



# **Balancing Land Development and Biodiversity Conservation through Biodiversity Offsetting Program**

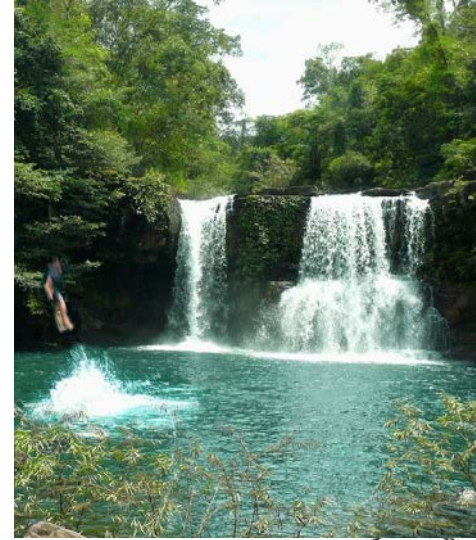
**Nophea Sasaki**

Associate Professor

Natural Resource Management, SERD

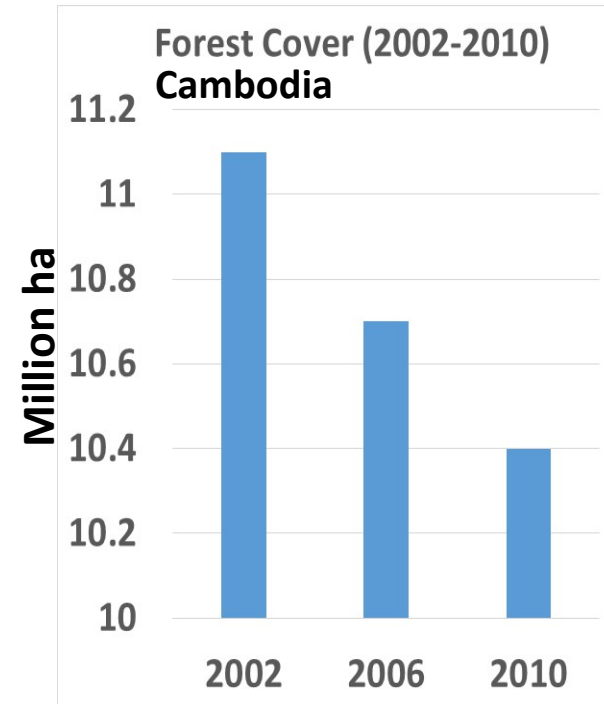
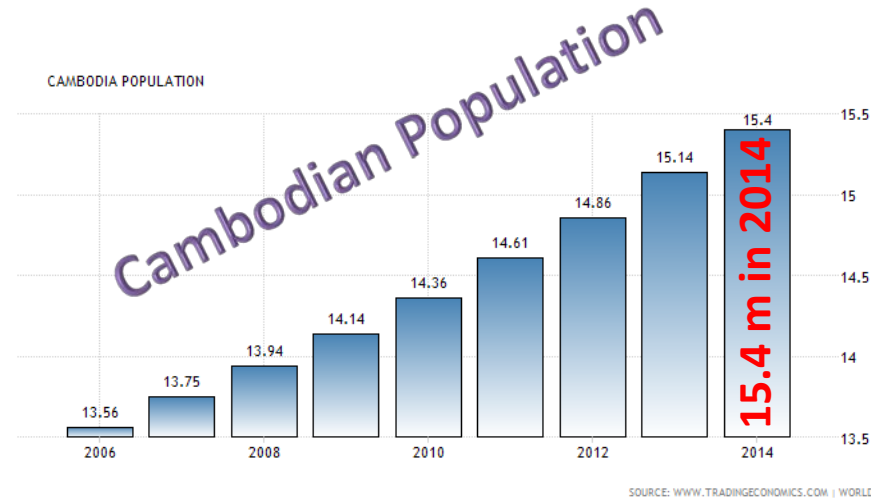
# Introduction

- Individual species supports the healthy ecosystems whose services are important for sustaining agricultural production and local livelihood
- Tropical deforestation has affected up to 91% of the threatened flora and fauna species and between 10-30% of all mammal, bird, and amphibian species are threatened with extinction.



# Introduction

- Despite such loss, growing population pose further pressure to forest clearing because forests are the important sources for agricultural expansion and/or urbanization.
- Biodiversity Offsetting is a potential program that should be considered in the project development for immediate effects



# International Programs and Biodiversity

- The UN-REDD+ Scheme
- Payment for Ecosystem Services (PES)
- The Convention on Biological Diversity:  
The Nagoya Protocol of Access and  
Benefit Sharing
- *Biodiversity Offsetting*

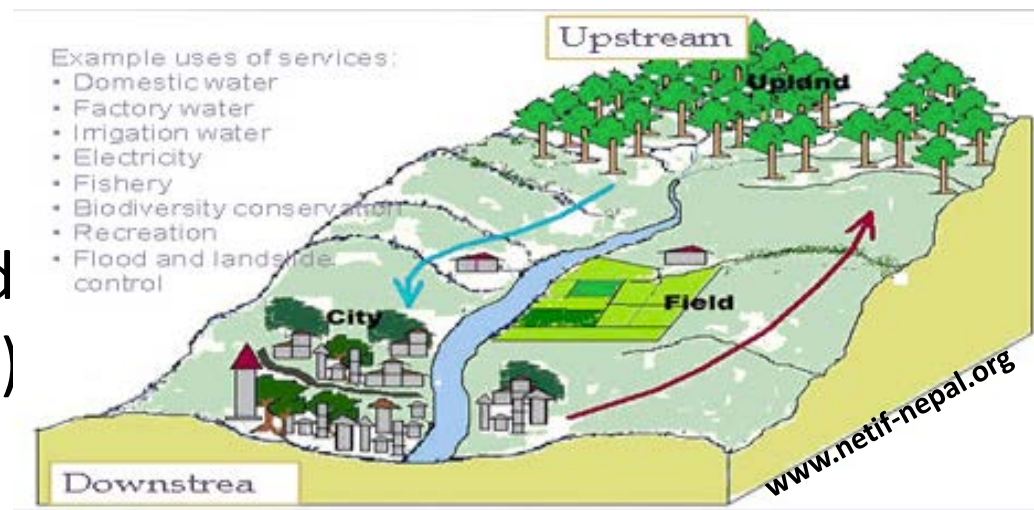


# The REDD+ and Biodiversity

- REDD+ ensures the safeguards of biodiversity but pay for carbon credits
- REDD+ approval is a long process and after all, carbon price affects the long-term implementation
  - Oddar Meanchey (started in 2008, validated in 2012, verified in 2013: Triple-gold Verification). By the time, carbon price decline, buyers are reluctant
  - Seima Forest (started in 2009, CCBA-validated in 2015)
- Main players: carbon developer but not land developer; the latter is actually responsible for immediate clearing of the forests

# Payment for Ecosystem Services (PES)

- PES focuses on payment to land owners for some sort of ecological services such as for clean water, scenic beauty
- PES does not focus on individual species i.e. biodiversity
- So far, Vietnam is the only country in Asia that introduced legislation for Payment for Forest Ecosystem Services
  - Clean water
  - Scenic beauty
- PES would not be effective as the users (buyers) are not the land developer (land clearing)



# Nagoya Protocol on Access and Benefit Sharing (ABS: 2014)

- ABS refers to the agreement between user and provider in the **access of genetic resources**, and how **benefits are shared** between them.
- Although plants, animals and microbes useful to humans are included, ABS needs investors who would be willing to explore the potential uses of the genetic resources
- ABS pays for the share of the findings from the use of genetic resources

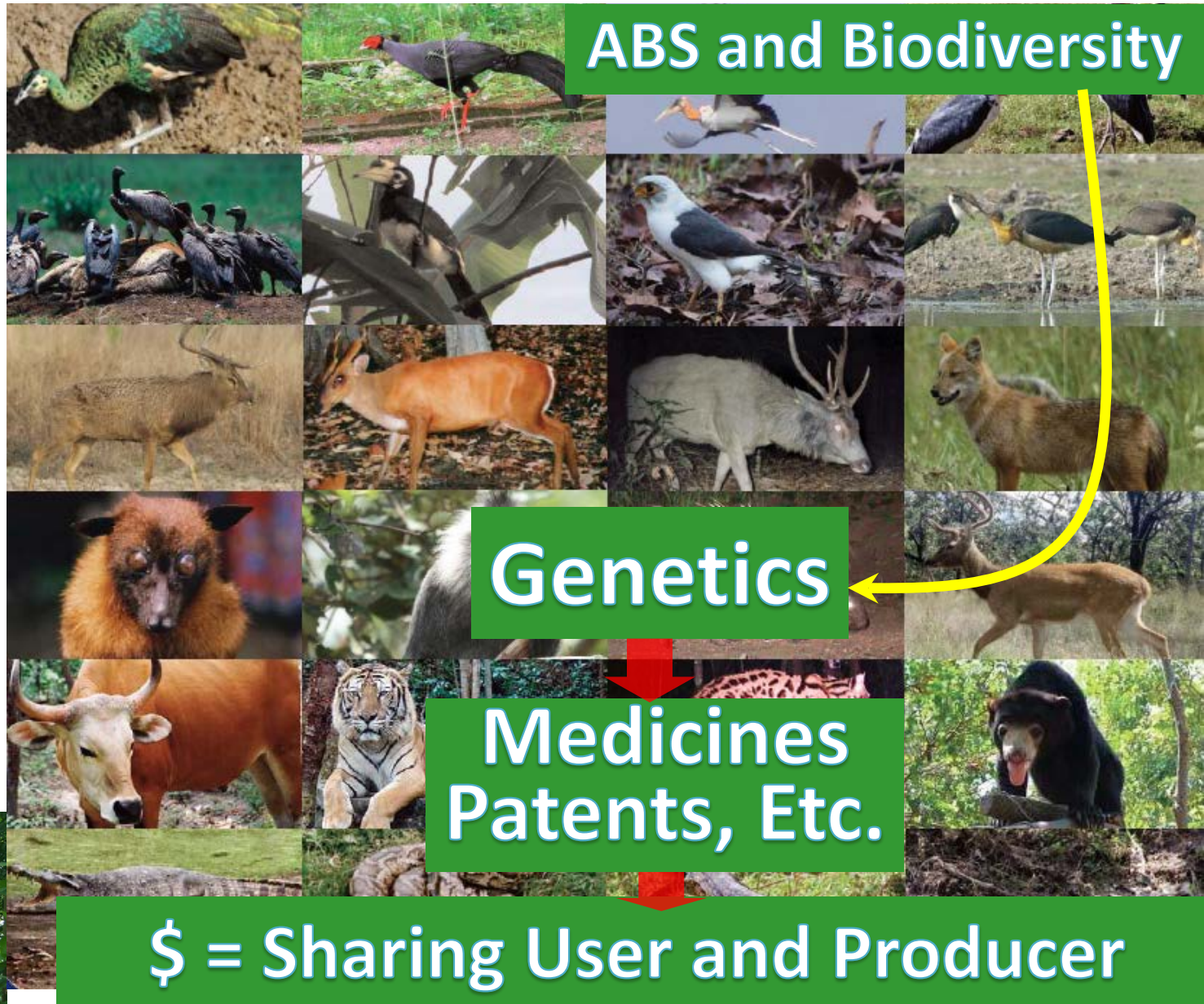


# Access and Benefit Sharing (ABS)

ABS's main players are not the land developers who are actually responsible for forest clearing



*Dalbergia cochinchinensis*



Biodiversity found in a REDD+ project in Oddar Meanchey (Elliott et al. 2011)

# Biodiversity Offsetting Program

A biodiversity offset is a way to demonstrate that a development project can be implemented in a manner that results in no net loss of biodiversity.

**Development needs** to pursue to meet the increasing demand of the growing population

**Biodiversity Offset:**  
Biodiversity Loss is offset through conservation of other habitats

**Clear A**



**Protect B**



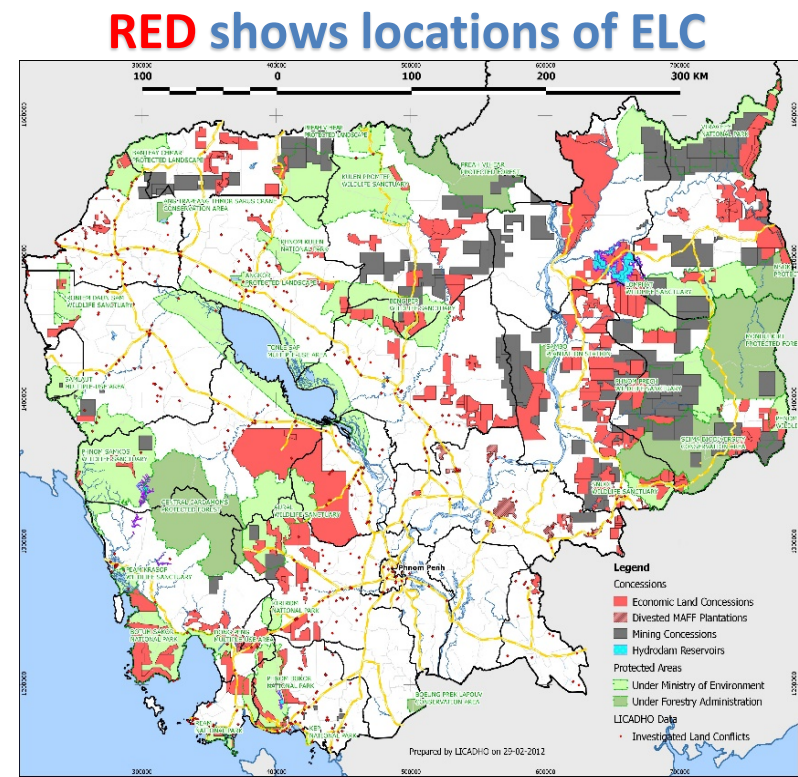
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# Cambodian Context

- Cambodia is moderately rich in biological diversity and levels of endemism.
- The Biodiversity Index is 7.5 (MacKinnon, 1997)
- Flora: Plant species are 15,000 species including at least 2,300 vascular plants (Ashwell 1997).
- Fauna: Mammals (212 species), Birds (536 species), Reptiles (176 species), freshwater fishes (850 species), marine fish species (435 species)

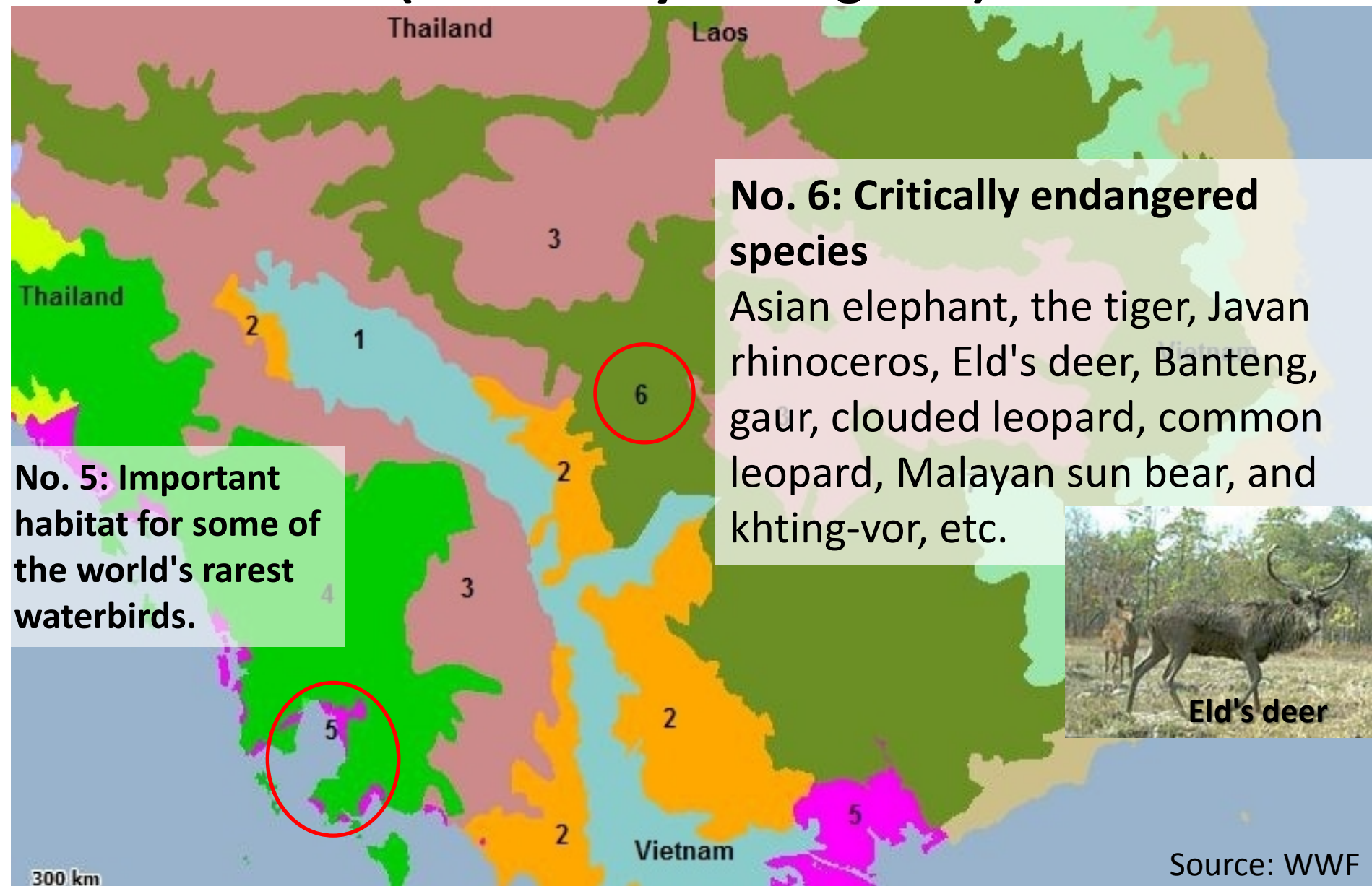
# Land Development and Biodiversity in Cambodia

- Land development may include economy land concession (ELC), special economic zone, social development areas, and others
- ELC was introduced to provide non-use land for agro-industrial plantations for the purposes of employment and income
- By June 2012, ELCs were granted to 118 companies covering a total land area of 1.2 million ha (MAFF website)





**Biodiversity Offsetting Program could be used to offset biodiversity loss due to land development**

# Wildlife species are affected by development (wildlife by ecoregions)



# Threatened bird species found in the REDD+ sites

Scientific Name	Common Name	
<b>Critically Endangered Species</b>		
<i>Thaumatibis gigantean</i>	Giant Ibis	
<i>Pseudibis davisoni</i>	White-shouldered Ibis	
<i>Sarcogyps calvus</i>	Red-headed Vulture	
<i>Gyps bengalensis</i>	White-rumped Vulture	
<i>Gyps tenuirostris</i>	Slender-billed Vulture	
<i>Houbaropsis bengalensis</i>	Bengal Florican	

Class	Number of species (number of species that are not yet confirmed, but suspected to occur, in brackets)					
	Critical	Endangered	Vulnerable	Near Threatened	Data Deficient	Total
Mammals		9 (2)	13	6		29 (2)
Birds	4 (1)	3	6	8 (1)		21 (2)
Reptiles	(1)	2	2 (2)	2		6 (3)
Amphibians			2	1	2	5
Fish		(1)			(2)	(3)
<b>Total</b>	<b>4 (2)</b>	<b>14 (3)</b>	<b>23 (2)</b>	<b>17 (1)</b>	<b>3 (2)</b>	<b>61 (10)</b>

# Plant Species likely affected by development

Species Code	Total	RSD
SRLO	49.1	11.30%
KRAY	45.7	10.50%
MNPR	33.7	7.80%
CHPL	31.4	7.20%
PLOG	20	4.60%
SRKM	18	4.20%
KRCS	17.8	4.10%
CRMS	17.3	4.00%
RINM	16.8	3.90%
POPL	14	3.20%
RANG	13.5	3.10%
TREN	12.8	3.00%
KRAK	12.5	2.90%
PRNG	11.2	2.60%
SMCH	10.5	2.40%
RODL	10.3	2.40%
CHBK	7.7	1.80%
KMPR	7.2	1.70%
TRYG	5.7	1.30%
Others (44 species)	70.7	16.30%

Species Code	Total	RSD
PRNG	31.5	8.90%
MNPR	31.2	8.80%
ATIT	26.5	7.50%
CRMS	26.2	7.40%
CHPL	24.7	7.00%
CHRH	24.7	7.00%
SRLO	19.5	5.50%
SEMN	14.0	4.00%
RODL	12.2	3.40%
CHPM	12.2	3.40%
KDCH	11.3	3.20%
CKTR	11.2	3.20%
PHUT	6.8	2.90%
CHRS	6.2	1.70%
KMPR	5.8	1.70%
TTRV	4.8	1.40%
POPL	4.5	1.30%
DCSP	3.0	0.80%
KRAY	2.8	0.80%
Others (32 species)	33.5	9.50%

Species Code	Total	RSD*
CRMS	26.3	10.70%
SRLO	22.4	9.10%
PRNG	11.5	4.70%
PHDK	10.7	4.30%
PPEL	10.5	4.30%
CHBK	9.7	3.90%
ANKM	9.5	3.90%
LGNG	9.3	3.80%
BKMT	9	3.70%
SKRM	7.1	2.90%
TLOK	7.1	2.90%
POPL	6.9	2.80%
SVDL	6.9	2.80%
PPUL	6.8	2.80%
PLUU	6.4	2.60%
TRAC	5.1	2.10%
PRUS	4.9	2.00%
CHTR	4.6	1.90%
KNDL	4.4	1.80%
Others (37 species)	37.6	15.30%

# How much payment needed?

- There exists no single metric that objectively captures the full extent of biodiversity (Bull et al. 2013)
- Many factors may be considered: current timber royalty, size of the affected size, price of timber sale, level of threats, ecoregions, etc.

Botanical name	Level of threat <sup>a</sup>	Timber grade	Timber royalty <sup>b</sup> (US\$ m <sup>-3</sup> )
<i>Dalbergia bariensis</i> , Pierre	5	Luxury	112–210
<i>Afzelia xylocarpa</i> (Kurz) Craib	5	Luxury	112–210
<i>Diospyros crumenata</i>	5	Luxury	112–210
<i>Pterocarpus pedatus</i>	5	Luxury	112–210
<i>Hopea odorata</i>	4	I	60
<i>Shorea cochinchinensis</i> Pierre	4	I	60
<i>Dasymachalon lamentaceum</i>	4	Luxury	112–210
<i>Diospyros bejaudi</i> Lecomte	4	Luxury	112–210
<i>Fagraea fragrans</i> Roxb	4	Luxury	112–210
<i>Albizzia lebbek</i>	4	Luxury	112–210
<i>Cinnamomum cambodianum</i>	4		
<i>Diospyros nitida</i>	3	Luxury	112–210
<i>Tarrietia javanica</i>	3	I	60
<i>Xylia dolabriformis</i> Benth	3	I	60
<i>Shorea vulgaris</i>	3	II	40
<i>Dipterocarpus alatus</i>	2	II	40
<i>Anisoptera costata</i> Kort	2	II	40
<i>Cassia siamensis</i>		Luxury	112–210
<i>Diospyros helferi</i>		Luxury	112–210
<i>Sindora cochinchinensis</i> Baill		I	60
<i>Lagerstroemia calyculata</i> Kurz		I	60
<i>Crudia chrysanth</i>		I	60
<i>Dialium cochinchinensis</i> Pierre		I	60
<i>Peltophorum ferrugineum</i> Benth		I	60
<i>Terminalia tomentosa</i>		I	60

# Biodiversity Pricing

## USA Case

- The credit price varies according to species, quality of habitat and conservation outcomes.
- For example, credits for the **golden-cheeked warbler** at the Hickory Pass Ranch conservation bank are priced at **US\$5000 per credit** (1 credit = 1 acre or 0.4 ha) with a requirement to set aside **US\$250/credit** for a maintenance fund



## Other Countries

- **France:** A speed train company pay to protect 1700 ha of habitat for little bustards in France
- **Panama:** Cobre Panama copper-mine project will result in the loss of 5,900 ha and will pay to protect two protected areas
- **Australia:** New South Wales set up a fund of US\$400 million to protect threatened woodlands on Sydney's Cumberland Plain to compensate for city development

# Biodiversity pricing in Cambodia (?)

Botanical name	Level of threat <sup>a</sup>	Price of sawnwood at various locations (US\$ m <sup>-3</sup> )
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*Dalbergia barbigera*, Pierre

5

20,000–50,000<sup>c</sup>

*Azadirachta indica* (L.) Kurz

5

14,000–20,000<sup>c</sup>

*Diospyros crumenata*

5

*Pterocarpus pedatus*

5

**Mean costs for managing**

*Hoplosternum littorale*

*Shorea chinensis* Pierre

*Dasyneura lamentacea*

*Diospyros laudii* Lecomte

*Fagraea insularis* Roxb

*Albizia lebbekii*

*Cinnamomum cambodianum*

*Diospyros nitida*

*Tarrietia javanica*

*Xylia dolabriformis* Benth

*Shorea vulgaris*

*Dipterocarpus*

*Anisoptera costalis*

## Ecoregions in Cambodia

**Status**

Cardamom Mountains moist forests

S

Central Indochina dry forests

V

Indochina mangroves

C

Southeastern Indochina dry evergreen forests

C

Southern Annamites montane rain forests

V

Tonle Sap freshwater swamp forests

V

C

**Level of Threats/Habitat Size**

# Species of High Priority: High Level of Threat

Botanical name	Level of threat <sup>a</sup>	Timber grade	Timber royalty <sup>b</sup> (US\$ m <sup>-3</sup> )	Price of sawnwood at various locations (US\$ m <sup>-3</sup> )
<i>Dalbergia bariensis</i> , Pierre	5	Luxury	112–210	3900–50,000 <sup>c</sup>
<i>Afzelia xylocarpa</i> (Kurz) Craib	5	Luxury	112–210	14,000–20,000 <sup>c</sup>
<i>Diospyros crumenata</i>	5	Luxury	112–210	
<i>Pterocarpus pedatus</i>	5	Luxury	112–210	
<i>Hopea odorata</i>	4	I	60	
<i>Shorea cochinchinensis</i> Pierre	4	I	60	
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<i>Albizzia lebbek</i>	4	Luxury	112–210	
<i>Cinnamomum cambodianum</i>	4			
<i>Diospyros nitida</i>	3	Luxury	112–210	
<i>Tarrietia javanica</i>	3	I	60	500 <sup>d</sup>
<i>Xylia dolabriformis</i> Benth	3	I	60	
<i>Shorea vulgaris</i>	3	II	40	

Priority Species

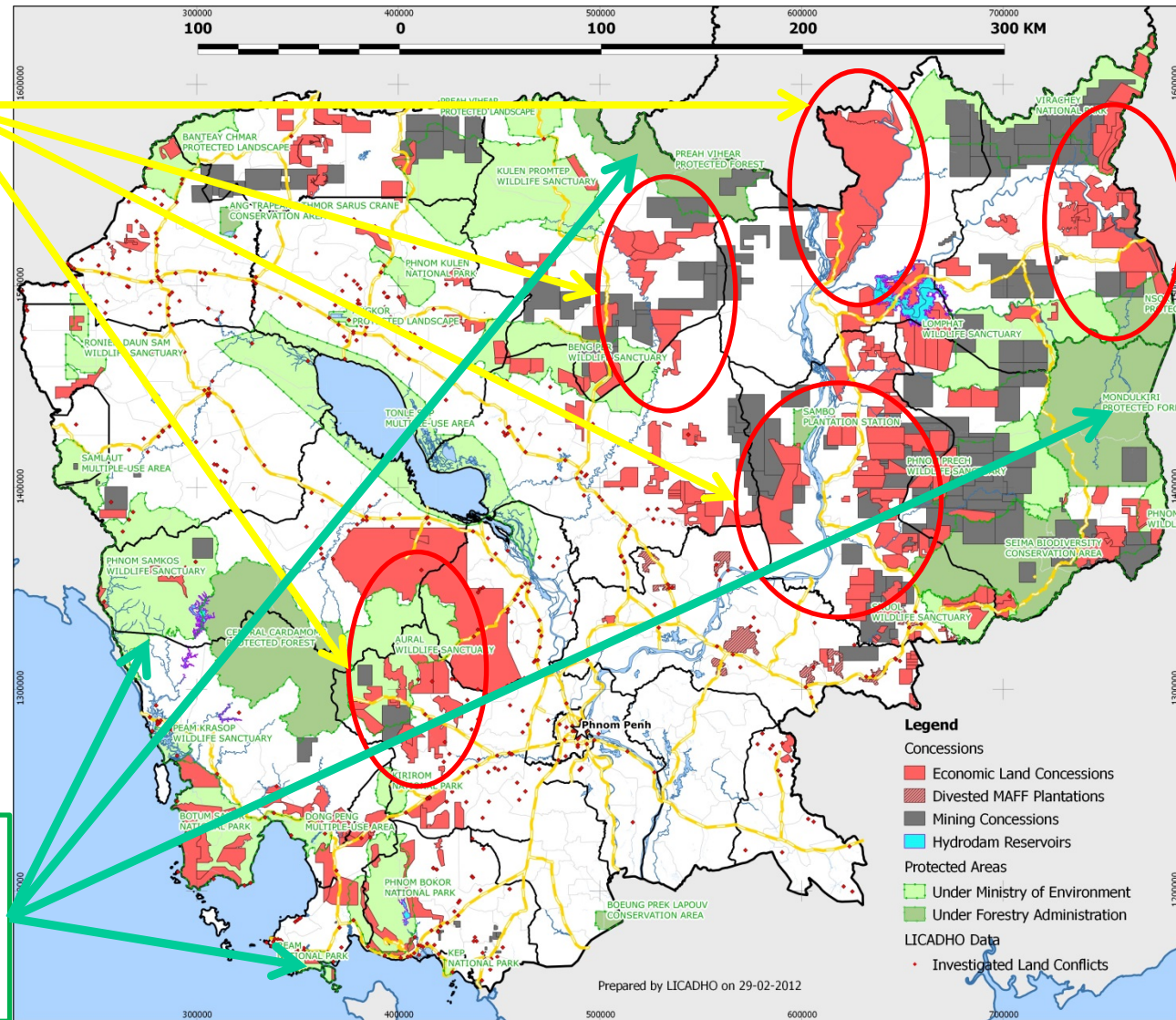
Tree species found in Kratie, Stung Treng and Rattakiri (Kimsun et al. 2016)

# Compensation Scheme

**Land  
Developers**

**Biodiversity  
Bank**

**Conservation  
Area (species)**



# Challenges for Biodiversity Offsetting Program

- There is no “one-size fits all” model
- We still have limited information on species distribution
- We still need to demarcate the boundary
- We need to have enabling environment (legislation, policies, and enforcement)

**Biodiversity Offset:  
Biodiversity**

**More on Carbon Offset:  
REDD+**

**BIODIVERSITY**

**More on genetic  
resources: ABS**

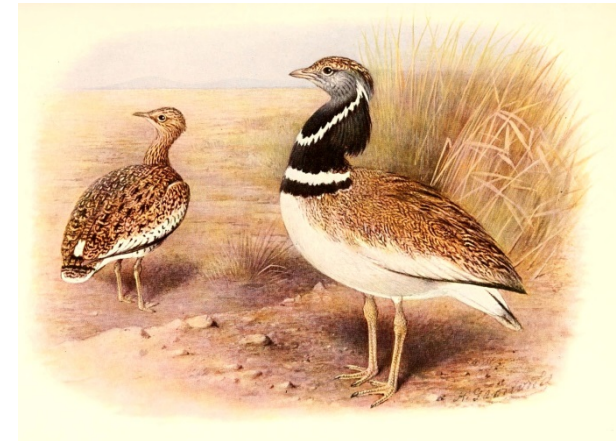
**More on Ecological  
Services: PES**

# **Thank You**

**`nopheas@ait.asia`**

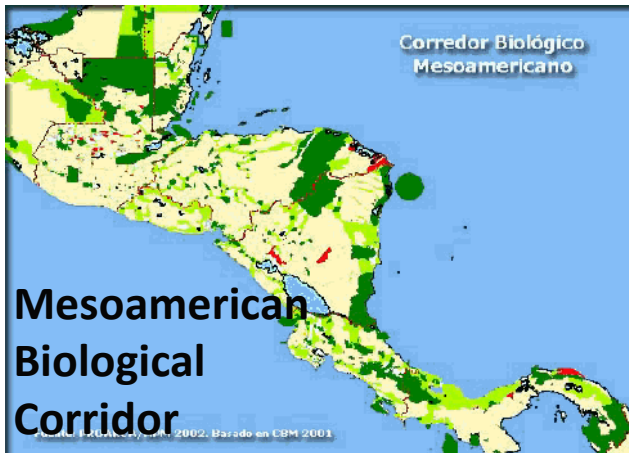
# Case Studies on Biodiversity Offsetting

- New South Wales set up a fund of US\$400 million to protect threatened woodlands on Sydney's Cumberland Plain to offset the effects on biodiversity of the city's expansion. Government and developers pay to landowners and new protected areas
- Since 2008, the French construction company Oc'via and its partners have invested millions of euros to manage around 1,700 ha of farmland in southern France to improve the habitat of little bustards (*Tetrax tetrax*), which will be affected by a high-speed rail project (Maron et al. 2015)



# Case study in Panama

- Cobre Panama copper-mine project is expected to result in the loss of 5,900 ha of forest from Central America's Mesoamerican Biological Corridor. This region has one of the highest concentrations of threatened species on Earth.
- To compensate, the company will contribute to the costs of managing two existing national parks (Santa Fe and Omar Torrijos), and a new protected area to be established nearby



# Discussions

- Biodiversity offset is an increasingly popular yet controversial tool in conservation
- Its popularity lies in their potential to meet the objectives of biodiversity conservation and of economic development
- Its controversy lies in the need to accept ecological losses in return for uncertain gains

Bull et al (2013)

# Existing Biodiversity Offset Programs and Their Objectives

	Programme	Objective
African Development Bank	ADB Operational Safeguard 3	To deliver a <i>net benefit</i> or <i>no net loss</i> for residual biodiversity impacts on natural habitats
Alberta, Canada	Wetland Policy	To <i>sustain the benefits</i> wetlands provide to the environment, society and the economy
Asian Development Bank	AsDB Policy Principles and Requirement 8	To deliver at least a <i>no net loss</i> for residual biodiversity impacts on natural habitats and critical habitats
Australia	Environmental Offsets	To deliver an overall conservation outcome that <i>improves or maintains</i> the viability of the protected aspect of the environment
Canada	Policy for the Management of Fish Habitat	<i>No net loss</i> in the productive capacity of Canada's fisheries habitats
China	Forest Vegetation Restoration Fee	To restore a forest <i>area no less</i> than that taken up by the developer's operations
France	National doctrine on the mitigation hierarchy, and national guidelines on the mitigation hierarchy	<i>No net loss</i> , and ideally, <i>net gain</i> of natural habitats
Germany	Impact Mitigation Regulation	Preservation of the existing ecological situation
International Finance Corporation	IFC Performance Standard 6	To deliver <i>no net loss</i> for residual biodiversity impacts on natural habitats and <i>net gains</i> for critical habitats
Queensland, Australia	Supported Community Infrastructure Koala Conservation Policy	<i>Net gain</i> in bushland koala habitat
United States	Compensatory Wetlands Mitigation	<i>No net loss</i> of wetland acreage and function
United States	Conservation Banking	To offset adverse impacts to a species
Victoria, Australia	Native Vegetation Permitted Clearing Regulations	<i>No net loss</i> in the contribution that native vegetation makes to Victoria's biodiversity