2012教育展示與物種存續研討會

6/28 Thu-29 Fri 研討會

Animal Exhibit & Species Survival Conference 2012

・時間：2012年6月28日~29日 ・地點：臺北市立動物園 演講廳

論文集 Abstracts

指導單位：行政院農業委員會林務局 FORESTRY BUREAU C.O.A　臺北市政府 TAIPEI

主辦單位：臺北市立動物園 TAIPEI ZOO

協辦單位：TIERGARTEN SCHÖNBRUNN　WILDLIFE CONSERVATION SOCIETY

教育展示與物種存續研討會，6/28		
時間	議題	主講人
8:30-9:00	報到、領取資料、入座	
9:00-9:20	開幕式、長官致詞	1. 臺北市立動物園園長 2. 林務局
議題 I 主持人: 呂光洋 教授		
9:20-10:20	動物園在極度瀕危動物復育所扮演的角色~案例分享	Gerald Kuchling 教授 澳大利亞西部大學
10:20-10:40	茶敘	
10:50-11:30	紐約布朗動物園物種存續計畫與爬蟲展示~以科莫多龍復育計畫為例	Donal Boyer 兩棲爬蟲動物館館長 紐約布朗動物園-國際野生物保育學會
11:30-12:10	國際野生物保育學會 緬甸辦公室工作介紹	Than Myint 緬甸工作站主任 國際野生物保育學會
12:20-13:30	中場交流與討論	
議題 II 主持人: 陳建志 副教授兼所長		
13:30-14:30	兩生類繁育中心-紐約布朗動物園的兩生類物種存續計畫	Donal Boyer 兩棲爬蟲動物館館長 紐約布朗動物園-國際野生物保育學會
14:30-15:20	維也納動物園物種存續計畫~以卵生鱷魚長程復育計畫為例	Anton Weissenbacher 動物部-館長 維也納動物園
15:20-15:40	茶敘	
15:40-16:30	紐澤西州都會區重新安置與監控北美松林蛇計畫與建立一個動物友善的環境設施介紹	Robert T. Zappalorti 執行長 美國兩爬聯合環境評估顧問公司
16:30-17:00	保育論壇&綜合討論 主持人: 程一駿 教授	

亞洲瀕危龜類工作坊，6/29		
Time	議題	主講人
8:30-9:00	報到、入座	
議題 III　主持人: 李壽先 教授		
9:05-9:15	臺北動物園瀕危龜類復育計畫	張明雄博士 保育研究中心-執行長 台北市立動物園
9:15-9:30	國內淡水龜類現況與種群存續計畫	陳添喜博士 助理教授 國立屏東科技大學野保所
9:30-10:00	極度瀕危龜類-印度與孟加拉的潮龜保育繁殖計畫	Peter Praschag 顧問 國際龜類存續聯盟
10:20-10:40	茶敘	
10:40-11:20	維也納動物園瀕危陸龜與淡水龜復育計畫~以潮龜保育繁殖計畫為例	Anton Weissenbacher 動物部館長 維也納動物園
11:20-11:50	龜類保育計畫結合緬甸境內動物園的保育整合工作	Win Ko Ko 緬甸工作站 龜類計畫聯絡人 國際野生物保育學會
11:50-12:20	緬甸境內淡水龜與陸龜之現況	Khin Myo Myo 緬甸工作站 龜類計畫召集人 國際野生物保育學會
12:20-13:20	中場交流與討論	
議題 IV　主持人: 顏聖紘 副教授		
13:20-14:00	龜類的繁殖技術與圈養環境展示設計	Peter Praschag 顧問 國際龜類存續聯盟
14:00-14:50	溫度決定性別物種的性別辨識技術用於人工繁殖瀕危龜類研究的影響與評估	Gerald Kuchling 教授 澳大利亞西部大學
14:50-15:30	龜類野外調查的資料收集與無線電追蹤技術	Robert T. Zappalorti 執行長 美國爬蟲環境評估顧問公司
15:30-16:00	瀕危龜類座談會　主持人: 吳聲海 副教授	

Animal Exhibit & Species Survival Conference, 6/28		
Time	**Title**	**Speaker**
8:30-9:00	Registration	
9:00-9:20	Opening Speech	1. Director, Taipei Zoo 2. Forest Bureau
SESSION I		
9:20-10:20	The instrumental role of zoos in the recovery of some of the world's most critically endangered turtles	Gerald Kuchling School of Animal Biology UNIVERSITY OF WEST AUSTRALIA
10:20-10:40	Tea Break	
10:50-11:30	AZA Komodo Dragon Species Survival Program	Donal Boyer Curator of Herpetology BRONX ZOO (WCS)
11:30-12:10	An overview of WCS work in Myanmar	Than Myint Country Director, Myanmar Program WILDLIFE CONSERVATION SOCIETY
12:20-13:30	Lunch	
SESSION II		
13:30-14:30	Amphibian Propagation Center (APC) - a broader review of the Bronx Zoo herp conservation programs	Donal Boyer Curator of Herpetology BRONX ZOO (WCS)
14:30-15:20	Long term ex situ breeding projects in Vienna Zoo - with a special focus on endangered Cyprinodontidae	Anton Weissenbacher Zoological Curator VIENNA ZOO
15:20-15:40	Tea Break	
15:40-16:30	Results of a 7-year Management, Relocation and Monitoring Plan for Northern Pine Snakes in an Urban Area of the New Jersey Pine Barrens	Robert T. Zappalorti Executive Director/President HERPETOLOGICAL ASSOCIATES, INC.
16:30-17:30	**Discussion**	
18:20-20:00	**Symposium**	

Workshop, 6/29		
Time	**Title**	**Speaker**
8:30-9:00	Registration	
SESSION III		
9:05-9:15	Endangered Turtle Conservation Project in Taipei Zoo	Chang, Ming-Hsuang CEO, Conservation&Research Center TAIPEI ZOO
9:15-9:30	Assurance Colonies Program of Freshwater Turtle in Taiwan	Chen, Tien-Hsi Institute of Wildlife Conservation NPUST
9:30-10:20	Status of the Northern River Terrapin (Batagur baska) and first breeding success in Bangladesh and India	Peter Praschag Turtle Biologist, Conservationist TURTLE SURVIVAL ALLIANCE
10:20-10:40	**Tea Break**	
10:40-11:20	Breeding and husbandry of turtles and tortoises in Vienna Zoo with a focus on Batagur baska	Anton Weissenbacher Zoological Curator VIENNA ZOO
11:20-11:50	Turtle Conservation Project Coordination with Zoological in Myanmar	Win Ko Ko Turtle Coordinator, Myanmar Program WILDLIFE CONSERVATION SOCIETY
11:50-12:20	Current status of freshwater turtle and tortoise in Myanmar	Khin Myo Myo Turtle Program Officer, Myanmar Program WILDLIFE CONSERVATION SOCIETY
12:20-13:20	**Lunch**	
SESSION IV		
13:20-14:00	Conservation Breeding and Facility Design of Freshwater Turtle and Tortoise	Peter Praschag Turtle Biologist, Conservationist TURTLE SURVIVAL ALLIANCE
14:00-14:50	Evaluating Impacts of Temperature Dependent Sex Determination in Headstarting and Captive Breeding Operations of Critically Endangered Tortoises and Turtles	Gerald Kuchling School of Animal Biology UNIVERSITY OF WEST AUSTRALIA
14:50-15:30	Radio-tracking Techniques and Data Acquisition for Turtles and Tortoises	Robert T. Zappalorti Executive Director/President HERPETOLOGICAL ASSOCIATES, INC.
5:30-16:00	**Round Table**	

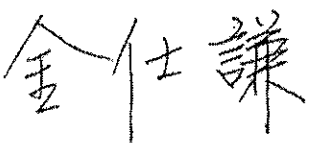
緣起

一個現代動物園進行教育展示時，也必須肩負保育推廣的責任，發揮自然保育及環境教育的全方位功能與價值。有別於傳統的動物展示模式，新的動物展示思維以結合生態與仿原棲息環境為主軸，除了為增進動物福祉而改善動物的居住環境外，也減少動物因侷限於人工圈養環境中所受到的壓迫。雖然動物園的圈養動物空間不若在大自然生活，但反觀目前惡化中的自然環境，野生動物因人為開發而喪失生存空間。動物園的存在，已成為域外保育與物種保存最有成效的場域，甚至是瀕臨絕種野生動物得以生存下來的關鍵。因為動物園的完整圈養繁殖種群，得以保存許多瀕臨絕種動物的血緣，可作為物種復育的基礎種群，也留存了未來重新建立族群的希望。動物園進行動物展示的同時，也必須兼顧另一項神聖的重要使命-物種保育與存續。

為進一步落實動物展示結合物種保育與研究的實務工作，臺北市立動物園乃邀請國內與歐、美、澳、東南亞地區動物園相關組織及相同專業領域的學者專家，於 6 月 28、29 日辦理「2012 動物教育展示與物種存續研討會」，期望透過保育主管人員及保育工作者的研習與討論，讓與會者得以更多元的專業與廣闊的視野，以永續保育理念與行動為核心，全面提升動物園專業與價值。

此次研討會以物種存續為主軸，涵蓋動物展示設計，結合族群管理等各類保育主題延伸的案例與成果。透過此次研討會，本園邀請了來自保育工作獲全球肯定的國際野生物保育學會(Wildlife Conservation Society)的專家、奧地利維也納動物園(Tiergarten Schönbrunn)與美國布朗動物園(Bronx Zoo)的資深館長，分享結合動物展示與域內保育方面的專業與經驗。我們也將趁這個難得的機會，邀集國內的專家學者與會，積極發展國內與國際間的保育合作，彼此間形成緊密的國際與跨領域保育夥伴，擴大保育互動網絡與影響層面。尤其以共同推展與落實生物多樣性永續保育概念，為野生動物保育與復育的目標共同努力。

臺北市立動物園 園長



講者簡介

Gerald Kuchling

Gerald Kuchling教授，維也納大學動物學與生理學博士，曾在維也納自然歷史博物館的爬蟲動物蒐藏組擔任研究助理及德國哥廷根大學進行博士後研究。1984年，他在馬達加斯加島上進行龜類保育研究，包括平背陸龜(*Pyxis planicauda*)首次的野外研究紀錄。90年代初期，在杜瑞爾野生動物保育基金會(Durrell Wildlife Conservation Trust)的贊助下，Kuchling教授成立了馬達加斯加大頭側頸龜(*Erymnochelys madagascariensis*)的保育計畫，同時他也和南非西海角的龜類研究員合作星叢龜(*Psammobates geometricus*)和挺胸陸龜(*Chersina angulata*)的研究工作。1987年，為了拯救極度瀕危的澳洲短頸龜(*Pseudemydura umbrina*)而與妻子移居澳洲，並在澳大利亞西部大學兼任教職。在與澳洲珀斯動物園(Perth Zoo)和政府部門合作後，首次成功人工繁殖澳洲短頸龜，並重新引入野外棲地，使當時全球為數不到50隻的澳洲短頸龜，目前已增加到200隻。Kuchling教授所參與保育計畫遍及全球，包含在泰國的狹頭鱉(*Chitra chitra*)及馬來西亞的潮龜(*Batagur affinis*)保育繁殖計畫。其中也包括1935年後未被發現而一度被視為絕種的緬甸鋸背龜(*Batagur trivittata*)，當此物種於2002年再次被發現後，即在國際野生物保育學會(WCS)的邀請下，前往緬甸並在緬甸曼德雷動物園(Mandalay Zoo)成功建立圈養繁殖族群。2007年受國際龜類存續聯盟(TSA)邀請下擔任(*Rafetus swinhoei*)的物種存續計畫召集人。常年被誤認為"鼉"的斑鱉目前全球僅存3隻的個體分別在蘇州動物園和長沙動物園與越南河內，目前有一對集中圈養在蘇州動物園進行復育與保種的工作。Gerald Kuchling教授在繁殖生物學上的研究最受矚目的即是用內視鏡判別幼龜性別的方法，對於龜類保育有著極大的貢獻，並著有《龜類生殖生理學》(The Reproductive Biology of the Chelonia)一書，他在2009年獲頒貝爾勒龜類保育獎(Behler Turtle Conservation Award)，這份殊榮象徵國際龜類學者對他在龜鱉類保育上付出與貢獻的肯定。

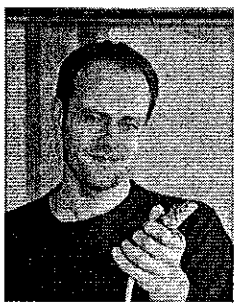
Robert T. Zappalorti

Robert Zappalorti先生於1977年創立了兩棲爬蟲環境評估與生態調查公司(Herpetological Associates, Inc)。Zappalorti先生曾主持牟氏龜(*Glyptemys muhlenbergii*)、東部山林響尾蛇(*Crotalus horridus*)、松林樹蛙(*Hyla andersonii*)和其他許多兩棲爬蟲物種的研究調查計畫，並在許多科學期刊和爬蟲學方面書籍中發表與著作，同時他的動物攝影作品也被刊登在許多書籍和雜誌，包含知名的國家地理雜誌。Zappalorti先生的專長為生物調查追蹤技術、外來種移除、保育區規劃與生物通道設置並擔任美東野生動物與環境保護等政府部門的顧問。在成立公司前，Zappalorti先生曾在紐約史坦島動物園(Staten Island Zoological Society in New York)擔任兩棲爬蟲館與教育部門的副館長。

Donal Boyer

Donal Boyer，爬蟲動物專家，曾任聖地牙哥動物園、布朗動物園等世界知名動物園之爬蟲館館長，擅長以結合生態之動物展示與教育，對於瀕危爬蟲動物的保育繁殖經驗豐富。並曾主持許多動物園內的域內保育計畫。

Anton Weissenbacher

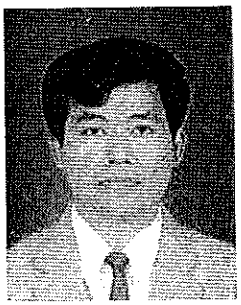


Anton Weissenbacher，維也納動物園水族館館長，主持該園多項瀕危動物的保育計畫，進年並參與維也納動物園於印度與巴基斯坦所進行的瀕危淡水龜域內保育計畫。

Peter Praschag

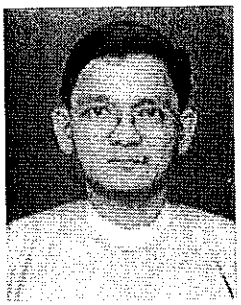
Peter Praschag博士是奧地利籍的龜類生態專家，曾任貝勒爾龜類保育中心Behler Chelonian Center (BCC)館長，並在印度與巴基斯坦從事瀕危龜類研究多年，Peter Praschag博士具有成功繁殖極度瀕危龜類的珍貴經驗。曾協助貝勒爾龜類保育中心及維也納動物園成功繁殖近十種極度瀕危龜類。國際龜類存續聯盟Turtle Survival Alliance(TSA) 顧問負責瀕危龜類的保育研究。

U Than Myint



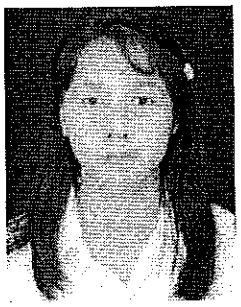
澳洲國家大學林業管理學碩士，專長為資源管理，環境整合管理，保育計畫設計及規劃。1997年起進入國際野生物保育學會(WCS)緬甸辦公室工作，現任緬甸辦公室主任負責緬甸境內各項保育計畫的負責人。

U Win Ko Ko



仰光藝術與科技大學(Arts and Sciences University of Yangon)動物學系畢業，專精於爬蟲動物學。曾任職於緬甸的公營鱷魚與水產養殖場。目前為國際野生物保育學會(WCS) 緬甸辦公室的龜類研究召集人，於緬甸各地進行鱷魚與龜類的族群研究調查。

Daw Khin Myo Myo



仰光大學(University of Yangon)動物學碩士，研究灣鱷(*Crocodylus porosus*)的生長發育。曾於緬甸漁業部水產部門擔任公職。現為國際野生物保育學會(WCS)於緬甸的龜類研究主管。負責調查緬甸各地龜類的族群研究。

相關組織與公司簡介

國際野生生物保護學會Wildlife Conservation Society

國際野生生物保護學會(WCS)創立於西元1895年，前身為紐約動物園學會，目前旗下擁有著全世界最龐大的都會動物園群，包括知名的紐約布朗動物園(Bronx Zoo)、中央公園動物園、紐約水族館等。由於WCS除動物園經營外，在全球60個國家中，有200個科學家在全球500個工作站進行域內保育工作。同時WCS也在全世界管理共達81萬平方公里生態保護區。域內保育主體對象涵蓋從海中的珊瑚蟲到陸地上的大象。因此在動物團體欲抨擊WCS在城市中圈養大型野生動物時，也無法忽視WCS致力保護野生生物及其棲息環境的所投入龐大心力的一面。WCS更憑藉其推動域內保育之努力與成果，推展其動物園存在之積極保育價值。目前為世界公認進行域內保育最成功的動物園組織。

WSC的緬甸辦公室最初為保護緬中邊界孟加拉虎而成立，目前有約20位工作人員負責熊科、貓科、靈長類、爬蟲類的保育工作。WSC與以前由軍事領導的緬甸聯邦政府到目前的緬甸聯邦共和國林業部關係良好。由於所有與緬甸境內動物園與自然保護區皆為林業部轄下管理。因此，在官方林業部的信任下WSC的緬甸辦公室，深入緬甸進行域內保育工作並同時參與緬甸境內動物園的保育工作。

國際龜類存續聯盟 Turtle Survival Alliance

國際龜類存續聯盟(TSA)是全球最大的專業保育網絡國際自然保育聯盟IUCN存續委員會（IUCN Survival Commission, SSC）旗下執行全球龜類物種存續任務的組織，組織成員來自國際自然保育聯盟淡水龜與陸龜專家群(IUCN,TFTSG),國際野生生物學會(WCS),歐洲水族館暨動物園協會(EAZA),聖地牙哥動物園學會等動物園及國際保育組織。為實際執行龜類救援安置、族群監測、保護區設置等任務組織；目前TSA 專注為亞洲龜類危機(Asian Turtle Crisis) 尋求應對策略，並以21世紀不讓任何龜類絕種為組織工作宗旨。

維也納動物園 Vienna Zoo

維也納動物園(Vienna Zoo)又名美泉宮動物園(Tiergarten Schönbrunn)；是世界最古老歷史悠久的動物園。位於奧地利維也納著名的美泉宮內，由哈布斯堡王朝於1752年建成，最初為皇家動物展覽館、世界上少的有擁有「大熊貓館」並成

功繁殖的動物園。動物園另外有「雨林館」「水族館」。維也納動物園一直以為野生動物保育為該園最重要的使命。

國際自然保育聯盟 International Union for Conservation of Nature

國際自然保育聯盟 (IUCN) - 於西元1948 年成立，為世界第一個以環境保育為訴求的全球性組織，目前也是全球最大的專業保育網絡，並是領導環境與永續發展議題上的先驅。多年來IUCN為政府、非政府組織與聯合國機構提供保育政策建議以及實際的解決方案。組織內擁有11,000 位志願工作的科學家及專家，參與其六個委員會。組織內有1000位具專業背景的工作人員，分別在分散在全球60個據點中，超過1000會員組織包括政府機構與非政府組織。IUCN並具有聯合國大會觀察員的身份，總部位於瑞士。其所編纂的紅皮書(The IUCN Red List of Threatened Species™)被認定為對生物多樣性狀況最具權威的指標。IUCN旗下的物種計畫(Species Programme)與存續委員會 (IUCN Survival Commission, SSC) 每年依各物種的族群數量、分布區域等變動調整物種紅皮書各物種的保育等級。保育等級被國際間各政府、非政府組織及保育學者視為重要的參考與依據，自1963年開始至今，IUCN物種紅皮書已經是全球動植物物種保育現況最完整的名錄。

兩棲爬蟲環境評估與生態調查公司 HERPETOLOGICAL ASSOCIATES, INC.

兩棲爬蟲環境評估與生態調查公司(HA)為美國東岸知名的環境評估與生態調查公司。總部位於紐澤西州，並在佛羅里達州與賓州分設據點，自 1977 年成立以來從事生態環境影響評估顧問與規劃工作。為美國政府與私人企業進行保育類動植物調查監測。紐澤西州自然保護區，費城國際機場與史都華國際機場週邊，都是該公司受美國政府委託環評的樣區。HA 擁有許多野生物調查專門技術，並提供生態工程規劃以降低土地開發對自然生態資源衝擊的解決方案。

The instrumental role of zoos in the recovery of some of the world's most critically endangered turtles

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ABSTRACT

Turtle and tortoise life history is generally characterized by high longevity of adults, late maturity, iteroparity, a long reproductive span, low adult mortality, high egg and/or juvenile mortality, and a long juvenile phase. Once turtle populations have been reduced to a few individuals these life history traits make natural population growth and recovery slow even if the reasons for their original decline have been addressed. These same life history traits, however, can make captive breeding and head starting a powerful recovery tool: egg and juvenile survival is typically high in captivity and the release of captive-bred turtles of a size where mortality is low can speed up recovery in the wild. Twenty five years ago, when the Western Swamp Turtle *Pseudemydura umbrina* was considered to be the world's most endangered turtle with less than 50 surviving individuals, I established a successful captive breeding program for this species at Perth Zoo in Western Australia. This program still operates today. The release of captive-bred turtles started 18 years ago and, together with intensive management in the wild, increased the wild population by an order of magnitude. During a joint survey with the Myanmar Forestry Department in 2002 I rediscovered live specimens and remnant populations of the Burmese Roof Turtle *Batagur trivittata* , a species not seen or recorded alive since 1935. I immediately initiated a captive breeding program at Mandalay Zoo and three years later the Wildlife Conservation Society started a conservation program for one of the last wild populations. These programs already increased the world number of *B. trivittata* by more than ten times. In 2007 I organized for the Turtle Survival Alliance a captive breeding attempt with the last male and female Giant Yangtze Softshell turtle *Rafetus swinhoei* in China at Suzhou Zoo and Changsha Zoo. Currently the known world population of that species counts only four, with two further specimens in Vietnam. Unfortunately this program has not yet produced any hatchlings, but the breeding program of the Chinese zoos is the last hope for the survival of this species. These examples where I was or am personally involved in setting up zoo breeding programs

demonstrate the instrumental role zoos can play in the recovery of the world's most critically endangered turtles. Other turtle species which may now largely depend on captive breeding for their survival and which are already represented in various zoo breeding programs include *Batagur baska*, *Cuora zhoui*, *Cuora mccordi*, and *Geochelone platynota*.

Toads, Salamanders and Dragons: A Collaborative Approach Conservation Projects

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ABSTRACT

The Wildlife Conservation Society (WCS) was founded in 1895 and has the clear mission to save wildlife and wild places across the globe. We currently manage about 500 conservation projects in more than 60 countries. WCS manages five living institutions in New York; Bronx Zoo, Central Park Zoo, Queens Zoo, Prospect Park and the New York Aquarium. These parks education millions of visitor per year on important issues affecting our planet. Each of these parks has ongoing conservations initiatives focusing on species within our collections. The Bronx Zoo Department of Herpetology is involved in a number of conservation programs but I will focus discussion on three collaborative programs. The first is the Kihansi Spray Toad project which began as an emergency salvage operation and has transformed into a reintroduction project, partners include the Toledo Zoo and Tanzanian Government and various NGOs. The second program is for a New York endemic amphibian, the Hellbender. This is a head start program and partners include the New York Department of Environmental Conservation and the Buffalo Zoo. The final program is an American Zoo and Aquarium Species Survival Program (SSP) for Komodo Dragons. Bronx is a participant in that program and I have been the species coordinator for the SSP since its inception.

An overview of WCS work in Myanmar

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ABSTRACT

In April 1985, the "New York Zoological Society" (NYZS) was established for educating the public on wildlife conservation at the Bronx Zoo in New York, USA. The name of the society was changed from "New York Zoological Society" to "Wildlife Conservation Society" in 1993 indicating its interest in wildlife and wild lands conservation activities all over the world. WCS is now one of the leading organizations in the world in the field of wildlife conservation. Currently WCS is running wildlife conservation projects in Asia, Africa and Latin America.

The Wildlife Conservation Society saves wildlife and wild places worldwide. We do so through science, global conservation, education, and the management of the world's largest system of urban wildlife parks, led by the flagship Bronx Zoo. Together these activities change attitudes toward nature and help people imagine wildlife and humans living in harmony. WCS is committed to this mission because it is essential to the integrity of life on Earth.

In Myanmar WCS has signed MoU with the Myanmar Forest Department of the Ministry of Environmental Conservation and Forestry in December, 1993 and it has been extended for another 4 times up to 2011. Now the MoU extension for 5th time has been proposed to the Ministry and it is expected to sign it soon. WCS provides technical assistance and financial assistance to the Forest Department.

The Goal of WCS Myanmar program is to protect wildlife and wild lands collaboratively with Ministry of Environmental Conservation and Forestry (MOECAF) and other relevant Ministries and organizations through adaptive conservation strategies based on rigorous science.

The major focus of the program covers mainly four areas. There are Protected area management and development, Scientific surveys, Capacity building and Conservation education. Under Protected area management and development, Activities for Park infrastructure development and financial supports to conservation staff are being conducted. Regarding Scientific surveys, it includes Biological surveys, socioeconomic surveys, protected areas assessments and Species oriented survey. Training / workshops and small Research grants are under the category of Capacity building. Conservation education covers activities of producing wildlife oriented Books / translations, Posters / pamphlets, Presentations / talks and Medias (Journals / Television).

Long term *ex situ* breeding projects in Vienna Zoo with a focus on endangered *Cyprinodontidae*

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ABSTRACT

Situated in the center of Europe, Vienna Zoo was founded in 1752 and thus is known to be the world's oldest zoo. Today it is also famous for its high standard in animal husbandry, its continuing breeding success with various endangered species and its efforts in nature and species conservation projects. Since 2003 Vienna zoo is one of the few zoos worldwide to display Giant Pandas, *Ailuropoda melanoleuca*. In 2007 the first cub was born, it was the first natural insemination Giant Panda birth in Europe. Exactly 3 years later a second cub was conceived – again via natural mating. The zoo's Northern Rockhopper Penguin, *Eudyptes moseleyi* breeding program is another outstanding success story: Over the past few years the zoo managed to breed an average of 10 chicks per year of this highly endangered species.

Apart from many other projects Vienna Zoo has put a lot of effort in freshwater fish conservation and breeding programs. Today it disposes of one of Europe's biggest collections of *Cyprinodontidae* with more than 50 endangered, critically endangered and extinct in the wild species. In cooperation with the University of Vienna and the RSCN (Royal Society for Conservation of Jordan Nature) Vienna Zoo conducted the first fish ecological investigation of the status and endangerment of *Aphanius sirhani*. The survey was the basis for the classification of *A. sirhani* as Critically Endangered in the IUCN Red List.

Results of a 7-year Management, Relocation and Monitoring Plan for Northern Pine Snakes in an Urban Area of the New Jersey Pine Barrens

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ABSTRACT

I report on the preliminary results of five-years of research on northern pine snakes (*Pituophis melanoleucus*), from the Stafford Business Park and Landfill, Ocean County, New Jersey. This research partially fulfills the threatened and endangered species requirement of the July 14, 2006, "Memorandum of Agreement" (MOA), established between the Pinelands Commission, Ocean County and Stafford Township. The MOA, which permits the redevelopment of the 388-acre Stafford Business Park, stipulated that a northern pine snake management plan was written and approved prior to beginning the redevelopment. The Pinelands Commission (*hereafter* the Commission), in consultation with the New Jersey Department of Environmental Protection (*hereafter* the Department), approved the pine snake management and monitoring plan in December 2006. Contained in the plan were actions to avoid impacts to the pine snake population currently using the Stafford Business Park. In an effort to avoid mortality of individual pine snakes, 92 snakes (21 adults and 71 hatchlings), were moved off the landfill site and relocated ~ 3000 feet west onto Stafford Forge Wildlife Management Area. All relocation sites were within the documented activity range of the pine snake population. The Department had primary oversight on the implementation of the plan, whereas Herpetological Associates, Inc. (*hereafter* HA) has carried-out the majority of the fieldwork and radio-telemetry monitoring. While there is limited research available on snake relocations, those studies that do exist suggest that it's difficult to successfully relocate adult snakes. In their 1999 Pennsylvania study, Reinert and Rupert attributed the bulk of the translocated snake mortality they observed to an inability of some timber rattlesnakes to locate acceptable over-wintering sites, after being relocated. Our plan corrected for the potential problem of snakes failing to find suitable dens by constructing artificial hibernacula at each of the release sites. Furthermore, HA's plan follows the recommendations given by Reinert and Rupert (1999) by not moving snakes outside their known activity range, as well as the recommendations of Dodd and Siegel (1991) by establishing a long-term monitoring program on relocated snakes with radiotelemetry. This seven-year monitoring program evaluated whether pine snakes moved from the old landfill used and exploited the newlycreated artificial dens and management fields. The monitoring program has partially answered 4 of 6 research

questions: **1.** Can adult and hatchling pine snakes overwinter successfully in artificial hibernacula after being moved to a different area within their activity range? **2.** Do non-shifted pine snakes from the existing Stafford Forge WMA population begin to use the artificial hibernacula on their own? **3.** How do the spatial movements and habitat use, foraging, mating, nesting, and denning of shifted pine snakes differ from the non-shifted pine snakes? **4.** Do pine snakes from this population (both shifted and non-shifted snakes) attempt to go back onto the Stafford Township Business Park during the construction period, and if so, does this tendency diminish over time? **5.** Do a higher percentage of pine snakes return to, and overwinter in, the artificial hibernacula when they are enclosed around the hibernacula for two winters versus only a single winter? **6.** Will shifted and non-shifted gravid female northern pine snakes from this population begin using the three management fields as nesting habitat in future years?

In 2012, HA is radio-tracking 20 adult pine snakes of which 10 are shifted and 10 are non-shifted snakes (10 males and 10 females). After five-years, we have answers to questions 1, 2, 4 and 6. All 100 snakes enclosed in the six artificial dens for one or two winters were able to hibernate successfully. Between 2008 and 2011 field season, the management fields were used extensively by pine snakes and other wildlife. Ten radio-tracked and two non-radio-tracked pine snakes were documented using the perimeter earth mounds for shelter, foraging and shedding stations throughout the active season. Three gravid female pine snakes were observed using management field 2 for nesting, two of which was a radio-tracked snake. Since 2006, 10 pine snakes were confirmed using one or more of artificial hibernaculum (selected on their own). It appears that only 20% of the pine snake population regularly uses the management fields and dens while the other snakes remain in the forest. Aside from pine snakes, 27 other reptile and amphibian species were documented in the study area. There were some unexpected problems that caused mortality to a portion of the 100 shifted snakes that included predation by red-tailed hawks (N= 15). This problem was solved by placing netting over each of the 6 dens. Likewise, a major forest fire occurred on May 16, 2007 that fatally burned several of the shifted snakes (N= 11, 3 adults and 8 neonates). Of the original 100 snakes, we can still account for 20 individuals. The study will end in 2013, and the results of our investigation will be submitted for publication in a scientific journal.

Chelonian Conservation Projects at the Taipei Zoo Conservation and Research Center

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ABSTRACT

The Burmese star tortoise, *Geochelone platynota*, is endemic of central Myanmar and considered to be one of the most highly endangered tortoises in the World. It is listed among the *Top 25 Most Endangered Turtles and Tortoises* by the Turtle Conservation Fund and ranked as Critically Endangered on the IUCN Red List. The current wild population is considered to be functionally extinct, although there are still a few specimens in captivity. The Taipei Zoo Wildlife Rescue Center received a few of those specimens that were confiscated for violation of Taiwan's Wildlife Conservation Act, in the late 90's. In 2003, the center succeeded in achieving the first captive breeding of *the Geochelone platynota,* and followed with various efforts in this regard, undertaking both *in-situ* and *ex-situ* conservation projects, including molecular genetics and reproductive endocrinology research of the *Geochelone platynota*. In association with the US-based Turtle Survival Alliance, Wildlife Conservation Society Myanmar Country Program and Behler Chelonian Center, the Center started to conduct ongoing research studies and *in-situ* species recovery programs in Myanmar. The objective of this endeavor is to support the our ultimate goal of Taipei Zoo Wildlife Rescue Center, which our goal is to prevent the regional extinction of the chelonian species in Asia, and with a view towards achieving that objective, we are to devote on working towards achieving biodiversity conservation and to sustainable development and striving to make the contributions to the conservation of the critically endangered chelonian species and in order to ensure their future survival in this region.

臺灣淡水龜的現況與保育行動

Current Status of the Freshwater Turtles in Taiwan and Conservation Action

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ABSTRACT

臺灣淡水龜的族群現況與保育，曾經是亞洲地區的模範生，現在卻也逐步淪陷了。高利的誘惑與管理執法上的冷處理，造成台灣淡水龜面臨嚴重的生存危機。過去的分布現況調查資料顯示除了金龜(*Mauremys reevesii*)之外，多數種類於台灣本島仍存在有不少穩定的族群，尤其在北部地區。食蛇龜(*Cuora flavomarginata*)與柴棺龜(*Mauremys mutica*)除於日本少數島嶼與台灣之外，於其他分布範圍已不易找到野生族群存在，但因棲息地的消失，加上於最近十年嚴重的獵捕壓力，對野生族群形成更嚴重的生存威脅。目前相關保育組織雖積極推動將食蛇龜與柴棺龜提昇為 CITES 附錄一物種，禁止商業性質國際貿易，並配合修訂保育類動物名錄之等級，有效管理人工飼養與繁殖行為。此外對已知部分較穩定的食蛇龜與柴棺龜野生族群，應積極進行基礎生物學的研究，透過研究過程降低獵捕的壓力，朝規劃成保護區的方向努力，以確保部分較穩定野生族群的存續。

Status of the Northern River Terrapin (*Batagur baska*) and first breeding success in Bangladesh and India

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ABSTRACT

With less than 50 known specimens *B. baska* is one of the most endangered vertebrate species in the world. Whereas according to the information of locals additional males are kept in fish breeding ponds in Bangladesh, one of the biggest challenges for the conservation of the species remains to find more females to enlarge the breeding stock. Breeding groups are located in Bangladesh, India and Austria. Last year the emphasis of conservation effort focused on the establishment of a breeding facility in Bangladesh. The Bangladesh Forest Department provided two ponds and some infrastructure at Bhawal National Park (BNP) to establish the assurance colonies through captive breeding. Last winter we improved the nesting beach at the breeding pond in Bhawal National Park and renewed the hatchery. All together we could acquire 14,5 long term captive individuals from village ponds. All five acquired females nested in March and April in the breeding facility. All nests got caged to protect the eggs from monkeys, monitor lizards and mongooses. Finally 27 hatchlings emerged out of 4 nests.

In Sanjekhali, India the three gravid females were translocated for nesting into a rearing facility for crocodiles. After dropping several eggs in water the females got released back into the pond. No nesting activity was observed in the corcodile facility, but surprisingly 25 hatchlings emerged in the second week of June.

For the long term survival of the species we will have to establish a studbook with well defined breeding lines based on genetic studies of all available specimens. That implicated the necessity of digging more ponds to keep breeding pairs separated. Because nothing is known about the biology and ecology of the Northern River Terrapin, another emphasis will be put on field surveys to locate possibly still remaining wild nest beaches and to transmitter a few specimens to learn something about the natural history of *B. baska*.

Breeding and husbandry of turtles and tortoises in Vienna Zoo with a focus on *Batagur baska*

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ABSTRACT

Vienna Zoo houses more than 15 different species of chelonians, several of them critically endangered. Over the last years the zoo has gained a lot of expertise in breeding, husbandry and animal training of turtles and tortoises. It regularly records breeding successes with Angulate Tortoises, *Chersina angulata*, Giant Asian Pond Turtles, *Heosemys grandis*, and others. It also participates in long-term conservation projects for native species such as the European pond turtle, *Emys orbicularis*. In 2010 Vienna Zoo successfully bred one of the most endangered turtles in the world, the Northern River Terrapin, *Batagur baska*, for the first time in captivity.

Turtle Conservation Project Coordination with Zoological in Myanmar

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ABSTRACT

1. Wildlife Conservation Society (Myanmar Program) coordination with Burmese star tortoise *ex-situ* program with Yangon Zoological in 1999, very wet season in Yangon, relocated to Shwesettaw Wildlife Sanctuary in arid zone. Similarly, WCS kept Arrakan Forest Turtle, *Heosemys depressa* in Yangon Zoo, not succeed.
2. Wildlife Conservation Society (Myanmar Program) provided Burmese star tortoise facility in Mandalay Yadanabon Zoological in 2000.
3. Dr. Gearld Kuchling and FD found adult B.trivittata at the pond of Maharmuni Buddhist pond in 2003 and transferred to Yadanabon Zoological Garden. Successful *B.trivittata* breeding since 3 year and M.emy ex- situ program in the Zoo.
4. TSA and WCS supported 3 turtle facilities in Yadanabon Zoological Garden. Burmese star tortoise, *Geochelone platynota*, Burmese roofed turtle, *Batagur trivittata* and Asian brown tortoise, *Manouria emys*. WCS and Yadanabon Zoological Garden involve confiscated turtle from Myanmar – China border and release turtle, tortoise into suitable habitat in Wildlife Sanctuaries, under the control of Forest Department.
5. TSA and WCS supported turtle, tortoise facility in 2 Wildlife Sanctuary in arid zone (central). Lawkananda is very successful G.platynot *ex-situ* program conduct with WS.
6. Inbreeding in problem in Eld's Deer *cervus eldi* in Yangon Zoo.
7. To involve reintroduce program for *Geochelone platynota*, Burmese roofed turtle, *Batagur trivittata*
8. Some B.trivittata from *in situ* to captive Wildlife Sanctuaries.
9. Some problems of males *Geochelone platynota* in mating season and plastron deformation.

Current status of freshwater turtle and tortoise in Myanmar

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ABSTRACT

Myanmar has 27 turtles and tortoise species among them 7 are endemic. 3 Critically endangered, 8 Endangered by protection status in IUCN Red list and CITES Appendix I, II. In addition, there are nationally protected by Myanmar Wildlife Law (1994) and Myanmar Fisheries Law (1993).

1. **In-situ Conservation-Upper Chindwin River (Burmese Roofed Terrapin *Batagur trivittata*, Burmese Peacock Softshell *Nilssonia formosa*, Burmese Narrow-headed Softshell *Chitra vandijki,* and Asiatic Softshell *Amyda cartilaginea*)**

Freshwater Turtle Conservation project started in upper Chindwin River since 2005, collaboration with the staff of Htamanthi Wildlife Sanctuary from Forest Department and local community members to protect freshwater turtles and their nesting sites. The team regularly patrolled the sandbank and offered rewards to local people who provided information or located turtle nests from December to April for *Batagur trivittata*, when nests or suspected nesting areas, people were employed for guard nesting beach.

2. ***Ex-situ* Conservation – Yadanabon Zoo**

In collaboration with the Turtle Survival Alliance (TSA), which also provided funding, we were able to improve and expand the head-starting and *ex-situ* assurance facilities at Yadanabon Zoo for the Burmese Roofed Terrapin from the upper Chindwin River. Additionally, at Lawkanandar Wildlife Park in Bagan has a large pond and it was suitable and grown out for adult animals. Lawkanadar facility is now completely finished and a number of adult animals already moved from Yadanabon Zoo.

3. **Release Program**

Seven of the oldest Burmese Roofed terrapin were set up the micro-chipped and released back into the upper Chindwin River with the support of local communities and local authorities.

4. **Arakan Forest Turtle *Heosemys depressa***

The first discovery of wild animals for Arakan Forest turtle by turtle team in 2009. Turtle team conducted further surveys in December 2010 in the eastern part of the Rakhine Yoma Elephant Range of Southwest Myanmar. An additional survey in the north of the range is planned for the start of the coming rainy season.

5. **Burmese Star tortoise**

The Myanmar star tortoise (*Geochelone platynota*) is endemic to the dry zone of central Myanmar, and populations have precipitously declined since the late 1990s. Dr. Platt and his team conducted a recent survey in Minzontaung Wildlife Sanctuary (MWS). As a result of the recent survey, MWS was deemed a suitable site for the reintroduction of captive-bred *G. platynota.*

6. **Assurance Colonies and Rescue Center**

Myanmar has 5 assurance colonies and rescue centers at Yadanarbon Zoo, Minsontaung Wildlife Sanctuary (MWS), Lawkanandar Wildlife Park, Shwesettaw Wildlife Sanctuary, Rakhine Yoma Elephant Range (Gwa) and Maymyo for processing trade seizures and head-starting program.

7. **Threat**

The number of gold mines is increasing along the Chindwin River which is a major disturbance to the turtles and their nesting sandbanks. And also making habitat destruction, subsistence harvesting and over-collection to supply international markets. Assessing primary trade routes into China.

8. **Public Awareness**

Public Awareness program on Chindwin River to build local support for *B. trivittata* and other freshwater turtle conservation since 2005. In addition, a community outreach program will be conducted in the villages surrounding MWS for a reintroduction of Burmese Star tortoise in this year.

Establishing a greenhouse in Central Europe: An attempt for a compromise between aesthetics and functionality

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ABSTRACT

In the 1970s and 80s a few private pioneers in central Europe established the first bigger facilities to keep and breed freshwater turtles and tortoises. In 1975 a small greenhouse was built in Graz, Austria, a prototype of several larger sized greenhouses focusing on subtropical turtle species. Learning from mistakes we planned and build a larger sized greenhouse for the maintenance of about 100 species from different climatic zones. Using an air ventilation system and passive solar energy we tried to reduce the costs of energy and match ecological goals. Unfortunately aesthetics and functionality are sometimes hard to impossible to combine. The intraspecific and interspecific aggression in almost all freshwater turtle species creates problems in keeping groups together – even in larger exhibits – and implicates separation in numerous small facilities.

Evaluating Impacts of Temperature Dependent Sex Determination in Headstarting and Captive Breeding Operations of Critically Endangered Tortoises and Turtles

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ABSTRACT

Temperature dependent sex determination has important implications for tortoise and turtle conservation programs involving captive breeding or nest translocation and head-starting. The standard scientific method to establish sex ratios of hatchlings is to sacrifice them for histological examination of their gonads. The dilemma is that this technique is generally not permissible in conservation programs of critically endangered species, for which however the assessment of sex ratios is particularly imperative. Many tortoise and turtle species take many years or decades to mature. External sexual dimorphism may take as long to develop. Thus, conservation programs often operate for a long time without knowing the sex ratio they produce. Over the last twelve years I used endoscopy in different breeding and head starting programs to evaluate sex ratios in juvenile *Amyda cartilaginea*, *Astrochelys radiata*, *Astrochelys yniphora*, Aldabra tortoises, *Batagur affinis*, *Batagur borneoensis*, *Erymnochelys madagascariensis*, *Geochelone platynota*, *and Gopherus agassizii*, most of which have tempearture dependent sex determination and typically show scewed sex ratios in conservation programs. Many species show pronounced differences in the threshold temperatures which produce male or female biased ratios. For example, similar incubation temperatures which produce mainly females in *Astrochelys radiata* produce overwhelmingly males in *Geochelone platynota*. It is therefore important to evaluate the incubation conditions which produce either sex for every species of concern. This applies even for groups which are generally considered to have genetic sex determination, for example softshell turtles: based on dissection of dead juveniles a captive breeding project for *Chitra chitra* in Kanchanaburi also produced a heavily male biased sex ratio.

Radio-tracking Techniques and Data Acquisition for Turtles and Tortoises

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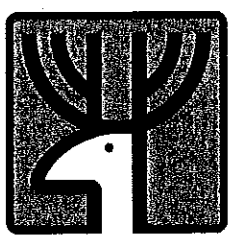
ABSTRACT

Depending upon Chelonian research goals, there are several advantages of using radio-telemetry to study the ecology and natural history of wild, free roaming turtles and tortoises. While there are some disadvantages of using radio-telemetry, such as the amount of time spent relocating study animals, or the high cost of transmitters and radio-receiver, nevertheless the data one is able to collect is worth the cost and effort. The selection of radio-transmitter size and battery life should be correlated to the weight and size of the turtle species being investigated. Using an epoxy resin (Loctite Putty, made by Henkel Corporation, Rocky Hill, Connecticut 06067), radio-transmitters can be attached to the rear portion of the carapace for terrestrial, aquatic and semi-aquatic turtle species. The highly aquatic softshell turtle requires a more sophisticated method of attaching transmitters, because the marginal edge of the shell has to be punctured with a sterile needle. Then the transmitter has to be sewn on with stainless steel wire or nylon fishing line. Radio-telemetry can help researchers learn the preferred habitat types and winter hibernacula used by land tortoises, box turtles, or most aquatic turtle species. Scientists can learn the hourly, daily and seasonal movements of free roaming turtles and tortoises. This method can help identify foraging areas within their habitat and the home range size of tortoises and aquatic turtle species. Home range maps can be plotted based upon GPS coordinates taken at each relocation point of the turtles. Information gathered by radio-telemetry can show scientists the home range of rare turtle species. The results of a two-year bog turtle radio-telemetry study is provided as a sample research project. The study was conducted between 2001 and 2002. Bog turtles are a small species with an average carapace length of 8.5 cm, therefore they typically have a small home range. In 2001, we tracked 14 bog turtles: 7 males and 7 females at three wetland habitats. Site 1: 3 males and 4 females. Site 2: 3 males and 2 females and Site 3: 1 male and 1 female. In 2002, we tracked 23 turtles: 10 males and 13 females. The number of turtles at each wetland habitat was: Site 1: 4 males and 5 females, Site 2: 2 males and 3 females, and Site 3: 3 males and 4 females. The mean activity home range of **37** bog turtles was **0.58-hectares** (with a range of 0.4 to 0.71 hectares). With the data collected, radiotelemetry can help scientists develop meaningful management and conservation plans for endangered turtles and tortoises.

諮詢顧問（依姓名筆劃排序）



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