

# Crocodile Conservation and Captive Breeding in Thailand

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## Thailand Location

- eastern border of Laos and Cambodia
- southern border contact with Malaysia
- western border contact the Andaman Sea and Myanmar
- northern border contact Myanmar and Laos
- area of 513,115 km<sup>2</sup>
- water area of 2230 km<sup>2</sup> (0.4%)
- Population of 66,404,688 people (20th largest in world)



## Thailand and CITES

- CITES Party since 1983
- Three responsible agencies:
  - Department of Fisheries responsible for aquatic animals.
  - Department of National Parks, Wildlife and Plant Conservation responsible for terrestrial animals.
  - Department of Agriculture responsible for plants.

## Regulation

The Wild Animal Reservation and Protection Act BE 2535 (WARPA) (CE 1992) stipulates that possession, breeding, domestic trading, movement, import and export must be approved by the Fisheries Director General.

- Possession: Shall have an evidence of the acquisition such as Movement document and Sales report.
- Breeding: Shall have Breeding program and Evidence of the acquisition.
- Domestic Trading: Shall have Evidence of the acquisition, Issue sales report wildlife for customers and make accountant distribution.
- Movement: Shall have Sales Report.
- Import: Shall have Evidence of the acquisition such as export permit from exporting country, health certificate.
- Export: Evidence of the acquisition such as sales report, import permit

Freshwater and saltwater crocodiles under enforcement WARPA

- Regulation of captive breeding wildlife. Offspring resulting from breeding can be traded within the country under the control of the government authority.
- International trade must be registered with the CITES Secretariat according to Resolution Conf. 12.10.

## Current Status of *C. siamensis* in Captivity

- 799 farms in 2010
- 22 CITES-registered farms, 3 in process of registration
- Stocks
  - breeding 56,923
  - raising 306,755
  - hatchling 188,700
- Annual production approximately 150,000-200,000 heads
- Aquaculture farms with GAP (Good Aquaculture Practice) Standard

## Related Crocodile Industries

- People in the industry; approx. 10,000 families (trading, culture, capture, carving, tanning, sewing leather, leather trade business)

## Export Statistics

2008 (exported 86,256 heads)

- live 27,433, skins 39,109, large products 19,714

2009 (exported 62,353 heads)

- live 17,321, skins 24,890, large products 20,142

2010 (exported 106,039 heads; No. of permits issued)

- live 71,523, skins 29,416, large products 5,100

### Wildlife Conservation

- Wildlife Sanctuary defined HUNTING, “Do not disturb or harm wildlife nest except for carrying out academic purposes.”
- Follow the Wildlife Reservation and Protection Act 2535

### Current Status of *C. siamensis* and its Habitats in the Wild

- Protection under WARPA B.E.2535 by Department of National Park and Wildlife
- Re-introduction Project Phase I
- Habitat protection in National Park and Wildlife Sanctuary

### History in Thailand

- In the past: distributed in wetland areas of central, northeastern and southern parts of Thailand.
- During World War II: most wild crocodiles were taken as skins. Most suitable habitats were depleted following development after WWII.
- Remaining wild population: now restricted to inaccessible swamps and river stretches in the remote parts of some protected areas in Thailand.

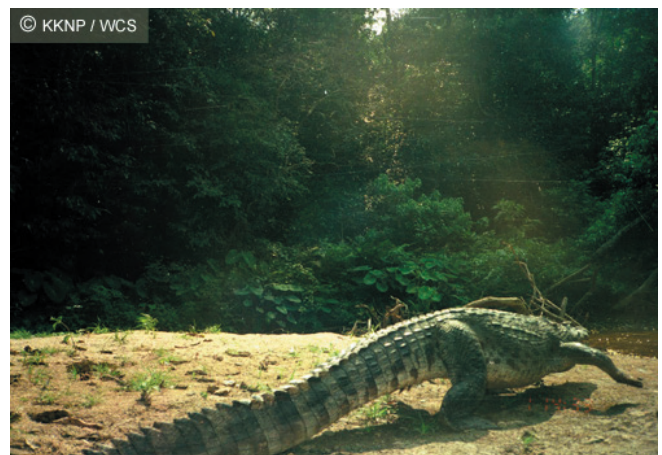
### Distribution of *C. siamensis* in Thai Protected Areas

- Kaeng Krachan National Park
- Pang Sida National Park
- Khao Ang Rue Nai Wildlife Sanctuary
- Yod Dome Wildlife Sanctuary
- Thung Salangluang National Park



### Conservation Action

- Habitat and population surveys
- Re-introduction Project (Phase I): Pang Sida NP
- Feeding Ecology Study in KARN-WS and Nesting Predation Study in KKNP
- Success DNA analysis Project: Kasetsart University
- Phase II re-introduction project at Bung Borapet Wildlife Sanctuary
- Full funding source from the crocodile co-operative



### Acknowledgements

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# Management and Conservation of Crocodiles in Cambodia

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## 1. Introduction

In Cambodia, fisheries sector has been considered as one of the major means which is playing an very important role in contributing to the national economy and daily food production

Management of the fisheries sector in Cambodia is fully based on the new Law on Fisheries, updated in response to the Fisheries Administration's urgent need and the social development. The Law on Fisheries consists of one article on the protection of endangered fisheries species including the crocodile species.

Currently the fisheries resources have been threaten by both anthropogenic impact and natural disasters, specifically by overexploitation and habitat destruction. These impacts have caused the fisheries resources gradually declining. In response to the need of local people and the Government policies, Fisheries Administration has been promoting the development of aquaculture everywhere in the whole Cambodia country, in particular of the crocodile farming because crocodile products both meat and skin are essentially for food security and export to international markets.

Crocodile farming has been the long tradition of Cambodian people residing around Tonle Sap (Great Lake). Income from such farming is the additional benefit besides fishing, fish pond raising and agriculture. The crocodile farming has been progressive since the new law on fisheries promulgated. In addition to the crocodile aquaculture at farms, local people both around Great Lake and on the floating houses on the river have also raised the crocodiles in the floating cages. In general, people around Great Lake, specifically in Siem Riep province have been actively participating in the occupation of crocodile farming; crocodile farms are rapidly increased and small scale crocodile farming are becoming the large scale one with hundreds of heads in each farm. Now crocodile raising becomes the farmers' certain occupations and crocodile farming has been spreading to other places including Battambang, Kampong Thom, Kampong Chhang, Kandal, Pursat, Banteay Meanchey, Kampong Cham, Preah Sihanouk, Koh Kong and Phnom Penh.

## 2. Objectives

- Improve and increase the management, conservation and development of both farm and wild crocodiles.
- Provide the raising techniques, manage the crocodiles

in farms and select the best brood stock.

- Conduct research and develop the raising technical documents on crocodile product processing and conservation.
- Searching for both national and international markets for crocodile skins and other crocodile products.

## 3. Crocodile Farming

Small and medium scales of crocodile breeding, hatching and farming are impressed by Cambodian people. At the same time that the crocodile farming increased, markets are mainly required. Crocodile skin is one of the important crocodile products in the market and the crocodile skin from Cambodia isn't met the requirement of the international markets yet. To meet the main requirement, the farmers have to improve the knowledge on raising, hatching and maintenances. More importantly, key partners of investment from both local and international markets are needed.

Activities of crocodile farming have been begun since the French colony time in 1944. During that time, majority of crocodile farming were happened in the provinces around Great Lake, specifically in Siem Riep province. People with knowledge and experiences of crocodile farming and crocodile product business have been starting their own activities in 1979. Wild crocodiles were caught and brought to the farms at that time and only three small-scale farming were started at remote areas in Battambang and Siem Riep provinces in 1979.

In 1989, more activities of crocodile farming were rapidly happened in five provinces including Siem Reap, Battambang, Kampong Chhang, Kampong Thom and Banteay Meanchey and spread to other provinces. In 2000, the crocodile farming were spread to 11 provinces and municipalities including Siem Reap, Battambang, Kampong Thom, Kampong Chhang, Kandal, Pursat, Banteay Meanchey, Kampong Cham, Preah Sihanouk, Koh Kong and Phnom Penh and a total number of crocodile farms were 507.

Currently, a total numbers of 561 crocodile farms with 257,216 heads including 53,263 female, 42,005 male, 52,929 sub-adults and 109,019 hatchlings are registered at National Fisheries Administration.

Six farms were registered with CITES in 1999, but one was removed from the list in response to CSG recommendations in 2003. The 5 registered farms comprise: Meas Sithon Farm (508M, 902F, 1568 sub-adults), Loun Nam Farm (212M, 507F, 2405 sub-adults), Thai Chay Farm (553M, 412F, 2165 sub-adults), Im Ream Farm (505M, 512F, 1318 sub-adults), Keo Thay Farm (212M, 507F, 2405 sub-adults).

### 3.1. Crocodile Raising

- Small scale crocodile farming: Farmers normally

keep 2-3 individuals of breeding stocks at the small place behind their own houses located on the riverbank or nearby the lakes where they easily provide the water and give them the foods. For those who have residences in floating villages, they raise the crocodiles in cages

- Medium scale crocodile farming: Locations where farmers raise the crocodiles are a bit away from river and lakes. Farmers create the concrete ponds and appropriate places for crocodiles to lay eggs are made in the pond.

### 3.2. Breeding and Hatching

Although best eggs and hatchlings are not provided, nothing changed in crocodile farming and Cambodian farmers do not catch the crocodiles in the wild and also do not collect the eggs in the wild for hatching in terms of commercial way. Only native species are well managed. Crocodiles need large place to live and enough food with good quality to eat. The native crocodiles with 12 and 15 years old in Cambodia produce good eggs. The eggs have high rate of hatching and the small size of eggs produce small hatchlings.

### 3.3. Annual Crocodile Production

Between 200,000 and 400,000 hatchlings were produced in 2010. Those hatchlings are used for local farming and export. For local farming, were used at the farm in Siem Riep, Battambang, Pursat, Kampong Thom, Kampong Chhang, Banteay Meanchey and Phnom Penh.

### 3.4. Creation of Crocodile Raising Ponds

In general, the creation of any crocodile farming pond is made basically depending on the actual density of hatchlings in the pond and the period of time that the hatchling developed to the adults. The bottom layer of the concrete pond needs to be smooth to avoid the skin scratching and to meet the main requirement of maintenance. The density of crocodiles in the pond follows the formal standard:

- 10 hatchlings/square metre
- 5 crocodiles 80 cm length/square metre
- 1-2 crocodiles 120 cm length/square metre
- 1 crocodiles 150 cm length/square metre

The above density of crocodiles in the pond allows the crocodiles to live in a large space without stresses and provide high growth rate.

### 3.5. Feeding

As Great Lake and coastal areas are the main sources of food supply for crocodiles, Cambodia has high potential for the development of crocodile farming. Due to current decreasing of fish catch in the nature,

it is affecting to the crocodile farming. To reduce fish catch in the wild for crocodile food, the farmers not only collect the offal from the slaughter houses but also import industrial food from overseas.

#### 3.5.1. Types of Food

- Fresh and dead foods: includes insects, rodents, chickens, fishes, frog, water snake, etc.
- Industrial foods: It is referring to the foods from industry

#### 3.5.2. Food Regime

- Hatchlings: quantity of food in the average from 15 to 20% of total bodyweight needs to be provided 3 to 6 times per week.
- Juveniles: quantity of food in the average from 5 to 10% of total bodyweight needs to be provided 3 to 6 times per week.
- Adults: quantity of food in the average of 1% of total bodyweight needs to be provided 1 to 2 times per week

## 4. Conservation

Conservation not only plays a very important role in maintaining native crocodile species but also improving the understanding of local people on the balance between development and conservation; more importantly it also makes local people stop doing the illegal activities. At the moment, there are about 300 individuals of wild Siamese crocodiles in Cambodia

Fisheries Administration's Department of Fisheries Conservation in collaboration with relevant NGOs in Cambodia has been implementing the following conservation activities:

- Conduct the crocodile abundant research
- Implement the education and awareness activities
- Enforce the law on fisheries

#### 4.1. Research Objectives

- Conduct crocodile abundance survey
- Conduct the population estimate research
- Conserve the wild crocodiles
- Strengthen the management of local crocodile farming
- Strengthen the enforcement of the law on fisheries on the protection of wild crocodiles

#### 4.2. Research Methodology

- Conduct the interview survey on the habitats and history of wild crocodiles
- Conduct the survey following the information obtained from the interview
- Taking photos of both habitats and crocodiles
- Submit the survey result report to Fisheries

- Administration to get the site designated
- Conduct the education and awareness on the importance of site to local people resided nearby.

#### 4.3. Results

- Siamese Crocodile conservation areas at Cardamom Mountain, around Great Lake, Sre Ambel district in Koh Kong Province and along Srepok River in Mondulakiri Province are identified.
- Management plan and patrol team are developed.
- Wild Siamese crocodiles confiscated are kept at FFI and WCS Centers.
- Siamese crocodile conservation areas were jointly identified with FFI and WWF.
- Five wild Siamese crocodiles were released at the core conservation area.

### 5. Skin Market

#### 5.1. Crocodile Skins

Crocodile skins have been exported to international markets, including France, Germany, Japan and USA. These countries have ordered 300,000 and 400,000 sets of unprocessed crocodile skins per year, a big quantity compared with other overseas markets.

Products and materials made from good quality crocodile skin last for long time and are very popular at the international markets of France, Germany, Japan and USA. Best quality of crocodile skin are used for manufacturing the bags and parts of the rest from manufacturing the bags can also be used for making belts, shoes, watch string etc., sold at high price. In addition to the above products and materials, crocodile skin can be used for making the clothes and other valuable furniture.

The USA, Australia and Zimbabwe produce more crocodile skins than other countries. Crocodile skin industry is one of the main economic targets in Cambodia because it can increase the additional income for the local people and also improve the economy. Traditional slogan says that "Crocodiles die of skins". This slogan shows clearly that crocodile skins have high value, good quality and popularity.

#### 5.2. Crocodile Meat

One kilogram of crocodile meat costs \$5 at local market and between \$20 and \$30 at American and European markets. Different types of foods used crocodile meat including soups, fries and roast. It is also used for medicine to cure asthma, teeth problem

and other diseases. Besides selling to the tourists, crocodile bone can also be used for the traditional medicine. More importantly, crocodile urine is one of the raw materials for producing the compound perfume.

#### 5.3. Export

Live crocodiles from small, medium and large farms are sold at the local markets for re-raising until the length of from 1.5 to 2 m, a best size at the market. The crocodiles with this size are killed for skin to export because they are growing so quickly and their skins are best quality. The expenditure for feeding and taking care of the crocodiles to more than 3 years of age are much more expensive than raising to take skin and meat. The skin at the abdominal part is so expensive because it has a small pattern. Crocodiles in Cambodia have been exported to China, Vietnam, Thailand and Singapore.

#### 5.4. Price of Hatchlings and Skin

The price of hatchlings and skin are depending on the market demand. The crocodile skin with highest price at the market is taken from *Crocodylus porosus*, *C. moreletii*, *Alligator mississippiensis*, *C. siamensis* and *C. niloticus* (National Research Council. 1983).

One hatchling normally costs only between \$15 and \$30 except in 1988 and 1990 which the price of one hatchling reached at between \$150 and \$350 (POF Siem Reap 1992). The crocodile skin with best quality can be used for long time and has high value of economy. The skin of crocodile with the length from 1.5 to 2 m costs \$250 (it is much more expensive than the skin of other animals).

### 6. Principles of Management

Recognizing the most importance of crocodiles for local people and the country, Royal Government, Ministry of Agriculture and Fisheries Administration have issued various policies, Sub-Decree and Declaration as following:

- Royal Krom No NorSor/RorKorMor/0506/011, dated 21 May, 2006, which promulgates the Law on Fisheries
- Sub-Decree No 53 OrNorKror.BorKor, dated 29 June, 2006, on the International Trade in Endangered Species of Wild Fauna and Flora
- Sub-Decree No 123 OrNorKror.BorKor, dated 12 August, 2009, on Determination Type of Fishery and Endangered Fishery Product
- Proclamation No 571 ProrKror.KorSrorKor, dated 06 September, 2010, on Protection Measure for the Endangered Fisheries Product
- By-Law of crocodile farming association

- Other legal instrument related to crocodile conservation and management

## 7. Transportation

### 7.1. Local transportation

Local transportation of crocodile products requires the following things:

- Crocodile farming permit
- Transportation permit declaring the quantity, length of crocodile, location of farming and destination issued by central Fisheries Administration.

### 7.2. Export

Transportation of crocodile products to overseas countries requires the following things:

- Registration at the Ministry of Commerce for creating the company
- Letter from private companies applies for crocodile export from Fisheries
- Registered companies have to have contracts with the CITES registered farms
- Based on actual quantity of crocodiles for export from CITES Management Authority, Fisheries Administration applies for the principle letter for export from the Ministry of Agriculture
- Export permit issued by CITES Management Authority

## 8. Conclusions

The management, development and conservation of crocodiles in Cambodia are the main activities for extracting the foreign currencies. Fisheries Administration has sufficient ability for conservation and development of crocodiles because Cambodia has wild crocodiles and fish for crocodile feeding. Farmers who have small-scale crocodile farming are collecting fishes from the wild by themselves. Moreover, the increasing of farmers shows clearly that the crocodile farming occupation is high potential. To maximize benefit from crocodile farming, Royal Government should encourage the conservation and crocodile processing industry.

## 9. Recommendations

To improve the management and conservation of crocodiles in Cambodia, useful recommendations are urgently implemented:

- To strengthen the cooperation among key partners of conservation and development
- To stop the illegal export of crocodiles, specifically at the border
- To strengthen the implementation of the 32 recommendations of CSG
- To strengthen the implementation of crocodile farming association's by-law
- To build capacity of farmers on the crocodile raising technique and husbandry
- To stop the import of hatchlings from the neighbouring countries
- To search for markets
- To search for key partners for development
- To change the way of selling hatchlings to ongoing raising for skins
- To register more crocodile farming at CITES Secretariat
- Communities are sustainably co-managing crocodile population in the way that are mutually beneficial and sanctioned by the highest level of authority possible
- The establishment of long-term re-introduction program and the release of 200 crocodiles by 2015 in accordance with IUCN guidelines
- A sound, scientific basic for conservation activities
- Improved perception and actions taken by key stakeholders, including policy makers, to support crocodile conservation
- Emergency mitigation actions for significant population under immediate threat (eg hydroelectricity development) are conducted
- Increased capacity, interest, resources, and willingness of other organizations and agencies to support crocodile protection and conservation
- Improving crocodile association
- Strictly and improving national registration
- Ask more CITES registration farms
- Against illegal trade crossed border
- Training of raising technique and husbandry
- Improving cooperation with other agencies involved with crocodiles



# Vietnam - Country Report

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CITES Management Authority  
Ho Chi Minh City, Viet Nam

## 1. Current status of *Crocodylus siamensis* and its habitats in the wild

- Freshwater crocodiles are now considered to be effectively extinct in the wild due to massive habitat loss, intensive hunting and live capture for crocodile farming.
- Only two individuals were detected in Ha Lam lake (Krong Trai Nature Reserve, Phu Yen Province) during a survey conducted in 2005 by a team of Institute of Tropical Biology (Fig. 1).



Figure 1. Freshwater crocodile track found on a bank of Ha Lam Lake (Nguyen Xuan Vinh *et al.* 2006).

## 2. Conservation action

- In the early 2000s, 60 freshwater crocodiles were re-introduced to Bau Sau (Crocodile Lake) in Cat Tien National Park (Fig. 2), with at least one nest being produced in 2005. Although there is some doubt about how many crocodiles remain in the wetland, as up to 25% of adults was reportedly killed in 2004 by local residents, regular monitoring shows evidence of hatchlings and juveniles, confirming that successful breeding continues.
- As of March 2010, there were 323 *Crocodylus porosus* and 240 *C. rhombifer* on farms. They are kept separately from the *C. siamensis* as reported by the farms. However, more care should be taken to ensure that hybridisation is controlled, and if possible eliminated.



Figure 2. Bau Sau (Crocodile Lake) in Cat Tien National Park.

## 3. Current status of *C. siamensis* in captivity

- Crocodylus siamensis* farming began in the early 1980s.
- Currently, there are more than 1100 farms and raising facilities, mainly located in southern Vietnam, with varying levels of *C. siamensis* stocks (Fig. 3; Table 1).

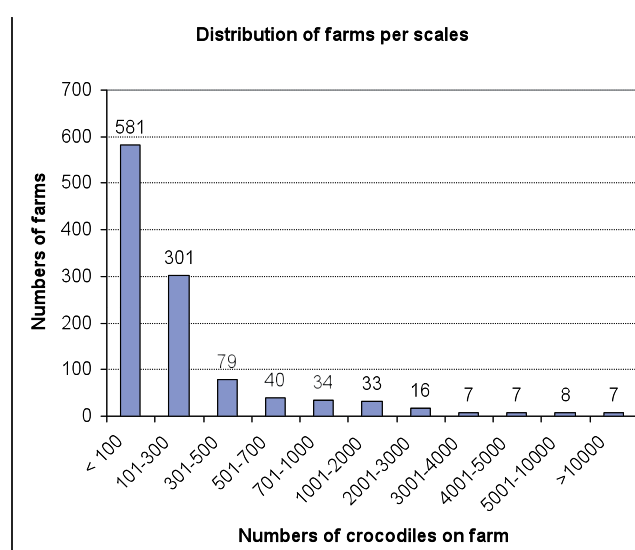


Figure 3. Numbers of different-sized crocodile farms.

Table 1. *Crocodylus siamensis* stocks on farms as of March 2010. Breeding stocks of Provincial Forest Protection Department (PFPD) registered farms are not fully compiled yet.

Type of Farm	Adult Males	Adult Females	Annual Hatchling Production	Total Stocks
7 CITES-registered	3,083	8,934	94,000	185,856
PFPD-registered	1,809	3,150	22,000	398,262
Totals	4,892	12,084	116,000	584,118

#### 4. Domestic versus International Trade

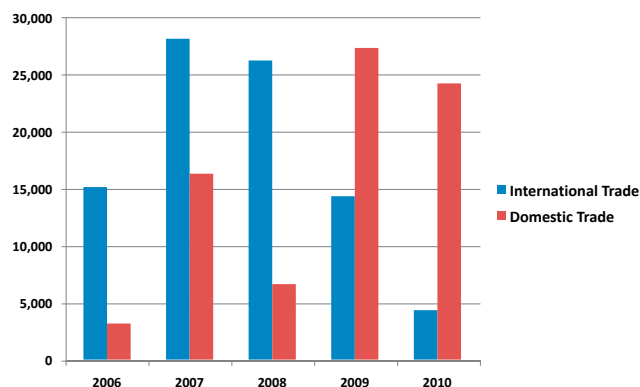


Figure 4. Levels of domestic and international trade.

#### 5. Legislation and Regulations, Enforcement



Figure 5. *Crocodylus siamensis*: Group II B listed in Decree 32/2006 - CITES Appendix I.

##### 5.1. Some relevant legislation and regulations

- Decree 32/2006/ND-CP dated 30/3/2006 of GoV on management of endangered, precious and rare forest plants and animals.
  - Circular 01/2011/TT-BNNPTNT dated 05/01/2011 of MARD on Amendment of list of endangered aquatic species in Vietnam which need protection, reproduction and development announced by MARD's Decision 82/2008/QĐ-BNN dated 17/7/2008
- Decree 82/2006/ND-CP dated 10/8/2006 of GoV on management of export, import, re-export, introduction from the sea, transit, breeding, rearing and artificial propagation of rare, precious, endangered wild animals and plants.
  - Circular 59/2010/TT-BNN dated 19/10/2010 of MARD on announcing the 2010 CITES Appendices.
- Penal Code (1999 and amended 2009) - Article 190: Breaching regulations on the protection of precious and rare wild animals.

- Decree 99/2009/ND-CP dated 02/11/2009 of GoV on administrative sanctions in the field of management and protection of forest and management of forest products.
- Decree 31/2010/ND-CP dated 29/3/2010 of GoV on sanctioning administrative violations in the field of fishery.
  - Decision 65/2010/QG-TTg dated 25/10/2010 of Prime Minister on promulgating the regulation on activity-cooperation responsibilities and relations among state management agencies (FPDs, Customs, Market Control Departments, Police, Border Army, Justice ...) in the struggle against smuggling, fake goods and trade fraud.

##### 5.2. Relevant enforcement agencies and cooperation

- CITES Management Authority
- CITES Scientific Authority
- Deployment of more than 10,000 forest rangers at commune level to implement activities in forest protection and management, including management of crocodile farming.



Figure 6. Inauguration of Vietnam - WEN in August 2010.



Figure 7. Interagency Workshop on Strengthening Control of Transnational Wildlife Crime, 18 March 2011.



6. Increased awareness on crocodile conservation and management



Figure 8. Public Awareness Campaign conducted in Noi Bai International Airport in May 2010.



Figure 9. Training Course on CITES Policies and Identification of Reptile Species (including Crocodiles) Commonly Found in Trade, in Ho Chi Minh City from 21-23 February 2011.



Figure 10. Workshop on Breeding and Sustainable Development of Animals Originated from the Wild (including Crocodiles), in Ho Chi Minh City, 25 March 2011.