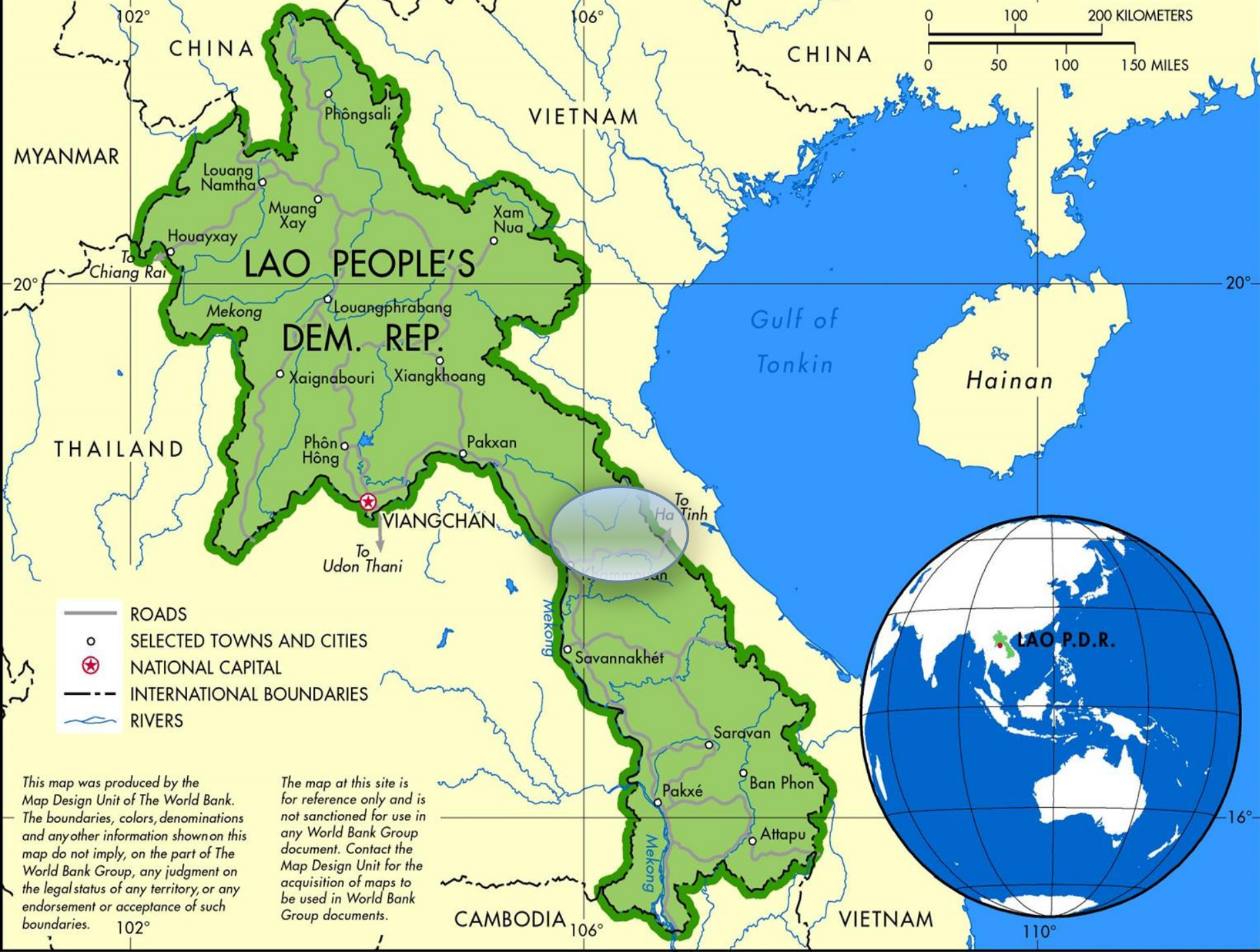


# Nam Theun 2

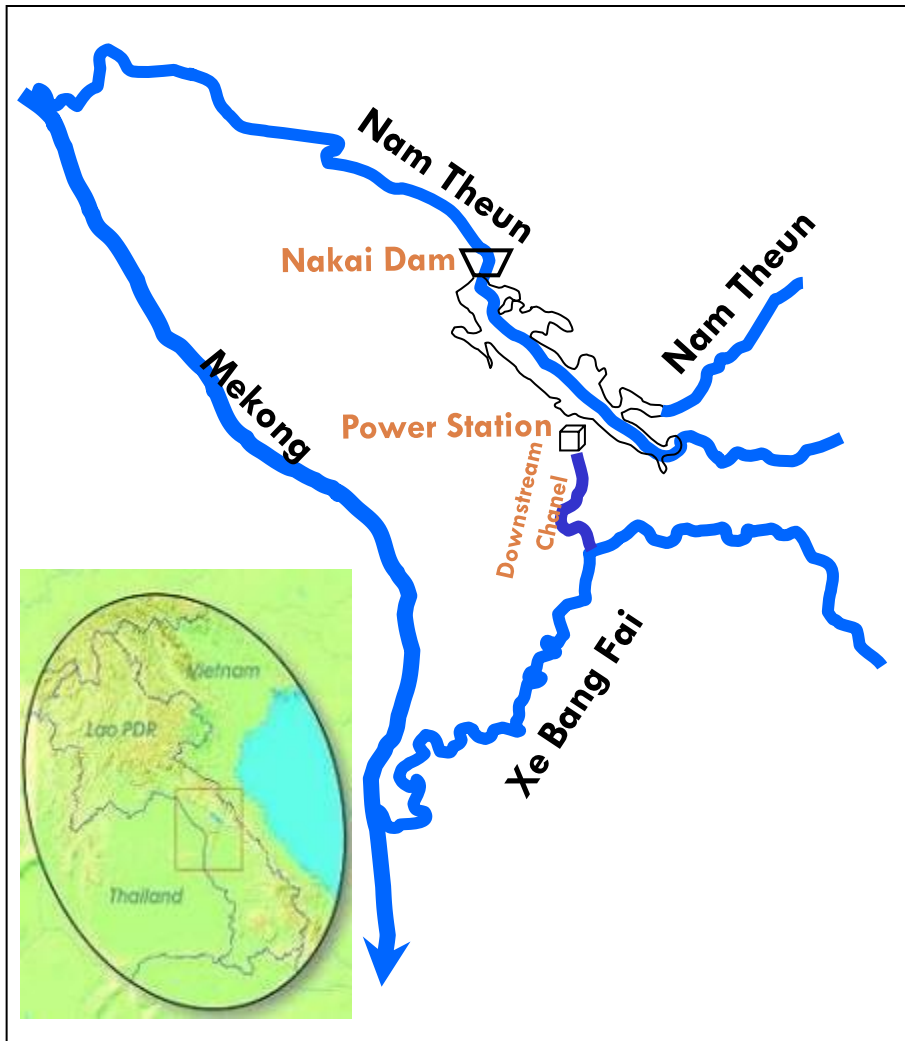


TNC workshop

April 2014

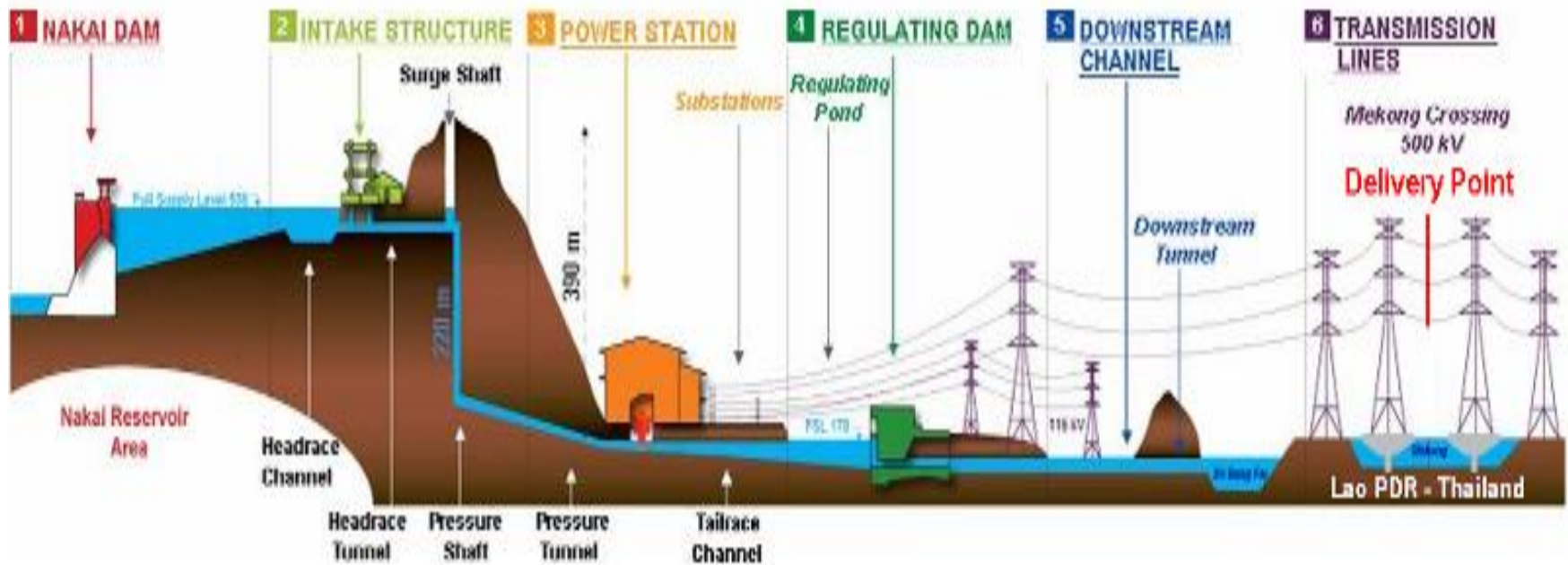


# The Hydropower Project



- Build, Operate, Transfer 25 year concession for Nam Theun Power Co.
- US\$1.3 Billion cost, financed by 27 parties (1/3 Equity; 2/3 debt)
- Generating up to 1,080 MW:
  - 1000MW sold to Thailand;
  - Up to 80MW for domestic grid
- Small wall (40m); high head (350m)
- Inter river-basin transfer from Nam Theun to Xe Bang Fai – both Mekong Tributaries
- Reservoir from 80km<sup>2</sup> to 450km<sup>2</sup> depending on season
- Generating US2 billion in revenues for Government during concession

# Technical Design









# Nakai Reservoir – December 2008

**8 NAKAI RESERVOIR**  
Catchment area : 4013 km<sup>2</sup>  
Surface area: 450 km<sup>2</sup>  
Storage volume 3,53 billions m<sup>3</sup>





# Power Intake - 2010

9



**A 9-km long Headrace Channel brings reservoir water to the edge of the plateau**

# Power Station - 2010

10

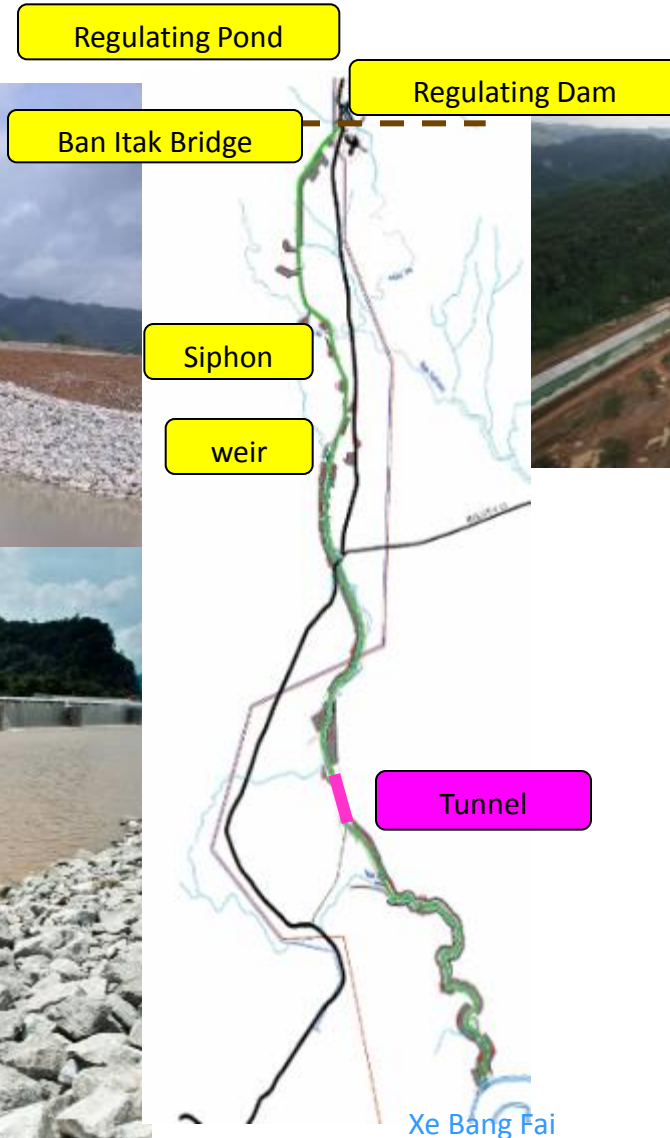


© NTPC V. Gauthier

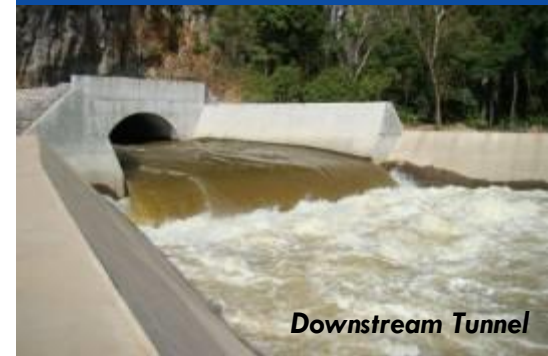


# Downstream Channel Features

12



**DOWNSTREAM CHANNEL**  
Capacity: 315 m<sup>3</sup> /s + intermediate runoff  
**Opened Channel:**  
Length: 27 km  
Width: 40 to 115 m  
**Tunnel:**  
Length: 600 m  
Diameter: 9,5 m (horseshoe)



# NT2 is a simple project...

13

1. Build a hydropower facility in Lao PDR;
2. Sell the electricity to Thailand for 25 years;
3. Spent the US\$2 Billion in revenue on poverty reduction and environmental protection.

# ...with one or two complications

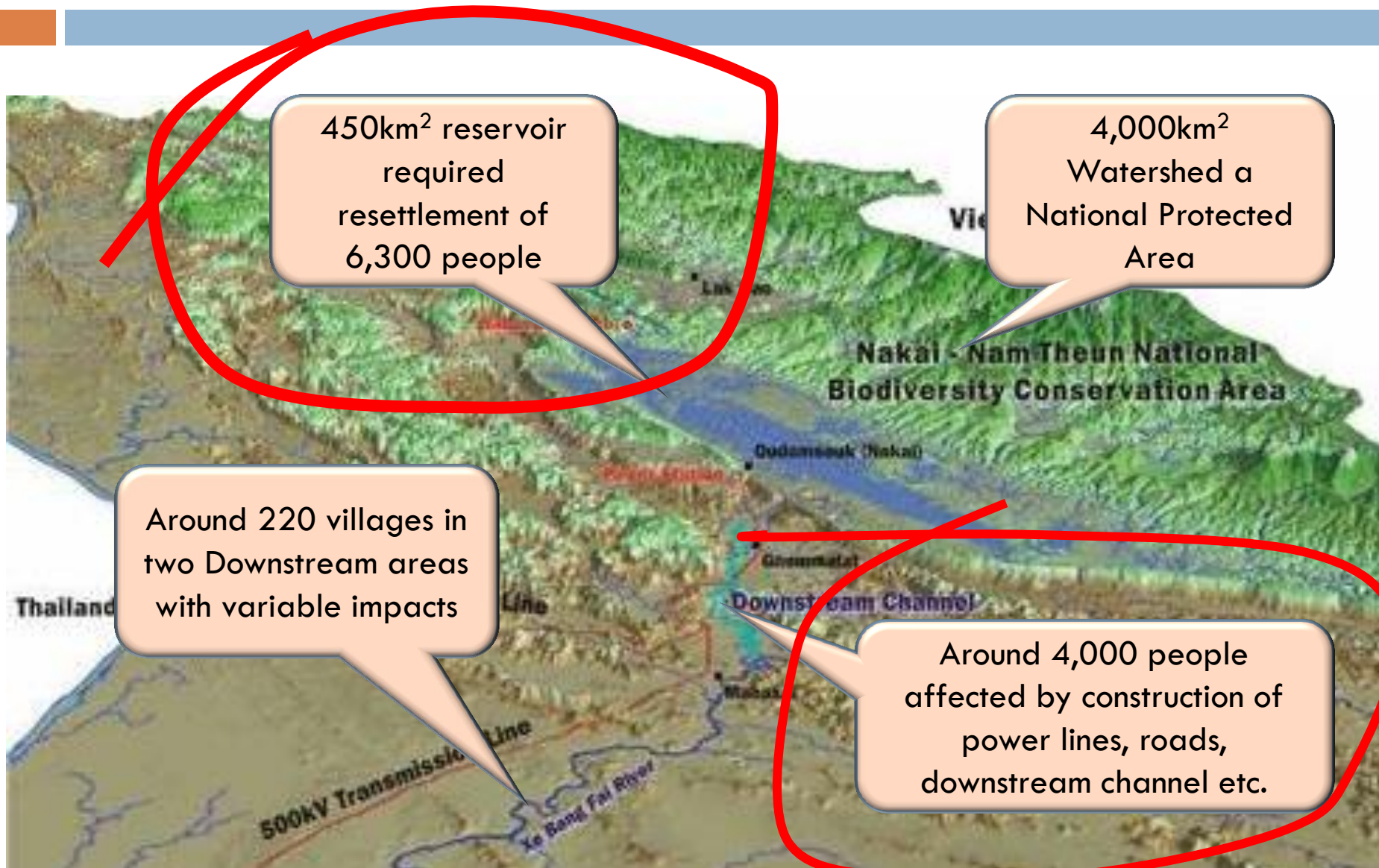
14

1. Build a hydropower facility in Lao PDR;
  - ▣ Complex engineering in a remote landlocked environment
  - ▣ A US\$1.45b financing package backed by 27 institutions
  - ▣ Large physical footprint – a 200km by 50km project area
    - Need to resettle 6,200 people
    - Three 'downstreams' in an inter-river basin project
2. Sell the electricity to Thailand for 25 years;
  - ▣ Needs a robust long-term Power Purchase Agreement
  - ▣ New 500kv lines; islands in the area
3. Spent the US\$2 Billion on poverty reduction and environmental protection.
  - ▣ New approach to budgeting, monitoring and evaluation

World Bank Complications:

- First major World Bank investment in hydropower after the World Commission on Dams
- Triggered all 10 safeguard policies

# Understanding the E&S Challenges



# NT2 Benefits

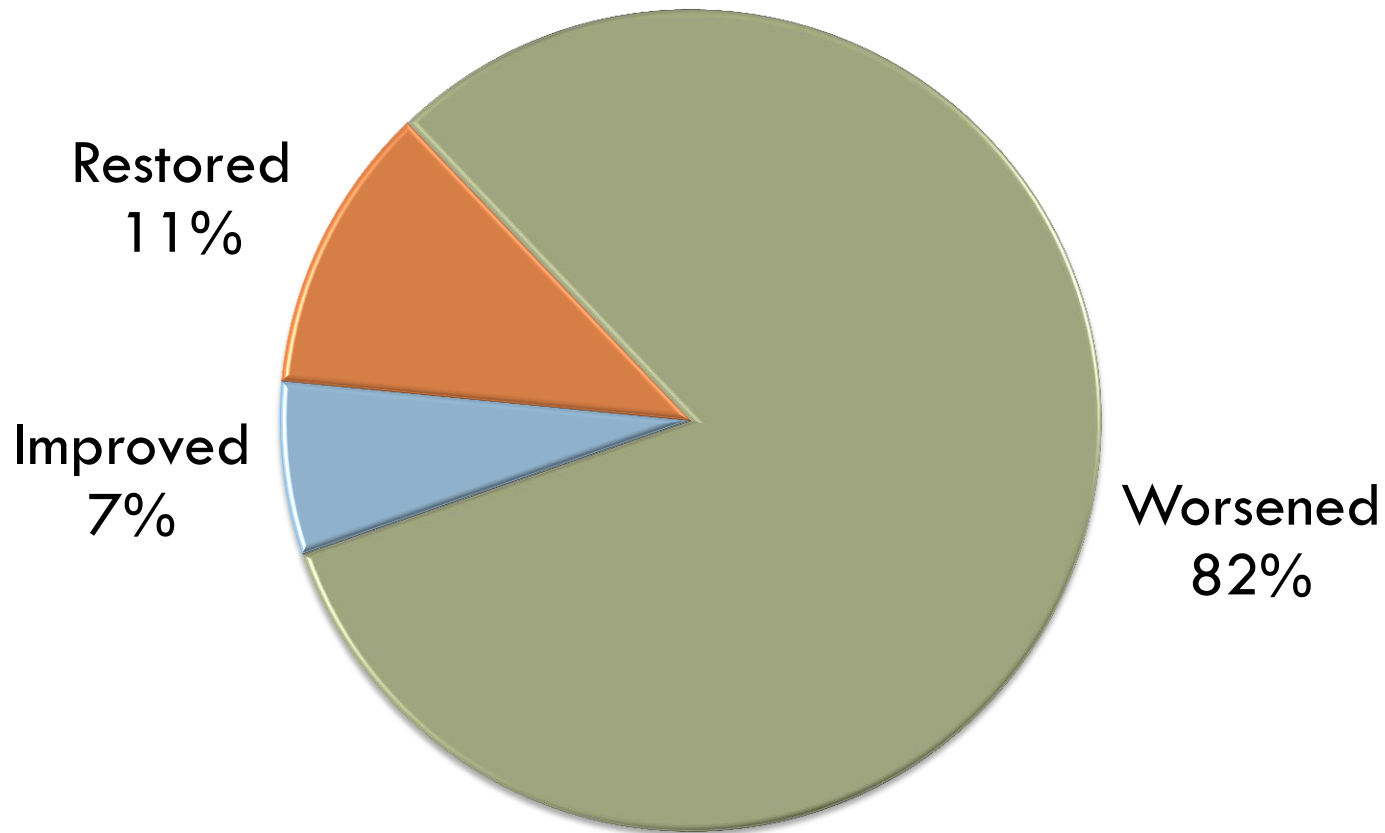
- Revenues (US\$2 billion over 25 years)
- Electricity (1080MW installed capacity)
- Social programs for impacted communities
  - ▣ Double resettler incomes
  - ▣ Assist downstream communities
- Environmental protection for watershed/protected area
  - ▣ US\$1m/year from project
- Lots of local assets
  - ▣ 270km of new and upgraded roads
  - ▣ Health centers, schools, water supply etc.



# Socioeconomic Impact of Resettlement:

Study of 44 Dams across the world (Scudder)

Living Standards of the Majority of Resettled People are:



# Why is Hydro Resettlement so Hard?

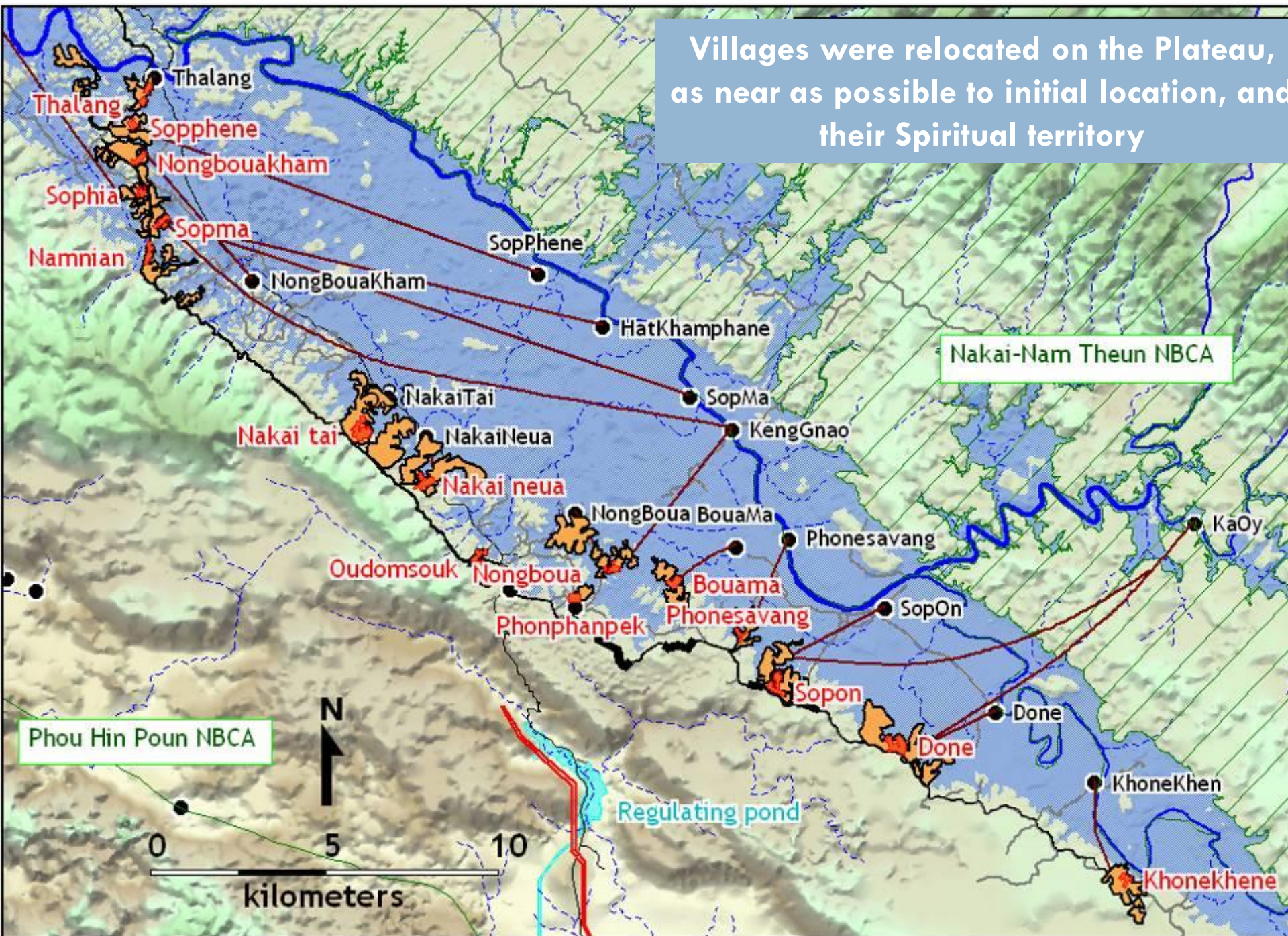
- **Scale:** Many people involved
- **Degree of social change:** Moving whole communities not just households
- **Livelihoods:** Often impacting large amounts of land, forest, and livelihoods (not ribbon development)
- **Vulnerability:** Hydropower often done in remote mountainous areas → disproportionately ethnic minorities / indigenous peoples
- **Complexity:** Many actors need to cooperate; diverse skills needed to design programs

# Life on Nakai Plateau before NT2



- ❑ One of poorest districts in Laos
- ❑ Half of villages with no road access
- ❑ 50% of people rice deficient for half the year
- ❑ 60% of children did not attend school

Villages were relocated on the Plateau, as near as possible to initial location, and their Spiritual territory



# Major Improvement of Living Conditions



# Building new lives

## □ development of sustainable income generating activities

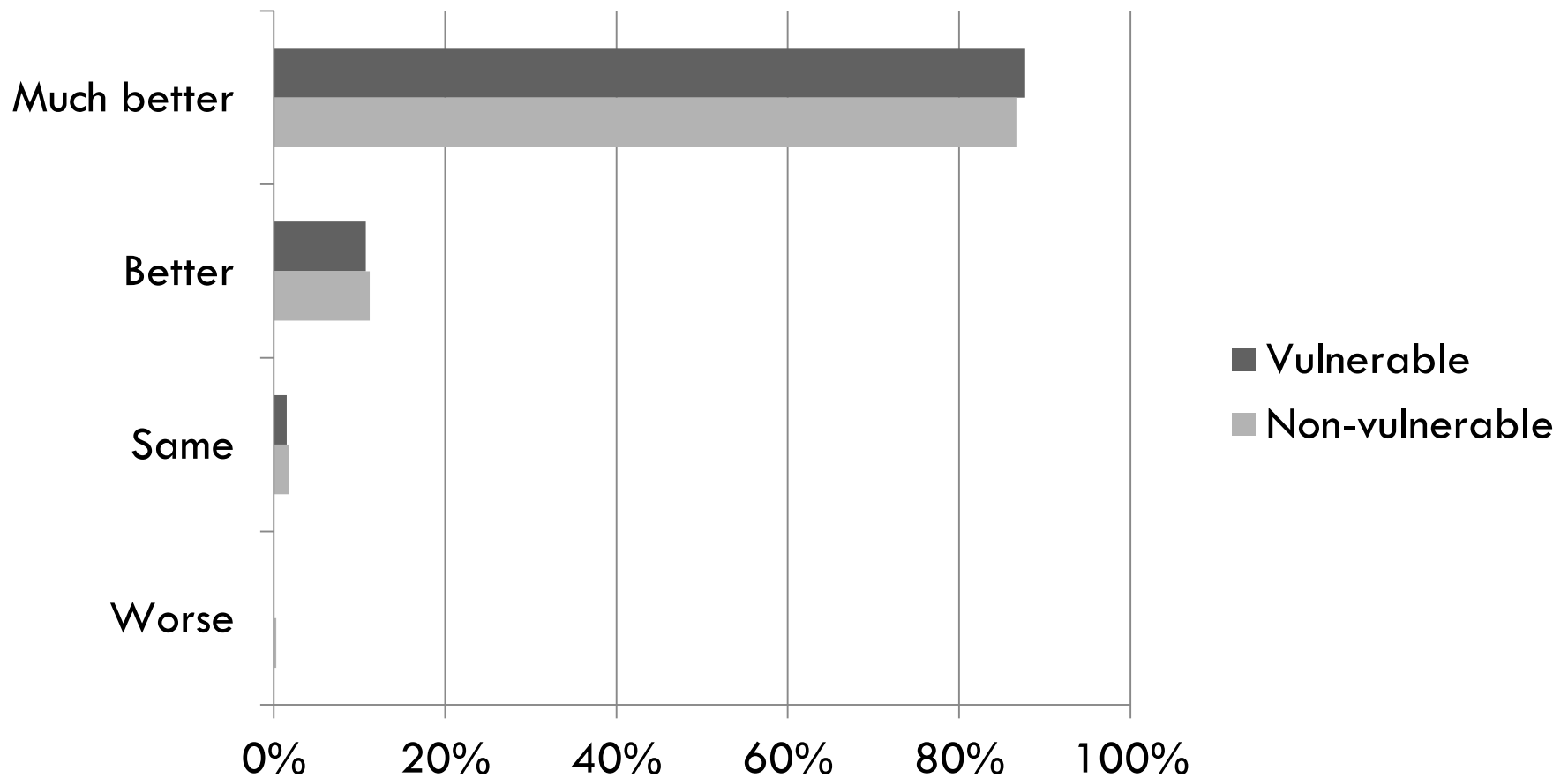
- Agriculture
- Fisheries
- Community Forestry
- Livestock (small and large)
- Off-farm activities

## □ Improvement of

- Health status (health services, health education, nutrition, family planning)
- Education
- Roads and access, communication, electricity, water/sanitation, housing
- Access to markets

# Major Improvements in community perceptions of their own lives

How does life now compare with life before resettlement?

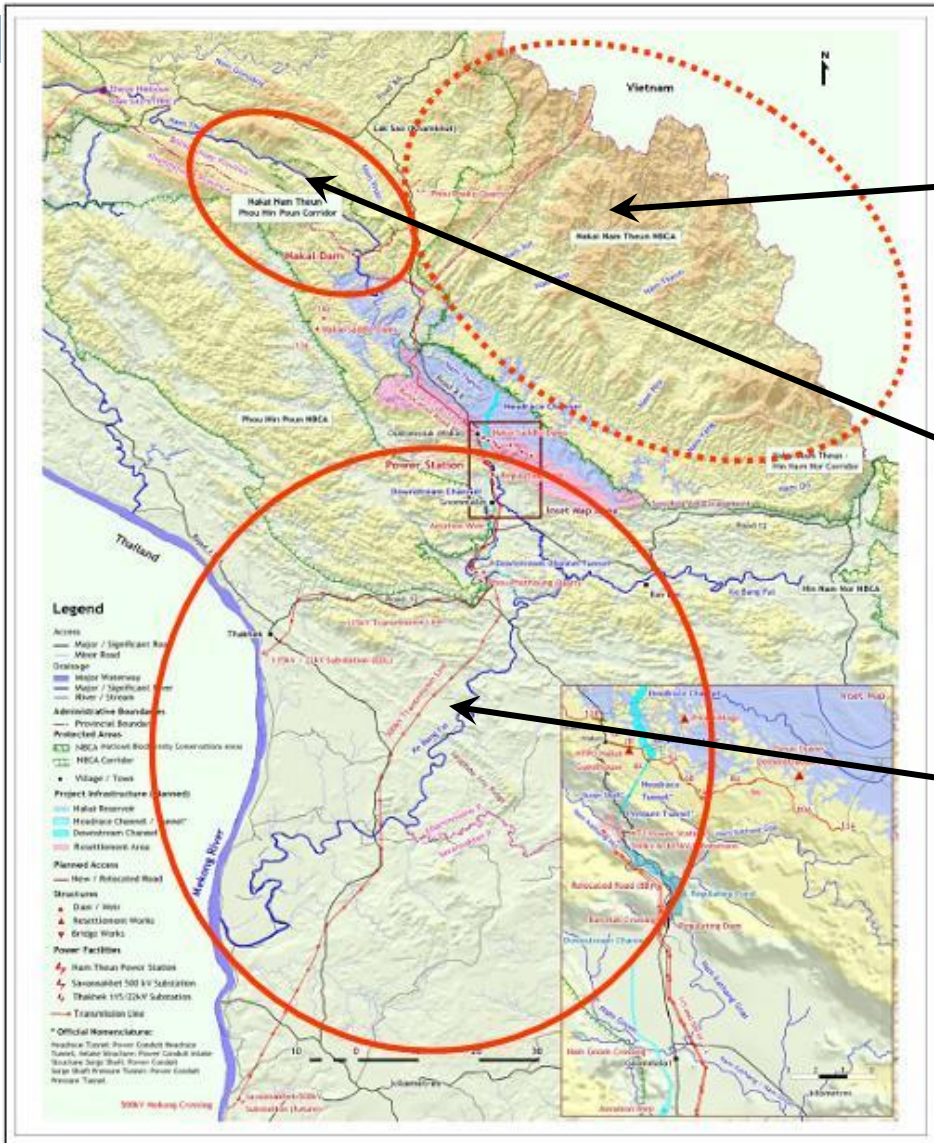


# Livelihoods post resettlement

- **Not about returning to the past**; need to help people prepare for the future
- NT2 aims to sustainably and significantly **improve** incomes → exact target less important than the **incentive of focusing on an outcome (not on inputs)**
- Five Pillars: Agriculture; Livestock; Forestry; Fisheries; off-farm
- Three challenges:
  1. Technical
  2. Community development and change
  3. Security and protection from outsiders



# Three “Downstream” Areas



Upstream of the Reservoir (Watershed)

Downstream of the dam (Nam Theun)

Downstream of Power Station (Xe Bang Fai)



# Downstream Development / Livelihoods

## □ Mitigate downstream releases impacts:

- Develop alternative income generating activities to fisheries and contribute to local development
- Design and construct specific infrastructures to mitigate hydrological potential changes
- Monitor actively potential impacts



Increased discharge → loss of garden areas.  
River bank gardens registration and compensation



Modification of irrigation pumps to accommodate water level fluctuation, repair of flood gates



Aeration Weir to improve quality of the released water – comprehensive water monitoring



NT2 stops operation when Xe Bang Fai River overtops its banks at Mahaxai



# Watershed Protection

Protected area: 4,000 km<sup>2</sup> – largest in the Lao PDR



- Preservation of a unique biodiversity in a National Protected Area :
  - NTPC fund: US1m / year (for 31 years)
  - GOL: implementation of the Watershed Management Protection Authority (WMPA)
- Support to village development
- Protection programs of wildlife
  - Rescue successfully completed
  - Baseline inventories completed
  - Wetland construction and vegetation program

# Roads

- 270km of new and upgraded roads
- Dramatically shifts access
  - ▣ All season access for many villages for first time
  - ▣ Travel time from provincial to district capital from around 4 hours to 90mins in dry season
- Company hands over US\$102m of assets (primarily roads) to government
- Annual maintenance burden of approx \$650,000

Big benefit, but not sustainable in current setup

# Different Timeframes

1993 2003 2005 2008 2009 2014 2034

## Contractual

✦ Development agreement

Concession and power purchase agreements

Financing

End of concession ✦

## Technical

Design and engineering

Construction

Operation and maintenance

## Environmental and social

Consultation and design

✦ Pilot program

Resettlement infrastructures

Res. livelihood

Downstream livelihood

Wildlife conservation

Revenues from the project:

- US\$2,000 million over the 25-year concession period (dividend, tax and royalty charges),
- US\$240 million yearly after concession period,

75 MW of competitively priced power and additional transmission facilities,

Roads improvement.



LAO PDR



Competitive price (4.2 US cents/kWh at the border),

Stable price:

- Low escalation rate,
- No fuel adjustment mechanism,

Built-in flexibility (frequency and voltage control),

Contribution to electricity delivery to northeastern provinces of Thailand.

**POWER PURCHASER**



- New villages and new houses,
- Permanents roads,
- Clean drinkable water and electricity,
- Irrigation facilities,
- Year-round boating on downstream rivers,
- New and improved schools, health facilities and community buildings,
- New livelihood opportunities,
- Access to reservoir for fishing,
- Labour opportunities.

**LOCAL COMMUNITIES**

## SHARING NT2 BENEFITS

### INVESTORS

Reasonable ROI (established with GOL),

Construction and operation remuneration (transparently justified and independently monitored).

### GLOBAL COMMUNITY



Saving on CO<sub>2</sub> emissions:

Project funded protection of a 4,000 km<sup>2</sup> National Biodiversity Conservation Area:

US\$1 million per year.















Downstream channel

