CROCODILE SPECIALIST GROUP NEWSLETTER

VOLUME 31 No. 2 • APRIL 2012 - JUNE 2012

IUCN • Species Survival Commission

CROCODILE

SPECIALIST

GROUP

NEWSLETTER

VOLUME 31 Number 2
APRIL 2012 - JUNE 2012

IUCN - Species Survival Commission

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PO Box 530, Karama, NT 0813, Australia

Printed by: Uniprint NT
Charles Darwin University, NT 0909, Australia

COVER PHOTOGRAPH: Philippine Crocodile (*Crocodylus mindorensis*) at Pag-Asa Farms-PAWB semi-wild enclosure. Photograph: Jojie Alcantara.

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The CSG Newsletter provides information on the conservation, status, news and current events concerning crocodilians, and on the activities of the CSG. The Newsletter is distributed to CSG members and to other interested individuals and organizations. All Newsletter recipients are asked to contribute news and other materials.

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George Saputra, IRATA, Jakarta, Java, Indonesia.
Yosapong Temsiripong, Sriracha Moda and Crocodile & Ostrich Cooperative of Thailand, Thailand.
The Marine Products Association, Hong Kong.

Contributors ($250 - $1000)

East Coast Zoological Society (Brevard Zoo), FL, USA.
Carl Camden, Kelly Services Inc., USA
Simone Comparini, Pantera S.R.L., S. Croce s/Arno, Italy.
Luis Gonzaga, Sitio do Carração Ltda., Brazil.
James Hennessey, Reptile Village Zoo, Ireland.
Indonesian Crocodile Farmers Association, Indonesia.
Vic Mercado, Microlab, Philippines.
Ari Palomo Del'Alamo Criatório Caiman Ltda., Brazil
J. Perran Ross, Gainesville, Florida, USA.
The Ebey family, New Mexico, USA.
Nao Thouk, Phnom Penh, Cambodia.
Virginia Aquarium, Virginia Beach, VA, USA.

Editorial

21st CSG Working Meeting

Steering Committee Meeting (21 May 2012)

1. Opening

Dr. Ana Labrador, Deputy Director, National Museum of the Philippines, welcomed participants to the meeting.

Steering Committee members present: Grahame Webb, Dietrich Jelden, Alejandro, Larriera, Tom Dacey, Perran Ross, Charlie Manolis, Alvaro Velasco, Samuel Martin, Allan Woodward, John Caldwell, Paolo Martelli, Val Lance, Dr. Giam, Yosapong Temsiripong, Hesiquio Benitez Diaz

Observers present: Heng Sovannara, Luon Nam, Adam Britton, Mark Bezuijen, Thongsavath Oudomxay, Chanthone Phothitay, Cayetano Pomares, Giovanna Webb, Margaret Tierney, Frederick Webb, Roberto P. Puentespina, Bjorn Limketkai, Robby McLeod, Leo Lapie, Gregory Lacoste, Marcos Coutinho, Steve Conners, Antonio Castro, James Chan, Vicente Mercado, Michael Vincent Cruz, Yusuke Fukuda, Maria de la Paz Lopez, Manuel Muñiz, M.M. Imran, Anslem De Silva, Godfrid Solmu, Matt Plummer, Geoff McClure, Guillermo Principe, Pablo Siroski, Csaba Geczy, Kristian Robert Pahl, Arvin Diesmos,James Alifang, Matthew Brian, Brian Jeffery, Rebecca Muscher, Mark Merchant, Marissa Tellez, Alex Meurer, Joe Wasilewski, Oswald Bracken Tisen, Christopher Kri Ubang, Rambli Bin Ahmad, Simone Comparini, Terry Cullen, Heintje Limketkai, Daniel Barlis, Buddy Chan, Choomjet Karnjanakesorn, Smith Thummachua, Bundit Kullavanijaya, Kumthon Suaroon, Yosapong Temsiripong

Apologies from Steering Committee members: Janaki Lenin, Rom Whitaker, Harry Messel, Ralf Sommerlad, Carlos Piña, James MacGregor, Richard Fergusson, Ruth Elsey, Don Ashley, Yoichi Takehara, Hank Jenkins, Alison Leslie, C.H. Koh, Fritz Huchzermeyer, Thomas Rainwater, Bernardo Ortiz-von Halle, Alfonso Llobet, Christine Lippai, Kent Vliet, Tomme Young, Asghar Mobaraki, Luís Bassetti, Phil Wilkinson, Jiang Hongxing, Frank Mazzotti

Apologies from other CSG members: Phil Steel, Ricky Taylor, Iqbal Zuberi, Rob Stuebing, Christopher Tracy, Zilca Campos, Paul Bodnar, Patrick Aust, Obdulio Menghi, Peter Brazaitis, Craig Franklin, Christopher Moran, John and Lillian Lever, Pushpa Palaniappan, Juan Rafael Bolaños Montero, Ernesto O. Boede, Ruchira Somaweera, Hannes Botha, Rafael Antelo, Pedro G. Vasquez Ruesta, Agata Staniewicz, Chris Kofron, A.M. Riyas Ahamed, Joe Abene, Keith Christian, Chris Peberdy, Paul Weldon, Craig Franklin, Roldán de Sola, Manori Gunawardena, R.J. Rao, Sally Isberg, Massimo De Luca, Rakotondrazafy Andry Malalan'Ny Aina, Frank Brandstätter, Subir Chowfin, Attaullah Pandrani, Timothy P. Scott, Gisela Poletta, Alba Imhof, Gordon Grigg, Rob Gandola, Melina Simoncini, Parntep Ratanakorn, Pierre Charruau, Virginia Parachú Marcó, Juan F. Dueñas-Serrano, Patrica Amavet, Iván Palacios, Somkiat Wannawatanapong, Harry Dutton, Dwayne Carbonneau, Sergio Alejandro Balaguera-Reina, Robert Godshalk, Samuel Furrer, Samir Whitaker, Engkamat Lading, Patrick Delaney, Gonzalo Fernández Hoyo, Tomas Waller, Abdul Aleem Chaudhry, Francisco Villamarín, Arnold Brunell, Mitch Eaton, Ian Games, Laura Brandt, Cathy Shilton, Wang Choalin, Wu Xiaobing, Ana Maria Trelancia, Sonia Canto, Fabian Schmidt, Boyd Simpson, Christy Wilkinson, David Wilken, Blair Hayman, Xander Combrink, Mushtaq Ahmed

1.1. Chairman's Report

The Chairman welcomed everyone and thanked the workshop organisers, including representatives of Government, academic institutions, industry and NGOs. He drew attention to the large agenda and indicated that agenda papers would be taken as read and opened for discussion and questions. He also drew attention to the activities of the CSG over the past two years and the forthcoming years, highlighting:

- Nine CSG members who had passed away since the last Working Meeting. A minutes silence was held in remembrance.
- Various meetings in which the CSG had been involved over the past 2 years.
- The situation in Madagascar, which necessitated a trade suspension recommended by the CITES Standing Committee.
- Deliberations of the Executive Committee meeting held on 20 May 2012, which were included in the agenda for this meeting.

1.2. Minutes and Actions from CSG SC Meeting, Manaus, Brazil (2010)

All outstanding actions from the Manaus meeting were reported in the minutes or addressed as separate agenda items in the papers of the meeting. Some discussion was held on:

- Proceedings of the Manaus Working Meeting have now been collated and will be published as an electronic document on the CSG website.
- Membership of the CSG and the Steering Committee will be reviewed following the IUCN World Conservation Congress in September 2012.
- The need to encourage new and younger member into the CSG. Terry Cullen suggested that we could establish a mentoring program.

Action 1. The Chairman requested Terry Cullen to provide the Executive Officer with some notes on his idea for a mentoring program.

Completion of actions from the last CSG SC meeting was noted.

1.3. Executive Officer's Report

The Executive Officer highlighted:

- CSG membership of 450 (60 countries)
- Only a 50% response to the CSG questionnaire
- Reviews and meetings
- SRAS (Agenda item SC.7.1) - since 2009, there had been 51 applications; 48 approved, 3 under consideration; and 26 reports received. Details are now available on the CSG website

The report was noted.

1.4. Financial Report

The financial report highlighted the current balance of around $US539,998.

TTF Funds - the Chairman outlined the issues involved with the Lake Mesangat proposal in East Kalimantan. The CSG is proposing to send a high level delegation (G. Webb and D. Jelden) to East Kalimantan to meet with the appropriate people in the local government and industry.

Chinese alligator Funds - the Executive Officer advised that there had been no transactions for over 7 years. It was suggested that anyone with ideas on what might be done with the funds should pass them on to Perran Ross to collate for the CSG Executive's consideration. One idea which evolved from the discussion was to use the funds to revise the Chinese Alligator section of the CSG's Action Plan.

The Chairman thanked Charlie Manolis and Tom Dacey for their efforts in controlling the CSG finances and providing the regular financial reports to members.

The reports were noted.

1.5. International Association of Crocodile Specialists Inc.

The Chairman gave an outline of the establishment of IACS as a separate legal identity to manage the finances of the CSG. The report was noted.

2. Regional Reports

2.1. South and East Africa

The Regional Chairman for South and East Africa, Rich Fergusson, was unable to attend the meeting. His report highlighted recent activities in:

- South Africa - decline in Loskop Dam population still being monitored
- Botswana - increase in Human-Crocodile Conflict with the increased annual floods
- Mozambique - crocodile management plan has been approved, but still not effectively implemented. Current CITES export quota for wild skins should be re-examined
- Namibia - management plan due to be finalised by July 2012
- Zimbabwe - only 19 active producers remaining
- Malawi - Agenda item 8.2 refers
- Tanzania - Protected populations remain healthy
- Kenya - No major changes recently
- Democratic REpublic of Congo - Joe Wasilewski provided an overview of his recent activities
- Sudan - with the advent of South Sudan as a separate identity, surveys of the Nile and Sudd could eventuate
- Egypt - situation on hold due to internal difficulties

Action 2. Joe Wasilewski will prepare a proposal for CSG consideration on assisting the Congo project.

The report was noted.

2.2. West and Central Africa

Samuel Martin addressed the report, highlighting:

- Difficulties of being able to operate in some countries due to civil unrest
- Strategic document, prepared by Dietrich Jelden, Samuel Martin and Christine Lippai, had been distributed to various wildlife ministries in the West African region by the Ministry of Environment of Burkina Faso
- NGO, SOS Crocodiles of La Ferme aux Crocodiles (France), continues to be involved in several projects in Burkina Faso, Benin and Niger

Matt Shirley gave a brief overview of the work he has been doing in Ivory Coast and Gabon.

The report was noted.

2.3. East and Southeast Asia

Neither of the Regional Chairs was able to attend the meeting. The report collated by CSG Executive Officer from various sources highlighted:

- International Crocodile Conference held in Kuching, Sarawak, Malaysia (October 2011)
- CSG Regional Species meeting held in Bangkok, Thailand (April 2011)
- East Kalimantan reports on *C. porosus*, *Tomistoma schlegelii* and *C. siamensis*
- Cambodian Crocodile Conservation Programme reports by FFI
- China sub-regional report on Chinese Alligator
- Recent update compiled by Mark Bezuijen

Yosapong Tempsrirpong outlined the activities included in the report from Thailand Fisheries Department (SC.3.5 Attachment "D" refers).

Heng Sovannara provided an overview report on some recent Cambodian activities:

- Siamese crocodile conservation requires an inter-agency approach as there are many national government agencies with overlapping jurisdictions
- National biological Strategies and Action Plans (being prepared under the national obligation of signatories to CBD) are only the first step - species conservation needs to be embedded in annual government work plans and budgets down to local level (country/district/village levels).

Chanthone Phothitay provided an overview report on some recent activities in Lao PDR:

- Government and WCS have commenced a Community-based Management Project, funded by the Mining Metro Group (MMG), which builds upon previous efforts
- In 2011 one wild nest, with 27 eggs, was found. Eggs incubated by Ban Kuen Zoo and 20 hatchlings produced. These animals have been scute-clipped and will be released in a head-start program in 2012/2013
- Through community workshops, community regulations for crocodile conservation developed in 9 villages in the Xe Champone and Xe Xangxoy Rivers. Crocodile conservation committees have been created, with representatives who co-ordinate village involvement. Appropriate public awareness signs have also been erected in the various crocodile conservation areas.

Oswald Bracken Tisen provided an overview of the recent International Crocodile Conference held in Kuching, Sarawak, Malaysia (October 2011), where the possible downlisting of *C. porosus* in Sabah, Sarawak and Brunei was discussed.

2.4. North America

The report, provided by the Regional Chairs, Ruth Elsey and Allan Woodward, and presented by Allan Woodward, highlighted:

- Status of American Crocodile
- Skin production figures
- Various State reports
- Reclassification Issues: *Caiman latirostris* - comments period closed 5 March 2012. USFWS announced its finding to remove *C. moreletii* from the US list of Endangered and Threatened Species and the final rule is expected to be published soon.

The Chairman thanked Ruth Elsey and Allan Woodward for the excellent report presented. The report was noted.

2.5. South Asia and Iran

The report provided by Janaki Lenin, who was unable to attend the meeting, highlighted current activities:

- India
  - Gharial; establishment of National Tri-State Chambal Sanctuary Management and Coordination Committee (NTRIS-CASMACC)
  - Saltwater crocodile survey undertaken in Indian part of Sundarban
- Sri Lanka - Ruchira Somaweera and Anslem de Silva received a CBOT grant to study "Usage of traditional knowledge to minimize human-crocodile conflict and conserve crocodiles in Sri Lanka". Two new crocodile facilities have been established
- Nepal - satellite telemetry study being undertaken
- Iran - first captive breeding and rearing facility established for Muggers
- Pakistan - are working in conjunction with Iran
- Bangladesh
  - Gharial surveys undertaken in the Padma and Jamuna Rivers, November 2009-October 2010 and again November 2010-October 2011.
  - Mugger - HCC incidents
  - Saltwater crocodile population appears to be declining
  - Commercial activities - three farms now operating

The report was noted.

2.6. Australia and Oceania

The report provided by Charlie Manolis highlighted:

- Northern Territory
  - Cane toads are having a major impact and causing declines in some *C. johnstoni* populations (eg

Victoria and Daly Rivers);
- Review of management program for *C. porosus* to be completed by end of 2012
- Management program for *C. johnstoni* was approved on 23 December 2010

- Queensland - a collaborative research project is exploring the "science" behind harvesting crocodile eggs in Cape York
- Western Australia - arrival of cane toads does not appear to have caused the high mortalties of *C. johnstoni* that have been reported elsewhere in the Northern Territory
- Papua New Guinea - crocodile farming industry continues to focus on *C. porosus*, although wild harvesting involves both *C. porosus* and *C. novaeguineae*. Population monitoring shows increasing breeding populations of both species
- East Timor - The East Timorese Government recently formed a Crocodile Task Force to improve knowledge and experience in managing crocodile populations. HCC continues to be an issue
- Solomon Islands - HCC continues to be a major issue and creating negative attitudes towards crocodiles

The report was noted.

2.7. Europe

Samuel Martin presented the report, highlighting:
- *Ex-situ* conservation through zoos
- Europe is active in supporting several crocodile conservation initiatives both logistically and financially overseas
- French company, Lacoste, are now supporting significantly 5 major separate projects around the world

The Chairman gave an overview of the involvement of the Lacoste Foundation in crocodile conservation in the framework of their 'Save our Logo" initiative, operating through French NGO, FDB.

2.8. Latin America and Caribbean

The report was presented by Alejandro Larriera, who thanked all representatives from the region for their input into the regional report and offered an apology for all those who were unable to attend the meeting. The report was noted.

2.8.1. Crocodile conservation in Jamaica

Perran Ross presented the paper and the issues discussed included:
- Although that contact had been made with new people in Jamaica, the situation has not changed in 30 years. Byron Wilson is the main contact person;
- Habitat is being lost and there has been an increase in the killing of *C. acutus* and there is real fear that the population may be lost; Need to encourage locals to increase the pressure on government to protect at least a couple of core areas; and,
- Need for a better public education program.

Action 3. The Chairman requested Perran Ross, Allan Woodward and Joe Wasilewski to review the situation and advise who will be able to advance the situation.

2. Reviews

3.1. Vietnam

There was no specific report from Vietnam and no representative from Vietnam present at the meeting. However, a report (Agenda item SC.3.5 - Attachment "B") addressed some of the general issues.

3.2. Cambodia: Update on Implementation of Recommendations

The report from Fisheries Administration of Cambodia on implementation of the Recommendations of the 2005 CSG review was included in the agenda papers. The Chairman advised that of the 31 Recommendations, 6 have been completed, 4 require some further clarification and the rest have not been satisfactorily resolved to date. Heng Sovannara advised that the lack of resources is a major problem in the implementation of the Recommendations.

Action 4. CSG will review the report and achievements, with the view of writing to Cambodian Director General of Fisheries, Dr. Nao Thuok, seeking advice and clarification on several of the issues.

3.3. Madagascar

Refer to SC.4.1 - CITES Report. The Chairman advised that Madagascar had become a very complicated issue in the context of CITES. Based on the recommendations of the CITES Standing Committee, a trade suspension had been imposed until such time that Madagascar can comply with 9 recommendations. To date, Madagascar has not met these requirements completely, and such trade bans, as for example by the EU, remain in place. Madagascar has begun to import raw *C. niloticus* skins from other Range States, manufacture them into finished products, and then re-export them. Although this would appear to be contrary to the trade suspension, the CITES Secretariat has advised that such is not the case. Dietrich Jelden advised that this is a CITES compliance issue which will discussed further at the 62nd meeting of the CITES Standing Committee in July 2012.

Action 5. CSG to write to CITES Secretariat, expressing its views on the import and re-export of imported skins and products respectively through Madagascar. The letter should request that it be electronically available on the CITES website as a SC62 'Information document'.

3.4. Cuba

Whilst the report provided by Roberto Soberon indicated that some progress is being achieved, it was noted that most of the important recommendations are yet to be implemented. As Roberto Soberon has now moved to Spain, the CSG Executive appointed Manuel Tabet as the LA&C Vice Chair. The report was noted.

3.5. First Species (*C. siamensis*) Meeting, Bangkok - Progress Report

The Executive Officer gave a brief overview of the recommendations from the *C. siamensis* meeting held in Bangkok (April 20110), indicating that the relevant recommendations had been forwarded to the respective Range States for their consideration and advice. Responses had been received from Cambodia, Vietnam, Dietrich Jelden and Thailand. Yosapong Temsrirpong gave an overview of the response provided by Thailand's Fisheries Department. It was noted that there had been made some progress on the compliance and enhanced co-operation issues between China and its neighbouring Range States. Similarly Cambodia and Vietnam were now discussing illegal cross-border trade.

Action 6. The Chairman indicated that the CSG would seek updated reports from the outstanding respondents (Indonesia, Cambodia, Lao PDR) and attempt to progress the recommended actions from the Bangkok meeting.

Action 7. Yosapong Temsrirpong was requested to convene a *C. siamensis* Working Group to discuss what might be possible in respect of the common recommendations on compliance, capacity building, etc., and report back to the meeting.

The report was noted.

4. Thematic Group Reports

4.1. CITES

The report was briefly introduced by the Chairman, in the absence of "Hank" Jenkins, highlighting:

- Ranching and trade in ranched specimens of species transferred from Appendix I to Appendix II (Decision 15.51), and the history behind the various CITES Resolutions - Resolution Conf. 9.24 (Rev. CoP15), Resolution Conf. 11.16 (Rev. CoP15) and Resolution Conf. 9.20 (Rev.). The issue is quite complicated and was referred back to the Animals Committee (AC) for consideration and recommendation. CSG provided an information document (AC 25 Inf. 9 on 'Ranching and trade in ranched specimens of species transferred from Appendix I to Appendix II 'http://www.cites.org/eng/com/ac/25/index.php) to recommending that the two systems should remain totally separate and this was accepted by the AC
- Madagascar - Discussed previously under Agenda Item SC.3.3
- *C. johnstoni* - the correct nomenclature has been formally accepted by CITES
- *C. niloticus* - awaiting the outcome of the process for species recognition
- Malawi - Refer Agenda Item SC.8.2
- Compliance with CITES

4.2. Industry

Charlie Manolis addressed the report provided by Vice Chair Don Ashley.

Action 8. Establish a Working Group (with Charlie Manolis as Chair) to review the issues raised in the report and report back at the end of the Working Meeting.

4.3. Trade Monitoring

John Caldwell presented the report, highlighting: the source of the trade data; outstanding CITES reports and preparation of IACTS reports. The report was noted.

4.4. Veterinary Science

Dr. Paolo Martelli presented the report, highlighting:

- The purpose of the Group
- Ongoing problem of passive members
- Ongoing communications within the Group
- Membership is now 13 members
- Vet Science documents available to go onto the new CSG website
- Concern over the animal welfare issue, particularly stunning and individual pens

The animal welfare issue was referred to a Working Group to report back before the end of the meeting.

4.5. Zoos and Community Education

Vice Chair Kent Vliet was unable to attend the meeting, however the Executive gave an overview of the report highlighting:

- Need for increased communication and liaison within the group
- Activities of the European Association of Zoos and Aquaria (EAZA)
- Active groups in Europe, Australia and North America
- Space and husbandry standards for captive

crocodilians. This issue was also discussed at the CSG Executive meeting the previous day
- Identification of community education programs in USA and Costa Rica

Action 9. Establish a Working Group (comprising Kent Vliet, Ralf Sommerlad and Rene Hedegaard) to look at the issue of "Space and husbandry standards for captive crocodilians" and report back to the CSG Executive.

Action 10. Establish a separate CSG Community Education Group, under the chairmanship of Clara Lucia Sierra Diaz (Colombia).

4.6. General Research

Val Lance gave a verbal report highlighting that science is flourishing in the crocodilian world. A recent internet search reveals some 1500 articles available online. On a sadder note, Val reported that the proposed Symposium on Crocodylia had been turned down twice, so he would no longer pursue this issue.

The report was noted.

4.7. Legal Affairs

The report from Vice Chair, Tomme Young, was noted.

5. IUCN Red List Authority

Perran Ross advised that Red List Assessments had been completed for *Crocodylus acutus*, *C. moreletii*, *C. palustris* and *C. siamensis* and these were now ready for circulation to CSG members for comment prior endorsement by the Chairman and inclusion on the website. *Crocodylus mindorensis* would be completed during the course of this Working Meeting, only leaving *Tomistoma schlegelii* and *Osteolaemus tetraspis* to be completed later. It was agreed that the assessment of *C. niloticus* could be deferred.

Action 11. Completed Red List Assessments to be circulated to CSG members for comments prior to endorsement by CSG Chair and inclusion on the CSG website.

6. Task Force/Working Group Reports

6.1. Tomistoma Task Force

The report was prepared by the TTF Chair, Bruce Shwedick, who was unable to attend the meeting, so Colin Stevenson reported on his behalf, highlighting:
- Funding support received from Virginia Aquarium and Miami Metro Zoo
- Activities and reports from Agata Staniewicz on her research in the Mesangat Lake area of East Kalimantan
- Deferral of the proposed TTF Workshop
- Work continuing on the Tomistoma Husbandry Manual

The report was noted.

6.2. Human-Crocodile Conflict

Richard Fergusson was unable to attend the meeting but provided a written report. A working group was established under Chairmanship of Charlie Manolis to discuss progress being made by the group. The report was noted.

7. General Business

7.1. Student Research Assistance Scheme

The report presented by the Executive Officer Tom Dacey highlighted:
- 52 applications received since 2009; 48 approved, 1 withdrawn, 3 applications under consideration and 26 reports received
- Details of successful applications are now on the CSG website, and final reports are posted as they are received

The report was noted.

7.2. CSG Website

Charlie Manolis advised that the new CSG website is up and running. The report was noted.

7.3. Castillo Award

The Chairman advised that the CSG Executive had considered several nominations and the successful recipient would be announced at the closing dinner on the evening of 25 May 2012.

8. Other

8.1. Crocodilian Capacity Building Manual

The following issues were discussed:
- CITES Secretariat has advised that they are not in a position to support this proposal
- Need to take similar approach as was done for the Action Plans - allocate tasks to various members with set deadlines and appoint someone to be the co-ordinator
- It might be necessary to employ a co-ordinator to progress and finalise the Manual

Action 12. Allan "Woody" Woodward to reconvene the

Crocodilian Capacity Building Working Group to review the previous Working Group report and report back on how it might be developed into a working document.

Action 13. Depending on outcomes of Action 12, advertise for expressions of interest for a CSG Communications Officer, who could co-ordinate the finalisation of the proposed Crocodilian Capacity Building Manual.

8.2. Malawi - Implementation of CITES Resolution Conf. 11.16 (Rev. CoP15) on ranching

Dietrich Jelden addressed the issue, highlighting the problem of Malawi increasing their annual quota from 3000 to 10,000 without any explanation and their failure to submit annual returns.

Action 14. Dietrich Jelden to draft a letter to CITES Secretariat, with a copy to Malawi.

9. Next CSG Working Meeting

Sri Lanka (Anslem de Silva) and Louisiana (Mark Merchant) made their respective presentations. After due consideration of the proposals the Executive decided that:

- The 22nd CSG Working Meeting will be held in Colombo, Sri Lanka (May 2013); and,
- The 23rd CSG Working Meeting will be held at McNeese University, Louisiana, USA (May 2014).

The meeting closed at 1730 h.

Tom Dacey, *CSG Executive Officer, csg@wmi.com.au*.

Working Meeting (22-25 May 2012)

The 21st Working Meeting of the IUCN-SSC Crocodile Specialist Group (CSG) was held in Manila, Philippines, 22-25 May 2012, and was preceded by a CSG Executive Committee meeting on 20 May, and a Steering Committee meeting on 21 May. The meeting was hosted Crocodylus Porosus Philippines Inc., the National Museum of the Philippines, and the Protected Areas and Wildlife Bureau of the Department of the Environment and Natural Resources.

The Organizing Committee consisted of Daniel Barlis, Careen Belo-Solco, Rainer Manalo, Vicente Mercado, Chona Mercado, Benedict Solco, Theresa Mundita S. Lim, Josefina de Leon, Nermalie Lita, Jeremy Barns, Eloy Cercado, Arvin Diesmos, and Ana Labrador. Together with their support staff, they did a marvellous job in preparing and running the meeting.

None of this would have been possible without the generous financial support provided by the major sponsors: Crocodile Porosus Philippines Inc., the National Museum of the Philippines, and the Protected Areas and Wildlife Bureau of the Department of Environment and Natural Resources.

CSG Chairman Professor Grahame Webb welcomed 176 participants from 29 countries to the meeting (Australia, Argentina, Brazil, Cambodia, Czech Republic, Colombia, Denmark, France, Germany, Hong Kong, Hungary, India, Italy, Japan, Laos, Malaysia, Mexico, Nepal, Netherlands, Papua New Guinea, Philippines, Slovakia, Singapore, South Africa, Sri Lanka, Thailand, United Kingdom, USA, Venezuela). CSG working meetings are normally held each two years, and are the primary international meeting dedicated to crocodilian conservation, management and research. They have become the major forum for discussion of conservation issues involving crocodilians, and for presenting new findings and new directions with research and management. The 21st Working Meeting was no exception, with some truly exceptional presentations.

A highlight of the meeting was the attendance by Michel Lacoste, Chairman of the Board of the French coorporation Lacoste, and Bernhard Limal and Antoine Cadi, from the French NGO "Fonds de Dotation pour la Biodiversité" (FDB) (Fig. 1). As part of the "Save Our Logo" initiative, Lacoste, with assistance from FDB, is already supporting 5 separate crocodilian conservation projects around the world, including a project on Philippine crocodiles in northern Luzon, operated by the Mabuwaya Foundation Inc.

Figure 1. Chairman of the Board of Lacoste, Michel Lacoste (centre), presents CSG Chairman Grahame Webb (left) with a crystal crocodile, as Antoine Cadi (right) looks on.

A number of important issues were addressed by the CSG Steering Committee prior to the working meeting, including the proposed protection of Lake Mesangat in East Kalimantan, the status of the trade ban on *C. niloticus* from Madagascar, Malawi's export quota, review of Steering Committee appointments and the proposed review of CSG membership following the IUCN World Conservation Congress in September 2012. Important initiatives such as crocodile conservation in Jamaica, outcomes from the CSG meeting on *C. siamensis* held in Bangkok, review of Red List assessments, establishment of a CSG Community Education Group, and the proposed Crocodilian Capacity Building Manual were also advanced.

A range of topics were covered during the 4-day working meeting, with oral presentations organized into discrete sessions: Management Programs; Populations; Genetics; Disease; Human Dimension; Markets; Conservation; Reproductive Biology; General Biology; and, Physiology. A Poster session also saw a diverse range of topics being covered.

Progress being made with the conservation of the Philippine Crocodile (*Crocodylus mindorensis*), one of the world's most critically endangered species, was covered by various presentations, and included issues such as hybridization, reintroduction, community education, distribution and status. The two main foci of this work are in northern Luzon and Mindanao. The late Andy Ross (1953-2011), who inspired and mentored much of the work now being undertaken in the Philippines, was honoured through a special presentation given by Vic Mercado, with additional testimonials by Grahame Webb, Tom Dacey, Perran Ross and Charlie Manolis. The late Jack Cox (1952-2010), who collaborated with Andy Ross, and who contributed significantly to crocodile conservation in the Asian region, was also honoured.

Working groups were established for the CSG's Veterinary Science, Tomistoma Task Force, Industry and Human-Crocodile Conflict thematic groups, and deliberations are summarised in the Proceedings. The Crocodilian Capacity Building Manual working group established in 2010 was re-convened to progress this issue. Representatives of most Range States for the Siamese Crocodile (*Crocodylus siamensis*), together with researchers and industry members, met during the course of the meeting, and they have proposed the establishment of a Siamese Crocodile Task Force to facilitate and improve communication, and advance common goals with the conservation and management of this critically endangered species.

No CSG meeting would be complete without social activities. The French cuisine lunch hosted by Michel Lacoste on Tuesday, and the welcome function on Tuesday night hosted by Protected Areas Wildlife Bureau were enjoyed by all. The Wednesday night function featuring entertainment by the Bayanihan Dance Troup, hosted by Crocodylus Porosus Philippines Inc., was another great success. The closing ceremony banquet on Friday night, with the CSG Auction, provided a fitting end to a great meeting.

The auction once again proved popular, with auctioneer Joe Wasilewski and his team working at a furious pace (Fig. 2). The record sum of $US5140 was raised, which will go to crocodile conservation efforts in Benin, West Africa. Thanks are extended to all those people who contributed items to the auction, and of course to those who dug deep into their pockets to buy them.

After considerable deliberation, Matthew Shirley (USA) was awarded the Castillos Award for his contribution to crocodilian biology, management and conservation in West and Central Africa (Fig. 3).

Figure 2. Auctioneer Joe Wasilewski consults with Alvaro Velasco during the auction. Photograph: Giovanna Webb.

Figure 3. Castillo Award recipient Matthew Shirley (right), with CSG Chairman Grahame Webb (left) and Freddy Webb (centre). Photograph: Giovanna Webb.

Following the meeting, participants had the opportunity to go on tours to the many tourist venues around the Philippines, including visiting "Lolong", the largest Saltwater Crocodile (*Crocodylus porosus*) in captivity in the world (6.17 m long), which was captured in Mindanao in 2011.

Tom Dacey, CSG Executive Offier, <csg@wmi.com.au>.

Allan Woodward and Yosapong Temsiripong

Collette Adams and Curt Harbsmeier

Tom Dacey, Chieko Abe, Chona Mercado, Careen and Ben Solco.

Marissa Tellez and Ali Haghighi

Allan Woodward and Grahame Webb *

Back: Willem van de Ven, Myrna Cureg, Marites Gatan-Balbas, Sabita Malla, Antonio Castro Casal. Front: Dominic Rodriguez, Merlijn van Weerd, Vic Mercado, Grahame Webb, Michel Lacoste, Bernard Limal, Antoine Cadi, Brian Jeffrey.

John Caldwell, Dietrich Jelden, Beatrice Langevin and Kathleen Lance

Joe Wasilewski, Becky Muscher, Marcos Coutinho and Mark Merchant

Vic Mercado and Daniel Barlis *

Jennifer and John Breuggen *

Beatrice Langevin and daughter, Fleur

CSG Executive - Alejandro Larriera, Dietrich Jelden, Grahame Webb and Tom Dacey

Marites Gatan-Balbas, Myrna Cureg and Tom Dacey

Anslem de Silva, Abdul Hamid Ahmad, Rambli bin Ahmad and Imran Mohamed Mossadique.

Godfrid Solmu

* Photograph: Geoff McClure; All other photographs: Charlie Manolis

22nd CSG Working Meeting

Colombo, Sri Lanka, 20-23 May 2013

The 22nd CSG Working Meeting will be held in Colombo, Sri Lanka, from 20-23 May 2013. This represents a slight deviation from normal CSG practice, in that this meeting will take place 12 months after the 21st Working Meeting.

With a "Living with Crocodilians" theme, we encourage people to participate in what will be the first CSG Working Meeting in the South Asia and Iran region since 1978.

Details on the meeting will be available soon.

CSG Student Research Assistance Scheme Update

The CSG Student Research Assistance Scheme has provided funding to an additional 10 students in 2012:

1. Thialgo Portelinha (Argentina): Home range and habitat use for *Caiman latirostris* in Santa Fe, Argentina.

2. Victor Batista (Brazil): Spatiotemporal dynamics of a Dwarf caiman (*Paleosuchus palpebrosus*) population in the Brazilian Cerrado.

3. Marissa Tellez (USA): Environmental perturbation impact on host-parasite dynamics of *Alligator mississippiensis* and its helminth parasites.

4. Carlos Chacin (Venezuela): Population state, space distribution and reproductive aspects of *Paleosuchus trigonatus* in the Kak'kada River, Venezuela.

5. Guiherme Freire (Brazil): Movement of resident and relocated male caimans between protected and impacted habitats in Amazonia.

6. Natalia Rivera (Costa Rica): Carrying capacity of the American crocodile population in the Tempisque River basin.

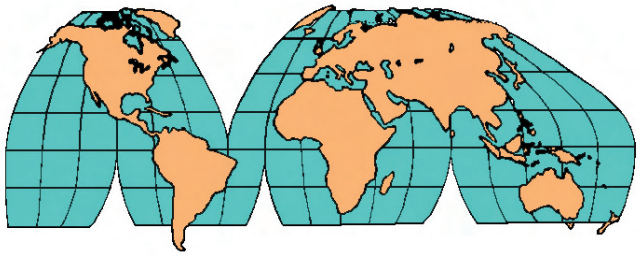
7. Thiago Marques (Brazil): Use of space, isotopic fractionation and genetic characterization of *Caiman latirostris* in eucalypt landscape.

8. Nidia Farfan (Colombia): Population ecology of *Crocodylus acutus* (Cuvier 1807) in Parque Nacional Natural Tayrona, Colombian Caribbean.

9. Dani Rivera (Peru): Conservation status of *Caiman crocodilus* and *Melanosuchus niger* in the Galvez River basin, Loreto, Peru.

10. Gnanki Nathalie Kpera (Benin): Crocodile habitat use and strategies to reduce human-crocodile conflicts in agro-pastoral dams in northern Benin.

Regional Reports



Latin America and the Caribbean

Colombia

ATTACKS AND HUMAN-CROCODILE CONFLICT IN LOCAL COMMUNITIES IN COLOMBIA. Like many other countries with crocodilian populations, Colombia has a high cultural interaction between crocodiles and human communities. Religious beliefs of some indigenous cultures (eg Tumaco-La Tolita, Sinú, motilones: Medem 1981; Cardele de Schrimpff 2006; Ulloa-Delgado 2011) or festive rituals in some towns and provinces (Balaguera-Reina *et al*. 2012) are examples of these interactions. Despite these cultural interactions, overexploitation of crocodilian populations in the 20th century reduced some species to the point of extinction (*Crocodylus acutus*, *C. intermedius*, *Melanosuchus niger*) and eradicated them of some places in the country (Medem 1981; Barahona *et al*. 1996; Ulloa-Delgado and Sierra-Díaz 2002).

Currently, the development of conservation plans and protected areas has generated some successful recovery processes as well as increases in biodiversity (Delgado and Sierra-Díaz 2002; Vásquez and Serrano 2009), including the restocking of areas where the species were extirpated. These reintroductions, particularly in areas where the species has not occurred for some time and where human habitation has increased, have generated encounters between people who now have little knowledge about the species (Balaguera-Reina and González-Maya 2011).

General media (eg local and national newspapers) and environmental agency (eg Tayrona National Natural Park and North and Eastern Amazonian Regional Agency-CDA) records were evaluated, with the aim of quantifying negative relationships (space and/or resources conflicts) between crocodiles and human communities in Colombia. Over the last 14 years (1998-2012) there were 10 documents (Ramírez 1998; Martínez 2009; Tafur 2011a,b; González 2011; Moncada 2011; Cetina 2011; Caracol News 2011; El Espectador 2011; Redacción País 2011) and three personal communications (regional environmental agency staff) about negative relationships within 6 departments (Antioquia, Atlántico, Bolívar, Magdalena, Norte de Santander and Vaupés). *Crocodylus acutus* (12) and *M. niger* (1) are the species causing the conflict [community fear (11), fatal attack (2)]. Until now, two cases involving "fear" (Tayrona National Natural Park) and one case of attack (Villa del Carmen Province) resulted in the *C. acutus* being killed (two

confirmed and the other from community information).

The first fatal attack occurred in Villa del Carmen Province, Tibú Municipality, Norte de Santander Department, and involved a 3.8 m *C. acutus* and a local 6-year-old child. The local authority recorded drowning as cause of death and the crocodile was hunted by the local people.

The second incident occurred in Bocas de Taraira Province, Taraira Municipality, Vaupés Department, and allegedly involved a *M. niger* and a local child (approximately 6 years old). Authorities could not confirm that the caiman or another large predator was responsible for the child's death. Nonetheless, the incident encouraged the local people to hunt *M. niger* in the area, declaring that they were dangerous and there were many of them.

The majority (84.6%) of "fear" incidents occurred over the last two years in towns near wetlands (Puerto Colombia, Tayrona National Natural Park), mangroves (Cartagena), rivers (Villa del Carmen) and lakes (Campo de la Cruz) connected with big rivers (Magdalena and Apaporis Rivers). All cases were derived from specimen translocations (Fig. 1).

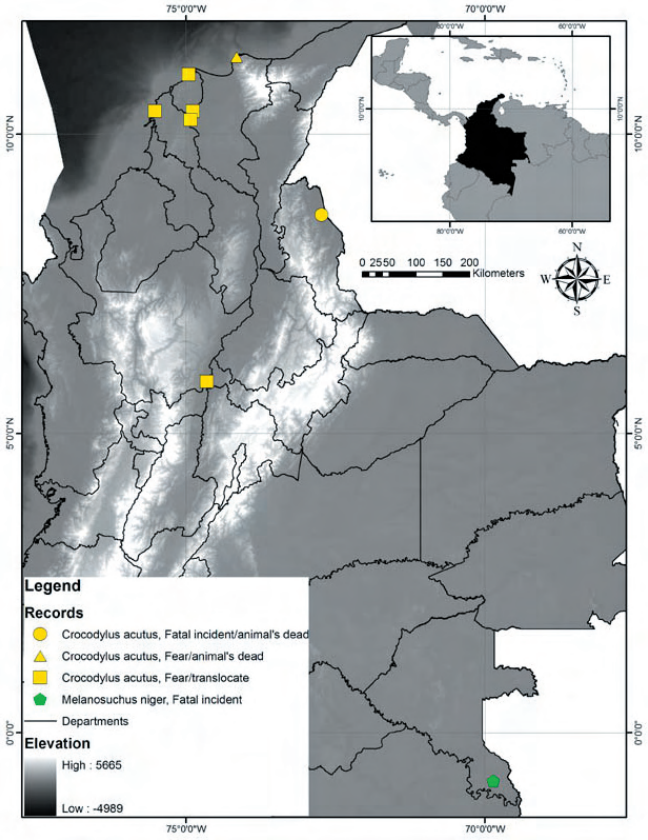


Figure 1. Distribution of attacks and human-crocodile conflict records in Colombia, 1998-2012.

All these cases of negative human-crocodile conflict were generated by a disorderly extension of human settlements and the lack of planning in urban development. The loss of historical cultural relationships between people and biodiversity (Balaguera-Reina and González-Maya 2011) has complicated the management of this natural resource. Relocation of problem animals is a short-term solution that does not necessarily take into account the requirements of the species or the ecosystem, and promotes the outlook within the community that the species is not necessary in the area from which it is being removed, and thus being detrimental to future conservation processes.

Currently, gaps in knowledge on crocodilian distribution, densities and habitat status are severe limitations to the development of appropriate management plans to reduce space and/or resource conflicts between crocodilians and the human population. The lack of records on attacks and human-crocodile conflicts in Colombia also highlights the need to improve the dissemination of information so that strategies for the management of these events can be implemented.

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South Asia and Iran

Nepal

100 GHARIAL RELEASED INTO CHITWAN NATIONAL PARK, NEPAL, JANUARY-APRIL 2012. Between 7 January and 15 April 2012, 100 *Gavialis gangeticus* (19 M, 81 F) reared at the Gharial Conservation Breeding Center (GCBC), Kasara, Chitwan National Park, were released into the Rapti River. Animals were of varying ages (58 @ 6 y; 27 @ 7 y; 13 @ 8 y; 1 @ 11 y; 1 @ 15 y), and were scute-clipped, measured and sexed prior to release. They ranged between 139 and 192 cm total length (mean= 157.6 cm, SD= 8.48, N= 100) and between 6.0 and 29 kg bodyweight (mean= 9.6 kg, SD= 2.85, N= 80).

The Gharial were transported to release sites in ventilated wooden boxes (20 x 30 x 180 cm). As with previous releases (Khadka 2010), the Gharials were not released directly into the river, but rather they were released into small enclosures at the water's edge so they could to adapt to natural conditions. These pre-release enclosures were made of elephant grass, and situated in parts of the river where water flow is slow, and fish are able to enter the enclosure. The animals must break out of the enclosure and enter the river by themselves.

Gharials were released on 7 January (Kasara; N= 20), World Wetland Day, 2 February (Kasara, N= 20; Sauraha, 18 km upstream of GCBC, N= 20) and Wildlife Week, 15 April (Kasara N= 40). Participants included the Chairman of Buffer Zone Council, Chairman of the Regional Hotel Union, Director General of Department of National Parks and Wildlife Conservation, Civil District Officer, representative of Bird Education Society, buffer zone community forestry, reporters, conservationists and students.

The Gharial release program began in 1981, and since that time 861 *G. gangeticus* have been released into different river systems in Nepal. Some 580 Gharials are currently held in captivity at GCBC.

Gharial releases follow a similar procedure every year (eg Khadka 2010). According to official data, previous releases

did not include the Rapti River, but involved the Narayani and other rivers. Gradually those Gharials entered the Rapti River through the Rapti-Narayani confluence by themselves (Khadka 2011). The Rapti River is considered good habitat, is a secure area, and there are minimal threats for Gharials compared to other rivers.

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MONITORING OF GHARIAL AND MUGGER IN THE NARAYANI AND RAPTI RIVERS OF CHITWAN NATIONAL PARK, NEPAL, FEBRUARY 2012. On 4-10 February 2012, daytime surveys were carried out in the Rapti and Narayani Rivers of Chitwan National Park (CNP), with the aim of obtaining updated information on the status and distribution of Gharial (*Gavialis gangeticus*) and Muggers (*Crocodylus palustris*). The surveys covered the same areas as in November 2010 (Fig. 1), and used the same methodology (see Khadka 2011), except that 10 x 50 DPS1 Olympus binoculars were used in 2012.

Gharial

Gharial counts are in Table 1, together with the 2010 results (see Khadka 2011). Similar counts (28 and 32 non-hatchlings in 2010 and 2012 respectively) were recorded in both years for the Narayani River, but 58% more non-hatchlings were sighted in the Rapti River in 2012 (41 versus 26; see Table 1). In February 2011, 48 Gharial were recorded in the Narayani River and 33 in the Rapti River (CNP Annual Report), after a release had been undertaken. In 2008 34 individuals

Table 1. Results of Gharial counts in the Rapti and Nayanari Rivers, November 2010 and February 2012. H= hatchlings, J= juveniles, SA= sub-adults, A= adults, NH= non-hatchlings. Note: 4 juveniles in Sauraha-Gharialghat and 3 juveniles in Kasara-Rapti/Naryani confluence sighted in 2012, were released in January-February 2012, prior to the survey being undertaken.

River/Location of sightings	km	2010			2012				
		H	NH	Total	H	J	SA	A (M.F)	Totals
Rapti River									
Khagendarmali-Sauraha	17.0	-	6	6	-	3	7	1	11
Sauraha-Gharialghat	15.0	3	11	14	-	9	9	3 (0.3)	21
Kasara-Rapti/Naryani confluence	18.0	-	9	9	-	3	6	-	9
Total Rapti River	**50.0**	**3**	**26**	**29**	**-**	**15**	**22**	**4**	**41**
Narayani River									
Sigrauli-Amaltari (South)	30.0	-	12	12	-	-	11	7 (1.6)	18
Sigrauli-Amaltari (North)	30.0	-	6	6	-	-	4	-	4
Amaltari-Baguban	20.0	1	4	5	1	-	2	1 (0.1)	4
Baguban-Tribeni	20.0	-	6	6	-	-	4	3 (0.3)	7
Total Narayani River	**100.0**	**1**	**28**	**29**	**1**	**-**	**21**	**11 (1.10)**	**33**
Grand Total	**150.0**	**4**	**54**	**58**	**1**	**15**	**43**	**15**	**74**

Table 2. Results of Mugger counts in the Rapti and Nayanari Rivers, November 2010 and February 2012. H= hatchlings, J= juveniles, SA= sub-adults, A= adults, NH= non-hatchlings.

River/Location of sightings	km	2010			2012				
		H	NH	Total	H	J	SA	A (M.F)	Totals
Rapti River									
Khagendarmali-Sauraha	17.0	-	3	3	2	-	-	3 (1.2)	5
5 Sauraha-Gharial Ghat	15.0	-	9	9	2	3	1	8 (2.6)	14
Kasara-Rapti/Naryani confluence	18.0	-	9	9	-	-	-	7 (2.5)	7
Total Rapti River	**50.0**	**-**	**21**	**21**	**4**	**3**	**1**	**18 (5.13)**	**26**
Narayani River									
Sigrauli-Amaltari (South)	30.0	-	1	1	-	-	1	2 (1.1)	3
Sigrauli-Amaltari (North)	30.0	-	11	11	-	2	1	6 (2.4)	9
Amaltari-Baguban	20.0	-	3	3	-	-	1	4 (1.3)	5
Baguban-Tribeni	20.0	-	17	17	-	2	2	8 (3.5)	12
Total Narayani River	**100.0**	**-**	**32**	**32**	**-**	**4**	**5**	**20 (7.13)**	**29**
Grand Total	**150.0**	**-**	**53**	**53**	**4**	**7**	**6**	**38 (12.26)**	**55**

were counted in the Narayani River and 24 were counted in the Rapti River (a further 7 were indirectly counted in the Narayani River). One hatchling (Ratnpur, Narayani River) and one small juvenile (Charahara, Rapti River) were recorded in 2012, the result of natural recruitment.

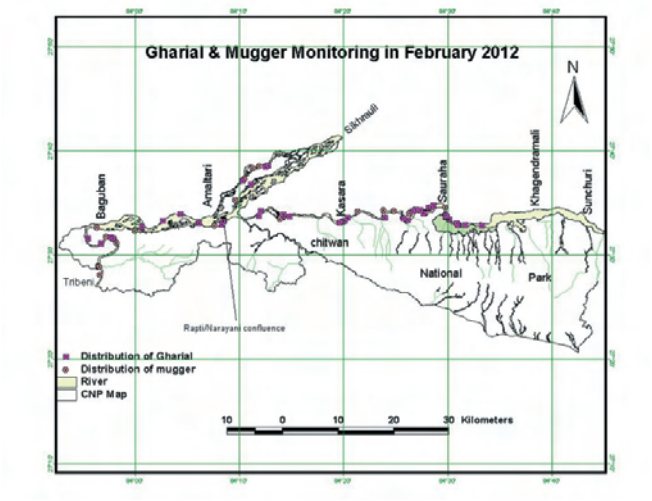

Figure 1. Locations of Gharial and Mugger sighted during survey.

Seven of the sightings in the Rapti River were from the group of 60 animals released in January-February 2012 (Khadka 2012), just prior to the survey was undertaken. One of these 7 juveniles was located 22 km downstream of the Kasara release site. None of the Gharial sighted in the Narayani River were identified as having been released 1-2 months earlier. Another animal sighted was one of 10 individuals released in April 2004 - it is clearly identifiable by its cracked lower jaw (see later).

On the basis of survey results it is not possible to assess the fate of released Gharial. Daytime surveys are more likely to detect larger individuals (eg basking), and individuals that are underwater or amongst vegetation may not be sighted. In addition, wariness may be a significant factor affecting sightability. One released Gharial regularly followed fishing boats and "stole" fish from nets, suggested that some of these captive-reared animals may not be as wary as their wild counterparts. That released animals have simply not managed to acclimate to life in the wild cannot be discounted, but given the close proximity of these surveys to the release of 100 Gharial, mortality is unlikely to be the reason for the lack of sightings in 2012. Spotlight surveys are considered the best option for obtaining more detailed data on population size and size structure.

Data obtained from the daytime surveys indicate that sub-adult and adult Gharial tend to maintain fixed areas for basking (and feeding?). One Gharial released into the Rapti River at Janakpurghat in April 2004 has been sighted since 2007 just in front of the Gharial monitoring center at Amaltari in the Narayani River, about 60 km downstream of the release site. Even with a cracked lower jaw, caused during captive rearing, the animal appears in good health and has survived.

Muggers

A total of 55 Muggers were observed; 4 hatchlings and 22 non-hatchlings in the Rapti River, and 29 non-hatchlings in the Narayani River (Table 2). Similar numbers (21 and 32 non-hatchlings for the Rapti and Narayani Rivers respectively) were sighted in November 2010 (Khadka 2011). The presence of hatchlings indicates some successful nesting, but overall the population appears to be stable. However, spotlight surveys would provide more detailed information on size structure, particularly for smaller individuals that are less likely to be sighted during the day.

Seasonal use of habitat by Gharials and Muggers

Although Gharial and Muggers were seen together in the rivers, they appear to have different site preferences. Gharial typically bask on sand, whereas Mugger mainly bask on mudflats or other muddy areas, and on logs (flooded trees) and rocks.

Muggers are mostly seen in lakes, pond and marshland during the winter season, but in the rainy season they appear to move to river/tributaries confluences and paddy fields, and village fish ponds also. Gharials also use small tributaries during the rainy season, away from the flooded river mainstreams. At this time fish are also diverting into small tributaries, for breeding.

Acknowledgements

I would like to thank Charlie Manolis for his valuable comments on this paper, and Jhamak Bahadur Karki, Chief Warden of Chitwan National Park and all of my assistants who helped me during the survey.

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East and Southeast Asia

Malaysia

STATUS OF SALTWATER CROCODILE POPULATION IN THE KAWANG RIVER, SABAH. CT. Kawang River is one of the remaining habitats for *Crocodylus porosus* on the west coast of Sabah, Malaysia. In this study, we aimed to quantify the current abundance of the species and identify potential human-crocodile conflict (HCC) issues in the Kawang River area.

Three spotlight surveys were carried out in 4.4 km of the mainstream of the Kawang River (Fig. 1), between October 2010 and February 2011. All routes and crocodile sightings were recorded using a Global Positioning System (GPS) device with mapping software. Crocodile were classified into defined size classes (adapted from Bayliss 1987): <0.5 (hatchlings), 0.5≤1.0, 1.1≤1.5, 1.6≤2.0, 2.1≤3.0, >3.0 m or EO (Eyes Only).

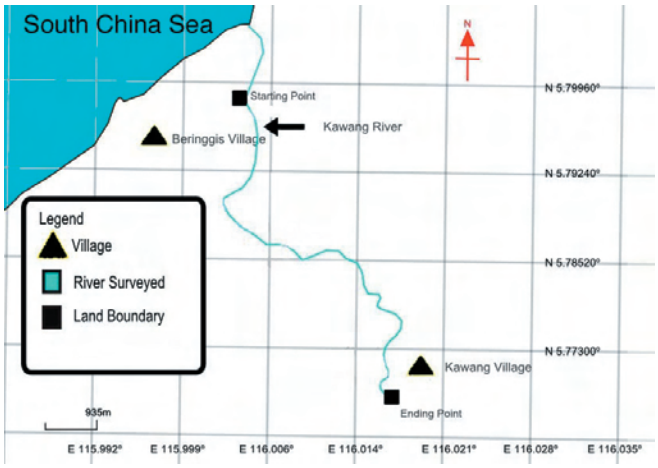

Figure 1. Survey route in the Kawang River.

For the purposes of analysis, eyes only were assumed to be wary non-hatchlings (Bayliss 1987). Absolute abundance of non-hatchlings was estimated from relative abundance using a correction factor of 1.6 (ie assuming that 62.5% of crocodiles were sighted; Webb *et al*. 1983). As numbers of hatchlings can vary greatly from year to year, and mortality is usually very high, these were excluded from analyses.

Structured interviews with 18 local people living near the river (Kawang and Beringgis villages) were used to obtain information on the historical abundance of *C. porosus* and to assess HCC issues. The DAFOR Scale was used to record the sighting per unit effort (number of sightings/year) of the interviewees based on crocodile sightings in the past 5 years (2005-2010); Dominant >20, Abundant 10.1≤20, Frequent 4.1≥10, Occasional 2.1≥4, Rare 1≥2, Absent 0 sightings per unit effort.

Sightings during spotlight surveys varied between 8 and 20 crocodiles and 5 and 10 non-hatchlinsg (Table 1). Mean non-hatchling density was 1.59 NH/km (range 1.14 to 2.27; SD= 0.06; N= 3).

Table 1. Results of spotlight surveys in the Kawang River. EO= eyes only.

Survey Date	--- Total Length Size Class (m) ---				EO	Total
	<0.5	0.5-1.0	1.1-1.6	1.6-2.0		
23 Oct 2010	2	4	-	-	2	8
4 Dec 2010	3	3	1	1	-	8
26 Feb 2011	10	3	2	-	5	20
Means	5.0	3.3	1.0	0.3	2.3	12.0

Norazmi (2008) reported an average density of 0.93 NH/km (range 0.0 to 1.80; SD= 0.90; N= 3) in the 5 km of river surveyed (November 2007 to February 2008). Most of the crocodiles sighted were 0.5-1.0 m size class. Notwithstanding the slightly longer distances surveyed by Norazmi (2008), and differences in timing of surveys, the mean densities (0.93 and 1.59 NH/km in 2007/08 and 2010/11 respectively) suggest that the non-hatchling population has increased by 71.0% in the intervening 3-year period - a mean rate of increase of 19.5% per annum. On the basis of the surveys with the maximum numbers of non-hatchlings sighted, the apparent population increase is lower, at 26.3% (a mean rate of increase of 8.1% p.a.).

The non-hatchling population of *C. porosus* in the survey section of the Kawang River is conservatively estimated as 11 individuals (mean of 7NH/survey x 1.6), and the size structure is strongly biased towards juveniles. Although no animals greater than 2 m in length were recorded, adults could have been represented in the Eyes Only portion. Although the presence of hatchlings (Table 1) sugegsts the presence of at least some adults, it is not known whether adults contributing to recruitment (hatchlings) are resident in the area or whether they move in from elsewhere.

Of the 18 interviewees, 15 (83%) had seen *C. porosus* in the Kawang River over the last 5 years. Most sightings were of hatchlings (<0.5 m; N= 10), followed by >3.0 m (N= 8) and 0.5≤1.0 m (N= 7) long individuals. Large crocodiles (adults) were sometimes sighted during the early dawn, basking along the river banks. Most of the interviewees (67%) stated that there were more crocodiles now relative to the past, which supported the results of spotlight surveys. Two interviewees thought that crocodile numbers were decreasing and two considered crocodile numbers to have remained the same. Only one interviewee was unsure about the crocodile population structure.
Based on the DAFOR scale, sightings by 8 of the 15 interviewees who had sighted crocodiles in the Kawang River were categorized as Frequent, Abundant or Dominant (5-20 sightings per year). The sightings of the remaining 7 interviewees were categorised as Rare (1-2 sightings per year).

Interviewees did not consider HCC to be a significant issue in the Kawang River area. Only 5 of 15 interviewees have seen or heard about HCC issues, and these involve crocodiles at times going into a small creek near Beringgis Village to prey on livestock (eg goats, chickens) that strayed onto the river banks. Although this potentially dangerous situation still exists, no action has yet been taken to address it. Personal observations suggest that inadequate management of livestock is contributing to the situation.

No crocodile attacks on humans have been reported in the area. The close proximity of current human settlements to crocodile habitats (eg some houses in Kawang Village are a few metres from the water's edge), and further encroachment into those habitats, could result in HCC in the future, particularly if the crocodile population increases in size and changes size structure towards larger animals. Lamarque *et al*. (2009) claimed that conflict between crocodiles and local communities escalates because of loss of habitat and subsequent reduction and fragmentation in crocodile distribution, leading to increasing contact between human and crocodiles.

In the Chiawa Game Management Area of Zambia, the majority of households had a bore closer than the river, yet many people still utilized river water. This was because the bore was broken or it is quicker to perform daily activities near the river, and avoiding the queing system at the bore (Wallace 2010). Villagers around the Kawang River do not have this problem, as tap water is available for each household. In general, people are not dependant on river water for daily chores.

When the interviewees were asked whether they keep a distance when they see a crocodile, 9 answered "no" and one even showed evidence that he caught crocodiles using his bare hands. In addition, only 9 of the 15 interviewees were aware that *C. porosus* is a protected species in Sabah. This highlighted the fact that awareness of the local people towards HCC was low. With poor livestock management (see above) and human encroachment into crocodile habitats, the potential for HCC in the future, and possibly serious attacks, could increase. Improving public education on crocodiles is considered an important element for not only maintaining maintaining public safety but ensuring the long-term conservation of *C. porosus*.

Acknowledgements

All field trips were funded by the Borneo Marine Research Institute (BMRI). The authors would also like to thank Charlie Manolis for his valuable comments on this paper and all the assistants who helped them during the surveys.

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Myanmar

ESTUARINE CROCODILES IN SOUTHERN MYANMAR. Estuarine crocodiles (*Crocodylus porosus*) have long been reported from the coastal mangrove swamps of Mon State and Tanintharyi Division in southern Myanmar. Mason (1860) considered crocodiles to be abundant in the tidal streams of Tanintharyi and noted frequent attacks on humans. Likewise, Theobald (1868a,b) commented on the abundance of crocodiles in the same region and claimed large individuals would even assail passing boats. Peacock (1933) described *C. porosus* as being "especially common" in coastal Tanintharyi. According to Theobald (1868b), *C. porosus* were often observed at the mouth of the Salween River in Mon State. Elsewhere in Mon State, crocodiles were said to remain common in coastal rivers as late as the 1960s (Myint Swe 1964).

Unregulated skin hunting began in Myanmar during the 1950s resulting in widespread declines of crocodile populations throughout the country (Thorbjarnarson *et al*. 2006). Thorbjarnarson *et al*. (2000) found a potentially viable population of *C. porosus* in the Ayeyarwady Delta, although a subsequent review concluded that current information on crocodiles was lacking from most other regions of the country (Thorbjarnarson *et al*. 2006). Because government authorities refused to issue permits for researchers to visit Tanintharyi owing to a tenuous security situation, the conservation status of *C. porosus* in the region was considered particularly ambiguous (Thorbjarnarson *et al*. 2006). Nevertheless, a few scattered reports indicated small numbers of *C. porosus* continued to survive in coastal Tanintharyi, but remained subject to illegal exploitation (Thorbjarnarson *et al*. 2006). Moreover, a ready market for illegally harvested skins was thought to exist in neighboring Thailand (Thorbjarnarson *et al*. 2006).

During a recent (May 2012) survey of critically endangered mangrove terrapins (*Batagur affinis*) in Tanintharyi Division (Platt *et al*. 2012), we visited a number of villages and took the opportunity to query the inhabitants regarding the local occurrence of crocodiles, and knowledge of crocodilian natural history, ethnozoology, and illegal exploitation. We used a combination of open-ended interviews, in which each informant was asked a series of questions that included standard questions prepared in advance and others that arose during the course of conversation (Martin 1995), and semi-directed interviews where questions were asked and discussed more informally (Gilchrist *et al*. 2005). Our past experience in Myanmar has demonstrated the value of these methods in making rapid biological assessments, particularly of wildlife that are commercially or culturally valuable, or in the case of crocodiles, perceived as a threat to human well-being (eg Platt *et al*. 2001, 2004). Transcripts of our interviews are contained in field notes that will be deposited in the Vertebrate Collection of the Campbell Museum (Clemson University, Clemson, South Carolina, USA).

According to villagers interviewed, crocodiles were once common in the Tanintharyi River, but numbers have steadily declined over the years. Currently only "one or two" crocodiles are said to be encountered every year, suggesting populations are greatly reduced. In the past, villagers rarely entered the water to fish, bathe, or wash clothes because of the potential danger of crocodile attack. Now however, villagers routinely enter the water with little thought given to crocodiles. Crocodile nesting apparently no longer occurs along the main channel of the Tanintharyi River, although a few crocodiles are said to construct nests on small tributary creeks where boat access is difficult. Crocodile nests are described as large mounds of vegetation often constructed in thickets of giant ferns (*Acrostichum aureum*) and "prickly" shrubs (*Acanthus ilicifolius*?). Similar habitat is used by nesting *C. porosus* in coastal Rakhine State (Platt 2000) and on islands in the Ayeyarwady Delta (Thorbjarnarson *et al*. 2006).

Crocodiles also reportedly occur throughout much of the Mergui Archipelago, and frequently move between islands. We received, but were unable to verify several second-hand accounts of recent crocodile attacks in the archipelago that resulted in at least one fatality. Crocodiles, including some very large individuals were said to inhabit the Lenya River, and several informants maintained that crocodiles are commonly observed in the Hnine River north of Boatpyin, an area under the control of anti-government insurgents. Non-combatants rarely venture into these "war zones" (sensu Martin and Szuter 1999) owing to safety concerns. Consequently, exploitation of wildlife is minimal in contested areas, which can function as de facto nature reserves harboring globally significant populations of endangered species (Kuchling *et al*. 2006; Platt *et al*. 2008).

Population declines of crocodiles in most areas of coastal Tanintharyi are undoubtedly due to chronic illegal killing for skins and to destroy animals thought to pose a danger to villagers. Owing to their rarity, few if any people deliberately seek out crocodiles anymore and most are probably killed when opportunistically encountered. In the past, crocodile hunting was a major livelihood in the region. Crocodiles were hunted from boats using harpoons rigged to long lines; after being harpooned the crocodile was followed until becoming exhausted and then dispatched with an axe-blow to the head. Crocodile skins were smuggled across the border and sold in Thailand, and our interviews suggest this trade continues, albeit at much-reduced levels. A ready market apparently exists for illegally harvested crocodile skins and body parts in Thailand.

Villagers reported a variety of local uses for crocodile body parts. Crocodile meat is consumed as food whenever available, and larger teeth are removed and used as extensions for pipe stems. Crocodile gall bladder is highly valued for its purported medicinal value; although this organ can be sold in Thailand, villagers instead use it to treat various ailments, including epileptic seizures among children and unspecified testicular disorders in adult males. To treat the latter condition, the scrotum is pricked repeatedly with an old-fashioned ink pen or copper tattoo needle dipped into a paste made from crocodile gall bladder.

Acknowledgments

Our work in Myanmar was made possible by the Minister of the Ministry of Environmental Conservation and Forestry, Director General and Deputy Director General of the Planning and Statistics Department of the Ministry of Environmental Conservation and Forestry, Director General and Deputy Director General of the Forest Department and the Director of NWDC. We thank Assistant Director U Min Htut (Kaw Thaung Town), Assistant Director U Soe Khaing (Myeik Town), Liaison Officer/Staff Officer U Myo Min Naing (Kaw Thaung Town), Staff Officer U Thet Wai (Tanintharyi Town), and all other participating Forest Department staff for their invaluable assistance. This project was made possible through the generous support of Andy Sabin and the Sabin Family Foundation, Turtle Conservation Fund, and Wildlife Conservation Society. U Than Myint, U Saw Htun, Colin

Poole, and Rick Hudson were instrumental in insuring the success of our fieldwork.

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Philippines

PHILIPPINE CROCODILE ATTACKS ON HUMANS IN THE NORTHERN SIERRA MADRE. Over the past 10 years the Mabuwaya Foundation has worked with local governments and rural communities to preserve the critically endangered Philippine crocodile (*Crocodylus mindorensis*) in the wild on Luzon (van Weerd and van der Ploeg 2012). Most people living in Philippine crocodile habitat now know that crocodiles are protected by law and support the conservation of the species in the wild (van der Ploeg *et al*. 2011a). But two recent crocodile attacks on people have eroded public and political support for the conservation of the Philippine crocodile.

Incidents

On 19 February 2010, a Philippine crocodile attacked a pregnant woman in Dinang Creek in barangay Cadsalan, a remote village in the Municipality of San Mariano, Isabela Province. At around 1300 h, Glenda Arribay went to the creek to take a bath. When she squatted on an overhanging tree to scoop water, a large crocodile seized her lower right leg. As she fell in the water, the crocodile released her. Screaming for help, she swam back to the tree and pulled herself up. The crocodile however bit her again in the same leg. She kicked the crocodile several times on its head with her left leg while clinging to the roots of the tree. The crocodile released her and disappeared underwater. She pulled herself out of the water and called for help. Her husband, who was working on a nearby field, heard her cries and rushed to the scene. Glenda

had severe wounds on her leg. Villagers gave emergency aid and antibiotics, and then brought her to the hospital in San Mariano town. She was hospitalized for 7 days. Her wounds healed well, and four months later she gave birth to a healthy son. Glenda herself thinks the attack is a case of mistaken identity. At the time of the attack her dog accompanied her to the creek, and sat next to her on the overhanging tree. She thinks that the crocodile attack was directed at the dog and that she was bitten by mistake. Dogs are regularly taken by Philippine crocodiles.

On 27 August 2010, at around 1200 h, Mario Jose was attacked by a Philippine crocodile along the Catalangan River in barangay Dibuluan, San Mariano. The specific conditions of the attack remain obscure. According to several people, Mario was setting his fish nets in an oxbow lake when saw a crocodile. He tried to scare the animal away by throwing stones. But instead of fleeing, the crocodile attacked him. Other people claim he was electro-fishing, and that he was bitten when he stunned the crocodile. In any case, the crocodile bit him twice in his right leg and then disappeared underwater. People heard Mario's calls for help and carried him back to his house. He had several deep punctures is his calf, and was brought to the hospital in San Mariano. His wounds healed well and after 14 days Mario returned home.

Reactions

People's responses to these crocodile attacks ranged from pragmatism to hysteria. During a television interview Glenda mentioned that the crocodiles in Dinang Creek generally do not pose a threat to humans: 'we are used to swim with crocodiles' (Fig. 1). Other people in Cadsalan also react remarkably rational to crocodile attacks. Most people in the village are Kalinga, who believe that crocodiles are the embodiment of the ancestors (van der Ploeg *et al*. 2011b). These indigenous people see crocodile attacks on humans as the result of human misbehavior. Some villagers actually blamed Glenda Arribay for the attack, and question why she was taking a bath alone in an area where everybody knows that there are large crocodiles. Also in Dibuluan, people thought that it was Mario Jose's own fault (Fig. 2). Throwing stones to a crocodile is seen as an unwise provocation: 'as long as you respect crocodiles, the crocodiles will not harm you.' Of course, people in these remote villages are concerned about the threat posed by crocodiles, particularly to children. But people know from their own experience that the chance of being bitten by a crocodile is very small, and that simple precautionary measures can minimize the risk.

Outsiders however tend to be much less sensible. The attack on Glenda Arribay was widely publicized in the national media. Some of these reports were fairly accurate and balanced. Others misrepresented and sensationalized the story. 'Croc devours preggy Ilocana' read a headline on Pinoy Ako Online, a Philippine news website. ABS-CBN produced a 'docudrama' of the attack in Dinang Creek entitled 'I survived' that reinforced all existing stereotypes of crocodiles (see: http://www.pinoytvi.cc//pinoy/channel/watch/170520/I-SURVIVED-NOV-11-2010-PART-1-4.html).

Figure 1. Edward and Glenda Arribay in the hospital in San Mariano during a television interview (Source: http://www.abs-cbnnews.com/nation/regions/02/23/10/pregnant-woman-escapes-croc-attack).

Figure 2. Mario Jose recovers from a Philippine crocodile bite. Photograph: F. Koopmans.

Journalists often implicitly held the Mabuwaya Foundation responsible for the attacks. GMA7, the largest television network in the Philippines, for example reported that the attack on Glenda Arribay occurred near the 'crocodile breeding farm of the Mabuwaya Foundation', implying that the crocodile escaped from captivity. The foundation indeed raises juvenile Philippine crocodiles in captivity in San Mariano town (approximately 25 km from Dinang Creek); but no crocodiles have escaped from the rearing station nor were any released in or near Dinang Creek. Other newspapers linked the attack in Cadsalan to the release of 50 captive-bred

Philippine crocodiles in Dicatian Lake in the municipality of Divilacan, on the other side of the Sierra Madre mountain range (GMANews 2010a). The underlying question in many of these reports is why these dangerous animals are being protected.

Reactions of the general public are characterized by incomprehension and ignorance. People's remarks on various websites exemplify this: 'How could a normal person swum in a creek with tons of crocs? I can't believe it! So stupid. Might the croc is hungry!!![sic]' (ABS-CBN 2010). People in the urban centers often have little knowledge of the conservation status of the Philippine crocodile or of the living conditions in the remote rural areas. For many people the idea of living with a potentially dangerous predator is inconceivable.

Policymakers also expressed their alarm about the crocodile attacks. Concerned about the safety of the public, the local government unit of San Mariano temporarily suspended the release of captive-raised Philippine crocodiles to the wild. The Vice-Governor of Isabela remarked that people could kill crocodiles if they posed a threat to humans, although he later retracted his comment (GMANews 2010b). At the national level, policymakers often do not differentiate between the Philippine crocodile and the saltwater crocodile (*C. porosus*). The Secretary of the Department of Environment and Natural Resources for example recently mentioned that there is 'no place for crocodiles in the Philippines' because 'the reptiles could attack locals in surrounding areas' (AFP 2011).

Prevention

It is in fact remarkable that there are so few crocodile attacks on humans in the Sierra Madre. People intensively use the creeks and rivers where Philippine crocodiles occur: men regularly fish at night with spears; women spend much time on the edge of the water washing clothes or fetching water; and children often play in or near the water. The only other Philippine crocodile attack of which we are aware occurred in July 2000, also in Dinang Creek. The time of the year, the location and the behavior of the animal suggest that the crocodile attacked to defend its nest.

However the incidence of crocodile attacks on humans is likely to increase as the crocodile population is recovering and human populations are also rapidly growing (cf. Caldicott *et al*. 2005). It is therefore essential to try to identify interventions that effectively prevent crocodile attacks on humans. This is particularly important as basic healthcare facilities are lacking in this remote rural area, and people generally do not have medical insurance and often lack the money to pay for medicines.

Improving people's awareness of the risks posed by crocodiles, for example by placing signposts advising against entering the water, is generally seen as a necessary precautionary measure (Gruen 2009). After the attack in Cadsalan students of Isabela State University designed a poster with several practical suggestions how to minimize human-crocodile conflicts (Fig. 3). Two thousand copies were distributed among people living in Philippine crocodile habitat in the northern Sierra Madre. The poster fosters traditional values such as respect for crocodiles. The Mabuwaya Foundation also places billboards along crocodile sanctuaries to inform people on the presence of the species.

Figure 3. Poster designed by students of Isabela State University.

Crocodile attacks can also be prevented by providing safe access to water (Wallace *et al*. 2011). During a community consultation in Cadsalan in March 2010 villagers suggested to construct several wells in the village in order to minimize human-crocodile interactions. Four pump wells were subsequently constructed in Cadsalan (van Weerd *et al*. 2011). These wells now provide a source of safe drinking water for the community, but have not reduced human activities in the creek: children still play in the water and women continue to do the laundry. So-called 'crocodile-proof fences' have proved an effective method to reduce human-crocodile conflicts in Southern Africa (Aust *et al*. 2009). Constructing protective barriers in which people can bath safely could be a possible precautionary measure in the northern Sierra Madre. But fencing all crocodile sanctuaries, as people sometimes suggest during community consultations, is obviously not feasible from an economic, social and ecological point of view.

Participatory land-use planning is regarded as long-term solution for human-crocodile conflicts (Dunham *et al*. 2010). The Mabuwaya Foundation supported barangay councils in the design and implementation of legislation protecting crocodiles and freshwater habitat. In Cadsalan for example the barangay council declared Dinang Creek a Philippine crocodile sanctuary, and prohibited the cultivation of the riverbank. The idea is that such a buffer-zone will protect basking and breeding sites, ensure prey availability, minimize erosion and prevent human-crocodile conflicts. To restore the natural vegetation along the creek, villagers planted 1455 trees. In addition 4597 fruit-tree seedlings were provided to affected farmers to compensate for the loss of land and stimulate a transition towards sustainable land use (van Weerd *et al*. 2011). The results so far are not encouraging: most seedlings have died, and several farmers continue to

cultivate the 5 m buffer-zone. Villagers generally do not think buffer zones are a viable solution to prevent human-crocodile conflict, as it will take several years before such a natural buffer zone is in place.

The relocation of problem-crocodiles is generally regarded as a last resort to prevent attacks on humans, but there are doubts about its effectiveness (Walsh and Whitehead 1993). A serious concern is that problem-animals often end up in captivity thereby depleting the population in the wild. In March 2009 for example the local government unit and the Mabuwaya Foundation captured a Philippine crocodile in barangay Paninan that repeatedly approached humans. It was subsequently released in the Disulap River crocodile sanctuary. However in August 2010 the foundation had to recapture the animal after it repeatedly attacked livestock. The adult male crocodile is now held in captivity. Moreover, people often do not want the removal of crocodiles. In Cadsalan people objected to catching the problem crocodile that attacked Glenda Arribay. This refusal reflects traditional beliefs towards crocodile-ancestors, as well as an opportunistic assessment of the possibility of receiving developmental support.

Conclusion

These precautionary measures can however never wholly assure human safety. Efforts to communicate the risks posed by crocodiles will not guarantee the safety of children. Along similar lines, the proclamation of freshwater protected areas, the restoration of buffer zones or the provision of safe water points will not prevent an occasional crocodile attack. The preservation of a large and potentially dangerous predator in a human-dominated landscape always entails a certain degree of risk. Paradoxically, people living in Philippine crocodile habitat seem more willing to accept this harsh reality than most outsiders.

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Europe

Czech Republic

FIRST GHARIAL EGGS FOR EUROPE. Miroslav Prochazka, Director of Krokodyli Zoo in Protivin, a non-EAZA institution, has reported the successful egg-laying of Gharial (*Gavialis gangeticus*) for the first time in Europe! Twelve (12) eggs were laid on 28 March 2012, 8 of which were damaged/destroyed during egg-laying. Three more eggs were laid the following night. Of the 7 eggs available for incubation, opaque banding was clearly visible on 3 of them 3 days after laying, indicating fertility.

The adult Gharial were imported in October 2011 from Madras Crocodile Bank, along with several subadults. The timing of egg-laying relative to the date indicates that egg devlopment and mating most likely occurred after the Gharial arrived at the zoo. Congratulations to Protivin and good luck for successful incubation.

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United Kingdom

RUDYARD KIPLING INSPIRES NAMING OF PREHISTORIC CROCODILE. A new species of prehistoric crocodile has been named after writer Rudyard Kipling (1865-1936). The 130-million-year-old specimen, called *Goniopholis kiplingi*, was discovered in Swanage, Dorset, by the Jurassic Coast World Heritage Site team in 2009. It was named after The Jungle Book author in recognition for his enthusiasm for natural sciences. The specimen is presently on display at Dorset County Museum.

Source: BBC News (http://www.bbc.co.uk/news/uk-england-dorset-17446330).

Science

Recent Publications

Webb, G., Brien, M., Manolis, C. and Medrano-Bitar, S. (2012). Predicting total lengths of Spectacled caiman (*Caiman crocodilus*) from skin measurements: a tool for managing the skin trade. Herpetological Conservation and Biology 7(1):16-26.

Abstract: Colombia uses a closed-cycle captive breeding program for producing *Caiman crocodilus* (mostly *C. c. fuscus*) skins for export. Skin size limits are used as a regulatory measure to exclude illegal wild-caught adults entering legal trade. However, the size limits employed were not well defined by morphological endpoints, and the degree of shrinkage between raw and processed skins was not well grounded in science. Thus, trimming and cutting of skins to meet market demand makes compliance with the limits problematic. We examined the relationship between *C. crocodilus* total length (TL) in freshly culled animals and the size of whole skins and skin pieces at different stages of preservation and tanning (raw wet-salted, wet blue, crust, and finished leather) in 276 farm-raised *C. crocodilus* (423-2210 mm TL). We present formulae for accurately predicting the TL of Caimans from which whole skins or skin pieces originated. To account for tail tip amputations, we used standardized total length (TLST). The results provide resource agencies in Colombia better tools for establishing meaningful size limits, and provide the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) with a better mechanism for assisting Colombia with compliance. This approach may have application to the regulation of other species of reptile in trade, where size limits are part of the regulatory procedures.

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Gramentz, D. (2012). Zum Schreckruf von *Gavialis gangeticus* (Gmelin, 1789). Sauria, Berlin 34(1): 21-26.

Abstract: The distress calls of juvenile *Gavialis gangeticus* and were analysed as to call length, frequency, call structure and sound pressure level. The results are presented in oscillograms, audiospectrograms and three-dimensional images.

Submitted Papers

ADANSON'S TAXONOMY MAKES SENSE NOW. There are three genera of living crocodilians in the Green Cape (Cap Vert) region of northwestern Africa, as exemplified by the Senegal and Gambia Rivers and their environs. There is the

Senegal longirostrine *Mecistops*, the Senegal mesorostrine *Crocodylus*, and the Senegal brevirostrine *Osteolaemus*. The true identity of Adanson's so-called black longirostrine is a combination of *Osteolaemus* (black) and *Mecistops* (longirostrine). The black longirostrine was a mistake in Adanson (1757, 1759), which dealt with only two kinds, but should have detailed three. His first kind would later, in Adanson (1775), get the name Adanson's Green, but in 1757 (French), and in 1759 (English translation) this kind #1 was merely the ordinary (similar to the crocodile of Egypt and the Nile) species, which is clearly *Crocodylus*. This animal sunbathes (basks) in groups on riverbanks, shares the rivers with the large hippopotamus, and deposits its eggs in a hole that the female digs into the ground. Most of Adanson's (1757, 1759) anecdotes about Green Cape crocodilians concern the *Crocodylus*. It was numerous (he estimated seeing the heads of 200 on one occasion in the Senegal River), and dangerous (as were the hippos), and the taste of its cooked meat was not unpleasant.

In Adanson (1757, 1759) the primary crocodilian was *Crocodylus* (the Green kind, called "diasik" or "diasic" by the locals), and there was inserted a short and peripheral note about the other (of the two in 1757, 1759) kind as being black in color and more longirostrine than the Green. Later, Adanson (1775) listed a plate of unpublished pictures of "le Maïmaï, ou crocodile noir" and a plate of "le Diasik, ou crocodile vert" (also unpublished). Because of the unfortunate circumstance that the Diasik and Maïmaï pictures were then (and still are) unpublished, the taxon that Adanson (1775) called his Black crocodile has (with a few mostly speculative exceptions) been for a long time generally assumed to be a shortening of the earlier Adanson's black longirostrine. However, we have recently seen the unpublished pictures, and Adanson's (1775) Maïmaï or Black crocodile is definitely not the longirostrine (long snouted) genus *Mecistops*. Rather, it is clearly the brevirostrine (short snouted) *Osteolaemus*.

Characters supporting our identification of Adanson's (1775, 1845) Maïmaï as the African dwarf crocodile include its mandibular symphysis (viewed from below) being approximately as short as in the Diasik, and thus totally wrong for *Mecistops*. The dorsal view shape of the head is less longirostrine than in Adanson's Green, and thus again it is much too brevirostrine for *Mecistops*. Its postoccipital scales are too large and numerous to possibly be *Mecistops*. Its nuchals have two scales in each transverse row, and thus are wrong for *Crocodylus*, which should have four scutes in its anterior row of nuchals. Diagnostically, the Maïmaï pictures show a very commonly reported number of double-crested caudal rows (11) for *Osteolaemus*. This DCC result is significantly too small for any other African crocodilian. Additionally, the stocky build of the creature is less streamlined and elongate in its overall proportions than the more aquatic *Mecistops* and *Crocodylus*. The tail of Adanson's Black (but not longirostrine) Maïmaï is proportionally shorter than on his Green. The Maïmaï or Black Crocodile was shown comfortably high-walking on raised dry land, and being killed in a terrestrial situation in a face to face encounter with a man shoving a spear through its open mouth and straight down its throat. Another man was holding the tip of its outstretched and remarkably short tail.

In Adanson (1775), which was numbers and words only, he listed pictures of two (*Osteolaemus* and *Crocodylus*) of the three kinds of Senegal crocodilians, but his kind #3 (*Mecistops*) was not listed as having been illustrated. There was no need to mention his third kind in Adanson (1775), because this publication was not a list of all of the crocodilian taxa, but rather a list of the two plates of pictures that he was planning to publish.

We today strongly suspect that Michel Adanson neither captured nor closely examined the third kind (*Mecistops*), but he had heard about its existence from Senegalese locals. In his earlier work, Adanson (1757, 1759) had discussed the Diasik (today's *Crocodylus*) at length, and had mentioned the so-called black longirostrine (a mistake), but later in Adanson (1775) his Maïmaï (the Black Crocodile) was only said to be black, without any mention of its being longirostrine. Thus, because of the absence of the Diasik and Maïmaï plates getting published (which would have demonstrated the truth), authors like Lacépède in 1788, Gmelin in 1789, and Latreille in 1801 were all accidentally fooled by something that appeared to be obvious, namely that Adanson's (1775) "le Maïmaï, ou crocodile noir" was the same thing as the earlier black longirostrine from Adanson (1757, 1759). However, what had appeared to be obvious was in fact not true. In *Gavialis gangeticus* (Gmelin, 1789), the Senegal in the old type-locality Senegal (sic) and Ganges is the Adanson (1757, 1759) black longirostrine error. Separately, *Crocodilus niger* Latreille, 1801, was a scientific name for Lacépède's earlier Black Crocodile of Senegal based on the Adanson (1757, 1759) black longirostrine. In all three cases, the longirostrine part was important. However, both Lacépède and Latreille named their taxon as black, and we note that these two authors explicitly classified their Adanson's Black as a kind of crocodile, as opposed to a kind of gharial.

None the less, Lacépède in 1788, Gmelin in 1789, and Latreille in 1801, were all thinking at the time that Adanson's Black was more longirostrine than Adanson's Green. Later, in 1807, in the type-description of *Crocodilus suchus* Geoffroy-Saint-Hilaire, it was again asserted that Adanson's Black was more longirostrine than Adanson's Green. It was not until Adanson (1845) was published by his nephew (A. Adanson), after Michel Adanson died, that the inadvertent flaw in the thinking of Gmelin, Lacépède, Latreille and Geoffroy-Saint-Hilaire was exposed. Each of these four authors thought that they knew something, but had been misled by an incomplete and misleadingly worded set of data.

In addition to the Diasik (kind #1 in 1757, 1759, 1775), and in addition to the Maïmaï (wrongly called longer snouted than the Diasik in 1757 and 1759, and correctly but confusingly called "le Maïmaï, ou crocodile noir" in 1775), there was a third kind. He didn't say what color it was, but Adanson's (1845) kind #3 has a head shape and snout that is clearly more longirostrine (the jaws are less dorso-ventrally flattened) than Adanson's (1845) kinds #1 and #2. In Adanson's posthumous (1845) schema his kind #3 was classified (by its 1845 name and distribution only) as a gharial, and significantly its

snout was said to approach an oval in cross-section. The two aforementioned unpublished plates of pictures, and two additional pages (one Crocodile Noir, and one Crocodile Vert) of earlier and annotated sketches that we have seen, all identify the Adanson (1775) "le Diasik, ou crocodile vert" as Crocodylus, and "le Maïmaï, ou crocodile noir" as *Osteolaemus*. These are the two kinds that he examined closely and illustrated. There was no picture of *Mecistops* in 1775, so the very old (1757, 1759) longirostrine error in Adanson's Black was not contradicted in Adanson's publications until posthumously in 1845.

In summary, #1 in Adanson (1757, 1759, 1775, 1845) is Crocodylus; and #3 in Adanson (1845) is Mecistops; and #2 in Adanson (1775, 1845) is *Osteolaemus*; but the so-called black longirostrine in Adanson (1757, 1759) is fiction. There is no Senegal content in *Gavialis* today. Similarly, even though *Mecistops* has vernacularly been called a false-gavial, it has never been alleged that there is any Senegal content in *Tomistoma*. Further, Lacépède's Senegal Black Crocodile and its later binomen *Crocodilus niger* Latreille, 1801, although not itself confused with the gharial of Asia, was nonetheless a case of obvious confusion involving the Adanson's blacklongirostrine error that was printed the year before 1758, and was thus exciting (but alas flawed, and thus not yet understood) news during the first 50 and highly influential years of modern zoological nomenclature.

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THE MOST CROCODILE OF CROCODILES. Before it became the name of the CSG's well-known animal, the word crocodile (krokodeilos) already existed in ancient Greece, where it was applied to an agamid lizard that eats yellow flowers and never willingly enters or even approaches proper bodies of water. It does not drink water in the ordinary sense, and could be said to actually fear rain, and to stay well away from the margins or edges of rivers, streams, puddles, ponds and lakes. These extremely desert adapted lizards do not ordinarily swim, but when caught in a flash flood they puff themselves full of air, go perfectly stiff, and buoyantly float on the surface of the current until eventually snagged and deposited on dry land.

The lizard in question is common in southwestern Anatolia (today Turkey), and long ago there was a colony of Greeks called the Ionians who lived there. It was these adventurous Ionians who explored the eastern shore of the Mediterranean Sea as far as Egypt. They were the first Europeans to see a crocodile, in this case meaning the carnivorous reptile that loves the water and attacks those who drink at its margins. Thus, in the Ionian language, there were two krokodeilos reptiles, one familiar at home in Anatolia on land (small and harmless as an adult terrestrial lizard), and an additional one of the water (large and dangerous, and restricted to rivers in Egypt).

The Anatolian land crocodile has a flat topped and posteriorly broadened head, an elongate and somewhat dorsally flattened body with four short legs of approximately equal length, and has its tail covered with pointed scales on the upper surface. The same is true about the Egyptian water crocodile. The two kinds differ significantly in adult size, and also in diet. One eats flowers, while in contrast the other kills cattle and humans. The agamid's short and sharply studded tail is defensive, and is employed as an armored door to protect the lizard when it hides, head first, between rocks.

In contrast, the water crocodile's tail is long, and the vertical

keels of the single-crested caudal scales function when the animal is swimming. The resemblance between the Anatolian land crocodile and the Egyptian water crocodile is merely that, when viewed from a really far distance away, the sunbathing carnivorous water animal on rocks or sand looks a little like the terrestrial and herbivorous lizard when seen from much closer. Although etymologically helpful to us today, it was pure laziness that the ancient Ionian Greeks did not invent a new word for *Crocodylus niloticus*, but rather that they awarded it an already existing animal name. However, because the land krokodeilos of Anatolia has been found to also live in Egypt, the distinction between Anatolian crocodiles (krokodeilos) versus Egyptian crocodiles (krokodeilos) is not today sufficient. It is necessary to refer to the former as land crocodiles, and the latter as water crocodiles. Because the Ionians did not call the CSG's Nile River animal by an Egyptian name, we strongly believe that the water krokodeilos of Egypt was seen only wild and basking, as opposed to viewed in close proximity at an enclosure. Therefore, regardless of how far upriver the Ionian explorers sailed on the Nile, we are sure that the original crocodile was not the smaller and more polite and relatively harmless second species of *Crocodylus* (the DNA supported species *C. suchus* of some very modern authors) in Egypt, which is presumably restricted in the wild to isolated situations deep in the desert, and according to the new DNA cryptic "western clade" species model, also exhibited captive (and mummified in large numbers) at ancient Thebes.

Of the two kinds of Egyptian and Sudanese crocodiles, the krokodeilos was, and still is, the large and conspicuous one that inhabits the navigable Nile. It is the crocodile in the story about belly to belly copulation, where the supine female is helpless and vulnerable on her back afterwards (until righted by her lover, she can be approached and killed), because of the explicit detail that the sailors killed her on a sandbar in the River Nile (Nilos). It thus logically follows that both she and her husband were krokodeilos (*Crocodylus niloticus*, as opposed to what is today being called *C. suchus*). Therefore, back in 1768 when Laurenti named a pair of *Paleosuchus trigonatus* pictures (male upright, female reclining on her back) that he thought were illustrating the famous belly to belly Nile River story as *Crocodylus niloticus*, it was his intention that the pair of Seba pictures were krokodeilos (definitely Egyptian wild *Crocodilus vulgaris* Cuvier, 1807; and certainly not exclusively *Crocodilus suchus* Geoffroy-Saint-Hilaire, 1807). So, if *Crocodylus suchus* is indeed a second and "cryptic" species of crocodile in northern Africa, then it is assumed and asserted by us that, because of its currently presumed absence in the flowing Nile, *C. suchus* was too cryptic to be the krokodeilos that the Ionian Greek explorers reported to their friends when they returned home to Anatolia. The original crocodile was not demure, but rather was dangerous.

Speculatively, we wonder if possibly the people who settled along the Nile River in Egypt brought "western clade" *Crocodylus* with them when they retreated from the increasing aridity and desert expansion that is today the Sahara. Were the captive Suchus in Egyptian temples from the old country (nations west of Egypt and Sudan)? We assert that the original Ionian Greeks who coined the modern word crocodile were not describing a captive examined up-close, but were rather reporting something wild and distant that they observed from the safety of their boats. If they had visited any crocodile temples, the names Suchus and Champsa would have been available. In contrast, they called their newly discovered creature Krokodeilos.

This suggests that, except for perhaps being told that those creatures seen basking in the distance are dangerous carnivores, they did not talk to anyone about crocodiles in the southeastern (Palestine and Egypt) corner of the Mediterranean Sea region, and instead used their own northeastern Mediterranean Sea (ancient Greek language) region name. With reference to what Ross (2010) called Nilekroko-Israel (NK-I), we have worked through the literature and examined many photographs of NK-I, and observe that the population of *Crocodylus* in the Kishon and Yarkon Rivers, and known to breed in the Zerka River region at a lake along its course, appears to be somewhat smaller than the gigantic (Nile Perch eating) Lake Turkana *Crocodylus* in "Eyelids of Morning" (and also somewhat less regular in its dorsal scalation). The ancient Romans knew about the Zerka crocodile, but whether or not the Ionian Greeks stopped at NK-Israel territory and saw wild crocodiles while on their travels to and from Egypt, we do not yet know. However, circumstantial evidence suggests that NK-Israel was not seen by the Ionians, because the Zerka River crocodile lake was located a short distance inland, whichmeant going ashore, and even then probably seeing only heads. In the highly unlikely and merely hypothetical event that the original Ionians saw their very first crocodile in Israel (=Syria and Palestine in the old literature), then it would be even more interesting to know if Nilekroko-Israel is the same species as the crocodile of the flowing Nile. Until proven otherwise, we today presume NK-Israel to be *Crocodylus niloticus* colonized in the past through the easternmost distributaries of the Nile Delta.

There is very little that is simple about *Crocodylus* in Africa, except for the one basic idea that at the time when Laurenti named *Crocodylus niloticus* in 1768, the word krokodeilos was clearly the water crocodile of Egypt, as exemplified by the very old story about a copulating pair on a sandbar in the navigable Nile River. See Ross *et al*. (2010) for details about the belly to belly copulation myth.

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