Mobile Data Collection tool for National ASGM Overview – User Guide

17 November 2017

Version 1.1

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1   Introduction

1.1   Scope and Purpose

Collecting field data is often necessary to prepare the national Artisanal and Small-scale Gold Mining (ASGM) sector overview. The United Nations Institute for Training and Research (UNITAR) has developed a mobile data collection tool to accompany the two methodologies developed by the Artisanal Gold Council (baseline estimates) and UNITAR (socio-economic research methodology). The development of this tool has been funded by UN Environment.

The tool is a tailor-made electronic form to be used with KoBo Toolbox. The Kobo Toolbox is a free data collection solution available for Android mobile devices. It has been developed by the Harvard Humanitarian Initiative with support from UN OCHA.

The tool has three main functions:

1. Combine location data with basic site-specific information to build a map
2. Contextualize and manage the pictures taken at the mining site
3. Manage data collection from distance and share the progress with key stakeholders

The aim of this manual is to give the reader tailored instructions how to use the tool for the national ASGM overview, and not all aspects of KoBo Toolbox are covered. Readers are encouraged to look at support pages at http://support.kobotoolbox.org/ for further instructions. All feedback to develop the tool further is welcome[1].

1.2   Methodological Aspects

When preparing the national ASGM sector overview, countries are relying on three available methodologies[2]:

*   Baseline Estimates for the Artisanal and Small-scale Gold Mining Sector - A Toolkit and Guide by The Artisanal Gold Council (AGC), Draft version, 2017
*   Generic methodology for the socio-economic ASGM study, United Nations Institute for Training and Research (UNITAR), Draft version, 2017

These two methodologies combined provide a comprehensive approach to generate nuanced understanding of the ASGM sector in a given country.

Both methodologies have their own paper forms and ways to process the data. The tool provides a way to combine location data with key characteristics of the studied mining sites, thus enriching the data analysis and reporting.

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[1]Please send your questions and feedback to UNITAR (cwm@unitar.org).

[2] In addition to the methodologies mentioned, there is a document 'WHO guidance on addressing health aspects in the context of developing National Action Plans under the Minamata Convention on Mercury, Draft version, March 2017', but it is not yet publicly available at the time of this writing.

The tool contains three different sections:

1. Name and contact details
2. General Site Characteristics
3. Detailed data collection
   a. Extraction (digging)
   b. Processing (Crushing, milling, sluicing, amalgamation)
   c. Cyanide Leaching
   d. Health and Socio-economic Assessment
   e. Environmental Impact Assessment

Sections 1, 2 and 3(a, b, c) lend directly from the methodology developed by the Artisanal Gold Council, whereas the section on Health and Socio-economic assessment is based on UNITAR's Generic methodology for the socio-economic ASGM study as well as the draft guidance by WHO[3].

Section 3(e) on environmental impact assessment has been added to remind the research team that key information on overall environmental impact should be included in the National ASGM Overview[4].

ASGM, as mining in general, can have manifold environmental impacts, including on[5,6,7]:

- Population (e.g. impact on standard of living, impact on livelihood)
- Flora and fauna (e.g. deforestation)
- Land, water and air (e.g. soil contamination)
- Landscape (e.g. land degradation)
- Climate (e.g. CO_2 emissions)

A thorough environmental impact assessment would require more than observation and an interview-based survey. However, as established by Obiri S, Mattah PAD, Mattah MM, et al., people living in the mining area have remarkably accurate understanding of the pollution of their environment.[8] Therefore, interviewing people on aspects such as water quality and

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[3] Ibid.

[4] Section 4.2, UN Environment: Developing a National Action Plan to Reduce, and Where Feasible, Eliminate Mercury Use in Artisanal and Small Scale Gold Mining Working Draft August 17, 2015. Available at https://wedocs.unep.org/bitstream/handle/20.500.11822/11371/National_Action_Plan_draft_guidance_v12.pdf?sequence=1&isAllowed=y, accessed 17 November 2017.

[5] Environmental Law Alliance Worldwide (ELAW): Guidebook for Evaluating Mining Project EIAs, 2010. Available at https://www.elaw.org/files/mining-eia-guidebook/Full-Guidebook.pdf, accessed 16 November 2017.

[6] Ministry of Employment and Economy: Environmental Impact Assessment Procedure for Mining Projects in Finland, 2015. Available at http://en.gtk.fi/export/sites/en/mineral_resources/EIA_guidelines_for_mining_projects_in_Finland_2015.pdf, accessed 16 November 2017.

[7] Mozhgon Rajaee, Allison K. Yee, Rachel N. Long, Elisha P. Renne, Thomas G. Robins, Niladri Basu, Pulmonary function and respiratory health of rural farmers and artisanal and small scale gold miners in Ghana, In Environmental Research, Volume 158, 2017, Pages 522-530, ISSN 0013-9351. Available at http://www.sciencedirect.com/science/article/pii/S0013935117302463, accessed 16 November 2017.

[8] Obiri S, Mattah PAD, Mattah MM, et al. Assessing the Environmental and Socio-Economic Impacts of Artisanal Gold Mining on the Livelihoods of Communities in the Tarkwa Nsuaem Municipality in Ghana. Basu N, Keane S,

deforestation are valuable leads to better understand the environmental impact of mining in the focus area. Subsequently, this information can be enriched by other methods such as satellite analysis on deforestation.[9],[10]

1.3   Process Overview

Using the tool is intended to be simple. The typical sequence for utilizing the tool contains seven steps:

1. Sign-up for a free server
2. Upload the tailored form into your own server
3. Configure your Android data collection device
4. Collect the data
5. Manage data collection
6. Make a Map and Download the data

2   Sign-up for a Free Server

2.1   Choosing Your Server

One of the best things about the tool is that it is entirely free. The first thing you need to do is to sign up for a free server account at http://www.kobotoolbox.org/. There are two secure and free server options available:

CREATE AN ACCOUNT OR LOG IN

UNLIMITED USE FOR HUMANITARIAN ORGANIZATIONS
Provided by UN OCHA: Benefit from professional user support.

Sign Up or Log in

RESEARCHERS, AID WORKERS & EVERYONE ELSE
Provided by KoBoToolbox: Get support from our community.

Sign Up or Log in

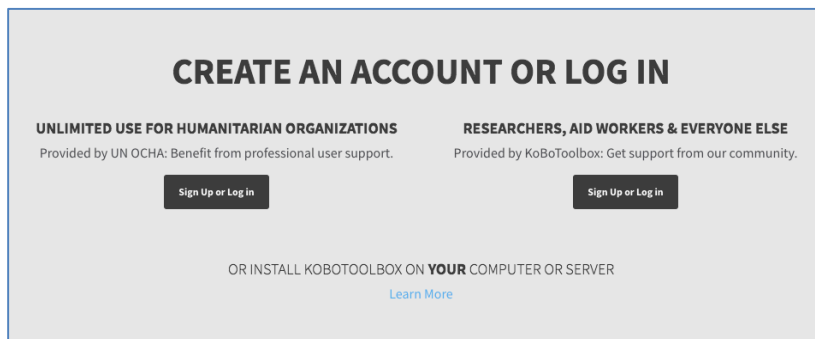OR INSTALL KOBOTOOLBOX ON **YOUR** COMPUTER OR SERVER
Learn More

Figure 1: Sign-up for a free server

Moher PB, eds. *International Journal of Environmental Research and Public Health.* 2016;13(2):160. Available at https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4772180/, accessed 16 November 2017.
[9] UNITAR-UNOSAT: Satellite Mapping of Artisanal and Small Scale Gold Mining in Central Kalimantan, Indonesia, UN Environment 2017. Available at http://unosat-maps.web.cern.ch/unosat-maps/ID/OT20151123IDN/UNOSAT_Central_Kalimantan_Report_Feb2016o.pdf, accessed 17 November 2017.
[10] Kenneth J Davis: Satellite Image Time Lapse of Artisanal Mining in Peru, Blog post, 12 March 2014. Available at https://geovisualist.com/2014/03/12/satellite-image-time-lapse-of-artisanal-mining-in-peru/, accessed 17 November 2017.

The first one, provided by UN OCHA, is a dedicated server for humanitarian organizations. The server provided by KoBoToolbox is hosted by the Harvard Humanitarian Initiative[11], and that is the one you should use. There is an option of hosting your own server, however this requires specific IT skills on server configuration and maintenance.

2.2 Data Protection

As in all data collection, ensuring data protection is of paramount importance, and needs to be guaranteed at every step of the data process, including data collection, storage and sharing. Therefore, do ensure adequate anonymization, use a secure server and clearly define data sharing protocols.

3 Upload the Form Onto Your Server

3.1 Upload the form

The tool is essentially a tailor-made form, which can be distributed in Microsoft Excel (xls) format If you don't have the form in xls format yet, you must download and save it to your own computer.[12] Once logged in to the server, just click the button 'new' in the left-hand corner of the screen, choose 'upload' and select the xlsl file from the location you have saved it. Do not edit the xls file directly.
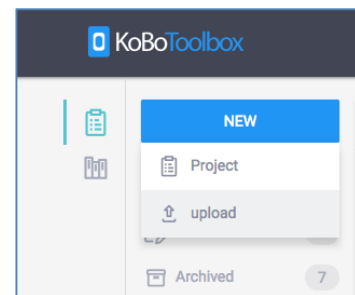
Figure 2: Upload the form

3.2 Deploying the form

You should now see a view as below and the only thing to do is to 'deploy' the form. By deploying the form, you make it available for data collection using mobile devices. You can view the form by clicking the 'eye' icon as seen below.
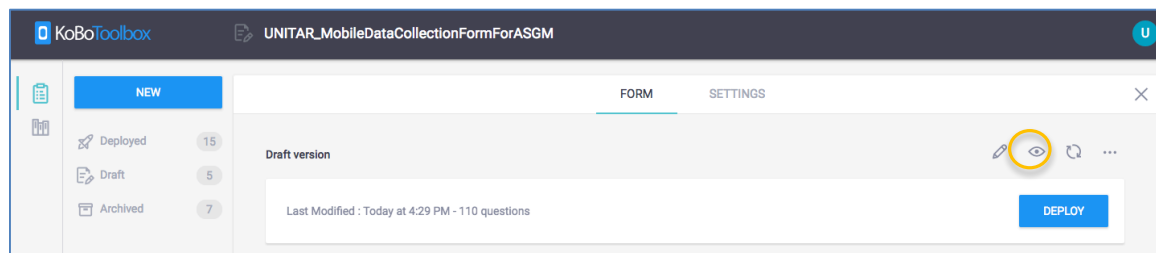
Figure 3: Deploy the form

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[11] Find out more at https://hhi.harvard.edu/about.
[12] The form is available for download at https://www.dropbox.com/s/wftpipgrdpezo82/MobileDataCollectionToolForASGMOverview16112017_form.xls?dl=0

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4 Configure Your Android Data Collection Device

4.1 What do you need?

You only need a relatively new smartphone or a tablet using the Android operating system 2.1 or more recent[13]. It is advisable to steer away from the cheapest devices, which may pose problems in the field due to short battery life and limited memory, as well as from the most expensive ones, which constitute an unnecessary budget increase for your data collection and may pose a risk to data collectors carrying them in contexts where expensive mobile devices are attracting attention. You only need a mid-range device with GPS, Wi-Fi and camera functionalities with a power bank[14]. You do not want to run out of battery in the middle of your field visit, so it is also important to invest in a power bank to accompany the mobile device. Having a device with a mobile internet connection is an advantage, as you can then send your data for validation on a daily basis.

Figure 4: Mid-range mobile device with a power bank

4.2 Install the Data Collection Application

The compatible application to be used for data collection is the ODK Collect application which can be freely downloaded from the Android Market[15].

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[13] Android version 2.1 'Éclair' was released in January 2010.
[14] E.g. a Power bank with capacity of 6000mAh
[15] As it currently stands (November 2017) the Kobo Collect application lacks one key functionality and thus cannot be recommended. ODK Collect provides an option to choose the image quality to be uploaded, which is necessary in areas lacking good internet coverage.
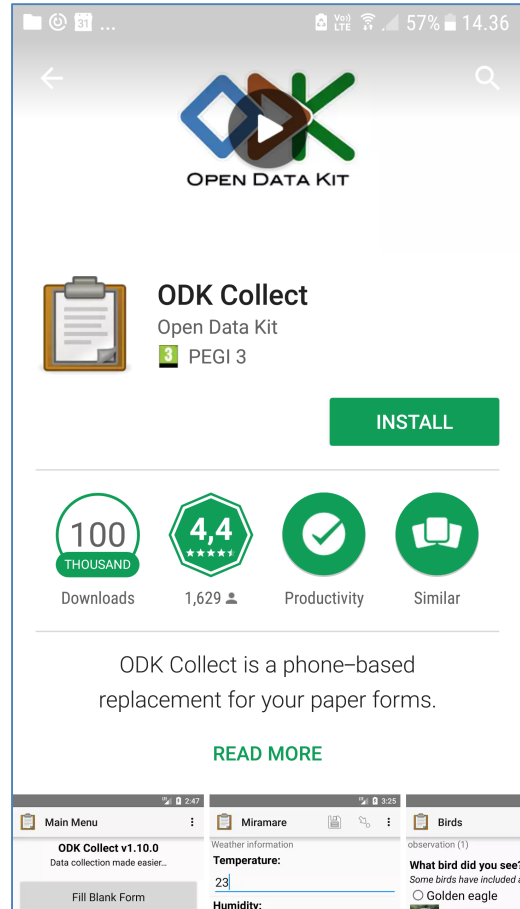
Figure 5: Install ODK Collect

4.3   Install the form onto your mobile device

Once you have installed the ODK Collect application, downloading the tool onto your mobile device is easy:

1. Open the ODK Collect Application
2. Click ⋮ and choose 'General Settings'
3. Click 'Server'
4. Enter the server URL

   https://kc.kobotoolbox.org and your username

   and password
5. Return to home screen and open 'Get Blank Form', then download 'MobileDataCollectionFormForASGMOverview'
6. Return home screen and open 'Fill Blank Form'
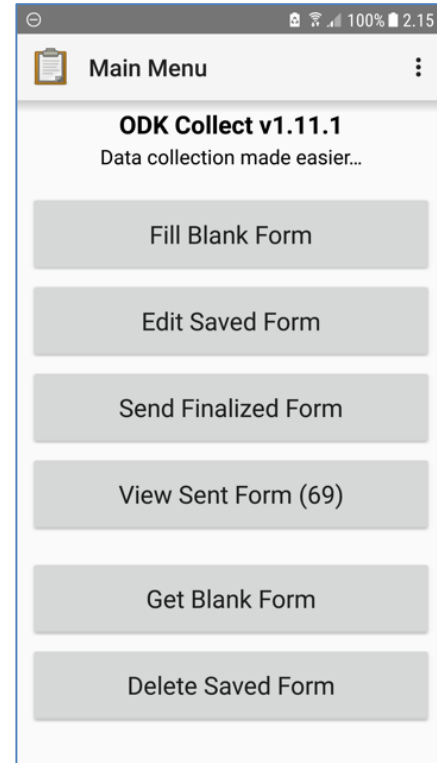7. Choose the form and start collecting data

5   Collect Data

5.1   Necessary Device Settings

Before starting data collection, you should ensure that the device is using the right settings. For this, open the General settings in KoBo by clicking the symbol of three dots in the right-hand corner and selecting 'General Settings' as done in previous Step already. Select 'Form management' and you should see the view as in Figure 7.

There are two[16] important settings you should check:

1. Keep the 'Auto send' option 'Off' as you might like to go back to some of your forms before uploading them to the server[17].
2. Choose the most suitable photo file size for your purposes from XX. You have three options
   a. Medium (2048px)
   b. Small (1024px)
   c. Very small (640px).

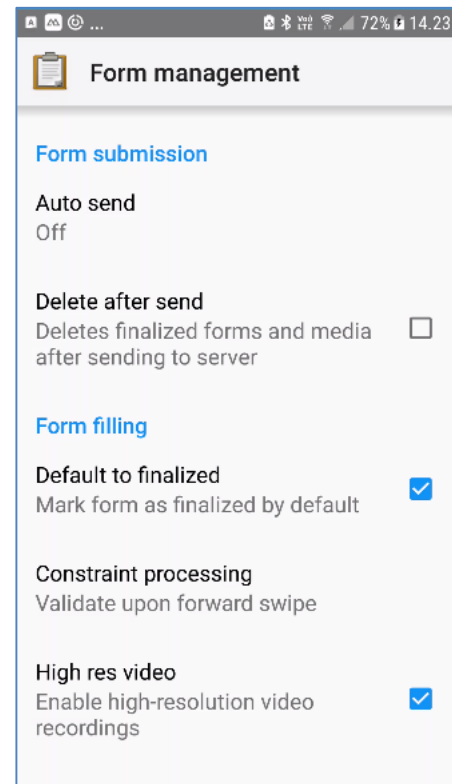Make your choice depending on your network conditions. By default, photos are uploaded in their

Figure 6: Home Screen of ODK Collect

Figure 7: Form management

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[16] If short in space, select option 'Delete after send' as well.
[17] You can edit saved forms by clicking 'Edit Saved Forms' at the home screen.

native resolution, however this may cause problems in contexts with weak network connection. Option 'Small (1024px)' should work fine in most cases even in the rural areas.

5.2 Using the device on the field

You are now all set for the data collection. We recommend you to fill-out the form at each mining site you are visiting. By 'mining site', we mean an extraction site or processing site as it has been defined in Baseline Estimates for the Artisanal and Small-scale Gold Mining Sector - A Toolkit and Guide by The Artisanal Gold Council (AGC).

5.3 Navigating in the form

Using the form is simple: You can move forward and backward in the form by swiping the screen to left or right with your finger. A few questions are mandatory, such as your name, preventing you from proceeding until you have answered those questions. You can also move rapidly around the form by clicking the 'arrow' button, as shown in the Figure 8.
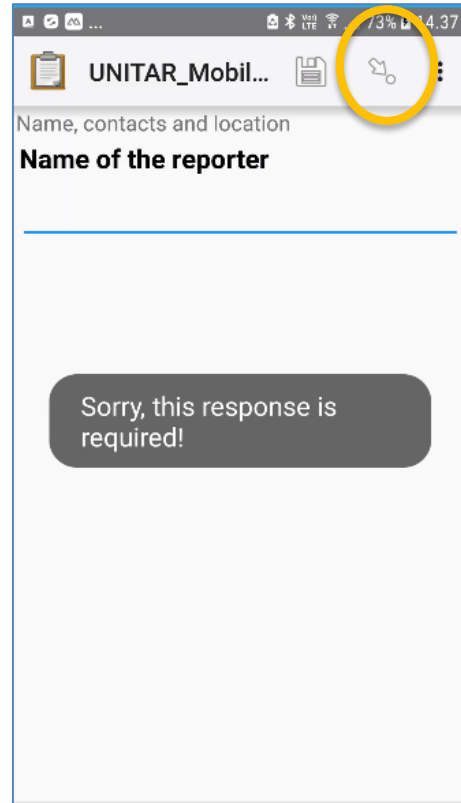

Figure 8: Giving your name is mandatory

The tool contains three different sections:

1. Name and contact details
2. General Site Characteristics
3. Detailed data collection
   a. Extraction (digging)
   b. Processing (Crushing, milling, sluicing, amalgamation, etc.)
   c. Cyanide Leaching
   d. Environmental Impact Assessment
   e. Health and Socio-economic Assessment

Note that locating yourself using GPS might take some minutes, as your device is trying to capture signals from satellites. During that time the accuracy begins to approach 6m, but you may stop the process any time by clicking 'Save GeoPoint' when the desired accuracy has been acquired. In ideal conditions, the accuracy can be up to 6 metres

Also note that GPS doesn't work indoors, so find an open spot at the center of the mining site where you record your location.
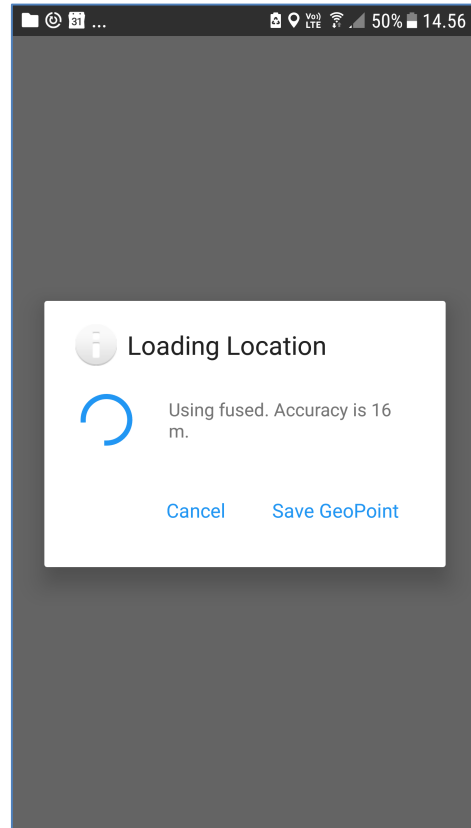

Figure 9: Using GPS

5.4 Upload the collected data

To upload your data, you only need to open 'Send Finalized Form', select the form or forms you have been working on and click 'Send Selected'. Please note that this requires an Internet connection.

You can edit your saved forms using the option 'Edit Saved Forms', before uploading them, in case you want to change something. To enable others (e.g. project manager) to see the collected data and to minimize the risk of data loss if something should happen to your mobile device, you should try to send your collected data at the end of each day.

6 Manage Data Collection

6.1 View the data

When logged in to the server, the user must select the form they are interested in. In case you are using KoBoToolbox for the first time, you should now have only one deployed form available, namely 'MobileDataCollectionFormForASGMOverview'. When you select 'DATA' you will be given different options to view your data:

- Reports (Quick glance analysis of the data)
- Table

- Gallery (Photos)
- Map (Locations of the mining sites on a map)
- Downloads (You can download your data in various formats, including Excel. We speak more about this in Step 7.)
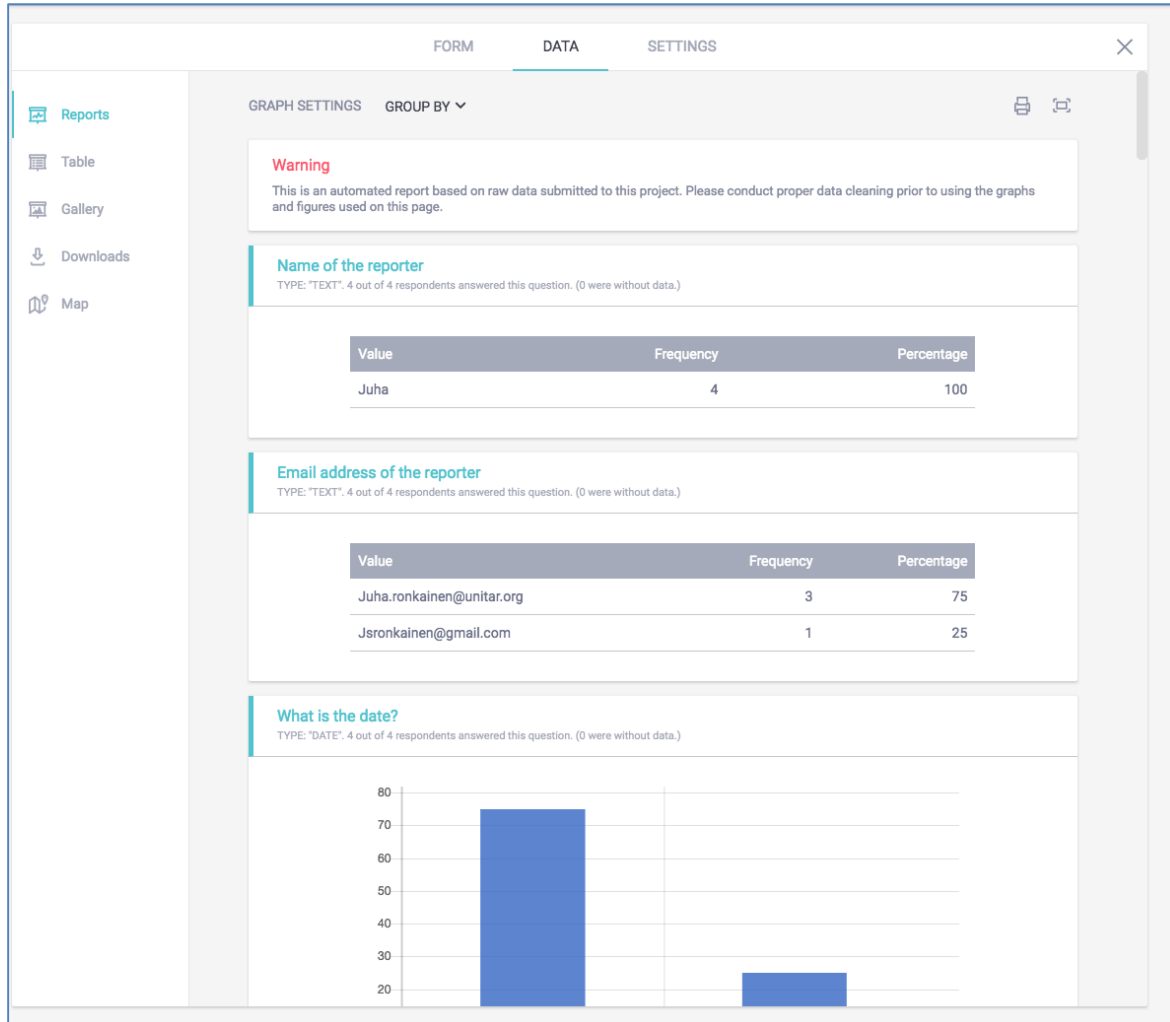

Figure 10: Use 'DATA' view to manage data collection

6.2 Add additional data using the browser

You may also want to add mining sites to the database without actually visiting the sites based on literature reviews or data available by the government officials. This can be also done at the KoBo server as you can see below.
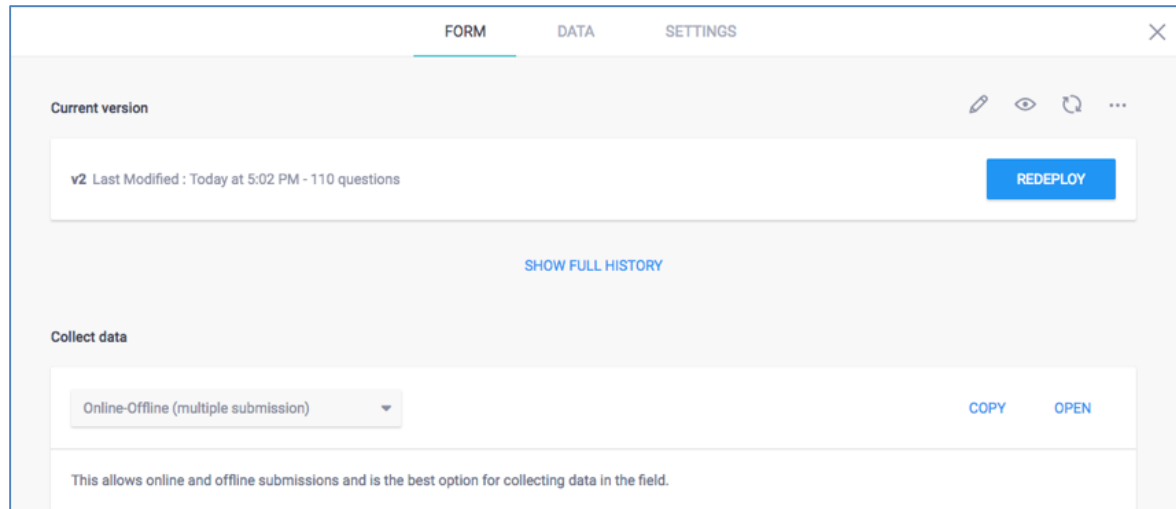
Figure11: Add data using browser

6.3 Add missing information of gold production and mercury usage

As gold production and mercury use are calculated using the detailed field forms provided as a part of the methodology for baseline estimates, you can add that information later to the database using either the 'Table' or 'Map' view[18]: Just open the data (Table) or click the data point (Map), and the form will be opened as illustrated in Figure 13. Click 'Edit Submission Data' and you are free to edit all submitted data or add new information. Just remember to submit the form once you are done to make these changes permanent.

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[18] For example, you can add the data on gold production and mercury use once you are back in your office.
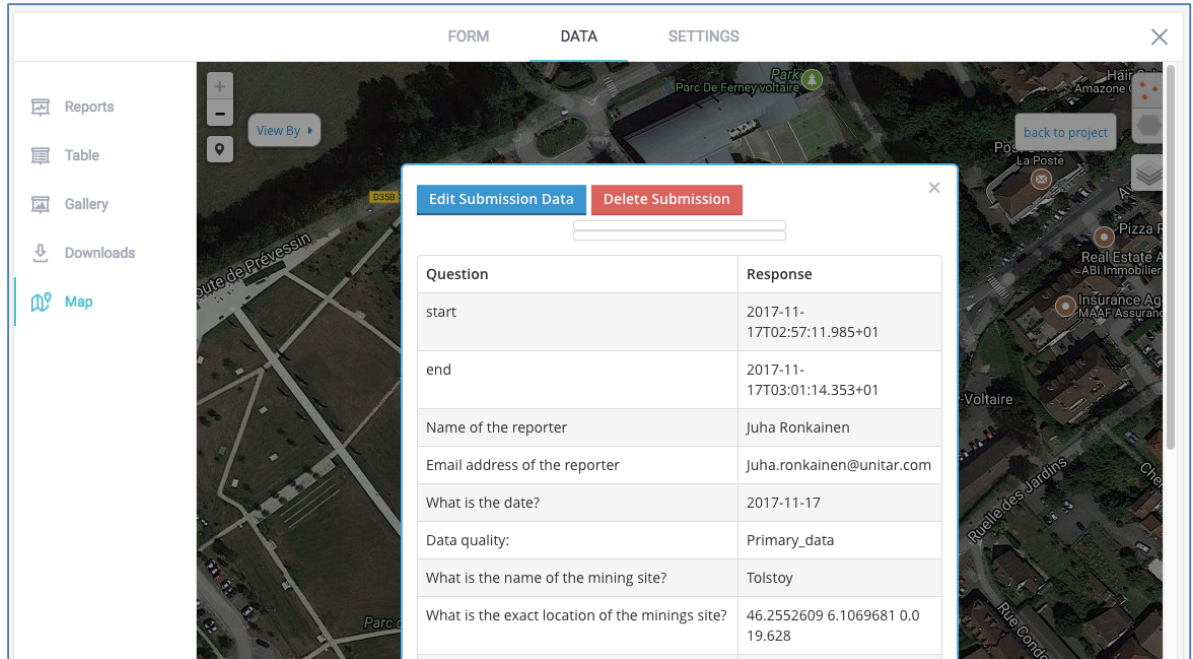
Figure 13: Click 'Edit Submission Data' to add missing information or to edit submitted data.

6.4   Share the data

The data collected is available only for authorized person. The server uses a security certificate to ensure all the data sent to the server are private. Sharing the data with the project steering committee or with key stakeholders can be done easily at the form settings by turning on the 'Sharing by link' option, as shown below.

Figure14: Turn on 'Sharing by link" to share your data

By enabling sharing by link, you can simply share the blue link to anyone to give them access to your data. Please note that users receiving the link can only view and comment on the data. They do not have permission to alter the data or the project settings, nor can they submit new data.

7 Make a Map and Download the Data

7.1 Make a Map

Even though KoBoToolbox server does not offer sophisticated tools for analysis, a simple map can easily be generated. In addition to only showing the map points, you can generate a simple legend by opening 'View By' and selecting a characteristic to be illustrated as seen in table 1. Suitable background map can also be chosen. The prepared map can be saved simply by taking a screen shot, as has been down in Figure 15.

Figure15: Example data: Licensed Gold mines in Geneva, Switzerland and Frankfurt, Germany

Worst practice highlighted[19]	'View By' option selected
Whole ore amalgamation	'Select the applicable statement for the processing system:'
Open burning of amalgam or processed amalgam	'Are retorts used?'
Burning of amalgam in residential area	'Do they burn amalgam in residential area?'
Cyanide leaching in sediment, ore or tailings to which mercury has been added without first removing the mercury	'Do they first remove the mercury before applying cyanide in sediment, ore or tailings?'

Table 1: How to highlight selected 'worst practices'

7.2 Download the Data

To analyze the gathered information with other tools, such as MS Excel, SPSS, or QGIS, you can download the data and pictures by selecting 'Data', 'Downloads' and then selecting the needed data format. Data can be downloaded in typical xls format and pictures can be downloaded compressed in a zip format.
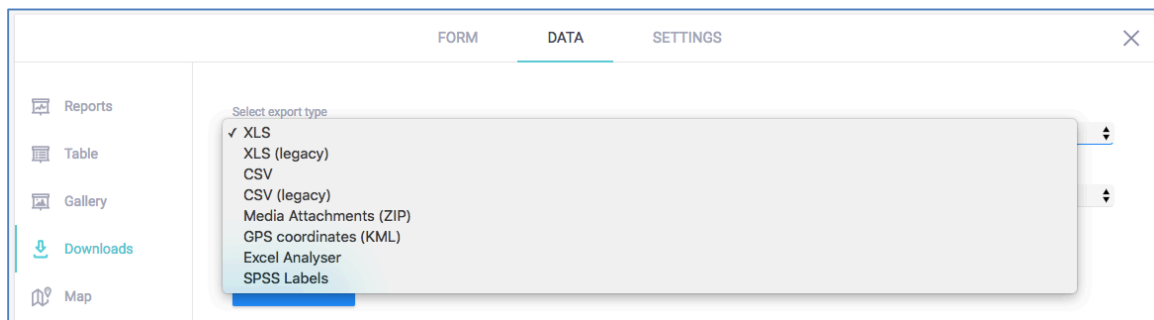

Figure16: Available formats to download the data

 To download the data in a format suitable for tools such as MS Excel, you should select export type 'xls' and then select Value and header format as 'XML values and headers'. This makes the downloaded data much cleaner to use.

Downloading pictures is a straight forward, as typical operating systems being used automatically know how to open compressed ZIP folders. Please note that the excel file makes
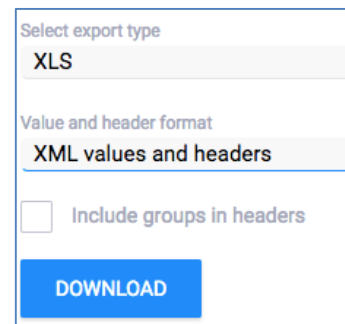

Figure 17: Choose the correct header format

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[19] So called worst practices are outlined in the Minamata Convention (Article 7: Annex C).

references to the pictures using the unique file names of the pictures.[20]

8   Further Considerations: Geospatial analysis

There are multiple reasons why it is important to conduct further spatial analysis on where gold mining takes place in a country. In its simplest form, you might like to know whether mining activities are taking place in protected areas, or if there are lakes or rivers nearby. Additionally, it is illustrative to see where is the nearest school or a health care center, as it tells us about the general living conditions of miners and their families. The extent to which this kind of data is available and accessible to the public depends on the country and context.

There are plenty of ways to conduct geospatial analysis, and two different approaches are briefly introduced here: MapX is a service developed jointly by UN Environment, the World Bank and GRID-Geneva, whose mission is to 'support the sustainable use of natural resources by increasing access to the best available geospatial information, technology and monitoring tools.' You can access MapX at https://www.mapx.org/. Whether the analysis is done by yourself or by hiring a GIS analyst, there are plenty of tools available such as ArcGIS (paid) and QGIS (free), to name a few.

9   Making Your Own Form

Finally, it is highly possible that depending on your context you might consider customizing the standard form provided.[21] Therefore, the form has been licensed under the Creative Commons Attribution 4.0 International License. For this, follow instructions outlined in the KoBo Toolbox user portal.[22] This license lets you remix, tweak, and build upon the provided form even for commercial purposes, as long as you credit UNITAR and UN Environment and license your new form under the identical terms. We would also highly appreciate, if you would send us a copy of the new form you created for our reference and learning.

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[20] To link the pictures at the KoBo Toolbox server to your Excel file, you can to follow instructions available at the KoBo Toolbox support forum: http://support.kobotoolbox.org/customer/portal/questions/16294267-photo-collection, accessed 17 November 2017.

[21] Detailed instructions on how to build or edit a form can be found at http://support.kobotoolbox.org/customer/en/portal/topics/690866-creating-forms/articles, accessed 17 November 2017
[22] To view a copy of this license, visit http://creativecommons.org/licenses/by/4.0/.