■ 公開
□ 密件、不公開

執行機關(計畫)識別碼：070101e501

農業部林業及自然保育署112年度科技計畫研究報告

計畫名稱：國際生態工程學會(IEES)研討會資料蒐集研究案(國立中興大學)(第1年/全程1年)

(英文名稱) Research Proposal for Data Collection at International Ecological Engineering Society (IEES) Conference (National Chung Hsing University)

計畫編號：112農科-7.1.1-務-e5(1)

全程計畫期間：自 112年9月1日 至 112年11月30日
本年計畫期間：自 112年9月1日 至 112年11月30日

計畫主持人：林幸助
研究人員：林蔚任、何瓊紋
執行機關：國立中興大學

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一、執行成果中文摘要：

本計畫旨在參加國際生態工程學會（International Ecological Engineering Society）於希臘哈尼亞（Chania, Greece）於2023年10月1日至5日舉辦的年會。透過參與此次盛會，期待深入了解最新的生態工程相關研究成果及應用技術。這次參與不僅是為了探討如何應用生態工程方法提升紅樹林的自然碳匯能力，更是希望能探索利用自然解方以達成自然棲地淨零碳排的可能性。

二、執行成果英文摘要：

This project aims to participate in the annual conference organized by the International Ecological Engineering Society, scheduled to be held in Chania, Greece, from October 1st to 5th, 2023. Through this participation, the goal is to gain in-depth insights into the latest research findings and applied technologies in ecological engineering. This engagement not only intends to explore how ecological engineering methods can enhance the natural carbon sequestration capacity of mangroves but also aims to investigate the potential of employing nature-based solutions to achieve net-zero carbon emissions in natural habitats.

三、計畫目的：

1. 促進紅樹林碳匯最新相關研究報告之分享交流。
2. 蒐集生態工法應用在紅樹林復育及保育的方法及案例。
3. 尋求紅樹林作為減排增匯永續發展之策略。

四、重要工作項目及實施方法：

參加由國際生態工程學會於2023年10月1日至10月5日在希臘哈尼亞舉辦的生態工程國際學術研討會，並於會議中發表臺灣紅樹林碳匯相關研究，並於國外與會者進行紅樹林碳匯研究進行學術交流，並於會議中蒐集生態工程用於紅樹林復育等主題相關資料，以作為國內未來進行紅樹林復育案例的參考資料，研討會網址為 https://www.iees.tuc.gr/key-dates/。

本次研討會以「封閉循環與循環社會2023：生態工程的力量」(Closed Cycles and the Circular Society 2023: the power of ecological engineering)為主題，共分有8個主題進行學術研究發表。本次申請人林蔚任博士進行發表的研究題目為「紅樹林碳收支模式建議由枯落物量推算淨生產量及碳埋藏量」(Mangrove carbon budgets suggest the estimation of net production and carbon burial by quantifying litterfall)，何瓊紋助理教授發表的研究題目為「中都濕地公園利用紅樹林植樹增加碳匯量」（Enhancement of carbon sinks through mangrove afforestation in a tropical constructed wetland park）。

五、結果與討論：

一、參加會議經過

本次國際生態工程學會2023年會訂於2023年10月1日至5日於希臘(Greece)哈尼亞(Chania)舉行，同行共有臺灣專家學者共6人一同前往參加，除了本計畫案主持人林幸助教授，何瓊紋助

理教授及林蔚任博士後研究員外，尚有國立中山大學海洋環境及工程學系林巧雯助理教授、邱子潔研究生及國立臺東大學生命科學系呂佩倫副教授一同組團參加。

10月1日下午抵達希臘哈尼亞城市後，晚上隨即前往指定地點完成報告手續、領取名牌，並參加研討會舉辦的歡迎晚會(Welcome reception)。
10月2日至4日為會議報告日，共有3場大會演講(Keynote)，其餘時間共有三間場地進行專題研究報告，並有單獨空間進行海報展示，提供與會者自由瀏覽。
10月5日為實地考察日，共有4種與生態工程相關的行程可供選擇，但因大會太晚宣佈實地考察行程安排，以致於已經安排會後的私人行程，故沒有參加當日的實地考察。

二、會議介紹

國際生態工程學會(International Ecological Engineering Society)自1993年起，每2年舉辦一次年會，今年2023年為第12次年會，共有約300位來自全球53個國家的與會者。本次年會共有收錄269篇摘要，其中包含190篇口頭報告及79篇海報發表。本次會議中的口頭發表又分兩種形式，其一是完整的15分鐘口頭報告，另一種是利用5分鐘時間快速介紹研究的初步成果，2種報告形式在報名時可由與會者自行選擇。

本次會議共有八大主題，分別如下：

1. Use of ecological elements and ecosystems to reduce pollution
2. Use of ecosystems in a circular society
3. Circular design and integrated planning approaches for increased resiliency
4. Resource recovery and reuse
5. Climate change, green and just transition, and carbon neutrality: the role of ecological engineers
6. Regenerative agriculture
7. Ecological Engineering and the mining industry
8. Ecological Engineering Education

三、學術研究發表

本次研討會林蔚任博士及何瓊紋助理教授分別各有1篇關於紅樹林碳匯研究的海報發表，分別是(1)綜合臺灣西海岸10處海岸紅樹林的碳收支研究，找出紅樹林枯落物量與紅樹林淨生產量、土壤碳埋藏量的關係，並找出影響臺灣水筆仔和海茄苳紅樹林碳收支的環境因子。(2)透過高雄中都公園濕地復育紅樹林案例，針對其中不同紅樹林物種進行碳匯測量，估算紅樹林復育可增加的碳匯量，作為未來紅樹林減碳方法學的實地案例之一。

四、演講紀錄

Keynote 1. Nature-Based Solutions for Wastewater Treatment and Application of Circular Economy strategies

第一場大會演講講者是義大利的Dr. Fabio Masi，講者首先提到在現今社會中的農業活動施用過多的氮肥及人為活動產生的磷鹽造成環境的污染，影響地球的水循環，因此如何透過循環方式透過利用廢棄物方式解決這個問題，特別是透過結合以自然為本的解決方法(Nature-based solution, Nbs)並結合聯合國永續發展目標(Sustainable Development Goals, SDGs)。講者提出幾個過去的研究案例，透過生態工程方法達到水質淨化的目的：(1) 透過建置人工濕地淨化污水達到水資源節約、循環及再利用的目的，並重複使用廢棄的營養鹽。這樣的方法也是一種以自然為本的解決方法，人工濕地不但可以增加生物多樣性、減緩熱島效應、調節洪水，也能達到營養循環、能量循環及固定二氧化碳的功效。(2)　　在建築物屋頂設置綠屋頂(green

roof)或是於建築物牆面設置垂直植栽(vertical garden)，可作為人工濕地以淨化建築物中產生人為廢水，淨化後形成灰水(grey water)可供循環使用，此方法不僅可淨化水質，亦可增加城市綠面積或增加棲地環境增加都市的植物或昆蟲的生物多樣性。從本場大會演講的內容中了解人工濕地淨化水質的功能與重要性，並能應用多種型態的人工濕地於都市建築中，利用人工濕地的淨水能力作為自然為本的解決方法。

Keynote 2. Nature-Based Solutions to Optimize the Water-Ecosystem-Food Nexus at the Basin Scale
第二場大會演講講者是希臘的Dr. Nikolaos Nikolaidis，講者利用在希臘克里特島的生態長期研究站(eLTER)了解在半乾燥氣候區的水文、氣象、土壤特性及營養成分，並利用此觀測站的長期資料，瞭解當地農業最適的灌溉方式，以達到水資源循環、合理使用氮磷營養，減少資源浪費。講者以在一處酪梨種植場應用長期研究資料改善土壤為例，發現當土壤總體密度降低，土壤孔隙率增加，土壤保水性增加，而可以減少灌溉用水並減少水資源的浪費。再利用環境DNA檢測土壤細菌和真菌的群聚組成後，發現合理化施肥也能增加兩者的生物多樣性。

Keynote 3. Design of Green Infrastructure for a Circular Economy: Case Studies from Different Social and Economic Contexts
第三場大會演講講者是美國的Dr. Emmanouel Stefanakis，講者首先介紹環境、經濟及社會的關係與連結，並介紹綠色基盤(green infrastructure)的基本概念及設計過程。講者隨後以美國德州的Woodlands New Community為案例，介紹社區重建時如何應用綠色基盤的概念，在2017年遭遇500年頻率的颶風侵襲後，重新設計及規劃社區空間，增加對抗氣候變遷的韌性。講者其次使用海地的La Ville Verte為案例，介紹使用生態工程設計達到社區循環經濟的成果。

(O-030) Methodological approach for assessing the effectiveness of co-creation processes of Nature-based solutions: The case-study application of CLEVER Cities project.
講者介紹了"The CLEVER Cities project"，這是一個歐盟的研究計畫，目的在發展、實施創新的都市解決方案，以促進都市的可持續發展和提高都市居民的生活品質。其核心目標在因應氣候變遷、促進公平與降低都市脆弱度，正好承接大會邀請演講的脈絡，並更為強調社會公平與廣納所有利害關係者的參與。

(O-061) How circular design and integrated planning approaches may increase resiliency and biodiversity?
講者說明利用UNECE PPPs database(聯合國經濟及社會理事會歐洲經濟委員會公私營合作資料庫)，以循環設計與整合規劃來促進生態系韌性與生物多樣性。

(O-066) Turning a nuisance into a resource: options and obstacles for sustainable use of beach wrack derived from case studies
講者介紹一個處理海灘積藻的歐盟計畫CONTRA project，全名為Conversion of a Nuisance to a Resource and Asset。這是一個值得臺灣借鏡的計畫，其目的為在滿足公眾對“乾淨”海灘的需求的同時最好地保護環境。海灘積藻/草對海灘生態系統和海岸防護具有重要作用。但是，當大量積藻/草堆積在人類休閒用的海灘上時，就被視為一種“骯髒”，並且清理成本高昂。本計畫為了在相互衝突的利益之間找到平衡，選擇6個地點進行環境、經濟和社會方面的全面評估。歐洲海灘常堆積著地中海特有的大型海草-大洋海海草，其實為重要的藍碳資

源，堆積在海灘上也有提供潮間帶生物躲藏的棲地功能，卻因為人類的休憩需求而需要大成本清除，我也很期待看到這個計畫最後會建議怎麼樣的權衡策略。

(O-087) he use of Participatory System Dynamics Modelling to support 'Nexus doing' : preliminary results from the Koiliaris (Greece) case study
講者介紹了另一個歐盟計畫The LENSES projects，全名為LEarning and action alliances for NexuS EnvironmentS in an uncertain future，計畫的目標之一是透過參與式系統動力學建模（Participatory System Dynamics Modelling）來支援"Nexus doing"，即促進水、土地、能源等不同領域之間的協同管理。講者並介紹其參與的位在開會地點希臘克里特島的Koiliaris Critical Zone建構模式的案例，包括
1. 利害相關者參與：以確保建模過程中涵蓋多元的觀點和知識。
2. Nexus Doing的模擬： 使用系統動力學建模工具，模擬和分析水、土地、能源等不同領域之間的關聯性和相互影響。
3. 可行性評估： 評估不同的"Nexus doing"策略的可行性，並探討可能的影響。
4. 知識傳遞和協作： 透過建模過程中的知識共享和協作，促進當地社區和利害相關者對Nexus doing的理解和參與。

(O-095) Efficiency removal of specific substances in multistage treatment wetland for urban drainage water
講者提到暴雨造成陸地逕流，帶入陸源大量的營養物質、重金屬或其他無機物質進入都市集水區，大量的營養鹽容易造成水源優養化問題，因此講者提到利用人工濕地作為源頭管理，事先處理陸源逕流的營養成分。講者介紹在此案例中是以結合垂直流及水平流等2種類型組合成的人工濕地，處理後的水質在濁度、總懸浮固體、氮磷營養鹽、重金屬、微生物、多環芳香烴(polycyclic aromatic hydrocarbons, PAHs)及塑膠微粒(microplastics)等各項目，都能有效的改善及淨化。

(O-104) The integrated constructed wetland design approach: A review
講者開場就提到如何協調社會環境的需要與人類社會的需求，是重要的問題，並以愛爾蘭(Ireland)的土地乾旱為例，解釋如何透過生態工程回覆土壤的濕潤度，同時又能滿足社會上對人類福祉的好處。講者提到利用整合型人工濕地(integrated constructed wetland)為手段，作為結合土地和水資源的媒介，在生物多樣性、水資源管理及土地地景三要素中達成平衡。愛爾蘭目前有超過200個此類型人工濕地，不僅能處理人為家庭廢水，亦能夠過人工濕地蓄積雨水、重複使用廢水等水資源管理。另外此類型的人工濕地土壤中也能夠儲存碳、氮吉磷等元素，是重要的碳匯生態系。營運此類人工濕地的成本也比建造與運作污水處理廠節省60%~80%，講者認為人工濕地是適合作為水資源管理的生態工程方法和手段。

(O-117) Diffuse pollution treatment wetlands in cold climate: the importance of flood meadows
講者介紹芬蘭南邊的一處解決擴散型污染(diffuse pollution)的人工濕地案例，此種濕地內有不同的植物，從2010年的50種提升至2017年有151種草本植物，僅有3種是非原生種。人工濕地能夠作為緩衝地帶，降低大雨或融雪造成的流速和濁度，植物亦能提供淨化水質的生態功能。因此講者提到此類型人工濕地可視為是一種以自然為本的解決方法，濕地內的草澤植物不僅可以淨化水質、增加生物多樣性及降低甲烷排放。

(O-124) Development of a beach management technology solution to monitor and mitigate plastic marine littering

講者介紹其提出的一個遊戲化應用程式(Gamification platform)，將無人機等監測到的海洋汙染數據，整合在此平台中，強調遊戲化方法來認知海洋垃圾對海洋生態、海洋景觀、沿海國家的經濟皆造成負面影響，介以提高使用的環保意識。

(O-154) The water reuse potential of nature-based solutions in response to the increased water scarcity risks imposed by climate change
講者首先介紹水資源短缺可能由於(1)實際缺少或水資源不足，(2)缺乏水資源的使用權及(3)因缺乏適當基礎設施而未能定期供應水。在2025年之前，衣索比亞、印度、肯亞、尼加拉瓜和秘魯都有可能遭遇水資源短缺的危機。因此講者介紹透過以自然為本的解決方案(nature-based solution)，透過雨水的再利用，以紓緩水資源短缺造成的壓力。講者介紹利用路面植栽作為淨化系統，透Nbs與地景結合，達到水資源再利用、節約能源、增加儲水空間及氣候調適等多重功效，增加水資源利用的同時也增加人類福祉。

(O-162) Eco-traditional buildings in Makkah: Al-Byaddiah Palace as a case study
講者講述其多年來對沙烏地阿拉伯漢志地區的伊斯蘭教聖城麥加(Makkah)傳統建築的研究成果。過去大家已經對其建築排列方式與立面裝飾呈現的美學有豐富的了解，講者則從其看似裝飾性的包裹建築物表皮的木衣(roshan)，其實為功能性的建築元素，可保持房屋涼爽和通風，因此不僅反映了與該地區的建築和居住相關的文化，更呈現出建築與環境自然之間的和諧。

(O-166) Investigating GHG emissions from vertical subsurface flow (VSSF) Constructed Wetlands treating the UASB effluent originating from domestic wastewater
講者利用希臘雅典郊區的垂直潛流人工濕地(vertical sub-surface flow constructed wetlands, VSSF CW)探討人工濕地處理污水的過程中產生的甲烷及氧化亞氮通量，並探討溫室氣體的變異與造成的原因。夏、冬季時人工濕地除汙過程中釋放的溫室氣體總量相近，分別是0.55及0.62kg CO2e m-3。污水進入人工濕地時會有大量的甲烷及氧化亞氮氣體產生，不同的是甲烷會快速下降90%，但氧化亞氮則在6小時後下降約60%。可能影響人工濕地溫室氣體排放量的原因包含濕地底土的氧氣飽和度，越厭氧的土壤容易產生較多的甲烷氣體。其次氧化亞氮氣體則與處理污水內含有的氮鹽量相關，但氮鹽轉換的過程中容易產生氧化亞氮。

(O-180) Transforming polluted urban waters into liveable urban space with the help of NBS taking the Flussbad Berlin as an example
講者介紹德國柏林(Berlin)市區的Flussbad Berlin計畫，此計畫為柏林施普雷運河(Spree Canal)的改善計畫，透過以生態方式建置人工濕地淨化進入運河的水質，讓乾淨的水流入下游的河段，並在下游河段建置游泳區，提供市民親水空間。此報告所提淨水計劃類似臺中市政府2020年左右對市區綠川的改善計畫，透過源頭建置人工濕地(污水處理廠)改善流入綠川的水池，並在綠川兩側建置污水溢流管分離乾淨與污水，改善及提升市區內綠川的水質，增加臺中市民的親水意願。

(O-183) It is a waste to waste waste: examples of circularity in Kenya and Mali (just listen to your grandfather)
講者介紹肯亞與馬利將廢水循環再利用的方法，並強調丟棄廢水是很浪費的! 要聽阿嬤的話!

(O-184) Advancing Sustainability of Process Industries through Digital and Circular Water Use Innovations - Experience from AquaSPICE project

講者講述歐盟計畫AquaSPICE project，其計畫目的在改進和保障水之產品供應鏈的品質，以確保消費者獲得安全、高品質和可溯源的水之產品。

(O-185) Advancing sustainability in industrial supply chains by embracing circular approaches and digital transformation
講者介紹又一個的歐盟計畫Plooto’s project，這個計畫透過一個循環且具彈性的訊息系統(CRIS)，將原物料與廢棄物之間的的關係串聯起來(CDT)，特別是廢棄物轉化成原物料的過程，增加廢棄物的再利用。例如，Plooto增加從廢棄電子設備(WEEE)回收的NdFeB和鋇鐵氧體(Sr-ferrite)永磁體(PMs)的再利用，如此則能減少對稀土元素Nd的依賴。

(F-052) Floating constructed wetlands based on recycled polymers to restore aquatic ecosystems
講者介紹在智利中部城市的案例中，利用回收的寶特瓶製作浮體式人工濕地(floating constructed wetland)，以淨化都市中運河的水質，不僅可以降低人工濕地的營建成本，也可以降低設置的困難度。講者利用排列廢氣寶特瓶搭建平台，並於寶特瓶間空隙種植莎草及蘆葦，透過植物生長吸收水體內的營養物質達到淨化水體的效果。講者提到在室內水池的研究成果，利用PETG材質能比HDPE材質在水面有更高的浮力，但僅有40%的植物能夠生長出新的莖，推測可能是寶特瓶搭建的平台沒有提供適合的空間讓植物生長。在野外測試的結果中發現此種利用寶特瓶搭建的浮體式人工濕地能夠飄浮在水面約2週時間，直到整個裝置被偷走後即終止實驗。

(F-055) Nitrogen fixation rate measurement by nitrogen fixing bacteria in a L*emna minor* aquatic system
這份研究呈現了浮萍共生的固氮細菌固氮的實驗結果，研究中計算的最高固氮速率為0.699 mg TN/(mg Ns* day)。實驗發現，由於較低的溫度(20˚C而非26˚C)影響了植物的新陳代謝率和生長，此外在前21天內，浮萍的氮含量從0.082降至0.047 mg N/mg d.m.。總葉片數的生產量從30增加到251，遵循指數方程式直到穩定階段（第60天）。浮萍的乾重也呈指數增長，即使在總葉片數穩定和死亡階段之後仍然如此。液相中的硝酸鹽從初始值(99.4 mg/L)減少，保持在45.0到70.0 mg/L範圍內，然後進一步下降。液相中的銨水平保持在非常低的水平，甚至無法測量到。生物量的蛋白質含量在28.5%到38.8%之間變動。綜合來看，這項研究展示了浮萍共生固氮過程中氮的轉移和植物生長特性，但也突顯了溫度對於適應期的影響以及生物量內蛋白質含量的變化。這些發現對於深入了解浮萍共生的固氮機制以及應用於氮循環的管理上有著重要意義。

(F-067) Development of a blockchain solution for food waste management
講者講述在希臘一個媒合剩餘食物與食物需求者的平台Blockfoodwaste project，目的在於減少食物資源的浪費，間接消滅貧窮。聽到這樣的平台倍感親切，因為臺灣已經這樣做很久了，從最早的PTT 窮人版，到臉書的剩(聖)食社團，還有騎樓下的愛心冰箱都是分享剩餘食物的平台，都是努力消滅剩食的平台。臺中還有搶救即將被拋棄的市場醜蔬果的”明日餐桌”公益團體，非常適合到國際研討會發表臺灣經驗。

六、結論：

一、林蔚任博士後研究員會後心得

這次是首次參加生態工程相關的國際研討會，參加後有了許多新的領悟。參加的起因原是因為大會公佈的主題中有以海岸紅樹林或紅樹林復育為主題，期待能分享自己的研究成果，並從其他與會者報告的國際案例中學習。然而，參加後才意識到目前國際生態工程仍偏重於人工濕地，特別是種植草本植物的人工濕地，來進行水質淨化或其他目的。

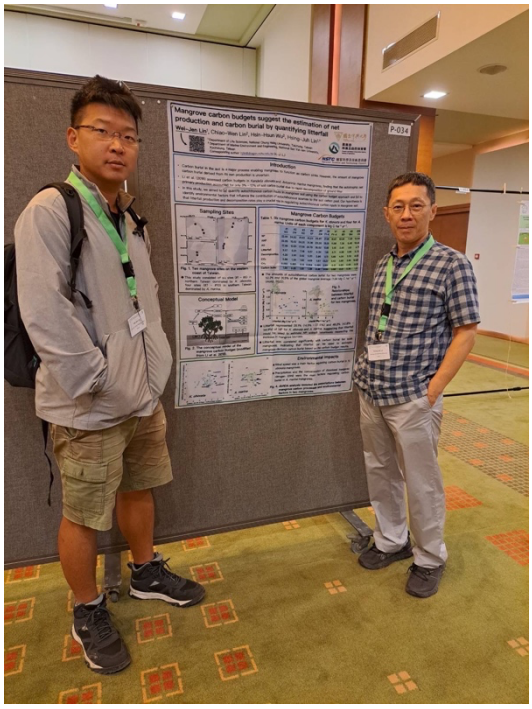
人工濕地不僅提供水質淨化功能，也孕育了豐富的生物多樣性，並具有碳匯能力。但目前的研究案例多以草本植物，如禾本科的蘆葦或莎草科的莎草等，氮是否能將紅樹林作為人工濕地的主要植物類型？紅樹林作為木本植物具有較高的生長能力，其土壤也有碳匯能力，同時提供生物多樣性的棲息環境，理應能取代草本植物。

因此參加完本次會議後我開始思考，若將紅樹林用於人工濕地是否能增加其碳匯量？又或者，高營養濃度是否會抑制紅樹林的生長？這是未來值得探討的研究問題。若以紅樹林作為人工濕地，並能增加其碳匯量，這將是一種理想的自然為本解決方法，能夠同時實現污水淨化和碳匯增加的雙重效益。這次研討會激發了我對於生態工程更廣闊的思考，期待未來能深入探索這個領域的可能性。

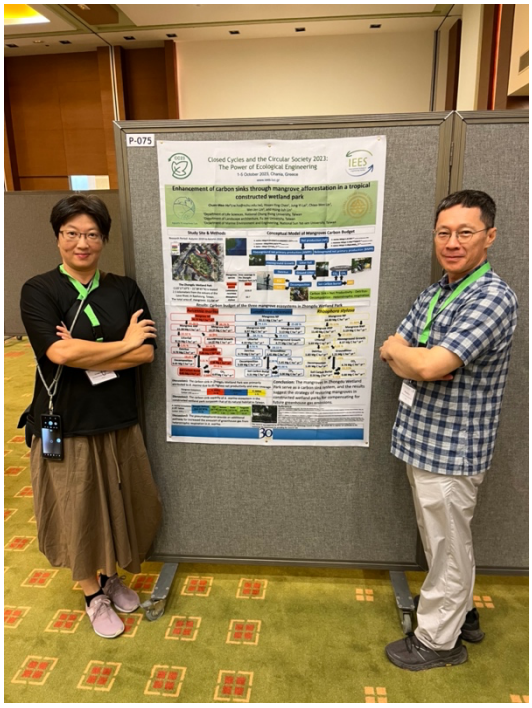
二、何瓊紋助理教授會後心得

這次的會議與我原先的預期差距甚大，以為會接觸到許多以工程方法解決生態問題的研究，但其實議題完全圍繞在以自然解方來面對人與環境之間的衝突，包括顯而易見的資源不足與氣候變遷帶來的衝擊。我也留意到，歐盟鼓勵多項整合性的計畫來解決上述關注的議題，並透過模式來找到最佳策略，也用試點方式測試策略的可行性，而亞洲地區至少在臺灣，尚未有類似的計畫出現。因此本次研討會收穫豐富，期能提供給政府單位作為政策擬定之參考。

七、參考文獻：



林幸助教授與林蔚任博士後研究員合影於海報發表前。



林幸助教授與何瓊紋助理教授合影於海報發表前。

本次國際生態工程學會 2023 年會與會者大合照。

IEES 2023 PROGRAM

Closed cycles and the Circular Society 2023:
The power of ecological engineering
1-5 October 2023, Chania, Greece

Sunday 1 Oct		Grand Arsenal (Chania old port)
	17:30	Registration desk open
	18:00 - 20:00	Welcome reception

O = Oral presentation: 10 min talk + 4 min Q&A + 1 min buffer (Speaker change)
F = Flash Oral presentation: 4 min talk + 1 min buffer (Speaker change)

Monday 2 Oct		IMPERIAL MAIN HALL	IMPERIAL ROOM 1	IMPERIAL ROOM 2
	08:00 - 09:00	Registration (lobby area)		
	PLENARY SESSION I Chair: Alexandros Stefanakis			
	09:00 - 09:15	CONFERENCE OPENING AND WELCOME Alexandros Stefanakis, IEES President		
	09:15 - 09:30	WELCOME MESSAGES Professor Michalis Zervakis (TUC Rector) Ioannis Malandrakis (Mayor of Platanias Municipality)		
	09:30 - 10:15	KEYNOTE: Nature-based Solutions for Wastewater Treatment and Application of Circular Economy strategies Fabio Masi (Iridra Srl, Italy)		
	10:15 - 10:45	Coffe break (lobby area)		
		Session A1: Circularity in the built environment Chair: Mateus Dina & Schubert Hendrik	Session A2: Social dimension of NBS Chair: Pagano Alessandro & Johannes Heeb	Session A3: Resource recovery from water Chair: Raffael Känzig + Gajewska Magdalena
	10:45 - 11:00	(O-099) A spatial perspective on circular economy and the construction sector within Flanders (Belgium) Pisman Ann (Belgium)	(O-030) Methodological approach for assessing the effectiveness of co-creation processes of Nature-based solutions: The case-study application of CLEVER Cities project. Mahmoud Israa (Italy)	(O-040) Production and recovery of orthophosphate from phosphonate-contaminated wastewater combining ozonation and ultraviolet advanced oxidation processes Ji Yuxian (Belgium)
	11:00 - 11:15	(O-021) Valorisation of the stabilized organic fraction of mixed municipal waste as building materials within a circular economy Santos Michael M. (Portugal)	(O-112) Why there are not more Nature-Based Solutions implemented in European cities: A Stakeholder Analysis Pineda-Martos Rocío (Spain)	(O-119) Framework elaboration for the development of hybrid modelling for resource recovery from municipal wastewater and impact mitigation in Gotland/SE *(R)* Francisco Erika Cristina (Sweden)
	11:15 - 11:30	(O-014) Formalising the temporal aspect of timber component reusability in a circular construction indicator Anastasiades Kostas (Belgium)	(O-087) The use of Participatory System Dynamics Modelling to support 'Nexus doing': preliminary results from the Koiliaris (Greece) case study Pagano Alessandro (Italy)	(O-044) Exploring the potential of cyanobacterial microbiomes for sustainable bioproducts Joan Garcia (Spain)
	11:30 - 11:45	(O-135) Waste to construction: A novel Hempcrete product research Meir Isaac (Israel)	(O-152) Multi-criteria tool for Nature-based Solutions and Bioeconomy practices selection towards WEFE Nexus implementation: the case of Tinos island Tsatsou Alexandra (Greece)	(O-048) Electrocoagulation flotation treatment technology in perspective of resource recovery and reuse of municipal wastewater in different regions of the world Hassan Nazia (Belgium)
	11:45 - 12:00	(O-096) Why edible cities? Regelsberger Martin (Austria)	(O-163) Tiganokinisi: social innovation though the collection and recycling of domestic used cooking oil in Cyprus Petsa Demetra (Cyprus)	(O-134) Sidestream sulphide-driven denitrification as robust solution to enable resource recovery in a large-scale industrial WWTP Polizzi Cecilia (Italy)
	12:00 - 12:05	(F-016) Plant-based biocides for the sustainable conservation of built heritage – Field experiments Mateus Dina (Portugal)	(O-009) Combining public participation, participatory design and AI to promote integrated planning approaches Dyer Mark (New Zealand)	(O-069) Recovery of resources and generation of valuable products from municipal wastewater – assessment of products quality Krzeminski Pawel (Norway)
	12:05 - 12:10	(F-034) Advancing circular economy in the built environment: The CircularB Action Pineda-Martos Rocío (Spain)		
	12:10 - 12:15	(F-057) Biomimicry in architectural design in a holistic design process Nowak Anna (Poland)		
	12:15 - 13:45	Lunch time!		
Knowledge Transfer Event (lobby area) --- SEALIVE --- Strategies of Circular Economy and Advanced bio-based solutions to keep our Lands and seas alIVE from plastic contamination --- ISOTECH Ltd AKTI Project & Research Center		Session A4: Novel designs of Constructed Wetlands Chair: Uggetti Enrica & Jan Vymazal	Session A5: The impact of urban NBS on public health and well-being Chair: Kolokotsa Dionysia & Mahmoud Israa	Session A6: Circular design for increased resilience I Chair: Filippos K. Zisopoulos & Goonetilleke Ashantha
	13:45 - 14:00	(O-104) The Integrated constructed wetland design approach: A review Harrington Rory (Ireland)	(O-008) On the integration of nature-based solutions for health and wellbeing in two European Cities: The case studies of Dundalk and Skelleftea Kolokotsa Dionysia (Greece)	(O-083) Bioregional approach for circular design: case study in Roma via Guido Reni (Italy) Francese Dora (Italy)
	14:00 - 14:15	(O-095) Efficiency removal of specific substances in multistage treatment wetland for urban drainage water Gajewska Magdalena (Poland)	(O-110) Measuring the impact of Nature-Based Solutions on citizens' health and well-being: risks and challenges of using wearable devices Biesaga Mikołaj (Poland)	(O-085) El Remanso experimental center in Choachí-Colombia, A laboratory Eco-Village to learn and co-build Rojas Hector (Mexico)
	14:15 - 14:30	(O-100) Removal performance of different types of bioelectrochemical constructed wetlands for dairy wastewater treatment Kotsia Dimitra (Greece)	(O-088) Greenness visibility in urban living environments as pathway to promote health and well-being: mapping spatial differentiation in Flanders (Belgium) based on viewshed analysis Vervoort Peter (Belgium)	(O-185) Advancing sustainability in industrial supply chains by embracing circular approaches and digital transformation Maria Aryblia (Greece)
	14:30 - 14:45	(O-171) Performance of pilot-scale constructed wetlands with different designs and substrates treating olive mill wastewater Dimitra Moschogianni (Greece)	(O-151) Urban greenery's effects on public health and wellbeing of citizens and how to assess it – preliminary euPOLIS findings Randelovic Anja (Serbia)	(O-162) Eco-traditional buildings in Makkah: Al-Byaddiah Palace as a case study Faredah Almurahhem (Saudi Arabia)
	14:45 - 14:50	(F-052) Floating constructed wetlands based on recycled polymers to restore aquatic ecosystems López Daniela (Chile)		
	14:50 - 14:55	(F-009) Selecting innovative substrates materials: characterization and potential application for enhancing CWs sustainability Ventura Delia (Italy)	(O-155) Innovative urban solutions to enhance public spaces and promote good public health and wellbeing - the case studies of euPOLIS and VARCITIES Randelovic Anja (Serbia)	(O-184) Advancing Sustainability of Process Industries through Digital and Circular Water Use Innovations – Experience from AquaSPICE project Arampatzis Goerge (Greece)
	14:55 - 15:00	(F-017) Smart monitoring of waste-filled constructed wetlands for the removal of nutrients from wastewater with low carbon content Pinho Henrique (Portugal)		
	15:00 - 16:00	Coffe break (lobby area) & Poster session		
		Session A7: Sludge management Chair: Alexandros Stefanakis & López Daniela	Session A8: Sustainable Drainage Systems Chair: Frank van Dien & Tsatsou Alexandra	Session A9: Circular water economy Chair: Simos Malamis & Tjasa Griessler Bulc
	16:00 - 16:15	(O-032) A pilot study of domestic sewage sludge dewatering using Sludge Treatment Reed Beds in Oman Al-Rashdi Tahra (Oman)	(O-076) Blue-green infrastructure in highly urbanized areas - practical design examples Rous Vit (Czech Republic)	(O-159) Water companies and circular economy : Challenges and opportunities Kotsifaki Christina (Greece)
	16:15 - 16:30	(O-133) Sludge Treatment Constructed Wetland: a solution for treating sewage sludge for agricultural reuse Uggetti Enrica (Spain)	(O-150) Sustainable drainage systems (SuDS) for rainwater harvesting and stormwater management in temporary humanitarian settlements Tota-Maharaj Kiran (United Kingdom)	(O-114) Water recovery in swimming pools in accordance with the assumptions of the circular economy Kudlek Edyta (Poland)
	16:30 - 16:45	(O-173) DIALKOP project: design and operation optimization of Sludge Treatment Reed Beds in Greece Ioannis Asimakoulas (Greece)	(O-149) Experimental study and nodelling of granular filter nedia used within SuDS for stormwater purification Tota-Maharaj Kiran (United Kingdom)	(O-153) Water quality monitoring of recycled water using effect-based bioassays – a tool for the circular economy Schoenborn Andreas (Switzerland)
	16:45 - 17:00	(O-067) Fate of pit latrine sludge buried in entrenchments Bakare Babatunde Femi (South Africa)	(O-023) Assessment of the potential for microplastic retention in mature SUDS Calzadilla Cabrera Dario (Spain)	(O-136) Greywater treatment and reuse in a residential building in Zurich, Switzerland: Evaluation of the treatment performance and user acceptance Vischer Tabea (Switzerland)
	PLENARY SESSION II Chairs: Alexandros Stefanakis & Raffael Känzig 17:00 - 17:45 30 years of IEES (all participants invited!)			

Tuesday 3 Oct		IMPERIAL MAIN HALL	IMPERIAL ROOM 1	IMPERIAL ROOM 2
	08:30 - 09:00	Registration (lobby area)		
		Session B1: Resource recovery and reuse from waste Chair: Antonopoulou Georgia & Ashley Hall	Session B2: Green roofs and walls Chair: Michael Ruby & Pineda-Martos Rocío	Session B3: Sustainable management of waste biomass Chair: Asli Isci Yakan & Timo Steinbrecher
	09:00 - 09:15	(O-124) Development of a beach management technology solution to monitor and mitigate plastic marine littering Tzanetou Dimitra (Greece)	(O-144) If you build it, they will come: invertebrates on green roofs Michael Ruby (Australia)	(O-027) Deep eutectic solvent pre-treatment of residual biomass streams - effects on anaerobic degradability Schultz Jana (Germany)
	09:15 - 09:30	(O-066) Turning a nuisance into a resource: options and obstacles for sustainable use of beach wrack derived from case studies Schubert Hendrik (Germany)	(O-128) Proposing a holistic experimental setup for green roof flammability testing Chell Sylvie (Australia)	(O-053) Transforming biogenic waste through anaerobic digestion in achieving the circular economy Fan Chihhao (Taiwan)
	09:30 - 09:45	(O-138) Location-based resource analysis tool for waste management and makers: a case study of Pop-Machina Conserva Andrea (Spain)	(O-168) On the influence of plant morphology in the extensive green roof cover: a case study in Mediterranean area Sara di Lonardo (Italy)	(O-089) Deep eutectic solvent pretreatment of cork dust: effects on biomass composition, phenolic extraction and anaerobic degradability Bagder Elmaci Simel (Turkey)
	09:45 - 10:00	(O-157) 3D printed Mn-based monoliths for lithium recovery from oilfield brines Knapik Ewa (Poland)	(O-158) Novel computational tool for coupling water and heat transport models – application on green roofs Stanic Filip (Serbia)	(O-093) Potential applications of hazelnut industry waste based on material properties Aguado González Laura (Spain)
	10:00 - 10:05			(F-005) Wool of mountain sheep - maximizing resources utilisation Kobiela-Mendrek Katarzyna (Poland)
	10:05 - 10:10	(O-010) Reusing depleted hydrocarbon reservoirs: An ecological alternative? Bauer Johannes Fabain (Germany)	(O-078) Performance of three ornamental species for indoor living walls irrigated with greywater Pérez-Urrestarazu Luis (Spain)	(F-029) Wheat bran proteins – raw material for production of nutritional-valued food Slavíková Zuzana (Czech Republic)
	10:10 - 10:15			(F-004) Application of sheep wool as slowly released organic fertilizer in tomato and winter wheat cultivation Broda Jan (Poland)
	10:15 - 10:20	(F-046) Energy-efficient bipolar membrane electrodeionization for integrated water and chemical recoveries from wastewater of recycled polyethylene terephthalate processes Lin Yu-I (Taiwan)		(F-008) Integrated chemicals and waste management for reduction of adverse effects to environment Aleksandryan Anahit (Republic of Armenia)
	10:20 - 10:45	Coffe break (lobby area)		
		Session B4: Urban and regenerative agriculture Chair: Argüello Jazmin & Broda Jan	Session B5: Bioenergy, Renewable energy systems and energy efficiency Chair: Kolokotsa Dionysia & Stergios Vakalis	Session B6: Circular design for increased resilience II Chair: Nowak Anna & Ann Pisman
	10:45 - 11:00	(O-098) Urban agriculture in Latvia – is that a choice between business, community networking and individual traditions? Dobele Madara (Latvia)	(O-130) Carbon neutrality of energy produced from woody biomass Jandl Robert (Austria)	(O-061) How circular design and integrated planning approaches may increase resiliency and biodiversity? Adam Avshalom M. (Israel)

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	11:00 - 11:15	(O-115) Linking nature, culture, and food as an urban farming nature-based solution Argüello Jazmin (France)	(O-071) An innovative approach towards energy conservation using single RGB camera technology for obtaining occupant location in buildings Jeoung Jaewon (South Korea)	(O-011) Regenerative economics for assessing and monitoring transitions towards a circular economy Zisopoulos Filippos Konstantinos (Netherlands)
	11:15 - 11:30	(O-132) HABSIM – Unique R&D Infrastructure for closed-loop food production in space and on Earth Blomqvist Tor (Germany)	(O-072) Sustainable solutions under climate change towards water and energy independence using wind power and hydrogen storage Bertsiou Maria Margarita (Greece)	(O-052) Voluntary standards, as a way how the food industry and retailers control impact of their supply chains on ecosystem services provided by soil Frouzova Jaroslava (Czech Republic)
	11:30 - 11:45	(O-146) Fighting poverty of West African fishermen through aquaponics training centre in Kokrobite, Ghana Kaenzig Raffael (Switzerland)	(O-118) Design and implementation of a solar thermal system as a contribution to resilience and sustainable development in paramo ecosystems Kafarov Viatcheslav (Colombia)	(O-097) Measurement scale validation for inner and outer circular economy loops: a proposal based on food and beverage circular packaging and wishcycling Vayona Anastasia (United Kingdom)
	11:45 - 11:50	(O-103) Urban bioeconomy: mapping organic resource streams and the bio-symbioses in cities through Geospatial and Material Flow Analysis Yang Nan-Hua Nadja (United Kingdom)	(F-013) Recovery of bioenergy and high added value bioproducts from confectionary industrial wastewaters Ntaikou Ioanna (Greece)	(O-183) It is a waste to waste waste: examples of circularity in Kenya and Mali (just listen to your grandfather) Ruud Kampf (Netherlands)
	11:50 - 11:55		(F-018) Coupling retired electric vehicle batteries with PV systems for urban sustainability: the case study of Greece Kastanaki Eleni (Greece)	
	11:55 - 12:00		(F-021) Renewable resources in the conditions of the Slovak Republic Daneshjo Naqib (Slovakia)	
	12:00 - 12:05	(F-038) Analysis of the aquaponics system sustainability via system dynamics modelling – FEW nexus approach Francisco Erika Cristina (Sweden)	(F-020) Effect of environmental factors on dust accumulation and the efficiency of photovoltaic panels: A study case in an Andean City Sanchez Nazly (Colombia)	(F-003) Training a new generation of farmers and agricultural entrepreneurs to implement the concept of circular economy in agriculture – the TANGO-Circular Erasmus plus project George P. Spyrou (Greece)
	12:05 - 12:10	(F-064) Analysis of selected factors determining the possibility of introduction and effective operation of rainwater sharing systems for hydroponics in existing multi-family buildings Bąk Joanna (Poland)	(F-045) Forest conversion and GHG emission in screening and EIA procedures regarding PV sys-tems in Croatia Kalcicek Matea (Croatia)	(F-065) Towards sustainable food systems deploying Circularity Compass Strategy Papadopoulou Kyriaki Maria (Greece)
	12:10 - 12:15	(F-056) Close cycle approach in a food farm in Reggio Emilia, Italy Romagnolli Floriana (Italy)	(F-048) Implementation of DSS to optimize the selection of marine energy sites on the Mexican coastline Rivera Camacho Graciela (Mexico)	(F-067) Development of a blockchain solution for food waste management Plakas George (Greece)
	12:15- 12:20	(F-022) Optimization of wheat nutrition for regenerative agriculture Sadovski Alexander (Bulgaria)	(F-049) Osmotic power generation-based System for self-consumption electricity Ortiz Salcedo Monserrat Karina (Mexico)	
	12:20 - 14:00	**Lunch time!**		
	14:00 - 14:45	**KEYNOTE:** Nature-based solutions to optimize the Water-Ecosystem-Food Nexus at the basin scale Nikolaos Nikolaidis (Technical University of Crete, Greece)		
		Session B7: Stormwater management **Chair: Polizzi Cecilia & Henrique Joaquim de Oliveira Pinho**	**Session B8: Constructed wetlands applications** **Chair: Giuseppe Cirelli & Ioannis Asimakoulas**	**Session B9: Ecological restoration** **Chair: Zhang Mingye & Schoeman Yolandi**
	14:45 - 15:00	(O-057) Nature-Based Solutions for flooding risk mitigation in an urban area: The case study of Catania (Sicily, Italy) Sciuto Liviana (Italy)	(O-013) Assessing the treatment capacity of an ecological engineered wetland receiving AMD over a period of nine years using water quality and periphyton as indicators Oberholster Paul Johan (South Africa)	(O-051) The role of natural processes in post mining land reclamation Frouz Jan (Czech Republic)
	15:00 - 15:15	(O-165) Adoption of ecohydrology approaches for urban stormwater management and advancing the circular economy concept Goonetilleke Ashantha (Australia)	(O-172) Efficiency of pilot scale constructed wetlands with various substrates for landfill leachate treatment Ioannis Asimakoulas (Greece)	(O-073) Phytocap soil density specification for optimum plant water use and root growth Ruby Michael (Australia)
	15:15 - 15:30	(O-019) Advancing Nature-Based Solutions for the management of water quality under the umbrella of the UNESCO IHP Ecohydrology Programme: case study of Pilica river catchment in Poland Jarosiewicz Paweł (Poland)	(O-074) Use of Vertical Flow Constructed Wetlands for domestic laundry wastewater treatment with ornamental plants Stefanatou Aimilia (Greece)	(O-033) Organic amendments-based technosols for the restoration of Mediterranean habitats and soil-carbon sequestration Carabassa Vicenç (Spain)
	15:30 - 15:45	(O-101) Science behind STORMEE - STORMwater Environmental Efficiency toolkit: 1) infiltration basin Vasilic Zeljko (Serbia)	(O-043) Small constructed wetland in Norwegian agricultural catchment – 18 years monitoring and perspectives for the future Krzeminska Dominika (Norway)	(O-045) Ecological engineering enhances ecological restoration in Chinese desertified lands Xinrong Li (China)
	15:45 - 15:50	(F-019) Sub-calibration of soil moisture sensor for stormwater management Perry Joseph (Finland)	(F-037) Life cycle assessment of Horizontal Subsurface Flow Constructed Wetlands: The importance of regional characteristics to enhance environmental protection Goulart Coelho Lineker Max (Denmark)	(F-023) Significance of soil type and applied fertilization on the content and uptake of macroelements with sunflower biomass Petkova Zdravka (Bulgaria)
	15:50 - 16:30	**Coffe break (lobby area) & Poster session**		
		Session B10: NBS for climate change adaptation **Chair: Nikolaos Nikolaidis & Dimitra Kotsia**	**Session B11: Water quality improvement for resource efficiency** **Chair: Darja Istenič & Pawel Krzeminski**	**Session B12: Ecological engineering for the protection of land and biodiversity** **Chair: Carabassa Vicenç & Joan Garcia**
	16:30 - 16:45	(O-169) CARDIMED - Climate Adaptation and Resilience Demonstrated In the MEDiterranean region Simos Malamis (Greece)	(O-077) Degradation of organic micropollutants in a modified OECD 308 test: implications for the use of reactive amendments in nature-based systems Perdana Mayang Christy (Czech Republic)	(O-164) Integrating the scope of ecological engineering applications: A structured framework with case studies from Australia Dale Glenn (Australia)
	16:45 - 17:00	(O-050) Development of a climate change adaptation plan for the Jordan Valley based on WEFE nexus analysis: The EcoFuture project Nikolaos Nikolaidis (Greece)	(O-020) Degradation of perfluoroalkyl and polyfluoroalkyl substances (PFAS) in secondary effluent by nonthermal plasma: role of reactive oxidative and reductive species Chen Changtao (Belgium)	(O-160) Field application of processed biosolids: Integrating municipal waste management and regenerative agriculture in Canada Grant Clark (Canada)
	17:00 - 17:15	(O-143) A glimpse into the euPOLIS multi-dimensional indicator system for site screening & NBS assessment Baki Sotiria (Greece)	(O-179) Techno-Economic Feasibility Analysis (TEFA) of the Advanced Primary Filtration (APF) process as a retrofit system at the municipal Wastewater Treatment Plant (WWTP) of Marpissa, Paros, Greece Petros Gikas (Greece)	(O-113) Innovative bioinspired intervention to control the growth of a new spit and reduce the occlusion of the mouth of the Goro lagoon (Italy) Corbau Corinne (Italy)
	17:15 - 17:30	(O-154) The water reuse potential of nature-based solutions in response to the increased water scarcity risks imposed by climate change Apostolaki Stella (Greece)	(O-080) Quantifying the effects of grazing beef cattle on microbial quality of surface water Gilboa Ben-David Yael (Israel)	(O-029) Modification of spent coffee grounds for their use as organic fertilizer Juglova Zuzana (Czech Republic)
	17:30 - 17:35	(F-031) Development of an NbS evaluation framework in the nexus of Sustainability, Circularity and Justice Mavrigiannaki Angeliki (Greece)	(F-041) Occurrence of ESKAPE pathogens in wash waters of the agri-food industry in view of the implementation of a closed loop economy Kanarek Piotr (Poland)	(F-010) Nature-based solutions using ecological engineering and dedicated to combine the mitigation of natural risks linked to water with benefits for biodiversity: considering interdisciplinary and transdisciplinary approaches Rey Freddy (France)
	17:35 - 17:40	(F-036) What do we know about the interactions between Nature-based solutions (NBS) and landscape? Sowińska-Świerkosz Barbara (Poland)	(F-053) Biological treatment of synthetic hypersaline wastewater: inoculum selection and start-up of a sequencing batch rector Polizzi Cecilia (Italy)	(F-014) Short term results of different planting technologies applied in the restoration of European habitats Carabassa Vicenç (Spain)
	17:40 - 17:45	(F-054) Integrating YamiTao traditional ecological knowledge into ecology education - an exemplification of Nature-Based Learning Lu Pei-Luen (Taiwan)	(F-002) Innovative hybrid dairy wastewater system assisted by an intelligent software tool for quality prediction of the processed product water to be used for crop irrigation in a greenhouse George P. Spyrou (Greece)	(F-042) Ecosystem services value dynamics under land use alterations in the upper Ganga riverine wetland Kansal Mitthan Lal (India)
	19:30 - …	**Conference dinner @ Diogenis Restaurant**		

Wednesday 4 Oct		**IMPERIAL MAIN HALL**	**IMPERIAL ROOM 1**	**IMPERIAL ROOM 2**
	08:30 - 09:00	**Registration (lobby area)**		
		Session C1: Constructed wetlands technology I **Chair: Michail Fountoulakis & Seintos Taxiarchis**	**Session C2: Bio-based materials I** **Chair: Glenn Dale & Johannes Fabian Bauer**	**Session C3: Ecosystem services provision and assessment** **Chair: Oberholster Paul Johan & Sowińska-Świerkosz Barbara**
	09:00 - 09:15	(O-170) Performance of pilot-scale vertical flow constructed wetlands with and without aeration for municipal wastewater treatment Panagiotis Regouzas (Greece)	(O-003) Plant growth under different bio-composts applications Al-Busaidi Ahmed (Oman)	(O-081) Assessing and mapping yearly ecosystem services supplies in areas affected by land degradation processes with the support of remote sensing indices: two case studies from the NewLife4Drylands Project Ungaro Fabrizio (Italy)
	09:15 - 09:30	(O-117) Diffuse pollution treatment wetlands in cold climate: the importance of flood meadows Wahlroos Outi (Finland)	(O-064) Biomass waste-based material: Electrochemical performances and CO2 uptake capability Trinh Kieu Trang (Japan)	(O-046) Planting xerophytic shrubs significantly increased the carbon sequestration capacity and potential of sandy land Haotian Yang (China)
	09:30 - 09:45	(O-016) Effects of arbuscular mycorrhizal fungi on the metabolism of ibuprofen in constructed wetland with different substrates Chen Zhongbing (Czech Republic)	(O-129) Kitchen waste from cooked food: source of contamination or a valuable source for organic composting serving circular economy perspectives? Use of waste vermicompost as a soil amendment for greenhouse vegetables (II) Kinigopoulou Vasiliki (Greece)	(O-055) Life-cycle environmental assessment of strategies for sewage treatment and reuse: a case study considering local conditions in south-central Chile Neumann Patricio (Chile)
	09:45 - 10:00	(O-102) Long term performance of nature-based solutions as decentralized wastewater treatment: a case study of a retail store in southern Italy Marzo Alessia (Italy)	(O-167) Material flow analysis of the organic fraction of municipal solid waste in EU: monitoring current uses with emphasis on bio-based applications Stamatia Skoutida (Greece)	(O-034) The Ecological Engineering Nexus Accounting Framework: a tool for impact valuation of ecological engineering projects Schoeman Yolandi (South Africa)
	10:00 - 10:15	(O-166) Investigating GHG emissions from vertical subsurface flow (VSSF) Constructed Wetlands treating the UASB effluent originating from Seintos Taxiarchis (Greece)	(O-108) Organic-mineral composite material for removal of chromium from natural water Ekonomakou Antonia (Greece)	(O-137) Nature-based and solar energy building solutions in the water-energy-food nexus across diverse climatic zones in Europe Karamanis Dimitrios (Greece)
	10:15 - 10:20			(F-070) The Application of GeoPlanner in Local Development Management Jan Kazak (Poland)
	10:20 - 10:25	(O-186) Aerated wetlands for water reuse - Hydropolis Prague Rous Vit (Czech Republic)	(O-177) The awarded EUTeens4Green projects to TUC students: promoting nature-based solutions and circular economy Dionysis Tselentis (Greece)	(F-068) Assessment of carbon sequestration potential of targeted plants using remote sensing, GIS, and machine learning systems Aljabri Khalid (Oman)
	10:25 - 10:30			(F-007) Remote sensing-based water quality inversion in Třeboň fishponds: a comparative analysis of machine learning algorithms Ge Ying (Czech Republic)
	10:30 - 11:00	**Coffe break (lobby area) & Poster session**		
		Session C4: Constructed wetlands technology II **Chair: Fabio Masi & Chen Zhongbing**	**Session C5: Bio-based materials II** **Chair: Grant Clark & Panagiotis Regouzas**	**Session C6: Aquatic vegetation systems** **Chair: Vlysidis Anestis & Daniela Andrea López Leyton**
	11:00 - 11:15	(O-086) A natural coagulant for colour removal from raw and treated tequila vinasses (with constructed wetlands) Zurita Martínez Florentina (Mexico)	(O-012) Optimization of biochar filter for handwashing wastewater treatment and recycling at the point of use Bautista Quispe Jhonny Ismael (United Kingdom)	(O-026) A semi-self-sustaining microalgal-bacterial granular sludge process could reduce the cadmium-effect on wastewater treatment efficiency Li Yanyao (Belgium)
	11:15 - 11:30	(O-063) Treatment performance of constructed wetlands with subsurface horizontal flow after thirty years of operation Vymazal Jan (Czech Republic)	(O-047) Removal of Heavy Metals and Antibiotics from Water Using Biochar: From Lab to Real-World Use Ahmed Mushtaque (Oman)	(O-059) Assessing Contaminants of Emerging Concern, Heavy Metals, and Pathogens in Wastewater-Grown Microalgae for Agricultural Applications Uggetti Enrica (Spain)
	11:30 - 11:45	(O-180) Transforming polluted urban waters into liveable urban space with the help of NBS taking the Flussbad Berlin as an example Heribert Rustige (Germany)	(O-176) Production and characterization of Carbon Nanotubes and Graphene Oxide biochar nanocomposites from rice husks and sewage sludge and adsorption tests of six Emerging Contaminants from wastewater Panagiotis Regouzas (Greece)	(O-091) Algal technologies for green products – preliminary microbiological examination Istenič Darja (Slovenia)
	11:45 - 12:00	(O-079) Septage treatment using the First Stage of French Vertical Flow Constructed Wetlands: From the commissioning to the closure of the system	(O-161) Coffee-oil: production of biocrude oil from spent coffee grounds via hydrothermal liquefaction	(O-145) Tertiary wastewater treatment of anaerobic digestion effluents using a phytoremediation bioreactor

		Arévalo Durazno María Belén (Ecuador)	Vakalis Stergios (Greece)	Vlysidis Anestis (Greece)
	12:00 - 12:05		(F-030) Production and characterization of biochar produced from different type of bran Pořízka Jaromír (Czech Republic)	(F-055) Nitrogen fixation rate measurement by nitrogen fixing bacteria in a Lemna minor aquatic system Vlysidis Anestis (Greece)
	12:05 - 12:10	(O-175) Large-scale constructed wetlands from Brazil to the Middle East: scaling up NBS Alexandros Stefanakis (Greece)	(F-051) Activation of persulfate with hydrochar for catalytic degradation of bisphenol A in view of water treatment Zhang Xian (Belgium)	(F-069) Assessing Heavy Metal Pollution with Common Weeds: Unveiling their Bioindicator Potential Cakaj Arlinda (Poland)
	12:10 - 12:15		(F-035) Acute toxicological evaluation of green biocides for outdoor cultural heritage, using Lactuca sativa seeds Rosa Manuel (Portugal)	(F-032) Study on algae composition of a river entering Taihu Lake and effect of constructed wetland Du Yingming (China)
	12:15 - 14:00	**Lunch time!**		
	PLENARY SESSION III **Chair: Alexandros Stefanakis**			
	14:00 - 14:45	**Discussion panel** **The future of Ecological Engineering: integrating nature in problem-solving for a circular society**		
		Session C7: Sustainability in practice **Chair: Alexandros Stefanakis**	**Session C8: Water reuse and sustainability** **Chair: Jan Kazak & Marzo Alessia**	
	14:45 - 15:00	(O-182) Sponsored speech: Novel equipment of wetlands maintenance Ruud Kampf (Netherlands)	(O-041) Utilizing treated wastewater for pasture irrigation: effects on productivity, plant community structure and soil properties Dovrat Guy (Israel)	
	15:00 - 15:15		(O-092) Native vegetation for the reuse of treated municipal wastewater: Implications for greenhouse gas emissions Meister Alexandra (New Zealand)	
	15:15 - 15:20	(F-071) The SunAir Fountain panel: solar-powered drinking water production from the air humidity Alexandros Stefanakis (Greece)	(F-047) Over 80% water recovery from urban greywater using nanofilter membranes – A Swedish case study Hall Ashley (Sweden)	
	15:20 - 15:25		(F-027) Integrating academic knowledge on "Sustainability of Agricultural Water Management" Dahal Bishal (Finland)	
	15:20 - 16:00	**Coffe break (lobby area)**		
	PLENARY SESSION IV **Chair: Alexandros Stefanakis & Andreas Schönborn**			
	16:00 - 16:45	**KEYNOTE**: Design of green infrastructure for a circular economy: case studies from different social and economic contexts Emmanouel Stefanakis (Sustainable Strategies International, USA)		
	16:45 - 17:15	**CLOSING SESSION & AWARDS** **IEES2023**		

Thursday 5 Oct	**Tours & Fieldtrips**

LIST OF POSTER PRESENTATIONS		
NAME	**COUNTRY**	**POSTER TITLE**
Pástor Michal	Slovakia	(P-002) Survival rate of selected newly planted urban trees in the city of Nitra (Slovakia) in the context of circular economy
Bauer Johannes Fabain	Germany	(P-005) Reclamation of land from fluid hydrocarbon extraction: State of the art and current challenges
Sirakov Ivaylo	Bulgaria	(P-006) Influence of different exposure times of treatment with a microelement in an aquaponic system on hydrochemical indicators and productivity of pepper (Capsicum annuum) cultivated integrated with common carp (Cyprinus carpio)
Zou Yuanchun	China	(P-008) Wetland-based solution for sustainable water management in a semiarid irrigation area subject to water use conflict
Aleksandryan Anahit	Republic of Armenia	(P-009) Tailings management facilities: risk reduction
Yang Mingyue	China	(P-010) Efficient removal and electrochemical detection of heavy metals by utilizing heavy-metal-tolerant bacteria from sludge
Lyu Xianguo	China	(P-011) Effect of reclamation on the vertical distribution of SOC and retention of DOC in the wetland landscapes in the Sanjiang Plain, Northeast China
Da Costa Maria	Portugal	(P-014) Physics of sound and SDGs: Raising awareness for the dangers of noise pollution
Çam Miyase Deniz	Türkiye	(P-015) Deep eutectic solvent pretreatment of olive tree biomass
Janczukowicz Wojciech	Poland	(P-016) The effect of external carbon source type and dose on nitrogen and phosphorus removal in Sequencing Biofilm Batch Reactor (SBBR)
Rodziewicz Joanna	Poland	(P-017) The influence of the method of organic substrate dosing on the efficiency of Sequencing Biofilm Batch Reactor (SBBR)
Jang Jeonghwan	Republic of Korea	(P-018) Aerobic DNRA-performing neobacillus sp. strain isolated from rice paddy field soil, Republic of Korea
Petkova Zdravka	Bulgaria	(P-019) Significance of soil type and applied fertilization on the content and uptake of macroelements with sunflower biomass in pot experiments
Barati Bahram	Belgium	(P-020) Enhancing biomass and phycocyanin productivity of spirulina sp. cultivated in anaerobically digested brewery effluent
Mielcarek Artur	Poland	(P-021) Biofilm - Supporting denitrification and dephosphatation with citric acid
Borodinecs Anatolijs	Latvia	(P-022) Dynamic electricity price: challenge for selection of cost-optimal PV Systems for households
Aljabri Khalid	Oman	(P-023) Remote sensing analysis for vegetation assessment of a large-scale constructed wetland treating produced water polluted with Oil hydrocarbons
Lin Chiao-Wen	Taiwan	(P-024) Greenhouse gas emissions from Lumnitzera racemosa mangroves
Lin Chiao-Wen	Taiwan	(P-025) Establishment of carbon sink coefficients of seagrasses in tropical islands
Isci Asli	Turkey	(P-026) Bioethanol production from microwave-assisted deep eutectic solvent pretreated wheat straw
Aslanhan Dicle Delal	Türkiye	(P-028) Deep eutectic solvent pretreatment of olive pomace
Kováts Nora	Hungary	(P-029) Can landraces better cope with environmental stress?
Schubert Hendrik	Germany	(P-030) Nature-based coastal protection measures in a circular society
Nabelek Jakub	Czech Republic	(P-031) Effect of wheat bran pre-treatment on isolation of ferulic acid
Steinbrecher Timo	Germany	(P-032) Production of biogenic aromatics from lignocellulosic agricultural residues
Sarabi Shahryar	Netherlands	(P-033) Promoting environmental justice in urban transitions: an embedded view
Lin Wei-Jen	Taiwan	(P-034) Mangrove carbon budgets suggest the estimation of net production and carbon burial by quantifying litterfall
Ghosh Sayanti	India	(P-035) Biochar supported Ag-TiO2: A green catalyst for degradation of pharmaceutically active compounds and disinfection in wastewater
Truu Jaak	Estonia	(P-036) Microbial fuel cells as a sustainable pathway to remediate oil-contaminated sediments and soils
Kimura Keiichi	Japan	(P-037) Cyanobacterial biocrust development on biomineralized sandy soil: new dryland restoration method
Tejada Manuel	Spain	(P-038) Green pepper (Capsicum annuum) fruit quality. Effects of the application of biostimulants obtained from slaughterhouse sludge
Tejada Manuel	Spain	(P-039) Application of a biostimulant obtained by enzymatic hydrolysis from slaughterhouse sludge in the bioremediation of soils polluted by the imazamox herbicide
Montero Pau	Spain	(P-041) Drone monitoring of extractive activities in Catalonia: a collaborative system for improving the sustainable management of the mining sector
Parrado Juan	Spain	(P-042) Design of a chemical/biological biphasic process for circular economy for the conversion of polyurethane into agronomic biostimulants
Kulbat Eliza	Poland	(P-043) Effect of sewage sludge mono- and co-digestion on nutrients removal from reject water
Parrado Rubio Juan	Spain	(P-044) Bioprocess of Keratin wastes conversion into agronomic biostimulants and biofertilizer
Wilinska-Lisowska Anna	Poland	(P-045) Possibilities of nutrients recovery from the liquid fraction of digestate from agricultural biogas plants in Poland
Montero Pau	Spain	(P-046) Remote sensing indicators for the study of drylands in Mediterranean climate
Ponis Stavros	Greece	(P-047) Be Well and Green When Digital - Lessons Learnt from the BeWEEN project
Truu Marika	Estonia	(P-048) Enhancing methane mitigation in landfills: insights from biocover composition and microbial parameters
Goulart Coelho Lineker Max	Denmark	(P-049) Proposal of a multicriteria decision making method to support the selection of nature-based solutions addressing rainwater management
Krzysztof Jóźwiakowski	Poland	(P-051) New generation Christmas tree shape hybrid treatment wetland for wastewater treatment in Roztocze National Park, Poland
Dong Pengyu	Belgium	(P-053) Optimized removal of silica during manure treatment by electrocoagulation-flotation (EC-F) in view of fouling prevention of reverse osmosis membranes
Gerasimova Iliyana	Bulgaria	(P-055) Fertilization and uptake of macroelements with maize biomass (a pot experiment with pelic vertisol)
Okuro Toshiya	Japan	(P-056) Effects of mixed seeding of several plants with different growth forms on mitigating sand drifting in desertified grassland in the Northeast Asia
Rusyn Iryna	Ukraine	(P-057) Green electricity: a renewable resources biotechnology and ecological engineering tool
Marijuan Raquel	Spain	(P-058) Evaluating the impact of Nature-based Solutions on the provision of water-related and water-dependant Ecosystem Services
López Leyton Daniela	Chile	(P-059) Hybrid constructed wetlands for enhance quality of urban aquatic ecosystems
Olaniran Ademola	South Africa	(P-060) Enhanced bioremediation of polycyclic aromatic hydrocarbons by laccases from two indigenous fungal isolates via the ABTS Mediator Systems
Wąs Adam	Poland	(P-061) Modelling policy options for GHG mitigation in Polish agriculture
Karamanis Dimitrios	Greece	(P-062) Climate-neutral EU Regions: Expanding the mission of 100 EU carbon-neutral cities to 30 European carbon-neutral regions through S3 platform until 2030
Perez Rubi Maria	Germany	(P-063) Scaling-up Nature-Based Solutions for decentralized greywater treatment retrofitted in urban areas of Costa Rica
Szymańska Magdalena	Poland	(P-064) A Bio-refinery concept for N and P recovery - a chance for biogas plant development
Sosulski Tomasz	Poland	(P-065) Reduced tillage, fertilizer placement, and soil afforestation as methods of CO2 soil emissions mitigation
Dafnos Ioannis	Greece	(P-067) Exploring the hydrological dynamics of Kifissos basin in Greece - an integrated analysis of water and groundwater resources
Gómez Silvia	Spain	(P-068) Agroecological solutions for resilient farming in West Africa: Identification of farmers' and communities' needs
Antonopoulou Georgia	Greece	(P-069) Biohydrogen production from household food waste through dark fermentation: the possibility of water minimization during dilution
Gómez Garrido Melisa	Spain	(P-070) Sustainable Environmental Management of pig production with an Integral Manure Management System with Constructed Wetlands
Rontogianni Anatoli	Greece	(P-071) High and low technological implementation of bio based energy sources in Europe: Comparisons and contrasts
El Bied Oumaima	Spain	(P-072) Decision Support System (DSS) for Controlled Pig Slurry Application and Sustainable Resource Management
Terrero Turbí Angélica	Spain	(P-073) Use of techniques to mitigate Greenhouse Gas emissions and ammonia from pig slurry storage
Dobele Aina	Latvia	(P-074) Aspects of urban agriculture in the sustainable development - the case of Latvia
Ho Chuan-Wen	Taiwan	(P-075) Enhancing carbon sinks through mangrove afforestation in a coastal constructed wetland park
Bauwe Andreas	Germany	(P-076) Performance of a denitrifying bioreactor for the treatment of nitrate-laden agricultural drainage water in northeastern Germany
Rubio-Clemente Ainhoa	Colombia	(P-077) Elimination of Crystal Violet in water by Pinus patula biochar: process optimization and validation
Rubio-Clemente Ainhoa	Colombia	(P-078) Life cycle assessment in the production of raw and Fe-modified biochars
Daphne Argyropoulou	Greece	(P-079) Greywater treatment with green walls for the washing of reusable cups and bottles
Fountoulakis Michail	Greece	(P-080) Integrate management of residues generated from olive cultivation and olive oil production process for soil resource recovery: the “Elaionas” project
Bąk Joanna	Poland	(P-081) Introduction of aquaponic farms partly supplied by rainwater into the urban tissue - possibilities, barriers, limitations and challenges
Seintos Taxiarchis	Greece	(P-083) BIODAPH2O – Investigating a novel system for tertiary wastewater purification
Klontza Eleftheria	Greece	(P-084) Arthrospira (Spirulina) platensis growth and biofixation of CO2 using cheese whey in the context of circular economy
Zabaniotou Anastasia	Greece	(P-085) Closed loops and the circular economy of polypropylene waste: Design, engineering and feasibility of pyrolysis
Tong Shouzheng	China	(P-086) The driving mechanisms for community expansion in a restored Carex tussock wetland
Zhang Mingye	China	(P-087) Effects of melatonin priming on Suaeda corniculata seed germination, antioxidant defense, and reserve mobilization: Implications for salinized wetland restoration
Lin Wei-Jen	Taiwan	(P-088) The carbon budget in aquaculture systems with the Asian clam (Corbicula fluminea) in eastern Taiwan
K. Lasaridi	Greece	(P-089) Comparative analysis of composting source-separated biowaste and the organic fraction of the Chania MBT plant
Maria Frantzeskou	Greece	(P-090) Short term effects of non-tillage on soil health restoration in Mediterranean environments
Athanasios Tsilimigkras	Greece	(P-091) Drivers of Change: Analyzing the Historical Shifts and Future Pathways for Biophysical and Socioeconomic Influences on Land Degradation in the Mediterranean