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Do crocodiles have rabies? Initiating a dialogue on in-situ crocodile conservation

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are reports of other crocodylian species being hit by trains or vehicular traffic (eg Anon 2009), including Muggers in Iran (Mobaraki 2007), and so it equally possible that it was simply in the wrong place at the wrong time!

The origin of this female Mugger is unknown. Given its size in July 2001 (79 cm), growth rate achieved between the first and second captures (50.5 cm/y), and timing of nesting of *C. palustris*, the animal is likely to have been around 1 year of age. On 6 occasions it had moved from the site of release (Ajwa Lake) to urban areas of Nimeta Village (1), Dumad roadside (1) and Chhani Village (4); 9 km, 19 km and 22 km straight-line distance from Ajwa Lake respectively. Distance between the Bhimnath Bridge (Vishwamitri River) and site of collision with the train was 2 km. Interestingly, 3 of 8 captures occurred in May-August 2007, indicating movement of at least 63 km in that period.

All 8 captures occurred between the months of April and August, and 4 of them occurred during the monsoon season. During the monsoon season the waterbodies at Nimeta, Dumad and Chhani are interconnected with the Vishwamitri River, and movement at this time would have been easier for the animal. Reasons for the movement of this individual out of Ajwa and into urban areas may involve:

1. Social interaction with other Muggers in Ajwa.
2. Seeking nesting habitat. The animal was located at Chhani Village on four occasions after it had reached size at maturity, perhaps reflecting better “breeding” conditions at this location.
3. Some type of “homing” mechanism, as has been reported for other crocodylians (eg *C. porosus*, *C. johnstoni*, *C. acutus*).

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East and Southeast Asia

Philippines

DO CROCODILES HAVE RABIES? INITIATING A DIALOGUE ON *IN-SITU* PHILIPPINE CROCODILE CONSERVATION. In 2008 the Mabuwaya Foundation (MF) organized community dialogues in 15 villages in the northern Sierra Madre. These meetings took two days and included: lectures on the Philippine crocodile, wetland conservation and environmental legislation; film showing; a puppet show; and, a planning workshop on community-based wetland conservation action. More than 750 people attended these meetings and asked questions, raised issues and proposed solutions. Here we present four short dialogues (translated from Ilocano) that are illustrative of local peoples' perceptions of protecting Philippine crocodiles (*Crocodylus mindorensis*) in the wild. The questions of people and the answers of our team show the importance (and also the difficulties) of engaging rural communities in crocodile conservation.

Why do we have to protect crocodiles?

On 24 May we organized a community consultation in Cadsalan, a remote village in the municipality of San Mariano and one of the key Philippine crocodile conservation sites in the northern Sierra Madre.

- Boy Robles (farmer): “Why do we have to protect crocodiles? It seems that crocodiles are more important than people. The government made a law to protect crocodiles, but they don't help the people.”
- Jessie Guerrero (MF): “Of course crocodiles are not more important than people. We conserve the Philippine crocodiles for the benefit of people. The Philippine crocodile occurs only in the Philippines and is almost extinct, that's why we have to protect it. It is part of our cultural heritage. In other countries people earn money with crocodiles, for example through tourism.”

- Elymar Appaccag (barangay councilor): “If you want to protect your crocodile you should place a fence around the creek, or transfer the crocodiles to a safe place.”
- Jessie Guerrero: “Our goal is to protect the Philippine crocodile in the wild. We don’t want to create a zoo. And if we place a fence the crocodiles cannot move out and people can no longer fish in the creek.”
- Sofia Manuel (barangay health worker): “Does a crocodile bite contain rabies?”
- Jessie Guerrero: “Only mammals can have rabies. Crocodiles are reptiles. I have been bitten many times by the crocodile hatchlings and never got sick.”

In all villages, people asked why crocodiles should be protected. Most people in the project area now know that the Philippine crocodile is protected by law. But people question the motivation of preserving crocodiles. In most cases people really don’t understand why a potentially dangerous animal should be preserved. Some people fear crocodile conservation is a political ploy for more regulatory control by the central government that will lead to the expropriation of farmland. Others see crocodile conservation as a distraction from more pressing developmental needs, such as the provision of basic infrastructure, education and healthcare.

Our team formulated 6 reasons why it is important to conserve crocodiles in the wild:

1. the national law (obviously begging the question but people often accept this as an excellent reason);
2. ecological values (crocodiles are a flagship species for sustainable wetland management);
3. cultural values (crocodiles are an important part of Philippine culture and history);
4. economic benefits (increased fish catches from wetland conservation);
5. intrinsic or religious values (crocodiles have the right to live); and,
6. immaterial benefits (it’s interesting, exciting and fun to conserve crocodiles). Particularly the fact that this endemic species has been exterminated throughout the country but survives in their village appeals to people.

Are crocodiles dangerous?

On 8 February we held a meeting in Disulap to discuss the management of the municipal Philippine crocodile sanctuary in the Disulap River. We have worked 10 years with this community, but people still have many questions.

- Marites Balbas (MF): “There are several zones in the crocodile sanctuary. In the nesting season from April to July all activities are prohibited in the strict protection zone, because crocodiles can be aggressive when they guard their nest. In other areas fishing, bathing and washing clothes are allowed.”
- Johnny de Gollo (farmer): “There is no problem with the sanctuary. But a crocodile attacked my pig far from the sanctuary. And the crocodile did not even finish everything: it just ate the intestines of the pig. That’s not good. The crocodile is greedy. I’m afraid that one day it will attack a

child”

- Marites Balbas: “But did you ever hear of a Philippine crocodile attack on people?”
- Aizah Nojadera (teacher): “No, but what will happen if the crocodile population will grow? We will experience ecological imbalance. The crocodile will have to eat more.”
- Marites Balbas: “fifty years ago there were many crocodiles in San Mariano. Now there are only very few. If the population will grow they will find a place. There is enough food in the river for the crocodile: fish, rats, insects, snails...”
- Aizah Nojadera: “I’m not against the crocodile, but I thought that large crocodiles ate people.”
- Marites Balbas: “You have seen too many movies! The Philippine crocodile grows up to 3 meter. We never heard a story of a Philippine crocodile attacking people. But be careful: when the crocodile has a nest, she can be aggressive. That’s why there is a strict protection zone in the sanctuary.”
- Johnny de Gollo: “But what about my pig?”
- Paul de Gollo (barangay captain): “Your pig should not wander around: it should be tied near the house.”

Fear of crocodiles was another recurrent theme during the consultations. People are concerned about the safety of their children and livestock. In our communication, education and public awareness campaign we’ve stressed that the Philippine crocodile is extremely wary of people, and that there are no recorded fatal attacks on humans. In fact most people know from their own experience that Philippine crocodiles do not pose an imminent threat to humans. But the teacher in the dialogue above expressed a common concern: what will happen if the Philippine crocodile population will recover? Crocodiles might not be dangerous today; but how about tomorrow? We had actually never thought about this issue. There is an urgent need to integrate these local concerns and questions in the design of our communication materials.

How can we benefit from crocodile conservation?

We held a community consultation in Buyasan on 26 May. Buyasan lies on the bank of the Ilaguen River and fishing is an important livelihood strategy for the community. Philippine crocodiles are occasionally caught in nets or fish traps.

- Elvis Sales (fisherman): “The fishermen complain that crocodiles destroy their fishnets. The fishermen are afraid to fish because of the crocodiles. Sometimes they see crocodiles underwater. What can you do about that?”
- Visitacion Aglugub (housewife): “Why are you afraid? We wash our clothes in the creek. Often the crocodile is very near, but it never attacked us. Sometimes the crocodile wants to play with us. When I was washing clothes the crocodile once took the shirt. As long as you don’t harm the crocodile, the crocodile will not harm you.”
- Juan Telan (farmer): “How can we benefit from the conservation of crocodiles?”
- Jerome Miranda (municipal councilor): “It is simple: if we protect the Philippine crocodile, we protect the fish that we

eat. We have to stop the use of electricity fishing, because it depletes the fish stocks on which we depend. Let us join hands to protect our environment!”

- Bonbon Aglugub (fisherman): “Yes, there used to be many fish in Buyasan. The problem is that people from other villages come here and fish with electricity. There is no ludong [Bluespot mullet] anymore in the river.”
- Marites Balbas (MF): “It is the responsibility of the barangay officials to protect the environment. The officials can declare a fish sanctuary or enact a barangay ordinance prohibiting destructive fishing methods. It protects the Philippine crocodile and benefits people.”
- Melchor Marrallag (fisherman): “But in most cases the army and the police are the ones doing illegal fishing!”
- Elmer Tales (barangay tanod): “Can we apprehend offenders?”
- Jerome Miranda: “Yes, based on the Local Government Code, the barangay officials can arrest people who violate the barangay ordinances. The barangay officials should make a decision on this. You are the ones who can decide what is best for the people and for the crocodiles.”
- Rogelio Macapia (barangay captain): “We would like to declare Bulawan Cave and Dilatngan Creek as our fish sanctuary. If we see people fishing with electricity we will confiscate the battery.”

In the remote rural areas of the Philippines, such as Buyasan, most people earn less than \$US1 per day. There is a clear need to link crocodile conservation with people’s well-being. But a sustainable harvesting or ranching program is obviously not a possibility with this critically endangered species. And the economic returns of a community-based crocodile-tourism enterprise in this remote corner of the Philippines are highly uncertain. We have therefore adopted a broader ecosystem approach to conserve wetlands. Rural communities in the Philippines rely heavily on freshwater ecosystems. Fishing is an important livelihood activity, especially for the poor. People are directly confronted with the effects of overfishing and erosion as a result of logging and unsustainable land use practices. There is broad public support to conserve critical wetlands and ban destructive fishing methods. In this view the Philippine crocodile becomes the flagship species of community-based wetland conservation. The participation and consent of rural communities assures that environmental legislation is actually enforced. Representatives from the municipal government, in this case the municipal councilor Jerome Miranda, attend the dialogues and provide feedback. The views, ideas, suggestions and critique of respected local politicians, village leaders, elders, friends and neighbors are obviously taken more seriously than the remarks of conservationists: when Vistacion said that the Philippine crocodile does not pose a threat, nobody questioned it anymore.

How many eggs do crocodiles lay?

On 18 June we talked with the community of Dibuluan, a small Kalinga settlement on the forest frontier. The Kalinga are the indigenous people of the northern Sierra Madre. A population of Philippine crocodile survives in this area.

- Margie Collado (daycare worker): “How many eggs can a crocodile lay?”
- Jessie: “There can be up to 23 eggs in a Philippine crocodile nest. The incubation period is 60 to 90 days. The crocodiles lay their eggs in April and the nest will hatch in July. You can easily recognize a crocodile nest: it is a large mound made of leaves.”
- Rudy Revilla (member of the farmer’s cooperative): “What if my carabao is eaten by a crocodile? Do I have the right to kill the crocodile in return?”
- Dominic Rodriguez (Mabuwaya Foundation): “No. According to the Wildlife Act you can only kill a crocodile if there is an imminent danger to humans. Anyway, did you ever see a Philippine crocodile attacking a buffalo?”
- Rudy Revilla: “No.”
- Dominic Rodriguez: “The Wildlife Act specifies a penalty of 100,000 pesos or 6 years in jail for killing a Philippine crocodile.”
- Onofre Daniel (village councilor): “It’s good that we know the laws and the penalties now. It is up to us if we want to violate the law. For me, I will not try. It’s hard to be in prison”
- Bernalie Coca (daycare worker): “I attended this meeting because I wanted to know the importance of the Philippine crocodile. First, I found the bukarot [Philippine crocodile] useless. But during the lectures I learned many new things and now I am interested in crocodile conservation.”
- Myla Tagaoan (village councilor): “Yes, the lectures were as clear as the blue sky. It was not boring.”

What should we do if a crocodile attacks livestock? What is the penalty if someone kills a crocodile? What to do if you accidentally catch a crocodile? During the village meetings people often pose practical questions. It provides an opportunity for our team to disseminate information on Philippine crocodile conservation, and better understand and respond to people’s concerns. In fact people raise relatively few problems with crocodiles during the community consultations: in general people tolerate the species.

To our surprise most questions of communities deal with Philippine crocodile ecology and behavior: How big is an adult crocodile? What do crocodiles eat? How long can a crocodile stay underwater? What does a nest look like? People are often fascinated by crocodiles and have a genuine interest in the species. This is an important motivation for people to preserve crocodiles, also for poor rural households in the northern Sierra Madre.

Initiating a dialogue on crocodile conservation

During the village meetings in the northern Sierra Madre we engaged rural communities in a dialogue on Philippine crocodile conservation. It enabled us to contextualize the fears and concerns of local people, and directly address these issues. It provided an opportunity to share information, find common ground to solve specific problems, and integrate crocodile conservation in broader discussions on rural development and environmental management. As a result rural communities feel that their voice is heard and their concerns are taken into account.

We think that such a participatory approach is instrumental to mobilize local support for the conservation of endangered crocodylians in the developing world. Much can be gained by documenting local experiences with community-based approaches and drawing global lessons. Here lays, in our view, an important role for the Crocodile Specialist Group. The CSG website is a valuable tool for extension workers in the field (particularly the “crocodylian biology for beginners” section). This can be further developed into an interactive platform that provides conservation education tools for schools and communities, and facilitates information sharing among crocodile conservationists and local communities across the globe.



Figure 1. The Philippine crocodile mascot ‘Krokey’ dances with a village councilor in Tappa. Photograph: Marites Balbas.



Figure 2. Community consultation in barangay Disulap. Photograph: Merlijn van Weerd.

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Cambodia

CAUGHT ON CAMERA! THE SIAMESE CROCODILE RETURNS TO EASTERN CAMBODIA. Populations of the critically endangered Siamese crocodile (*Crocodylus siamensis*) appear to be recovering in the Mondulhiri Protected Forest region of eastern Cambodia. Camera traps set up on small “beaches” alongside the Tonle Srepok River in the protected region caught some excellent photographs within one month of being established (Figs. 1 and 2).



Figure 1. Siamese crocodile captured by camera trap during the day.



Figure 2. Siamese crocodile captured by camera trap at night.

The cameras, which are triggered by movement, were set up as part of a joint conservation project by the International Institute for Environment and Development (IIED) and WWF Greater Mekong. They have been a great source of evidence