出國報告（出國類別：會議）

參加太平洋島國環境大會

(31st Pacific Island Environment Conference, PIEC)

服務機關：行政院環境保護署
姓名職稱：鍾寧心科長兼組長、游智淵科長、陳孳之特約環境監測師、
吳嘉琳特約環境技術師
派赴國家：帛琉
出國期間：**112**年**7**月**26**日至**8**月**2**日
報告日期：**112**年**8**月**29**日

出國摘要

報告名稱：參加太平洋島國環境大會 (31st Pacific Island Environment Conference, PIEC)

出國機關：行政院環境保護署

出國人員：鍾寧心科長兼組長、游智淵科長、陳荸之特約環境監測師、吳嘉琳特約環境技術師

出國類別：開會

出國地點：帛琉

關鍵詞：環境保護、太平洋島國、國際合作

內容摘要：

本團員偕同中央大學許桂榮教授及財團法人中華經濟研究院王豫豪輔佐研究員於112年7月29日至8月2日赴帛琉參與第31屆太平洋島國環境大會。期間偕同美國環保署赴帛琉環境品質保護委員會 (Environmental Quality and Protection Board, EQPB)訪視臺美環保署推動之國際環境夥伴計畫 (International Environmental Partnership, IEP) 亞太汞監測網絡 (Asia-Pacific Mercury Monitoring Network, APMMN) 設置的雨水汞監測站，進行儀器操作說明，並參與 PIEC 安排之帛琉國家掩埋場及科羅州政府回收處理廠（Koror State Government, KSG Recycling Center）參訪活動。

PIEC 開幕由帛琉副總統 J. Uduch Sengebau – Senior、美國環保署第九分署長 Martha Guzman、國合處國合主任 Mark Kasman 致詞，並邀請帛琉前總統 Thomas Remengesau Jr 進行專題演講。本團員於 PIEC 中主講大會議程 International Environmental Partnership (Asia-Pacific Mercury Monitoring Network and Workshop of Waste Management with Taiwan ICDF)，分享國際夥伴計畫（亞太汞監測網絡及廢棄物研討會），由鍾寧心組長報告臺美共同推動的「國際環境夥伴(International Environmental Partnership, IEP)」計畫，游智淵科長報告臺灣空氣品質監測，該監測數據對臺灣空污管制策略成效及空品預報發布之重要，另也介紹在亞洲地區重要的背景測站鹿林山測站。由中央大學許桂榮教授報告亞太汞監測網絡(APMMN)現階段執行成果以及未來規劃。由吳嘉琳特約技術師報告我國111年參加帛琉舉辦之我們的海洋大會，與美國環保署承諾透過能力建構提升區域及海洋環境品質，爰與財團法人國際合作發展基金會合作辦理「廢棄物管理研習班」，邀請太平洋島國學員來臺，透過課程討論與實地參訪，學習我國公私協力推動資源循環的政

策法規及管理實務之推動成果，並邀請與會者透過這些平台網絡的交流分享持續建構環保知能。本團並參加我國財團法人國際合作發展基金會辦理之 Striving for Climate Justice: Bringing Resilience and Financing to Vulnerable SIDS Groups。

本次出國藉由 PIEC 的參與，於會中報告臺美共同推動的「國際環境夥伴(IEP)」計畫，簡介這個以國際環保官員專家為主體的國際交流合作平台所推動的網絡專案、會議活動與相關工作成果，另藉由大會參與宣導汞對人體健康的危害以及監測的重要性，邀請亞太地區海島國家一同加入汞監測等環境保護的行列，對提升我國區域能見度與拓展島國環保交流有一定助益。另透過大會參與，實地掌握島國環境議題，可供後續公私部門參與協助方案研析。

一、前言

太平洋島國環境大會（Pacific Islands Environment Conference, PIEC）每兩年舉辦一次，由美國環保署與 The US-affiliated Pacific Islands, US API（包括3個美國屬地-美屬薩摩亞、北馬利安納群島及關島，及3個獨立自由聯合國家-密克羅尼西亞、馬紹爾群島及帛琉）及開發中島嶼國家共同辦理，以重申他們致力為後代子孫保護環境的承諾。PIEC 於西元2017年曾在北馬利安納群島舉行， 西元2019 年則在關島舉辦，本屆 PIEC 原訂於2022年在帛琉舉辦，但因受疫情影響延後於西元2023年8月1日至8月4日辦理，主要由美國環保署第九分署及帛琉環保局共同舉辦。本次大會的主題為「協調太平洋島國、海洋及經濟體系之戰略（Harmonizing Strategies in the Pacific Islands, Oceans, and Economies）」。

二、目的

臺美環保署間執行臺美環保合作技術協定有近30年的時間，美國環保署洽邀我環保署參與 PIEC 分享我國廢棄物管理政策與專業技術知識，並簡介臺美共同推動的「國際環境夥伴計畫(IEP)」此一以國際環保官員專家為主體的國際交流合作平台所推動的網絡專案、會議活動與相關工作成果。

攝食魚類是甲基汞危害人體健康的主要暴露途徑，而魚是海洋島嶼國家居民主食，因而有較高的甲基汞危害風險。研究顯示大氣汞沈降是魚體汞主要來源，但太平洋島嶼國家普遍缺乏量測大氣汞及汞濕沈降所需之超微量採樣與分析技術，形成大氣汞監測的空白區，而我國與美國環保署合作建置的亞太地區汞監測網(APMMN)，協助亞太地區國家建立汞超微量採樣與分析能力，提昇監測能量，並拓展區域大氣汞監測活動。我國於西元2020年協助友邦帛琉建置大氣汞監測技術，但在相關設備抵達帛琉後，全球受 COVID-19疫情及各國邊境管制與入境隔離措施影響，暫無法協助帛琉架設監測儀器及操作維護汞濕沈降採樣測站。現因疫情緩解，擬藉此次會議召開機會，前往帛琉協助監測技術建置並舉辦教育訓練及宣傳 APMMN 成果。

三、行程與內容概要

日期	工作內容概要
7月29日（六）	啟程前往帛琉
7月30日（日）	會議準備。
7月31日（一）	● 上午前往 EQPB 訪視雨水汞監測站，並與當地人員進行儀器操作說明。

	● 下午參加太平洋島國環境大會安排之參訪活動：科羅爾州回收中心(KSG Recycling Center - Belau Eco Glass Project)和國家垃圾填埋場(National Landfill)。 ● 晚上出席大會辦理之非正式交流活動(Informal Gathering)，活動在 Palau Pacific Resort 舉辦，鍾寧心組長於交流活動中與美國環保署第九分署長、國合處國合主任等進行交流。
8月01日（二）	下午出席太平洋島國環境大會： ● 大會開幕由帛琉副總統 J. Uduch Sengebau – Senior、美國環保署第九分署長 Martha Guzman、國合處國合主任 Mark Kasman 致詞，並邀請帛琉前總統 Thomas Remengesau Jr 進行專題演講 ● 出席財團法人國際合作發展基金會辦理之議程 Striving for Climate Justice: Bringing Resilience and Financing to Vulnerable SIDS Groups。會議由財團法人國際合作發展基金會李朝成秘書長揭開序幕，由帛琉農業、漁業和環境部長 Steven Victor、Ebiil Society 執行長 Ann K. Singeo 及 Splendid Bio Co 創辦人 Jack Hua 及國合會 Yunching Tseng 擔任與談人，討論如何將平等和包容置於核心地位應對氣候變化。並討論援助機構的性質和功能及促進島嶼發展中國家的氣候正義。 ● 本署辦理大會議程 International Environmental Partnership (Asia-Pacific Mercury Monitoring Network and Workshop of Waste Management with Taiwan ICDF) ，分由 ■ 鍾寧心組長報告臺美共同推動的「國際環境夥伴(IEP)」計畫，簡介這個以國際環保官員專家為主體的國際交流合作平台所推動的網絡專案、會議活動與相關工作成果，並邀請太平洋島國夥伴的參與。 ■ 游智淵科長報告臺灣空氣品質監測，該監測數據對臺灣空污管制策略成效及空品預報發布之重要，另也介紹在亞洲地區重要的背景測站鹿林山測站及亞太汞監測網發展及現況。 ■ 中央大學許桂榮教授報告亞太汞監測網絡(APMMN)現階段執行成果以及未來規劃，包含監測環境中的汞重要及協助汞公約(the Minamata Convention on Mercury)的監測。 ■ 吳嘉琳特約技術師報告我國111年參加帛琉舉辦之我們的海洋大會，與美國環保署承諾透過能力建構提升區域及海洋環境品質，爰與財團法人國際合作發展基金會合作辦理「廢棄物管理研習班」，邀請太平洋島國學員來臺，透過課程討論與實地參訪，學習我國公私協力推動資源循環的政策法規及管理實務之推動成果，並邀請與會者透過這些平台網絡的交流分享持續建構環保知能。 ● 晚上與駐帛琉黎倩儀大使及財團法人國際合作發展基金會

	李朝成秘書長等餐敘，報告本署目前及未來在帛琉進行的環保國際交流合作工作。
8月02日（三）	下午赴機場返回臺灣。

四、推展工作及會議報告紀要

(一) 帛琉環境品質保護委員會

我國環保署於2020年3月贈送雨水汞監測器於帛琉環境品質保護委員會（Palau Environmental Quality and Protection Bureau, EQPB），但因受 Covid-19疫情影響，無法派員前往帛琉處理安裝及人員培訓之事務。受美國環保署邀請，期望我國環保署於太平洋島國環境大會辦理前，可提供人員赴帛琉執行器材安裝及培訓之事。經聯繫協調，國際環境夥伴計畫亞太汞監測網絡(APMMN)執行單位中央大學派員人提早前往帛琉執行器材安裝及人員培訓。

7月31日上午我方團員陪同美國環保署國際與原住民事務辦公室 Mark Kasman 主任前往 EPQB 辦公室，參訪設置於 EQPB 辦公室屋頂上的汞雨水監測器。Kasman 主任感謝我國環保署赴帛琉完成器材設置及培訓之業務。

圖1 團員與美國環保署 Mark Kasman 及帛琉 EQPB 人員參訪監測器地點

圖2 團員說明監測器作業流程

圖3 環保署游智淵科長贈送 APMMN 紀念品予美國環保署 Mark Kasman

(二) 帛琉國家掩埋場及科羅州政府回收處理廠

7月31日下午我方團員參與 EQPB 於大會開幕前所安排的行程，參訪帛琉國家掩埋場（National Landfill）及科羅州政府回收處理廠（Koror State Government, KSG Recycling Facility）。

帛琉國家掩埋場位置於帛琉艾梅利克州，是由日本政府出資建設，並於2021年開始運作。在國家掩埋場開始營運之前，各地方政府持有各自的掩埋場。但自國家掩埋場運作之後，各地方掩埋場停止使用，並將全國的廢棄物轉送於國家掩埋場，除三個外圍島嶼州仍持有掩埋場之外。該掩埋場面積為280 x 280公尺，可容納384,898立方公尺的廢棄物。掩埋方式採用日本開發的半厭氧型垃圾處理技術（名為「福岡方式」），將通風管道設置於掩埋場的底層，並將空氣引入底層，有效將廢水與廢棄物分離，並透過引進的空氣控制臭味散發，同時促進有機廢棄物的分解。掩埋場分為四個區塊進行掩埋，目前一天的廢棄物接受量為16-20公噸。該掩埋場除了廢棄物處理之外，另有提供廢棄車回收處理。

圖5 掩埋場場長利用模型說明掩埋場設施

圖6 掩埋場全景

圖7 廢棄車暫置處理

帛琉全國僅有兩家回收廠，科羅州政府回收處理廠為其中之一，同時也是唯一政府營運的回收處理廠。帛琉在太平洋島國中為最早成立廢飲料容器押金徵收制度（Container Deposit Levy），針對所有進口及當地生產的鐵、鋁、塑膠及玻璃容器徵收 USD 0.10的押金，當廢容器妥當交付於回收廠時，將退還 USD 0.05的押金，USD 0.025為回收業者的補助金，剩餘的 USD 0.025為政府營運費用。該制度促使廢棄的飲料容器得以從垃圾填埋場回收分流並轉移到其他再利用的地方處理。

該回收廠商提供鐵、鋁、塑膠及玻璃廢容器之回收業務，當回收者交付廢容器時，採用雷射統計器，精準計算廢容器總數，確保退還費用。廢鐵與鋁容器回收處

理作業較簡單，主要去除標籤，清洗壓成磚塊後，銷售於台灣下游業者。鐵與鋁廢容器銷售價格為 USD 0.4/公斤及 USD 0.3/公斤。廢玻璃容器採取類似作業，將標籤去除後，粉碎成玻璃片，一部分銷售於下游業者，另一部分作為該回收廠製作玻璃藝術品之原物料。廢塑膠容器回收處理因塑膠種類較多，回收作業較複雜。

回收處理場也推動「帛琉生態玻璃」專案，生產用回收玻璃瓶製作的玻璃工藝產品，透過回收活動促進環境保護。該專案的目標是藉由生態友好的方式回收廢玻璃製品，並藉由提供遊客回收再製體驗活動讓旅遊業參與進來，從而改善帛琉的旅遊業，提供機會創建一個新的「帛琉製造」產業機會，促進帛琉的經濟增長。

除廢容器回收之外，該回收處理廠同時提供有機廢棄物處理服務，將有機廢棄物轉換成推肥，並提供於當地民眾購買。因帛琉為島國，確保民眾食物來源為重要議題之一，該回收處理廠為提升民眾可自己種菜，同時促進塑膠回收，當民眾回收60公斤廢塑膠時，該回收處理廠將提供一個蔬菜培養箱，培養箱中包含各種蔬菜種苗及推肥土壤。

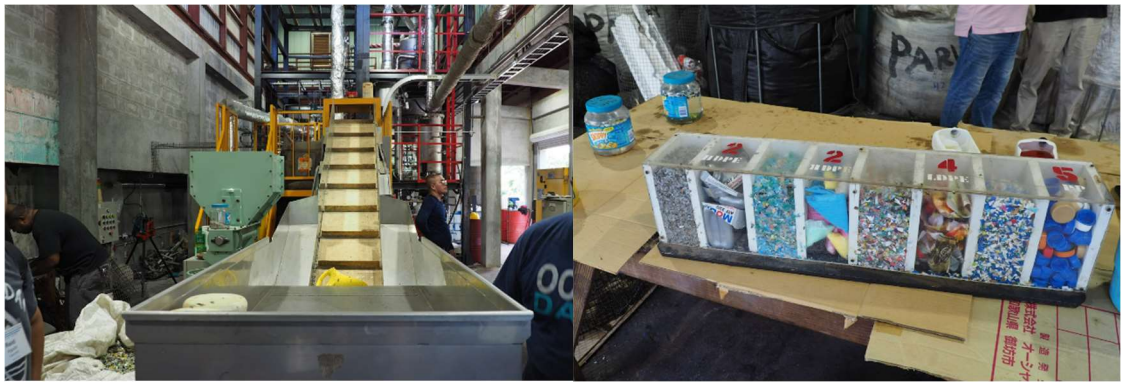


圖8 廢塑膠容器處理

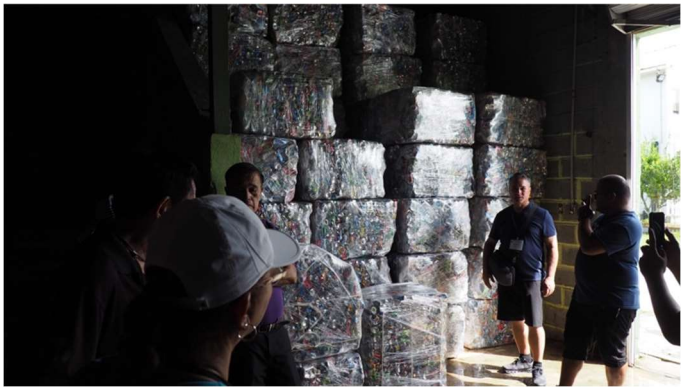


圖9 廢鋁罐暫置處理

圖10 蔬菜種苗培養溫室箱

(三) 出席大會交流活動與開幕

大會於7月31日晚間辦理非正式交流活動(Informal Gathering)，活動在 Palau Pacific Resort 舉辦，鍾寧心科長兼組長並於交流活動中與美國環保署第九分署長、國合處國合主任等進行交流。

圖11 鍾寧心科長與美國環保署第9分署長 Martha Guzman 交流

8月1日下午團員出席參與 PIEC 大會開幕及主題活動。大會開幕由帛琉 J. Uduch Senegebau 副總統兼法務部長、美國環保署第九分署 Martha Guzman 區域署長及美國環保署國際與原住民事務辦公室 Mark Kasman 主任分享開幕致詞。Senegebau 副總統兼法務部長，Guzman 區域署長分享第九分署過去對於其他太平洋島國所提供的支援，如協助關島處理於5月受颱風所造成的災害廢棄物，並期望未來可與在場的島國共同合作。Kasman 主任分享美國與我國環保署這三十年來的交流與合作，並借鏡國際環境夥伴計（International Environmental Partnership, IEP）的成果，促進島國參與 IEP 之合作與交流。開幕最後由 Thomas Remengesau 前帛琉總統發表主題演講。

我國駐帛琉黎倩儀大使及財團法人國際合作發展基金會李朝成秘書長皆出席本次大會，鍾寧心科長兼組長及團員向黎倩儀大使報告環保署目前及未來在帛琉進行的環保國際交流合作工作。

圖12 團員向我國駐帛琉黎倩儀大使報告交流

圖13 大會開幕
（左上）帛琉 J. Uduch Senegebau 副總統兼法務部長、（右上）美國環保署第九分署 Martha Guzman 區域署長、（左下）美國環保署國際與原住民事務辦公室 Mark Kasman 主任、（右下）Thomas Remengesau 前帛琉總統

（四）出席大會平行會議

第一場平行會議主題活動由財團法人國際合作發展基金會主辦氣候正義場次，分享脆弱族群的多元觀點與經驗，由國合會秘書長李朝成博士開幕致詞，帛琉環境部 Steven Victor 部長、國合會研考處曾筠清處長、原住民族委員會代表華偉傑博士

(排灣族)、帛琉當地 NGO Ebiil Society 執行長 Ann Sinego 共同與談，最後由台灣青年代表呂伊庭和帛琉青年代表 Jodean Remengesau 共同發表青年世代的氣候正義宣言。

圖14（左上）國合會研考處曾筠清處長、（右上）原住民族委員會代表華偉傑博士

（五）辦理國際環境夥伴(IEP)計畫相關拓展交流活動(Networking Session)

大會第二場平行議程由本團員辦理「國際環境夥伴計畫：亞太汞監測網絡與廢棄物研討會分享」場次。本議程係受美國環保署國際合作暨原民事務總處之邀，共同提案辦理國際環境夥伴(IEP)計畫相關拓展交流活動(Networking Session)。

平行會議由環保署綜合計畫處鍾寧心科長兼組長報告臺美共同推動的「國際環境夥伴(IEP)」計畫，簡介這個以國際環保官員專家為主體的國際交流合作平台所推動的網絡專案、會議活動與相關工作成果，並邀請太平洋島國夥伴的參與；接續由環保署監測暨資訊處游智淵科長報告臺灣空氣品質監測，該監測數據對臺灣空污管制策略成效及空品預報發布之重要，另也介紹在亞洲地區重要的背景測站鹿林山測站；由中央大學許桂榮教授報告 IEP 專案-亞太汞監測網絡(APMMN)，簡介這個以推動亞太區域國家大氣汞監測活動、環境監測技術交流及監測資料共享的網絡，如何協助夥伴國家因應汞水俁公約第十九條，提升大氣汞監測相關能量，及其現階段執行成果以及未來規劃；最後由吳嘉琳特約環境技術師報告我國111年參加帛琉舉辦之我們的海洋大會，與美國環保署承諾透過能力建構提升區域及海洋環境品質，爰與財團法人國際合作發展基金會(ICDF)合作辦理「廢棄物管理研習班」，邀請太平洋島國學員來臺，透過課程討論與實地參訪，學習我國公私協力推動資源循環的政策法規及管理實務之推動成果，並邀請太平洋島國環境保護從業人員可以持續關注 IEP 網絡及 ICDF 訓練活動，戶透過交流與心得分享的學習為日益複雜的環境問題尋找解方。

圖12（左上）鍾寧心科長兼組長、（右上）游智淵科長、（左下）許桂榮教授、（右下）吳嘉琳特約環境師

五、結論與建議

（一）本次出國藉由 PIEC 的參與，於會中報告臺美共同推動的「國際環境夥伴(IEP)」計畫，簡介這個以國際環保官員專家為主體的國際交流合作平台所推動的網絡專案、會議活動與相關工作成果，並邀請太平洋島國夥伴的參與，對提升我國區域能見度與拓展島國環保交流有一定助益。

（二）另透過大會參與，實地掌握島國環境議題，可供後續公私部門參與協助方案研析。例如：本次藉由大會參與及國際環境夥伴計畫共同執行單位的協力宣導，在島國汞監測及電子廢棄物環境議題探討引起與會者關注，透過國際環境夥伴(IEP)亞太汞監測網絡(APMMN)及國際電子廢棄物管理網絡(IEMN)的平台網絡，提供建立適當的汞監測及電子廢物管理系統所需的支持和資源。

六、國外人士個人資料彙整表

會晤人士	國別	任職單位	職稱	聯絡方式
Martha Guzman	US	US EPA Regional 9	Regional Administrator	
Bradley Nolan		SPREP	Project Manager	bradleyn@sprep.org
Michael Flores	Saipan	BEQC	Specialist	

	CNMI			
Bachat Arse-nio	Palau	EQPB	Specialist	ngi-rarsen@gmail.com

附件資料

一、 大會議程

二、 簡報資料：國際環境夥伴計畫亞太汞監測網絡與廢棄物研討會分享

Preconference Training and Site Tours
Preregistration required
July 31, 2023 (Day 1) – 1-5PM
- Hazardous Materials Awareness & HAZWOPER Refresher Part 1
- Site Tour 1: Palau National Landfill and KSG Recycling Center
- Site Tour 2: Ngardok Lake Reserve

July 31, 2023, 6:00-8:00 PM
Informal Welcome Gathering
Palau Pacific Resort
Appetizers and No-Host Bar
Opening Remarks:
EQPB CEO – Michael Blesam
Charge d' Affaires – Andrew McLean

Preconference Training
Preregistration required
August 01, 2023 (Day 2) – 8-12PM
- Hazardous Materials Awareness & HAZWOPER Refresher Part 2

PIEC Opening Day

August 01, 2023 (Day 2)

Update 08.01.23 – subject to change

12:00 – 12:55 pm
LUNCH
Boxed lunch provided

1:00 – 1:05 pm	Opening Prayer and Debusch
1:05 - 1:10 pm	Welcome Message Palau
1:10 - 1:25 pm	J. Uduch Sengebau – Senior Vice President, Republic of Palau Minister, Ministry of Justice
1:25 - 1:40 pm	Martha Guzman, Regional Administrator, USEPA Region IX
1:40 - 2:00 pm	Mark Kasman, Director of Office of International Affairs, USEPA
2:00 - 2:30 pm	Keynote Speaker, Former President Thomas Remengesau Jr., Republic of Palau

BREAK 2:30 - 3:00PM

3:00 – 4:00 pm

1 **Title:** Striving for Climate Justice: Bringing Resilience and Financing to Vulnerable SIDS Groups
Type: Panel
Speakers:
I. Opening Remark: Amb. Charles Li, the Secretary General of TaiwanICDF
II. Steven Victor, the Minister of Agriculture, Fisheries, and Environment (Palau)
III. Yunching Tseng, Director of the Research, Development, and Evaluation Department, Taiwan ICDF
IV. PhD. Jack Hua, Founder of Splendid Bio Co.
V. Ann K. Singeo, Executive Director, Ebiil Society
Summary: This session will discuss how equality and inclusion are placed at the heart of combating climate change. It will also address the characteristics and functions of aid agencies in facilitating climate justice in SIDS.
Location: Chamayong Room
Moderator: Uroi Salii

2 **Title:** Environment & Economies; the Infrastructure Backbone
Type: Stand alone
Speaker: Peter Peschut, Nimbus Consultant
Summary: Infrastructure is the critical component of the economic and social fabric of modern societies. Infrastructure provides the fundamental facilities and systems to provide the services and resources for a functional society. Sufficient and quality infrastructure is the backbone of socio-economic advancement. Infrastructure is the physical framework on which beneficial human activities begin, and then evolve, towards greater service and effectiveness. Government programs, social services, economic growth, cannot exist without the underpinning of infrastructure. A health care system needs first a hospital and clinics; an education system needs first a school-building; a rash collection program needs a landfill; a recycling program needs a sorting and transfer station. And each needs utilities of water, power, and wastewater, to allow people to use them.
Location: Glass room
Moderator: Christianera Tuitele

4:00 – 5:00 pm

3 **Title**: Environmental Justice Training Session
Type: Panel
Speaker: CJ Mishima and Laura Ebbert, US EPA
Summary: Introduction to Environmental Justice, Grant Programs and Goal 2 Strategy
Location: Glass Room
Moderator: M. Bubbles Olkeriil

4 **Title:** International Environmental Partnership (Asia-Pacific Mercury Monitoring Network and Workshop of Waste Management with Taiwan ICDF)
Speaker: Taiwan EPA
Summary: Overview the IEP, an international platform that engages experts to work on various pressing environmental challenges and brief introduction on APMMN, one of IEP major networks, and recap on recent ICDF WWM on how these networks could work with the Pacific Island Region for a better environment.
Location: Chamayong Room
Moderator: Bachat Arsenio

End Day 2

31st PIEC Break Out Session Agenda
August 02, 2023 (Day 3)

PIEC Break Out Session Agenda

8:30 – 9:30 am

5 **Title:** Pacific Islands Solid Waste Management Plans
Type: Panel
Speakers:
I. Calvin Ikesiil (Palau)
II. Manny Camacho or Matt Nieswender
III. Glenn San Nicolas (Guam)
IV. Timonie Hood (EPA)
Summary: Panelists from the Pacific Islands will speak about their experience developing a solid waste management plan. They will highlight both challenges, successes, and best practices. The session will end with Q and A from the audience.
Track: Island
Location: Chamayong Room
Moderator: Angela Sandoval

6 **Title:** Building Resilience in Disaster Risk Reduction efforts in Palau
Type: Stand alone
Speakers: Portia Kesolei, IOM
Summary: One of IOM's (International Organization for Migration) key strategies for DRR (Disaster Risk Reduction) in Palau is to enhance the capacity of local authorities and communities to prepare for and respond to disasters. This includes developing disaster preparedness plans, conducting risk assessments, and providing training on emergency response protocols. In the area of DRR, Palau focuses on strengthening the resilience of the Palauan community to natural hazards through a comprehensive approach that involves capacity building, investing in climate resilient infrastructure, community-based initiatives, and public awareness campaigns.
Track: Oceans
Location: Glass Room
Moderator: Christianera Tuitele

9:30 – 10:30 am

7 **Title:** Reuse, Recycling and Composting Strategies in the Pacific Islands
Type: Panel
Speakers:
I. Manny Camacho or Matt Nieswender (CNMI)
II. Sabrina Cruz (Guam)
III. Selby Etibek (Palau)
IV. Timonie Hood (EPA)
Summary: Panelists from the Pacific Islands will speak about their experience implementing reuse, food donation, recycling and composting projects by sharing both their challenges and successes. New federal funding opportunities for waste reduction will also be shared. The session wil include opportunities for Q and A
Track: Island
Location: Chamayong Room
Moderator: Angela Sandoval

8 **Title:** Challenge on coastal management reaching coral reefs
Type: Stand alone
Speakers: Tadashi
Summary: Palau is a small island country consisting of 20 large islands and hundreds of smaller ones with reef systems that are located just outside the Coral Triangle, which harbors the world's highest level of marine biological diversity. The coral reefs in Palau also support a thriving dive tourism industry and subsistence fisheries as well as important ecological services, such as protecting the shoreline from waves and erosion.
Track: Standalone
Location: Glass Room
Moderator: Dr. Peter Peschut

10:30 – 11:30 am

9 **Title:** Zero waste and plastics prevention
Type: Panel
Speakers:
I. Glenn San Nicolas (Guam)
II. Roland Gutierrez (Guam)
III. Manny Camacho or Matt Nieswender (CNMI)
IV. Timonie Hood (EPA)
Summary: Panelists will share strategies on how to tackle zero waste and the effect of plastics in the Pacific Islands.
Track: Islands
Location: Chamayong Room
Moderator: Sabrina Cruz Sablan

10 **Title**: Science to management feedback loops associated with the Micronesia challenges
Type: Standalone
Speaker: Dr. Peter Houk (University of Guam)
Summary: Small-island nations must manage their local resources to enhance the ecosystem services that reefs provide in the face of both local stressors and climate change. In this spirit, the political leaders of five nations in Micronesia initiated a friendly challenge, the Micronesia Challenge (MC), to 'effectively manage' 50% of marine systems by 2030 by addressing local stressors and mitigating global stressors. The initiation of the MC was novel because it blended a strong top-down political will with a framework that fostered collaborative, bottom-up, science networks. We first describe how the MC facilitated a unified process for the collection, storage, and quality-control of coral-reef and fisheries data over the past decade. We then provide three examples showcasing the utility of our growing data streams to foster positive change in the status of marine resources across both local and regional scales. These examples will focus on watershed discharge and water quality standards, coastal fisheries, and how progress with the MC movement is being tracked across the region. Despite progress with managing local stressors, climate disturbances are now changing the outcomes of management policies and must be incorporated. A better appreciation for synergies between climate impacts, local stressors, and management policies is discussed.
Track: Oceans
Location: Glass room
Moderator: Dr. Peter Peschut

11:30 – 12:40 pm
LUNCH – boxed lunch provided

12:45 – 1:40 pm

11 **Title:** Island Composting Session
Type: Panel
Speakers:
I. Glenn San Nicolas (GEPA)
II. Matt Nieswender (CNMI)
III. Timonie Hood (US EPA)
Summary: Materials that can be composted -- clean wood, pallets and crates, branches, leaves, grass, food and paper -- often make up the largest portion of island waste streams. These materials can safely be composted on-island to rebuild soils and improve agricultural production. This session will feature an open discussion with experts from Guam, which composted as much as 27,000 tons/year , CNMI and EPA on everything composting: shifting to compostable packaging, permitting large facilities, backyard composting and gardening and controlling Rhino Beetle spread.
Track: Islands
Location: Glass Room
Moderator: Bachat Arsenio

12 **Title:** PFAS Emerging Contaminants – CNMI Issues
Type: Standalone
Speakers: Travis Spaeth, BECQ
Summary: History, concerns of the spread around Saipan, how we started regulating it, what is being done to meet those regulations and what the future regulations look like with EPA's proposed MCLs.
Track: Climate
Location: Chamayong Room
Moderator: Rikki Camacho/Elena Vaouli

1:45 – 2:40 pm

13 **Title:** Management of the Marine & Terrestrial Environment of Koror State
Type: Standalone
Speaker: Jennifer Olegeriil
Summary: The marine and terrestrial environment of Koror State plays an important role in generating income for the nation. Eco-tourism is seen as the most economically important activity as over 80% of Palau's visitors come to snorkel and dive among the coral reefs in the RISL (Rock Islands Southern Lagoon). As a marine environment, vastness and isolation have been key beneficiaries in aiding to preserve it over thousands of years from being over exploited. Today, the threat of climate implications and various activities conducted at the site such as tours, swimming, snorkeling, diving, fishing, and including the threat of invasive species accelerate stress and pressure on the environment/natural resources.
Track: Islands
Location: Chamayong Room
Moderator: Christianera Tuitele

14 **Title:** Moana Taka and Swire Shipping
Title: Moana Taka: Partnering on Pacific Island Waste Issues
Type: Panel
Speaker:
I. Bradley Nolan, SPREP
II. Kacey Iloilo, American Samoa
Summary: The Pacific Islands face unique challenges managing solid waste. Moana Taka will present an overview of opportunities working with Swire Shipping to assist the FAS with waste issues. American Samoa will share their experiences piloting an electronic waste collection, transport and disposal program.
Track: Islands
Location: Glass Room
Moderator: Angela Sandoval

BREAK 2:40 – 3:00 pm

3:00 - 4:00 pm

15 **Title:** Chemical Waste Cleanup in the Freely Associated States
Type: Standalone
Speakers: Chris Reiner and Bret Moxley
Summary: Learn about work U.S. EPA Region 9 has done in Palau to cleanup legacy chemicals in laboratories, schools and other institution, and other cleanups EPA plans to conduct in the Freely Associated States. The presentation will also discuss a broader vision for cleanup to explain how the work was funded, planned and carried out, with the goal of educating other island communities of the importance of this and management of hazardous waste throughout the island nations of the Pacific.
Track: Islands
Location: Glass Room
Moderator: Angela Sandoval

16 **Title:** A Ridge to Reef Framework to protect Guam's water quality and coral reef ecosystem
Type: Standalone
Speakers: Fran Castro, Associate Director of Sea Grant
Summary: Watershed pollution and fisheries exploitation are priority, chronic stressors that impact Guam's coral reefs. Yet, quantifying the relative contribution of individual stressors to any reef is difficult due to natural variation in biological assemblages that exists across island scales, and uncertain site-specific disturbance histories. A study of 26 sites in southern Guam watersheds using dissolved inorganic nitrogen (DIN) as a focus has shown the effects of pollution on coral reef and fish assemblages and supports the need to update Guam's water quality standards. The study found stress-tolerant corals where DIN is relatively high, indicating reduced coral diversity and evenness. In addition, there is an increase in biomass in fish when DIN is high, but only small-bodied fishes are present, which are neither effective for balancing coral reef ecosystems nor desirable for human consumption. DIN is resultant of sediment and nutrient runoff from upland activities in each of these watersheds. These activities may derive from leaky septic systems, sewer overflows, pit latrines, animals, and erosion from badlands. Updating the Guam water quality standards will aid in addressing excess nutrients entering nearshore waters, however, the community, government, and legislature all have a role in effectuating policy to address the effects of pollution on Guam's reefs.
Track: Oceans
Location: Chamayong Room
Moderator: Sabrina Cruz Sablan

4:00 – 5:00 pm

17 **Title:** Solid Waste Solutions Session
Type: Work group
Speakers: EPA Staff
Summary: EPA staff will help facilitate a work group focused on action item development focused on the topics discussed in the panel sessions. There will be a work group for composting, solid waste management plans, plastics and zero waste. By the end of the session, participants will have a draft list of next steps on how to approach their specific needs.
Track: Islands
Location: Chamayong Room
Moderator: Christopher Mishima

18 **Title:** Voluntary Conservation Programs supported by the Natural Resources Conservation Service is the Pacific Islands area
Type: Standalone
Speaker: Amber Denton Johnson, NRCS
Summary: Soil Erosion/Sedimentation - how upland homeowners and farmers can prevent soil erosion, stop pollution from leaving their properties and improving soil health at the homesite.
Track: Oceans
Location: Glass Room
Moderator: Bachat Arsenio

End Day 3

31st PIEC Break Out Session Agenda
August 03, 2023 (Day 4)

8:30 – 9:30 am

19 **Title:** Water and environmental programs, USDA grant opportunities
Type: Stand alone
Speaker:
I. Lennie Okano – Kendrick, USDA Rural Development
Summary: Financing and technical assistance to develop and improve drinking water, wastewater, and solid waste systems.
Track: Economies
Location: Glass Room
Moderator: Angela Sandoval

20 **Title:** Marine Debris and Abandoned Derelict Vessels (ADVs)
Type: Panel
Speaker:
I. Elizabeth (Becky) Furey (CNMI)
II. David Benavente (CNMI)
III. Rudy Paulino (GEPA)
IV. Becky Skeele (Pacific Coastal Research Planning)
Summary: Panelist will share their approach on ADVs and Marine Debris. CNMI will also share how they approached clean up post Typhoon Yutu
Track: Oceans
Location: Chamayong Room
Moderator: Angela Sandoval

9:30 – 10:30 am

21 **Title:** Laboratory Infrastructure in the Pacific Islands
Type Panel
Speakers:
1. Charito Bautista (CNMI)
2. Rudy Paulino (Guam)
3. Christianera Tuitele (American Samoa)
Summary: EPA staff will help facilitate a panel discussion with PI laboratory representatives. Panelists will share high-level successes, challenges and needs. The panel will also explore potential areas for regional collaborations and cross-island training and support. By the end of the session, participants will have a draft list of next steps on how to approach their specific needs.
Track: Islands
Location: Chamayong Room
Moderator: Elena Vaouli

22 **Title:** DOD activities in the Pacific Islands
Type: Standalone
Speakers: Mark Cruz, Joint Region Marianas, Department of Defense
Summary: Provide Pacific Islands a comprehensive understanding of DOD activities
Track: Climate
Location: Glass Room
Moderator: Darion Jones

10:30 – 11:30 am

23 **Title:** EPA Criminal Investigation Division and Enforcement
Type: Panel
Speakers: Emily Weaver (US EPA) and Jan Yukimoto (US EPA)
Summary: In a panel-type setting, we'd like to discuss a quick overview of EPA CID, hazardous waste management, environmental justice, EPA's NEIC lab capabilities, EPA CID's jurisdiction in U.S. territories vs. freely associated states, the connection between community and law enforcement, and how criminal liability is integral to the integrity of environmental regulatory programs everywhere
Track: Economies
Location: Glass Room
Moderator: Christopher Mishima

24 **Title:** Improved disaster waste management for a resilient pacific
Type: Standalone
Speakers: Sanimili Bulai, Secretariat of Pacific Regional Environment Programme, Disaster Waste Management
Summary: Principal and concept of Disaster Waste Management and how effective waste management contributes to improving the capacity of Pacific Countries to prepare for emergencies and disasters, thereby ensuring timely and effective response. Highlights how SPREP through the PacWastePlus Programme is assisting countries to mainstream disaster waste management into the Framework for Resilient Development in the Pacific 2017 – 2030 (FRDP) and contribute towards the achievement of the Sendai Framework Goals.
Track: Climate
Location: Chamayong Room
Moderator: Christianera Tuitele

11:30 – 12:40 pm
LUNCH - Boxed lunch provided

12:45 – 1:40 pm

25 **Title**: International E-waste Management Network: Promoting Sustainable and Sound Management of E-waste through International Collaboration
Type: Networking - Facilitated Discussion
Speaker: Justin Wang (IEM)
Summary: The International E-waste Management Network is a multilateral cooperation platform established by the Taiwan and U.S. EPAs in 2010. The mission of the IEMN is to share best practices and experiences based on a circular economy approach that reduces the negative impact of electronic waste on public health and the environment while promoting positive socio-economic outcomes. It supports government decision-makers around the world in policy development to manage e-waste in order to transition to a circular and sustainable economy for the future. The network also engages electronic producers, recyclers, as well as researchers, encompassing the entire electronics product lifecycle. Like the rest of the world, the Pacific Island nations also face the issue of e-waste management, and many nations lack the proper treatment capacity and technology to address e-waste. The IEMN would be able to provide technical support and resources needed to establish a proper e-waste management system in the Pacific Islands.
Track: Climate
Location: Glass Room
Moderator: Christopher Mishima

26 **Title:** USAID Clean Cities Blue Ocean
Type: Stand alone
Speaker: Rene Acosta
Summary: The session will be a hybrid in format both in-person (Rene Acosta attending) and a virtual presentation from Jon Angin our Chief of Party on CCBO's 3R/SWM work as it impacts on climate change, health, biodiversity, gender empowerment, local governance, etc. Rene's in-person presentation is on the current work CCBO has conducted in the Pacific particularly the Solid waste Capacity Index for Local Government (or SCIL, pronounced as skill) self-assessment experience of the recently completed SCIL activities in Kolonia in Pohnpei FSM, Suva in Fiji, and in Port Moresby PNG (to be completed in July). We plan on inviting the PSEPA Executive Director to share his experience having co-coordinated with CCBO the SCIL self-assessment process in Kolonia.
Track: Economies
Location: Chamayong Room
Moderator: M. Bubbles Olkeriil

1:45 – 2:40 pm

27 **Title:** Designing Sustainable Finance schemes for waste management in the pacific
Type: Standalone
Speaker: Bradley Nolan, Secretariat of Pacific Regional Environment Programme
Summary: Introduction of the 21-step pathway workbook to developing a Sustainable Financing Scheme. The workbook guides completion of activities to gather data and provides templates and assistance to support the completion of each step. While each Sustainable Financing Scheme will be different to suit local needs and context, the Workbook will guide participants through key questions and consideration to facilitate evidence-based decision making.
Track: Economies
Location: Glass Room
Moderator: Jessica Emesiochel

28 **Title:** Pesticides in the Pacific Islands
Type: Panel
Speaker
I. Tualagi Gaoteote (American Samoa)
II. Zabrina Cruz (CNMI)
III. Maria Duenas (Guam)
IV. Sasha Mizenin (USEPA)
Summary: The session is for PI to share about pesticides management in the pacific
Track: Climate
Location: Chamayong Room
Moderator: Darion Jones

BREAK 2:40 – 3:00 pm

3:00 - 4:00 pm

29 **Title:** Safe Drinking Water
Type: Standalone
Speaker: Juliana Mendoza (Guam)
Summary: The effective way of providing high quality drinking water and protecting public health is to have public water systems operated by certified operators. Certified operators are the front line in maintaining the purity and adequacy of the state's public drinking water
Track: Climate
Location: Chamayong Room
Moderator: Roland Guiterrez

30 **Title:** Blue Carbon / Ngarchelong Forestry Project
Type: Combined session

Speaker:
I. Richard MacKenzie, PhD, Blue Carbon Climate Fellow
II. Balkuu Kumangai, Rteluul Community Regeneration Organization (RCRO)
Summary: Blue carbon - What it is, how to measure and how it can be used to increase the resilience of coastal ecosystems.
RCRO - Local organization instrumental in leading a community initiative that uses traditional knowledge/practices to reforest a savannah area in Ngarchelong.
Track: Climate
Location: Glass Room
Moderator: Kiyara Swanson

4:00 – 5:00 pm

31 **Title:** FAS work group session **(Resolutions)**
Type: Work group
Speaker: EPA Facilitated
Summary: Brainstorm a list of action items or steps to move forward
Track: Harmonized Strategies
Location: Chamayong Room

32 **Title:** Territories (**Resolutions**)
Type: Work group
Speaker: EPA Facilitated
Summary: Brainstorm a list of actions items of steps to move forward
Track: Harmonized Strategies
Location: Glass Room

Traditional Talk and Closing Messages

5:00 – 5:05	Introduction
5:05 – 5:25	Palau Traditional Leader, Johnson Toribiong
5:25 – 5:45	American Samoa Presentation/SIVA
5:45 – 5:55	Closing message US EPA, Laura Ebbert, Director, Tribal, Intergovernmental and Policy Division
6:00 – 6:05	Closing message Palau, Glenn Seid
6:05 – 6:10	Hand off to next host country Palau Traditional Dance
6:10 – 6:15	Final Remarks/Prayer

End Day 4

August 04, 2023 (Day 5)
Site Tours *(pre-registration required)*
Tour 1: Palau National Landfill and KSG Recycling Center
Tour 2: Ngardok Lake Reserve
Tour 3: Rock Island Southern Lagoon

International Environmental Partnership

Ning-Hsin Chung
Section Chief
Department of Comprehensive Planning
Environmental Protection Administration, Taiwan

Taiwan EPA and International Collaboration

Established in 1987 to address various environmental issues

In 1993, Taiwan and US signed the Agreement for Technical Cooperation in the Field of Environmental Protection

Taiwan and US Collaboration

Study Tours
- Taiwan EPA sent staff for training in US EPA
- Onsite training

Workshop
- Invited US experts to hold workshops in Taiwan
- Information sharing

Aid & Assistance
- US aided in the development of many environmental monitoring programs in Taiwan

Joint Collaboration
- Taiwan and US EPAs mutually collaborate to implement projects

International Environmental Partnership (IEP)

- Multilateral collaboration initiated in 2014; strengthen global partnership
- Aims to provide an international network to share and exchange best practices and technology in environmental protection
- Successfully connected many countries in southeast Asia region on various environmental issues
- Share Taiwan and US experiences and accomplishment with international partners
- Several key environmental projects

https://www.iep-global.org/

Global Environmental Education Partnership (GEEP)

The mission of the GEEP is to create a vibrant and inclusive learning network designed to build capacity in countries around the world to strengthen environmental education leading to a more sustainable future.

1. Strengthen networks
   - connect the people and organizations to promote environmental education around the world
   - highlight EE efforts at various levels and showcase the networks that link practice and innovation
2. Build leaderships
   - develop young leaders who have the 21st century skills required to address the complex sustainability challenges
3. Champion effective practice
   - showcase and promote good practices

https://thegeep.org/

International E-waste Management Network (IEMN)

The mission of the IEMN is to share best practices and experiences based on a circular economy approach that reduces the negative impact of electronic waste on public health and the environment while promoting positive socio-economic outcomes.

1. Global platform
   - support stakeholders around the world in managing e-waste
   - provide venue for knowledge sharing and best-practice exchange
2. IEMN community
   - connects stakeholders to stay informed on latest news and events
   - webinars and meetings to share information

https://iemn.net/

Asia-Pacific Mercury Monitoring Network (APMMN)

The APMMN is a cooperative effort to systematically monitor mercury in air and rainwater throughout the Asia-Pacific Region, and share information, data, tools and technology to expand monitoring capacity in the region.

- Determine the status and trends in atmospheric mercury concentrations as well as wet, dry, and total atmospheric deposition of mercury.
- Provide a robust dataset for regional and global model input.
- Assist partners in developing their mercury monitoring and assessment capacity by providing training on multi-media (e.g., air, precipitation, water, sediment, biota) sampling and analytical methods, and best practices.
- Share data and monitoring information among network partners.

http://apmmn.org/

Other Programs

Eco-Campus

Encourages elementary schools to develop and promote environmental protection and sustainable development

South and Southeast Asia-Air Improvements in the Region (SSEA-AIR)

Aims to cooperate with countries and cities across South and Southeast Asia and improve their technical capacity to address air pollution

Other Programs

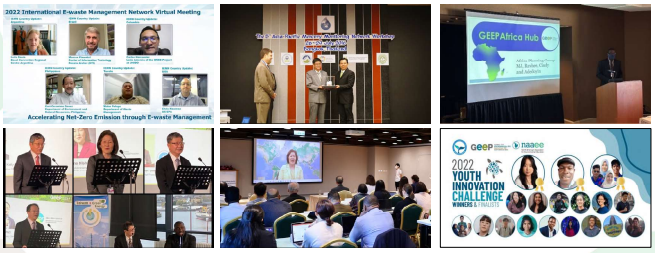
Environmental Enforcement

Increases regional capacity for environmental enforcement and compliance assurance through training, workshop and study tours

Contaminated Site Remediation

Introduces and localizes innovative ideas and technologies to improve soil and groundwater contaminated sites

IEP Accomplishments



Participations from over 70 countries in more than 100 conferences, workshops, and training

Successfully assisted many countries (Vietnam, Philippines, Malaysia…) in establishing regulations

Raised Taiwan's visibility in the international community

IEP Wants You

International Environmental Partnership

Join the IEP

Support the global community

Share knowledge and experience

行政院環境保護署
Environmental Protection Administration
Executive Yuan,R.O.C.(Taiwan)

Thank you

31st Pacific Islands Environment Conference

Environmental Monitoring in Taiwan

Jhih-Yuan Yu
Section Chief
Department of Environmental Monitoring
and Information Management of Taiwan epa

Introduce Taiwan

- Taiwan' s total land area is only about 36,000 square kilometers ; it is shaped like a leaf that is narrow at both ends. To the north lies Japan; to the south is the Philippines.
- Many airlines fly to Taiwan, helping make it the perfect travel destination.

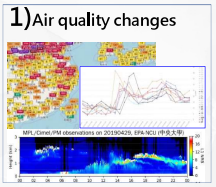
Air Quality Monitoring

- Air quality monitoring is important to identify air quality index (AQI) and other information that are key to battling against air quality.
- Taiwan EPA currently has 78 standard stations that individually collects local air pollution data on an hourly basis.
- Both historical and new data from the monitoring stations can be referenced for air quality forecast.

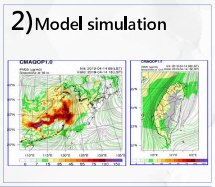
Air Quality forecast

Forecast Release=1+2+3+4

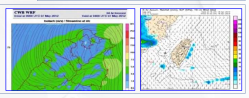
1) Air quality changes



2) Model simulation



3) Real-time weather forecast



4) Expert experience

Briefing the Lulin station

- Location: 23.74°N, 120.87°E
- Altitude: 2,862 m
- Purpose: To track the trans-boundary transport of atmospheric pollutants.
- International cooperation with NOAA, NASA and USEPA.

The Lulin Background station

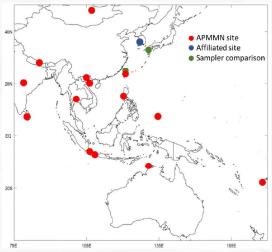
- Continuous measurement of species composition and concentration, including gaseous elemental mercury(GEM), gaseous oxidized mercury(GOM) and particulate-bound mercury(PBM).

The Asia Pacific Mercury Monitoring Network (APMMN)

- A cooperative effort to systematically monitor mercury in air and rainwater throughout the Asia-Pacific Region since 2012.
- Goal: Systematically monitor wet deposition and atmospheric concentrations of mercury in a network of stations throughout the Asia-Pacific region.

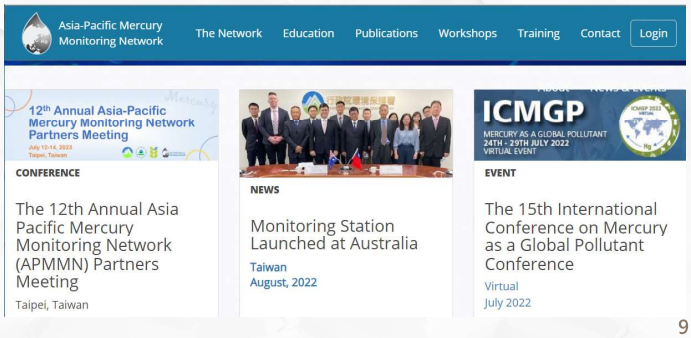
APMMN Site Map

- U.S. EPA and Taiwan EPA will continue to enhance the partnerships, and wet deposition samplers 13 additional monitoring stations.



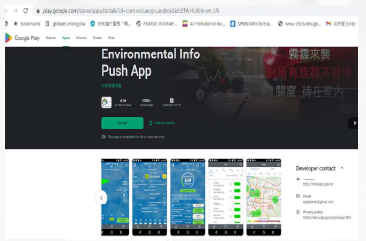
- **13 APMMN sites**
  - Australia
  - Fiji
  - India
  - Indonesia
  - Korea
  - Mongolia
  - Nepal
  - Palau
  - Philippines
  - Sri Lanka
  - Taiwan
  - Thailand
  - Vietnam

APMMN WebSite



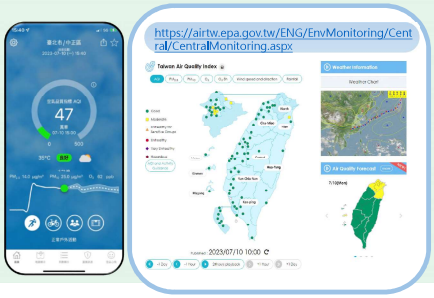
Taiwan EPA provides many other services

- The EPA provides the public with detailed information through real-time air quality forecast notifications and practical environmental information.
- With the administrative area positioning function, you can search for the towns and towns you are interested in, and then inquire about the local environmental information.



Taiwan EPA provides Environment Info Push

- Environment Info Push which is the first domestic APP to provide 12-hour air quality prediction using big data and artificial intelligence.
- Foreigners in Taiwan are able to grasp real-time environmental information easily.



Summary

- U.S. EPA and Taiwan EPA will continue to enhance the partnerships, and wet deposition samplers 13 additional monitoring stations.
- Using the same instruments and standard operating procedures across Asian countries and the Pacific.
- We would like to continue to cooperate on international efforts to help reduce the global mercury pollution.

Thank you for your attention

13

Asia Pacific Mercury Monitoring Network

Asia-Pacific Mercury Monitoring Network (APMMN)

Guey-Rong Sheu[1], David Schmeltz[2], David Gay[3] (on behalf of many!)

[1]National Central University, Taiwan
[2]U.S. Environmental Protection Agency, USA
[3]National Atmospheric Deposition Program, USA

International Environmental Partnership

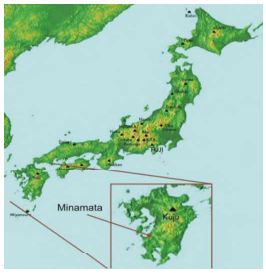
NADP

Outline

- Why is mercury still a concern
- What is APMMN
- What Progress Have We Made
- Future plans

Minamata Disease and Hg Pollution

- Minamata disease, a neurological disease caused by severe Hg poisoning due to consumption of contaminated fish, was first discovered in Minamata, Japan in 1956.
- Hg-containing industrial wastewater discharge was the major Hg source to the fish in Minamata Bay.

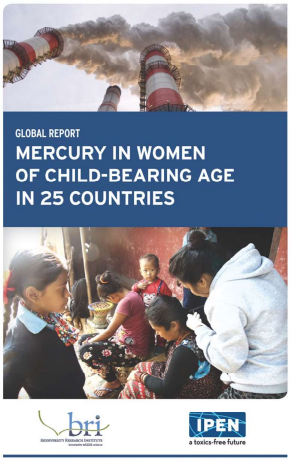


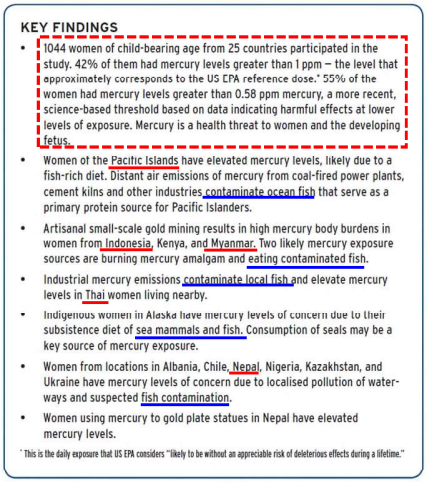
(Time, 2010)

Minamata Convention on Mercury

- The Minamata Convention on Mercury was opened for signature by governments at a Diplomatic Conference on October 9-11, 2013 in Japan.
- Minamata Convention on Mercury entered into force on August 16, 2017.

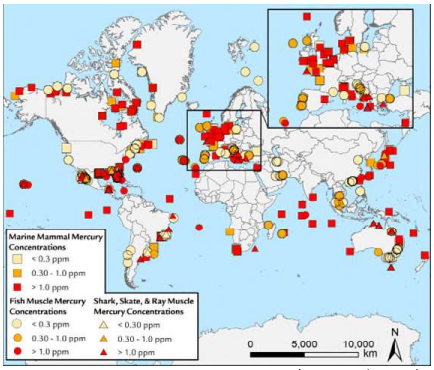
Global Hg Pollution





Global Hg Pollution

- Fish consumption is the major exposure route of Hg to many people worldwide.
- Hg concentrations in fish are elevated globally.

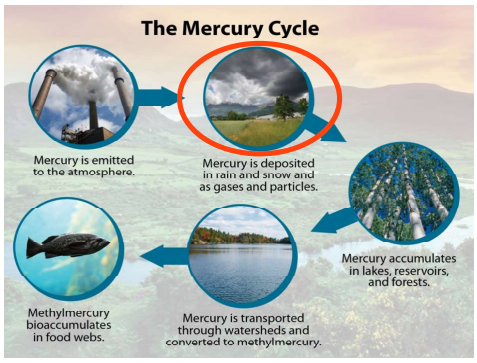


Nation	Standards
International Food Standards (Codex Alimentarius)	Fish: less than 0.5 mg/kg of methyl mercury Carnivorous fish (shark, swordfish, and tuna): less than 1 mg/kg of methyl mercury
US	Fish: less than 1 mg/kg of methyl mercury
EU	Fish: less than 0.5 mg/kg of total mercury Carnivorous fish including shark: less than 1 mg/kg of total mercury
Japan	Seafood (excluding abyssal fish and tuna): less than 0.4 mg/kg of total mercury, less than 0.3 mg/kg of methyl mercury
Australia and New Zealand	Fish: less than 0.5 mg/kg of total mercury Carnivorous fish including shark: less than 1 mg/kg of total mercury
Korea	Seafood (excluding abyssal fish and tuna): less than 0.5 mg/kg of total mercury

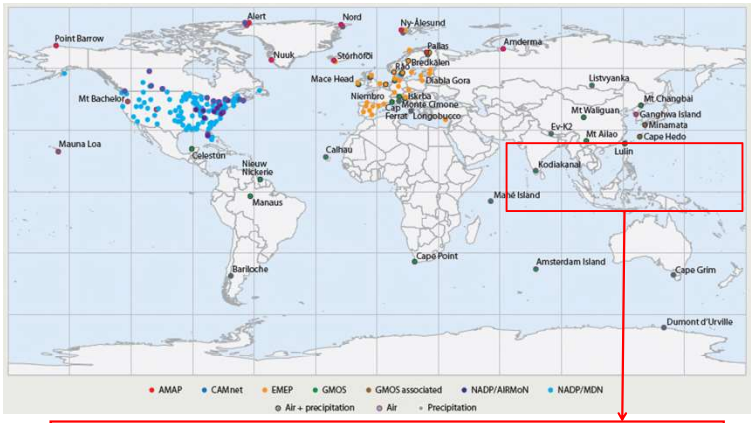
(Evers et al., 2012)

Global Hg Pollution

- Atmospheric deposition is the major source of Hg to many aquatic ecosystems.
- Once deposits from atmosphere, inorganic Hg can get methylated by bacteria to form MeHg then biomagnifies through food chain, resulting in higher concentrations in large long-lived predatory fish.



Atmospheric Hg Monitoring Worldwide



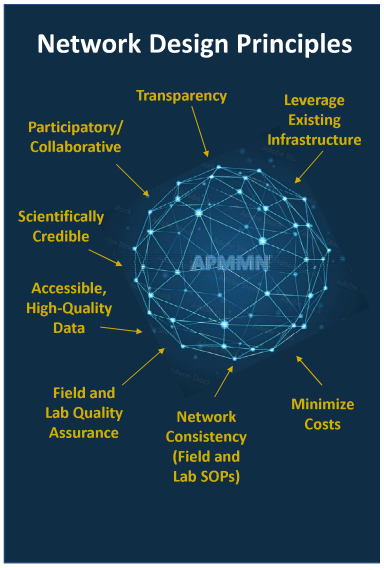
Long-term or background atmospheric Hg monitoring activities in SE and S Asia and the Pacific Island countries are very limited.

Asia Pacific Mercury Monitoring Network (APMMN)

- A cooperative effort to systematically monitor mercury in air and rainwater throughout the Asia-Pacific Region since 2016.
- However, planning began in 2012 with a series of meetings and workshops.
- Involves many different and voluntary groups, including environmental ministries and federal government agencies, academic institutions, and scientific research and monitoring organizations.

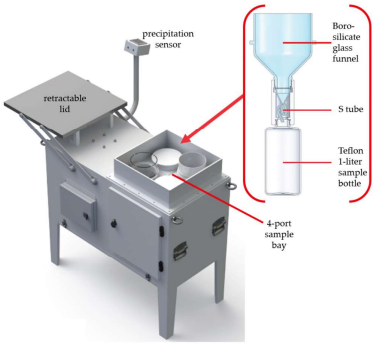
APMMN Objectives

- Determine status and trends in concentrations of atmospheric mercury, and wet, dry, and total deposition
- Develop a robust dataset for modeling and assessment
- Assist partner countries in developing monitoring capacity
- Share data and monitoring information



Approach

- Automated wet deposition sampler provided by Taiwan EPA
- Site operator and lab staff training
- Samples shipped to National Central University, Taiwan for Hg analysis
- Data reported back to operating country

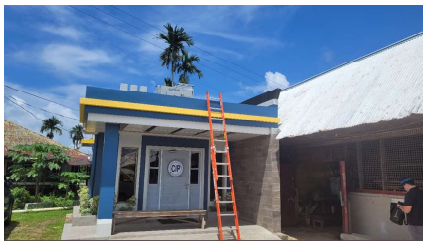


Taiwan-Style APMMN Wet Deposition Sampler

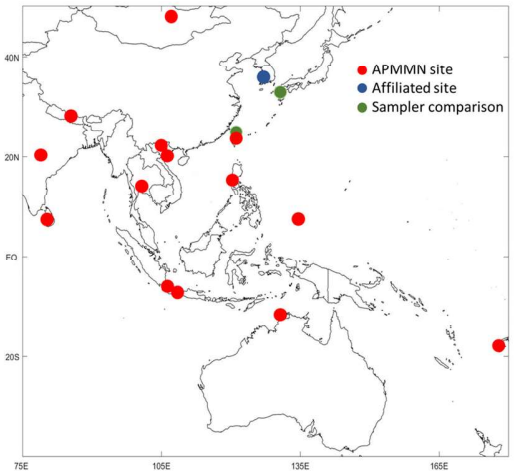
Chemical Analysis: Cold vapor atomic fluorescence spectroscopy (CVAFS) at National Central University, Taiwan
Mercury Forms: Total mercury wet deposition and precipitation concentrations
Sampling Frequency: One week; Tuesday – Tuesday schedule
Meteorology: Precipitation depth measured onsite (best) or as close as possible to the sampler (within 5 km)
Site Types: Regionally representative; urban, remote, rural areas with estimated high levels of mercury and deposition; sensitive ecosystems

APMMN Site Setup in Palau in 2023

- Sampler arrived Palau in 2020, but the site setup was delayed due to the COVID-19 pandemic.
- Sampler installed on the roof of EQPB Building on July 28, 2023.



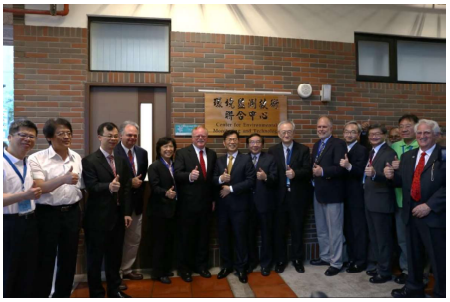
APMMN Site Map



- **15 APMMN sites**
  - Australia
  - Fiji
  - India
  - Indonesia
  - Korea
  - Mongolia
  - Nepal
  - Palau
  - Philippines
  - Sri Lanka
  - Taiwan
  - Thailand
  - Vietnam
- **2 sampler inter-comparison sites**
  - NCU, Taiwan
  - NIMD, Japan

Center for Environmental Monitoring and Technology

- To support the operation of APMMN, Taiwan EPA funded the establishment of the Center for Environmental Monitoring and Technology on NCU campus in 2016
  - Rainwater sample Hg analysis
  - Meetings and workshops
  - Capacity building
  - Technology transfer



Wet Deposition Samples Received and Analyzed

Year	2016-17	2018-19	2020	2021	2022	**Sum**
Number	279	336	175	266	282	**1338**

APMMN Partners Meetings in 2012-2019

APMMN Partners Meetings in 2020-2022 (Virtual)

APMMN Partners Meeting in Taipei in 2023



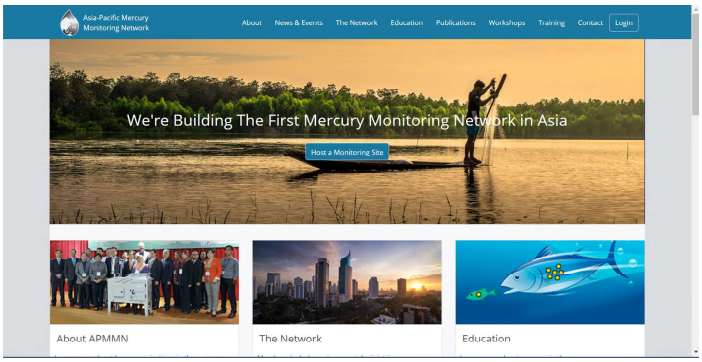
Capacity Building and Training

On-site training in Philippines (June 2018)


Training workshop in Taiwan (June 2019)

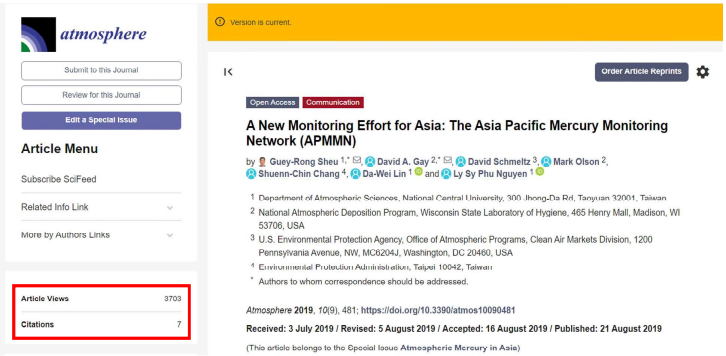
Advanced training in Taiwan (April 2019)

APMMN Website



apmmn.org

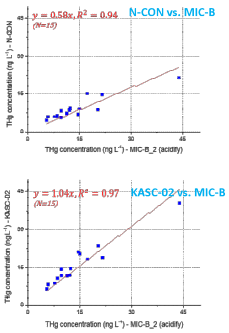
An Article Introducing the APMMN



Atmosphere 2019, 10(9), 481; https://doi.org/10.3390/atmos10090481

Inter-comparison of Various Wet Deposition Samplers

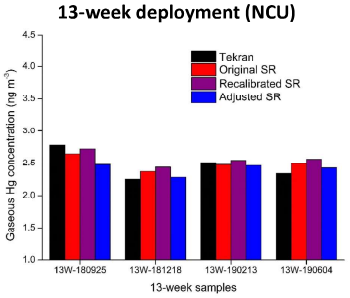
- There is no "standard" wet deposition sampler.
- APMMN uses MIC-B type sampler, whereas NADP/MDN uses N-CON sampler. Japan uses KASC-02 sampler.
- Inter-comparison study conducted to study the influences of sampler types on rainwater Hg measurement.



Passive Air Sampler(MerPAS) Test in Taiwan

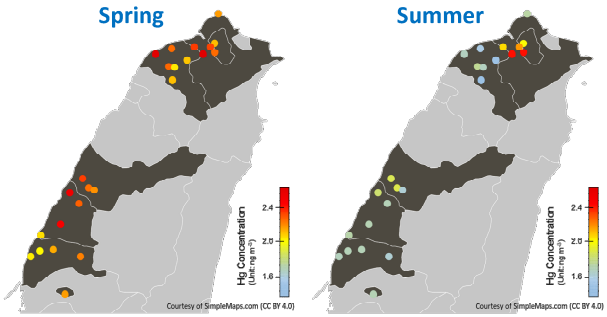
- From July 2018 to June 2019.
- Deployed at site on NCU campus (ground, suburban) and at the Lulin Atmospheric Background Station (mountain, remote).
- Side-by-side with a Tekran system.
- Various temporal resolution.

13-week deployment (NCU)



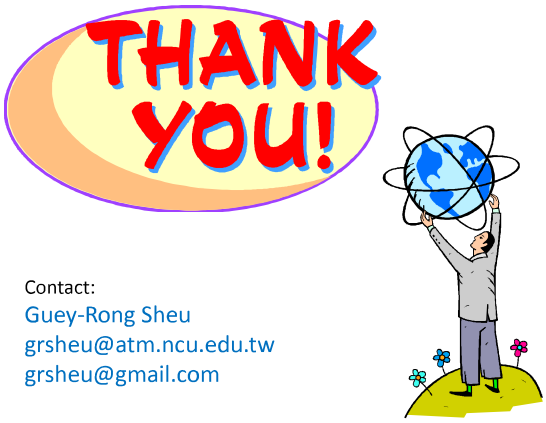
MerPAS Application in Taiwan: Temporal and Spatial Variations

2020, Northern Taiwan, 6 sites
2021, Central Taiwan, 12 sites
2022, Northern Taiwan, 6 sites



Future Plans

1. **Bring in new partners and expand existing wet network**
   - Deploy new mercury wet deposition collectors
2. **Continue training and network organizational development**
   - Annual Partners Meeting and training, site visits
3. **Network atmospheric mercury monitoring stations**
   - Explore networking operating atmospheric mercury monitoring systems into one harmonized network in the Indo-Pacific region
   - Considering a manual active/passive measurement of atmospheric Hg in network
   - Working closely with Japan on gaseous Hg monitoring



Contact:
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grsheu@atm.ncu.edu.tw
grsheu@gmail.com

行政院環境保護署
Environmental Protection Administration Executive Yuan, R.O.C.(Taiwan)

Taiwan-US Collaboration Taiwan ICDF Workshop on Waste Management

Chia-Lin Wu
Specialist, Dept. of Comprehensive Planning
Environmental Protection Administration, R.O.C. (Taiwan)

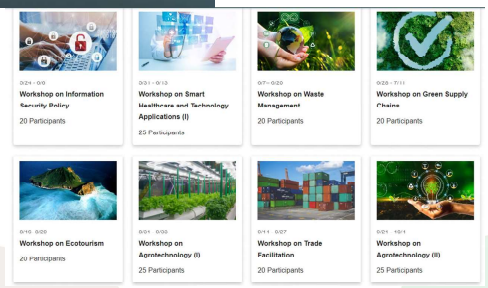
2022 Our Ocean Conference

Taiwan ICDF WWM

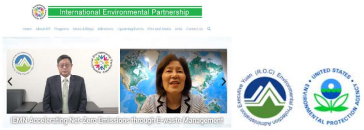
Workshop of Waste Management

TAIWAN ICDF 財團法人國際合作發展基金會
International Cooperation and Development Fund

International Education and Training



International Environmental Partnership



GEEP GLOBAL ENVIRONMENTAL EDUCATION PARTNERSHIP

APMMN

IEMN

行政院環境保護署
Environmental Protection Administration
Executive Yuan,R.O.C.(Taiwan)

Opportunities are HERE
Stay Connected!