

出國報告(出國類別：開會)

## 參加第五屆世界風險大會 (Fifth World Congress on Risk)



服務機關： 行政院環境保護署毒物及化學物質局

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## 摘要

國際風險分析學會 (Society for Risk Analysis, 簡稱 SRA) 成立於西元 1980 年, 該學會自 1981 年持續至今出刊「Risk Analysis: An International Journal」, 為風險分析領域極具領導指標性的學術期刊。SRA 定期在每年 12 月第二周舉辦研討會, 今 (2019) 年 5 月 6-8 日在南非開普敦舉辦三年一度的 SRA 第 5 屆世界風險大會 (SRA Fifth World Congress on Risk), 並與環境毒理學和化學學會非洲分會 (Society of Environmental Toxicology and Chemistry, SETAC Africa) 主辦 2019 年第 9 屆雙年度 SETAC 非洲會議。

今年度世界風險大會主題訂為「發展與韌性 (Development and Resilience)」, 大會吸引來自美國多個州、芬蘭、法國、非洲、日本、中國等國家的政府部門、世界衛生組織、業界、學術界、非政府組織發表風險分析 (風險評估、風險管理、風險溝通、風險相關政策) 最新研究方向與方法新視野。此趟會議我與美國環保署副助理署長 Dr. Nancy Beck 碰面, 更與美國環保署高級顧問 Dr. Abdel-Razak Kedry、華盛頓大學 Alison C. Cullen 教授、康乃爾大學兼現任 SRA 會長 Katherine A. McComas 教授、Argonne 國家實驗室 Dr. Margaret M. MacDonell、日本產業技術綜合研究所主任研究員 Dr. Kyoko ONO 多位專家學者進行風險評估教育教材、風險評估人員認證、風險評估種子師資培訓、國外制度推行經驗之意見交換。

參加國際風險盛會, 最大的收穫是熟悉認識國際重量級人物, 俾利建立拓展國際合作外, 還能短時間內快速汲取當前全球風險分析發展現況, 並有機會在世界舞台上彰顯我國環保署毒物及化學物質局的能見度。此趟令人驚豔的南非學習之旅, 對本署未來建立風險評估教育教材與認證制度推動與國際接軌有很大的助益與突破。

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## 一、目的

國際風險分析學會（Society for Risk Analysis，簡稱 SRA）成立於西元 1980 年，該學會自 1981 年持續至今出刊「Risk Analysis: An International Journal」，為風險分析領域極具領導指標性的學術期刊。SRA 定期在每年 12 月第二周舉辦研討會，今（2019）年 5 月 6-8 日在南非開普敦舉辦三年一度的 SRA 第 5 屆世界風險大會，是第一次在發展中地區舉行的世界風險大會，並與環境毒理學和化學學會非洲分會（Society of Environmental Toxicology and Chemistry，SETAC Africa）主辦 2019 年第 9 屆雙年度 SETAC 非洲會議。

SRA 世界風險大會，曾於比利時布魯塞爾（2003 年）、墨西哥瓜達拉哈拉（2008 年）、澳洲雪梨（2012 年）、新加坡（2015 年）舉行，吸引來自各國代表、相關政府組織、業界、學術界、非政府組織參與。2019 年風險世界大會主題訂為「發展與韌性（Development and resilience）」，主要目標有以下幾點：「促進對全球關注風險問題的對話和教育」、「分享對於分析方法、決策流程和制定的見解」、「分享風險評估、管理和溝通方面的進展」、「促進風險分析相關團體組織和個人間的聯繫」以及「促進教育機會並將科學知識推廣到其他地區」。

針對我國推動國家化學物質政策綱領，以「有效管理化學物質，建構健康永續環境」為願景，執行「國家治理、降低風險、管理量能、知識建立與跨境管理」5 大施政目標與 23 項推動策略，其中針對「制定化學物質管理行動方案」、「建立化學物質風險及危害評估機制與工具，防範與緩解化學物質對健康與環境之危害」、「健全化學物質登錄制度，落實化學物質流向與追蹤查核管制」、「建置國家級檢驗單位與檢驗標準，強化檢驗與勾稽能力」、「推動國際關注之新興污染物質環境調查」、「強化企業社會責任，導正媒體與利害相關者對危害化學物質之認知」、「配合國際化學物質管理相關公約，執行國際協定」、「管理化學物質跨境運輸」以及「積極參與國際性化學物質管理相關組織與會議」等策略，是圍繞「風險分析」的思維。

風險分析是決策過程中重要的工具之一，用以評估科學數據中的不確定性，避免錯誤決策所造成的損失。爰此，本署出席國際風險盛會，快速瞭解當前全球風險分析發展現況、新興資訊蒐集、研究趨勢、風險分析方法及其應用知識，特別是借鏡國際以風險為基礎的化學物質管理策略與作法。此外，汲取國外風險評估認證推行經驗、拓展國際合作、接軌風險評估教育教材與風險評估人員認證制度，為此趟出國計畫的重要目的。

## 二、開會過程

會議地點在開普敦國際會議中心舉行（圖 1），每日會議上午 8:30 至 10:00 大會特定安排 3 位特別演講（keynote），3 天的會議，我全程參與聆聽 9 場特別演講（圖 2）。第 1 天第 1 場次由美國環保署副助理署長 Dr. Nancy Back 揭開序幕，我特提早於會場與 Dr. Nancy Back 會面，並代本署化學局謝局長向 Dr. Nancy Back 問候（圖 3）。Dr. Nancy Back 演講主題為「Risk and Resilience at the U.S. Environmental Protection Agency: Chemical Regulatory Policy（美國環境保護署風險和韌性：化學品監管政策）」（圖 4），演講要點：

- （一）美國「弗蘭克勞滕伯格 21 世紀化學物質安全法案」（Frank R. Lautenberg Chemical Safety for the 21st Century Act）為毒性物質控制法（Toxic Substance Control Act, TSCA）的最新修正案。
- （二）USEPA 既有化學物質清單約 40,000 種，目前針對 10 種既有化學物質進行風險評估，40 種既有化學物質優先評估名單，在 2020 年開始評估。USEPA 每年約收到 800 種的新化學物質資料。美國 EPA 的 TSCA 相關的工作人員大約為 250 位。
- （三）依據物質的使用條件，採用以風險為基礎方法（risk-based approach），並同時評估化學物質的危害（hazard）和暴露（exposure），以進行化學物質暴露風險的確認（risk determinations）。USEPA 進行健康與環境之危害及暴露評估，其評估的族群，涵蓋工作者、消費者、一般民眾、易感族群。而環境評估，涵蓋水體環境。
- （四）化學品監管的首要目標是減少化學品對人體和環境產生不合理的風險（reduce unreasonable risk）。因此，化學品帶來的益處、在經濟上的影響、對於小企業和創新的衝擊，以及替代品的成本及效益都須考慮在內。

- (五) 農藥在銷售或分銷之前，必須在 USEPA 註冊，於「聯邦殺蟲劑、殺真菌劑及滅鼠劑法」註冊時，申請人必須表明根據規範使用農藥「通常不會對環境造成不合理的不利影響」。農藥的風險評估需進行人體健康風險評估(一般民眾、孕婦、嬰幼兒、兒童、勞工)，以及環境宿命與生態風險評估(植物、鳥類、無脊椎動物、魚類及哺乳動物)。
- (六) 任何農藥的使用需考量對經濟、社會及環境成本及其效益，以避免對人體或環境造成任何不合理的風險。另根據美國聯邦食品藥物和化妝品法(Federal Food Drug and Cosmetic Act, FDCA)，任何不符合標準的食品中使用農藥，而產生的農藥殘留會對人類造成飲食的風險也需考慮在內。
- (七) 針對化學品之效益及替代品評估，提及替代品評估(alternatives assessment)，需瞭解對整體農藥市場的衝擊。而效益評估(benefits assessment)，需瞭解農藥成份提供的價值。至於衝擊評估(impact assessment)，則需瞭解化學品管制之潛在經濟影響。
- (八) USEPA 以風險為基礎及韌性管理方式重點：確保化學品及農藥的安全性及可用性來保護大眾健康及生態環境。另外，也極力讓所有的社區、個人、企業及州、地方及部落管理機構都能獲取足以有效參與管理人類健康及環境風險的正確化學物質資訊。



圖1.開普敦國際會議中心



圖2.大會會場





圖3.筆者與美國環保署Dr. Nancy Beck合照



圖4. Dr. Nancy Beck特別演講

每日會議上午 10:30 由高達 14 至 24 個不同主題之平行口頭演講，至下午 16:50 結束，會場亦有海報展。第一天上午聆聽重點，還包括 Calidris Environment BV 的 Dr. Annegaik Leopold，演講主題「Endocrine Disruptors: What do we know? What do we not know? How to we communicate about this?」（內分泌干擾物質：我們知道什麼？我們不知道什麼？我們應該如何溝通呢？）」（圖 5），演講要點:

- (一) 1980 年代開始，人們已意識到內分泌干擾物質可能對環境產生不良的影響，進而公眾及政治上的關注亦隨之增加。相關文獻指出:在非洲的水域發現有持久性有機污染物、重金屬及雙酚 A；在非洲水域中雙性的鯰魚，亦暴露於含有雌性激素-壬基苯酚的環境；非洲水域 DDT 噴灑區域的淡水魚也發現了雙性的特性。
- (二) 在過去 15 年中，歐洲、美國及日本已展開了相關的研究，且由 OECD 彙整全面的測試（如：體內（*in vivo assay*）、體外（*in vitro assay*）等）計畫。
- (三) 針對內分泌干擾物質的風險溝通，以社區為基礎所介入的內分泌干擾物質風險溝通工作，相較於由外人所規範制定的措施更為成功。而在科學家的角色上，需意識到公眾不易區分危險與風險、決定如何針對不確定性進行溝通、意識主題可能存在的偏見及發展溝通的策略等。科學家可以協助社區層級的互動、精心的制定溝通的策略及傾聽公眾的想法。

第一天下午聆聽重點，也包括美國華盛頓大學 Alison C. Cullen 教授，演講主題：

「Gender-associated Differences in Risk Attitudes and Perceptions Among Farmers in Mali（馬里農民的風險態度和感知與性別相關的差異）」（圖 6），演講要點：

- （一）過去研究顯示男性和女性的風險態度是不同的，因此可能會用不同的方式感知風險。
- （二）研究調查馬里 6 個區域（Gao, Kayes, Koulikoro, Mopti, Segou 及 Sikasso）內的單親或雙親的異性家庭，觀察性別與工作傷害（work injury）、極端天氣（more extreme weather）、社區關係（weaker community relationships）、過多債務（increasing level of debt）、缺乏購買者（lack of buyers at the market）及戰爭/衝突（war/conflict）6 種風險認知的關聯性。利用回歸分析，調整基本人口學因子（年齡、教育、健康、財富、時間貧窮、兒童、地理區域）及態度相關因子，結果顯示性別與風險認知之間的關聯，排除地理區域的干擾因子下，除極端天氣外，女性表達了更多關注；然而，當統計模式調整地理區域這項干擾因子時，與性別的關聯基本上不存在，因為性別角色和態度會因應地理區域有所不同。



圖5. Dr. Annegaike Leopold演講



圖6. Alison C. Cullen演講



圖7.風險分析學會-南非分會108年成立



圖8. 筆者與Dr. Abdel- Razak Kedry 第1次見面

第一天晚上我亦參加風險分析學會南非分會成立大會（圖 7），這也是首次在開發中國家舉辦風險世界大會的原因。SRA 世界風險大會，演講主題橫跨了系統性風險分析與新興韌性理論、災害風險評估、風險評估模式發展、糧食-能源-水資源安全相關議題、災害與關鍵基礎設施相依性之探討、全球性巨災風險等豐富議題。第二天和第三天，除聆聽各場口頭演講外，並主動認識美國環保署高級顧問 Dr. Abdel-Razak Kedry（圖 8）、華盛頓大學 Alison C. Cullen 教授（圖 9）、康乃爾大學兼現任 SRA 會長 Katherine A. McComas 教授（圖 10）、Argonne 國家實驗室主管 Dr. Margaret M. MacDonell（圖 11），及日本產業技術綜合研究所 Dr. Kyoko ONO 主任研究員（圖 12）交換意見，並宣傳我國環保署毒物及化學物質局成立願景與推動策略。第三天重頭戲，為臺灣大學吳焜裕教授，演講主題:「Significance of Risk Assessor Certification（風險評估人員認證的重要性）」，演講要點:

- （一）在美國 1983 年，國家研究委員訂定風險評估及管理的架構，以科學的方法參與決策過程、風險分析及風險治理，主要利用現有的科學資訊在公共政策上作出決策。
- （二）在臺灣，也將健康風險評估應用於環境衛生相關的政策，但在過去 10~20 年間，健康風險評估受到公眾極大的爭議與不信任。為了強化與公眾的信任，有必要改進風險溝通的相關工作。
- （三）尋求最佳促進科學與政府之間伙伴關係的機制，此機制確保政府的管理是依據最佳可取得的科學數據及判斷，重要的管理上的決定伴隨著不可避免的利益衝

突中應保持科學數據及判斷的完整性。

- (四) 健康風險評估的局限性包括：不完整的數據、不足的證據、缺乏知識、無法完整描述過程以及有限的資源。在健康風險評估上的不確定性包括：評估過程的假設、情境、模式、參數及缺乏知識。
- (五) 風險管理者決策的混淆包括：可能不知如何依據多份風險評估報告做決策及不知道決策的局限性等。
- (六) 建議健康風險評估人員應先取得認證的原因包括：風險分析領域非常多樣、評估方法已日趨成熟、應要有整合多種科學資訊的能力以及應廣泛的使用合理的科學做決策，以尋求環境及食品安全政策的一致性。
- (七) 風險評估人員認證的重要性為：確保風險評估人員能夠適當的選擇和整合科學的資訊，並且確保能在必要的時候做出適當的假設，以及能夠評估其假設的影響。而健康風險評估中使用的科學資訊應對公眾透明，且應充分對健康風險評估中的不確定性和局限性做清楚的描述，以便為公眾和風險管理者提供信息。風險評估人員認證制度可重新獲得公眾的信任，以實現有效的風險溝通，而風險管理者也可以意識到在不確定性下制定的政策的局限性。
- (八) 健康風險評估是一項專業，建立認證體係是為了鑑定在這個領域的專業人士的資格。認證也是為了確保能進行具有科學依據的健康風險評估，從而實現有效的風險溝通和具有科學基礎可執行的公共政策。



圖9. 筆者與Alison C. Cullen教授合照



圖10. 筆者與Katherine A. MeComas教授合照



圖11. 筆者與Dr. Margaret M. MacDonell 合照



圖12. 筆者與Dr. Kyoko ONO合照

第四天由台灣風險分析學會協助，安排 2 場次非正式討論活動，分別與美國環保署高級顧問 Dr. Abdel-Razak Kedry，針對長期合作風險評估教材以及種子師資交換意見；以及與日本產業技術綜合研究所主任研究員 Dr. Kyoko ONO，針對日本風險分析學會 2019 年 6 月底新書「風險科學百科全書」出版的歷程進行實務經驗深度交流分享，作為本署編撰風險評估教材很棒的學習經驗。出國行程表如下表：

日期	工作內容概要
108.05.04-05	啟程，搭機前往南非開普敦
108.05.06-08	參加第 5 屆世界風險大會，開普敦國際會議中心舉行
108.05.09	與美國環保署研究與發展辦公室國家環境評估中心 Dr. Abdel-Razak Kadry，以及日本國立研究開發法人產業技術綜合研究所 Dr. kyoko ONO 交流化學物質風險分析認證制度與教育教材
108.05.10-11	返程，搭機返回臺灣

### 三、心得與建議

第 5 屆世界風險大會吸引有來自美國多個州、日本、非洲、芬蘭、法國、中國等國家的政府部門、業界、專家學者、非政府組織、世界衛生組織參與，令我眼界大開。SRA 提供交換風險分析和風險解決問題的資訊、想法及機會，促進個人和組織之間的理解及專業合作，推動發展風險分析及其相關應用知識，並鼓勵應用風險分析方法來解決實際面臨之種種問題，推進風險分析研究和教育領域的最新進展，有機會參加這樣盛大的國際會議，備感榮幸（圖 13）。

這次的會議，最大的收穫是熟悉認識國際重量級人物，俾利建立後續長期國際合作外，各演講者的專業領域涵蓋不同跨學科和多學科分野，藉由不同的觀點來分別詮釋風險分析，提高管理風險和培養社會韌性方面的知識和實踐。風險分析教育和風險評估人員認證推動，是改善風險和韌性的實踐與應用，以促進社會永續發展。風險評估基礎教育教材，以及如何推動風險評估人員認證成為國人信賴的認證機構、制度或資格，也是此趟會議請益的核心任務。此趟階段性交流成效良好，實屬難得之國際交流機會，成果之建議如下：

對象	Dr. Abdel- Razak Kadry	Dr. kyoko One	Prof. Alison C. Cullen
機構	美國環保署高級顧問 馬里蘭大學教授	日本產業技術綜合研究所	美國華盛頓大學
專長	毒理學及風險評估	化學品安全及風險評估	人類健康風險評估
建議	美國已有多多年風險評估經驗，如臺灣推行風險評估人員認證，可與美國馬里蘭大學合作進行種子風險評估人員的認證，目前已有相關的教材與師資可協助臺灣推動風險評估教育及認證。	可提供日本風險分析學會推出風險科學百科全書(108年6月底出版，日本版)。書籍內容共13個章節，涵蓋風險分析基礎和新興議題的案例研究(化學物質、金融、氣候變遷、食品安全與新興風險等章節)，由163名專家撰寫。	可提供臺灣推行風險評估教育教材之建議，特別是風險溝通議題。

綜上所述，臺灣未來將推行風險評估教育教材、風險評估種子師資培訓、風險評估人員認證，建議可拓展與美國馬里蘭大學、美國華盛頓大學，或日本產業技術綜合研究所機構合作，汲取國外制度成功推行之經驗，並結合國內相關專業組織力量，以逐步建構我國專業風險評估人員及其實質影響力。值得一提，南非開普敦會議餐點或是當地都是使用紙吸管（圖 14），國內對塑膠吸管政策正採取行動，並規劃全面禁用的時程。限用塑膠吸管的政策，已經逐漸成為世界趨勢。



圖13. 會場一隅



圖14. 南非開普敦-使用紙吸管

## 四、附錄

附錄一、大會議程

附錄二、會議資料



## 附錄一、大會議程



**FIFTH WORLD CONGRESS ON RISK**

DEVELOPMENT AND RESILIENCE

**SETAC Africa 9th Biennial Conference**

# 2019 Conference Program



In partnership with



Cape Town International Convention Centre

Cape Town, South Africa

May 6-8, 2019



# Plenary Sessions

All plenary sessions are held in Cape Town International Convention Centre, West Ballroom

**8:30 AM – 10:00 AM**

## Monday Plenary International Perspectives on Risk and Resilience

*Moderator: Igor Linkov*

Speakers:

- Nancy Beck; Principal Deputy Assistant Administrator, Office of Chemical Safety and Pollution Prevention, US EPA
- Lorraine Maltby; Professor, Department of Animal and Plant Sciences, Sheffield University
- Phil Mjwara; Director, International Cooperation and Resources Department of Science and Technology (South Africa)

**5:30 PM – 6:30 PM**

## Monday Plenary SETAC Plenary / Introduction in Auditorium

**8:30 AM – 10:00 AM**

## Tuesday Plenary One Health

*Moderator: Charlie Menzie*

Speakers:

- Dr Sohel Saikat; Programme Officer, Quality Systems and Resilience Technical Lead: DFID Tackling Deadly Diseases in Africa Programme (TDDAP) and KOICA Quality and Resilience in Ethiopia and Liberia Project UHC and Health Systems Cluster World Health Organization
- Niladri Basu; Associate Professor, Department of Natural Resource Sciences and the School of Human Nutrition, McGill University
- Zingisa Motloba; South African Bureau of Standards

**8:30 AM – 10:00 AM**

## Wednesday Plenary Resilience and Industry

*Moderator: Aleksandar Jovanovic*

Speakers:

- Titus Mathe; Eskom
- Katherine McComas; Cornell University
- Myriam Merad; French National Centre for Scientific Research, France

**10:30 AM – 3:00 PM**

## Wednesday Plenary

### SETAC Session: Risk-Based Weight-of-Evidence Approach for Chemical Management

Chairs:

- Charles Menzie, SETAC
- Victor Wepener, North-West University

Topics:

- Weight-of-Evidence and Risk Management for Chemicals Outside of Africa
- Risk Policy and Science Considerations for Management of Chemicals within Africa
- Panel Discussion for Africa Experience
- Workgroup Discussion of Scientists and Policy Makers From Within Africa and From Other Global Regions

Speakers:

- Lovelace Sarpong; Chemicals Control and Management Center of the Environmental Protection Agency of Ghana
- Gerhard Cilliers; Directorate Resource Quality Information Services, Department Water and Sanitation, South Africa

- Sebastian Jooste; Directorate Resource Quality Information Services, Department Water and Sanitation, South Africa
- Melissa Lintnaar-Strauss; Department of Water Affairs, South Africa
- Ikechukwu Orwurah; University of Nigeria, Nigeria
- Olawale Otitoju; Federal University Wukari, Nigeria
- Gertie Arts; Wageningen University and Research Center, The Netherlands
- Igor Linkov; U.S. Army Engineer Research and Development Center, United States
- Ross Smith; Hydrobiology, Australia
- Abdel Kadry; U.S. EPA, United States
- Bryan Brooks; Baylor University, United States

**3:30 PM – 4:30 PM**

## Wednesday Closing Session / SETAC Africa Assembly

## Technical Program

Presenter's name is asterisked (\*) if other than first author.

10:30 AM – 12:10 PM		10:30 AM – 11:50 AM		10:30 AM – 12:10 PM	
M2-A Cybersecurity Risk Analysis Meeting Room 1.41 Chair: Thierry Wandji		M2-B Energy Meeting Room 1.42 Chair: Margaret MacDonell		M2-C Risk Communication Meeting Room 1.43 Chair: Christopher Cummings	
<b>10:30 AM</b>	<b>M2-A.1</b>	<b>10:30 AM</b>	<b>M2-B.1</b>	<b>10:30 AM</b>	<b>M2-C.2</b>
The Science of Cyber Resilience: Characteristics and Initial System Taxonomy <i>Henshel DS, Levitt K, Templeton S, Cains MG, Alexeev A, Blakely B, McDaniel P, Wehner G, Rowell J, Weismen M</i> Indiana University		Assessing Resilience in the Energy Supply Sector <i>Auerkari P, Jovanovic A, Pohja R, Tuurna S*, Molarius R, Koivisto R, Hapuli H</i> VTT Technical Research Centre of Finland		Risk Communication of Climate Change in Portugal <i>Rocha CL, Santos IA, Vasconcelos LT, Cruces AC, Fernandes PC, Charmier MA</i> Universidade Lusófona de Humanidades e Tecnologias	
<b>10:50 AM</b>	<b>M2-A.4</b>	<b>10:50 AM</b>	<b>M2-B.2</b>	<b>10:50 AM</b>	<b>M2-C.3</b>
Resiliency of Smart Infrastructure Under Cyberattack in Internet of Things <i>Ghorbani R, Branigan J</i> University of Hawaii at Manoa		Investment Risk Mitigation and Resilience in Energy Systems Infrastructure <i>Shittu E, DeLuque I</i> George Washington University		Science Communication: Thinking Globally and Acting Locally <i>Paulik LB</i> Maul Foster & Alongi, Inc.	
<b>11:10 AM</b>	<b>M2-A.5</b>	<b>11:10 AM</b>	<b>M2-B.3</b>	<b>11:10 AM</b>	<b>M2-C.4</b>
Integrating Stakeholder Mapping and Risk Scenarios to Improve Resilience of Cyber-Physical-Social Networks <i>Almutairi A, Lambert JH</i> University of Virginia		A Network-based Organizational Model for Improving California's Transportation Fuel Sector Resilience to Sea Level Rise and Coastal Flooding <i>Lindbergh S, Radke J, Roberts K</i> University of California at Berkeley		Frontiers of Risk Communication: Grand Challenges for Communication of Emerging Bioscience Issues <i>Cummings CL</i> Nanyang Technological University	
<b>11:30 AM</b>	<b>M2-A.6</b>	<b>11:30 AM</b>	<b>M2-B.8</b>	<b>11:30 AM</b>	<b>M2-C.5</b>
A Strategy for Managing Apathetic Users During Requirements Definition <i>Aziken GO, Egbokhare FA, Ariavie GO</i> Federal University		Design and Testing of Cloud-based Distributed Automated Fraud Detection for Gasoline Resellers <i>Beteto AL, Melo V*, Lin J, Polmateer TL, Dias EM, Lambert JH</i> University of São Paulo, University of Virginia		Change the Game for Environmental Research – Activities to Support Science and Risk Communication <i>Seiler TB</i> RWTH Aachen University, Institute for Environmental Research, Ecosystem Analysis unit	
<b>11:50 AM</b>	<b>M2-A.7</b>			<b>11:50 AM</b>	<b>M2-C.6</b>
Robust and Resilient Software Security Certification and Accreditation <i>Wandji T</i> Navair Air Systems Command				Emerging Contaminants and Related Risk Communication Aspects <i>Leopold A</i> Calidris Environment BV	

## Technical Program

Presenter's name is asterisked (\*) if other than first author.

10:30 AM – 11:30 AM

**M2-D**

**Governance and Decision Making**

*Meeting Room 1.44*

*Chair: Dalila Antunes*

**10:30 AM**

Science-Informed Decision Making: Holistic Frameworks to Support Societal Values

*Apitz SE*

*SEA Environmental Decisions Ltd*

**M2-D.3**

**10:30 AM**

Application of Formal Causal Analysis to Diagnosing Environmental and Health Conditions

*Menzie CA*

*SETAC - Exponent*

10:30 AM – 11:50 AM

**M2-E**

**Pollution and Environmental Health**

*Meeting Room 1.61*

*Chair: Clark Ehlers*

**M2-E.1**

**10:30 AM**

Fluoride a Double Edged Sword - Fluoride Exposure and its Effect on the Intelligence of School Children in Tamil Nadu, India

*Francis DL*

*Dr MGR Medical University, Chennai, Tamil Nadu, India*

**M2-F.3**

**10:50 AM**

When Climate Change is not Psychologically Distant – factors Influencing the Acceptance of Sustainable Farming Practices in Vietnam

*Connor M, de Guia AH, van Nguyen H, Sander BO, Gummert M  
International Rice Research Institute*

**M2-D.5**

**10:50 AM**

Risk Assessment Former Outdoor Firing Range Decommissioning: A Comparison Between Switzerland, United States of America and French Technical and Legal Regulation

*David JF*

*Compagnie Nationale des Experts de Justice en Environnement*

**M2-E.2**

**10:50 AM**

Estimating Inorganic Arsenic Exposure from Rice Consumption in Chinese Populations

*Shao K, Xu J, Li H, Zhou Z*

*Indiana University Bloomington*

**M2-F.4**

**11:10 AM**

Assessment of Chemical Risk to Ecosystem Services: A Proof of Concept Study

*Maltby L, van den Brink P, Faber J  
The University of Sheffield*

**M2-D.6**

**11:10 AM**

The New Zealand System to Assessing the Benefits and Risks of Releasing Exotic Organisms to Manage Invasive Species

*Ehlers C*

*Environmental Protection Authority*

**M2-E.3**

**11:10 AM**

Heavy Metal Accumulation of Plants from the Vicinity of Copper - Nickel Mines in Selebi-Phikwe, Botswana

*Manyiwa T, Gabankitse G, Rantong G, Ultra VU*

*Botswana International University of Science & Tec*

**M2-F.5**

**11:30 AM**

Contaminated Sites, Ecosystem Services and Citizen Science Opportunities

*MacDonell MM, Mishra SK, Zvolanek E, Hildebrand RD*

*Argonne National Laboratory*

**M2-E.4**

**11:30 AM**

Bisphenol-A Levels and its Association with Reproductive Hormones and Oxidative Stress Biomarkers in Men

*Ugwu PI, Charles-Davies MA, Ugochi O, Okoli SU*

*University of Ibadan*

**M2-F.6**

10:30 AM – 11:50 PM

**M2-F**

**Chemicals**

*Meeting Room 1.62*

*Chair: Kan Shao*

**Monday**

10:30 AM – 11:50 AM	1:30 PM – 2:50 PM	1:30 PM – 2:10 PM
<p><b>M2-G</b>  <b>Fate, Effects, and Risks of Agrochemicals I</b>  <i>Meeting Room 1.63</i>  <i>Chair: Afolarin Ogungbemi</i></p>	<p><b>M3-A</b>  <b>Infrastructure Resilience Design</b>  <i>Meeting Room 1.41</i>  <i>Chair: Bödvar Tomasson</i></p>	<p><b>M3-B</b>  <b>Nanomaterial Safety</b>  <i>Meeting Room 1.42</i>  <i>Chair: Emma Anyika</i></p>
<p><b>10:30 AM</b> <span style="float: right;"><b>M2-G.1</b></span>  Evidence of Impacts from DDT on Large Aquatic Bird Eggs from KwaZulu-Natal, South Africa  <i>Bouwman H, Yohannes YB, Nakayama SMM, Motohira M, Ishizuka M, Humphries MS, van der Schyff V*, du Preez M, Dinkelmann A, Ikenaka Y</i>  <i>North-West University, Potchefstroom</i></p>	<p><b>1:30 PM</b>  Holistic Security Design Using Risk Analysis Methods  <i>Tómasson B</i>  <i>University of Iceland</i></p>	<p><b>1:30 PM</b> <span style="float: right;"><b>M3-B.4</b></span>  Nanomedicine and Nanotoxicology: Convergence of the Mechanisms Involved  <i>Gulumian M, Andraos C</i>  <i>National Institute for Occupational Health</i></p>
<p><b>10:50 AM</b> <span style="float: right;"><b>M2-G.2</b></span>  (Anti-)androgenic Activity of Water Containing Agricultural Chemicals: Glyphosate, 2,4-D, and Cry Proteins  <i>Horn S, Pieters R, Bohn T</i>  <i>North-West University</i></p>	<p><b>1:50 PM</b> <span style="float: right;"><b>M3-A.5</b></span>  Risk-Based Design and Office Chairs for Lecturers at the University of Benin  <i>Idada RO, Ariavie GO, Adams V</i>  <i>Federal University</i></p>	<p><b>1:50 PM</b> <span style="float: right;"><b>M3-B.5</b></span>  Risk Governance for Emerging Technologies  <i>Trump B, Linkov I</i>  <i>US Army Corps of Engineers</i></p>
<p><b>11:10 AM</b> <span style="float: right;"><b>M2-G.3</b></span>  Effects of Pyrethroid Insecticide Exposure on Male Reproductive Hormones, Histology and Sperm quality in Adult Rats  <i>Nwadike CN, Okereke S, Ikaraoha IC, Nwanjo HU, Okoroiwu LI</i>  <i>Imo State University Owerri, Abia State University Ururu</i></p>	<p><b>2:10 PM</b> <span style="float: right;"><b>M3-A.6</b></span>  A Sociotechnical Perspective on Safety Incidents in High-risk Industries  <i>Goede JF, Hofstede GJ</i>  <i>North-West University, Wageningen University and Research</i></p>	
<p><b>11:30 AM</b> <span style="float: right;"><b>M2-G.4</b></span>  The Use of Behavioural Screening in Pollution Control: Locomotion Response as a Sensitive Endpoint in Fish and Invertebrates  <i>Ogungbemi AO, Leuthold D, Teixido E, Van Gestel CA, Scholz S, Küster E</i>  <i>Uni-Landau, UFZ Leipzig</i></p>	<p><b>2:30 PM</b> <span style="float: right;"><b>M3-A.7</b></span>  Guideline for Resilience Assessment of Smart Critical Infrastructures  <i>Øien K, Bodsberg L, Jovanovic A</i>  <i>SINTEF</i></p>	

**Monday**

1:30 PM – 3:10 PM	1:30 PM – 2:50 PM	1:30 PM – 2:30 PM
<b>M3-C</b> <b>Public Health - Water Infrastructure</b> <i>Meeting Room 1.43</i> <i>Chair: Kerry Hamilton</i>	<b>M3-D</b> <b>Social Risk Communication</b> <i>Meeting Room 1.44</i> <i>Chair: Kevin Quigley</i>	<b>M3-E</b> <b>Organizational Risk Reduction</b> <i>Meeting Room 1.61</i> <i>Chair: Myriam Merad</i>
<b>1:30 PM</b> Probabilistic Study of Chemical Contaminant in Pipe Network System <i>Mishra PK, Putcha CS*</i> <i>California State University, Fullerton</i>	<b>1:30 PM</b> Forum Theatre as a Novel Form of Risk Communication for Indigenous Youth Suicide Prevention <i>Jardine CG, Friedel T, Crowshoe L, Henderson R</i> <i>University of the Fraser Valley, Mount Royal University, University of Calgary</i>	<b>1:30 PM</b> Novel Risks: Organizational Resilience through Resistance <i>Maguire S, Hardy C</i> <i>McGill University</i>
<b>1:50 PM</b> Risks Associated with Sewage Sludge Disposal: Case Study from Kerala, India <i>Reghu I, Varghese GK*</i> <i>National Institute of Technology Calicut</i>	<b>1:50 PM</b> Environmental Risk Narratives in Historical Perspective: From Early Warnings to 'Risk Society' Blame <i>Burgess A</i> <i>University of Kent</i>	<b>1:50 PM</b> Preventing Major Accidents and Disasters: How to Get Out of Organizational Dualism "Culture-Structure" <i>Merad M</i> <i>Centre National de la Recherche Scientifique (CNRS)</i>
<b>2:10 PM</b> Water Infrastructure, Childhood Blood Lead Levels, and Delinquency Risk: Characterizing the Effects of Exclusion from Municipal Water Services in Wake County (North Carolina, USA) <i>Clonch A, Fisher M, MacDonald-Gibson J, Macdonald J, Cooke P</i> <i>UNC Chapel Hill Gillings School of Global Public Health</i>	<b>2:10 PM</b> Risk Communication and Knowledge Fragmentation in Disaster Arenas <i>Santos IA, Vasconcelos LT, Rocha CP</i> <i>MARE.NOVA-Universidade Nova de Lisboa</i>	<b>2:10 PM</b> Senior Management Accountability for Risk Events: Risk Culture Lessons from South African 'State Capture' Scandals <i>Zaaiman H, Goede JF</i> <i>North-West University</i>
<b>2:30 PM</b> Microbiological Quality of Green Stormwater Infrastructure and Potential Risks <i>Hamilton KA, Ahmed W, Ishii S, Haas CN</i> <i>Arizona State University</i>	<b>2:30 PM</b> National Media Coverage of three Mass Evacuations in Canada: Amplifying or Attenuating Feelings of Trustworthiness <i>Quigley KF, Millot M, Burns C</i> <i>MacEachen Institute for Public Policy and Governance, Dalhousie University</i>	<b>M3-E.3</b> Novel Risks: Organizational Resilience through Resistance <i>Maguire S, Hardy C</i> <i>McGill University</i>
<b>2:50 PM</b> Assessing Community Health and Resilience in Extreme Events <i>Reible DD, MacDonell M, Rifai H, Rodriguez L</i> <i>Texas Tech University</i>	<b>M3-D.2</b> Forum Theatre as a Novel Form of Risk Communication for Indigenous Youth Suicide Prevention <i>Jardine CG, Friedel T, Crowshoe L, Henderson R</i> <i>University of the Fraser Valley, Mount Royal University, University of Calgary</i>	<b>M3-E.4</b> Preventing Major Accidents and Disasters: How to Get Out of Organizational Dualism "Culture-Structure" <i>Merad M</i> <i>Centre National de la Recherche Scientifique (CNRS)</i>
	<b>M3-D.3</b> Environmental Risk Narratives in Historical Perspective: From Early Warnings to 'Risk Society' Blame <i>Burgess A</i> <i>University of Kent</i>	<b>M3-E.5</b> Senior Management Accountability for Risk Events: Risk Culture Lessons from South African 'State Capture' Scandals <i>Zaaiman H, Goede JF</i> <i>North-West University</i>
	<b>M3-D.4</b> Risk Communication and Knowledge Fragmentation in Disaster Arenas <i>Santos IA, Vasconcelos LT, Rocha CP</i> <i>MARE.NOVA-Universidade Nova de Lisboa</i>	
	<b>M3-D.6</b> National Media Coverage of three Mass Evacuations in Canada: Amplifying or Attenuating Feelings of Trustworthiness <i>Quigley KF, Millot M, Burns C</i> <i>MacEachen Institute for Public Policy and Governance, Dalhousie University</i>	

**Monday**

**1:30 PM – 3:10 PM**

**M3-F**

**Transportation**  
Meeting Room 1.62  
Chair: Darren Shannon

- |  |               |
|--|---------------|
| <p><b>1:30 PM</b><br/>Quantifying Resilience of R&amp;D Plans for Electric Vehicles in Energy Microgrids<br/><i>Alsultan M, Lambert JH*</i><br/><i>University of Virginia</i></p>  | <b>M3-F.2</b> |
| <p><b>1:50 PM</b><br/>Maximizing the safety Benefits of Autonomous Vehicle Technologies<br/><i>Good DH, Miao Y, Krutilla K</i><br/><i>Indiana University</i></p>   | <b>M3-F.3</b> |
| <p><b>2:10 PM</b><br/>The Influence of Crash Velocity on the Severity of Road Traffic Accidents – A Multivariate Mediation Analysis<br/><i>Shannon D</i><br/><i>University of Limerick</i></p>   | <b>M3-F.4</b> |
| <p><b>2:30 PM</b><br/>Anticipating Transitions in Personal and Societal Transportation Systems<br/><i>Wells EM</i><br/><i>Carnegie Mellon University</i></p>   | <b>M3-F.5</b> |
| <p><b>2:50 PM</b><br/>Intelligent Transportation Systems (ITS) and the Need for Resilience<br/><i>Ganin AA, Mersky AC, Kitsak M, Keisler JM, Linkov I</i><br/><i>University of Virginia, U.S. Army Engineer Research and Development Center, Northeastern University, University of Massachusetts Boston</i></p> | <b>M3-F.6</b> |

**1:30 PM – 3:10 PM**

**M3-G**

**Fate, Effects, and Risks of Agrochemicals II**  
Meeting Room 1.63  
Chair: Nico Wolmarans

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|--|---------------|
| <p><b>1:30 PM</b><br/>Acute Effects of Binary Mixtures of Glyphosate, Paraquat and 2, 4 D-Amine on Sorghum saccharatum<br/><i>Nkwatoh TN, Fai ABP, Tchamba NM</i><br/><i>University of Dschang Cameroon</i></p>  | <b>M3-G.1</b> |
| <p><b>1:50 PM</b><br/>Organochlorine Pesticides in Blood of Wild and Captive African Leopards, Panthera pardus pardus (Linnaeus, 1758)<br/><i>van As M, Wolmarans N, Wepener V, Smit NJ</i><br/><i>North-West University, University of the Free State</i></p>                                   | <b>M3-G.2</b> |
| <p><b>2:10 PM</b><br/>Combined Effects of Predator Presence and Pesticides on Macro-Invertebrate Communities in a Microcosm Setting<br/><i>Wolmarans NJ, Kok A, Bervoets L, Meire P, Taylor JC, Smit NJ, Wepener V</i><br/><i>North-West University, University of Antwerp</i></p>               | <b>M3-G.3</b> |
| <p><b>2:30 PM</b><br/>Pesticides and Non-target Animals: Farmers' Environmental Risks Perception and Toxicological Evaluations of Paraquat and Glyphosate on Nile Tilapia<br/><i>Sogbanmu TO, Aribisala OA</i><br/><i>University of Lagos</i></p>  | <b>M3-G.4</b> |
| <p><b>2:50 PM</b><br/>Assessment of Antioxidant Status and Renal Function Profile of HIV Seropositive Treatment Naïve Patients<br/><i>Ezekwesiri CO, Nwanjo HU, Nwosu DC</i><br/><i>Imo State University, Department of Clinical Chemistry, Federal Medical Centre (FMC) Owerri, Nigeria</i></p> | <b>M3-G.5</b> |

**3:30 PM – 5:10 PM**

**M4-A**

**Risk Management Frameworks: Chemicals**  
Meeting Room 1.41  
Chair: Kennedy Holt

- |  |               |
|--|---------------|
| <p><b>3:30 PM</b><br/>Adsorption of Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS) from Water Using Leaf Biomass (Vitis vinifera) in A Fixed-Bed Column Study<br/><i>Fagbayigbo BO, Opeolu BO, Fatoki OS</i><br/><i>Cape Peninsula University of Technology, South Africa</i></p>  | <b>M4-A.1</b> |
| <p><b>3:50 PM</b><br/>Life-of-Mine Environmental Risk Drivers for Minerals Extraction – a Developing Country Perspective<br/><i>Smith R, Orr M</i><br/><i>Hydrobiology</i></p>   | <b>M4-A.2</b> |
| <p><b>4:10 PM</b><br/>Risk Assessment and Sustainability Assessment Combined for Mining Activities in the ITERAMS Project<br/><i>Ciroth A, Burhan S, Di Noi C</i><br/><i>GreenDelta</i></p>  | <b>M4-A.4</b> |
| <p><b>4:30 PM</b><br/>Private Well Treatment Systems: A Systematic Review of Available Studies to Identify Which Systems and Contaminants are Best Studied, Removal Efficiency, and Current Data Gaps<br/><i>Holt KM</i><br/><i>University of North Carolina at Chapel Hill</i></p>  | <b>M4-A.5</b> |
| <p><b>4:50 PM</b><br/>Excess Lifetime Cancer Risk and Radiation Pollution Hazard Indices in Rocks and Soil of Some Selected Mining Sites in Nasarawa State, Nigeria<br/><i>Aborisade A, Gbadebo A, Adedeji O, Okeyode I, Ajayi O</i><br/><i>Department of Environmental Management and Toxicology, Federal University of Agriculture</i></p> | <b>M4-A.6</b> |



**Monday**

<b>3:30 PM – 4:50 PM</b>		<b>3:30 PM – 5:10 PM</b>		<b>3:30 PM – 4:50 PM</b>	
<b>M4-B</b> <b>Perspectives of Ecotoxicology</b> <i>Meeting Room 1.42</i> <i>Chair: Salah Soliman</i>		<b>M4-C</b> <b>Risk and Resilience</b> <i>Meeting Room 1.43</i> <i>Chair: Hiba Baroud</i>		<b>M4-D</b> <b>Social Risk Perception and Reduction</b> <i>Meeting Room 1.44</i> <i>Chair: Alison Cullen</i>	
<b>3:30 PM</b> Toxicology Across the Taxonomic Spectrum <i>Fai PB, Grant A, Reid B, Demeffack JM, Yamssi C, Ngameni TN</i> <i>University of Bamenda</i>	<b>M4-B.1</b>	<b>3:30 PM</b> The Science and Practice of Resilience <i>Linkov I</i> <i>US Army Corps of Engineers</i>	<b>M4-C.1</b>	<b>3:30 PM</b> Secondary Risk Theory: Empirical Foundations for a new Theory of Risk Perceptions <i>Cummings CL, Kong WY, Rosenthal SB</i> <i>Nanyang Technological University</i>	<b>M4-D.1</b>
<b>3:50 PM</b> Environmental Toxicity and Bio-nematicide from Waste of Black Soap Local Processing Industry in South Western Nigeria <i>Olatunji GA, Fabiyi DA</i> <i>University of Ilorin</i>	<b>M4-B.2</b>	<b>3:50 PM</b> Stability of a Giant Connected Component in a Complex Network <i>Kitsak MK, Ganin AG, Eisenberg DE, Krapivsky PK, Krioukov DK, Alderson DA, Linkov IL</i> <i>Northeastern University</i>	<b>M4-C.2</b>	<b>3:50 PM</b> Variability in Cross Domain Risk Perception among Smallholder Farmers in Mali by Gender and other Demographic and Attitudinal Characteristics <i>Cullen AC, Anderson CL, Biscaye P, Reynolds TW</i> <i>University of Washington</i>	<b>M4-D.2</b>
<b>4:10 PM</b> Plasmid Profile of Bacteria Isolated from Painted Concrete Walls From Parts of Imo and Rivers State, Nigeria <i>Chiegboka NA, Emeka-Nwabunnia IE, Nwaneri CB</i> <i>Federal University of Technology, Owerri, Imo State</i>	<b>M4-B.3</b>	<b>4:10 PM</b> Are Developing Countries More or Less Resilient to Disasters? <i>Baroud H</i> <i>Vanderbilt University</i>	<b>M4-C.4</b>	<b>4:10 PM</b> Do Ambiguity Attitudes Vary with the Lottery Type and Outcome Domain? <i>Riddell MC</i> <i>University of Nevada, Las Vegas</i>	<b>M4-D.3</b>
<b>4:30 PM</b> Disinfection Characteristics of Pathogenic Bacteria on Ozonation Over the Effluent of the Quarantine Station <i>Kim JH, Kim CG</i> <i>Incheon, INHA University</i>	<b>M4-B.5</b>	<b>4:30 PM</b> Can Resilience Strategies Effectively Mitigate Business Interruption (BI) Losses? <i>Santos JR</i> <i>George Washington University</i>	<b>M4-C.5</b>	<b>4:30 PM</b> Psychosocial Risk Reduction by Engineers and Technicians in a Manufacturing Company <i>Berglund R, Backström T, Bellgran M</i> <i>Mälardalens Högskola</i>	<b>M4-D.4</b>
		<b>4:50 PM</b> The New ISO 31050: Emerging Risks & Resilience <i>Jovanovic AS, O'Brien S</i> <i>EU-VRi / Steinbeis Advanced Risk Technologies</i>	<b>M4-C.6</b>		

**Monday**

**3:30 PM – 4:30 PM**

**M4-E**

**Symposium: Aligning Resilience Assessment Approaches Worldwide**  
*Meeting Room 1.61*

*Chair: Aleksandar Jovanovic*

**3:30 PM**

Resilience Assessment of Infrastructure Systems Considering Interdependency and Complexity  
*Wang M, Liu K*  
*Beijing Normal University*

**M4-E.1**

**3:50 PM**

Summary of the SmartResilience Project Results  
*Jovanovic AS, Øien K, Choudhary A, Tetlak K, Reis A, Caillard B*  
*EU-VRI European Institute for Integrated Risk Management*

**M4-E.2**

**4:10 PM**

Stress-testing Resilience of Critical Infrastructures  
*Jovanovic A, Szekely Z\**  
*EU-VRI, Germany and BZN, Hungary*

**M4-E.3**

**3:30 PM – 4:50 PM**

**M4-F**

**Risk Management and Frameworks: Africa Part 1**  
*Meeting Room 1.62*

*Chair: Reuben Dlamini*

**3:30 PM**

Sustainable Land Management and Agro-climatic Risk Mitigation: Lessons from Smallholder Crop Farmers in Southeast Nigeria  
*Okereke CO*  
*Ebonyi State University*

**M4-F.1**

**3:50 PM**

Between Climate Change and Conflicts: The Farmer-Herder Crisis and Risk of Governance in the North Central Nigeria  
*Mbah PO*  
*University of Nigeria*

**M4-F.3**

**4:10 PM**

Resource Intensity Trends of the South African Ferrochrome Industry  
*Dlamini RM, von Blottnitz H*  
*University of Cape Town*

**M4-F.5**

**4:30 PM**

A Science-based System to Facilitate Change  
*Stewart JM, Butte G, Blomerus K\**  
*JM Stewart Consulting and Decision Partners: Cognitive Science Systems LP*

**M4-F.6**

**3:30 PM – 4:10 PM**

**M4-G**

**Plastics in our Environment**  
*Meeting Room 1.63*

*Chair: Carina Verster*

**3:30 PM**

A first Insight into South Africa's Freshwater Microplastic Load  
*Verster C, Bouwman H*  
*North-West University*

**M4-G.5**

**3:50 PM**

Plastics and the Human Environment: A Case Study of Plastics Waste Disposal in the University of Nigeria, Nsukka Community  
*Nduka OC, Ezenwa MO, Okolo CO, Mbaeyi-Nwaoha IE*  
*University of Nigeria, Nsukka, Nnamdi Azikiwe University, Awka*

**M4-G.7**

**Monday**

**3:30 PM – 4:50 PM**

**M4-H**

**Managing Exposure and Risks through Novel Waste Treatment Strategies I**

*Meeting Room 1.64*

*Chair: Mariette Smart*

**3:30 PM**

**M4-H.2**

Determination of Heavy Metal Concentration in Treated and Untreated Wastewater from Two Treatment Plants in Maluti-a-Phofung Municipality

*Moloi MS, Ogbeide O, Voua Otomo P*

*Ecotoxicology Research Laboratory, Afromontane Research Unit, University of the Free State*

**3:50 PM**

**M4-H.3**

Antibiotics in Freshwater, Marine Water and Wastewater Systems

*Moodley B, Thavarayan L, Gumbi B, Agunbiade F, Matongo S*

*University of KwaZulu-Natal*

**4:10 PM**

**M4-H.5**

Assessing Options for Reusing Sulfidic Coal Waste

*Stander H, Harrison STL, Broadhurst JL*

*University of Cape Town*

**4:30 PM**

**M4-H.6**

Considering the Risks Associated with Waste Valorisation: Methods, Challenges and Solutions

*Smart M, Zulu N, Harrison STL*

*University of Cape Town*

**3:30 PM – 4:10 PM**

**M4-I**

**Fate and Effects of Oil in the Environment**

*Meeting Room 2.61-2.63*

*Chair: TBD*

**3:30 PM**

**M4-I.3**

Genotoxicity Assessment of the Water Soluble Fraction of Crude Oil Using *Allium cepa* Chromosomal Assay

*Ogbeide GE, Olorunfermi DI, Eriyamremu GE*

*Federal University*

**3:50 PM**

**M4-I.4**

Assessment of the Genotoxic Effect of Spent Engine Oil Treated Soil on a Tropical Legume Plant; *Glycine max*

*Udebuani AC, Onyemereneche SI, Abara PN*

*Federal University Of Technology Owerri Imo State*

**Tuesday**

10:30 AM – 11:50 AM	10:30 AM – 11:50 AM	10:30 AM – 12:10 PM
<b>T2-A</b> <b>Regulation and Policy</b> <i>Meeting Room 1.41</i> <i>Chair: Kanshu Rajaratnam</i>	<b>T2-B</b> <b>Resilience Methods</b> <i>Meeting Room 1.42</i> <i>Chair: Lev Virine</i>	<b>T2-C</b> <b>Risk Management and Frameworks: Africa, Part 2</b> <i>Meeting Room 1.43</i> <i>Chair: Lawrence Kapustka</i>
<b>10:30 AM</b> An Analytical Framework to Review Judicial Decisions based on the Precautionary Principle with a Case-study Application <i>Gonçalves V</i> <i>Dinâmia-Cet/Iscte-Iul</i>	<b>10:30 AM</b> Analysis of Risk Resilient Project Portfolios <i>Virine L</i> <i>Intaver Institute Inc.</i>	<b>10:30 AM</b> Regulatory Policies and Environmental Compromise In Developing Nation: The Way Forward <i>Olawale O</i> <i>Federal University Wukari</i>
<b>10:50 AM</b> From Safety Regulation Compliance to Resilience-assessment-as-a-service: Would the European Resilience Assessment Agency be a Solution? <i>Jovanovic AS, Caillard B</i> <i>EU-VRi / Steinbeis Advanced Risk Technologies</i>	<b>10:50 AM</b> Community-Based Resilience Building as a Way of Balancing Risk and Sustaining Development <i>Huang TL</i> <i>National Cheng Kung University</i>	<b>10:50 AM</b> Collaboration to Advance Environmental Management Goals of Africans <i>Kapustka L</i> <i>LK Consultancy</i>
<b>11:10 AM</b> Retrospective Risk Assessment as Part of Environmental Forensic Investigations <i>Siddik Muhammed A, George Varghese K, Babu Alappat J</i> <i>TKM College of Engineering, National Institute of Technology Calicut and Indian Institute of Technology Delhi</i>	<b>11:10 AM</b> The Worldwide Education of the Next Generation of Safety Professionals: How Can Technology and Innovation Contribute to a Resilient Africa? <i>Hardy K</i> <i>Embry-Riddle Aeronautical University</i>	<b>11:10 AM</b> Minimizing the Effect of Microbial Activities from Dustbins in the Home Environment <i>Egbokhare I, Egbokhare O, Ariavie GO</i> <i>Ovanent University</i>
<b>11:30 AM</b> Legislation as a Business Risk: Case of India's Nuclear Liability Act 2010 <i>Mulavana Parameswaran RM</i> <i>Indian Institute of Management Ahmedabad</i>	<b>11:30 AM</b> Resilience Modelling for Improved Nuclear Safety <i>Patelli E, Ferson S, George-Williams H</i> <i>University of Liverpool</i>	<b>11:30 AM</b> Performing Social Risk Assessment in Mozambique – Managing Local Communities' Engagement Challenges <i>Antunes D</i> <i>People &amp; Environment (Mz); Factor Social (Pt)</i>
		<b>11:50 PM</b> Application of Ecological Risk Assessment in South Africa: A Management Tool to Embrace or to Avoid? <i>Wepener V</i> <i>North-West University - School of Biological Sciences</i>

**Tuesday**

10:30 AM – 11:30 AM	10:30 AM – 12:10 PM	10:30 AM – 11:30 AM
<p><b>T2-D</b>  <b>Symposium: Risk, Safety, and Standardization in Emerging Nations</b>  <i>Meeting Room 1.44</i>  <i>Chair: Wang Tong</i></p>	<p><b>T2-E</b>  <b>Risk Education</b>  <i>Meeting Room 1.61</i>  <i>Chair: TBD</i></p>	<p><b>T2-F</b>  <b>Symposium: Risk in the Water Domain: Perceptions, Communication and Commodification</b>  <i>Meeting Room 1.62</i>  <i>Chair: Michael Siegrist</i></p>
<p><b>10:30 AM</b>            Method for Quantitative Safety Risk Assessment in Urban Regions  <i>Dai BQ, Xie YS, Wang T</i>  <i>Beijing Municipal Institute of Labor Protection</i></p>	<p><b>10:30 AM</b>            Risk Based Inspection Implementation Efficiency  <i>Mkhabela SM, Wannenburg JW</i>  <i>University of Pretoria</i></p>	<p><b>10:30 AM</b>            Understanding Perceptions of Risk as a Prerequisite to effective Risk Communication  <i>Etale A, Siegrist M</i>  <i>University of the Witwatersrand, ETH Zurich</i></p>
<p><b>10:50 AM</b>            Risk Analysis and Control in City Gas Supply System  <i>Lyu LH, Bai YQ, Zhang XF, Bai G</i>  <i>Beijing Municipal Institute of Labor Protection</i></p>	<p><b>10:50 PM</b>            Development of a CFD based Tool to facilitate Risk Based Inspection (RBI) of Air-flue Gas Circuits in coal Fired Power Plants  <i>Van Der Merwe JCM, Jestin LJ, Brunel Diankouika JB</i>  <i>ESKOM, Power Plant Engineering Institute</i></p>	<p><b>10:50 AM</b>            When Governments Retreat, the Private Sector Steps Up: On the Risks Associated with the Commodification of Water  <i>Cohen A, Arvai J</i>  <i>University of Michigan</i></p>
<p><b>11:10 AM</b>            Characteristics and Risk Control of Confined Space Accidents in China: Transferability of Results to Africa  <i>Liu Y, Yang CL, Qin Y</i>  <i>Beijing Municipal Institute of Labour Protection</i></p>	<p><b>11:10 AM</b>            The Development of an Optimal Outage Execution Strategy by Applying a Risk Based Inspection Methodology  <i>Narain Singh SNS, Ulassi AU</i>  <i>Eskom Holdings SOC Ltd</i></p>	<p><b>11:10 AM</b>            Communicating about the Risks of Potable Recycled Water: What Works?  <i>Fielding KS, Dolnicar S, Roiko A</i>  <i>University of Queensland</i></p>
	<p><b>11:30 AM</b>            Influence of Prior Creep Damage on Fracture Localisation in X20CrMoV12-1 Cross-welds Mechanical Tests  <i>Rasiawan TR, Knutsen RDK</i>  <i>University of Cape Town</i></p>	
	<p><b>11:50 AM</b>            Optimizing Inspection Policies for Coal Fired Boiler Tubes Subject to Corrosion  <i>Wannenburg JW, Lelo AL*, Heyns PSH</i>  <i>University of Pretoria</i></p>	

**Tuesday**

10:30 AM – 11:50 PM	10:30 AM – 12:30 PM	10:30 AM – 12:10 PM
<p><b>T2-G</b>  <b>Exposure and Risk to Air Contaminants at Local, Regional, and Global Scales</b>  <i>Meeting Room 1.63</i>  <i>Chair: Jawahar Sainulabdin</i></p>	<p><b>T2-H</b>  <b>Life-Cycle Analysis, Sustainability, and Technology Futures for Africa</b>  <i>Meeting Room 1.64</i>  <i>Chair: Angel Avadi</i></p>	<p><b>T2-I</b>  <b>Exposure and Risks of Metals in Soils and Sediments I</b>  <i>Meeting Room 2.61-2.63</i>  <i>Chair: TBD</i></p>
<p><b>10:30 AM</b> <span style="float: right;"><b>T2-G.1</b></span>            Monitoring Environmental Exposure to outdoor Air Pollution Levels Within Informal Settlements in the Western Cape, South Africa  <i>Madonsela BS, Baatjies R, Dalvie MA</i>  <i>Cape Peninsula University of Technology</i></p>	<p><b>10:30 AM</b>            Challenges to Agricultural LCA in Africa  <i>Avadi A</i>  <i>CIRAD - French Agricultural Research Centre for International Development</i></p>	<p><b>10:30 AM</b> <span style="float: right;"><b>T2-I.1</b></span>            Metal Accumulation in Riverine Macro-Invertebrates from a Platinum Mining Region  <i>Erasmus JH, Wepener V, Zimmermann S, Sures B, Malherbe W, Smit NJ</i>  <i>North-West University, Universität Duisburg-Essen</i></p>
<p><b>10:50 AM</b> <span style="float: right;"><b>T2-G.2</b></span>            Behavioural and Biochemical Changes in Wistar Albino Rats Exposed to Different Brands of Vulcanizer Solutions  <i>Otitoju O, Ayantse M*, Yakubu OJ</i>  <i>Federal University Wukari Taraba State</i></p>	<p><b>10:50 AM</b> <span style="float: right;"><b>T2-H.2</b></span>            Road and Rail Freight LCI Data for South Africa  <i>Burke MA, Althaus H-J, Russo V, Valsasina L, Safaei A, Von Blottnitz H, Notten P</i>  <i>The Green House, INFRAS, University of Cape Town, Ecoinvent Association</i></p>	<p><b>10:50 AM</b> <span style="float: right;"><b>T2-I.2</b></span>            Assessment of Trace Metal Pollution in Richards Bay Harbour: Implications for Future Port Development  <i>Izegaegbe JI, Vivie L, Mzimela HMM</i>  <i>University of Zululand</i></p>
<p><b>11:10 AM</b> <span style="float: right;"><b>T2-G.4</b></span>            Air Pollution from an Industrial Cluster - A Qualitative Health Risk Analysis  <i>Sainulabdin JS, Varghese GK</i>  <i>National Institute of Technology Calicut</i></p>	<p><b>11:10 AM</b> <span style="float: right;"><b>T2-H.3</b></span>            Precious and Scarce Metals LCIs in South Africa  <i>Russo V, Charikinya E, Goga T, Harding KG, Safaei A, von Blottnitz H, Broadhurst JL</i>  <i>University of Cape Town, University of Witwatersrand, Ecoinvent Association</i></p>	<p><b>11:10 AM</b> <span style="float: right;"><b>T2-I.3</b></span>            Metals in Sediments as Indicators of Metal Pollution in an Acid Mine Drainage Impacted Subtropical River  <i>Zviregei Jiri ZJ, Richard Greenfield RG, Johan J van Vuren JJV</i>  <i>Bindura University of Science Education,</i></p>
<p><b>11:30 AM</b> <span style="float: right;"><b>T2-G.5</b></span>            Contaminants in African's Mountain Tops; An Understudied Scenario  <i>Ogbeide O, Chukwuka AV, Otomo PV</i>  <i>University of the Free State, Afromountane Research Unit</i></p>	<p><b>11:30 AM</b> <span style="float: right;"><b>T2-H.4</b></span>            Resource Intensity Trends of the South African Ferrochrome Industry  <i>Dlamini RM, von Blottnitz H</i>  <i>University of Cape Town</i></p>	<p><b>11:30 AM</b> <span style="float: right;"><b>T2-I.4</b></span>            Risk Assessment of Heavy Metals in Vegetables Grown around Quarry Sites in Okigwe, Southeastern Nigeria  <i>Abara P, Udebuani CA, Okeke IH</i>  <i>Federal University of Technology</i></p>
	<p><b>11:50 AM</b> <span style="float: right;"><b>T2-H.5</b></span>            Potential Challenges of Cassava Cultivation in South Africa  <i>Itoba Tombo EF, Ntwampe SKO, Nchu F, Mudumbi JB</i>  <i>Peninsula University of Technology, Bioresource Engineering Research Group (BioERG)</i></p>	<p><b>11:50 AM</b> <span style="float: right;"><b>T2-I.5</b></span>            Toxicological Evaluation of the Effect of Lead-Mining Activities in Agalegu Environment; Health Implication for Children in the Community  <i>Dike IC, Obiweluozo PE, Uzodinma U, Onwurah CN, Obodouzu JC</i>  <i>University of Nigeria, Nsukka, Enugu State</i></p>
	<p><b>12:10 PM</b> <span style="float: right;"><b>T2-H.6</b></span>            Power Density Prediction from Waste Palm Kernel Shell Fuel in a Direct Carbon Fuel Cell: An Empirical Model  <i>Jafri N</i>  <i>Taylor's University</i></p>	

## Tuesday

**1:30 PM – 3:10 PM**

**T3-A**

**Risk Frameworks: Ecosystem and Environment**  
Meeting Room 1.41  
Chair: Nil Basu

**1:30 PM T3-A.1**  
Alternative Frameworks for Evaluating Deep Sea Mining Projects  
*Krutilla K, Good D, Arin T, Toman M*  
*Indiana University, World Bank*

**1:50 PM T3-A.2**  
One Health Approach Towards Addressing Pollution at the Pole – Integrating Evidence Across Inuit, Wildlife, and Ecosystems  
*Basu N*  
*McGill University*

**2:10 PM T3-A.4**  
A Multi-criteria Model of shipping Impacts on the Arctic Environment  
*Pelot RP, Schmitz P, Dawson J, Joyce J*  
*Dalhousie University, The University of Ottawa*

**2:30 PM T3-A.5**  
Evaluation of Multiple Stressors Effecting Socio-ecological Endpoints of Water Resources in Africa Using Regional Scale Ecological Risk Assessments  
*O'Brien G, Wepener V, Dickens C*  
*University of Mpumalanga*

**2:50 PM T3-A.6**  
PAHs in Fish-Human Health Risk Assessment Models for Dietary Intake  
*Tongo I, Rosenstein AB*  
*University of Benin, Lexington Environmental Risk Group, LLC*

**1:30 PM – 3:10 PM**

**T3-B**

**Public Health - Epidemiological Risk and Exposure**  
Meeting Room 1.42  
Chair: Linda Schenk

**1:30 PM T3-B.2**  
The Dutch Dual System of Occupational Exposure Limits: Scoping the Issues Encountered by Professionals  
*Schenk L, Palmen NGM*  
*Karolinska Institutet*

**1:50 PM T3-B.3**  
Radiation Risk and Quality Assurance in Breast Cancer Imaging- A Case Study of Pakistan  
*Khan KJ, Begum N*  
*University of Vienna*

**2:10 PM T3-B.4**  
Potential Human Health Risk of Combined Exposure to Multiple Antibiotic Residues via Drinking Water and Vegetables in Terms of Toxicological Effects and Resistance Development  
*Hanna N, Tamhankar AJ, Stålsby Lundborg C*  
*Karolinska Institutet*

**2:30 PM T3-B.5**  
Using Risk Analysis to Estimate the Economic Burden of Foodborne Disease in Sub-Saharan Africa: The Case of Ethiopia  
*Scharff RL, Havelaar AH, Ketema M, Kowalczyk BB, Weir MH*  
*The Ohio State University, University of Florida, Haramaya University*

**2:50 PM T3-B.6**  
Excess Lifetime Cancer Risk and Radiation Pollution Hazard Indices in Rocks and Soil of Some Selected Mining Sites In Nasarawa State, Nigeria  
*Aborisade MA, Gbadebo AM, Adedeji OH, Okeyode IC, Ajayi OA*  
*Federal University of Agriculture, Abeokuta*

**1:30 PM – 2:10 PM**

**T3-C**

**Regulation and Legislation**  
Meeting Room 1.43  
Chair: Dalila Antunes

**1:30 PM T3-C.2**  
Natural Risks Insurance for Enhancing Resilience Towards Sustainable Development: The Algerian Experience  
*Benouar D*  
*University of Sciences & Technologies Houari Boumediene (USTHB)*

**1:50 PM T3-C.6**  
Safety Behaviours and Performance: Current Practices and Future Opportunities  
*Antunes D, Carrasqueira M, Jacinto C, Santos J, Dias J, Agostinho F*  
*Factor Social (Pt)*

**Tuesday**

1:30 PM – 2:30 PM	1:30 PM – 3:30 PM	1:30 PM – 3:10 PM
<b>T3-D</b> <b>Water</b> <i>Meeting Room 1.44</i> <i>Chair: Charles Menzie</i>	<b>T3-E</b> <b>Symposium: Food Safety</b> <i>Meeting Room 1.61</i> <i>Chair: Tsu-Mu Kao</i>	<b>T3-F</b> <b>Public Health - Chemicals</b> <i>Meeting Room 1.62</i> <i>Chair: Tamuno-Borna Odinga</i>
<b>1:30 PM</b> Low-impact Methods for Sustainable Remediation of Contaminated Wetlands and Sediments <i>Menzie CA</i> <i>SETAC - Sediment Solutions - Exponent</i>	<b>T3-D.2 1:30 PM</b> Risk Analysis of Taiwan Food Imported from Japan after the Fukushima Nuclear Accident <i>Kao TM</i> <i>Institute of Nuclear Energy Research</i>	<b>T3-E.1 1:30 PM</b> The Contribution of Bisphenol-A to Pituitary-Gonadal Hormones Disruption and Oxidative Stress in Occupationally Exposed Male Plastic Industry Workers <i>Ugwu PI, Charles-Davies MA, Obilor U, Bolajoko EB, Orimadegun BE, Aremu OO, Okoli SU</i> <i>University of Ibadan</i>
<b>1:50 PM</b> Harmful Algal Blooms: Understanding Public Health and Environmental Risks in the Face of Change <i>Brooks B</i> <i>Baylor University</i>	<b>T3-D.3 1:50 PM</b> Frying French Fries Can Cause Exposure to Acrylamide Through Inhalation Pathway <i>Hsu HT, Chen MJ, Tseng TP, Cheng LH, Huang LJ, Yeh TS</i> <i>China Medical University</i>	<b>T3-E.2 1:50 PM</b> Noxious Effect of Exposure to Air Freshener on the Hematological, Hemostatic and Male Reproductive Function <i>Odinga T, Eze EM, Memoh P</i> <i>Rivers State University</i>
<b>2:10 PM</b> Thermophysical Effects of Heat and Mass Transfer in Magnetohydrodynamics Viscoelastic Fluid Flow in Inclined Porous Media <i>Amoo S, Daniel MI</i> <i>Federal University Wukari Taraba State</i>	<b>T3-D.7 2:10 PM</b> Role of Quantitative Health Risk Assessment from Food Monitoring Information in the Food Safety Network in Taiwan <i>Chuang YC</i> <i>National Taiwan University</i>	<b>T3-E.3 2:10 PM</b> Growth and Heavy Metal Accumulation of Colophospermum mopane as Influenced by Compost, Fly Ash and Mycorrhizal Inoculation <i>Manyiwa T, Ultra VU</i> <i>Botswana International University of Science &amp; Tec</i>
	<b>2:30 PM</b> Application of Food Description to the Food Classification System – A Risk Assessment Case Study on Acrylamide <i>Ho WC, Chiu SY, Chuang YC, Hsu HT, Chiang SY</i> <i>China Medical University</i>	<b>T3-E.4 2:30 PM</b> EcoToxChip: A Toxicogenomics Tool for Chemical Prioritization and Environmental Management <i>Basu N, Hecker M, Crump D, Head J, Xia J, Hickey G, Maguire S</i> <i>McGill University</i>
	<b>2:50 PM</b> Probabilistic Risk Assessment of Cumulative Dietary Exposure to Triazole and Organophosphorus Pesticides in Taiwan <i>Chiang SY, Chang BS, Chuang YC, Ho WC, Wu KY</i> <i>China Medical University</i>	<b>T3-E.5 2:50 PM</b> Particulate Matter Trapper For Internal Combustion Engines: An Imperative <i>Alutu NC, Sheidu SO</i> <i>Nnamdi Azikiwe University Awka, Anambra State</i>
	<b>3:10 PM</b> Probabilistic Risk Assessment of Heavy Metals in Chinese Herbal Medicines Consumed in Taiwan <i>Lin PH, Lo CY, Chuang YC, Chang BS, Chiang SY</i> <i>China Medical University and National Taiwan University</i>	<b>T3-E.6 3:10 PM</b> Probabilistic Risk Assessment of Heavy Metals in Chinese Herbal Medicines Consumed in Taiwan <i>Lin PH, Lo CY, Chuang YC, Chang BS, Chiang SY</i> <i>China Medical University and National Taiwan University</i>
		<b>T3-F.1 1:30 PM</b> The Contribution of Bisphenol-A to Pituitary-Gonadal Hormones Disruption and Oxidative Stress in Occupationally Exposed Male Plastic Industry Workers <i>Ugwu PI, Charles-Davies MA, Obilor U, Bolajoko EB, Orimadegun BE, Aremu OO, Okoli SU</i> <i>University of Ibadan</i>
		<b>T3-F.5 1:50 PM</b> Noxious Effect of Exposure to Air Freshener on the Hematological, Hemostatic and Male Reproductive Function <i>Odinga T, Eze EM, Memoh P</i> <i>Rivers State University</i>
		<b>T3-F.8 2:10 PM</b> Growth and Heavy Metal Accumulation of Colophospermum mopane as Influenced by Compost, Fly Ash and Mycorrhizal Inoculation <i>Manyiwa T, Ultra VU</i> <i>Botswana International University of Science &amp; Tec</i>
		<b>T3-F.9 2:30 PM</b> EcoToxChip: A Toxicogenomics Tool for Chemical Prioritization and Environmental Management <i>Basu N, Hecker M, Crump D, Head J, Xia J, Hickey G, Maguire S</i> <i>McGill University</i>
		<b>T3-F.7 2:50 PM</b> Particulate Matter Trapper For Internal Combustion Engines: An Imperative <i>Alutu NC, Sheidu SO</i> <i>Nnamdi Azikiwe University Awka, Anambra State</i>



**Tuesday**

**1:30 PM – 3:10 PM**

**T3-G**  
**Exposure and Risk Posed by E-Waste**  
*Meeting Room 1.63*  
*Chair: Matt Dodd*

- 1:30 PM** **T3-G.1**  
 Extended Producer Responsibility Policy and Electronic Waste Management in Ghana  
*Asibey MO, Lykke AM, King RS*  
*Kwame Nkrumah University of Science and Technology and Aarhus University*
- 1:50 PM** **T3-G.2**  
 Estimating the Human Health Risk Associated with Metal Exposure at an E-Waste Recycling Site in Kumasi, Ghana  
*Dodd M, Otoo Amposah L, Darko G*  
*Royal Roads University*
- 2:10 PM** **T3-G.3**  
 High Abundance of Resistance Genes in Selected Electronic Waste (E-waste) Dumpsites Presents a Potential Novel Reservoir of Metal Tolerant and Antibiotic Resistant Bacteria  
*Ikhimiukor OO, Adeleke RA, Mueller JA, Adelowo OO*  
*University of Ibadan, Agricultural Research Council - Institute for Soil, Water and Climate (ARC-ISCW), and Helmholtz Centre for Environmental Research - UFZ*
- 2:30 PM** **T3-G.4**  
 Spectroscopic Determination of Rare Earth Element Concentrations in Environmental Samples Originating from Electronic Waste Disposal  
*Makombe M, Somerset VS*  
*Department of Chemistry, Cape Peninsula University of Technology*
- 2:50 PM** **T3-G.5**  
 Recovering Metals from E-waste is a Risky Business  
*Mudge SM, Pfaffhuber KA, Bouman EA, Uggerud H, Thorne RJ, Fobil J*  
*Norwegian Institute for Air Research (NILU)*

**1:30 PM – 3:10 PM**

**T3-H**  
**Assessing and Addressing Water Quality and Quantity Needs I**  
*Meeting Room 1.64*  
*Chair: Pieter Hugo*

- 1:30 PM** **T3-H.1**  
 Copper and Zinc in Water, Sediment and Gastropods in the Harbours of the Cape Town Metropole, South Africa  
*Fru W, Odendaal JP, Snyman R*  
*Cape Peninsula University of Technology*
- 1:50 PM** **T3-H.2**  
 Developing a Water Accounting and Assessment Protocol for Water Management of Mining and Minerals Processing  
*Hugo PDW, Broadhurst JL*  
*University of Cape Town*
- 2:10 PM** **T3-H.3**  
 Coagulation-Flocculating Removal Potentials of Microalgae Using Environmental Friendly Plants, Polymeric and Inorganic Coagulants  
*Ikele CF, Ogbonna CN*  
*University of Nigeria*
- 2:30 PM** **T3-H.4**  
 The Water Quality of the Niger River Basin, Drained by a Major Abattoir in Southern Nigeria  
*Ikpesu T, Ariyo AB*  
*Federal University Otuoke*
- 2:50 PM** **T3-H.5**  
 Indigenous Response to Transboundary Smelter Contamination  
*Fraser WJ*  
*Lodestone Environmental Consulting*

**3:30 PM – 4:50 PM**

**T4-A**  
**Public Health - Epidemiological Management**  
*Meeting Room 1.41*  
*Chair: Alison Cullen*

- 3:30 PM** **T4-A.1**  
 The Administrative Value of Poliovirus Surveillance Information  
*Scott RP, Chabot-Couture G, Cullen AC\**  
*Colorado State University, Intellectual Ventures, University of Washington*
- 3:50 PM** **T4-A.2**  
 Risk-Based Approach for Blood Safety Decisions in Taiwan  
*Matanhire TB, Lin SW\**  
*National Taiwan University of Science and Technology*
- 4:10 PM** **T4-A.3**  
 Wastewater Epidemiology as a Rapid Tool for Understanding Community Drug Use Patterns  
*Pagsuyoin SA, Bello D, Luo J, Zhang J*  
*University of Massachusetts Lowell*
- 4:30 PM** **T4-A.5**  
 Citizen Science Approach as a Way to Improve Malaria Risk Perception  
*Asingizwe D, Poortvliet PM, Koenraad CJM, Van Vliet AJH, Murindahabi MM, Ingabire C, Mutesa L, Leeuwis C*  
*University of Rwanda, Wageningen University and Research*

**Tuesday**

3:30 PM – 4:50 PM	3:30 PM – 4:30 PM	3:30 PM – 4:30 PM
<b>T4-B</b> <b>Risk Management Theory</b> <i>Meeting Room 1.42</i> <i>Chair: James Bone</i>	<b>T4-C</b> <b>Travel and Tourism</b> <i>Meeting Room 1.43</i> <i>Chair: Nick Gray</i>	<b>T4-D</b> <b>Risk and Resilience in Human Systems</b> <i>Meeting Room 1.44</i> <i>Chair: TBD</i>
<b>3:30 PM</b> Redesigning Risk Management for the Digital Economy <i>Bone J</i> <i>Columbia University</i>	<b>T4-B.3 3:30 PM</b> Distributed Decision Making with Poor Data <i>Ferson S, Birch R, Mannis A, Patelli E, De Angelis M, Gray N*</i> <i>University of Liverpool</i>	<b>T4-C.1 3:30 PM</b> Servicing Everyday Risk in Urban East Africa: Solid Waste Resilience in Dar es Salaam's Informal Settlements <i>Wernstedt K, Kihila J</i> <i>Ardhi University, Dar es Salaam, Tanzania, Virginia Tech</i>
<b>3:50 PM</b> Turning Enterprise Risk Management Theory into Practice in the jewellery Industry — The Case with Soo Kee Group <i>Acharyya M, Ying T</i> <i>Glasgow Caledonian University</i>	<b>T4-B.4 3:50 PM</b> An Investigation on the Boosters of the Tourism Sector on Economic Development <i>Ormulindi EO</i> <i>Co-operative University of Kenya</i>	<b>T4-C.2 3:50 PM</b> The Impact of Risk Governance Institutions on Local Adaptive Capabilities: The Case of Adaptation in Nigeria Local Communities <i>Doe JB, Oramah CP*</i> <i>Centre For Risk Management and Societal Safety, University of Stavanger</i>
<b>4:10 PM</b> Developing a Risk and Capability Assessments Methodology for the Baltic Sea Region <i>Karlsson B, Tomasson B</i> <i>University of Iceland</i>	<b>T4-B.6 4:10 PM</b> Examining the Effects of Health Risk on Tourism Industry in Mombasa County, Kenya <i>Otieno A</i> <i>Co-operative University of Kenya</i>	<b>T4-C.3 4:10 PM</b> Risk Communication and Governance in a Post-Truth Environment <i>Renn O</i> <i>Institute for Advanced Sustainability Studies (IASSS)</i>
<b>4:30 PM</b> Brazilian Drug Traceability System <i>Melo VAZC, Rodrigues AG, Beteto AL, Dias EM</i> <i>University of São Paulo</i>	<b>T4-B.7</b>	<b>T4-D.4</b> <b>T4-D.5</b> <b>T4-D.6</b>

**Tuesday**

3:30 PM – 4:30 PM	3:30 PM – 4:30 PM	3:30 PM – 4:30 PM
<p><b>T4-F</b>  <b>Symposium: The National Knowledge and Research Center for Emergency Readiness</b>  <i>Meeting Room 1.62</i>  <i>Chair: Deborah Shmueli</i></p>	<p><b>T4-G</b>  <b>Exposure and Risks to Drinking Water</b>  <i>Meeting Room 1.63</i>  <i>Chair: Gbadebo Adeyinka</i></p>	<p><b>T4-H</b>  <b>Managing Exposure and Risks Through Novel Waste Treatment Strategies II</b>  <i>Meeting Room 1.64</i>  <i>Chair: Kudakwashe Engels Chingono</i></p>
<p><b>3:30 PM</b>            Concept and Research Gap Assessment - National Knowledge and Research Center for Emergency Readiness  <i>Shmueli DF</i>  <i>University of Haifa</i></p>	<p><b>3:30 PM</b>            Assessment of the Seasonal variability and Quality Index of Groundwater from Industrial areas of Southeastern, Nigeria  <i>Ekere NR, Akudu A, Ihedioha JN, Ibeto CN</i>  <i>University of Nigeria, Nsukka</i></p>	<p><b>3:30 PM</b>            Tetracycline Sorption by a Tailor - Made Adsorbent in Aqueous System  <i>Adelagun ROA</i>  <i>Federal University Wukari</i></p>
<p><b>3:50 PM</b>            City Resilience to Droughts and Earthquakes: Some Israeli Insights  <i>Feitelson E</i>  <i>Hebrew University</i></p>	<p><b>3:50 PM</b>            Safety of Drinking Water in Nsukka, Southeast Nigeria: An Assessment of Bacteriological Quality, Antibiotic Resistance and Human Health Risks  <i>Chigor CB, Bako AS, Ozochi CA, Igbinosa IH, Titilawo Y, Ugwu KO, Adukwu E, Chigor VN*</i>  <i>University of Nigeria, University of Benin, Alex Ekwueme Federal University, University of the West of England</i></p>	<p><b>3:50 PM</b>            Beta-FeOOH/Polyamide Nanocomposite for the Remediation of 4-chlorophenol from Wastewater  <i>Akharamo MO, Fatoki OS, Opeolu BO, Olorunfemi DI</i>  <i>Cape Peninsula University of Technology, University of Benin</i></p>
<p><b>4:10 PM</b>            The Role of Urban Planning in Escaping from Tsunami  <i>Plaut P</i>  <i>Technion</i></p>	<p><b>4:10 PM</b>            Contamination in Our Packaged Water: Scoping Study of Ilara-Mokin Water  <i>Osuolale O</i>  <i>Private University</i></p>	<p><b>4:10 PM</b>            Application of a particulate Waste to Mitigate Pollution in Transboundary Rivers  <i>Chingono KE, Bere E, Yalala B, Sanganyado E</i>  <i>National University of Science and Technology</i></p>

10:30 AM – 3:00 PM

Wednesday Plenary

SETAC Session: Risk-Based Weight-of-Evidence Approach for Chemical Management

West Ballroom

Chairs: Charles Menzie, Victor Wepener

This session continues a global program to examine how risk-based approaches can be applied to guide the management of chemicals. The session will include presentations by experts on applying risk assessment approaches in Europe, North America, and Asia-Pacific. The session will then involve presentations and discussions among invited guests from Ghana, South Africa, and Nigeria. Finally, a short workshop will be convened to discuss possible ways in which risk-based approaches might benefit chemical management in Africa countries. The meeting is open to participants from the SRA World Congress and SETAC Africa meeting to listen, learn, and share their views. The outcome will be compiled into a peer-review paper.

**Introduction and Statement of Purpose**

Victor Wepener, Charlie Menzie  
North-West University, SETAC

**Overview of Weight-of-Evidence and Use for Chemicals Assessment and Management**

Charlie Menzie; SETAC

**Importance of Considering Multiple Lines of Evidence – A Practical Example**

Bryan Brooks; Baylor University

**Weight-of-Evidence and Risk Management for Chemicals Outside of Africa**

- Weight-of-evidence initiatives in the Asia-Pacific region  
*Ross Smith; Hydrobiology*
- Weight-of-evidence initiatives and perspectives in Europe  
*Gertie Arts; Wageningen University and Research Center*
- Weight-of-evidence initiatives and perspectives in the United States  
*Abdel Kadry; U.S. EPA*

**Risk Policy and Science Considerations for Management of Chemicals within Africa**

- Overview for South Africa with regard to water program  
*Melissa Lintnaar-Strauss; Department of Water Affairs*
- Overview for Ghana  
*Lovelace Sarpong; Chemicals Control and Management Center of the Environmental Protection Agency of Ghana*
- Overview for Nigeria  
*Ikechukwi Onwurah, Otitoku Olowale; University of Nigeria, Federal University Wukari*
- Overview of technical and management challenges in South Africa  
*Gerhard Cilliers, Sebastian Jooste; Department Water and Sanitation*

**Panel Discussion for Africa Experience**

- All Africa country representatives (and audience participants)  
*Victor Wepener; SETAC*

**Workgroup Discussion of Scientists and Policy Makers from within Africa and from Other Global Regions**

Charlie Menzie, Victor Wepener, Beatrice Opeolu, Bart Bosveld;  
SETAC, North-West University, Cape Peninsula University of Technology

10:30 AM – 11:30 AM

W2-A

Flood

Meeting Room 1.41

Chair: TBD

**10:30 AM W2-A.1**

Algerian Public Infrastructure Investment to Reducing Flood Disaster Risk in the District of Bab El Oued in Algiers (Algeria)  
*Benouar D*  
*University of Science and Technology Houari Boumediene*

**10:50 AM W2-A.4**

Flash Flood Nowcasting Using Weather Radar Rainfall Ensemble  
*Bacelar L, Caseri A, Tomasella J, de Angelis CF*  
*National Institute for Space Research (INPE), National Centre for Monitoring and Early Warnings of Natural Disasters*

**11:10 AM W2-A.6**

Thinking Urban Flood Resilience Through Observatory Design  
*Heinzlef C, Becue V, Serre S*  
*University of Avignon*

**Wednesday**

10:30 AM – 11:30 AM		10:30 AM – 11:30 AM		10:30 AM – 11:30 AM	
<b>W2-B</b> <b>Risk Modeling</b> <i>Meeting Room 1.42</i> <i>Chair: TBD</i>		<b>W2-C</b> <b>Urban Resilience Planning</b> <i>Meeting Room 1.43</i> <i>Chair: Ayedh Almutairi</i>		<b>W2-D</b> <b>Symposium: Advancing Risk and Resilience Practice Through Risk Analysis Education and Certification</b> <i>Meeting Room 1.44</i> <i>Chair: Tailin Huang</i>	
<b>10:30 AM</b>	<b>W2-B.1</b>	<b>10:30 AM</b>	<b>W2-C.3</b>	<b>10:30 AM</b>	<b>W2-D.1</b>
Public Sector Programme Risk Management Challenges: An Exploratory Study <i>Mulambya E, Zaaïman H, Erasmus CM</i> <i>North-West University, Republic of South Africa</i>		Stories of the Storm: How Sense-making of Household Crisis Preparedness is Framed by an Urban Norm <i>Kvarnlöf L, Wall E*</i> <i>Mid Sweden University</i>		Significance of Risk Assessor Certification <i>Wu C, Chiang SY, Wu KY*</i> <i>National Taiwan University</i>	
<b>10:50 AM</b>	<b>W2-B.3</b>	<b>10:50 AM</b>	<b>W2-C.4</b>	<b>10:50 AM</b>	<b>W2-D.2</b>
Integrated Risk Quantification with Markov Chain Monte-Carlo Techniques: Application to Financial Engineering Risk Measurements in the Banking Industry <i>deGraft Johnson EOA, Amponsah SK, Barnes B, Mensah L</i> <i>Kwame Nkrumah University of Science and Technology, University of Ghana</i>		Considering the Role of Resilience in Countering Terrorism: Progressive Fashion or the (Risk) Emperor's New Clothes? <i>Mythen G, Weston S</i> <i>University of Liverpool</i>		The Experiences in Developing Risk Analysis Education Program in Taiwan <i>Ho WC, Huang TL, Liu YK, Lin SW, Yu HL*</i> <i>National Taiwan University</i>	
<b>11:10 AM</b>	<b>W2-B.6</b>	<b>11:10 AM</b>	<b>W2-C.5</b>	<b>11:10 AM</b>	<b>W2-D.3</b>
Disruption Theory of Enterprise Schedules for Risk Comparisons <i>Thorisson H, Lambert JH</i> <i>University of Virginia</i>		Rapid Detection of Escherichia coli in Treated Effluent from the Phuthaditjhaba and Harrismith Wastewater Treatment Plants (WWTPs)'s Effluent <i>Mosolloane PM, Bredenhand E, Otomo PV</i> <i>University of the Free State and the Fromontane Research Unit</i>		Introduction of the Risk Analysis Handbook Edited by SRA-Japan <i>Ono K, Maeda Y</i> <i>National Institute of Advanced Industrial Science and Technology</i>	

**Wednesday**

10:30 AM – 12:10 PM	10:30 AM – 11:50 AM	10:30 AM – 12:10 PM
<b>W2-E</b> <b>Symposium: Risk Analysis in an Interconnected World</b> <i>Meeting Room 1.61</i> <i>Chairs: Jin Hong and Andrew Robinson</i>	<b>W2-F</b> <b>Symposium: Risk Assessment and Health</b> <i>Meeting Room 1.62</i> <i>Chair: Emma Anyika</i>	<b>W2-G</b> <b>Exposure and Risks of Metals in Soils and Food II</b> <i>Meeting Room 1.63</i> <i>Chair: Florence Awino</i>
<p><b>10:30 AM</b> <span style="float: right;"><b>W2-E.1</b></span> A System Designed to Detect and Predict Emerging Food Safety Risks <i>Jin H, Crossley S, Webb T</i> <i>Food Standards Australia New Zealand</i></p> <p><b>10:50 AM</b> <span style="float: right;"><b>W2-E.2</b></span> Does Size Matter? (To Biosecurity Risk at the Border) <i>Robinson AP, Arthur A</i> <i>The University of Melbourne</i></p> <p><b>11:10 AM</b> <span style="float: right;"><b>W2-E.3</b></span> An Organizational Perspective on Constructing Novel Risks: The Case of bisphenol A <i>Hardy C, Maguire S*</i> <i>McGill University</i></p> <p><b>11:30 AM</b> <span style="float: right;"><b>W2-E.4</b></span> Risk Assessment on Dietary Exposure to Rare Earth Elements in Chinese Population <i>Yan S, Lei Z*, Zhaoping L</i> <i>China National Center for Food Safety Risk Assessment</i></p> <p><b>11:50 AM</b> <span style="float: right;"><b>W2-E.6</b></span> Applying a Strategic Risk-based Approach to Allocating Resources to Biosecurity Management in New Zealand <i>Reed C, Hathaway S, Newfield M, Ormsby M, Taylor E, Robinson A</i> <i>Ministry for Primary Industries</i></p>	<p><b>10:30 AM</b> <span style="float: right;"><b>W2-F.1</b></span> Major Environmental and Health Challenges in East Africa and the potential Role of SRA Africa in Improving Risk Based Decision Capabilities <i>Anyika E</i> <i>The Co-operative University of Kenya Mombasa Campus</i></p> <p><b>10:50 AM</b> <span style="float: right;"><b>W2-F.2</b></span> Roles of Nonprofit Organizations in Promoting Toxicology and Risk Assessment Training in Africa <i>Gadagbui B</i> <i>Toxicology Excellence for Risk Assessment (TERA)</i></p> <p><b>11:10 AM</b> <span style="float: right;"><b>W2-F.3</b></span> Probabilistic Quantitative Risk Assessment: Modelling with Genome Copies and Fecal Indicator Ratio Conversion for Estimating Exposure Dose <i>deGraft Johnson EOA</i> <i>Nkrumah University of Science and Technology</i></p> <p><b>11:30</b> <span style="float: right;"><b>W2-F.4</b></span> Assessing Public Health Policy Formulation on Sustainable Economic Development <i>Mohamed H</i></p>	<p><b>10:30 AM</b> <span style="float: right;"><b>W2-G.1</b></span> Variation of Metal Concentrations in Crops Grown on an Urban Waste Dumpsite: Effect of Growth Period <i>Awino FB, Maher WB, Lynch JA</i> <i>University of Canberra</i></p> <p><b>10:50 AM</b> <span style="float: right;"><b>W2-G.2</b></span> Heavy Metal Concentration And Availability In Soils At The Vicinity Of Cu-Ni Mine In Selebi-Phikwe, Botswana <i>July KP, Opaletswe AK, Manyiwa T, Ultra V</i> <i>Botswana International University of Science &amp; Technology</i></p> <p><b>11:10 AM</b> <span style="float: right;"><b>W2-G.4</b></span> An Integrated Approach for Assessing Soil Contaminants in a Coal Mining Area Using Land Snails (<i>Achatina fulica</i>) as Bioindicators <i>Ndebele D, Basopo N, Siwela AH</i> <i>National University of Science and Technology</i></p> <p><b>11:30 AM</b> <span style="float: right;"><b>W2-G.5</b></span> Health Risk Assessment of Heavy Metals in Canned Meat Products <i>Otitotoju GTO, Otitotoju O, Makilolo OM</i> <i>Federal University Wukari Taraba State</i></p> <p><b>11:50 AM</b> <span style="float: right;"><b>W2-G.6</b></span> Heavy Metals in Four Fish Species in Epe Lagoon, Lagos, Nigeria <i>Olaifa FE, Osofisan KF</i> <i>University of Ibadan</i></p>

**Wednesday**

**10:30 AM – 11:30 AM**

**W2-H**  
**Assessing and Addressing Water  
 Quality and Quantity Needs II**  
*Meeting Room 1.64*  
 Chair: TBD

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| <p><b>10:30 AM</b><br/>                 Endocrine Disrupting Effects of Public Swimming Pool Water<br/> <i>Pieters R, Horn S, Joubert S, Sepato TT, Gerber E</i><br/>                 North-West University</p> <p><b>10:50 AM</b><br/>                 Development of a Reliable and Non-invasive Diagnostic Tool to Detect Aphanomyces Invadans, the Causative Agent of Epizootic Ulcerative Syndrome (EUS) of Fishes, From Environmental Samples<br/> <i>Greeff-Laubscher MR, Christison KW, Smit NJ</i><br/>                 North-West University, Department of Agriculture, Forestry and Fisheries (DAFF)</p> <p><b>11:10 AM</b><br/>                 Aquatic Risk Assessment for Freshwater Ecosystems and Humans: Effects of Global Warming, Eutrophication and Chemical Exposure<br/> <i>Arts G</i><br/>                 Wageningen Environmental Research</p> | <p><b>W2-H.1</b></p> <p><b>W2-H.5</b></p> <p><b>W2-H.6</b></p> |
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**10:30 AM – 12:30 PM**

**W2-I**  
**Ecotoxicology and Chemistry: Field  
 and Laboratory Approaches I**  
*Meeting Room 2.61-2.63*  
 Chair: Susana Cristobal

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| <p><b>10:30 AM</b><br/>                 Toxicity Assessments of a Range Of Nanomaterials using Danio rerio (zebrafish) for a Multi-endpoint Approach<br/> <i>Botha TL, Wepener V</i><br/>                 Unit for Environmental Sciences and Management, Water Research Group, North-West University</p> <p><b>10:50 AM</b><br/>                 Effect of Cadmium/Tellurium Quantum Dots and Citrate capped Nanogold on Staphylococcus aureus and Escherichia coli using xCELLigence RTCA SP<br/> <i>Coetzee I, Botha TL, Claassens S, Wepener V</i><br/>                 North-West University</p> <p><b>11:10 AM</b><br/>                 Assessing the Hematological and Serum Biochemistry Profile of African Catfish (Clarias gariepinus) Raised in Water Impacted by Domestic and Industrial Effluent along Ona River, Ibadan, Nigeria<br/> <i>Iji OT, Osuolale O, Fateye BF</i><br/>                 Federal College of Animal Health &amp; Production Technology, Elizade University Ilara-Mokin Ondo State, Grand Valley State University</p> <p><b>11:30 AM</b><br/>                 Systems Level Analysis of Short-term 17<math>\alpha</math>-ethynylestradiol Exposure in Wild Sentinel Fish<br/> <i>Renaud L, Richards D, Falcinelli S, Agarwal N, Hazard E, Carnevali O, Hyde J, Hardiman G*</i><br/>                 Medical University of South Carolina, Clemson University, San Diego State University, Università Politecnica della Marche, NQAA Fisheries, Queens University Belfast</p> <p><b>11:50 AM</b><br/>                 Deciphering Mechanism of Actions of Chemical Compounds or Pollutant Mixtures by Bioactive Thermal Proteome Profiling (bTPP)<br/> <i>Carrasco del Amor A, Fresno O, Cristobal S*</i><br/>                 Linköping University, University of the Basque Country</p> <p><b>12:10 PM</b><br/>                 Biomonitoring, Physico-chemical, and Biomarker Evaluations of Abattoir Effluent Discharges into the Ogun River from Kara Market, Ogun State, Nigeria, using Clarias gariepinus<br/> <i>Olaniran EI, Sogbanmu TO</i><br/>                 University of Lagos</p> | <p><b>W2-I.1</b></p> <p><b>W2-I.2</b></p> <p><b>W2-I.3</b></p> <p><b>W2-I.4</b></p> <p><b>W2-I.6</b></p> <p><b>W2-I.7</b></p> |
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**1:30 PM – 2:50 AM**

**W3-F**  
**Health Risk Mitigates for Tourism  
 and Economic Developments**  
*Meeting Room 1.64*  
 Chair: Shital Thekdi

- |   |  |
|---|--|
| <p><b>1:30 PM</b><br/>                 Assessing Mitigates to Environmental Health Hazards in Mombasa County<br/> <i>Mumu A</i></p> <p><b>1:50 PM</b><br/>                 Determination of Health Risks at Mombasa County<br/> <i>Shileche EA</i><br/>                 The Co-operative University of Kenya Mombasa Campus</p> <p><b>2:10 PM</b><br/>                 Voluntary Participation In Determining Health Risk Mitigates<br/> <i>Chepkonga M</i><br/>                 The Co-operative University of Kenya</p> <p><b>2:30 PM</b><br/>                 Business Concessions For Voluntary Fundraising on Health Risk Mitigation<br/> <i>Obware FO</i><br/>                 The Co-operative University of Kenya</p> | <p><b>W3-F.1</b></p> <p><b>W3-F.2</b></p> <p><b>W3-FH.3</b></p> <p><b>W3-F.4</b></p> |
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## Wednesday

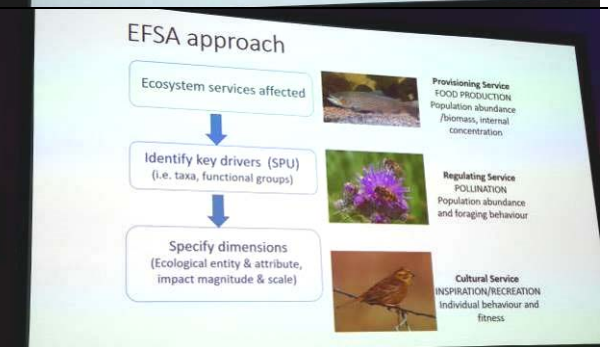
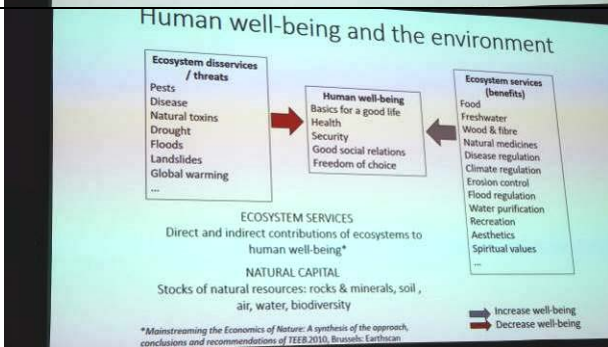
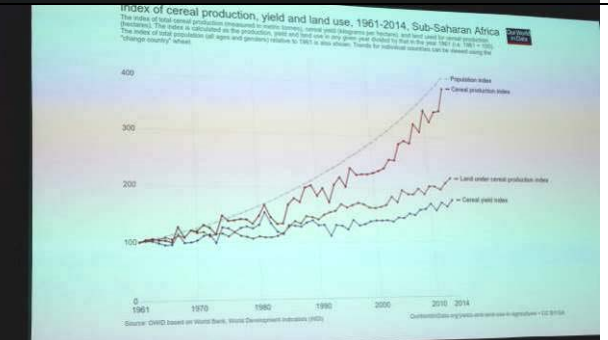
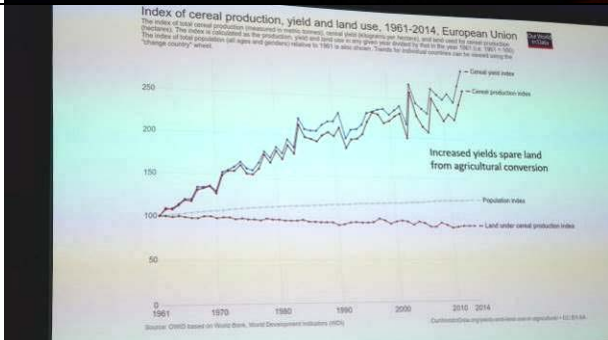
1:30 PM – 2:30 PM	1:30 PM – 2:50 PM	1:30 PM – 2:50 PM
<b>W3-G</b> <b>Health, Nutrition, and Biochemistry as it Influences Exposures and Responses II</b> <i>Meeting Room 1.63</i> <i>Chair: Richard-Haris Boyi</i>	<b>W3-H</b> <b>Ecological Insights for Assessments</b> <i>Meeting Room 1.64</i> <i>Chair: Susana Cristobal</i>	<b>W3-I</b> <b>Ecotoxicology and Chemistry: Field and Laboratory Approaches II</b> <i>Meeting Room 2.61-2.63</i> <i>Chair: Ifeoluwa Grace Idowu</i>
<b>1:30 PM</b> <span style="float: right;"><b>W3-G.1</b></span> Comparative Studies on the Kinetic Properties of Lipases Purified from <i>Aspergillus nidulans</i> and <i>Aspergillus niger</i> LC 269109 <i>Mida HM, Boyi RN*, Otitoju O, Sabinus EO, Chilaka FC</i> <i>Federal University Wukari</i>	<b>1:30 PM</b> Species Diversity and Distribution of Ants (Hymenoptera:Formicidae) in Ketu Fruit Market and Lekki Urban Forest and Animal Sanctuary Initiative(LUFASI) Nature Park <i>Ahme WU</i> <i>University of Lagos</i>	<b>1:30 PM</b> <span style="float: right;"><b>W3-I.1</b></span> The Effects of Different Concentrations of Heavy Metals on the Biomass Yield and Specific Growth Rate of <i>Rhizobium</i> sp <i>Udensi JU, Ngumah C, Mgbemena IC, Ejiogu CC, Ebe T, Ozioma G</i> <i>Federal University of Technology Owerri</i>
<b>1:50 PM</b> <span style="float: right;"><b>W3-G.2</b></span> Indices of Ready-To-Eat Breakfast Product (RTE) for Diabetics from Sorghum, African Yam Bean and Unripe Plantain Flour Blends using a Bioassay <i>Onuh FA, Ani JC, Mbaeyi-Nwaoha IE</i> <i>University of Nigeria, Nsukka</i>	<b>1:50 PM</b> <span style="float: right;"><b>W3-H.2</b></span> Chlorophyll as A Biomarker for Evaluating the Impact of Hydrocarbons on Soil Ecosystem and Hence Soil Productivity <i>Osuji CA, Ubani CS, Anosike CA, Onwurah INE</i> <i>Biochemistry Department University of Nigeria, Nsukka</i>	<b>1:50 PM</b> <span style="float: right;"><b>W3-I.2</b></span> Persistent Organic Pollutants in Leatherback- and Loggerhead Sea Turtle Eggs from KwaZulu-Natal <i>Van der Schyff V, du Preez M, Nel R, Ikenaka Y, Johannes YB, Bouwman H</i> <i>North-West University</i>
<b>2:10 PM</b> <span style="float: right;"><b>W3-G.3</b></span> Utilization of Fruit and Vegetable Waste as a Natural Resources of Bioactive Compounds <i>Uchegbu NN, Uzodimma EO</i> <i>University of Nigeria, Nsukka</i>	<b>2:10 PM</b> <span style="float: right;"><b>W3-H.4</b></span> Towards the Next Generation of Chemical and Environmental Assessment <i>Lizano-Fallas V, Cristobal S*</i> <i>Linköping University</i>	<b>2:10 PM</b> <span style="float: right;"><b>W3-I.4</b></span> A Simple Method for Occurrence and Risk Assessment of Personal Care Products, Pharmaceuticals and Stimulant in Mgeni and Msunduzi Rivers, KwaZulu-Natal, South Africa <i>Gumbi BP</i> <i>University of KwaZulu-Natal</i>
	<b>2:30 PM</b> <span style="float: right;"><b>W3-H.5</b></span> Evaluating the Effect of Cement Dust on Photosynthetic Pigments: Implications for Plant productivity <i>Farinmade AE, Ogunyebi AL, Omoyajowo KO*</i> <i>University of Lagos, Akoka</i>	<b>2:30 PM</b> <span style="float: right;"><b>W3-I.5</b></span> Environmental Risks Assessment and Toxicological Evaluations of Printing Press Effluent using the African Sharptooth Catfish ( <i>Clarias gariepinus</i> ) <i>Sogbanmu TO, Ifeanyichukwu DP, Jimoh RO*</i> <i>University of Lagos and Ecotoxicology and Conservation Unit</i>



## 附錄二、會議資料

講者：Lorraine Maltby；Professor, Department of Animal and Plant Sciences, Sheffield University.

主題：Risk and Resilience in Chemical Ecological Risk Assessment: A European perspective.



- ### Take home messages
- Need both food security and functioning ecosystems.
  - Ecosystems and the species they support, provide multiple benefits and enhance human well-being.
  - Trade-offs between yield, agricultural area and biodiversity (species richness and composition).
  - Manage landscapes to optimise food production and other ecosystem services. Can't have everything, everywhere, all of the time.
  - Changing agricultural practice in one region may displace food production and hence environmental impact.

講者：Dr. Sohel Saikat ; Programme Officer, Quality Systems and Resilience Technical Lead: DFID Tackling Deadly Diseases in Africa Programme (TDDAP) and KOICA Quality and Resilience in Ethiopia and Liberia Project UHC and Health Systems Cluster World Health Organization

主題：Health System Resilience – A Shared Need for Tackling Emergencies and Safe Health Services.



### What is Health Systems Resilience?

The capacity of health actors, institutions, and populations to *prepare* for and effectively *respond* to crises; *maintain* core functions when a crisis hits; and, informed by lessons learned during the crisis, *reorganise* if conditions require it (Kruk et al. 2015).

**Functions:**

- ✓ Maintain quality routine health services at all contexts;
- ✓ Capacity for emergency specific health care;
- ✓ Public health response to emergency/crisis;
- ✓ Respond to changing epidemiology: NCD prevention, promotion & public health

**Leadership and Governance**

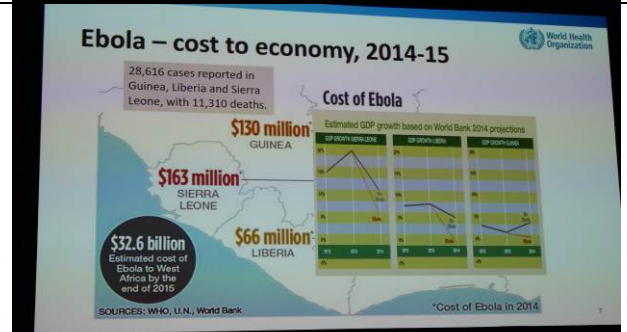
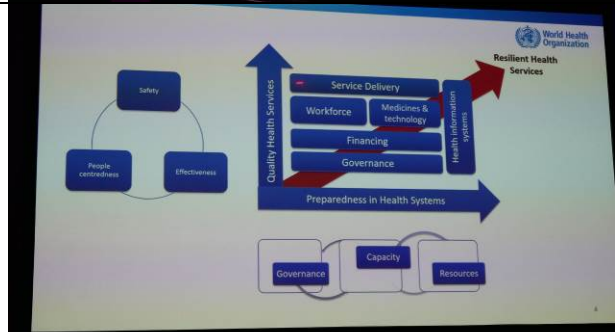
**Health workforce**

**Health financing**

**Infrastructure, equipment and supplies**

**Knowledge and information system**

Service delivery (individual and population-level services)



### DRC Ebola - Ongoing: Weak health systems, conflicts, concurrent outbreaks & displacement

Country	Health Care	Confirmed cases	Unconfirmed cases	Deaths	Healthcare workers infected
Guinea	10	1014	10	10	10
Liberia	10	1014	10	10	10
Sierra Leone	10	1014	10	10	10
DRC	10	1014	10	10	10
...	...	...	...	...	...

The number of healthcare workers infected is 90 (7% of total cases), including 33 deaths.

- ### Three Broad Different Country Contexts
- #### Three Types of HSS and Preparedness Support Strategies
- HSS country strategies including IHR core capacity and preparedness should be tailored to different country contexts:
- **Strategy 1:** Substitution of health services delivery and (re)building health systems and security foundations in conflict and fragile countries
  - **Strategy 2:** Providing technical assistance to strengthen health system and security foundations and build system institutions in least developed countries
  - **Strategy 3:** Supporting policy dialogue to support foundations building, institution strengthening and health system transformation in countries with mature health systems



- ### Key role that academic/allied sectors can play
- Advocacy for health as underpinning requirement for SDGs;
  - Advocacy within national authorities (MoH, MoE, MoP, MoA and security sectors) for increased domestic resources and health systems approach;
  - Health literacy and multi-disciplinary health workforce development;
  - Essential Public Health Functions;
  - Joint research with global and national authorities to further shape global policy agenda;
  - Pooling of resources and expertise would be highly beneficial, should the capacities – and gaps – in each sector and at the interface be assessed.
  - Enhanced academic partnership between institutions of countries of different income levels and capacities in public health.



講者：Titus Mathe; Eskom

主題：Can What Eskom has Done Recently, Help Find a Remedy for the Current Challenges, Including Preparing for the Next Cycle of Load Shedding.



### Eskom Overview

- Eskom : 100% state owned electricity utility, strongly supported by the government.
- Vertically integrated across generation, transmission and distribution
- Supplies approximately 95% of South Africa's electricity (45% of the total electricity consumed in Africa)
- Net maximum dispatchable generating capacity of 46 557MW as of 3 April 2019
- Infrastructure includes 32 898km of power lines and cables (765kV – 132kV) as of 3 April 2019
- Currently constructing two coal-fired power plants, Medupi & Kusile Power Stations, about 9 600 MW combined

### Eskom Fleet Technical Performance (last 9 years)

Tech Performance Measure	FY 2009/10	FY 2010/11	FY 2011/12	FY 2012/13	FY 2013/14	FY 2014/15	FY 2015/16	FY 2016/17	FY 2017/18
EAF (%)	85.20	84.60	82.00	77.70	75.50	72.70	71.00	77.30	78.00
UCLF (%)	5.1	6.1	8.0	8.7	11.0	15.2	14.9	9.9	10.2
SAIFI (Number /yr)	24.7	25.3	23.7	22.2	20.2	19.7	20.5	18.9	18.7
SAMD (Hours/yr)	54.4	52.6	45.8	41.9	37	36.2	38.6	38.9	38.9
System mins	4.1	2.6	4.7	3.5	3.1	2.9	2.4	3.8	2.1
Particulates (kg/MWh SO)	0.39	0.33	0.31	0.35	0.35	0.37	0.36	0.3	0.27

As of 31 March 2019 EAF was around 66%

### EPPEI Specialisation Centres established in line with Eskom's technical challenges

- Power Generation EPPEI SCs**
  - University of Cape Town – Energy Efficiency
  - University of Witwatersrand – Combustion Engineering
  - Stellenbosch University – Renewables, Heating and Cooling
- Cross-Cutting EPPEI SCs**
  - UCT – Materials Science & Mechanics
  - University of Pretoria – Asset management
  - Wits – High Voltage Alternating Current
  - UKZN – High Voltage Direct Current

### Eskom involvement in SMARTResilience project

- SMARTResilience project, funded by EU, is a project dealing with resilience of critical infrastructures in extreme situations: one of the 8 types of infrastructures are power plants.
- Eskom took part in the SMARTResilience EU project as a member of the International Advisory Board (Dr Shanil Singh represented Eskom in Norway in 2017).
- We understand the project have developed models and tools, based on risk and resilience indicators, also developed artificial intelligence / business intelligence interactive dashboard.

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### What can SmartResilience project do for Eskom?

- Help us to better prepare, withstand, recover and adapt for the next cycle of load shedding
- Resilience issues/indicators to consider:
  - Robustness of RBI & asset resilience
  - Financial robustness
  - Management and organization
  - Governance and procedures for quick decision making
  - Training and competency (link to EPPEI)
- Application of the Big 5 principles
  - Method, Tool, Cases, Standards & Rating
- Artificial intelligence / Business intelligence interactive dashboard for quick decision making

### What are the next steps?

- Consider Emergency Preparedness project for SA**
  - Eskom/IPPs, local industry, academics and international experts collaborate to create the "Risk & Resilience map of SA/Africa electricity supply". Eskom is ready to collaborate, but we have financial constraints.
- Benefits?**
  - De-risk Africa to attract investments and stimulate economic growth
  - Sustainable skills development programme for Africa
  - Better risk and resilience management for one of the most critical infrastructures in SA and Africa
  - Opportunity to solve real SA/Africa electricity sector problems not by fire-fighting, but by structural and sustainable improvement
  - Better understanding of interconnectedness to other critical infrastructure?

講者：Cummings CL；Nanyang Technological University

主題：Frontiers of Risk Communication: Grand Challenges for Communication of Emerging Bioscience Issues.

**SciTech perceptions**

Bar chart showing perceptions for Nuclear energy, Nanotechnology, and Synthetic biology across various statements.

**Misinformation, Disinformation, & Propaganda**

- Misinformation:** giving erroneous or incorrect information. It is false or inaccurate information that is spread unintentionally
- Disinformation:** intentionally disseminating false information. Often mixes truth with false conclusions and lies
- Propaganda:** systematic propagation of information or ideas by an interested party in order to instill certain responses.

**Post-normal science**

- Conceptualizes the management of complex science issues, where **"facts [are] uncertain, values in dispute, stakes high, and decisions urgent"**
  - Silvio Funtowicz and Jerome Ravetz

**Situational theory of publics**

- Nonpublic:** There is no consequence for this audience
- Latent public:** a consequence creates a problem but has not detected the problem yet
- Aware public:** has started working to solve the problem as individuals
- Active public:** has started working to solve the problem as a group
- Activist:** Actively seeks inclusion from others to solve the problem

講者：Thomas-Benjamin Seiler；RWTH Aachen University

主題：Change the Game for Environmental Research-Activities to Support Science and Risk Communication.

**SETAC Europe Interest Group**

SCIRIC process diagram showing the flow from PEOPLE and TOPIC to SCIRIC, then to Collate expertise and experience, Review of state-of-art, and Analysis of environmental research-characteristics, leading to Tailor-made tools and strategies, and finally to Strong community of experts.

**SETAC Europe Interest Group**

If you answered NO to Question 6, what is your reason?

Bar chart showing reasons for not answering 'Yes' to Question 6.

**SETAC Europe Strategic Goal**

- SG1 "Quality and Credibility of Science"
  - SG1a: Open Science
  - SG1b: Reproducible Science
  - SG1c: Science-based Risk Communication
  - SG1d: Science Integrity

Inventory | Network | Problem and challenge | Training | Keynotes

**SETAC Europe Strategic Goal**

SG1c "Science-based Risk Communication"

- Special sessions in Rome and Helsinki
- Survey "So you believe you are a good science communicator?"
- Short courses in future
- Keynotes in Helsinki and maybe Dublin

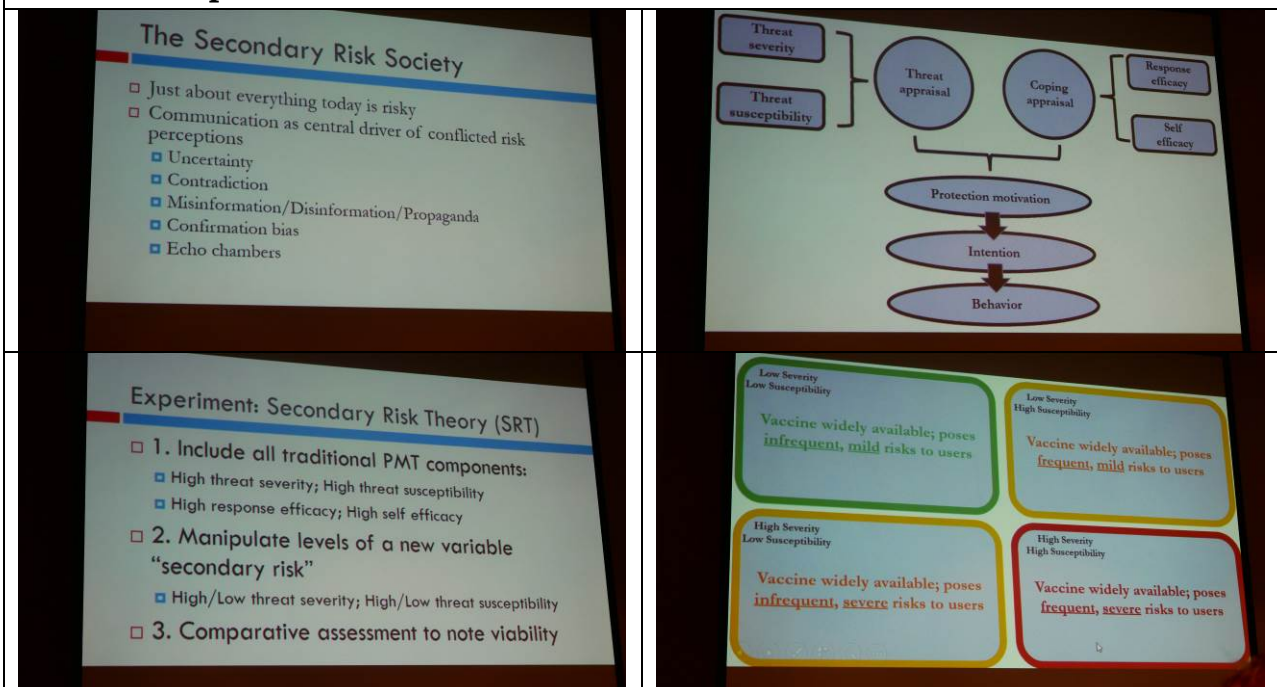
講者：Annegaaik Leopold；Calidris Environment BV

主題：Endocrine Disruptors: What do we know? What do we not know? How to we communicate about this?



主講人：Cummings CL；Nanyang Technological University

主題：Secondary Risk Theory: Empirical Foundations for a new Theory of Risk Perceptions.



## Significance of Health Risk Assessor Certification

Kuen-Yuh Wu  
Date: 2019, May 8

- **Health risk assessment: the foundation for making scientific-sound policy**
- Controversial examples in Taiwan
- Certification of risk assessors to ensure reasonable integration of scientific information
- Conclusions



### The needs of risk assessment

- A search of institutional mechanisms that best foster a constructive partnership between **science and government**
- Mechanisms to ensure that government regulation rests on **the best available scientific data and judgment**
- To preserve **the integrity of scientific data and judgments** in the unavoidable collision of the contending interests that accompany most important regulatory decisions

*NRC, The federal government in risk assessment, 1983.*

### Risk analysis is a science-based decision-making process

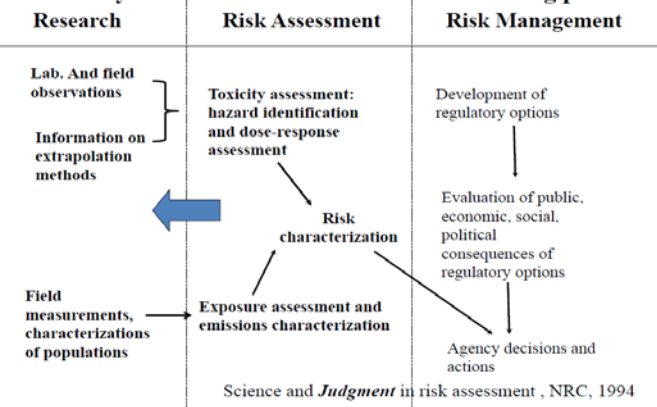


FIGURE 3.13 Risk Management Framework



*Source: Presidential-Congressional Commission on Risk Assessment and Risk Management. 1997. Framework for Environmental Health Risk Management, Final Report, Vol. 1, Washington, D.C.*

### Limitations of health risk assessment

- Incomplete data set
- Insufficient evidence
- Lack of knowledge
- Incapable of complete description of process
- Limited resources

### Uncertainty in health risk assessment

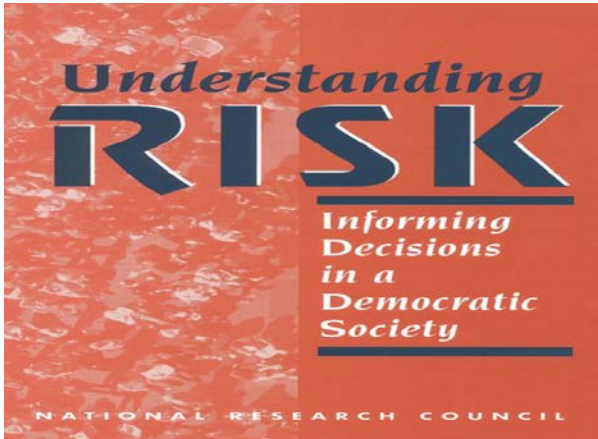
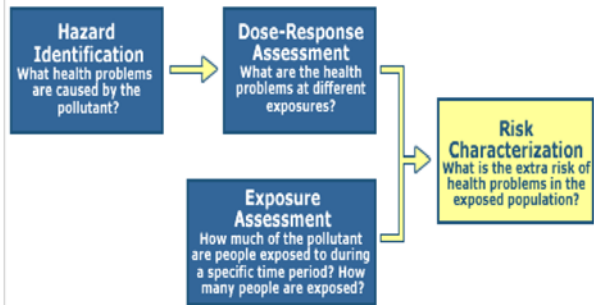
- Assumptions made in the assessment process
- Scenarios
- Models
- Parameters
- Lack of knowledge



## Main Contents

- Health risk assessment: the foundation for making scientific-sound policy
- **Controversial examples in Taiwan**
- Certification of risk assessors to ensure reasonable integration of scientific information
- Conclusions

## The 4 Step Risk Assessment Process



## What should health risk assessors inform risk communicators and managers?

- The magnitude and uncertainty of risk assessed should be communicated with the general public and risk managers.

## Every body can be a health risk assessor

$$ADD_{Pot} = \bar{C} \times \bar{I}R \times EF \times ED / (BW \times AT)$$

Cancer risk = ADD X cancer slope factor  
 HI = ADD/RfD

Because the equation used to calculate exposure dose is highly simplified, almost everyone with basic mathematic ability can do it.

## Practices focusing on exposure assessment

- Measurement data were directly converted to exposure doses by using local exposure factors.
- Exposure doses were assessed with air-disperse and multi-media models if the emission rates were available.

## Uncertainty in exposure scenarios dioxin-contaminated duck eggs



鴨農自行調配之飼料



魚粉等添加物



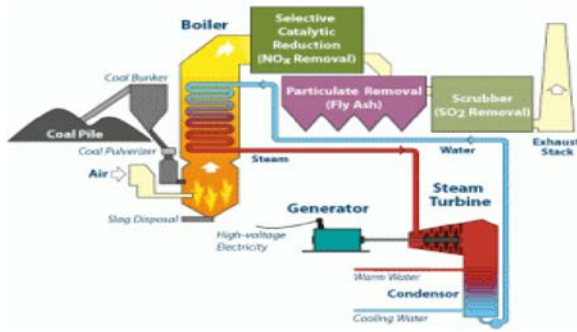
由飼料公司調配處方之飼料

## Assumptions made to identify sources of dioxin exposures for the ducks

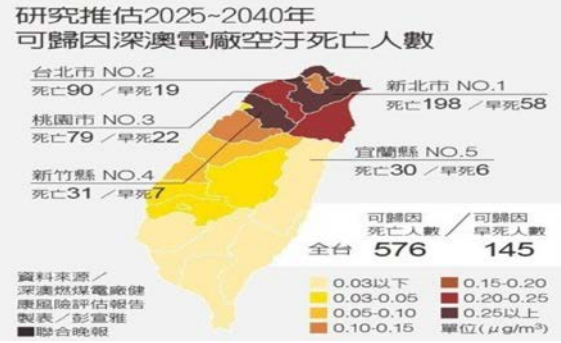
- Ducks consume 155 g of feed and 2% of the feed is soil everyday
- Ducks eat 01 g of leaf of Linden Hibiscus everyday.

**Inappropriate assumption of the worst case scenarios led to conclude that the emission from a company responsible for the incidence.**

An ultra super critical (USC) coal power plant project was forced to cancel because it was considered as polluted as the traditional coal-fired power plant



PM2.5 emitted by this USC coal power plant will kill more 700 people in Taiwan from 2025 to 2040.



## Uncertainty in reverse trajectory model

$$C(x, y) = \frac{QKVD}{2\pi\sigma_y\sigma_zU_s} \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right]$$

C(x,y): ambient air dioxin concentration, μg/m<sup>3</sup>

Q: dioxin emission rate, g/s

K: units conversion factor

V: Vertical term; accounts for vertical distribution of the Gaussian plume

D: Plume depletion term relating removal by physical or chemical process

σ<sub>y</sub>, σ<sub>z</sub>: standard deviation of lateral and vertical concentration distribution, m

U<sub>s</sub>: mean wind speed at release height, m/s

y: crosswind distance from source to receptor, m

## Confusing risk managers

- Do not know how to make decisions according to risk assessment reports.
- Cancer risk less than 1 in one million is safe? It does not matter how the risk was assessed.
- Do not know the limitations of the decisions made,

## Main Contents

- Health risk assessment: the foundation for scientific-sound policy of environmental health and food safety
- Controversial examples in Taiwan
- **Certification of assessors to ensure reasonable integration of scientific information into health risk assessment**
- Conclusions

## Uncertainty in health risk assessment

- Risk was frequently presented only.
- Uncertainty in mathematic modeling was not characterized.
- Assumptions were not described, neither the influences on the risk assessed by the assumptions.

## Limited risk communications

- Because risk cancer less than 1 in one million is safe, should the decision be accepted by the public?
- The general public did not trust and accept the assessment. It is nothing to do with the risk.

## Why is the health risk assessor proposed to be certified first?

- Very diverse fields in risk analysis
- The assessment methodology gradually approaching to mature.
- Required ability to integrate multi-disciplinary scientific information
- Widely used to make scientifically-sound decisions for consistent environment and food safety policies,

### **Significance to certify health risk assessors**

- To make sure health risk assessors capable of appropriate selection and integration of scientific information.
- To make sure health risk assessors capable of making appropriate assumptions if necessary
- To make sure health risk assessors capable of assessing the impacts of the assumptions made.

### **Conclusions**

- Health risk assessment is a profession, and to set up the certification system is to identify those qualified to be professional in this field.
- Certification is to make sure scientifically-sound health risk assessment can be pursued, so that the effective risk communication and sciences-based public policies can be pursued.
- Certification of health risk assessors will not only lay the foundation for risk assessor certification in other fields when their assessment methodology grows mature, but also provide incentives to recruit SRA members.

### **Significance to certify health risk assessors**

- Scientific information used in health risk assessment should be transparent to the public.
- Uncertainty and limitations in health risk assessment should be well-characterized to inform the public and risk managers.
- Trust to the public can be regained to achieve effective risk communication.
- Risk managers can be aware of limitations of the policies made under uncertainty .

**To the bright future, SRA members will be proud of being professional if the certification system is established for the health risk assessors first.**


# The Encyclopedia of Risk Research edited by SRA-Japan

- An introduction of the risk analysis handbook -

Kyoko Ono\*, Yasunobu Maeda  
 \*Executive Director, Public relations Committee, SRA-Japan  
 (National Institute of Advanced Industrial Science and Technology)

## The encyclopedia of risk research

- ✓ will be published in June, 2019
- ✓ edited by SRA-Japan
- ✓ the new edition, fully revised from former (2006) version.
- ✓ 810 pages, written by 163 experts
- ✓ Written in Japanese



THE ENCYCLOPEDIA OF RISK RESEARCH  
 リスク学事典  
 日本リスク学会 [編]  
 THE SOCIETY FOR RISK ANALYSIS, JAPAN

## Agenda

1. Revision of The encyclopedia of risk research
2. Scopes of the new encyclopedia
3. Contents and structure
4. Potential readers/users


## Contributors

- Chief editor
  - Kubo H (President of SRA-Japan)
- Editors
  - Maeda M\*, Yoneda M#, Shimada Y, Ono K#, Kishimoto A#, Takeda Y#, Hirota S, Ogata H, Kanda R#, Fujiwara H, Usuda Y, Niiyama Y\*, Nagasaka T\*, Tsuda H, Murayama T#
- Supervisors
  - Sakai Y\*, Fujii K#

\*: Former President of SRA-Japan, #: Director of SRA-Japan

## Revision? Why now?

- The former version
  - published in 2006, has been a unique comprehensive textbook of risk research in Japan
  - Out of print!!
- Circumstances around "risk" and "risk research" has been changed.



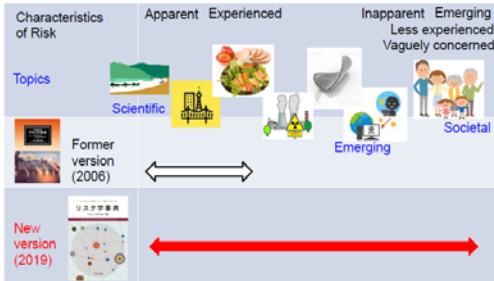
The former version (2006)

## Revise required, why?

In the 21th century ....

- ✓ broadened field where risk research could cover
- ✓ the word "risk" become common
- ✓ two big experiences on risk gave disorders in Japanese society
  - ✓ decline of economy related to Lehman Brothers bankruptcy in 2008
  - ✓ the Great East Japan Earthquake in 2011.

## Scopes broadened in the new version

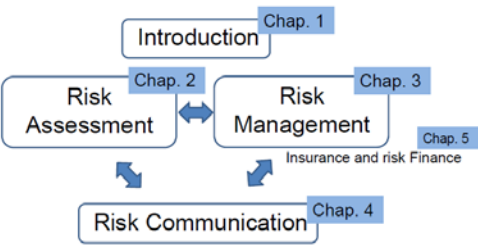


Characteristics of Risk: Apparent, Experienced, Inapparent, Emerging, Less experienced, Vaguely concerned

Topics: Scientific, Societal, Emerging

Former version (2006) vs New version (2019)

## Contents and Structure - Basics -



Introduction Chap. 1

Risk Assessment Chap. 2 ↔ Risk Management Chap. 3

Risk Communication Chap. 4

Insurance and risk Finance Chap. 5

Including...  
 Fundamentals of methodology,  
 Definition of terms i.e. International Standards (ISO)

(Re-) organized Definition of risk (Chap.1)



図1 リスク概念の共通項

Variety of definition on risk in field of...

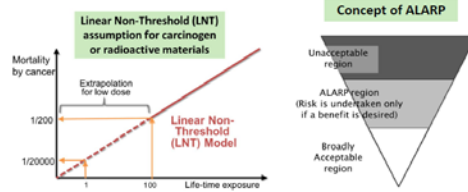


図2 機械安全のリスク概念 図3 自然災害のリスク概念 図4 工業化学物質のリスク概念 図5 セキヤリテイ分野のリスク概念

Contents and Structure - Basics -

Chap. 2 & 3

Chap. 3



Structure and scope - Specifics -

Including case studies... Chaps. 6-13



Potential readers/users

- Beginner of risk studies, i.e. college/Univ. students
- Risk management division of companies, i.e. Electric utilities
- Government, Municipality officers, i.e. policy making division, crisis management division
- Mass media
- NGO

Good for Collection in public library!



THANK YOU FOR ATTENTION!



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