



Photo credit: Tetsuji Ida

## Mekong Fisheries: current approaches to enhance freshwater fisheries in Cambodia and research gaps

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- About WorldFish
- Mekong River System and inland fisheries in Cambodia
- Community Fish Refuge approach to restore rice field fisheries
- Deep pool fish conservation zones in the Mekong mainstream
- Research gaps

## 概要



# Who We Are

- International research organization specialized in focused specifically on fisheries and aquaculture in developing countries
- A member of Consultative Group on International Agricultural Research
- Established in 1975
- Offices in 10 countries - Bangladesh, Cambodia, East Timor, Egypt, Malaysia (headquarters), Myanmar, Malawi, Philippines, Solomon Islands, Zambia
- 373 staff working in over 25 countries







**Mission:** to strengthen livelihoods and enhance food and nutrition security by improving fisheries and aquaculture, through research partnerships focused on helping poor producers and consumers, women and children.





# Lower Mekong River System – A Giant Wetlands Ecosystem



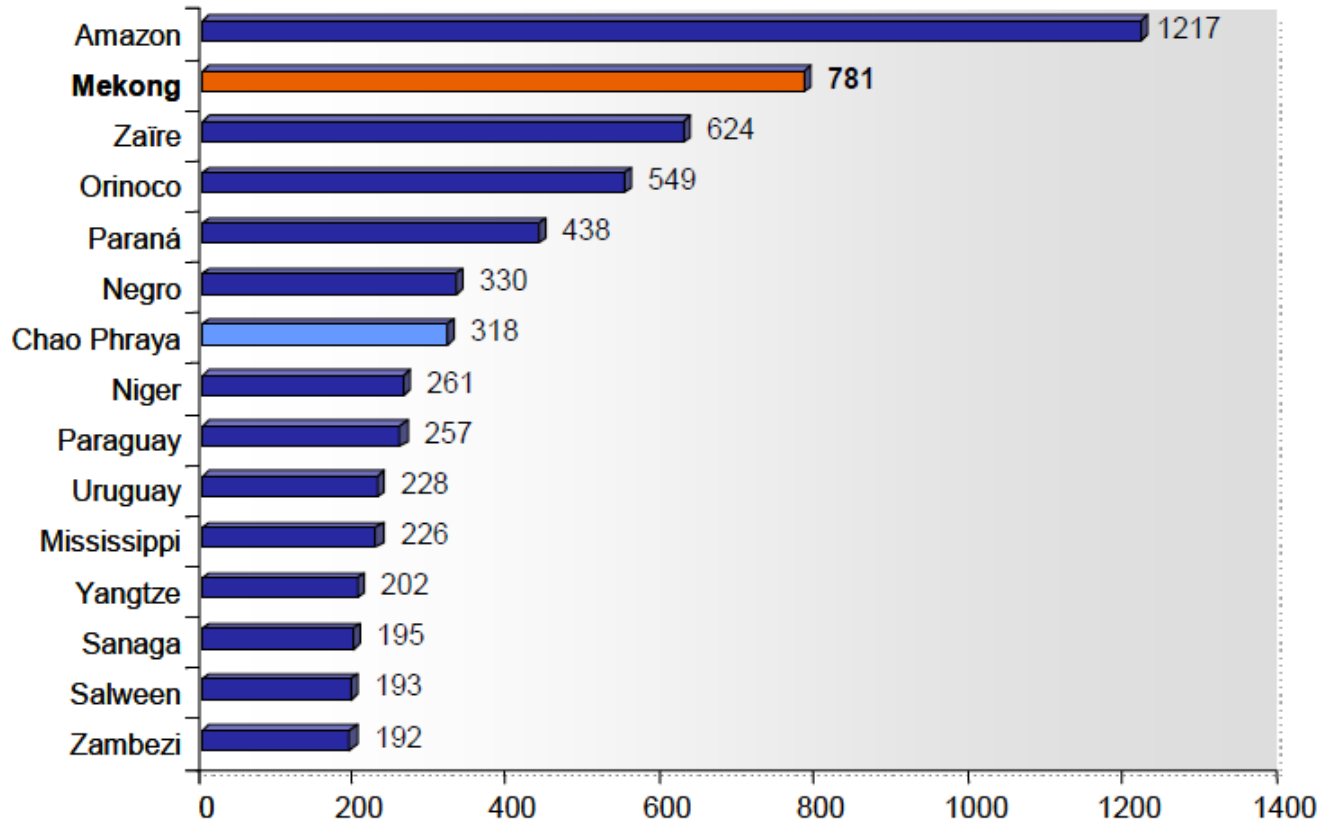
## Unique characteristics of the Mekong system:

- More than 80% of freshwater fish (for which data is available) are migratory
- 16% of migratory fish (for which data is available) are sensitive to hydrological changes or “migration triggers”
- Tonle Sap Great Lake is a part of the Mekong System

# Why is Mekong fish important?



**Second highest species diversity in the world after Amazon**



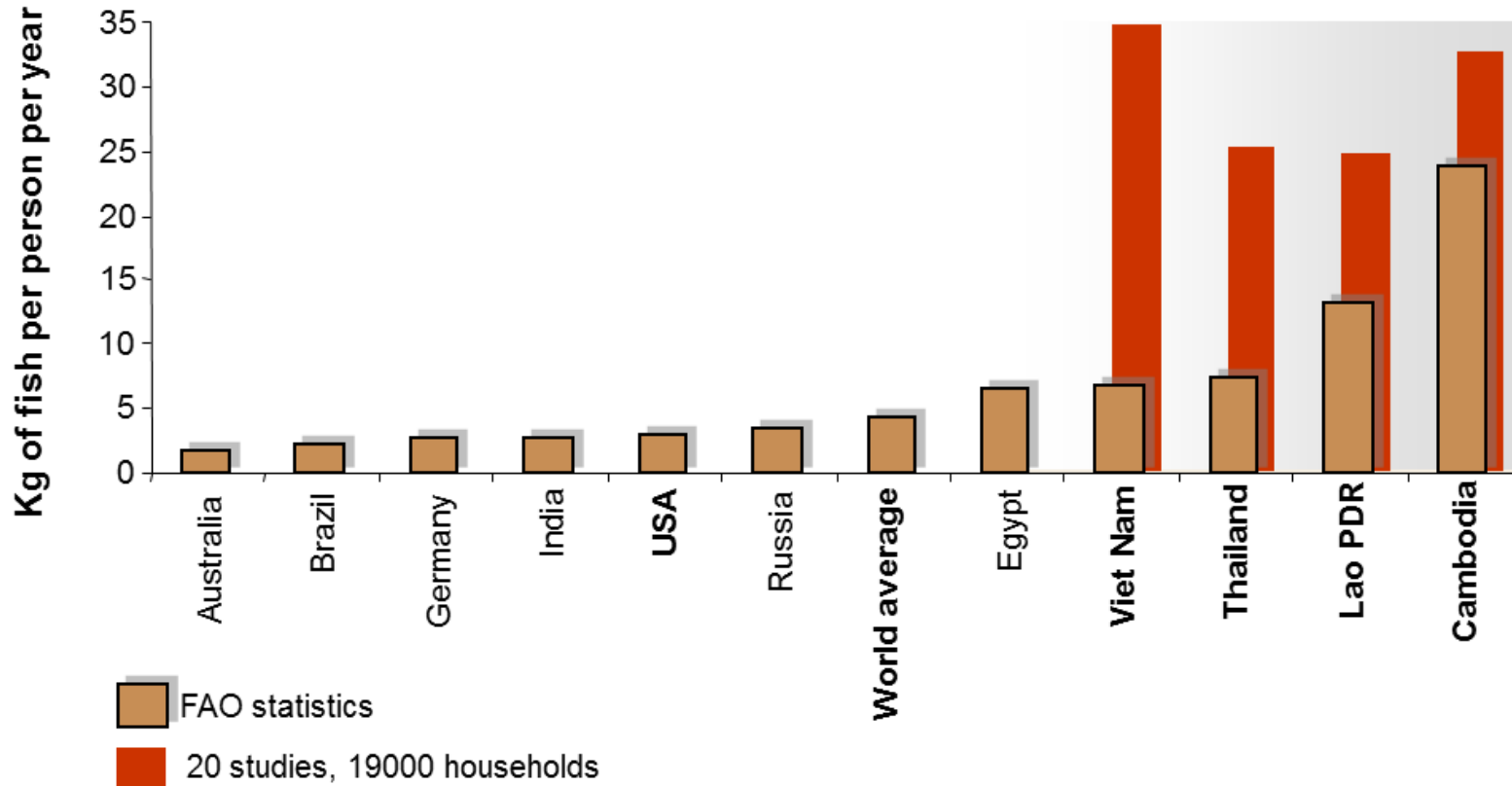
Fish species richness for different rivers of the world (Source: FishBase, December 2009)

# Why is Mekong fish important?



The most important source of animal protein in the local diet

Annual fish consumption per capita (kg)



# How big is inland fisheries in the Mekong Basin?



## Rich production

- 2.6 million MT/year, one of the most productive and intensively utilized river fisheries in the world
- Contributing to 20-25% of the World's inland fisheries production

## High economic value

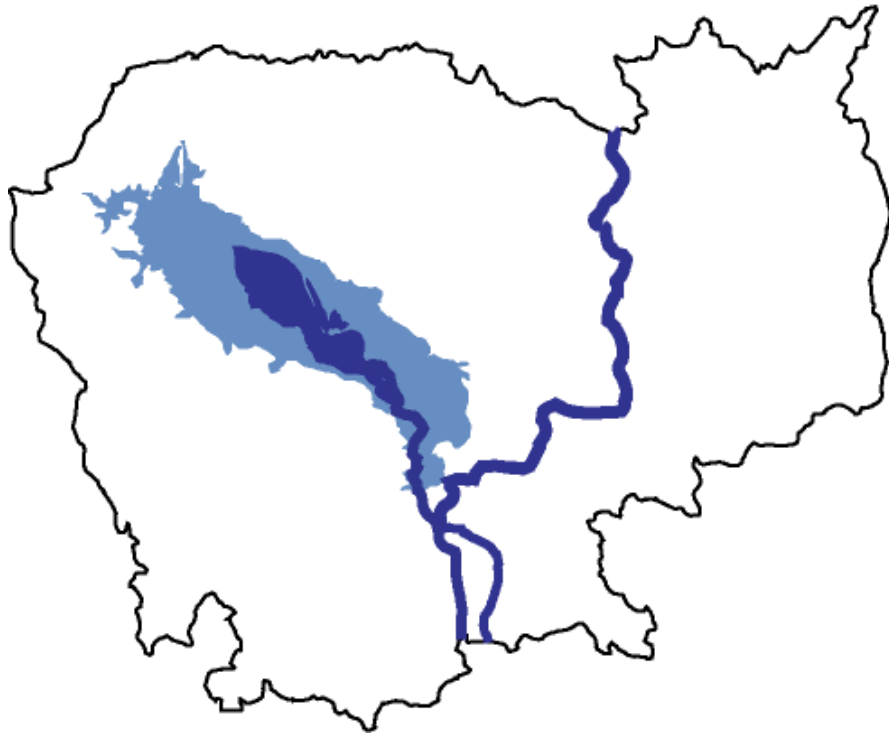
- More than USD 2 billion at landing (the value typically increases along the value chain)







# Tonle Sap Great Lake – A Dynamic Wetlands Ecosystem



Lake expands 4-6 times in size from 2,500 km<sup>2</sup> in dry season to 15,000 km<sup>2</sup> in wet season



Seasonal floodplain



Nearly 200 species of fish documented

***Where there is water, there is fish***



# Inland water fisheries support food security of Cambodia

## Key role in rural economy and food security

- 80% of the total fish production
- The 5<sup>th</sup> top producer of freshwater fish in the world (450,000-500,000 MT/year)
- 60% from Tonle Sap Lake
- = 3 times as pigs
- = 20 times as chicken
- = 80% of animal protein intake in local diet
- = 8-12% of GDP





Trammel net



Shrimp trap



Lift net



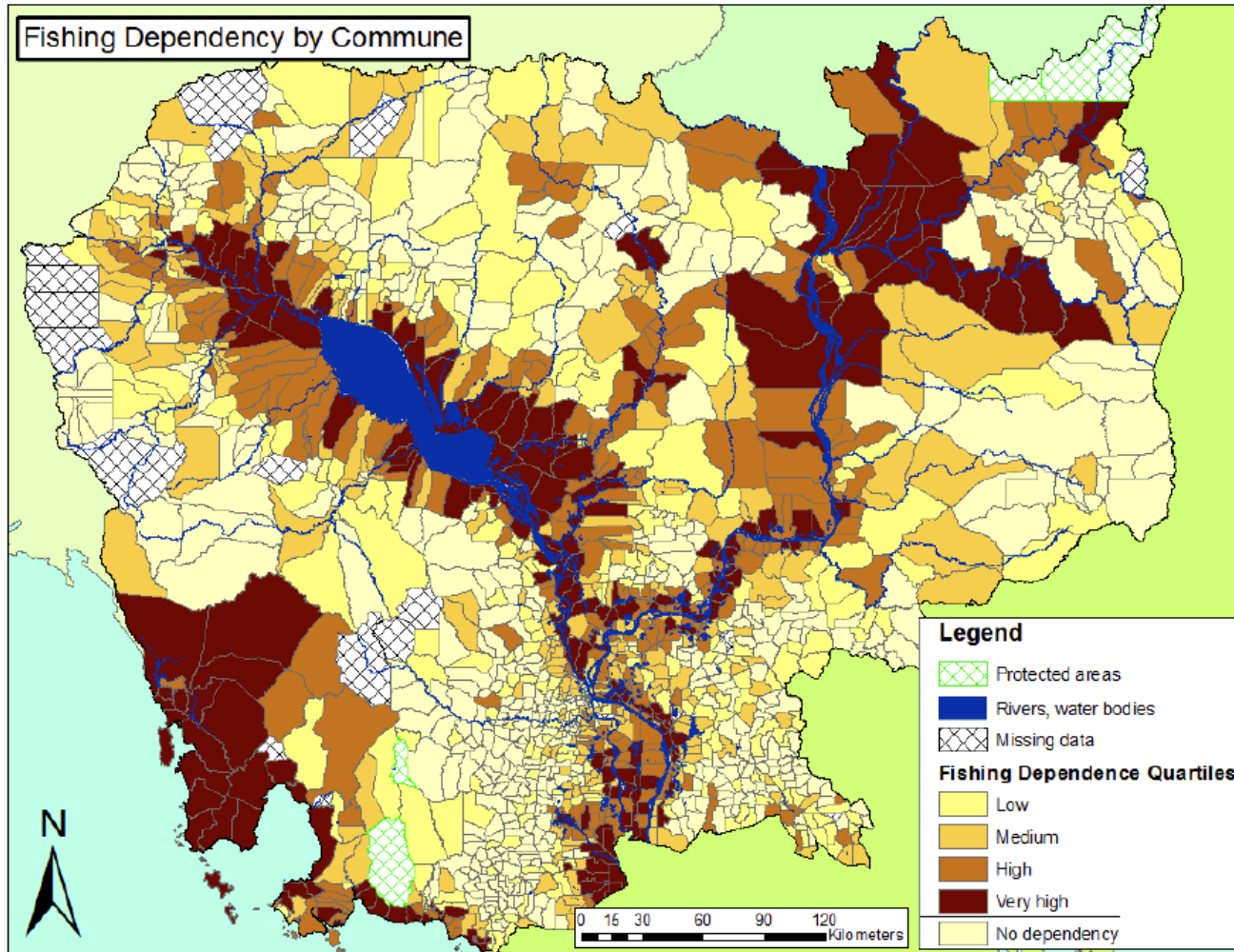
Cast net







# Distribution of Fishing dependent Communities



High concentration around Tonle Sap Lake, Mekong River, coastal zone, and wetlands

Fishing-dependent villages found everywhere in the country

Source: WorldFish Fish Valuation Project 2012



## **3 Conditions for Sustaining Mekong and Tonle Sap Fisheries:**

Seasonal hydrological changes

Healthy wetland environment

Migratory movement of fish





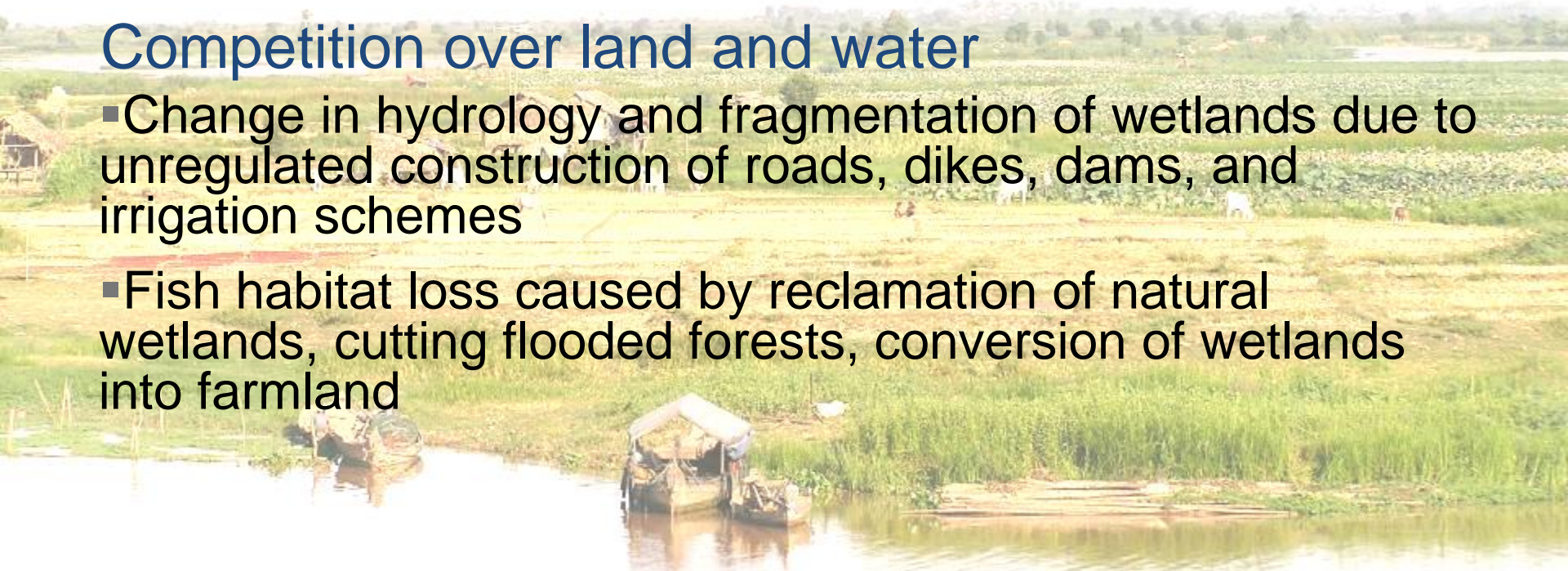
# Main causes of fisheries resource decline

## Overfishing

- Increased use of modern, more efficient fishing gear, increase in number of fishers
- Destruction of fish habitats using illegal fishing gear, harvesting of juvenile fish

## Competition over land and water

- Change in hydrology and fragmentation of wetlands due to unregulated construction of roads, dikes, dams, and irrigation schemes
- Fish habitat loss caused by reclamation of natural wetlands, cutting flooded forests, conversion of wetlands into farmland







# Fish habitat loss - medium-scale irrigation scheme interrupting floodplain



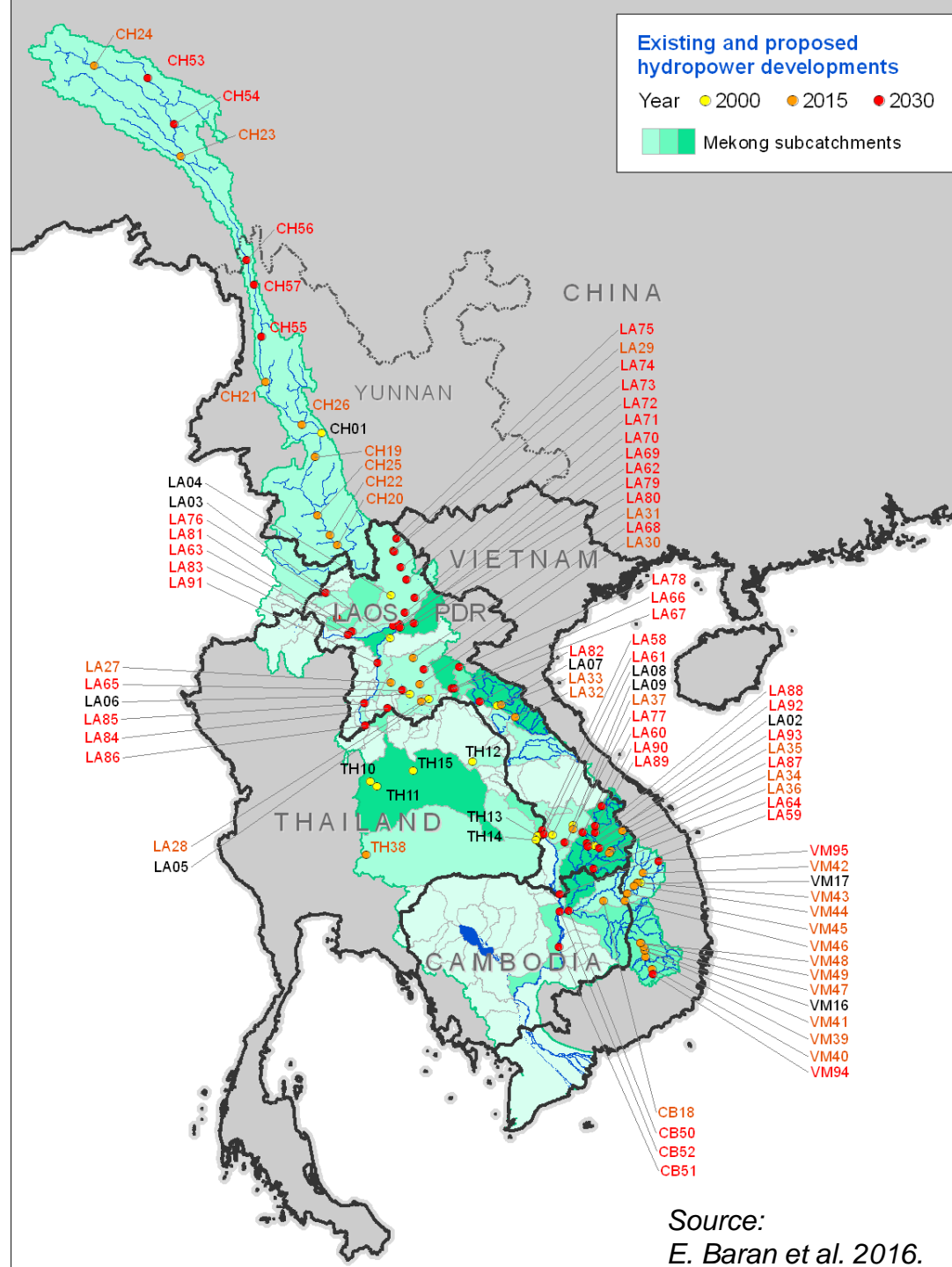
Source: Baran et al.  
2007. Built  
Structures Project  
15

# Fish migration block – hydropower dam development

## Number of hydropower or irrigation dams in Mekong Basin:

- Operational or completed - 241
- Planned - 91
- Under construction - 29
- Cancelled - 3

(As of 2015. Source: CGIAR Research Program on Water, Land, and Ecosystem web site)



Source:  
E. Baran et al. 2016.





## WorldFish Cambodia's Research Priorities

- Environmentally sustainable, pro-poor, and nutrition-sensitive aquaculture production systems
- Sustaining natural fisheries productivity in human-modified, multiple use landscapes
- Improving nutrition and food security through improving value chain of fish and fish-based products





# Approach 1: Enhancing Rice Field Fisheries through “Community Fish Refuge”

- 25-30% of total inland fish catch come from rice fields and farmland that are flooded in rainy season
- Rice field fisheries include not only fish but also other aquatic animals and plants, such as crabs, frogs, snails, insects that are importance food for Cambodian people











# Rice Field Fisheries - Top priority for resource enhancement

- Target for productivity increase in Fisheries Administration strategy
- Community Fish Refuges is promoted around the country
- Target for increasing CFRs from existing 800 to 1200 by
- Previously no established model for implementation and varied effectiveness



# **Rice Field Fisheries Project**

## **Phase I (2012-2016), Phase II (2016 – 2021)**

### **Project Goal**

**Promote sustainable rice field fishery management practices to increase benefits for poor households who are dependent on aquatic resources**

### **Project Approach**

**Enhance natural productivity of fish and other aquatic animals in rice field environments, through Community Fish Refuge (CFR) as dry season habitat of brood fish**

- Improve the physical environment and connectivity between CFR and surrounding rice fields**
- Improve institutional capacity of CFR committees and governance of CFRs**

# Community Fish Refuge (CFR) Example

At the end of wet season (Nov-Dec), fish migrates into refuge pond with receding water



Fish survives through the dry season (Jan – Apr) in refuge pond where fishing is prohibited



When the wet season starts (May – Jun), fish migrates out to rice field and floodplain where fishing is allowed





# Key Activities



## Physical improvements of CFR environment



## Research and M&E



## Community engagement & capacity building





# A well-designed CFR example



Community meeting place

Well submerged ecoshelter or *samrah*

Aquatic vegetation around the margins



Embankment used for vegetable cultivation for additional benefit

Well maintained inlet and outlet





# Key Achievements up to 2016



- Fish biomass increased on average by 30% at the project supported CFRs between 2013 and 2015
- Annual households fish catch by the project beneficiaries increased on average by 9% between 2012 and 2015
- Households in the poorest 20% category increased fish catch by 71%
- CFR management capacity assessment score increased from 1.84 to 2.6 (highest score is 3)





# Approach 2: Fisheries Management inside of a Ramsar Site, Wetlands Conservation Area

## Project Objective

- Maintain productivity of fisheries resources to support local community livelihoods

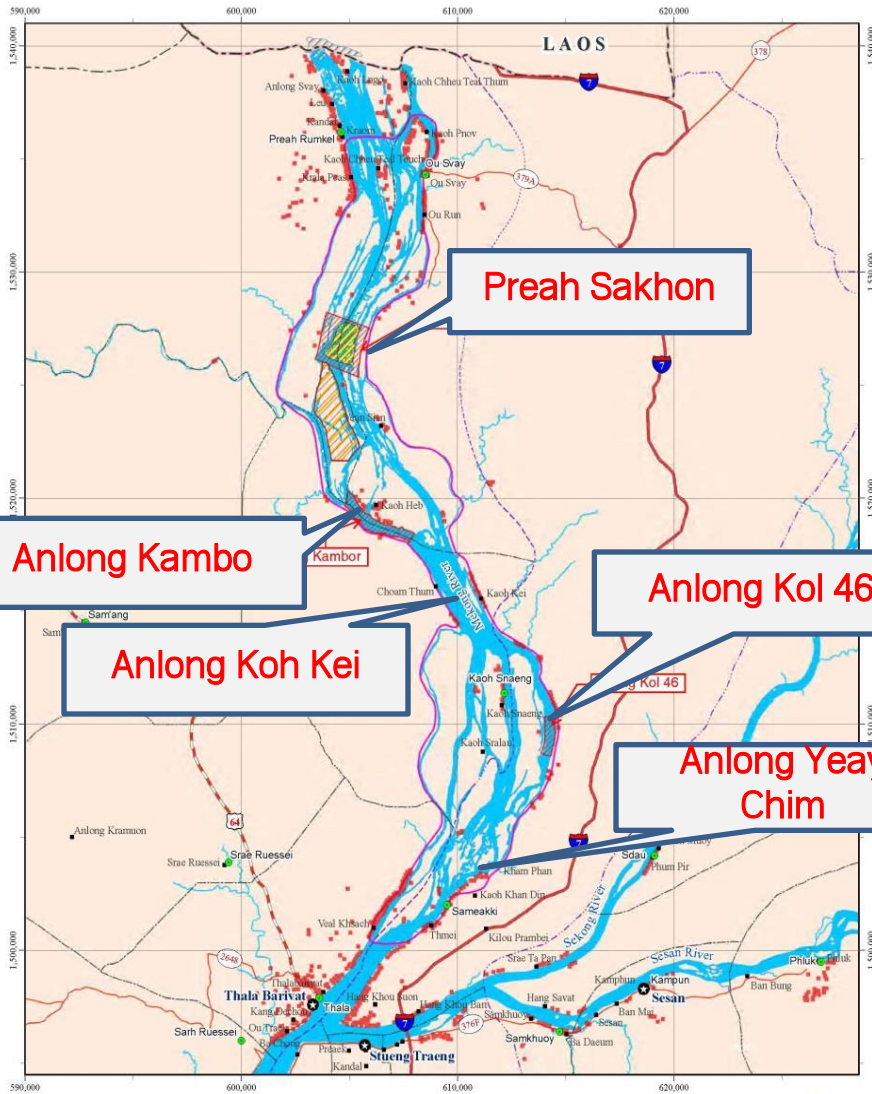
## Project Approach

- Establish a network of fish conservation areas managed through effective co-management led by local fishing communities





## Proposed Conservation Zones in Ramsar Site



# Stung Treng Ramsar Site

- Designated in 1999 as a *Wetlands of International Importance* under Ramsar Convention, but practically no management until recently
- Over 14,000 residents in 21 communities, plus distant villagers from outside, all involved in fishing to some extent
- WorldFish worked with CFI to establish 5 Fish Conservation Zones

0 2 4 km  
1:150,000  
Everest Spheroid, Indian Datum 1960,  
Universal Transverse Mercator  
Projection Zone 48 North.



**WorldFish CENTER**  
© WorldFish Center 2012  
Prepared in support of the project:  
"Stung Treng Ramsar site in  
Cambodia - Integrating fisheries  
management and wetland conservation"  
**International boundary shall not be  
considered authoritative.**  
Data Sources:  
Data source information is contained in  
the metadata of the digital datasets.

**Kol 46**



- **Khe & Koh Han, Koh Sneng**

# Multiple CFi Groups Protect FCZs Together

**Anlong Kambor**



- **Koh Hep, Koh Sneng, & Chamthom (Kambor)**

**Anlong Kho Key**



- **Koh Kei & Chamthom**

**Preah Sakhon**



- **Koh Chheuteal Touch, Kralapeas, Voeun Sean, O'svay, Orun**

**Anlong Yeay Chem**



- **Koh Khondin**



# Key Activities



- Local communities nominated and selected FCZs by themselves, based on a set of criteria
- FCZ boundaries determined based on consensus
- FCZ management rules and action plan periodically revised based on reality
- Social safeguard measures for poor families who are negatively affected by FCZs (e.g. exclusive access to fish in buffer zone in exchange of guarding the area)



# Key Activities

- Patrolling FCZs, reporting illegal fishing, confiscating illegal gear
- Regular committee meetings and progress reporting to the local authorities
- Communication of FCZ rules to other villagers and migrant fishers to request compliance





- Reduction in illegal fishing and recovery of fish resources (e.g. reappearance of larger, high value fish, easier to catch fish, sighting of Irrawaddy dolphins after many years of absence)
- Improved capacity of 14 CFi participating in the project, strengthened network of 21 CFi in the Ramsar site, and integration into provincial network
- Increased social legitimacy of CFi/FCZs because of the inclusion of social safeguards for the poor in the site management plans







# Challenges (Both Approaches)




- Illegal fishers becoming more “innovative”, often supported by local elite
  - High level political will needed to combat illegal fishing
- Degradation of aquatic environment (pesticide use, conversion of natural wetlands into farmland, blocking of wetlands and rivers)
  - Coordination needed with rice and other agriculture sectors, water development
- Dependency of community organization on external assistance



# Research Gaps

- How to improve the design of CFRs so that it can provide refuge to more diverse range of species?
- What is the role of seasonal flooding and inter-annual fluctuations in the effectiveness of CFR?
- How to optimize the use of water from CFR for multiple purposed, such as rice farming, animal raising, drinking water, and fish conservation?
- How to assess the effectiveness of CFR and FCZ on fisheries resources, what are the simple cost effective way to monitor/assess progress?
- Benefit sharing mechanism for improved fisheries, with women and marginalized stakeholder groups





**Thank you for your attention!**

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