recover better"* under the 14th tranche of the United Nations Development Account, launched in September 2022.The Project is expected to enhance the resilience and agility of national statistical systems (NSS) of the 50 beneficiary countries[1] to respond to emerging economic, social and environmental data needs in times of crises and disasters using innovative data sources, advanced data acquisition methods and modern technologies, while ensuring a path towards the achievement of the 2030 Agenda for Sustainable Development.

The webinar was organized by the United Nations Environment Programme (UNEP) and the United Nations Office on Drugs and Crime (UNODC) in collaboration with the UN Regional Commissions, the UN Statistics Division, as well as other international and national organizations. The **goal of the webinar** was to increase the knowledge of the beneficiary countries and other invited countries about statistics derived from geospatial and other data sources to assess the impact of the economy on the environment. The webinar consisted of the following topics:

- Impact of anthropogenic and natural processes on freshwater and marine ecosystems
- Impact of illegal economies on the environment: monitoring of illegal mineral mining
- Domestic Material Consumption as an indicator of economic pressure on the environment

The **target audience** for the webinar was national agencies that are responsible for the collection and dissemination of data and statistics on terrestrial, freshwater and marine ecosystems, as well as domestic material consumption. The participants could be from the national statistical system, ministries of environment, mineral mining and other relevant government agencies.

OVERVIEW

The webinar ran three hours a day for three consecutive days with the English, Russian and Arabic interpretation and included five sessions, 29 presentations from 24 different experts, two panel discussions with contributions from different UN organizations, as well as other global and regional organizations, national statistical offices, government agencies, universities, research institutes (see Annex I for the agenda). In addition to the speakers, there were 122 registered participants, including 65 women and 53 men, while more than 80 live participants were recorded for each day of the webinar. A total of 36 countries were represented, including Armenia, Azerbaijan, Bangladesh, Belarus, Bhutan, Bosnia and Herzegovina, Brunei, Burkina Faso, Colombia, Cote d'Ivoire, Ethiopia, Fiji, Ghana, India, Indonesia, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Maldives, Moldova, Montenegro, Nauru, Nepal, Palestine, Philippines, Singapore, Sudan, Thailand, Timor-Leste, Tunisia, Türkiye, Turkmenistan, Ukraine, Uzbekistan, and Vietnam.

[1] Albania, Argentina, Armenia, Bahamas, Bangladesh, Barbados, Bhutan, Burkina Faso, Burundi, Cabo Verde, Chile, Comoros, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, Eritrea, Fiji, Gabon, Georgia, Honduras, Indonesia, Iraq, Jamaica, Jordan, Kazakhstan, Lao PDR, Mexico, Moldova, Montenegro, Namibia, Nepal, Niger, North Macedonia, Pakistan, Paraguay, Senegal, South Sudan, State of Palestine, Sudan, Suriname, Timor-Leste, Tonga, Tunisia, Turkmenistan, Ukraine, Uzbekistan, Vietnam, Yemen and Zimbabwe.

All materials of the webinar, including video recording and presentations, are posted on the public website of UNEP, here.

PRESENTATIONS

DAY 1 – 18 APRIL 2023

Session 1: Opening and Introduction

Welcome and Opening Addresses

Angela Me, Chief of the Research and Trends Analysis Branch, Division for Policy Analysis and Public Affairs, UNODC opened the webinar by highlighting the collaboration between the UNODC and various UN entities to support countries in dealing with issues such as drugs, illicit financial flows, environmental crimes, and trafficking. She informed that UNODC has expertise in geospatial information systems to monitor drug cultivation and production in the world. UNODC works with national authorities to improve data collection related to environmental crime. She emphasized the importance of addressing these issues as they undermine the stability of countries. Angela expressed the hope that the webinar will help improve skills and data on the environment worldwide and expressed pleasure in collaborating with UNEP to organize the webinar.

Brennan Van Dyke, Chief of the Capacity Development and Innovation Branch, Early Warning and Assessment Division, UNEP in her opening address, discussed the improvement in data availability for environmental statistics, particularly for sustainable development goals (SDGs). She mentioned that the increase in data is attributed to countries investing in their national statistical systems to collect and report data for SDG indicators, and that in 2022, 59% of environment-related SDG indicators had sufficient data for analysis, compared to 42% in 2020 and 34% in 2018. It was also noted that the use of big data, such as Earth observation data and citizen science data, combined with advanced analytical techniques like machine learning, is becoming more prevalent in monitoring environmental issues and assessing the impact of the economy on the environment. Brennan emphasized the need for continued efforts at the national, regional, and global levels to improve data availability. She also informed that the UNEP and UNODC were hosting the global webinar to discuss the use of different data sources in monitoring emerging environmental issues.

Introduction of the Statistics and Data Project "Resilient and Agile National Statistical Systems to Meet Post-COVID-19 Data Needs to Recover Better" Under the 14th Tranche of the United Nations Development Account: Gabriel Gamez, UNSD the project coordinator and inter-regional adviser for the United Nations Statistics Division started his first presentation by providing information about the UN Development Account 14th tranche, which aims to improve the capability of beneficiary countries to meet Covid-19 data needs and enhance the preparedness of National Statistical Systems (NSS) to respond to crises. The implementing entities include regional commissions and global entities, with a budget of $3M for 2022-2025. The project consists of cross-cutting workstreams related to governance and innovation, as well as statistical-domain workstreams focusing on climate change, economic disparities, gender and social discrimination, and the impact of the economy on the environment. The project involves sub-regional, regional, and interregional events, the development of guidelines and tools, and assistance for 15 target countries.

Results of the Pre-Webinar Survey (see Annex II): Alice Bourdet, UNODC presented the results of a pre-webinar survey for the Global Webinar on Geospatial and Other Data Sources for Environment Statistics, focusing on the impact of the economy on the environment in Asia, Europe, and North Africa. The survey was filled by 38 participants, 42% male, 55% female, and 3% preferring not to say their sex. Among the participants, 66% were from National Statistical Offices and 34% from ministry or another governmental agency. In terms of expertise, 29% had expertise in water-related ecosystems, 10% in illegal mineral mining, and 13% in domestic material consumption. The survey results showed that 45% of participants never use geospatial data for indicators on freshwater ecosystems, while 53% had no knowledge on the use of geospatial data and techniques for mineral mines and environmental indicators. Furthermore, 34% had no knowledge about the impact of illegal mineral mining on the environment. Additionally, 58% were not familiar with domestic material consumption as an indicator of economic pressure on the environment, and 55% had no knowledge about the calculation of domestic material consumption at the national level.

Session 2: Impact of Anthropogenic and Natural Processes on Freshwater and Marine Ecosystems

Country-Owned Official Statistics as A Source for Water Statistics: Marcus Newbury, UNSD provided information about the importance of understanding and incorporating water statistics into decision-making for achieving Sustainable Development Goals (SDGs). The UNSD/UNEP Questionnaire on Environment Statistics[2] is a key tool for collecting data on water resources, waste management, and climate change. The questionnaire is sent to National Statistical Offices and Ministries of Environment, and data is also collected from government and non-government agencies. The collected data is used to inform policies and initiatives related to water sustainability, including groundwater management, water quality, wastewater treatment, and the valuation of water resources. Marcus emphasized the need for accurate and consistent data to track changes over time, as well as the potential use of other data sources such as cross-country surveys, private organizations, and remote sensing technologies. Overall, Marcus highlighted the essential role of water statistics in addressing environmental challenges and promoting sustainable development.

The Role of Freshwater Ecosystems in Accelerating the Implementation of Goal 6: Stuart Crane, UNEP spoke on the importance of freshwater ecosystems for tracking progress through the SDG indicator 6.6.1 for achieving SDG 6. He highlighted the impacts of human development and climate change on these ecosystems, but also the potential of "nature-based solutions" for restoring them. He stressed that water and climate are interconnected and managing water resources must consider ecosystem changes and climate impacts. The lack of quantifiable targets for restoring and protecting different freshwater[3] ecosystems types was noted, as well as the need to address untreated wastewater that pollutes rivers and lakes. Finally, Stuart emphasized the threat of climate change to freshwater ecosystems and human health, but also the potential benefits of protecting and restoring them.

Alive Demo of The Freshwater Ecosystem Explorer Reporting Data Platform: Stuart Crane, UNEP introduced an interactive tool called the Freshwater Ecosystem Explorer, which provides data on specific river basins, wetlands, and changes in freshwater ecosystems over time. He

[2] Questionnaire on Environment Statistics
[3] Find out more about UNEP's work and learn about UNEP's freshwater work

emphasized the importance of protecting and restoring wetlands as nature-based solutions for social and economic development and highlighted the relevance of the statistics for policy implications and their contribution to various frameworks such as the SDGs, global biodiversity, and climate change. The use of satellite images to detect natural and artificial water bodies and the ability to zoom in and observe specific locations on Freshwater Ecosystem Explorer were also demonstrated. Stuart mentioned the challenge of identifying different basins and provided examples of water bodies with different conditions and highlighted the ability to observe interannual changes and also provided the link[4] for further exploration of the data on the Freshwater Ecosystem Explorer.

Country Presentation on Using SDG 6.6.1 Data Application for National Planning: Kenya – Said Omar Mohammed, Water Quality Monitoring at the Ministry of Water, Sanitation, and Irrigation of Kenya discussed the importance of addressing environmental degradation and water resource management in Kenya to achieve the Sustainable Development Goals (SDGs). He highlighted the notable drivers of environmental degradation, such as population growth, inappropriate technology, unsustainable consumption patterns, poverty, and climate change. Said Omar focused on SDG indicator 6.6.1, which tracks changes in water-related ecosystems and aims to determine the extent of ecosystem change over time. The overall objective of their pilot project was to integrate freshwater data into decision making to improve the protection and restoration of freshwater ecosystems. He acknowledged the need for proper planning, management, and financial resources to realize universal access to water. He also mentioned the establishment of Water Resources Management Authority (WRMA) and Water Resources Authority (WRA) in Kenya to regulate and manage water resources. The government of Kenya has domesticated the integration of SDGs into national and county policies and planning frameworks. Kenya's participation in the pilot project was highlighted as an honorable achievement.

Earth Observations for Marine Ecosystem Monitoring: Emily Smail, GEO Blue Planet Initiative, NOAA, University of Maryland discussed the use of Earth Observations for marine ecosystem monitoring. She mentioned two types of observing systems, namely in situ and space-based systems. In situ observing systems involve directly monitoring the natural and man-made environment. Space-based observing systems, on the other hand, use satellites to collect data. Emily mentioned that the data and products from Earth Observations can be used to develop an early warning system and provide information to prevent the loss of marine and coastal biodiversity.

Data Collection on SDG 14.1.1 on the Index of Coastal Eutrophication and Marine Plastic Debris: Ekaterina Poleshchuk, UNEP provided information on the data collection for Sustainable Development Goal (SDG) 14.1.1, which focuses on the index of coastal eutrophication and marine plastic debris. She mentioned two levels of indicators for data collection, with an optional third level for relevant countries. The methodology for data collection was described, with a reference to a global manual on measuring SDG 14.1.1. The availability of data at level 1 was stated, including Chlorophyll-a deviations and anomalies from remote sensing on global, regional, and national scales. Ekaterina also mentioned a data collection exercise in 2023 at level 2, which involves a questionnaire on the sustainable use of oceans, seas, and

[4] Freshwater Ecosystems Explorer is accessible at https://www.sdg661.app/

marine resources. The United Nations Environment Programme (UNEP) is responsible for collecting and analyzing the data, and preparing them for publication on various platforms.

Integration of Science and Community for Coastal Ecosystem Monitoring in Bangladesh: **Subrata Sarker**, Department of Oceanography, Shahjalal University of Science and Technology highlighted the current focus on conservation and sustainable utilization of marine resources in Bangladesh, a maritime country with a large Exclusive Economic Zone (EEZ). However, there is limited data available to support these efforts, so an initiative has been taken to develop a monitoring system for the coastal and marine ecosystem of Bangladesh, he mentioned. This initiative integrates scientific monitoring activities with citizen-based monitoring, involving fishermen, school students, and local people in data collection using low-cost devices and an Android application. Subrata emphasized the importance of integrating field-based, citizen-driven, and model-based approaches for coastal ecosystem monitoring, as well as the need for scientific validation of data and an open-access platform for data sharing. Additionally, he suggested ensuring the sustainability of the monitoring initiative and adopting this approach on a wider geographical scale, as well as using low-cost instruments for monitoring environmental variables.

Country Experience: Fiji: **Zaidy Afrin** discussed the importance of localizing the Sustainable Development Goals (SDGs) for ocean and climate, particularly for island nations. She emphasized the need for multi-sector cooperation and policy integration between industry, environment, trade, science, and government. She highlighted the interconnections and interlinkages among the SDGs and the importance of evidence-based decision making. Zaidy also mentioned the role of the Navy and defense units in leading climate and ocean initiatives. She emphasized the need for aligning science, industry, and policy to have a significant impact and stressed the importance of financial support for implementing SDGs at the national level. The presentation concluded by highlighting the importance of improving governance and accountability and mentioned the significance of SDGs 16 and 14 in this regard.

Some Key Points of the Presentations on 18 April 2023

- The webinar, provided within the DA14 project on Statistics and Data, aimed to increase the knowledge of the beneficiary countries and other invited countries about statistics derived from geospatial and other data sources to assess the impact of the economy on the environment.
- The pre-webinar survey conducted revealed knowledge gaps among respondents in relation to environment statistics and indicators.
- Within the thematic session on the Impact of Anthropogenic and Natural Processes on Freshwater and Marine Ecosystems:
    - The presentations discussed the importance of monitoring water resources considering water-related ecosystem changes and climate impacts.
    - UNEP presented alive demo of the Freshwater Ecosystem Explorer reporting data platform covering countries from around the world.
    - The use of observing systems, both in situ and space-based, was highlighted as a means to collect data on ocean and coastal areas.

- Earth observations are crucial for monitoring and preserving inland water and marine environment, as emphasized by various speakers.

If you have any questions about SDG indicators 6.6.1 and 14.1.1, please contact UNEP: Stuart Crain (stuart.crane@un.org), Ekaterina Poleshchuk (ekaterina.poleshchuk@un.org), Dany Ghafari (dany.ghafari@un.org), and the SDG and Environment Statistics Unit of UNEP (unep-ewad-sdgs@un.org).

DAY 2 – 19 APRIL 2023

Session 3: The Impact of Illegal Economies on the Environment: Monitoring of Illegal Mineral Mining

Response Framework on Illegal Mining: Leonardo Correa, UNODC highlighted the need to prevent and combat crimes that affect the environment, such as corruption and illegal exploitation and trafficking. He emphasized the concern about these activities fueling criminal and terrorism activities, and also mentioned the support of UNODC in addressing these issues. The importance of adopting necessary legislation to tackle illicit economies and protect the environment was emphasized.

Measuring Illicit Financial Flows in the Mining Sector: The SDG Framework, Bilateral Trade Asymmetries and Its Link to Remote Sensing: Carlotta Schuster, UNCTAD expressed concern about the increase in criminal offences related to trafficking in precious metals and illegal mining[5], and highlighted the need to combat transnational organized crime and enhance the security of supply chains of precious metals. Capacity building is seen as crucial, based on a sound analysis of the situation on the ground. The presentation emphasized the importance of preventing, detecting, investigating, and prosecuting organized crime, drugs, corruption, and terrorism. It also mentioned the impact of these crimes on the environment, including pollution, the movement or dumping of waste, and the depletion of natural resources. Carlotta referenced various conventions and resolutions that call for member states to take effective measures in preventing and combating these crimes. She also emphasized the need for international cooperation among law enforcement and judicial practitioners.

Remote Sensing Techniques for Small-Scale Mining Detection: Elsy Ibrahim, University of Liège discussed the use of remote sensing techniques for detecting and monitoring small-scale mining activities, with a focus on a study area in the department of Antioquia, Colombia. Elsy highlighted the benefits of satellite data, such as high spatial coverage and timeliness, for analyzing mining activities. She also mentioned the challenges and environmental impacts associated with small-scale mining, including land degradation, heavy metal accumulation, and health hazards. She emphasized the need for early warning systems, intervention prioritization, and identification of pollution hotspots using remote sensing data. Overall, the presentation

[5] Find more on the Response Framework on Illegal Mining and the Illicit Trafficking in Precious Metals

provided insights into the potential applications of remote sensing in addressing the issues related to small-scale mining.

Mapping Global Mining Activities Using Open Earth Observation Data: Victor Maus, University Vienna provided information on mapping mining activities at a global level. He mentioned that the database includes both industrial mining and small-scale artisanal mining. The distribution of mining land use across countries was also highlighted. Victor further discussed the impact of mining on forests, indicating mining-related forest loss by country and by commodity from 2001 to 2019. The need for monitoring legal and illegal mining was emphasized. Overall, his presentation offered an overview of key facts related to mining and its effects.

Strengthening Development Minerals Governance in Fiji Using 'Digital Earth Pacific': Gary Lee, Pacific Community and **Mohammed Azad**, Mineral Resources Department provided information on development minerals, which include industrial minerals, construction materials, dimension stones, and semi-precious stones. He stated that global consumption of these minerals is significant, and in Fiji, the annual extraction is 6.4 tons per capita. Development minerals have important linkages to all 17 Sustainable Development Goals (SDGs), but they are paradoxically neglected from the agenda. The extraction sites in Fiji include hard rock quarries, river extraction, soft rock quarries, and sand quarries, he mentioned. Some of these sites are regulated, while others are unregulated or illegal. The Ministry of Lands and Mineral Resources (MLMR) has identified 46 illegal extraction sites from 2016 to 2021. Gary also mentioned the environmental and social impacts of development minerals, as well as their financial impacts and the hinderance they cause to the business environment. The recommended actions to address these issues include monitoring Fiji's rivers using satellite data, enforcing regulations, and efficiently allocating limited human resources. Overall, Gary highlighted the significance of development minerals and the need to transform the neglected sector.

Mining Activities from Space (Indonesia) - Remote Sensing Research Center of the National Research and Innovation Agency (BRIN) Indonesia: Udhi Catur Nugroho discussed the use of satellite imagery and remote sensing technology to detect mining activities, specifically in Indonesia. The work supports the local government in analyzing the environmental impact of mining activities. The availability of high-resolution data and challenges in detecting mining activities from space were highlighted. It was noted that remote sensing can only detect surface objects and additional ground data is needed to detect underground mining. Optical data is limited by cloud cover in tropical countries, but radar data can overcome this challenge at the expense of speckle noise. Udhi also mentioned the publication of a study on identifying tin mining areas using guided classification on Landsat 8 images. The satellite imagery is capable of showing various land cover types, such as plantations, open-pit mining areas, affected rivers, forests, settlements, and mining roads. The use of medium and high spatial resolution data for different purposes, as well as the challenges and benefits of manual and digital classification methods, were discussed. Additionally, Udhi mentioned a specific work using Object-Based Image Analysis and texture approach from Sentinel-1 radar data for open mining detection. Overall, the presentation emphasized the importance of collaboration and the need to combine remote sensing data with other information, such as concession maps, to accurately classify mining activities, including illegal mining.

Spatial Data Utilization to Monitor Mineral and Coal Mining – Directorate of Mineral-Coal Engineering and Environment of Ministry of Energy and Mineral Resources Indonesia: Yosafat R. Leonard's presentation provided information on the use of spatial data to monitor

mineral and coal mining in Indonesia. The Ministry of Energy & Mineral Resources utilizes spatial data to monitor mining concessions, forest areas, administrative boundaries, and mineral and coal potentials. The use of spatial data for mine monitoring includes analyzing mine rehabilitation and reclamation progress, environmental impact, and mine water management. Yosafat also highlighted the issue of illegal mining in Indonesia, with illegal mining activities identified in almost all provinces of the country. The impact of illegal mining activities includes safety hazards, landscape change, environmental degradation, economic loss, forest destruction, and potential social and security disruptions. It was noted that cloud cover, spatial resolution, and the use of other available spatial data are considerations in the analysis of illegal mining.

Monitoring of Mining Sites and Related Impacts on Natural Vegetation Using DE Africa Platforms: Joseph Tuyishimire, Digital Earth Africa discussed the importance of monitoring mining sites and the impacts of mining activities on natural vegetation. He highlighted the need for effective governance and regulation of mining activities to prevent economic damages and negative environmental impacts. He introduced Digital Earth Africa as a transparent, independent, and authoritative source for monitoring and tracking site compliance and approval. He emphasized the benefits of using Earth observation (EO) data in monitoring mining sites, including its ability to provide time series data, cover large areas, and access inaccessible areas. Joseph also mentioned the availability of DE Africa data through various platforms and provided contact information for key personnel involved in Digital Earth Africa.

Remote Sensing in Support of ASGM Policy Development, Implementation and Evaluation (Example in Eastern DR Congo): Abdul Moomen and Pierre Lacroix, GRID-Geneva spoke on the use of remote sensing technologies to monitor Artisanal and Small-scale Gold Mining (ASGM) activities and its impact on the environment. The aim of their presentation was to identify the benefits and limitations of using remote sensing for ASGM monitoring and raise awareness among decision-makers. The presentation highlighted the benefits of remote sensing, such as its ability to analyze large areas, analyze historical data, and access remote locations. It also discussed the limitations, including the lack of technical expertise in policy agencies and local communities, the need to involve various stakeholders, and the potential for socio-environmental disputes. They provided recommendations for international organizations, researchers, and governments/policymakers to improve the use of remote sensing in ASGM monitoring, including improving land use/land cover methodologies, involving local communities, and integrating remote sensing tools into policy development programs.

Panel Discussion on the Use of Geospatial Data for Illegal Mining: The panelists discussed the need for multidisciplinary and multistakeholder discussions in order to bridge the gap between data collection and information utilization. The discussion highlighted challenges faced in different countries, such as fragmented data, territoriality of government agencies in sharing data sets, limited human resources, and difficulties in integrating different data sources. They also mentioned the importance of centralized digital programs and tools at the national level to streamline data collection and provide relevant information to decision makers. Additionally, they emphasized the need for validation and reflection on the results obtained from data analysis. Various solutions were suggested, including the transformation of data into knowledge, the development of user-friendly tools for decision makers, collaboration with remote sensing agencies, and the use of geographical data and spatial tools.

Some Key Points of the Presentations on 19 April 2023

- Illegal mining activities have a range of negative impacts, including safety hazards, environmental degradation, economic loss, and potential links to criminal and terrorism activities.
- Effective governance and regulation of mining activities are necessary to prevent economic damages and negative environmental impacts.
- The UNODC is working towards promoting justice and the rule of law and making the world safer from drugs, crime, corruption, and terrorism.
- Various limitations, including a lack of technical expertise, need for stakeholder involvement, and potential socio-environmental disputes, exist in addressing illegal mining.
- The use of spatial data, remote sensing, and Earth observation (EO) data can help monitor and analyze illegal mining sites, aiding in decision-making and detection.

If you have any questions about illegal mining monitoring, please contact UNODC: Coen Bussink (coen.bussink@un.org).

DAY 3 – 20 APRIL 2023

Session 4: Domestic Material Consumption as An Indicator of Economic Pressure on the Environment

Domestic Material Consumption (DMC) As an Important Policy Indicator: Stephan Moll, Eurostat spoke about DMC as an indicator on the impact of the economy on the environment and the need for responsible production and consumption. According to him, the EU aims to decouple economic growth from negative environmental impacts and increase resource productivity. One way to achieve this goal is to increase the circularity of materials in the economy, which would reduce the need for resource extraction and waste. The European Green Deal, a political strategy for the EU, aims to make Europe the first climate-neutral continent by becoming a modern, resource-efficient economy. Stephan also mentioned such indicators as the Circular Material Use rate (CMU) and Material Footprint.

Available Tools to Support the Calculation of DMC at the Country Level: General Overview – Ekaterina Poleshchuk, UNEP provided general overview about the international statistical standards that support calculation of the indicator on Domestic Material Consumption (DMC). DMC is a Material Flow Accounting (MFA) indicator that reports the apparent consumption of materials in a national economy, including biomass, metal ores, non-metallic minerals, and fossil fuels. DMC is calculated based on agriculture, forestry, fisheries, mining, energy, and trade statistics, using available tools to support the calculation at the country level. The umbrella statistical standard for calculation of DMC is the System of Environmental-Economic Accounting-Central Framework (SEEA CF). Eurostat and UNEP are the main players at the global level in the field of EW-MFA methodology and data collection.

Eurostat Guidelines and Questionnaires: Stephan Moll, Eurostat provided information about the importance of seeking permission from respective right holders for the use or reproduction of elements not owned by the EU. He also highlighted the Domestic Material Consumption (DMC) indicator and the Economy-Wide Material Flow Accounts (EW-MFA)[6] accounting framework as key measures for evaluating material accumulation and flow in the economy. The EW-MFA record material flows into and out of the economy and derived indicators such as Direct Material Input (DMI) and Raw Material Input (RMI) are used as input indicators, while Direct Material Consumption (DMC) and Raw Material Consumption (RMC) serve as consumption indicators. Eurostat guidelines and questionnaires are provided as compilation tools for carrying out the above measurements. Stephan also highlighted the voluntary and mandatory EU legal requirements for data collection and the compilation tools available in the Eurostat EW-MFA questionnaire. All Eurostat materials are available online.

The Global MFA Manual The Use of Natural Resources in the Economy: A Global Manual on Economy Wide Material Flow Accounting – Sophia Leticia Groll, UNEP introduced the Global Manual on Economy-Wide Material Flow Accounts (EW-MFA)[7], which provides guidance for national statistical offices and other relevant organizations to compile direct material flow accounts. It builds on the experience of Eurostat accounting guidelines and extends it to a global level. The objective is to build capacity for EW-MFA at the national level and report progress towards the Sustainable Development Goals targets 8.4 and 12.2. She ended with a call for a live simulation.

Online Course on Domestic Extraction for EW-MFA: Sophia Leticia Groll, UNEP presented the Online Training on Economy-Wide Material Flow Accounting (EW-MFA) available on UNEP's eLearning Platform (https://elearning.unep.org/). The training is designed to support national statistical offices and relevant organizations in building Economy-Wide Material Flow Accounts. It includes video tutorials and training materials on Domestic Extraction (DE) and uses a global manual on EW-MFA. The training covers topics such as Domestic Material Consumption (DMC) as an indicator of economic pressure on the environment and the impact of the economy on the environment. Overall, she highlighted the availability and usefulness of the online training as a resource for understanding and managing material flows in the economy.

EW-MFA Compiler: Ekaterina Poleshchuk, UNEP presented the EW-MFA Compiler, a tool that supports countries in building Economy-Wide Material Flow Accounts by providing the basic structure and simple calculation tools for some material categories. The methodology involves using the EW-MFA Compiler in conjunction with reading the global manual on EW-MFA provided by UNEP in 2021. You can download the EW-MFA Compiler from the UNEP website: click here.

SDG Indicator 8.4.2/12.2.2 and UNEP Questionnaire on EW-MFA for these SDG Indicators: Dany Ghafari, UNEP informed about the Sustainable Development Goals (SDGs) indicators 8.4.2/12.2.2 and 8.4.1/12.2.1[8] as indicators that are used to track progress towards sustainable resource management and pollution prevention. The International Resource Panel (IRP) produces Environmental Material Flow Analysis (EW-MFA) for all countries, with data available from 1970 to 2019 for Domestic Material Consumption (DMC) and Material Footprint (MF). DMC is reported for 17 different raw materials and the total, and is available in tons, Kg per capita, and KG per constant USD for all countries, regional and global disaggregated. MF is reported at the

[6] Important document to explore: Economy-wide material flow accounts
[7] The Use of Natural Resources in the Economy: A Global Manual on Economy Wide Material Flow Accounting
[8] For more information, download the PowerPoint Presentation (unep.org)

global level in tons, KG per capita, and KG per constant USD. Dany also informed about a pre-filled EW-MFA questionnaire with estimated data for SDG indicators 8.4.1/12.2.1 and 8.4.2/12.2.2 that was sent to countries by UNEP for the first time in 2022 for the compilation of national data for these indicators.

Global Estimation Provided for Countries: The Basis for Domestic Material Consumption Accounts in the Global MFA Database: James West, CSIRO Land and Water, Sustainability Pathways Program, Australia spoke on the need for additional input from national statistical agencies in creating global Material Flow Accounts, particularly for categories such as domestic material consumption, domestic extraction, and physical imports and exports. He provided information on major primary categories for data quality, including biomass, fossil fuels, metal ores, and non-metallic minerals. However, he noted that some subcategories, particularly non-metallic minerals, are largely modeled and based on assumptions due to limited data availability. James highlighted the Global EW-MFA manual as a resource for national statistical offices to improve their national accounts. He also mentioned specific data sources and methods used for certain categories, such as the combination of metals data from various sources for non-ferrous ores.

Validating the Economy-Wide Material Flow Accounts (EW-MFA) in Namibia: Ezekiel N. Kambonde, Namibia Statistic Agency spoke on the benefits of using trade data based on HS codes to identify relevant products in material categories. The trade data is collected at different points of entry in Namibia and is reported on a monthly basis. Ezekiel suggested that a hands-on approach is more effective in acquiring the expected information from the questionnaires. The UNEP was praised for its work in establishing a robust structure of statistics within the environmental sphere. It was also noted that trade data can be influenced by various factors such as trade policies and agreements, so advanced validation is important. Ezekiel mentioned that the questionnaire provides a list of different products to consider for populating the material categories.

Panel Discussion on the Advantages and Disadvantages of the DMC Methodology: Stephan Moll (Eurostat), **Sophia Leticia Groll** (UNEP), **Ezekiel N. Kambonde** (Namibia Statistic Agency), **James West** (CSIRO) participated in a panel discussion about Domestic Material Consumption (DMC) and Material Footprint moderated by **Ekaterina Poleshchuk** (UNEP). They discussed the concept of Domestic Material Consumption (DMC) and its limitations as a global indicator. The speakers emphasized that DMC does not account for informal or illegal economic activities and does not reflect the indirect material flows involved in imports and exports. They also mentioned that calculating DMC is within the power of individual nations and can be useful for local or domestic policy makers to manage material flows within their countries. However, they noted that DMC alone does not provide a complete picture and should be considered alongside other indicators like Material Footprint to understand the environmental burdens and resource efficiency of a country. The discussion also highlighted the challenges of measuring the informal sector and the need for international monitoring to ensure efficient resource usage.

Session 5: Conclusions

Importance of Institutional Cooperation and Governance: Gabriel Gamez, UNSD highlighted the importance of institutional cooperation and governance in assessing the impact of the economy on the environment. He emphasized the advantages of a coordinated National Statistical System (NSS), including efficiency, effectiveness, quality, coherence, comparability,

and accessibility of official statistics. He also defined official statistics as those produced in accordance with the Fundamental Principles of Official Statistics by a national statistical office or another certified producer mandated by the government. Gabriel emphasized the need for coordination within a system to synchronize and harmonize activities, responsibilities, and command structures.

Some Key Points of the Presentations on 20 April 2023

- Domestic Material Consumption (DMC) was highlighted as an indicator of the impact of the economy on the environment and the need for responsible production and consumption.
- Eurostat and UNEP are the main players at the global level in the field of EW-MFA methodology and data collection.
- The System of Environmental-Economic Accounting-Central Framework (SEEA CF) is the umbrella international statistical standard for building EW-MFA and calculating DMC. Available global EW-MFA methodologies from Eurostat and UNEP are based on SEEA CF.
- A lot of useful information about the development of EW-MFA and DMC is available online on the websites of Eurostat and UNEP: manuals, questionnaires, EW-MFA compiler, e-learning course.
- Institutional cooperation and governance are important in assessing the impact of the economy on the environment.

If you have any questions about Material Flow Accounts and Domestic Material Consumption, please contact UNEP: Ekaterina Poleshchuk (ekaterina.poleshchuk@un.org), Dany Ghafari (dany.ghafari@un.org), and the SDG and Environment Statistics Unit of UNEP (unep-ewad-sdgs@un.org).

POST-WEBINAR SURVEY

From the participating organizations, 30 participants including 15 women took part in the Post-Webinar Survey with questions about capacity building, the use of geospatial data to monitor water-related ecosystems, illegal mineral mining, and the calculation of Domestic Material Consumption (DMC) at the national level. According to the survey results, almost all respondents indicated that their knowledge of these topics increased after the webinar. However, some participants expressed the need for better coordination, financing, and national programs in their field of work. Many participants expressed interest in expanding their organization's capacity for calculating DMC and using geospatial data to monitor illegal mineral mining. Additionally, some participants mentioned limitations to their organization's access to technology, data availability, and scope of work, while certain respondents highlighted the need for training and capacity building in areas such as remote sensing and ecosystem accounting. Overall, the survey results indicated varying levels of capacity and interest in the topics discussed, while most participants found the webinar informative.

ANNEXES

ANNEX I. WEBINAR AGENDA

Global Webinar on Geospatial and Other Data Sources for Environment Statistics:

Assessing the Impact of the Economy on the Environment

Online meeting[9], 18-20 April 2023

Agenda (version of 20 April 2023)

Note: Times are in Greenwich Mean Time / Universal Coordinated Time (GMT/UTC).

Tuesday, 18 April 2023	
Session 1: Opening and Introduction Moderator: Coen Bussink, UNODC	
06:00 – 06:15	**Housekeeping items** – *Coen Bussink, UNODC* **Welcome and opening addresses** • Angela Me, Chief of the Research and Trends Analysis Branch, Division for Policy Analysis and Public Affairs, UNODC • Brennan Van Dyke Chief of the Capacity Development and Innovation Branch, Early Warning and Assessment Division, UNEP
06:15 – 06:20	**Introduction of the Statistics and Data Project "Resilient and agile National Statistical Systems to meet post-COVID-19 data needs to recover better" under the 14th tranche of the United Nations Development Account** – *Gabriel Gamez, UNSD*
06:20 – 06:25	**Results of the pre-webinar survey** – *Alice Bourdet, UNODC*
06:25 – 06:35	**Q&A**
Session 2: Impact of anthropogenic and natural processes on freshwater and marine ecosystems Moderator: Ekaterina Poleshchuk, UNEP	
06:35 – 06:40	**Introduction** – *Ekaterina Poleshchuk, UNEP*
06:40 – 06:55	**Country-owned official statistics as a source for water statistics** – *Marcus Newbury, UNSD* **Q&A**

[9] The meeting was held with Zoom with English, Russian and Arabic interpretation.

06:55 – 07:50	**Freshwater Ecosystems:** • **Policy introduction** – *Stuart Crane, UNEP (5 mins)* • **Alive demo of the Freshwater Ecosystem Explorer reporting data platform** – *Stuart Crane, UNEP (15 mins)* **Q&A** *(10 mins)*
	Country presentations on using SDG 6.6.1 data application for national planning: • **Kenya** – *Said Omar Mohammed, Water Quality Monitoring at the Ministry of Water, Sanitation, and Irrigation of Kenya (15 mins)* **Open discussion and Q&A** *(10 mins)*
07:50 – 08:00	*Break*
08:00 – 08:55	**Marine Ecosystems:** • **Earth observations for marine ecosystem monitoring** – *Emily Smail, GEO Blue Planet Initiative, NOAA, University of Maryland (15 mins)* • **Data collection on SDG 14.1.1 on the Index of Coastal Eutrophication and Marine plastic debris** - *Ekaterina Poleshchuk, UNEP (5mins)* **Q&A** *(5 mins)* **Country experience:** • **Bangladesh –** *Subrata Sarker, Department of Oceanography, Shahjalal University of Science and Technology (10 mins)* • **Fiji** – Zaidy Afrin *(10 mins)* **Open discussion and Q&A** *(10 mins)*
08:55 – 09:00	**Closing remarks** – *Ekaterina Poleshchuk, UNEP*
Wednesday, 19 April 2023	
Session 3: The impact of illegal economies on the environment: monitoring of illegal mineral mining Moderator: Coen Bussink, UNODC	
06:00 – 06:05	**Introduction** – *Coen Bussink, UNODC*

06:05 – 07:05	**Overview:** • **Response Framework on illegal mining** – *Leonardo Correa, UNODC (10 mins)* • **Measuring Illicit financial flows in the mining sector: The SDG framework, bilateral trade asymmetries and its link to remote sensing** – *Carlotta Schuster, UNCTAD (15 mins)* • **Remote sensing techniques for small-scale mining detection -** *Elsy Ibrahim, University of Liège (15 min)* • **Mapping global mining activities using open Earth observation data** *Victor Maus – University Vienna (15 min)* **Q&A** *(5 mins)*
07:05 – 07:45	**Applications Asia:** • **Strengthening Development Minerals Governance in Fiji Using 'Digital Earth Pacific'** *- Gary Lee, SPC and Mohammed Azad, Mineral Resources Department (15 min)* • **Remote Sensing Research Center of the National Research and Innovation Agency (BRIN) Indonesia** – *Udhi Catur Nugroho (10 min)* • **Directorate of Mineral-Coal Engineering and Environment of Ministry of Energy and Mineral Resources** *Indonesia - Yosafat R. Leonard (10 min)*
	Q&A *(5 mins)*
07:45 –07:55	Break
07:55 – 08:30	**Applications Africa:** • **Monitoring of mining sites and related impacts on natural vegetation using DE Africa platforms** *- Joseph Tuyishimire, Digital Earth Africa (15 min)* • **Remote Sensing in support of ASGM policy development** (example in Eastern DR Congo) - A*bdul Moomen and Pierre Lacroix, GRID-Geneva (15 min)* **Q&A** *(5 mins)*
08:30 – 08:55	**Panel discussion** on the use of geospatial data for illegal mining • **Directorate of Mineral-Coal Engineering –** Indonesia • **Mineral Resources Department Fiji** - Mohammed Azad Fiji • **Pacific Community (SPC)**- Nicholas Metherall • **University Liège** *- Elsy Ibrahim* • **UNEP-GRID** - A*bdul Moomen/Pierre Lacroix* • **UNODC** – *Leonardo Correa* *Moderation: UNODC – 25 mins*

08:55 – 09:00	**Closing remarks** – *Coen Bussink, UNODC*
Thursday, 20 April 2023	
Session 4: Domestic Material Consumption as an indicator of economic pressure on the environment Moderator: Ekaterina Poleshchuk, UNEP	
06:00 – 06:05	**Introduction** – *Ekaterina Poleshchuk, UNEP*
06:05 – 06:20	**Domestic Material Consumption (DMC) as an important policy indicator** – *Stephan Moll, Eurostat* **Q&A**
06:20 – 07:10	**Available tools to support the calculation of DMC at the country level:** • **General overview** – *Ekaterina Poleshchuk, UNEP (5 mins)* • **Eurostat guidelines and questionnaires** – *Stephan Moll, Eurostat (10 mins)* • **The Global MFA Manual *The Use of Natural Resources in the Economy: A Global Manual on Economy Wide Material Flow Accounting*** – *Sophia Leticia Groll, UNEP (5 mins)* • **Online course on Domestic Extraction for EW-MFA** – *Sophia Leticia Groll, UNEP (5 mins)* • **EW-MFA Compiler** – *Ekaterina Poleshchuk, UNEP (10 mins)* **Q&A** *(15 mins)*
07:10 – 07:20	*Break*
07:20 – 07:35	**SDG indicator 8.4.2/12.2.2 and UNEP Questionnaire on EW-MFA for these SDG indicators** – *Dany Ghafari, UNEP* **Q&A**
07:35 – 08:05	**Calculation of DMC using EW-MFA at the country level:** • **Global estimation provided for countries** – *James West, CSIRO Land and Water, Sustainability Pathways Program, Australia (10 mins)* • **Validating the Economy-wide Material Flow Accounts (EW-MFA) in Namibia** – *Ezekiel N. Kambonde, Namibia Statistic Agency (10 mins)* **Q&A** *(10 mins)*
08:05 – 08:40	**Panel discussion** on the advantages and disadvantages of the DMC methodology – *Stephan Moll (Eurostat)*, *Sophia Leticia Groll (UNEP)*, *Ezekiel N. Kambonde (Namibia Statistic Agency), James West (CSIRO)* **Open discussion**
08:40 – 08:45	**Closing remarks** – *Ekaterina Poleshchuk, UNEP*

Session 5: Conclusions Moderators: Ekaterina Poleshchuk from UNEP, and Coen Bussink from UNODC	
08:45 – 09:00	• **Importance of Institutional Cooperation and Governance** – *Gabriel Gamez, UNSD (8 mins)* • **Main conclusions** – *Ekaterina Poleshchuk (UNEP) and Coen Bussink (UNODC)* **Closing of the Webinar**

ANNEX II. RESULTS OF THE PRE-WEBINAR SURVEY

Results of the Pre-Webinar Survey for Asia, Europe and North Africa

Global Webinar on Geospatial and Other Data Sources for Environment Statistics: Assessing the Impact of the Economy on the Environment

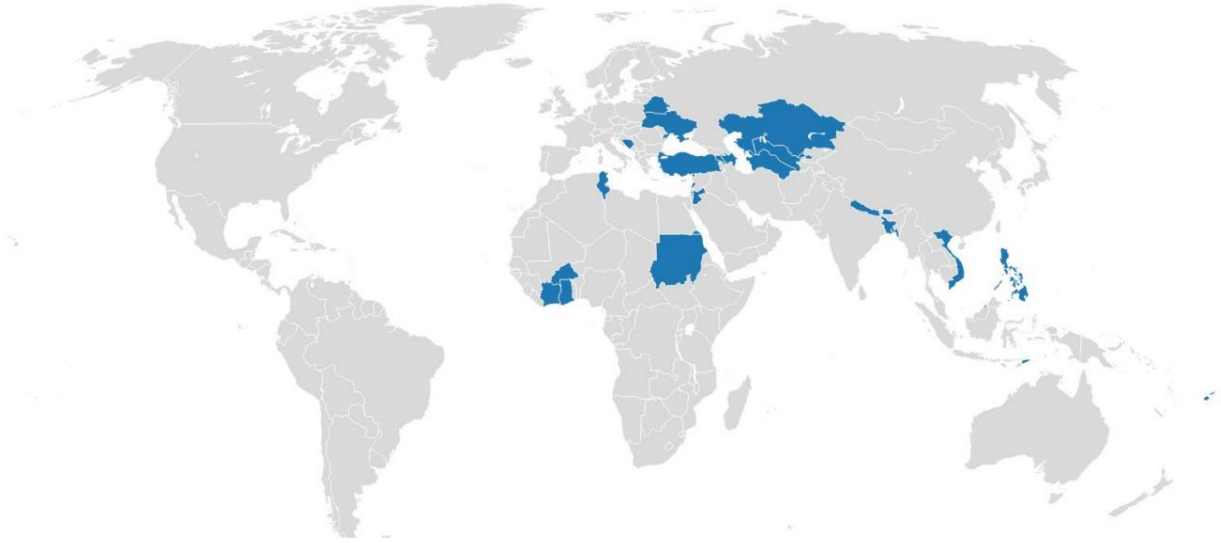
Alice Bourdet, 18 April 2023

UN environment programme

UNODC United Nations Office on Drugs and Crime

Overview of registrations

109 participants registered



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

Respondent Portrait

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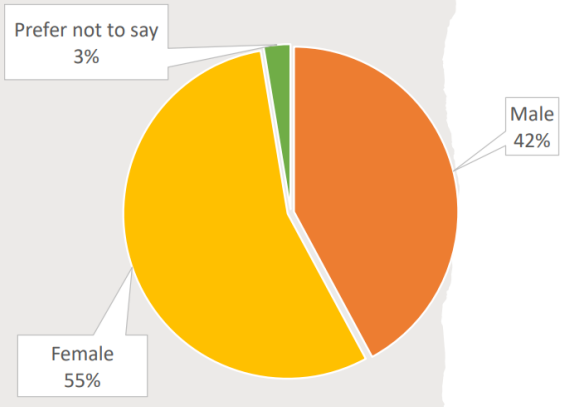
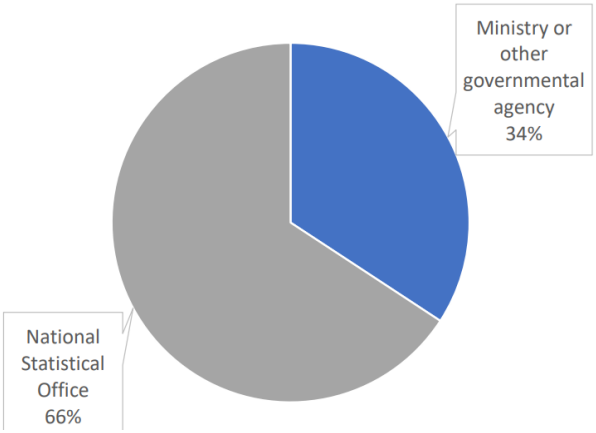
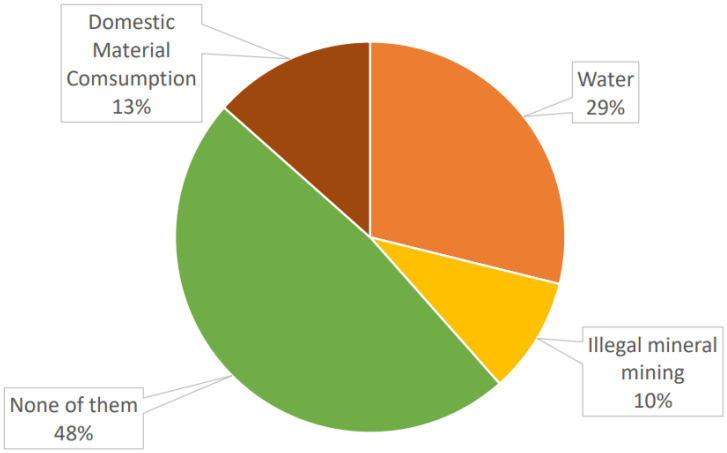




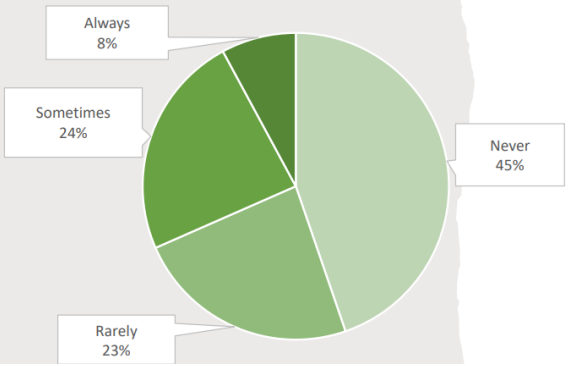
Respondent Portrait

- In which of the three webinar session areas do you have most expertise?

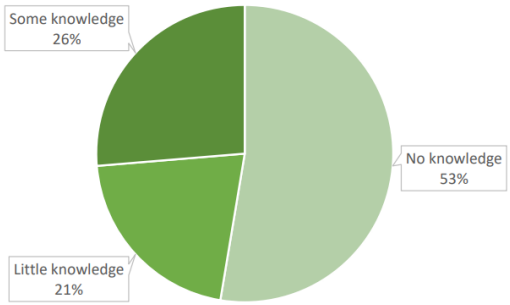


Geospatial data

- Please rate your current **use of geospatial data** to provide **indicators on fresh water-related ecosystems** for planning policy and decision-making

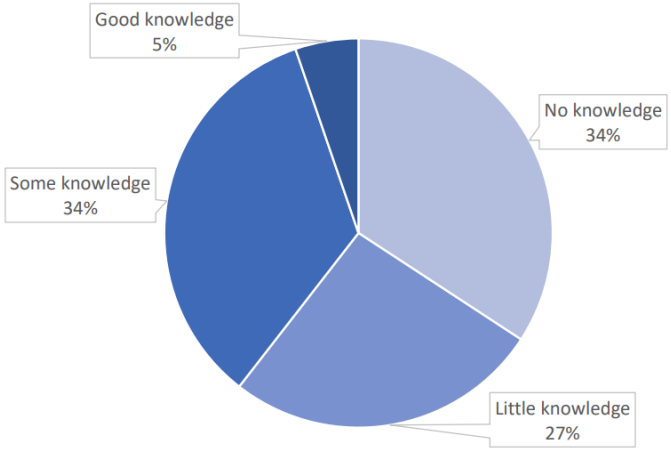


- Level of **knowledge on the use of geospatial data and techniques** to detect **mineral mines** and to generate **statistical estimates about mineral production and environmental degradation indicators**



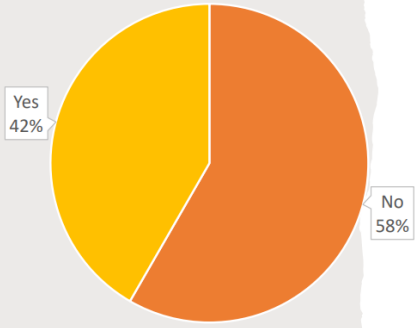
Impact of illegal economies on the environment

- Please rate your level of knowledge on the impact of illegal mineral mining on the environment

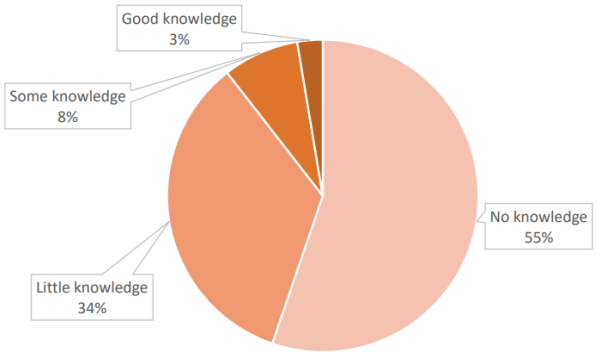


Domestic Material Consumption

- Are you familiar with Domestic Material Consumption as an indicator of economic pressure on the environment?



- Please rate your level of knowledge of the calculation of Domestic Material Consumption at the national level



We will send another short survey after the webinar

Thank you

UN environment programme

UNODC
United Nations Office on Drugs and Crime