#2, September 2021

Annual Progress Report

for

Project for Promoting Minamata Convention on Mercury by making the most of Japan's Knowledge and Experiences

(Reporting Period: July 2020 – June 2021)

Approved by Regional Director	Dechen Tsering	Date:	29 September 2021
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Reviewed by Regional Coordinator	Isabelle Louis (Officer-in-charge)	Date:	28 September 2021
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1 Project Information

Project title	Promoting Minamata Convention on Mercury by making the most of Japan's Knowledge and Experiences
Participating countries[1]	Indonesia, Japan, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Palau, Philippines, Sri Lanka, Thailand, and Vietnam
Project outcome	Countries increasingly generate and apply information on how to monitor and reduce mercury emissions and releases in their legislations, policies, or action plans.
Executing agency	UNEP Regional Office for Asia and the Pacific
Project period	July 2019 – June 2024 (60 months)
Reporting period	July 2020 – June 2021
Total budget	US$3,000,000 pledged (US$2,999,990 received as of July 2021)

2 Summary

Project for Promoting Minamata Convention on Mercury by making the most of Japan's knowledge and experiences, which was launched in July 2019, has continued the activities as much as possible due to COVID-19 pandemic. The implementation plan was developed, which employed at most flexibility to cope with the restriction in place to date, while the build back better concept for future relaxation of international travel, etc. were also envisioned.

The Project provided capacity building programmes for two key areas, namely mercury flow analysis and mercury monitoring. UNITAR is engaged to develop a training package for mercury flow analysis. This activity will be benefitted with UNITAR's past works for developing and updating UNEP Toolkit. AIT RRCAP will also be engaged to develop another training package for mercury monitoring. The Project has also established and is negotiating the collaborative activities with other organization for better results and efficient implementation. Two Minamata-based organizations, i.e. Minamata Environmental Academia and National Institute for Minamata Disease (NIMD) expressed their willingness to work for the Project.

Strengthening the analytical capacity of mercury laboratories in the region is another key aspect of the Project. It applied both standardized and customized activities. Laboratory Proficiency Testing (PT) provides a backbone of this component to provide overview of the regional collective capacity while a series of laboratory assessments identify the specific development needs. The Project has initiated collaborative activities with Asia Pacific Mercury Monitoring Network (APMMN), an existing network in the region.

Due to political instability in Myanmar, the project has minimised its engagement in Myanmar until further guidance is made available by the UN.

[1] Countries participated in the project inception workshop. Actual participation will be confirmed.

Project Management Unit (PMU) has been established and Programme Management Officer took office on 1 October 2020. Two more project staff, i.e. Programme Management Assistant and Admin Assistant are in the process of the recruitment. For the project oversight to provide strategic direction, the Project Steering Committee (PSC) has been established. The first PSC meeting was held in March 2021.

As of the end of June 2021, the Project spent or committed approx. 15.6% of the budget. The level of disbursement improved since the project activities resumed in Q4 2020.

The workplan is presented for the next reporting period (July 2021 – June 2022). Project expects the completion of two training modules including the trainers' trainings programmes using these materials. The capacity assessment of existing laboratories will gradually extend the coverage and laboratory proficiency testing (PT) will make substantial progress in this period. As for the dissemination of the project results, an annual webinar is prepared for wider audiences beyond the region.

3 Annual report July 2020 – June 2021

3.1 Overall progress

Project for Promoting Minamata Convention on Mercury by making the most of Japan's knowledge and experiences, which was launched in July 2019, has severely impacted by COVID-19 pandemic. At the beginning of this reporting period in July 2020, the Project was still in the restricted mode with minimum activities. So, the project activities needed to be adjusted to make them operational under pandemic setting.

Ministry of the Environment, Japan (MOEJ) and UNEP met virtually on 1 October 2020 and agreed the revision of the project detail taking into consideration the COVID-19 impacts. The implementation plan was developed and approved in December 2020. In the great uncertainty of the pandemic situation, the plan employed at most flexibility to cope with the restriction in place to date, while the build back better concept for future relaxation of international travel, etc. were also envisioned. The project objective as well as the outcome and three outputs remained intact.

The Project provided capacity building programmes for two key areas, namely mercury flow analysis and mercury monitoring. The capacity strengthening pathways were considered to link related activities within and outside of the project to provide the best opportunities to the partner countries. It included the follow-up consultation with focus group to align their needs and expectation. The Project has also established and is negotiating the collaborative activities with other organization for better results and efficient implementation. Two Minamata-based organizations, i.e. Minamata Environmental Academia and National Institute for Minamata Disease (NIMD) expressed their willingness to work for the Project.

Strengthening the analytical capacity of mercury laboratories in the region is another key aspect of the Project. It applied both standard and customized activities. Laboratory Proficiency Testing (PT) provides a backbone of this component to provide overview of the regional collective capacity while a series of laboratory assessments identify the specific development needs. With these top-to-down

and bottom-to-up approaches, the Project has gradually expanded the network of analytical institutions in the region.

3.2 Activities implemented

(Activity 1.1.1) Local resource survey

Progress: 100%

Minamata city and its surroundings has long history of mercury impacts and rehabilitation. Through the process, a lot of knowledge and experiences have been accumulated. Literature reviews and communications with local resource persons were conducted to stocktake relevant facilities/ institutions to the project. Minamata Environmental Academia (hereinafter referred to as 'Academia'), National Institute for Minamata Disease (NIMD), and Institute for Global Environmental Strategies (IGES) are identified as possible partners to implement some part of the project activities:

(Activity 1.1.2) Establish partnership/collaboration with institutions in and around Minamata

Progress: 100%

Following the local resource survey results, formulating a partnership with Academia[2] is explored. Academia has its mission to accumulate knowledge, wisdom, and lessons in Minamata and to disseminate them to the world for realization of sustainable society. A letter for requesting cooperation was sent from UNEP ROAP in the following areas:

- Identification of and coordination with local resources and facilities to establish partnerships (Activity 1.1).
- Local arrangement for Minamata-based face-to-face training programme including visiting programmes for historical sites (Activity 1.3).
- Leading the survey mission to assess analytical capacity of laboratories (Activity 2.1).
- Identifying experts and researchers who can provide technical advices on demand basis (Activity 2.3).
- Providing relevant technical contents to project-dedicated online platform (Activity 3.2).
- Identifying experts and researchers who can provide technical advices on demand basis (Activity 3.3).
- Other types as appropriate.

NIMD was established in 1978 with the purpose of conducting comprehensive medical research to improve medical treatment for victims of Minamata Disease. In 1996, NIMD was reorganized to strengthen research function to implement international, social, and natural scientific research and to collect, manage and provide international and domestic information with regard to Minamata Disease. To improve mercury-related research capacity, a letter for requesting cooperation was sent from UNEP ROAP in the following areas:

- Providing information to participants as a resource person (Activity 1.3).
- Supervising design of laboratory QA activities and evaluating the results (Activity 2.3).

[2] Minamata Environmental Academia belongs to the General Affairs and Planning Division, Minamata City.

- Providing information to participants as a resource person (Activity 3.1).
- Providing scientific and academic advices to country-specific technical needs on demand basis (Activity 3.3).
- Other types as appropriate.

IGES[3] is a non-profit public foundation that has already possessed partnership status with UNEP. A Small-scale funding agreement was concluded for implementing 2 online training programme and one virtual capacity assessment of existing laboratories in the region on the basis of technical assistance menus.

(Activity 1.2.1) Develop standard training materials for training courses

Progress: 20%

The project has so far held two online training programmes on mercury monitoring and flow analysis, which received strong interest to the participants. Based on the further needs identified via these processes, the project will develop 2 training packages for trainers' trainings on mercury monitoring and flow analysis.

A package to be developed will have 3-5 sessions (Approx. 3 hours per session) with several presentations, exercises, discussions. It will be based on, and build further on as feasible, the existing materials developed and used for past training activities within and outside of the project. Such materials will be collected and the relevance and usefulness for the package will be analysed. A package will be composed of agenda and available resources including presentation materials (slide decks), lecture/instruction videos (screen videos with speech, and similar), group work/exercises, etc. An instruction for package users such as a trainer's manual may be developed as well.

The topic for mercury mass flow analysis will be developed by United Nations Institute for Training and Research (UNITAR) and will include following information (tentative):

- Introduction: Introduction to this training module, the mercury problem, Minamata Convention on Mercury, how mercury mass flows can help us, UNEP Mercury Inventory Toolkit, and how it relates to mass flows, other mercury quantification tools.
- The mass balance principle: Process examples, sector examples, country examples.
- Key equations and definitions: Key mass balance equations - What is input, output and accumulation, system definition and boundaries, accumulation – Quantification, predictions, and implications.
- Examples of complex mass balance links.
- Stepwise discovering of mercury mass flows in a national context– Practical procedure: Sector definitions, data types and data sources, data collection methods and principles, quantification of flows and stocks – illustrative examples and models, use of online tools available, working with intervals, closing and calibrating the mass balance, identifying and reducing uncertainties, reporting principles, review by key stakeholders and incorporating feedback.
- Background literature on substance flow assessment and mercury.
- Exercises.
- Self-test.

[3] Kitakyushu Urban Centre (KUC) of IGES is the implementation partner.

- Trainer's manual.
- Pre- and post-workshop evaluations of participants.

A focus group with highly motivated individuals in the regional partners is formed and regular communication will be made during the course of the development. They will also be the initial beneficiary to the training package.

The topic for mercury monitoring and analysis will also be developed by another partner organization (i.e. AIT RRCAP). It will focus, in principle, on the general monitoring and analytical skills in environmental and bio media.

(Activity 1.3.1) Formulate and implement skill up training programmes

Progress: 30%

The project held the first online training programme on 'Role of monitoring laboratory for national mercury management' on 2 – 4 December 2020 (see Annex 5.1). The programme aimed to initiate the series of skill-up trainings for national monitoring laboratories that is monitoring (or will monitor) mercury levels in the country, and to help each institution locates its own monitoring capacity among regional counterparts. In total, five 3-hour sessions were programmed and implemented in following agenda:

- Opening session: Opening address, project introduction, keynote lecture
- Session A: Start-up of mercury monitoring
- Session B: Mercury monitoring in key media
- Session C: Mercury survey and research
- Session D: Advanced technologies and regional networking

The training was attended more than 100 participants observers, lecturers, etc., most of which came from environmental sector while some countries sent health and industrial sectors. The participants were mostly coming from analytical institutions from 10 countries (Indonesia, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam).

Due to COVID-19 situation, the international movement for most of countries is severely restricted, thus, the training was programmed virtually through internet communication tool. Online activities have limitation but could also provide opportunities to more participants than that of face-to-face ones.

Based on the interest demonstrated by the participants, the project will undertake bilateral communications with institutions on specific activities that fit needs of each country. Then the project will arrange effective and efficient capacity strengthening programmes.

The project held the second online training programme on 'Mercury inventory and material flow analysis' on 2, 4 and 12 March 2021 (see Annex 5.2). The programme aimed to support the improvement of national mercury inventories by compiling various types of information, and to introduce a comprehensive mass flow concept to outline the national mercury situation throughout its life cycle. Ministries/agencies responsible for the monitoring/management of mercury emissions and releases to air, water and soil, universities, research institutes or consulting companies which are engaged in development of mercury inventory, and National Focal Points of the Minamata Convention participated in the programme. In total, four 3-hour sessions (including opening, information sharing, etc.) were programmed and implemented in following agenda:

- Session 1: Mercury inventory and UNEP Toolkit
- Session 2: Overview and case examples of mercury material flow
- Session 3: Practical training on developing mercury material flow
- Session 4: Practical training on developing mercury inventory and material flow – follow up

The training programme was attended by 85 participants from 9 partner countries (Indonesia, Malaysia, Maldives, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam). Majority of the participants came from environmental sector while health sector and industrial sector from some countries also joined the programme. Also, there are numbers of participants from academia and IGOs. It also indicated the benefit of the online programme that can provide learning opportunities to more people.

Based on the needs and interest demonstrated by the participants during the training programme, the project will undertake further to provide support to develop mercury inventory and to introduce mass flow concept toward mercury flow analysis. The project will arrange a focus group with highly motivated individuals the discuss the next steps so that the project can more effectively and efficiently provide capacity strengthening programmes.

(Activity 1.4) Follow-up assessment of the effectiveness of the training programme

Progress: 25%

The project is to undertake assessment of the effectiveness of the training programmes (i.e. how the programmes have brought difference to the participants) in annual basis. In order to assess such changes, baseline information before the project was collected.

The project implemented 2 online sessions in December 2020 and in March 2021 for mercury monitoring and flow analysis, respectively. The participants were asked to answer the online questionnaire to indicate the level of understanding before the training. This information will be periodically monitored to assess the changes/improvements over the course of the project implementation (see Annex 5.3).

The project highlights two main topics to address, i.e. mercury monitoring and flow analysis. The survey asks the participants the fundamental knowledge on mercury and specific knowledge on subject matter as well as specific knowledge for each topic.

There are 61 effective respondents prior to the monitoring training in December 2020, and 56 effective respondents prior to the flow analysis training in March 2021, which were valid for the analysis. Some participants were submitted information to both surveys. The information collected in these surveys will serve as the baseline for future surveys to be conducted periodically throughout the project lifecycle. Based on the results, project activities will be adjusted to fit their shortcomings so that the project input will effectively bring meaningful results.

(Activity 2.1.1) Capacity assessment of existing monitoring laboratories

Progress: 20%

This work aims at evaluating the current mercury monitoring capacity of the analytical institutions that are monitoring (or will monitor in near future) mercury levels in the country in order to clarify the areas in need of intensive assistance in the coming years to set clear direction for future assistance. The identified needs and gaps will serve the basis of technical assistances under the project.

Nepal was selected as the first survey country and the Laboratory in Department of Environment, in Ministry of Forests and Environment, and National Public Health Laboratory, in Ministry of Health and Population were identified as the analytical laboratories. As the official visits were not possible due to recent COVID-19 situation, a local coordinator was engaged to communicate with the stakeholders for survey planning (see Annex 5.4).

There was one thing unfortunate for the project. As Nepal shares the long land border with India and suffered from the inflow of the Indian variant of COVID-19, Delta, that resulted in the rapid increase of new cases since late April 2021. The Government of Nepal imposed strict control measures to limit people's movement and access to offices, which forced the project activity put on hold for a couple of months. The actual survey will be conducted once the local movement ban due to COVID-19 is lifted and necessary tools such as camera can be brought into the sites.

(Activity 2.2.1) Develop and/or harmonize methodologies and standard operating procedures of mercury monitoring

Progress: preliminary

In order to evaluate the feasibility and challenges for introducing ambient mercury monitoring by gold trap method, which will be included in the monitoring guidance of Minamata Convention, a new monitoring site will be established. The site undertakes continuous data collection and analysis based on the consistent methodology in the region.

Maki monitoring station, Niigata, Japan is selected for this activity as it has already operating continuous ambient monitoring other than mercury, thus, it will be able to evaluate the benefits and additional burden of existing monitoring sites in comparison with establishing independent monitoring sites.

The continuous data collection based on methodology in the region will be undertaken for 2 years starting Q4 2021, which will provide basic mercury data comparable across the region. It is also expected to evaluate the existing training materials and to advise the improvement in more comprehensible ways.

(Activity 2.3.3) Undertake inter-laboratory data quality assessment for continual improvement

Progress: preliminary

This activity aims at evaluating the performance of mercury analyses conducted by the laboratories in the region, which provides individual proficiency levels and collective mercury monitoring capacity in the region. This is a part of continual improvement of quality data collection and analysis. The overall result is shared among participating countries and individual laboratories will receive some advisory that may include supporting options.

Public laboratories and laboratories in universities that undertake mercury analysis (or will undertake near future) for monitoring, survey or research purposes are welcomed to participate in the laboratory proficiency testing (PT). The laboratories should be able to obtain analytical results by themselves without external resources/supports.

An invitation will be distributed widely in Q3 2021 in the region, which calls for the expression of interest from participating laboratories. A survey form (questionnaire) will be prepared to collect current/past mercury analytical activities, challenges encountered, and future plan or expectation on

mercury analysis. In addition, a few key institutions, e.g. national reference laboratories, etc., will be the subject to the in-depth capacity assessment will be conducted.

The PT is conducted by the Project with the overall guidance by National Institute for Minamata Disease (NIMD), Minamata, Japan. As soon as the media for the PT is decided, sufficient quantity of the samples will be prepared. They should undertake homogeneity test and stability test to ensure that the participating laboratories will receive the same samples for analysis.

The analytical results and other information are compiled and statistically analysed by NIMD, which will be publicly available by Q3 2022. Individual laboratories will receive advisory notes, which will not be publicized, for further improving their analytical skills and encouraging the mercury-related activities. Some part of the results will be used for academic study.

(Activity 2.4.1) Collaborative activities with other programmes

Progress: preliminary

There are number of existing networks on chemicals management in the region. The project is communicating with the existing networks for possible collaboration that mutually benefits the objectives of both sides.

The project held an online meeting with Asia Pacific Mercury Monitoring Network (APMMN), a US-led cooperative effort to systematically monitor mercury in air and rainwater throughout the Asia-Pacific Region. The network involves many groups, including environmental ministries and federal government agencies, academic institutions, and scientific research and monitoring organizations. Both parties agreed to continue discussion for identifying areas of mutual interest and act collaboratively for effective mercury monitoring.

(Activity 3.1.2) Convene periodic stakeholders' meetings to share project results

Progress: preliminary

The project will hold annual webinar to disseminate project results to wider audiences. The concept note was developed and shared with Minamata Secretariat and UNEP Chemicals & Health Branch. It will be convened in close collaboration with these organization in Q4, 2021. Due to current COVID-19 situation, it will be held virtually.

(Activity 3.2) Accumulate and compile technical data and make it publicly available online

Progress: preliminary

The project is establishing a dedicated website and email address to disseminate project results and other information for project partners and other stakeholders beyond the region. UNEP ROAP is currently identifying suitable domain provider to host project-dedicated site.

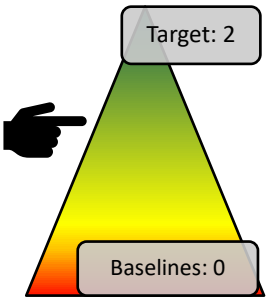
3.3 Results achieved

(Project outcome) Project partner countries embed scientific data in mercury management policies

Status: In progress: Candidate countries participating in the project to be identified.

Countries sending participants to the Inception Workshop (12 countries) expressed willingness to participate in the project in general. In the first and the second online training programme in December 2020 and March 2021, 10[4] and 9[5] countries sent participants, respectively. Japan sent observers for both trainings. The project will keep engaging these countries for future activities.

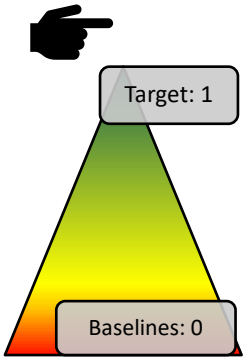
(Output 1) Number of capacity building programme package for specific subjects developed and implemented



Status: In progress (2): 2 topics (mercury flow and monitoring) are under development.

UNITAR is engaged to develop a training package for mercury flow analysis. This activity will be benefitted with UNITAR's past works for developing and updating UNEP Toolkit. AIT RRCAP will also be engaged to develop another training package for mercury monitoring.

(Output 1) Local coordination structure in Minamata developed



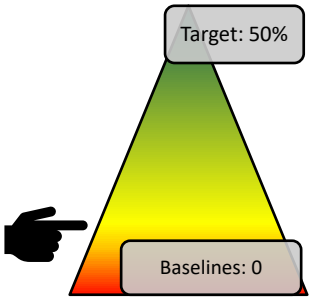
Status: Achieved (2): Local coordination structure with Minamata City and National Institute for Minamata Disease (NIMD) established.

Minamata Environmental Academia (Academia), Minamata City and NIMD are the partners based in Minamata which expressed the willingness to cooperate with the project. UNEP ROAP sent letters for requesting the cooperation, which formalized the relationships.

Academia is identified as the local coordination institution for the activities to be implemented in Minamata area. It will provide its facilities when convening face-to-face events. It will also facilitate approaching and establishing relationship to local institutions/ facilities/ companies/ resource persons for formulating project activities.

National Institute for Minamata Disease (NIMD) is a research institution to implement international, social, and natural scientific research and to collect, manage and provide international and domestic information with regard to Minamata Disease. In particular, NIMD will supervise overall design of the laboratory proficiency testing and evaluate the results.

(Output 1) % of trained participants who successfully apply the knowledge and skills on mercury management in their work disaggregated by gender and age range

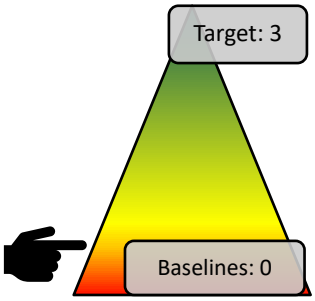


Status: Preliminary: Baseline data collected and compiled, which is disaggregated by gender.

The project implemented 2 online training programmes when the participants were asked to answer the questionnaire to indicate the level of understanding before the training. This information will be periodically monitored to assess the changes/improvements over the course of the project implementation.

[4] Indonesia, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam
[5] Myanmar's participation in the project activities has been suspended since February 2021.

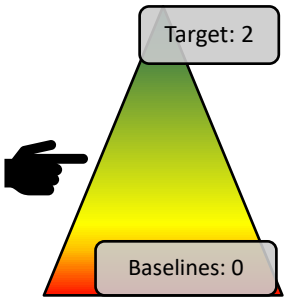
(Output 2) Number of countries with national institutions on the network that meet international standards on mercury analysis



Status: Preliminary: Capacity assessment in Nepal ongoing, another assessment under preparation.

Nepal was selected as the first survey country and the Laboratory in Department of Environment, in Ministry of Forests and Environment, and National Public Health Laboratory, in Ministry of Health and Population were identified. Philippines expressed the interest for the next round of assessment.

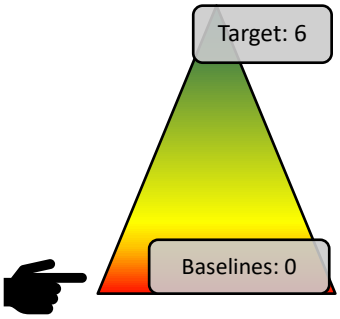
(Output 2) Number of existing regional networks establishing partnership with this programme



Status: In progress (1): Collaboration with Asia Pacific Mercury Monitoring Network (APMMN) is under discussion.

APMMN is a US-led cooperative effort to systematically monitor mercury in Asia and the Pacific region. The project held an initial talk with APMMN and agreed to continue discussion for identifying areas of mutual interest and act collaboratively for effective mercury monitoring.

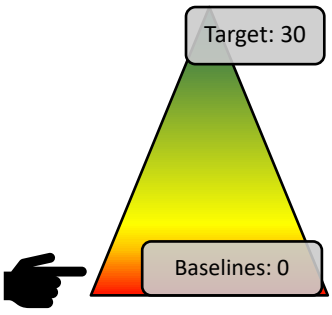
(Output 3) Number of countries submitting information to the information portal



Status: Preliminary: Project's dedicated website is under preparation.

The project is establishing a dedicated website as a platform to receive and disseminate information from countries and other stakeholders.

(Output 3) Number of countries outside of the project partners that received information through project activities



Status: Preliminary: Annual stakeholders' webinar 2021 that invites wider audiences is under preparation.

The project will organize the annual webinar to disseminate project results. Overseas Environmental Cooperation Center (OECC) is engaged for this activity, which will be held in Q4 2021 in collaboration with Minamata Secretariat and UNEP Global Mercury Partnership.

3.4 Risk management

(Risk log #1) Insufficient funding and human resources.

22 March 2021 The third instalment (USD999,990) posted, which accounts for the total amount of the project budget. The funding enables proceeding the activities, so this risk has been resolved.

(Risk log #5) COVID-19 pandemic situation

UN policy to cope with COVID-19 pandemic is still active. The outbreak in Thailand in late December impacted office operation for all UN agencies located in Bangkok including UNEP. Despite the work from home setting, the project implementation has continued to deliver the activities virtually with full support by the participants in compliance with the UN policy. Project will monitor the resumption of physical/face-to-face activities accordingly.

(Risk log #7) Political instability in Myanmar.

Due to political instability in Myanmar, the project has minimised its engagement in Myanmar until further guidance is made available by the UN. Overall project continues to progress.

3.5 Lessons learned

(Lessons learned log #2) Effective implementation of online programme

Online programmes are open to more participants than that of face-to-face ones. The first online training programme was attended over 100 participants, which would not be possible for face-to-face arrangement. Applicability of online tool for outreach activities could be a good option.

(Lessons learned log #3) Possibilities and limitations of virtual survey

Considering rapid development of new and emerging online technologies that enables real-time two-way communications, surveys without physical travel could be a prospective future methodology, not just an ad hoc measure but more effective and efficient survey technique. But at the same time, such methodology cannot replace the traditional physical survey completely and still has some vulnerability in severe COVID settings that is beyond the control. Finding capable local coordinators and securing Internet connection are the key for such remote operation.

3.6 Financial status

The third instalment USD999,990 was received from MOEJ in 2021 with the total amount of USD2,999,990. This suffices the funding for all project activities in the implementation plan.

Preliminary sum of the total expenditures[6] were USD467,735, which is approx. 15.6% against total project budget of USD3,000,000. The delivery was severely affected by the COVID-19 pandemic in 2019-20 period and continued at the Q3 2020. The project activities resumed in Q4 2020 and the level of activities are continuously growing. (see Annex 5.8)

[6] Certified amount will be finalized by UNON.

3.7 Project management

Strengthen PMU

Recruitment of Programme Management Officer completed in previous reporting period but due to COVID-19 pandemic, UNEP recruit process has been interrupted. Project Management Officer (P-4) finally took office on 1st October 2020 as the first staff dedicated to the project implementation.

Two more project staff, i.e. Programme Management Assistant and Admin Assistant, are in the process of the recruitment. Admin Assistant (G-5) is at the final stage of recruitment. The position will be initially shared with another UNEP project with 50% effort to be dedicated to the Japan Mercury Project. Programme Management Assistant is also under recruitment from United Nations Volunteers roster.

Project steering committee

The project has established the Project Steering Committee (PSC), which is composed of the representatives of UNEP ROAP, Minamata Secretariat, UNEP Chemicals & Health Branch and MOEJ with the ROAP to serve as the chair. PSC held the first dialogue webinar on 9 March 2021 for providing strategic direction to the project towards expected project outcome. The PSC agreed on its ToR at the beginning and then reviewed project progress in 2020 and planned activities in 2021. It confirmed that the project was active towards delivering expected results. It also confirmed many ongoing collaborative activities in the project with the Convention secretariat, Chemicals and Health Branch including the UNEP Global Mercury Partnership (GMP) and Ministry of the Environment of Japan (MOEJ) so that the opportunities and linkages will be explored to enhance the effectiveness.

Communications and visibility

Due to COVID-19, Minamata COP4 to be convened in Indonesia is split into 2 parts with the one virtual session in November 2021 and the other face-to-face session in Q1 2022. The project is considering participating in the COP4 for disseminating results for global level visibility. The actual arrangement is still under discussion.

Monitoring, evaluation, and reporting

The project is continuously monitoring its progress and situations to ensure the targets being achieved in accordance with the approved work plan. The monitoring items are considered based on the reporting frequencies, i.e. quarterly, semi-annually, annually, or once in the project lifetime.

On quarterly basis, the project monitors its financial status as an internal control and the Programme Management Officer examined and took appropriate measures to align it in accordance with the approved budget. One budget revision was conducted in April 2021 to cope with the continuing COVID-19 situation that restricted some of the planned activities including travels.

A semi-annual report was prepared in January 2021 that summarized the progress and results in July-December 2020. The adopted report was submitted to the PSC for their consideration.

4 Workplan in July 2021 – June 2022

Based on the overall implementation plan approved for entire project period and following the project progress in July 2020 – June 2021, the workplan for July 2021 – June 2022 is presented. (see Annex 5.5)

Activities under output 1

Project activities will be adjusted to 'new normal' that expects 'living with COVID-19'. Especially Activity 1.3, Formulate and implement trainings based on regional priorities and identified needs, should be done in online mode. The face-to-face trainings and visiting programmes are not expected but the situation will be continuously monitored to prepare necessary adjustment in advance.

Two training modules will be developed to promote mercury monitoring and flow analysis (Activity 1.2) that includes trainers' trainings using these materials. UNITAR and AIT RRCAP are to implement this component (Activity 1.3).

Assessment of the effectiveness of the training programmes (Activity 1.4) will be undertaken in Q2, 2022 against the baselines drawn in 2021.

Activities under output 2

Developing in-country capacity of mercury monitoring (Activity 2.1) is a key component in this project. The capacity assessment of existing laboratories (Activity 2.1.1) will be conducted in Nepal and Philippines in virtual setting as the expert team is not able to visit and survey the physical setting of the laboratories. Capacity strengthening to the laboratory technicians (Activity 2.1.2 and 2.1.3) will be provided based on the specific needs and priorities from Q1, 2022 onward. This activity will also include scientific research and environmental studies of the partner countries (Activity 2.4.2).

Continuous data collection and analysis (Activity 2.2) will be organized at dedicated sites and harmonization of methodologies will be assessed, which will ensure the comparability of data collected at different locations. A monitoring station will be setup by the project to collect information about the feasibility and effectiveness of such arrangement which will continue for 2 years from Q4, 2021.

A laboratory proficiency testing (PT) will be implemented for the analytical laboratories in the region (Activity 2.3) in collaboration with NIMD. Capacity strengthening to these laboratories will be linked to the previous activity (Activity 1.3) in this period and actual PT will be conducted in Q1, 2022.

Activities under output 2 will be coordinated with Asia Pacific Mercury Monitoring Network (APMMN) to enhance regional cooperation (Activity 2.4). Cross-participation to each activity will also be explored (Activity 2.4.1).

Activities under output 3

The project annual webinar 2021 is planned under Activity 3.1.2 which disseminates the progress of the project activities and results to wider audiences. As much as possible, the meeting is open to non-partners especially peers in other regions to provide replicative information. Due to COVID-19

situation, the meeting for 2021 will be convened virtually. It will be planned in close cooperation with Minamata Secretariat and UNEP Chemicals & Health Branch.

A dedicated project website will be opened to accumulated and compiled technical data to be disseminated and to connect the project partners to the project (Activity 3.2).

Project coordination, monitoring for new workplan July 2021-June 2022

Recruitment of Admin Assistant and Programme Assistant to the project will be completed by the end of 2021 so that the PMU becomes full-fledged.

Project Steering Committee (PSC) meeting will be held in every 6 months to inform project the strategic direction towards expected project outcome. It could meet either physically or virtually but due to the COVID-19 situation, the meeting in Q3, 2021 and Q1, 2022 will be convened virtually.

PMU will continue to monitor the project progress, results, financial status, and risks. Prior to the PSC meetings, Semi-annual reports will be prepared and shared to the PSC members in Q3, 2021 and Q1, 2022.

5 Annex

5.1 Online training programme #1

Outlines of the online training programme

Date & venue	2 – 4 December 2020, virtual meeting
Title	Role of monitoring laboratory for national mercury management
Objective	To initiate the series of skill-up trainings for national monitoring laboratories that is monitoring (or will monitor) mercury levels in the country. To help each institution locates its own monitoring capacity among regional counterparts.
Programme	The training programme is composed of 5 sessions (3 hours each). Opening session: Opening address, project introduction, keynote lecture Session A: Start-up of mercury monitoring Session B: Mercury monitoring in key media Session C: Mercury survey and research Session D: Advanced technologies and regional networking
Participants	Laboratory managers, technicians and technical officers who are in charge of mercury management. Participants: 103 from 10 countries (Indonesia, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam) Observers: 2 from Japan Lecturers: 13 (9 lectures, 2 information presentations) Host and guest: 4 (UNEP, MOEJ, Minamata Secretariat and Minamata Environmental Academia) Organizers: 6 (UN, MOEJ) Secretariat: 4 from IGES

Summary of the results

The first online training programme on 'Role of monitoring laboratory for national mercury management', held on 2-4 December 2020, was attended by more than 100 participants, observers, lecturers, etc. Most of them have environmental backgrounds while some countries sent participants from health and industrial sectors. Participants profile were asked by a questionnaire which indicated the largest portion involved in laboratory works, however, the works related to mercury was less than 10% for approx. half of the participants.

The purpose of this training programme #1 is to initiate the series of skill-up trainings for national monitoring laboratories that is monitoring (or will monitor) mercury levels in the country. The project addresses different monitoring needs and priorities of each country, which will be considered after the consultations and communications with relevant institutions identified by the participating

governments. The project will also help establish a region-wide network of laboratories with mercury monitoring capabilities around Asia and the Pacific to bring their capacities to international standards.

The programme was opened with 4 welcome remarks from UNEP ROAP as the project implementing agency, MOEJ as the financial contributor, Secretariat of the Minamata Convention as the key beneficially of the project, and Minamata Environmental Academia as the local partner. The session was followed by the introduction of the Japan-funded mercury project that this training programme falls under. Then, a keynote lecture on 'Health hazard of mercury and its countermeasures' was presented to the participants, which gave fundamental science to human health and history of Minamata disease. The session further extended 2 more information lectures on introduction of mercury monitoring instruments and National Institute for Minamata Disease (NIMD).

Subsequent sessions were programmed to fit to different development stage from start-up to advanced levels (from Session A for entry level to Session D for advance level). As each session was discreet, they were not arranged sequentially.

Session A Start-up of mercury monitoring (morning session in day 3)

- Lecture 1, Law, and standards in Japan: Ms. Itsuki Kuroda, MOEJ.
- Lecture 2, Mercury uses and emissions: Dr. Mick Saito, UNEP.

Session B Mercury monitoring in key media (morning session in day 2)

- Lecture 3, Ambient air monitoring: Dr. Koji Marumoto, NIMD.
- Lecture 4, Human hair monitoring: Ms. Rio Doya.

Session C Mercury survey and research (afternoon session in day 3)

- Lecture 5, Mercury survey at open-burning site: Mr. Tatsuya Hattori, IDEA.
- Lecture 6, Mercury analysis in products: Mr. Ryo Hasegawa, Environmental Control Center.

Session D Advanced technologies and regional networking (afternoon session in day 2)

- Lecture 7, Methyl-mercury analysis: Mr. Keisuke Uchida, IDEA.
- Lecture 8, Wet/dry deposition, and regional network: Dr. Ken Yamashita, Dr. Tsuyoshi Ohizumi and Dr. Hiroaki Minoura, ACAP.

Participants have different level of understanding and area of interest. Approx. half of participants felt that the programme provided lectures higher that the level of their personal competency. It should be gradually adjusted by knowing the current situation and future needs. Based on the interest demonstrated by the participants during the training programme and responses via questionnaire, the project will undertake bilateral communications with institutions on specific activities that fit needs of each country.

Due to COVID-19 situation, the international movement for most of countries is severely restricted, thus, the training was programmed virtually through internet communication tool. Online activities have limitation but could also provide opportunities to more participants than that of face-to-face ones.

Lectures and discussions

The lectures have been spread over 5 sessions in 3 days. The time difference among participating countries is within plus/minus 2 hours from Thai central time (GMT+7), which was the one of the considerations to develop time arrangement of the sessions. In order to avoid the sessions taking place too early or too late, the morning sessions were arranged in between 9:30 and 12:30, which means the sessions started at 7:30 for west-most countries and at 11:30 for east-most countries. The afternoon sessions were arranged between 14:00 and 17:00, which means the sessions ended at 15:00 for west-most countries and at 19:00 for east-most countries.

Day 1

An opening session was organized in the afternoon of Day 1. The session started with the opening addresses from 4 key organizations of the project. Ms. Isabelle Louis, Deputy Country Director of UNEP ROAP outlined that any forms of pollution including mercury contamination is one of the pillars of UNEP's global work. She emphasized the significance of the project being established in close collaboration with Minamata City to share its first-hand experiences and knowledge on mercury science and technologies.

Ms. Eriko Suda, Director of Mercury Management Office, Ministry of the Environment, Japan outlined that MOEJ has been promoting global mercury management and actively contributing to the Minamata Convention. She explained about the 'Moyai Initiative' which is to support developing countries on mercury management, which this project is part of.

Ms. Monika Stankiewicz, Executive Secretary, Secretariat of the Minamata Convention on Mercury extended her gratitude to MOEJ and UNEP ROAP for the continued support to the Convention. She clarified that the Minamata Convention covers the entire lifecycle of mercury and the monitoring is an important part of it.

Dr. Minoru Koga, Director, Minamata Environmental Academia introduced the establishment and the mission of his institution. He expressed disappointment of the programme not being able to be held in Minamata due to the COVID-19 pandemic but also expressed his gratitude to UNEP ROAP, MOEJ, NIMD and IGES to support this training programme.

The session was followed by the introduction of the Japan-funded mercury project that this training programme falls under. Dr. Mick Saito, Programme Management Officer, UNEP ROAP presented its background, objective, expected outputs and workplan for 5 years.

Q&A:

- Q: If there are any supporting programmes to raise capacity of mercury analysis; A: Output 2 of the project has a monitoring component focusing on the capacity building of mercury monitoring in national institutions.
- Q: How the mercury exposure is reduced effectively and efficiently in illegal gold mining; A: ASGM is not simple topic and participation to GEF-GOLD project is suggested.
- Q: Whether there are health effects to stage performers to break fluorescent lamps. A: As the elemental mercury used in the fluorescent lamps, it may not cause severe health effects, but it would be better stopping such performance.
- Q: In what forms mercury is taken up by plant; A: Rice grown in heavily contaminated fields shows higher methylmercury concentrations in the grains.

- Q: If there is health hazard of the dredged sediment in Minamata bay; A: Most of the mercury released to Minamata bay has been converted to mercury sulphide (HgS) which is rather stable. Mercury level in Minamata bay is still monitored continually.
- Q: If exposure to elemental mercury can be prevented by special mask; A: Gas mask equipped with activated carbon may absorb mercury.

A keynote lecture on 'Health hazard of mercury and its countermeasures' was presented by Dr. Mineshi Sakamoto, General, NIMD. The presentation showed the history of mercury poisoning including the Minamata disease which occurred in the mid-1950's, how mercury affected to human health, chemical characteristics and different species of mercury, and how it concentrates in the food chain as part of natural cycle. He also showed how Kumamoto Prefecture reduced the mercury concentration in Minamata bay by dredging contaminated sediment, etc.

Then, two information lectures were presented, started by Mr. Alvin Chua, Manager, International Sales Division, Nippon Instruments Corporation, on 'Mercury monitoring instruments – types and applications.' He presented mercury analysers with specific features targeting either the form of liquid, solid or gas. He showed how the mercury analysers are applied in various industries and sectors covering from environment, food, energy, emissions to human bodies.

Next, Dr. Koichi Haraguchi, Senior Researcher, NIMD showed a video introducing National Institute for Minamata Disease since its establishment. NIMD carries out research, archive the academic investigations, and provide training and social services related to mercury. It also serves as the WHO collaboration centre. He then introduced the newly developed human hair reference material for biomonitoring of mercury, which can be delivered freely to the laboratories in universities, public institutes, and private research institutes that perform chemical analysis.

Day 2

Subsequent 4 sessions in day 2 and 3 had the same structure with 2 lectures and a discussion time. The sessions were programmed to fit to different development stage from start-up to advance levels (from Session A for entry level to Session D for advance level). As each session was discreet, they were not arranged sequentially.

Morning session: Session B Mercury monitoring in key media

Lecture 3, Ambient air monitoring, was given by Dr. Koji Marumoto, Chief Researcher, NIMD. He introduced monitoring networks on atmospheric mercury, such as Canadian, American, Asian monitoring networks and GMOS. Air measuring stations in Japan were introduced as well as three types of sampling and measuring methods, i.e., continuous monitor, active sampling followed by mercury analysis, and passive sampling followed by mercury analysis.

Q&A:

- Q: If it is possible to utilize passive samplers in remote area (in terms of cost); A: It depends on the mercury concentration and availability of mercury analyser.
- Q: Appropriate analytical procedure for passive samplers; A: Mercury content in whole absorbent needs to be analysed. Fundamental is the survey design, e.g., what information needs to know, which method is the most suitable, etc.
- Q: Concerns about inexpensive methods (passive samplers) that might require many samples; A: Other media could be considered such as human hair, which provides information on mercury exposure.

Lecture 4, Human hair monitoring, was given by Ms. Rio Doya, IDEA. She explained why hair is important media for mercury measurements and advantages of using this method. Then, the sampling method was explained and how the samples should be collected. Analysis of Hg in hair with acid digestion using CVAAS (cold vapor atomic absorption spectroscopy) was explained, followed by introducing total Hg analysis by Thermal Decomposition AAS.

Q&A:

- Q: What inorganic and elementary mercury in human hair tells mercury contamination; A: Mainly more than 90% of mercury in hair is methylmercury.
- Q: If it needs to be washed and cleaned; A: It is better if external contamination is expected.
- Q: If metal scissors adversely affect results; A: Only if other metal contamination is also concerned. In any case, wash and dry them well before use.
- Q: Clarification of trimming 3cm from scalp side; A: It depends on the timeframe the survey is looking at as hair grows approx. 1cm per month.
- Q: What is the suitable media to assess people's habit; A: It depends on the objective of the survey. Hair mercury represents dietary mercury exposure while urine reflects inorganic exposure.
- Q: How fast fingernail grows; A: Approx. 3mm varied between persons. Be mindful however that only tip (not root) of fingernail is available.
- Q: If the subject person should avoid hair dye; A: Using questionnaire to pick up possible effect would be a good idea.
- Q: If residents neighbouring crematorium could accumulate mercury in hair; A: It is possible, but the level would be quite low.

Discussions took place on interpretation of observed data and measures to discrepancies between different methodologies.

- As for the ambient air, baseline level is important. After knowing it, investigation on elevated events and local source of emission would be possible.
- If very high concentration level was observed, the sample should be analysed with different method to cross check and confirm the value.
- Q: Health effect case from atmospheric mercury exposure in Japan; A: Japanese mercury exposure is mainly via fish consumption.
- Q: Medical treatment for those with high mercury level in their body; A: Biological half-time of elemental mercury is short (2-4 days in blood). That of inorganic mercury Hg^{2+} is about 20 days. Level will decrease with time once they move away from source. Only for acute mercury poisoning, chelating treatment can be done to remove mercury, which must be decided by medicine.
- Q: Difficulty of identifying exposure source; A: Imagine possible source, especially for vocational exposure, then narrow down the possibility.

Afternoon session: Session D Advanced technologies and regional networking

Lecture 7, Methyl-mercury analysis, was given by Mr. Keisuke Uchida, IDEA. He showed sample processing - homogenization of a fish sample, then, the outline flowchart of methylmercury analysis was presented. Hands on process was presented that included weighing the sample, standard curve making, and then step-by-step demonstration (adding solvents, reagents, heating in an oil bath, cooling, shaking, centrifuging, removing solvents, N_2 aeration). When the methylmercury was

extracted, it was measured by GC/ECD. He also explained for hair sample analysis, which is much simpler than previous process.

Q&A:

- Q: If the method suits to analyse fish oil sample, hexane is difficult to be removed from oil sample; A: Since oil is saponificated by alkaline, it moves to water phase, thus separated from solvent phase.
- Q: If acetonitrile (ACN) can be used; A: Not considered yet. Not sure about the solubility of methylmercury in ACN. Unlike PCB or other organic pollutant, methylmercury can transfer to water phase by dithizonation. Thus, the method can remove other matrices than methylmercury, which affect interference measurement.
- Q: What type of column is used; A: Packed column with fix phase named "Hg-20A"(sold by GL science)

Lecture 8, Wet/dry deposition, and regional network was given by Dr. Hiroaki Minoura, Dr. Tsuyoshi Ohizumi, Dr. Ken Yamashita, ACAP. Dr. Yamashita presented features of EANET (Acid Deposition Monitoring Network in East Asia). Classification of deposition monitoring sites and institutional framework of EANET, main activities of EANET and integrated approach of atmospheric management were introduced. Dr. Ohizumi presented the types of depositions, ratio between wet and dry composition and the estimation of the two. Inter-laboratory comparison survey, data completeness, chemical composition of rainwater, data analysis, salt contributions from sea salt and non-sea salt were also explained and the results on wet deposition monitoring in EANET were shown. Dr. Minoura explained about the dry deposition and acid deposition monitoring procedure, including site selection, monitoring frequency and measurement parameters. Furtherly, direct and indirect methods were introduced, such as filter-pack method, gradient method and inferential method.

Discussions took place on relevance and challenges of advanced mercury monitoring and strengthening regional collaboration.

- EANET has already collaborating with other organization such as EMEP and NADP in projects and conferences. It is open to cooperate especially cooperation within Southeast Asia is much easier.

Day 3

Morning session: Session A Start-up of mercury monitoring

Lecture 1, Law and standards in Japan was given by Ms. Itsuki Kuroda, Section Chief, MOEJ. She introduced laws and regulations to implement Minamata Convention in Japan including for manufacturers of mercury-using products, laws and regulations on Hg waste, and more.

Q&A:

- Q: How to recover mercury from household products; A: Mercury-containing waste is considered hazardous waste and collected separately.
- Q: How to develop legal system for ASGM; A: Japan does not have ASGM practiced. In general, mercury material flow analysis will help identifying the key issue and coming up with meaningful intervention.
- Q: How to make mercury standards for contaminated soil; A: Japanese measure is twofold if soil is contaminated and if it risks human health. In Japan, it is not required to remove the contaminants from the soil if it is stable.

- Q: Mercury analytical method for wastewater except AAS; A: Total mercury and organic mercury analysis use different methodology.
- Q: Highest mercury contribution to atmosphere in Japan; A: Either waste incineration or cement production.

Lecture 2, Mercury uses and emissions was given by Dr. Mick Saito, Project Management Officer, UNEP. He introduced the historical usage of mercury in products, such as in pigments, cosmetics, biocides, pharmaceuticals, gold/silver mining, vacuum pumps, thermometers, amalgams, explosives, lamps, batteries, electric controls, electrodes, and catalysts.

Q&A:

- Q: If mercury could not enter human body through skin; A: It is a matter of rate of absorption. Inorganic mercury such as skin whitening cream could be absorbed but the rate is relatively low.
- Q: If dental amalgam has adverse effect to human body; A: There is long lasting debate about the safety of dental amalgam. WHO says there are no negative health effects observed from dental amalgam for patients.
- Q: In case a person with high hair mercury level uses skin whitening cream, it means the inorganic mercury level in the body is high or not; A: Not necessarily as the external contamination might have resulted in the high mercury in the body. Inorganic mercury in human body does not result in mercury in hair.

Discussions took place on priority mercury issues and monitoring needs in countries and national mercury inventories.

- MOEJ provided information link on its material flow analysis (http://www.env.go.jp/en/chemi/mercury/mcm/004_material_flow_analysis_en.pdf) which contains comprehensive information throughout its life cycle. Mr. Eisaku Toda, Secretariat of Minamata Convention also introduced “Minamata Online” sessions on mercury material flow analysis (http://www.mercuryconvention.org/Meetings/MinamataOnline/tabid/8527/language/enUS/Default.aspx).
- Q: How to dispose of mercury waste from laboratory; A: The mercury waste is sent to the facility that can treat mercury.

Afternoon session: Session C Mercury survey and research

Lecture 5, Mercury survey at open-burning site, was given by Mr. Tatsuya Hattori, IDEA. He talked about the mercury in waste landfilling sites. The biggest exposure at the landfill would be due to inhalation of vaporized mercury. He added other media analysed for the survey - atmosphere, leachate water, waste itself, emission from disposal site surface.

Q&A:

- Q: If the property of elemental mercury (being trapped with other gaseous pollutants such as SO_2) can be used for mercury emission control: A: Mercury emission control techniques are assessed in the BAT/BEP guidance of the Minamata Convention (http://mercuryconvention.org/Portals/11/documents/publications/BAT_BEP_E_interractif.pdf).
- Q: If dissolved mercury is analysed in japan; A: It depends on the purpose of survey. Japanese standard is set for total mercury. In this survey, water was filtered to know mercury amount leached out of the waste.
- Q: How far from source the samples were taken; A: It depends on the parameters and conditions.

- Q: Feasibility of fingernail to determine mercury exposure; A: It depends on the survey design. Be mindful that only the tips of fingernail samples are available, which represent mercury level for some time ago.

Lecture 6, Mercury analysis in products, was given by Mr. Ryo Hasegawa, Environmental Control Center. He introduced details about the survey on batteries, including the points to select the target battery samples and the analysis of mercury in batteries. Then, he explained about the survey on lamps, points to select target lamps, survey design and analytical results of different types of lamps.

Q&A:

- Q: If Japan conducted survey on cosmetics; A: Japan's pharmaceutical law restrict ingredients in cosmetics and mercury compounds are not allowed. Mr. Hasegawa is planning survey on skin whitening creams in this fiscal year. The survey is planned to reflect present free market where products are distributed through various channels. Net shop is a challenge that is not limited to domestic market so that non-compliance could occur.

Discussions took place on plan and implement mercury survey and research and science-policy interface for national mercury management.

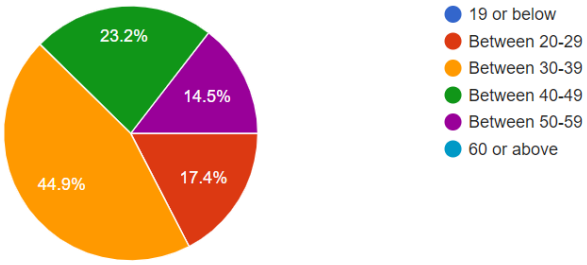
- It is a great importance not to lose the objective when design and implement a survey. If the objective is to pinpointing non-compliance products, market survey will put more focus to specific channels where mercury contents is usually higher.
- The results of the survey should be used to influence the policy makers to reconsider what kind of legal net of regulation should be put on the markets. Important point in designing survey is to how we can utilize the result of the survey.
- Q: Any social survey techniques applicable to ASGM issue; A: Many social survey techniques has been developed buy social scientists which might be applicable, including focus group discussion, transect, semi-structured interview, etc. There are statistical skills to analyse qualitative data, too.

Results analysis

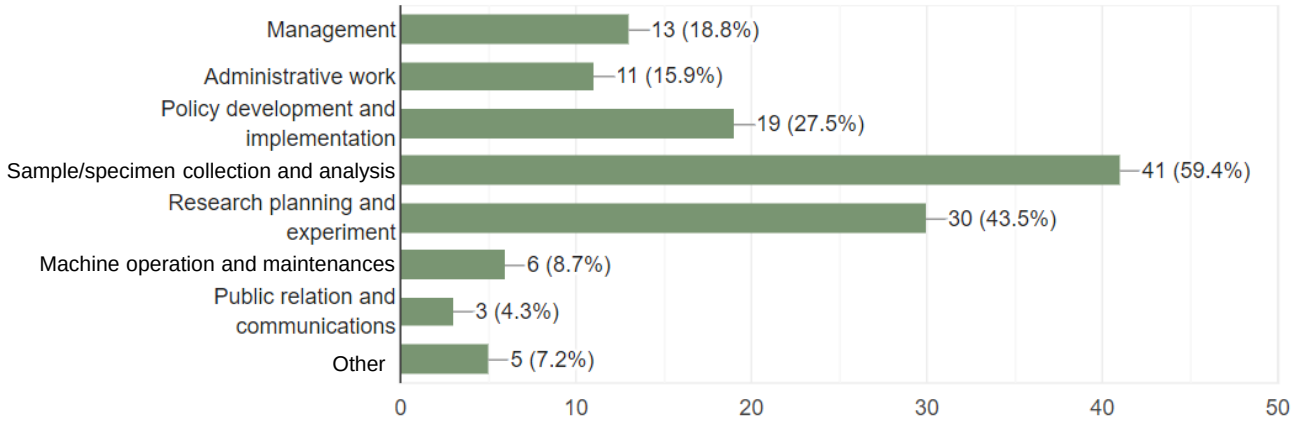
The training programme was attended by 103 participants from 10 partner countries. Majority of the participants came from environmental sector while health sector and industrial sector from some countries also joined the programme. The total number is more than that initially expected, which indicates high interest by participating countries. It also indicated the benefit of the online programme that can provide learning opportunities to more people.

Country	Total	Remarks	Country	Total	Remarks
Indonesia	21	All from environment	Nepal	2	All from environment
Malaysia	2	All from environment	Philippines	7	All from environment
Maldives	3	All from environment	Sri Lanka	28	1 from fisheries
Mongolia	3	All from environment	Thailand	8	All from environment
Myanmar	20	4 from health, 1 from JICA	Vietnam	9	3 from industry

A questionnaire was collected from participants to analyse the results of the programme. Total of 69 response was received. Approx. half of the respondents were in their 30's and 'sample/specimen collection and analysis' followed by 'research planning and experiment' are the main works of the participants. This profile is in line with the expected audience of this training programme.

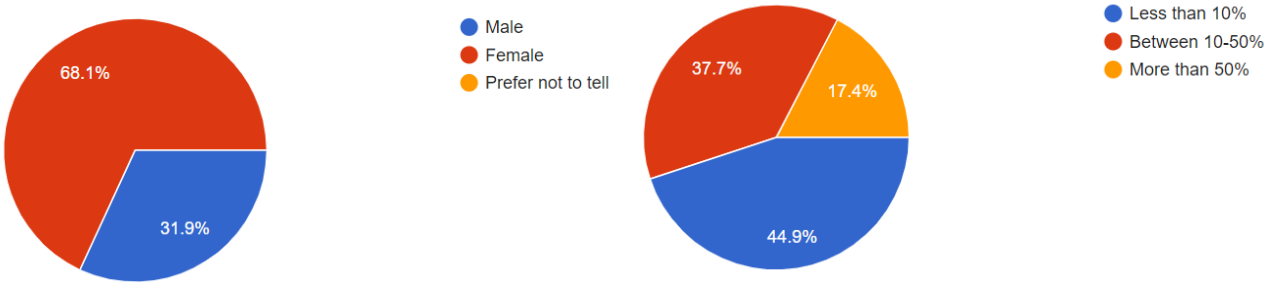


Age range of the participants



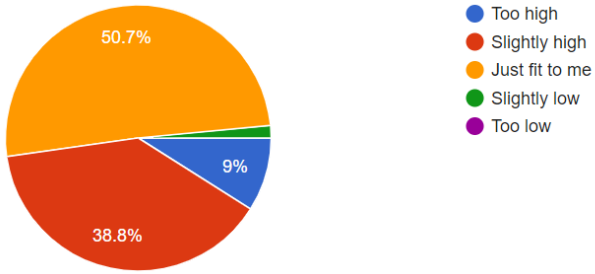
Participants' roles in the institutions (multiple choice)

Two-third of the participants were female, which suggests the laboratory works are undertaken widely by female technicians. Approx. half of the participants has been dedicated more than 10% of their time for mercury-related works. This means that the mercury is not necessarily their principal work, but they are routinely involved in mercury-related issues. The other half whose involvement is less than 10% may have acquired knowledge that could bring them more mercury-related work in future.

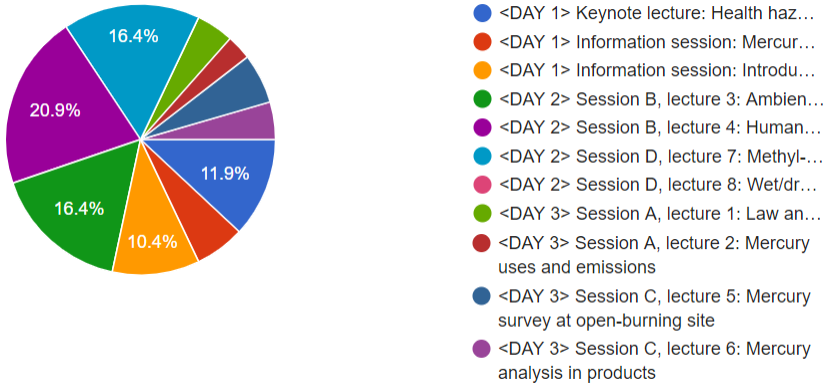


Gender Routine work related to mercury

Participants have different level of understanding and area of interest. Approx. half of participants felt that the programme provided lectures higher that the level of their personal competency. This is consistent with the previous results that approx. half of the participants is involved in mercury works less than 10%. It should be gradually adjusted by knowing the current situation and future needs. The programme can provide variety of lectures and other means of capacity development opportunities. In terms of the response of the participants on the 'most interesting lecture' in this training programme was widely distributed among all lectures, which indicated the value of the topics provided in the programme.



Lecture levels in comparison with competency



Lectures interested the most

Follow-up actions

Based on the interest demonstrated by the participants during the training programme and responses via questionnaire, the project will undertake bilateral communications with institutions on specific activities that fit needs of each country. Then the project will arrange groups of institutions with similar level and needs so that the project can more effectively and efficiently provide capacity strengthening programmes.

5.2 Online training programme #2

Outlines of the online training programme

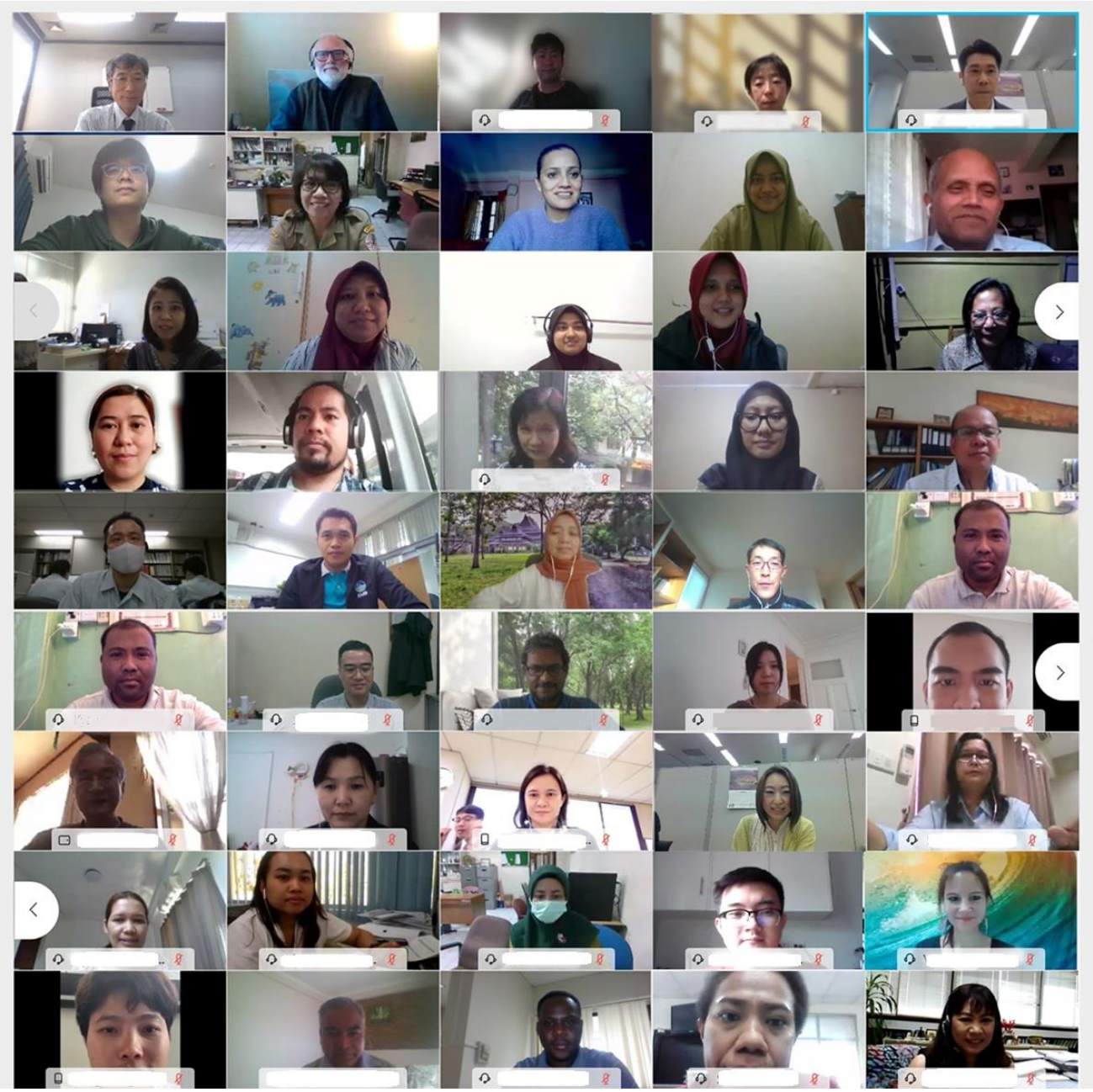
Date & venue	2, 4, and 12 March 2021, virtual meeting
Title	Mercury inventory and material flow analysis
Objective	To support the improvement of national mercury inventories by compiling various types of information. To introduce a comprehensive mass flow concept to outline the national mercury situation throughout its life cycle.
Programme	The training programme is composed of 4 sessions (3 hours each including opening, information sharing, etc.). Session 1: Mercury inventory and UNEP Toolkit Session 2: Overview and case examples of mercury material flow Session 3: Practical training on developing mercury material flow Session 4: Practical training on developing mercury inventory and material flow – follow up
Participants	Ministry/agency responsible for monitoring/management of mercury emissions and releases to air, water, and soil. University, research institute or consulting company which is engaged in development of mercury inventory. National Focal Points of the Minamata Convention. In order to enhance the effectiveness of the training programme, participants from different sectors in each country were encourages to create teams for group exercises. Participants: 85 from 9 countries (Indonesia, Malaysia, Maldives, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam) Observers: 5 from Japan Resource persons: 7 Organizers: 10 (UN and MOEJ) Secretariat: 4 from IGES

Summary of the results

The second online training programme on 'Mercury inventory and material flow analysis', held on 2, 4 and 12 March 2021, was attended by more than 100 participants, observers, lecturers, etc. Their background is diverse from environmental to industrial while environmental ministries took the largest portion. International and regional institutions based in the region also participated and provided substantive input to the programme. The works related to mercury was less than 10% for approx. half of the participants.

The purpose of this training programme #2 is to support the improvement of national mercury inventories by compiling various types of information, and to introduce a comprehensive mass flow concept to outline the national mercury situation throughout its life cycle. This training programme is jointly implemented by UNEP and MOEJ to enhance the effectiveness and impacts.

The training programme was composed of 4 sessions (3 hours each) in 3 days spread over 2-week span. The first 2 days (Day 1 and Day 2) provided the foundation for improving a mercury inventory and to develop a material flow in each country. One week's break before Day 3 allowed participants to undertake a group exercise within each country. The outcome of the intersessional work was presented at Day 3 session. A post-training questionnaire survey using the online meeting platform collected feedback from the participants.



The programme was opened with 2 short remarks from UNEP ROAP and MOEJ as the co-organizers of the programme.

Session 1 Mercury inventory and UNEP Toolkit (afternoon session in day 1):

- Lecture 1, Introduction of Toolkit, and its global use: Mr. Ken Davis, UNEP.

- Lecture 2, Design, and its contribution of UNEP Toolkit toward the implementation of the Minamata Convention: Mr. Jakob Maag, UNITAR.
- Case presentation 1, Country report on activities and challenges using UNEP Toolkit: Indonesia and Thailand.
- Group work 1, Upgrading Toolkit from Level1 to Level 2 including development of calculation factors

Session 2 Overview and case examples of mercury material flow (morning session in day 2):

- Lecture 3, Overview of substance flow analysis and mercury material flow: Dr. Noriyuki Suzuki, NIES.
- Lecture 4, Mercury material flow development: experience of Japan: Ms. Mai Kobayashi, EXRI.
- Case presentation 2, Country report on activities and challenges of development of the mercury material flow: Vietnam; UNIDO's activities to build capacity to develop mercury inventory and material flow in the Philippines: Mr. Teddy Monroy Go, UNIDO.

Session 3 Practical training on developing mercury material flow (afternoon session in day 2):

- Group work 2 & 3, Development of mercury material flow.
- Report of breakup group exercise.

Session 4 Practical training on developing mercury inventory and material flow – follow up (afternoon session in day 3):

- Report of progress/ results of intersessional exercise.

Between Session 3 and 4, which were 8 days apart, the group developed and improved their mercury flow diagrams for better understanding of national mercury profiles.

In addition, we have Information Session in day 2 with 2 lectures:

- Information sharing 1, Knowledge of Minamata: history and activities: Dr. Minoru Koga, Minamata Environmental Academia.
- Information sharing 2, Substance flow development: experience in Denmark: Dr. Carsten Lassen, COWI.

Due to COVID-19 situation, the international movement for most of countries is severely restricted, thus, the training was programmed virtually through internet communication tool. One of new arrangement was to apply an online whiteboard 'Miro" to develop mercury flow diagrams.

Lectures and exercises

The programme has been spread over 4 sessions in 3 days. The time difference among participating countries is within plus/minus 2 hours from Thai central time (GMT+7), which was the one of the considerations to develop time arrangement of the sessions. In order to avoid the sessions taking place too early or too late, the morning sessions were arranged in between 10:00 and 13:00, which means the sessions started at 8:00 for west-most countries and at 12:00 for east-most countries. The afternoon sessions were arranged between 14:00 and 17:00, which means the sessions ended at 15:00 for west-most countries and at 19:00 for east-most countries.

Day 1

Short opening remarks were presented by co-organizers of the online training programme.

Dr. Mick Saito welcomed all the participants to the 2nd online training program mercury inventory and material flow analysis which was jointly organized by UNEP and the Ministry of the Environment, Japan (MOEJ). It was also supported by Minamata City who provides first-hand knowledge on mercury management and together with the United Nations Institute for Training and Research (UNITAR) who have been providing technical supports in developing the UNEP Toolkit. This training workshop aims to support the improvement of national mercury inventories by compiling various types of information under the Minamata Convention on Mercury which entered into force in 2017.

Mr. Shohei Kozuka, MOEJ highlighted the importance of mercury management and introduced the Moyai Initiative which is to disseminate scientific knowledge on mercury technologies. He introduced that Japan has been developing the mercury material flow and hoped that it will serve as a reference for other countries to follow in developing their own mercury material flow.

Dr. Saito, then, briefly explained the objectives, expected outcomes and schedule of the training programme, which aimed to support national mercury monitoring and management of the participating countries.

Session 1 started with a lecture by Mr. Ken Davis, UNEP on Introduction to the UNEP Mercury Inventory Toolkit and its Global Use. The toolkit allows to estimate anthropogenic mercury emissions and releases in each country. It has two different types which can be chosen by the countries depending on the availability of data and the technical capacities: Level 1 (simplified version) and Level 2 (full toolkit for through and accurate analysis). The Excel spreadsheet can be downloaded from UNEP website where users can enter the activity data from different sectors to estimate mercury inventory. It also has a reference report and guideline on how to use the toolkit. It is developed based on mass balance principle and focusing on anthropogenic mercury. He gave an example of calculations using the toolkit and explained about the Level 2 source categories. He also showed the status and results of implementation of the Minamata initial assessment. He concluded his explanations by informing of the Mercury Inventory Toolkit website.

Lecture 2, Design Principles, and its Contribution of UNEP Toolkit toward the Implementation of the Minamata Convention, was given by Mr. Jakob Maag, Senior Advisor, UNITAR. He presented how the UNEP Mercury Inventory Toolkit was developed and are being used worldwide. The toolkit is to assess the emission inventory of mercury under the Minamata Convention and has been used in more than 90 countries. It was primarily developed aiming to raise the awareness of the countries on the status of mercury by allowing to evaluate and monitor its status. He described the design concept and how the toolkit works including the mass balance principle, simplifications, calculation of emissions, and availability of different versions (Level 1 & Level 2). He demonstrated how the Level 1 and Level 2 Excel spreadsheets looks like and what kind of functions are available.

Case presentation 1 was facilitated by Mr. Maag and invited 2 speakers. Dr. Kania Dewi, Environmental Engineering Study Program, Institute Teknologi Bandung presented the experience of mercury inventory in Indonesia. Indonesia had undertaken mercury monitoring using the Toolkit for three times so far. The initial attempt was in 2010 using Level 1 toolkit; second attempt was in 2017 using Level 1 toolkit; and the latest undertaken was in 2020 using both Level 1 and Level 2 toolkit. She showed the results in 2010 and 2017 by comparing the key factors. The result showed that the gold extraction with mercury amalgamation revealed highest mercury release to the environment in Indonesia and explained that the difference in 2010 and 2017 was due to changes in input factors. She then highlighted two key challenges in developing the mercury inventory in Indonesia which were the lack of mercury data and uncertainties in determining activity data. Based on these experiences, she concluded her presentation by showing recommendations to improve mercury inventory in Indonesia.

Q&A:

- Q: If it is required to use both input and output factors in level 2; A: It is not required but recommended to use both as both of them are important.
- Q: If the changes of default factor of mercury emission on ASGM was due to upgrading of the default factor in the UNEP Toolkit or it was upgraded taking into account the local situation based on available data; A: In Indonesia, data are not directly measured in the field but using a toolkit developed by UNEP.

Ms. Teeraporn Wiriwutikorn, Pollution Control Department, presented Thailand's report on activities and challenges using UNEP Toolkit. The first mercury inventory in Thailand was developed in 2010 by the Pollution Control Department of Thailand. They used the Level 1 Toolkit to conduct the inventory by utilising the 2010 data as a baseline. Secondary data were collected from relevant government agencies and primary data were collected by questionnaire survey. The limitation found through the initial exercise included lack of experiences and understanding by relevant agencies and lack of data. As a conclusion, she emphasised the importance to updating the data regularly and the opportunities the inventory analysis will provide including raising awareness of mercury management and involvement of relevant agencies.

Group work 1, enhancing inventory in Level 2, was facilitated by Mr. Maag. He provided a brief guidance on what to do in the group work by showing the Level 2 toolkit. Each group was tasked to work on two assignments in the group by referring to the Level 2 Excel spreadsheets:

- Assignment 1: list up types of data needed and discuss challenges in getting such a data on production, use and disposal of thermometer.
- Assignment 2: list up types of data needed and discuss challenges in getting such a data on the production of cement clinker.

All the participants were guided to split into seven (7) groups where the secretariat prepared the breakout session groups divided by countries. Three countries (Malaysia, Mongolia, and Maldives) were merged into one group due to small number of participants. Each group was recommended to download the Level 2 spreadsheet and use it in the group work. The intention of the breakout session was to let participants recognise how demanding and complex the data collection is even in Level 1 through the discussion by various stakeholders. He showed the examples of answers to the assignments on thermometers in production, use and disposal. He explained what types of data are needed and how to obtain such data for production of thermometers. He emphasised that the data collection is often challenging so the default factor is provided. He also showed the examples of answers to the assignments on production of cement clinker showing the differences in the types of

data needed and some unique challenges to collect them. He emphasized the needs of funding to collect accurate data.

Q&A:

- Q: How to upgrade the data from Level 1 to Level 2 without detailed recording in the customs data on the import of thermometers; A: If there are no production of thermometer in the country, net import (import – export) of liquid thermometers can be used. If an accurate information is not available, there is a way to conservatively assume that all glass thermometers contains mercury, or you may also assume that half of them contains mercury. It is a valid method as long as the assumptions are clearly justified.
- Q: If Nepal should remain using Level 1 and not trying to step-up to Level 2; A: It is recommended to use both Level 1 and Level 2 and keep both of them. It would not take so much time to put data in both Level 1 and 2.
- Q: If the data on the purchased mercury (e.g. thermometer production) can be used in Level 2 sheet 5-5; A: It can be used in Level 2 sheet 5-5.

Day 2

Day 2 started by the first information sharing lecture on Knowledge of Minamata: history and activities, given by Dr. Minoru Koga, Director General, Minamata Environmental Academia. He introduced the history of Minamata disease that occurred in Minamata bay. He explained about the activities of the Chisso Company in Minamata, from which methylmercury discharged into the environment. Dr. Koga then continued by explaining the symptoms of the Minamata disease and the compensation sums of the Minamata disease. He also introduced the comprehensive lessons from the Minamata disease affair and Minamata's regeneration (also called *Moyai-naoshi*). He introduced the missions of Minamata Environmental Academia, which aims for research and education, local community development, job creation, and industrial development in the area.

Mr. Osamu Sakamoto explained the objective of Session 2 and informed about the group work where participants will be developing each country's mercury material flow.

Lecture 3, Flow, stock, and emission – general knowledge for better development, was given by Dr. Noriyuki Suzuki, National Institute for Environmental Studies, Japan. He explained about the transport of mercury around the globe. His work is oriented on models of mercury material flow and mass flows in the natural environment. He pointed out that both, the mercury flow in the society and natural environment are important. He continued by explaining the mercury material flow in Japan for FY 2014. This flow allowed to identify which streams are important in Japan. He explained the three important processes in the flow, input, stock at node and output, what they represent, mass balance equation around the node with examples, as well as general observations of the input and output and stock at the node. He pointed out that it is important to understand the dynamic interrelation among the input, output, and mass in the node (stock), however it is difficult to obtain complete estimation and that there is need of final evaluation.

Q&A:

- Q: How to address the discrepancies in case contradicting numbers are obtained; A: there is not standard to distinguish discrepancies.
- Q: If it is always the case that the scales of focus mode of the MFA are largely dependent on the granularity of data available; A: How to obtain the data will be presented in the next lecture.

- Q: UNEP toolkit does not use “emission factor” but use “input factor” instead. What is the fundamental difference between the UNEP tool and Hg mass balance; A: There is no difference between them fundamentally.

Lecture 4, The development of mercury material flow in Japan, was given by Ms. Mai Kobayashi, Consultant, EXRI. She gave a presentation on the development of mercury material flow (MMF) in Japan. Largest input of mercury in Japan is the row mineral and fuels and the largest output is exported mercury. Japan’s material flow is similar to Level 2 of UNEP Toolkit and it has more country specific information. MOEJ has established an expert committee to develop the MMF. Japan has been updating the MMF since FY2007. She showed what kind of information were used, how they were collected, and how they were calculated in the MMF. She then showed some examples of policy implications of MMF highlighting how it contributes to understand the mass balance of mercury and review the effectiveness of policy measures. She noted that the domestic mercury demand (3.5 tons) can be met by mercury recovered from waste. Challenges in MMF include lack of cooperation from the private sector and uncertainty of the data. Finally, she explained how Japan has been promoting international cooperation on MMF capacity building.

Q&A:

- Q: How Japan distinguishes the product contains mercury or not when they request data at the customs office. If Japan have a specific HS code for thermometers with or without mercury; A: It used the HS code to distinguish whether the imported/exported products contain mercury or not, but if such information were not available, they conducted interviews to the stakeholders for further clarifications.
- Q: How to estimate mercury releases to air, water, soil, etc. so that the results can be used for policy making; A; they use different distribution factors in their MMF to calculate emissions to air, water, soil, etc. by each sector so that it is more accurate than UNEP Toolkit.
- Q: Why the various types of coals were given a same value of mercury concentration (0.039 g/t); A: According to the federation of electric power companies, types and amount of imported coal do not differ much in case of Japan, therefore, they are using the average amount for all types of coal.
- Q: Why the average FY2015-2017 is applied instead of actual FY2016 data; A: MMF in Japan is used to understand the long-term trend of the Hg material flow. Therefore, if there are not much fluctuation of data, they will apply single year data, if there were considerable fluctuations of data, they apply the average to show the long-term trend.
- Q: MMF may work better for countries where data is easily accessible but how the countries that have difficulty in accessing the data can adopt MMF; A: it was not so easy to get the data even in Japan and there are still some limitation of data. In Japan, they have been discussing on development of MMF since 2007 but they are still in the process of improving the system and methodologies. Japan also started with limited data at first but that would still provide useful data to understand the material flow.
- Q: If installed emission control units are considered when calculating the mercury flows from coal-fired power plant; A: they considered the installed unit control.

Case presentation 2 was facilitated by Mr. Sakamoto and introduced 2 examples of the outcome of a training workshop on mercury material flow organized by MOEJ in July 2019. Ms. Vu Huyen PHUONG, Vietnam Chemicals Agency, presented the activities and challenges of development of the mercury material flow in Vietnam. The first national inventory was conducted in 2015 (using Level 1 toolkit) as part as GEF project funded by the United Nations Industrial Development Organization (UNIDO). The highest rate of mercury occurred from waste sector. In 2019, another inventory was conducted focusing on industrial sectors (applied Level 2 toolkit). Major challenges identified in

inventory development were: 1) mercury estimation from waste and products, and 2) estimation and analysis from major industrial sectors.

Then, Mr. Teddy G. MONROY, UNIDO Philippines, presented UNIDO's Activities to Build Capacity to Develop Mercury Inventory and Material Flow in the Philippines. He showed the draft MMF of the Philippines which he developed. From his experience of developing the MMF, he showed the perceived benefits and challenges. He found that it is an effective tool to implement policy measures. The key challenges were lack of cooperation from private sector and data uncertainties.

The afternoon session started with the Information sharing 2 on Substance flow development: experience in Denmark presented by Dr. Carsten Lassen, Senior Specialist, COWI Holding A/S. The substance flow analysis (SFA) was developed to provide common understanding of the flows of the substances to all stakeholders. The first version was developed in 1993 and extended version in 2000. It contains 11 metals including mercury and 15 organic substances/substance groups. The mass balance principle is applied similarly as the UNEP toolkit. He showed an example of overall flow of lead and brominated flame retardants. He also showed the balances between estimated inputs and outputs of waste treatment processes. He concluded his presentation by summarising how useful SFA is in increasing the understanding of the total flow of substances but noted that it is relatively resource consuming – he therefore suggested to adjust from example of SFA in other countries.

Q&A:

- Q: What is the main difference between substance flow analysis (SFA) and lifecycle assessment (L+CA); A: LCA mainly focuses on the process or product.

Then, Mr. Sakamoto introduces Group work 2 on Development of mercury material flow. The participants were advised to breakout into five groups which were pre-arranged based on the countries (Indonesia; Maldives + Mongolia + Vietnam; Malaysia + Thailand; Nepal and Sri Lanka; and the Philippines). Each group was facilitated by the expert facilitator. The groups discussed where the mercury was coming from (input) and where it went (output) and tried to visualise them. The rapporteur (to be nominated in each group) took note on the discussion and was given an opportunity to present the outcomes at the plenary session.

- Indonesia group: Dr. Dewi reported that they focused on mercury related to coal mining and power plant including import and export. She explained the flow of materials including production, domestic use and cement production and construction. She mentioned that they had difficulty in developing this map due to limited information on some of the process such as pollution control devices.
- Maldives, Mongolia, and Vietnam group: Ms. Hameed, Maldives, presented the output from the group. She focused on Vietnam at national case. In the flow, they differentiated the input and output of materials in different colour and covered both imported products and nationally developed products. It was clarified that the flow is still rough and need some more input of information to finalise it due to tight schedule.
- Malaysia and Thailand group: Dr. Goh, Malaysia, presented the mercury material flow in both Malaysia and Thailand. He clarified that both countries do not have mercury mining, so they focused on import of Hg and import of Hg products. The production of Hg added products were further classified into medical thermometers, florescent lamp, and dental amalgam. He explained the detailed flow of medical thermometers.
- Nepal and Sri Lanka group: Dr. Shrestha, Nepal, prepared the material flow in case of Nepal based on the data in 2018 and 2019. Main mercury in Nepal is gold planting (13 tons Hg). Ayurveda is getting less recently but most of them are emitted in the air after being burned. Import coal is

used in power generation. Imported products can be ended as informal dumping and leakage to river. Dental amalgam is decreasing in medical sector recently.

- Philippines group: Mr. Tamani presented the result of the group session. They looked at the three major sectors of mercury in the Philippines including mercury-added products, coal-fired power plants, and ASGM and they made the flow diagram separately. Regarding the mercury-added products, majority of input is importation of products and local products are small. There are also some illegally imported materials through online shopping. Regarding the ASGM, it is currently illegal to use mercury in the mining but there are some usages derived from smuggled mercury or imported mercury for dental amalgam or other mercury containing products.

At the end of Day 2, Mr. Sakamoto explained about the intersessional work which took place until Day 3 session on 12th March. He encouraged all groups to continue the work and try to upgrade the material flow. He noted that secretariat arranged an online meeting rooms for further group discussion at 16:30-18:00 on 9th March. The outcomes of the intersessional work were presented on Day 3 sessions.

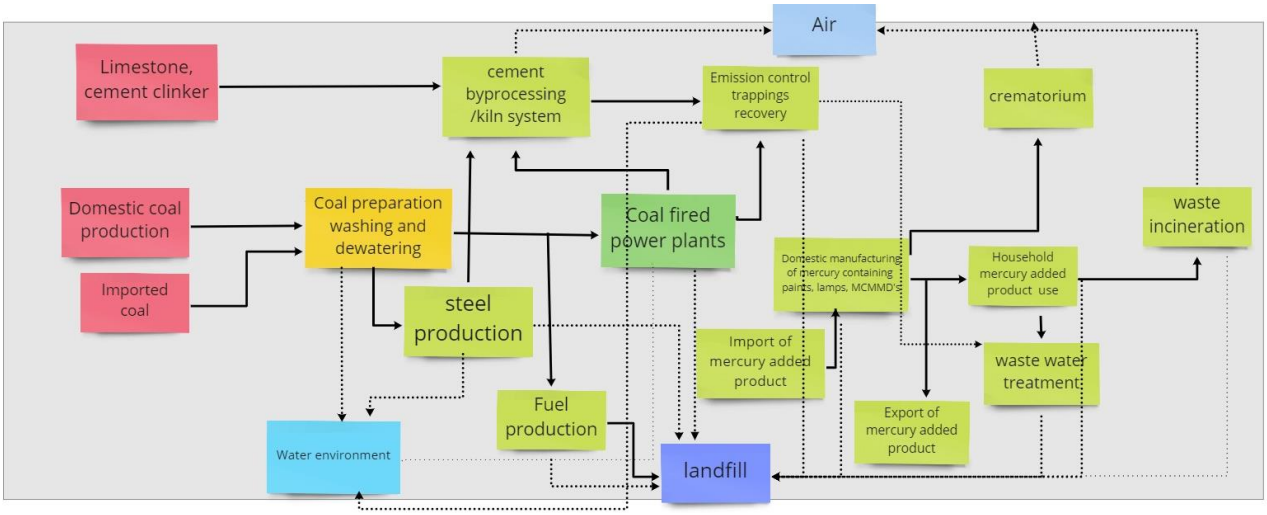
Day 3

Dr. Saito explained about Session 4. The groups were sharing their mercury material flows, which they have developed on the Miro board and posted questions each other. He introduced that Dr. Moritomi, Executive Director, Moritomi Environmental Engineering Laboratory, also participated in the session to give some questions and comments.

Case Presentation 3: Report of Progress/ Results of Intersessional Exercise 1 was facilitated by Mr. Sakamoto.

Mr. Borongan explained the mercury material flow developed by Maldives, Mongolia, and Viet Nam group. He outlined mercury input material sources for fuel production. He further explained that some of the mercury emissions in the exhaust of these plants are captured by emission control devices. He noted that in Viet Nam, some amount of coal is domestically produced. In the coal preparation washing and dewatering, there are discharges to the water environment (leakage to the environment). Coal is utilized in steel production from where combustion residuals are disposed of to the landfills. These however could also be utilized in the cement industry. A part of the coal was used in a fuel production and coal fired power plant. Mercury is also utilized in other facilities and products, including products for households and in industries. Some mercury added products are exported. There were several routes of mercury emissions into the air, water and on landfill. Emissions to air are from crematoriums, waste incineration and cement by-processing.

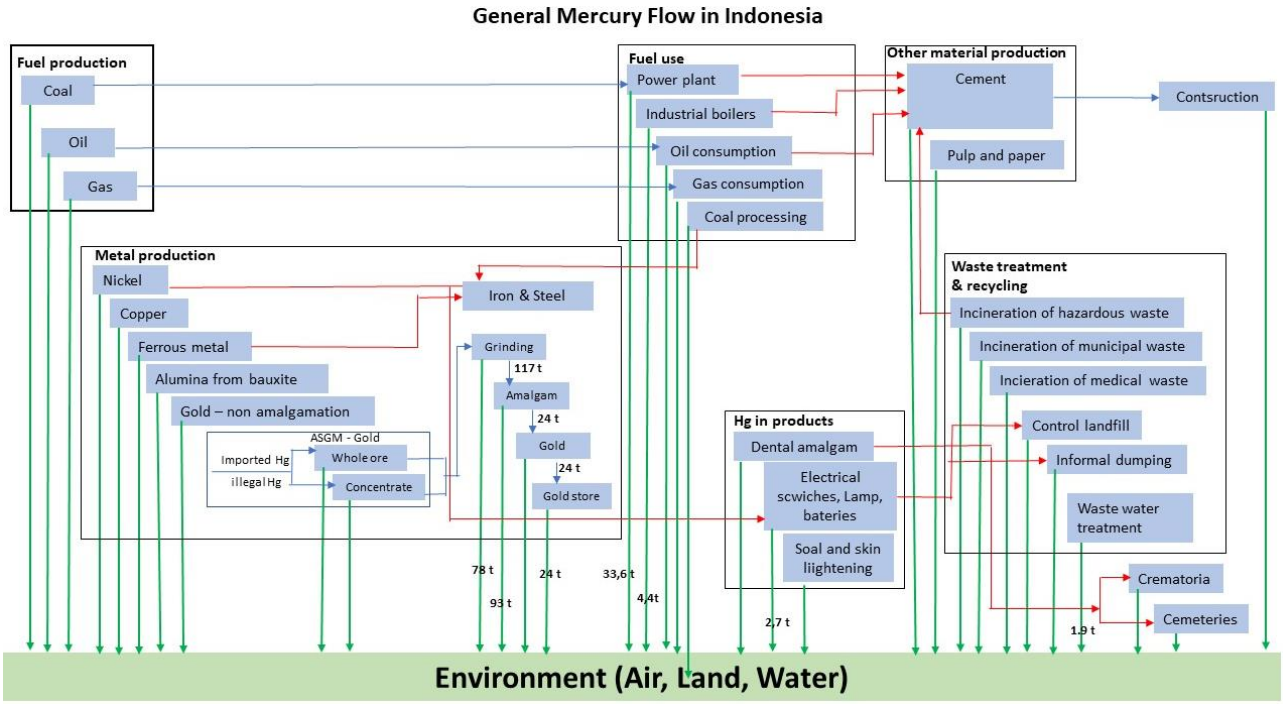
Mr. Borongan mentioned that they observed data gaps in available inventory report in Viet Nam on mercury sources and emissions, so they could not provide the specific data (quantities). Mr. Solomon Huno added that there was no mentioned of the amount of mercury imported in Vietnam and it could therefore not be reflected in the material flow. He also mentioned that for the production using mercury as a material (for example paints, medical devices), they would have to explore the flow further. As such they lumped the data together into domestic manufacturing of mercury containing paints, lamps.



Q&A + comments:

- Q: From where mercury is coming to the sector of domestic manufacturing and why the import of mercury-added products is coming to the domestic manufacturing; A: It was not clearly stated. They do not have the recycling of mercury.
- Q: If there is any reason why they used different kind of arrows; A: they used different types of arrows to better visualize the flow.
- Q: If there is a direct disposal line in addition to waste incineration; A: the waste from the incinerator would go to the landfill, as well as sludge from the waste water treatment and from activities connected to domestic manufacturing of mercury containing, steel and fuel production and coal-fired power plants.
- Q: Why mercury is going to the air after emission control trapping as shown on a diagram and if the trapped mercury is going to landfill; A: It could be an error and the emission control device would be reducing emission of mercury into the air but would not fully reduce the emission.
- Comment: Coal as a mercury source is important, however some of the flow is misleading.
- Q: What kind of waste is incinerated; A: It needs check in the source information.

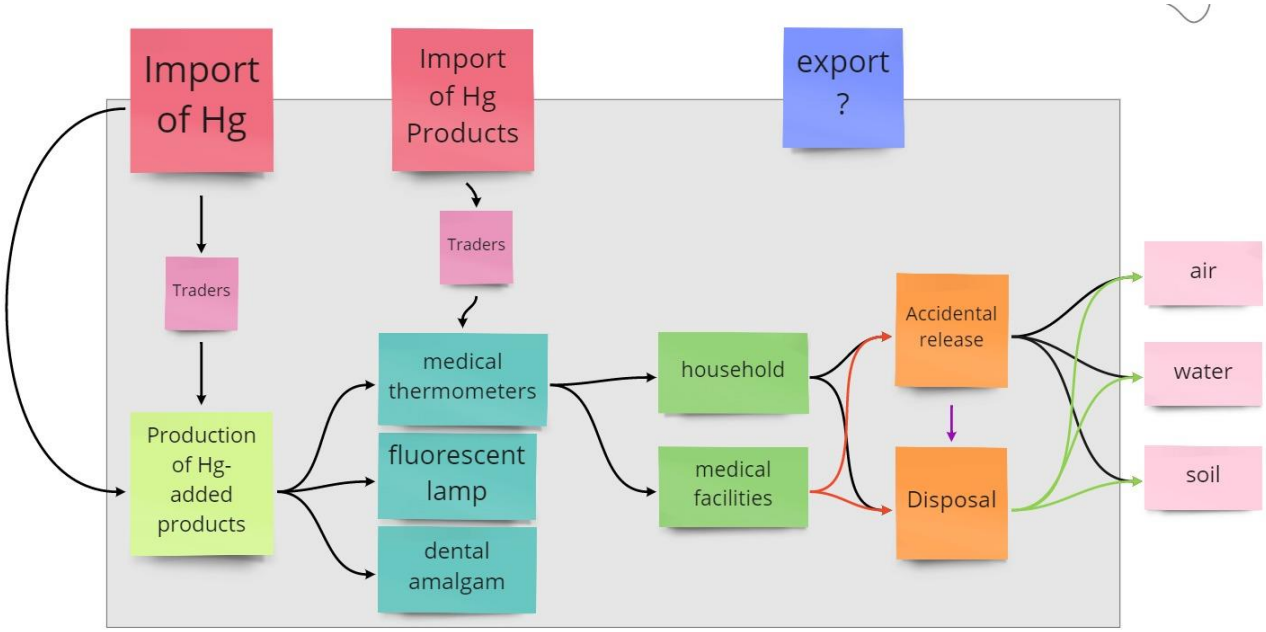
Dr. Dewi shared a general flow in Indonesia which they are still developing. They relied on UNEP toolkit when making the flow, however she mentioned that with the UNEP toolkit, they couldn't see the connections between activities, inflows, and outflows. Dr. Dewi introduced the sources of mercury in Indonesia and said that from all the activities, mercury would be emitted into the environment. In Indonesia, they had metal production sector, including ASGMs. She explained the flow of mercury to different products, such as batteries and the flow of mercury from the used products, which went on landfills or could be incinerated as a hazardous waste. From here, part of it could also go to the cement plants.



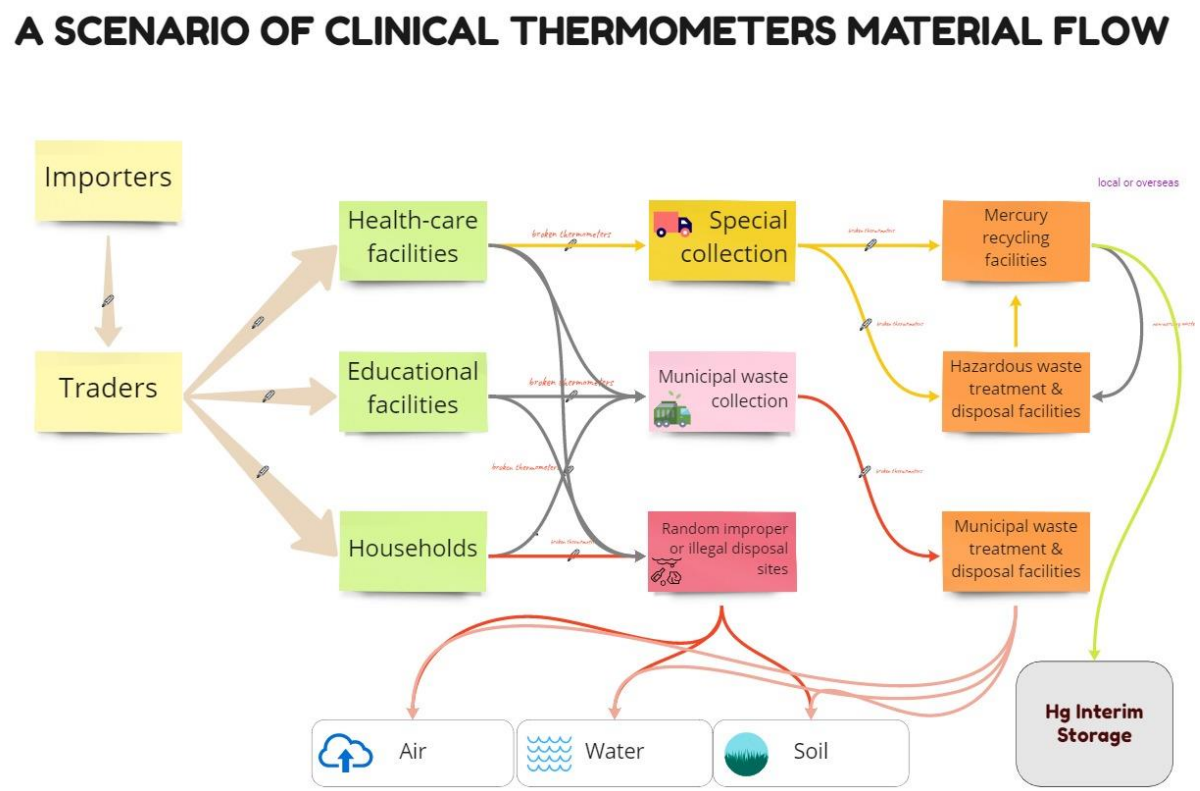
Q&A + comments:

- Q: What is the meaning of the red colour arrow; A: the red colour indicates products.
- Comment: It is advised to make a legend that explain the colour of arrows and add imports and exports.
- Comment: It could add another dispose pathway, not only landfill such as lamp recycling and recovery of mercury. There is no dedicated incineration of hazardous waste but incinerated in cement kilns; A: They incinerate in industries, in addition to cement plants.
- Q: There is no arrow leading to the environment from iron and steel factories: A; It should be added.
- Comment: There is not inflow to incineration of waste.
- Q: Where is the imported mercury for ASGM; A: The import is illegal.
- Comment: Mining waste, waste, and sludge, is also important. It is important to know where it goes, which should be shown in the figure.

Mr. Suraadiningrat presented the mercury material flow using Malaysian scenario. The flow developed was using amalgam and fluorescent lamp as an example; however, they could not finalize the diagram. In Malaysia, the mercury was imported for the production of mercury added products and production of mercury medical products. The users of these are households and medical facilities. They might cause accidental releases of mercury in the environment. He explained that from here, emissions to the air, soil and water could occur.



He also showed an alternative scenario (diagram nr. 2) for clinical thermometers. He explained that here the inflow was only through the import, through traders to households, education facilities and health care facilities. Broken thermometers could then go to special collection, municipal collection or random improper or illegal disposal. Mercury could be recycled when collected, but no data yet for this.

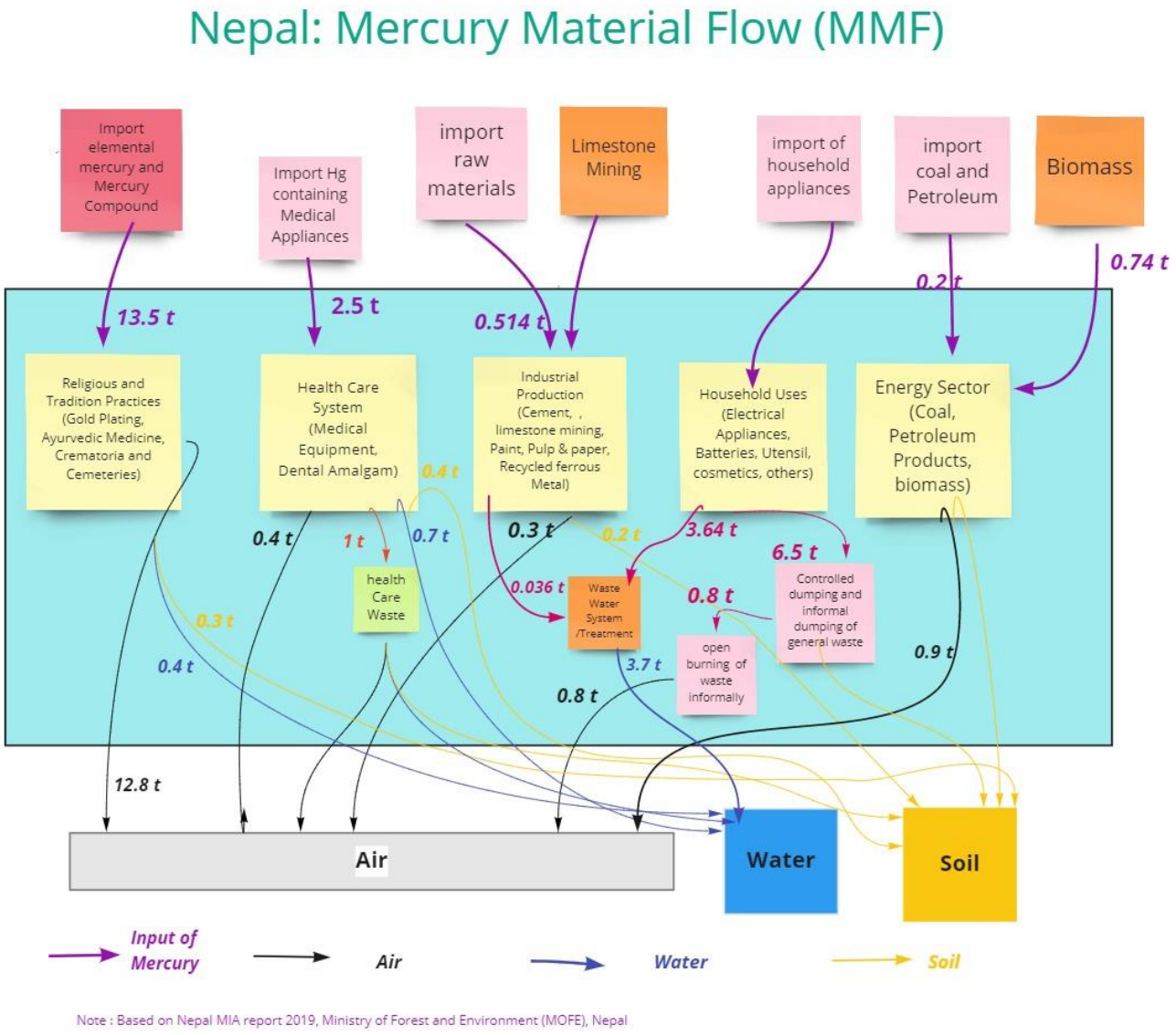


Q&A + comments:

- Q: Where mercury goes after they recover it upon recycling; A: it goes to interim storage for future use to ensure local demand for elemental mercury.
- Comment: The inflow and the outflow should match.

- Q: If there is a tendency for mercury from broken products to leak to the facilities from education facilities and healthcare facilities; A: in practice, healthcare facilities might dispose of the thermometers improperly, however, they are obliged to collect the broken devices which should be taken to the mercury facilities. There is still possible that the broken thermometers from healthcare facilities go to municipal waste collection or are not properly treated.

Dr. Devkota explained the mercury material flow developed for the case of Nepal. He stated the inputs of mercury into the flow, such as limestone mining, imports of mercury or mercury-added products, and biomass. Mercury from these inputs enter different activities, indicated by yellow sticky notes. From these activities, mercury entered different environmental compartments. Dark arrows in this chart represented the emissions to air, blue arrows represented the emissions to the water and yellow to soil. He added that the input here nearly equalled the output. He then explained about the flows within the chart as shown on the diagram. He suggested that Nepal would need to capture mercury so that they would not have so many problems with mercury anymore. He added that the flow allowed them to recognise different activities. The quantities of mercury into the environment would change if the industries would capture mercury.



Note : Based on Nepal MIA report 2019, Ministry of Forest and Environment (MOFE), Nepal

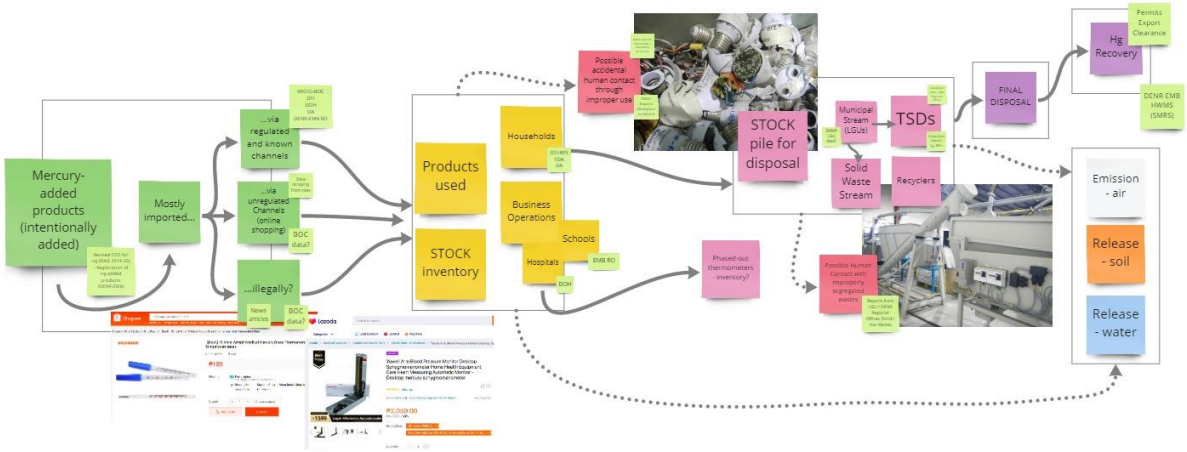
Q&A + comments:

- Q: Grouping of various products/processes should be decoupled, for example items used in household, to decouple processes and for each process identify from where mercury is coming from and where is it going to. This would allow not focusing only on emissions, but also on the flows between the components; A: they will define it in the future and that this is the first exercise.
- Q: There are some missing lines from the energy sector to the environment, as well as from informal dumping of waste. Whether the biomass production and mining are national activities; A: they both are.
- Comment: There might be additional discharges to water from the activities. If there is a water treatment system from the mining, the components could be connected and the discharge the mercury into the environment could be shown.

Mr. Cadavona was the one presenting. They developed three diagrams based on the three different mercury sources. The sticky notes were of different colour, each representing as indicated on their legend.

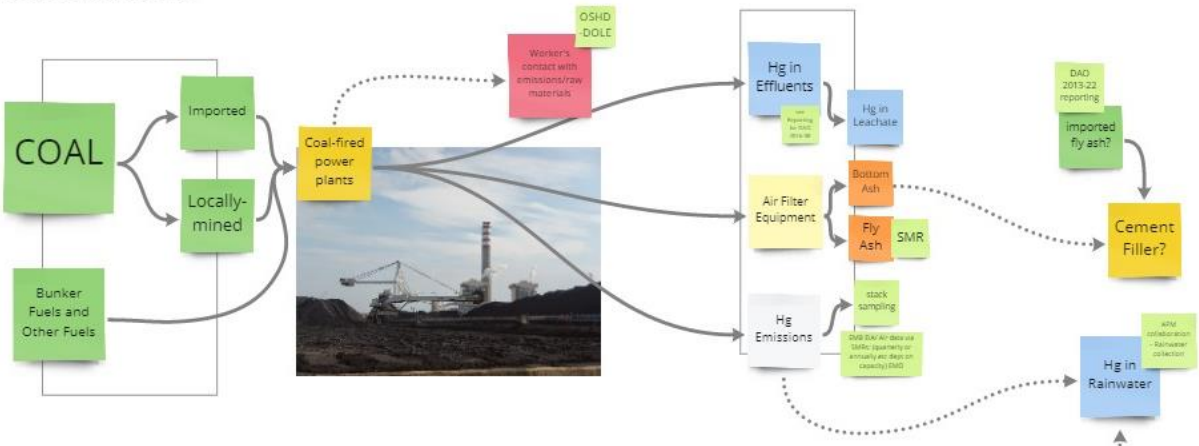
Mr. Cadavona said that the mercury-added products in the Philippines are mostly imported. There was a control on import, however unregulated channels, such as online shopping also exists. He continued that mercury from sources flowed into the product use and stock inventory. Here were households, business operations, schools, and hospitals. He mentioned that it was difficult to regulate household waste containing mercury. He also explained from where the data could be sourced out and where accidental leakages could happen. Although mercury-containing waste was considered as a household hazardous waste, in their country they had a hard time regulating it because of the informal sector. The Philippines practiced mercury recovery, and Hg was also exported. On the diagram, the group also showed where could be the risks of human contact with mercury.

Mercury-added Products

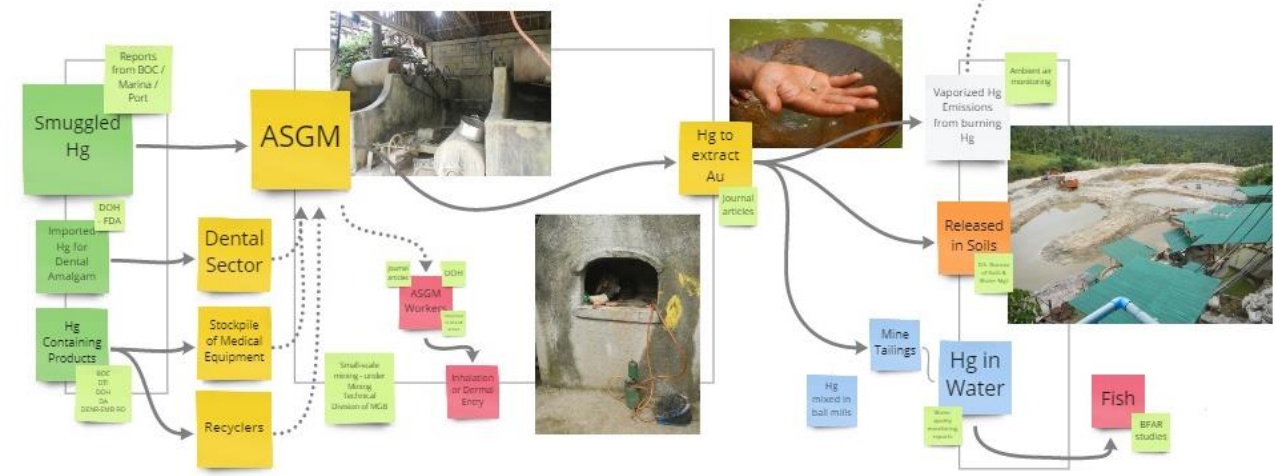


Mr. Cadavona then continued explaining the second diagram - coal-fired power plants as a Hg source. The sources were identified, their utilization and emissions. As before, the possible exposure to human was highlighted from the emissions and effluents. He explained the regulations on the mercury emissions from this source. He mentioned that in the Philippines, the ash could be used as an alternative construction material. The third diagram shown was for ASGM as a mercury source. He explained that the Philippines did not have a regulatory framework for this case, and it was a big problem in the country. The sources were smuggled Hg and amalgam as well as mercury-added products. He stated the activities, including recycling. Mercury was given illegally to the ASGM. Releases to the environment were identified. He also mentioned the sources of data on which the diagrams were established. The human exposure to Hg via seafood was also noted.

Coal-fired Power Plants



Artisanal and Small-Scale Gold Mining (ASGM)



Q&A + comments:

- Comment: These diagrams are visually appealing.
- Q: It was asked to clarify the node/ stock/ flow of the components such as via regulated channels in the mercury-added products diagram; A: They are not the part of the flow. Comment: some imported items are illegally imported and there are also unregulated channels, for example the online shopping. Some imports are regulated, and they wanted to distinguish these three channels.
- Q: What is the difference between solid and dotted lines; A: dotted arrows indicate accidental, intentional, or small-scale releases. These are not standard operating procedures. Solid line indicates intentional release of the mercury.
- Q: Why dotted line is connecting fly ash with cement filler in a coal-fired power plant diagram; A: this is not standard operating procedure as it is not always part of a coal operation system and

it does not occur regularly. The accidental releases could occur during the transportation to the cement factory and therefore the dotted arrow was drawn.

- Q: Where the phased-out thermometers go; A: there was an order to phase out mercury-containing thermometers, however until now, the government still does not have the disposal site for the thermometers and they are still stockpiled in hospitals.
- Q: From where 'other fuel' in the diagram came; A: it is domestic because under regulation the import is not allowed.
- Comment: The colour of some stickers was wrong – the release from the air filter is into the water, not the soil, and the colour of the sticker should be blue.

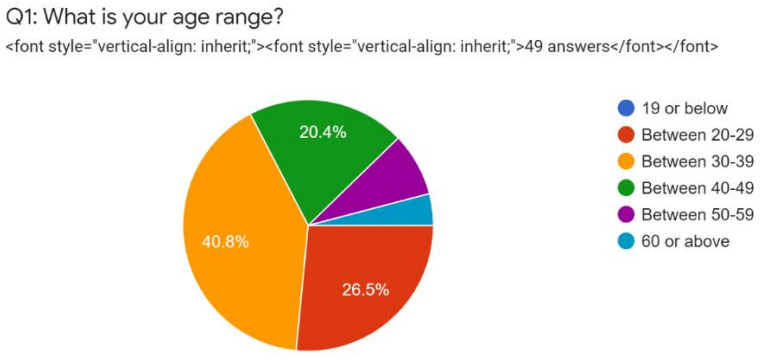
For closing, Dr. Saito said that this training not the end, but the beginning of the process and he invited participants to further collaborate and improve the flow analysis. He then invited Prof. Moritomi to share a word with the participants. He highlighted that it was important to consider the flow of each sector as well as each component.

Results analysis

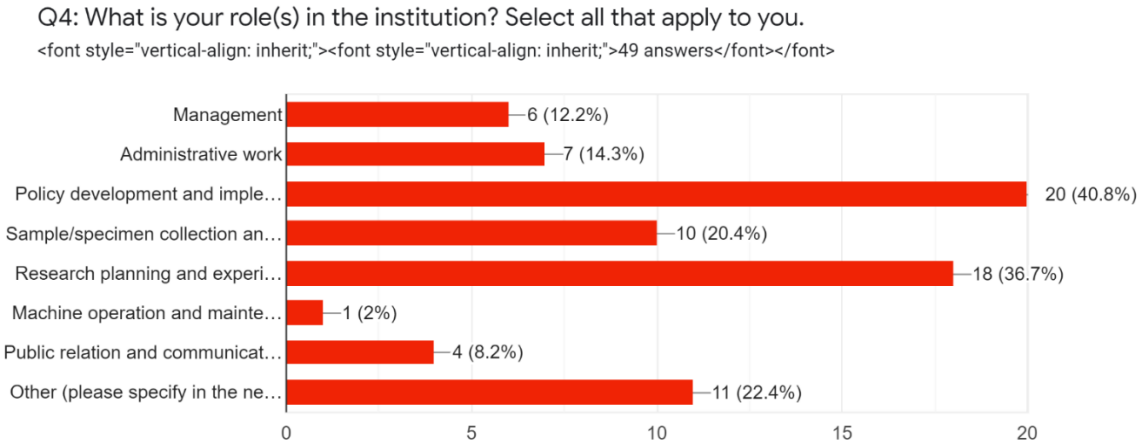
The training programme was attended by 85 participants from 9 partner countries. Majority of the participants came from environmental sector while health sector and industrial sector from some countries also joined the programme. Also, there are numbers of participants from academia and IGOs. The total number is more than that initially expected, which indicates high interest by participating countries. It also indicated the benefit of the online programme that can provide learning opportunities to more people.

Country	Total	Remarks	Country	Total	Remarks
Indonesia	11	6 from environment, 1 from energy, 1 from academia, 3 from BCRC	Philippines	26	22 from environment, 1 from UNIDO, 3 from private
Malaysia	3	1 from environment, 2 from academia	Sri Lanka	4	4 from environment
Maldives	1	1 from environment	Thailand	29	22 from Environment, 2 from health, 1 from industry, 1 from petroleum, 1 from marine, 2 from AIT
Mongolia	1	1 from academia	Vietnam	5	3 from industry, 2 from environment
Nepal	5	5 from environment			

A questionnaire was collected from participants to analyse the results of the programme. Total of 49 response was received. Approx. 40% of the respondents were in their 30's and 'policy development and implementation' followed by 'research planning and experiment' as the main works of the participants. This profile is in line with the expected audience of this training programme.

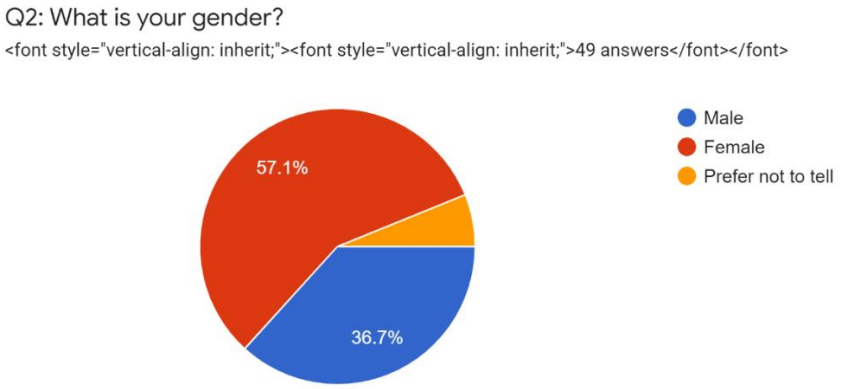


Age range of the participants

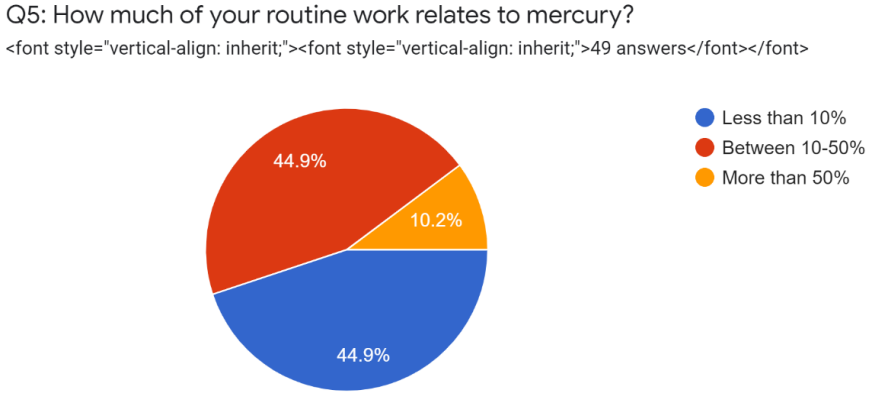


Participants' roles in the institutions (multiple choice)

More than half of the participants were female, which suggests the programme benefits more to female. laboratory works are undertaken widely by female technicians. Approx. half of the participants has been dedicated more than 10% of their time for mercury-related works. This means that the mercury is not necessarily their principal work, but they are routinely involved in mercury-related issues. The other half whose involvement is less than 10% may have acquired knowledge that could bring them more mercury-related work in future.

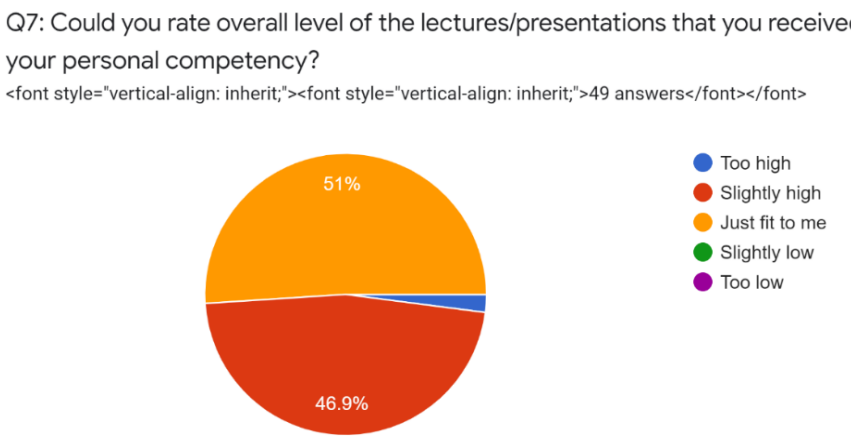


Gender



Routine work related to mercury

Participants have different level of understanding and area of interest. Approx. half of participants felt that the programme provided lectures higher that the level of their personal competency. This is consistent with the previous results that approx. half of the participants is involved in mercury works less than 10%. It should be gradually adjusted by knowing the current situation and future needs.



Lecture levels in comparison with competency

Follow-up actions

Based on the needs and interest demonstrated by the participants during the training programme, the project will undertake further to provide support to develop mercury inventory and to introduce mass flow concept toward mercury flow analysis. The project will arrange a focus group with highly motivated individuals the discuss the next steps so that the project can more effectively and efficiently provide capacity strengthening programmes.

5.3 Follow-up assessment of the effectiveness of the training programme

Baseline setting for effectiveness assessment

The project is to undertake assessment of the effectiveness of the training programmes (i.e. how the programmes have brought difference to the participants) in annual basis. In order to assess such changes, baseline information before the project is collected.

The project implemented 2 online training programmes in December 2020 and in March 2021 for mercury monitoring and flow analysis, respectively. The participants were asked to answer the online questionnaire before the training to indicate the level of understanding. This information will be periodically monitored to assess the changes/improvements over the course of the project implementation.

Summary of the 1st online training programme

Title	Role of monitoring laboratory for national mercury management (#1)
Date & venue	2 – 4 December 2020, virtual meeting
Participants	Laboratory managers, technicians and technical officers who are in charge of mercury management.
Attendance record	Participants: 103 from 10 countries (Indonesia, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam) Observers: 2 from Japan, Resource persons: 13, Host and guest speakers: 4, Organizers: 6, Secretariat: 4
Respondents	73 (after removing duplication, 61 responses are valid, female:36, male:21 NA:4)

Summary of the 2nd online training programme

Title	Mercury inventory and material flow analysis (#2)
Date & venue	2, 4, and 12 March 2021, virtual meeting
Participants	Ministry/agency responsible for monitoring/management of mercury emissions and releases to air, water, and soil. University, research institute or consulting company which is engaged in development of mercury inventory. National Focal Points of the Minamata Convention.
Attendance record	Participants: 85 from 9 countries (Indonesia, Malaysia, Maldives, Mongolia, Nepal, Philippines, Sri Lanka, Thailand, and Vietnam) Observers: 5 from Japan, Resource persons: 7, Organizers: 10, Secretariat: 4
Respondents	58 (after removing duplication, 56 responses are valid, female:31, male:22, NA:3)

There are 61 respondents prior to the monitoring training in December 2020, and 56 respondents prior to the flow analysis training in March 2021, which were valid for the analysis. Some participants were submitted to both surveys.

Survey design and results

The project highlights two main topics to address, i.e. mercury monitoring and flow analysis. The survey asks the participants the fundamental knowledge on mercury as well as specific knowledge for each topic.

Survey questions

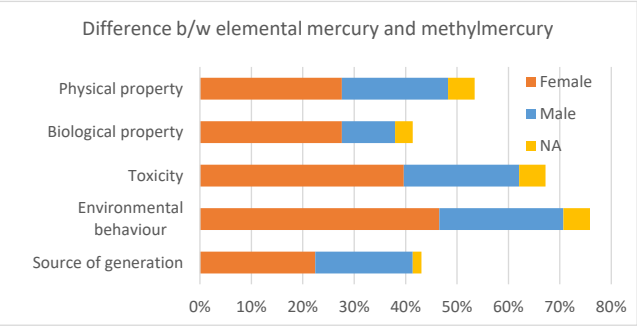
Q		#1 Monitoring training	Q		#2 Flow analysis training
1	Specific	Experience on mercury analysis.	1	Specific	Experience on mercury emission/release calculation.
2	Common	Knowledge on different mercury species.	2	Common	Knowledge on different mercury species.
3	Common	Mercury use in products and processes.	3	Common	Mercury use in products and processes.
4	Specific	Mercury detection theory.	4	Specific	Global mercury cycling.
5	Common	Mercury survey design for different sectors.	5	Common	Mercury survey design for different sectors.
6	Specific	Human biomonitoring and media selection.	6	Specific	Gold extraction methods with and without mercury.

Baseline for common questions

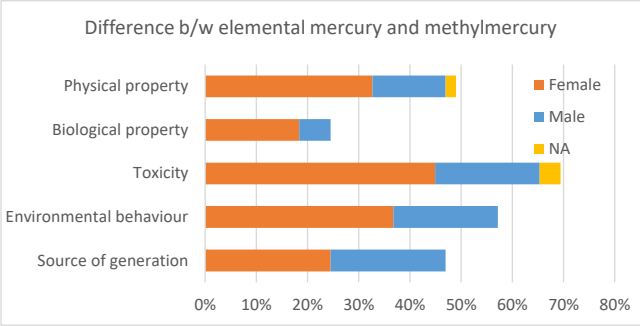
Question 2 asked about the knowledge on different mercury species for the participants of both trainings.

Question	Do you know the difference between elemental mercury and methylmercury in following areas? Select all that apply to you.
Selections	☐Physical property, ☐Biological property, ☐Toxicity, ☐Environmental behaviour, ☐Source of generation

#1 Monitoring training



#2 Flow analysis training

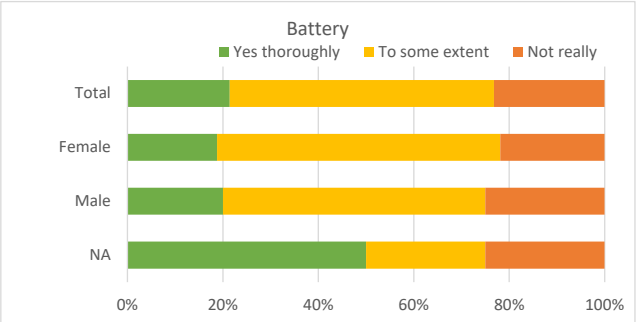


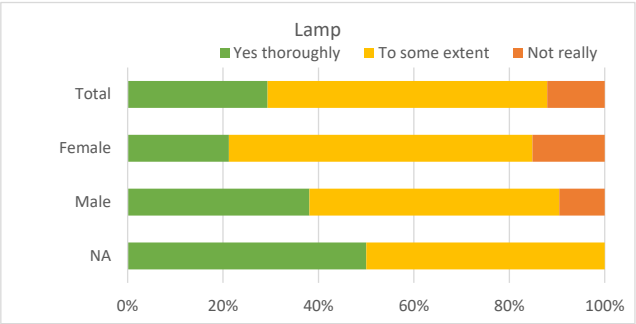
Participants well recognized toxicity and environmental behaviour while the understanding of biological property was low.

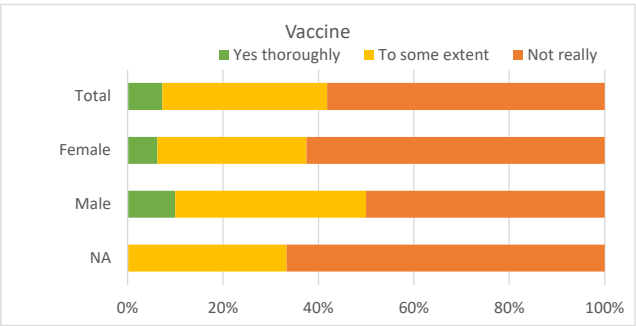
Question 3 asked about the mercury use in products and processes.

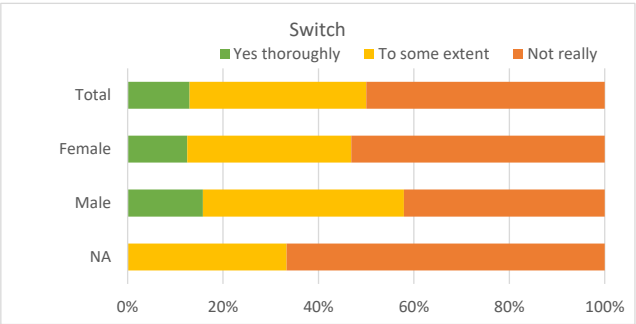
Question	Are you able to explain why mercury is used in following products?
Selections	Battery, Lamp, Vaccine, Switch, Dental restoration, Thermometer, Sphygmomanometer (manometer), Chlor-alkali production, Vinyl-chloride production ☐Yes thoroughly, ☐to some extent, ☐not really

#1 Monitoring training

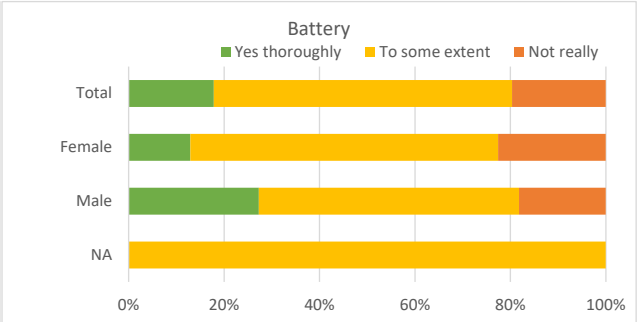


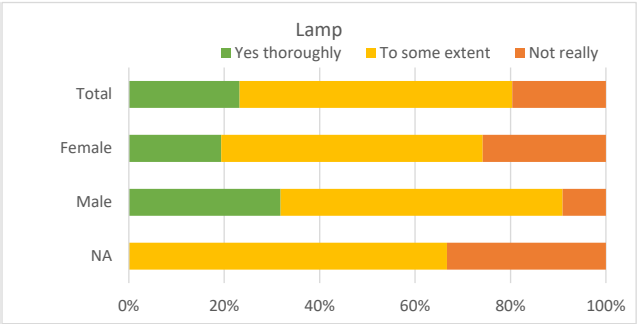


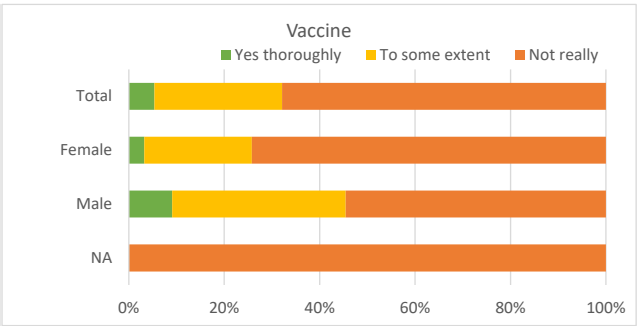


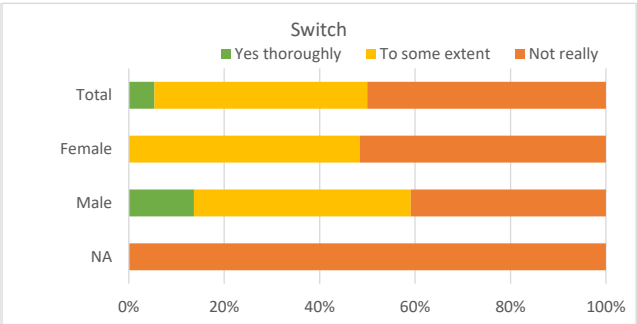


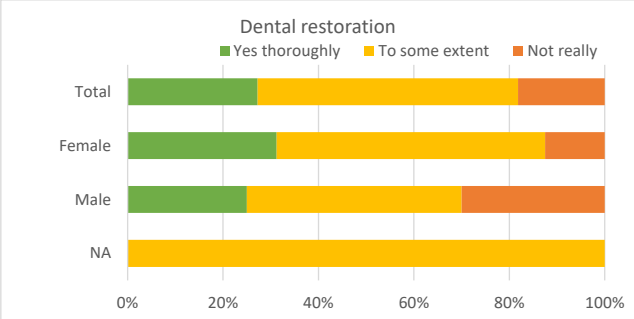
#2 Flow analysis training

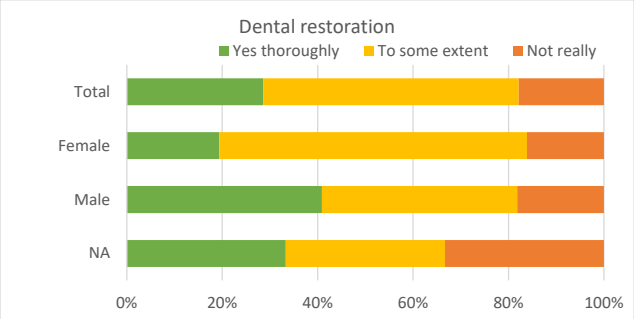


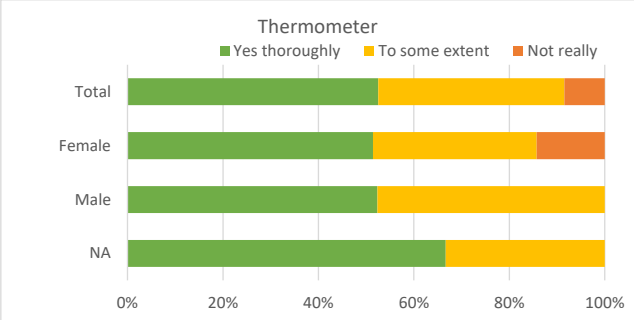


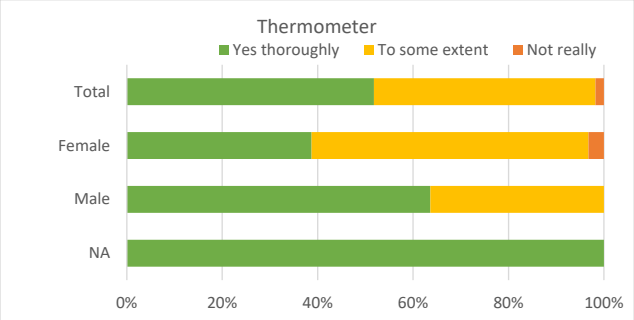


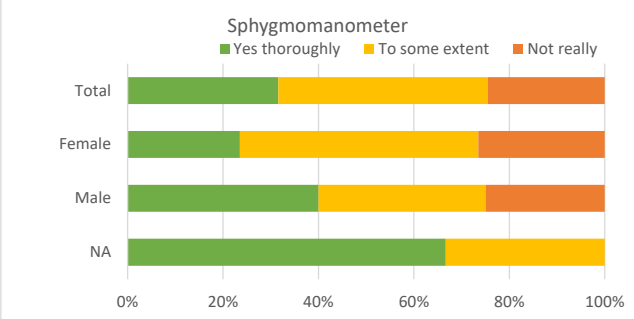


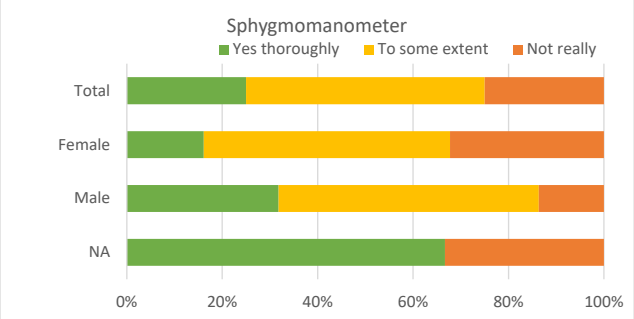


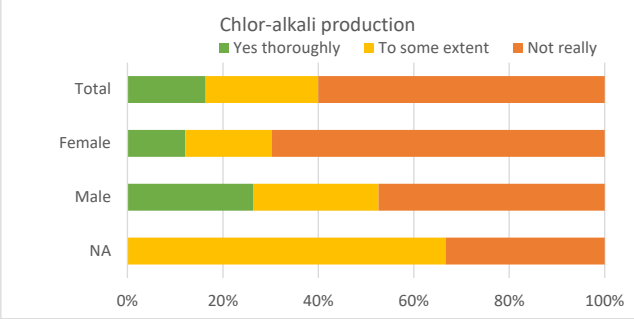


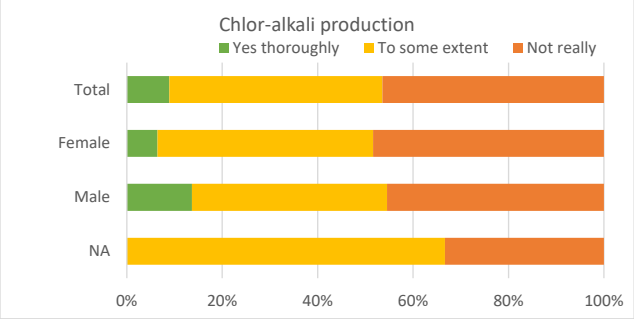


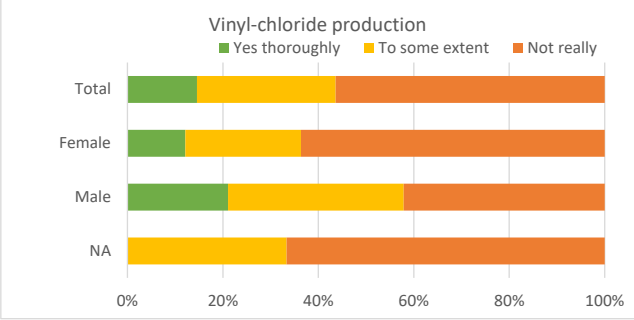


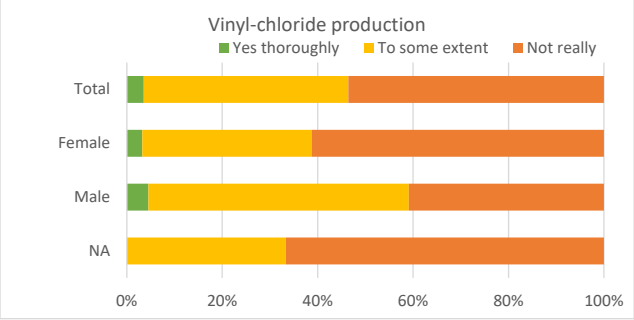












Participants to both trainings had similar tendency of the understanding. They know better about the mercury used for thermometer, lamp, battery, sphygmomanometer, etc. Knowledge on vaccine,

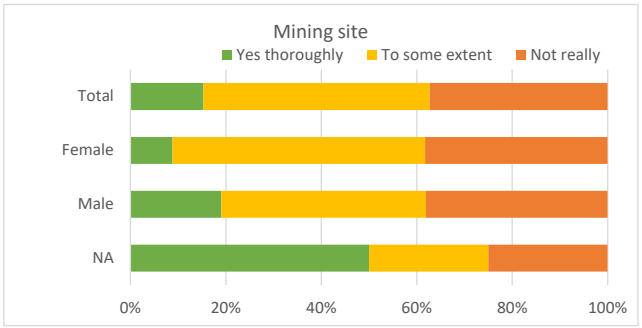
switch, chlor-alkali, vinyl-chloride is low. This means the relevance and importance of particular products and processes in their national context.

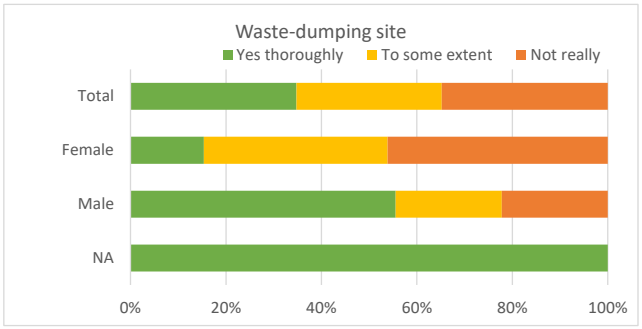
Although some items that have better understanding, still many people who do not have full understanding. It therefore requires further booster shots to improve their knowledge. It is also observed that the understanding of female participants is slightly lower than that of male participants although the statistical significance has not been assessed.

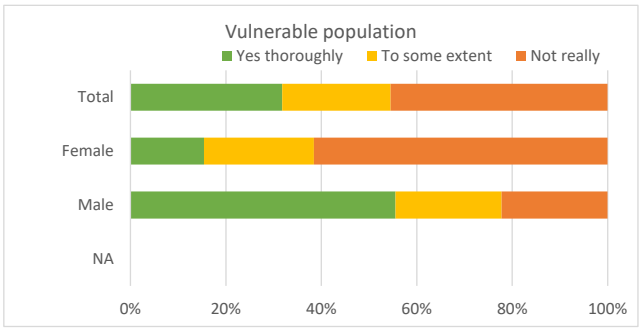
Question 5 asked about mercury survey design for different sectors.

Question	Can you properly select and design the monitoring methodology for following surveys?
Selections	Mining site, waste-dumping site, vulnerable population ☐Yes thoroughly, ☐to some extent, ☐not really

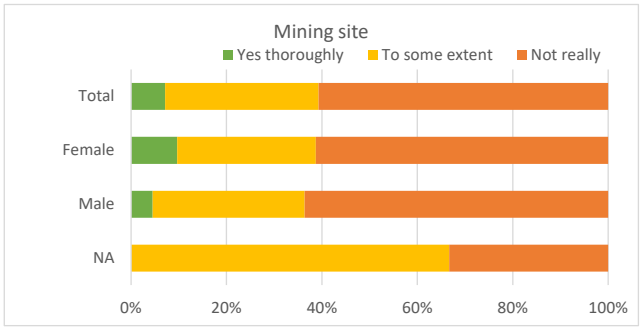
#1 Monitoring training

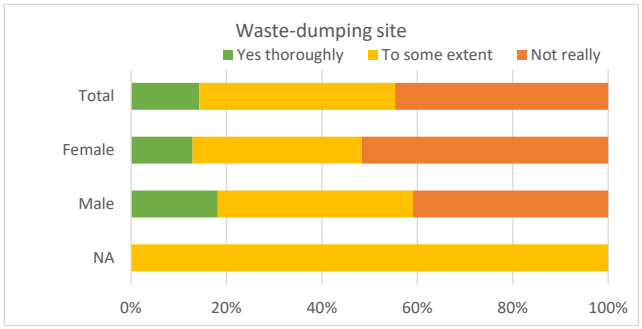


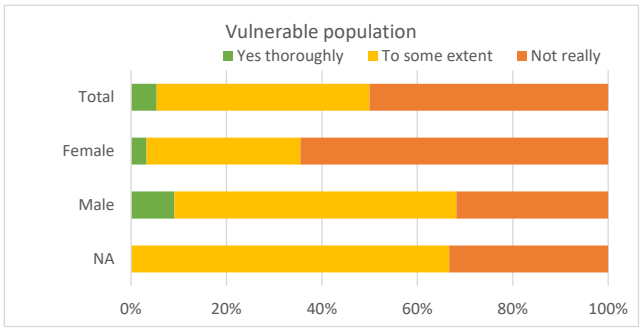




#2 Flow analysis training





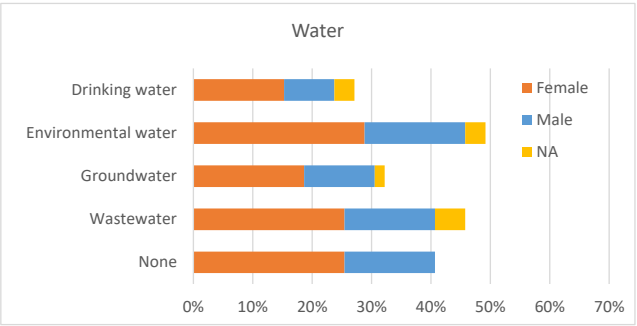


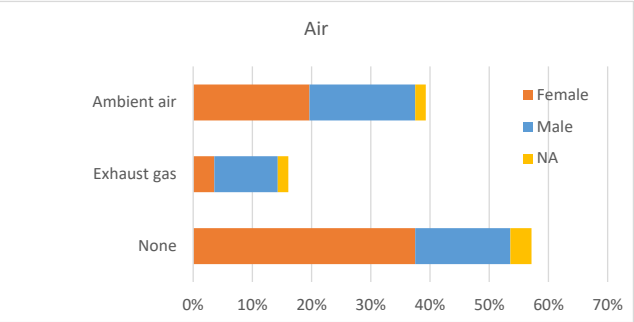
As this question asked monitoring methodology, participants to monitoring training understood more to the survey design. As the field survey is a comprehensive exercise including environmental monitoring and social survey, non-laboratory worker should also recognize the monitoring methodologies and interpretation of the results.

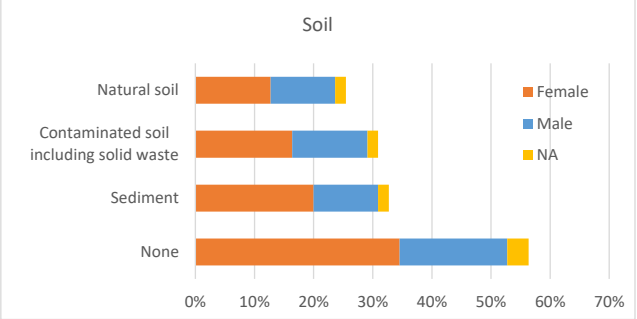
Baseline for mercury monitoring

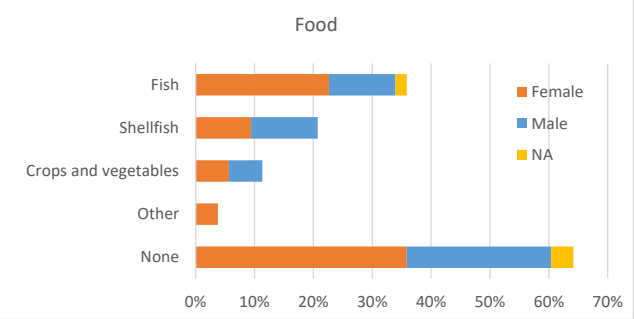
Question 1 of monitoring training asked about their experience on mercury analysis in different media.

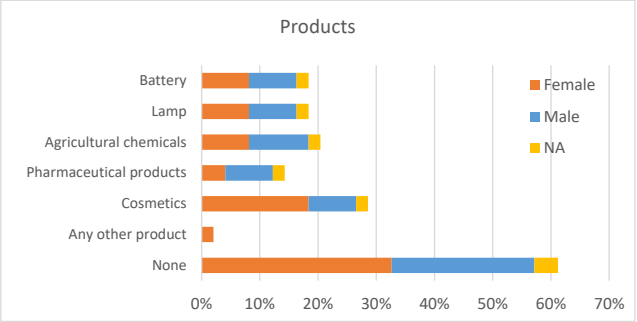
Question	Have you ever done mercury analysis in following media? Select all that apply to you.
Selections	Water: ☐drinking water, ☐environmental water, ☐groundwater, ☐wastewater Air: ☐ambient air, ☐exhaust gas Soil: ☐natural soil, ☐contaminated soil including solid waste, ☐sediment Food: ☐fish, ☐shellfish, ☐crops and vegetables, ☐other please specify Products: ☐battery, ☐lamp, ☐agricultural chemicals, ☐pharmaceutical products, ☐cosmetics, ☐any other product: please specify ☐Wildlife: please specify ☐Any other media: please specify











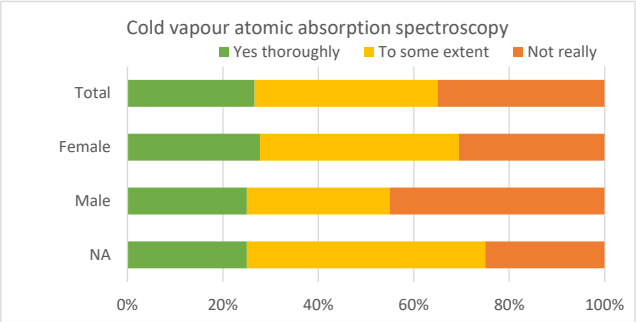
Water is predominant media that the participants choose to monitor especially environmental water and wastewater as many countries set environmental and effluent standards on mercury. Ambient

are and fish are also principal media of choice for their relevance to assess mercury risks for human health and environment.

As for the 'Food' category, mixed meal that assesses overall daily intake was also mentioned. As for the 'Products' category, fuel oil was mentioned. There was no specific monitoring media in 'Wildlife' category. In 'Any other media', biomarker such as hair, nail, and urine, and rainwater for wet deposition were mentioned. These media will be included in the questionnaire for the next time.

Question 4 of monitoring training asked about fundamentals of mercury detection theory.

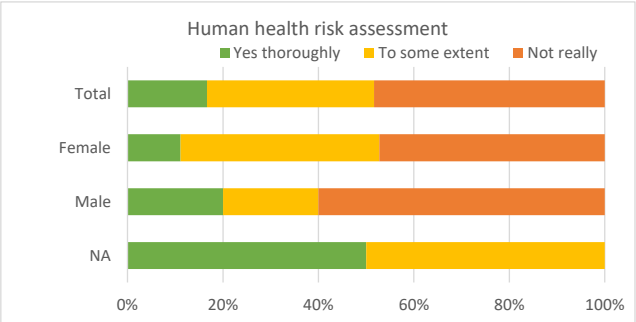
Question	Can you explain the mercury detection theory in cold vapour atomic absorption spectrometry?
Selections	☐Yes thoroughly, ☐to some extent, ☐not really



As the target audience is for analytical laboratory, there is already some level of understanding on mercury detection theory. It is imperative that this knowledge should be further improved. As the participants include other staff than laboratory analysts, this knowledge might not be relevant some of them.

Question 6 of monitoring training asked about human biomonitoring and media selection

Question	Can you differentiate the blood, urine, and hair testing for assessing human health risk due to mercury exposure?
Selections	☐Yes thoroughly, ☐to some extent, ☐not really



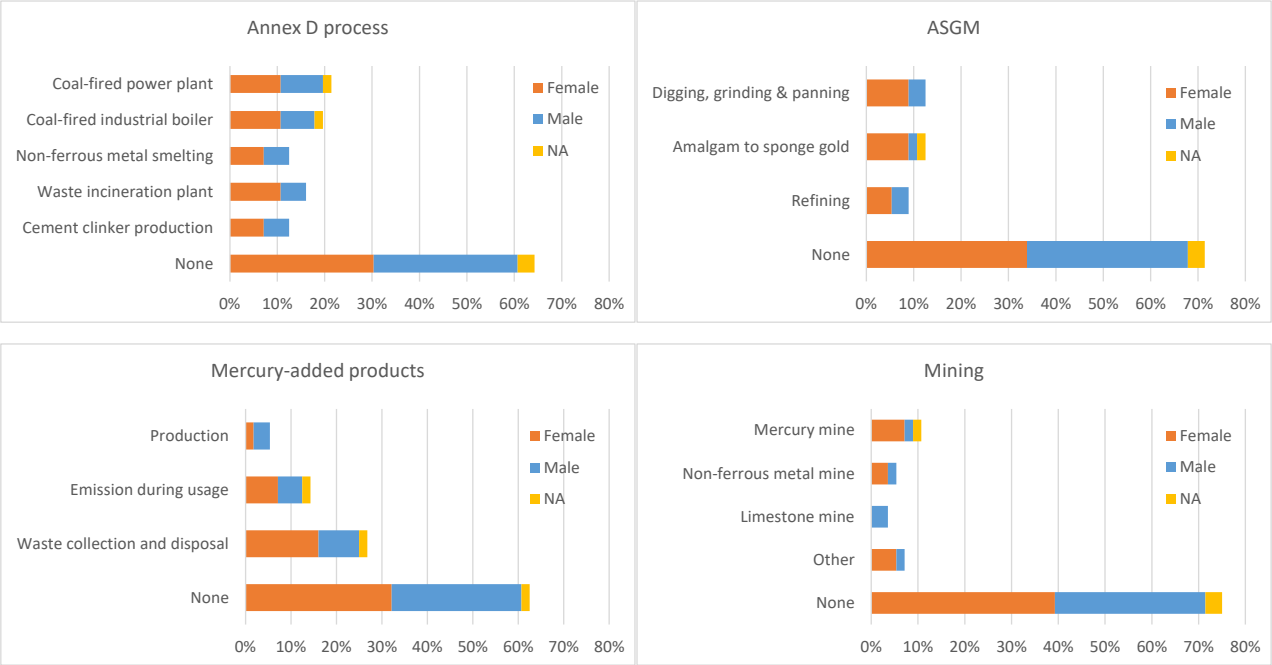
This is especially relevant to address the difference between elemental mercury poisoning and methylmercury poisoning. They are frequently confusing and different media is chosen for different

risk. The level of understanding is still low, and it is important to improve it so that their actual monitoring activities will bring meaningful outcomes.

Baseline for mercury flow analysis

Question 1 of flow analysis training asked about their experience on mercury emission/release calculation.

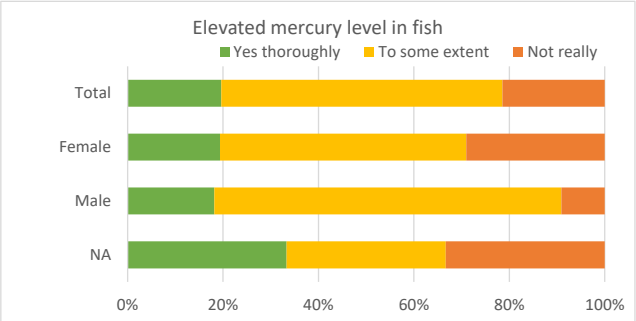
Question	Have you ever calculated mercury emission and releases in following sectors? Select all that apply to you.
Selections	Annex D process: ☐coal-fired power plant, ☐coal-fired industrial boiler, ☐Non-ferrous metal smelting, ☐waste incineration plant, ☐ cement clinker production ASGM: ☐digging, grinding & panning, ☐amalgam to sponge gold, ☐refining Mercury-added products: ☐production, ☐emission during usage, ☐waste collection and disposal Mining: ☐mercury mine, ☐non-ferrous metal mine, ☐limestone mine, ☐other please specify ☐Any other sector: please specify



Emission and release estimates are the most basic step for proper mercury management. Stationery emission sectors listed in Annex D and waste disposal sector are relatively well captured thanks to the UNEP-development Toolkit. Emissions and releases from ASGM and other mining sectors are less known. The introduction of calculation methodology and application to real setting should be strengthened.

Question 4 of flow analysis training asked about the fundamental of global mercury cycling.

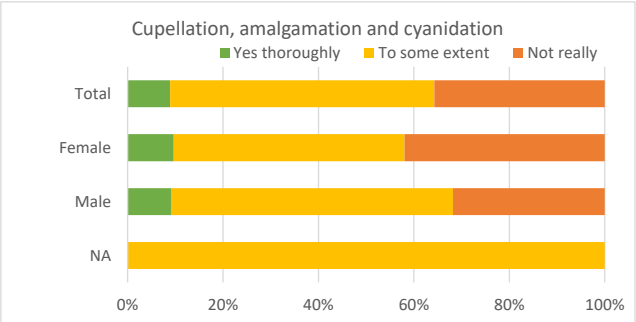
Question	Can you explain how anthropogenic mercury emissions results in the elevated mercury levels in fish?
Selections	☐Yes thoroughly, ☐to some extent, ☐not really



The important nature of the mercury is its global impacts as well as local poisoning risks, which is not easily recognized. Consumption of marine products is the main mercury exposure source for most of the vulnerable population but the countermeasure against this risk is not simple. Improving the fundamental science of the global mercury science is important.

Question 6 of flow analysis training asked the comparison of gold extraction methods with and without mercury

Question	Can you differentiate the environmental and health risks of cupellation, amalgamation and cyanidation processes for gold and silver smelting?
Selections	☐Yes thoroughly, ☐to some extent, ☐not really



When exploring non-mercury alternative methods, the knowledge on the extraction principles, benefits and other risks will be important. The level of understanding should, therefore, be further improved for regulatory and implementation sectors to address mercury use in ASGM sector.

Assessment of the effectiveness

The information collected in these surveys will serve as the baseline for future surveys to be conducted periodically throughout the project lifecycle. Based on the results, project activities will be adjusted to fit their shortcomings so that the project input will effectively bring meaningful results.

5.4 Capacity assessment of existing monitoring laboratories (preliminary)

Objective of the assessment

This work aims at evaluating the current mercury monitoring capacity of the analytical institutions that are monitoring (or will monitor in near future) mercury levels in the country in order to clarify the areas in need of intensive assistance in the coming years to set clear direction for future assistance. The identified needs and gaps will serve the basis of technical assistances under the project.

Laboratories subject to assessment

Nepal was selected as the first survey country and the Laboratory in Department of Environment, in Ministry of Forests and Environment, and National Public Health Laboratory, in Ministry of Health and Population were identified as the analytical laboratories. As the official visits were not possible due to recent COVID-19 situation, a local coordinator was engaged to communicate with the stakeholders for survey planning.

Country	Monitoring facility	Organization
Nepal	Laboratory in Department of Environment	Ministry of Forests and Environment
Nepal	National Public Health Laboratory	Ministry of Health and Population

Survey methods

Under the travel restriction, the assessment survey explores the possibility to obtain necessary data by a series of online hearings to the staff of the analytical institutions. In fiscal year, Ministry of the Environment, Japan (MOEJ) undertook the baseline surveys for 13 institutions in 9 countries. Based on the MOEJ method, the survey items were selected as follows:

- Laboratory overview: facility, staff, tools and glassware, reagents, storage, etc.
- State for microanalysis.
- Measuring instruments: condition and ancillaries, power supply, gas, consumables, operation, and maintenance records, etc.
- Analytical procedures: SOP manuals, work records, QC/QA status, etc., and
- Treatment of wastes and safety: wastewater and exhaust treatment, waste liquid and solid management, etc.

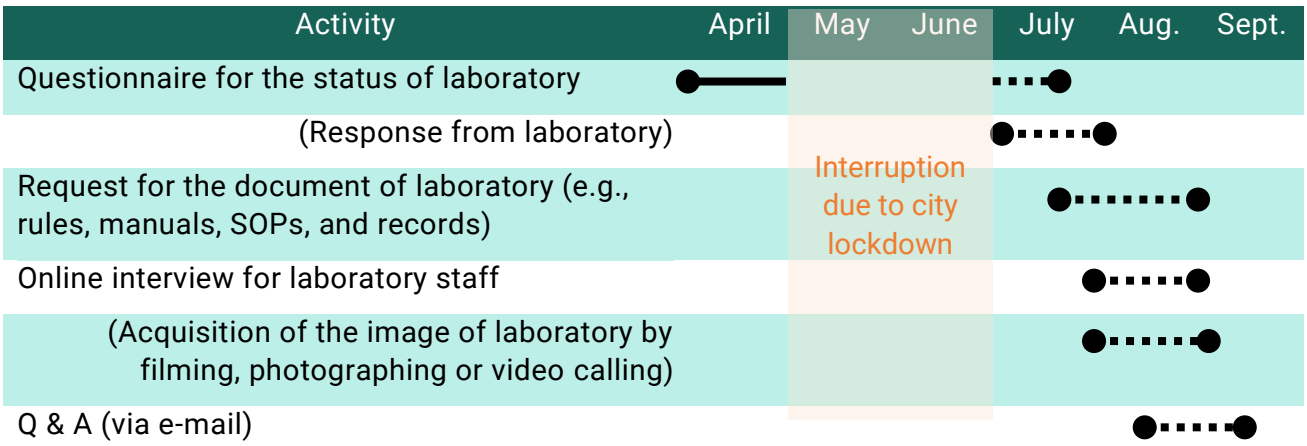
The survey team, which composes of international experts and a national coordinator, will exchange information, and discuss with managers/staff/technicians of those monitoring facilities on the issues regarding the research and monitoring activities taking into account the national status. The international experts are the knowledgeable in lab operation and chemical analysis particularly on mercury. They collaboratively assess the local settings and consolidate their views in the assessment report. The national coordinator works with international experts and establishes relation to the laboratories subject to the survey.

New and emerging online technologies that enables real-time two-way communications were considered as the means of this virtual survey. The survey items and the methodologies will be adjusted based on the results. The Internet connectivity is critical for the survey so that the project

secured several units of smartphones, which can operate web meeting applications such as Webex, Microsoft Teams, Zoom, etc.

Workplan and progress

The survey involves 4 steps starting from questionnaire survey, which laboratory staff will fill the form as much as possible. Then, two-way real-time communication will be conducted together with the collection existing lab management documents. Some follow up Q & A are also expected. Assessment report of the laboratory situation will capture the issues and challenges and include suggestions for the laboratory advancement and its support.



There was one thing unfortunate for the project. As Nepal shares long land border with India and suffered from the inflow of the Indian variant of COVID-19 that resulted in the rapid increase of new cases since late April 2021. The Government of Nepal imposed strict control measures to limit people's movement and access to offices, which forced the project activity put on hold for a couple of months. The actual survey will be conducted once the local movement ban due to COVID-19 is lifted and necessary tools such as camera can be brought into the sites.

Future directions

Considering the rapid development of new online tools, surveys without physical travel could be a prospective future methodology, not just an ad hoc measure but more effective and efficient survey technique. Nepal was selected as the first countries as a trial basis to accumulate knowledge and explore the feasibility. Although this activity is still incomplete, the methodology will be applied for assessing laboratories in other countries with less COVID-19 restriction.

But at the same time, such methodology cannot replace the traditional physical survey completely and still has some vulnerability that is beyond the control. Therefore, at this moment, it still is a better option to dispatch engineers/technicians who are experts in mercury monitoring physically on site, but due to recent COVID-19 situation that restrict international travel, such arrangement is not feasible in foreseeable future.

For enabling this approach, capable local coordinators for meetings and surveys as well as the improved Internet connectivity are very important.

5.5 Annual workplan

Output	Activity	Sub activity	Timeline[7] 2020 3	4	2021 1	2	3	4	2022 1	2	Deliverables	Progress and Planning
1	1.1 Assess and compile available resources and facilities in and around Minamata and establish partnerships to implement project activities.	Planned									A list of local partners in Minamata, Japan providing support for the project.	2 Local coordination structure established.
		1.1.1 Assess local human resources, facilities, programmes, and activities that may benefit the project implementation.				Completed						
		1.1.2 Establish partnership/collaboration for implementing project activities.					Completed					
1	1.2 Develop relevant capacity building programmes under the Minamata Convention.	Planned									Sets of training materials (agenda, presentations, reference materials), data books, and technical handbooks, etc.	Training modules to be developed for 2 online trainings by Q4 2021.
		1.2.1 Develop standard training materials and menus for scientists and technicians that are available for training courses and self-studying.										
		1.2.2 Develop data books or technical handbooks that compile assessed information for government officers and practitioners.										
1	1.3 Formulate and implement trainings based on regional priorities and identified needs.	Planned									2 face-to-face trainings and series of online trainings implemented per year[8].	1 online training in March 2021. 2 online trainings to be implemented by Q4 2021. 2022 training to be programmed (Face-to-face training subject to pandemic situation)
		1.3.1 Formulate and implement skill up training/visit programmes based on the needs and regional priorities.										
		1.3.2 Formulate and implement training/visit programmes upon the special requests from network partners.										
1	1.4 Undertake follow-up assessment of the effectiveness of the training programmes and publish annual reports.	Planned									Annual reports published.	Annual report (baseline) prepared. Progress by 2022 to be assessed against 2021 baseline results.
1		Planned										

COVID-19 pandemic

[7] Solid lines are implemented, dotted lines are planned timelines.
[8] Frequency will be adjusted depending on the COVID-19 situation.

Output	Activity	Sub activity	Timeline[7]								Deliverables	Progress and Planning
			2020		2021				2022			
			3	4	1	2	3	4	1	2		
	1.5 Develop institutional coordination structure to sustain capacity building programme based in Minamata.										Agreement on local coordinating structure beyond the project implementation.	
2	2.1 Develop in-country capacity for sampling and analysing mercury and mercury compounds from multiple media.	Planned									Laboratory assessment reports for all partner countries.	Two (including Nepal) virtual assessment missions by Q1 2022.
		2.1.1 Capacity assessment of existing laboratories in the region on the basis of technical assistance menus.										
		2.1.2 Provide advice to improve sampling design and field sample collection capacities and skills.										
		2.1.3 Provide advice to improve sample handling, pre-treatment and instrumental analysis capacities and skills.										
2	2.2 Undertake continuous data collection and analysis based on national/regional monitoring plans.	Planned									Mercury monitoring plans in participating partners that are harmonized.	A continuous data collection site developed in accordance with regional methodologies.
		2.2.1 Develop and/or harmonize methodologies and standard operating procedures of mercury monitoring among network partners.										
		2.2.2 Undertake continuous data collection and analysis based on national/regional monitoring plans.										
2	2.3 Provide technical advice and tools to strengthen a harmonized system for data processing and quality assurance for the regional institution network.	Planned									A QC/QA guidebook published; inter-laboratory quality assessment conducted.	Laboratory proficiency testing to be implemented by Q2 2022.
		2.3.1 Establish a technical advisory body for backstopping the regional institution network partners.										
		2.3.2 Develop a QC/QA guidebook for mercury monitoring customized for the network.										
		2.3.3 Undertake inter-laboratory data quality assessment for continual improvement among network partners.										
		2.3.4 Develop a start-up assistance menu for inviting new network partners for its expansion.										
2	2.4 Undertake partnership activities/ collaborations with other monitoring programmes to promote science-based policy making.	Planned									Collaborative activities with other monitoring networks.	Collaborative activities with APMMN initiated.
		2.4.1 Participate in the activities of other programmes and invite other programme parties for collaborative activities.										
		2.4.2 Conduct mathematical modelling, research, and environmental studies for enhancing science-policy interaction.										
3		Planned										

Output	Activity	Sub activity	Timeline[7]								Deliverables	Progress and Planning
			2020		2021				2022			
			3	4	1	2	3	4	1	2		
	3.1 Convene stakeholders' meetings on project planning and result dissemination.	3.1.1 Convene an inception workshop for project launch.	Completed								Meeting reports; increasing list of partners joining.	Annual webinar on mercury science 2021 to be convened by Q4 2021.
		3.1.2 Convene periodic stakeholders' meeting to share project results.						▪ ▪ ▪				
3	3.2 Accumulate and compile technical data and make it publicly available online.	Planned									A dedicated web page of the project serving as an information portal.	A project dedicated website to be established by Q4 2021.
								▪ ▪ ▪ ▪ >				
3	3.3 Strengthen national capacities to utilize mercury data for risk assessment and policy development through the provision of technical advice and knowledge exchange.	Planned									List of services provided, web stories on impact.	
		3.3.1 Provide technical advice to partners to include national mercury monitoring plan into national development plans.										
		3.3.2 Conduct country level technical workshops for scientists and practitioners.										
		3.3.3 Prepare national inventories and national report with the mercury data obtained by national monitoring plan.										

5.6 Result framework

Intended Project Outcome *(linked to UNEP POW 522.3 Outcome and Output 3[9])*: Countries increasingly generate and apply information on how to monitor and reduce mercury emissions and releases in their legislations, policies, or action plans.		
Outcome indicators, including baseline and targets:		**Updated Result Status**
Indicator 1: Number of countries that embed scientific data collection in their mercury management policies.	Baseline: 0, Target: 6	In progress: Candidate countries participating in the project to be identified.
Indicator 2: Number of Countries that regularly put information on mercury monitoring available via the information portal.	Baseline: 0, Target: 6	
Indicator 3: Number of new, adequate policies and legislation in effect on mercury management.	Baseline: 0, Target: 3	

Results	**Results (Output) Indicators**	**Baselines and Targets**	**Updated Result Status**
Output 1: Comprehensive capacity building programme based in Minamata developed and implemented.	Number of capacity building programme package for specific subjects developed and implemented.	Baseline: 0 Targets: 2	In progress (2): 2 topics (mercury flow and monitoring) are under development.
	Local coordination structure in Minamata developed.	Baseline: 0 Target: 1	Achieved (2): Local coordination structure with Minamata City and National Institute for Minamata Disease (NIMD) established.
	% of trained participants who successfully apply the knowledge and skills on mercury management	Baseline: 0 Target: 50%	Preliminary: Baseline data collected and compiled, which is disaggregated by gender.

[9] UNEP PoW 522.3 Outcome: Countries address priority chemicals and waste issues using information, assessments, guidance and tools provided by UN Environment. Outcome indicator: (i) Increased number of governments addressing priority chemicals and wastes issues towards the Strategic Approach to International Chemicals Management objectives and their obligations under the chemicals multilateral environmental agreements, through the use of knowledge and tools provided by UNEP, baseline 0 target 14. Output 3: Global Monitoring Programmes on POPs and mercury developed based on national and regional reports and training of laboratories. Output indicator: Number on regional reports on chemicals priorities supported by UN Environment in the region, baseline 0, target 4 (1 from Japan Mercury Project); Number of laboratories trained, baseline 0, target 19 (12 from Japan Mercury Project). Milestones to the PoW 522.3: by Dec. 2021, mercury monitoring training(s) provided for 12 laboratories (in Asia-Pacific), by Dec. 2022, a regional report (in Asia-Pacific) prepared.

	in their work disaggregated by gender and age range.		
Output 2: A regional monitoring institution network in Asia and the Pacific established.	Number of countries with national institutions on the network that meet international standards on mercury analysis.	Baseline: 0 Targets: 3	Preliminary: Capacity assessment in Nepal ongoing, another assessment under preparation.
	Number of existing regional networks establishing partnership with this programme.	Baseline: 0 Target: 2	In progress (1): Collaboration with Asia Pacific Mercury Monitoring Network (APMMN) is under discussion.
Output 3: Outreach of qualified information in support of early implementation of the Convention implemented.	Number of countries submitting information to the information portal.	Baseline: 0 Targets: 6	Preliminary: Project's dedicated website is under preparation
	Number of countries outside of the project partners that received information through project activities.	Baseline: 0 Target: 30	Preliminary: Annual stakeholders' webinar 2021 that invites wider audiences is under preparation.

5.7 Project budget

Item		Budget (USD)
Output 1: Comprehensive capacity building programme based in Minamata developed and implemented.		545,000
1.1 Assess and compile available resources and facilities in and around Minamata and establish partnerships to implement project activities.	5,000	
1.2 Develop relevant capacity building programmes under the Minamata Convention.	110,000	
1.3 Formulate and implement training based on regional priorities and identified needs.	400,000	
1.4 Undertake follow-up assessment of the effectiveness of the training programmes and publish annual reports.	-	
1.5 Develop institutional coordination structure to sustain capacity building programme based in Minamata.	30,000	
Output 2: A regional monitoring institution network in Asia and the Pacific established.		477,000
2.1 Develop in-country capacity for sampling and analysing mercury and mercury compounds from multiple media.	261,000	
2.2 Undertake continuous data collection and analysis based on national/regional monitoring plans.	158,000	
2.3 Provide technical advice and tools to strengthen a harmonized system for data processing and quality assurance for the regional institution network.	50,000	
2.4 Undertake partnership activities/ collaborations with other monitoring programmes to promote science-based policy making.	8,000	
Output 3: Outreach of qualified information in support of early implementation of the Convention implemented.		463,244
3.1 Convene stakeholders' meetings on project planning and result dissemination.	258,244	
3.2 Accumulate and compile technical data and make it publicly available online.	85,000	
3.3 Strengthen national capacities to utilize mercury data for risk assessment and policy development through the provision of technical advice and knowledge exchange.	120,000	
Project Coordination		1,152,099
Project staff personnel	1,039,425	

Item		Budget (USD)
Project M&E	30,636	
Office rent and common costs	82,038	
Sub-Total Project Cost		**2,637,285**
PSC (13%)		342,855
UN Levy (1%)		19,802
TOTAL		**3,000,000**

5.8 Financial report (preliminary sum[10])

Income Category	Pledged (USD)	Received (USD)	Status
2019 Contribution	1,000,000	1,000,000	Received
2020 Contribution	1,000,000	1,000,000	Received
2021 Contribution	1,000,000	999,990	Received
TOTAL	**3,000,000**	**2,999,990**	

Expenditure Category	Budget (USD)	Expenditure (USD)			Delivery Rate (%)
		Actual	Committed	Total	
010 Staff Personnel	1,139,425	214,045	29,522	243,567	21.4
160 Travel	360,474	30,570	0	30,570	8.5
120 Contractual Service	230,186	12,623	0	12,623	5.5
135 Equipment and Furniture	105,518	2,918	0	2,918	2.8
125 Operational Costs	121,740	20,838	0	21,300	17.5
and 130 Supplies		462	0		
140 Grant to IP	680,000	0	85,423	85,423	12.6
Sub-Total Project Cost	**2,637,343**	**281,456**	**114,945**	**396,401**	**15.0**
155 UN PSC (13%)	342,855	48,915	0	51,532	15.0
and 150 IP PSC		0	2,617		
Total Project Cost	**2,980,198**	**330,371**	**117,562**	**447,933**	**15.0**
UN Levy (1%)	19,802	19,802	0	19,802	100.0
TOTAL	**3,000,000**	**350,173**	**117,562**	**467,735**	**15.6**

Note: Amounts are rounded at one dollar.

[10] Certified financial statement is issued separately by UNON.

5.9 Risk log

Risk Description/ Analysis		Category	(I) Impact Severity 1-5	(L) Likeli-hood 1-5	I x L Overall Risk rating	Risk Management Strategy & Actions	By When/ Whom?
1	Insufficient funding and human resources.	Economic	4	1	4	As this project is formulated under the contribution agreement already signed, the shortcoming of fund is unlikely. 22 March 2021 The third instalment (USD999,990) posted, which account for the total amount of the project budget. The funding enables proceeding the activities, so this risk has been resolved.	On regular basis/ Programme Officer, ROAP senior management
2	Attention on chemicals and waste decreases.	Political	4	2	8	The engagement with partner countries through this project and other opportunities to show the relevance of the issue.	On regular basis/ Programme Officer, ROAP SP5
3	The supporting group do not provide quality input or sufficient support.	Organization	4	2	8	Cooperation and engagement of local partner in Minamata will be confirmed at the initiation stage of project implementation.	On regular basis/ Programme Officer
4	Low interest from decision makers at national level.	Organization	4	1	4	All partner countries are ratified or implemented MIA projects towards ratification, which indicates high interest at national level.	On regular basis/ Programme Officer, ROAP SP5
5	Covid-19 pandemic persists for many years.	Social	4	3	12	UN policy to cope with COVID-19 pandemic is still active. Implementation modality without international travel is	On regular basis/ ROAP senior management

	Risk Description/ Analysis	Category	(I) Impact Severity 1-5	(L) Likeli-hood 1-5	I x L Overall Risk rating	Risk Management Strategy & Actions	By When/ Whom?
						prepared as an alternative plan, which can be switch to normal mode when travel restriction is lifted. Project will monitor the resumption of physical/face-to-face activities accordingly.	
6	Pro-democracy protest in Thailand leads social unrest.	Social	3	2	6	Pro-democracy protest against current military regime is put on pause. Local security situation is carefully assessed to evade demonstration campaign.	On regular basis/ ROAP senior management
7	Political instability in Myanmar continue.	Political	3	4	12	Political instability in Myanmar limits the engagement of the project. The Project Management Unit will continue to monitor the situation as well as guidance provided by the UN for engagement with the Government of Myanmar.	On regular basis/ Programme Officer, ROAP SP5
8	Cooperation from Minamata City reduces when focal persons of Minamata are replaced.	Organization	2	3	6	Partnership between Minamata City and UNEP is maintained basically by the mutual trust at individual level. There is uncertainty if such trust is maintained when the Director General is replaced. The project sent a letter as the tangible evidences to demonstrate the benefit of this partnership. Thus, this risk has been resolved.	On regular basis/ Programme Officer

5.10 Lessons learned log

	Date	Description	Recommendation/ Action
1	2 September 2019	Local media (in Minamata and Kumamoto) valued this mercury project and published news articles in local newspapers. They asked more information on the project and requested participation to the workshop.	The project implemented by international organization such as UNEP has high news value to the local media so that it could increase visibility of the project. Press releases or other information may help more media coverage on this project.
2	2-4 December 2020	Online activities have limitation but could also provide opportunities to make tangible contribution to the project. Online programmes are open to more participants than that of face-to-face ones.	Online meeting tools such as WebEx, Microsoft Team, etc. are versatile applications, thus maximising their utility should be explored.
3	29 April 2021	Considering rapid development of new and emerging online technologies that enables real-time two-way communications, surveys without physical travel could be a prospective future methodology, not just an ad hoc measure but more effective and efficient survey technique.	But at the same time, such methodology cannot replace the traditional physical survey completely and still has some vulnerability in severe COVID settings that is beyond the control. Finding capable local coordinators and securing Internet connection are the key for such remote operation.