

# Mangrove, resilient shrimp production and macro-economic sustainability.



## Introduction

Mangrove ecosystems fulfil important functions. But despite recommendations the area covered continues to decrease globally. Exceptions are e.g. Vietnam, Thailand (Table at right), and Philippines where protection started over 30 year ago. Massive conversion in East-Kalimantan started in 1980.

## Project Approach

Analyse, identify and disseminate methods for management & policy development, through assessments in three communities of:

- Existing datasets.
- Mangrove's status and values of goods and services.
- Livelihood strategy of 30 households:
  - One year logbook of harvest, incomes, costs;
  - Household survey.
- Institutional analysis with local & national stakeholders.
- Economic modelling of scenarios.

## Project sites Mahakam delta, East Kalimantan

- Fishermen (trawlers) using an island : Salo-Palai
  - Fishermen/farmers using an island : Saliki
  - Pond-farmers on island with peat soil: Taddutan.
- Average farm and pond:  $0.3 \pm 10.3$ ;  $7.4 \pm 8.1$  ha.
  - Average shrimp yield: 75 kg/ha.



## Mangrove area (ha) around Pak Pharang bay (NSTT) and in Thailand (1961 – 2004)

	1961	1975	1979	1986	1989	1991	1993	1996	2004*
NSTT	61,200	15,500	12,832	8,835	8,520	8,024	7,996	8,416	10,270
Thailand	367,900	312,700	287,308	196,435	180,599	173,820	168,682	167,582	233,699

(Charupatt and Charupatt, 1997 cited in Aksornkoae and Tokrisna 2004, \*DMCR (unpublished), 2005)

## State of the System in Mahakam delta

In the Mahakam delta land-grab started since 1970 due to:

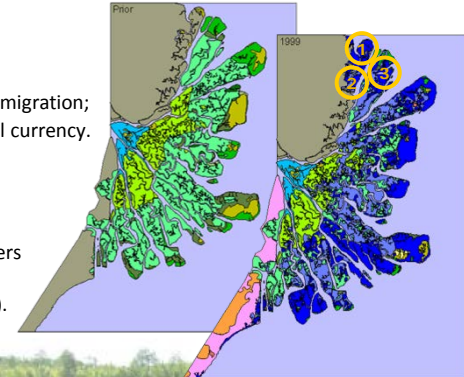
- Inconsistencies between central and local land policy;
- Excavator' owners stimulating pond' opening & labour immigration;
- Ban of trawling and high benefit of shrimp farming in local currency.

Low pond production explained by:

- Low water exchange and lack of bottom preparation;
- Impact of acid soils and diseases after 3 years;
- Absentee land-title holders exploiting immigrant caretakers whose livelihood is mainly based on collecting e.g. crabs;
- Insufficient depth of most of pond area (see picture right).

Community level planning is constrained by:

- Skewed landownership and
- complex relationships care-takers, pond-farmers, middlemen, land-title holders.



DebRoy, IIFET 2012: Total economic value (TEV) of intact mangrove forest 57,000 US\$ ha<sup>-1</sup> (India)

## Benefit & productivity of Mahakam' extensive and 2 other shrimp farming systems

For shrimp price of 6 US\$ kg <sup>-1</sup>	Extensive	Green-water associated to Mangrove (ratio 1 : 4)		Intensive
		Excl. TEV	Incl. TEV mangrove	
Profit including depreciation (\$ ha <sup>-1</sup> )	680	1,110	37,110	1,700
Rate of Return (RR) on initial cost	20%	17%		5%
Rate of Return on operating cost	218%	21%		6%
Internal RR for 10 years at 10%	14.3%	2.8%		<0%
<b>Total shrimp harvested from 11 ha</b>	<b>500</b>	<b>11,000</b>	<b>11,000</b>	<b>50,000</b>

Huge economic loss from total conversion =>

Mix of resilient intensive shrimp farming and mangrove by far most beneficial for macro-economy

## Approach

- Interactive involvement of stakeholders for:
  - well defined action plans with clear goals ;
  - appropriate indicators for monitoring.
- Consider complex relations between;
  - Owners and caretakers,
  - Residents, 'pond-owners' and state administration,
  - 'de jure' and 'de facto' legal situations around land ownership.
- Which may constrain or prevent implementation of more equitable or sustainable management strategies.



## Policy intervention needed for Indonesian deltas

- Strong control on mangrove cutting / restoration:
  - Authorise each settler to clear 30% only;
  - Oblige others to restore 70 % of the mangrove;
  - In Indonesia called *Komplagan*.
  - Plan spatial aggregation of mangrove.
- Organise claiming REDD compensation for mangrove forest.
- Financial support for more intensive shrimp production:
  - Intensive Green-Water systems from Philippines.

Contact: Roel.Bosma@wur.nl

1: Aquaculture & Fisheries, Wageningen University , Netherlands (WU),  
2: Fisheries & Marine Sc. Fac., Mulawarman Univ., East Kalimantan,  
3: University of Essex, United Kingdom.