Basin Development Plan Programme Phase 2

## Economic, Environment and Socical Impact Assessment of Basin-wide Development Scenarios

# Preliminary Economic Assessment

# Presentation Outline

- General approach to economic assessment
- Main findings of preliminary assessment
- Next steps

# General Approach to Economic Assessment

- **Economic Growth:** net present value (NPV) of incremental net economic benefits and losses for each development scenario to reflect contribution to LMB economy
- **Equity:** economic benefits distributed between LMB countries to indicate main beneficiaries from water resources development
- **Employment:** impact on number of jobs and livelihoods created and lost due to interventions under each development scenario
- **Risk and Uncertainties:** sensitivity analysis to assess with impact of change with respect to expected benefits and costs as well as economic losses

# Economic Impact on Key Indicators

| Direct Benefits | Indirect Benefits | Indirect Losses |
|---|---|---|
| Increased energy production from hydropower<br><br>Increased agricultural production from irrigation expansion<br><br>Increased fisheries production from reservoirs and aquaculture | Reduced flood damages to crops and infrastructure<br><br>Increased crop production due to reduced salinity<br><br>Enhanced navigation during dry season | Reduced capture fisheries production<br><br>Decline in wetland areas and other eco-systems<br><br>Increased riverbank erosion |

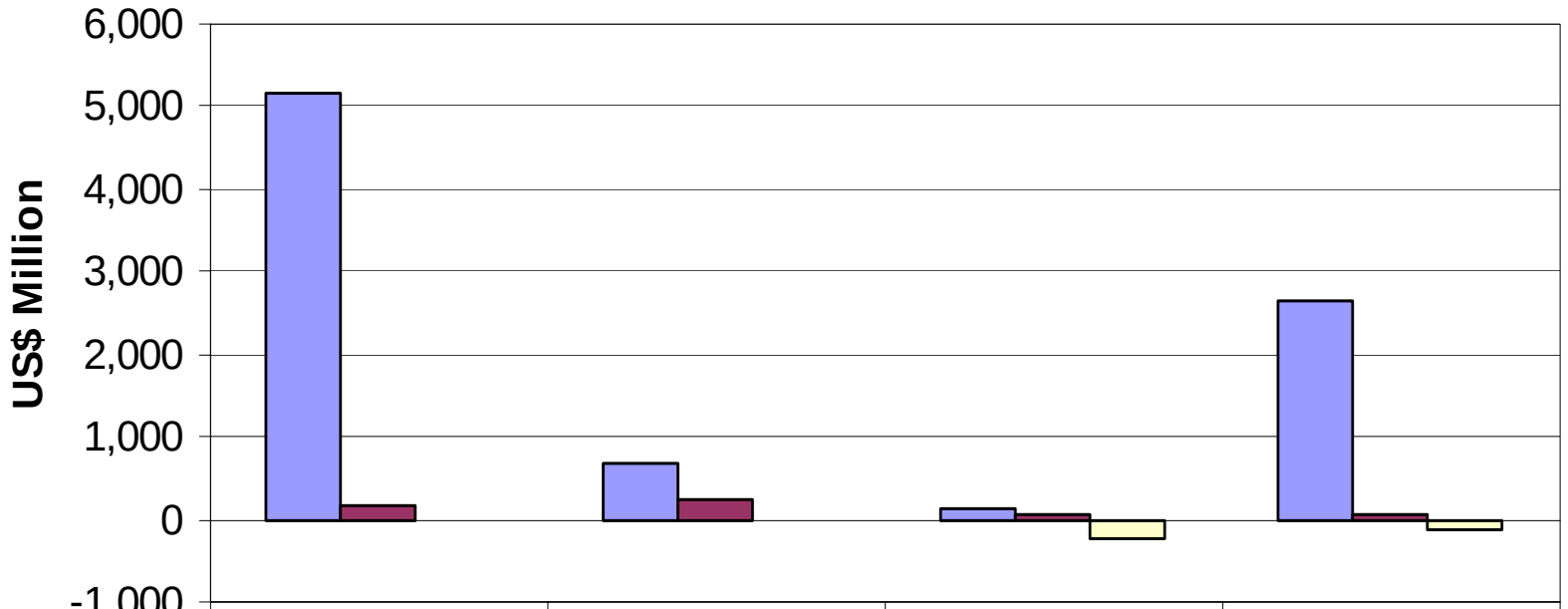
# Main Findings of Preliminary Assessment

- Definite Future Scenario
- Foreseeable Future Scenarios (20 Year Plan):
  - All tributary mainstream and dams
  - Without mainstream dams
  - Without lower mainstream dams
  - Without Thai mainstream dams
- Flood Management in Mekong Delta

# Definite Future Scenario

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower (LMB only) | 6,032 MW | 8,200 |
| Reservoir fisheries | 39,348 tons/year | 429 |
| Flood damage mitigation | 200,728 ha | 455 |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 9,153 |
| Net Economic Losses | | |
| Capture fish catch losses | -69,235 tons/annum | -392 |
| Wetland area lost | -38,638 ha | -21 |
| Area lost to bank erosion | n | n |
| sub-total | | -414 |
| Overall Net Benefits/Losses | | 8,739 |

# Definite Future Scenario:
# Distribution of Economic Benefits and Losses

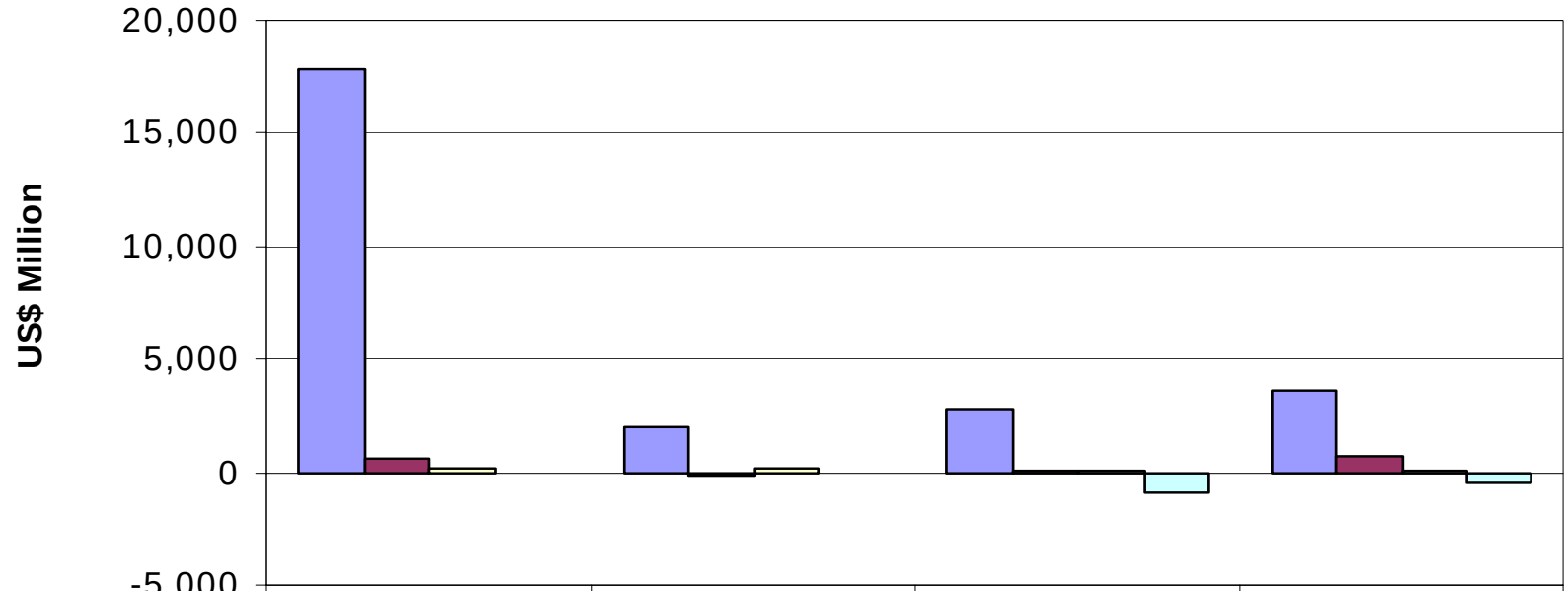



| | Lao PDR | Thailand | Cambodia | Vietnam |
|---|---|---|---|---|
| Direct Benefits | 5,177 | 666 | 124 | 2,663 |
| Indirect Benefits | 175 | 233 | 51 | 65 |
| Indirect Losses | -26 | -29 | -233 | -127 |

# Foreseeable Future Scenario: All Dams

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower | 27,505 MW | 26,335 |
| Irrigated agriculture | 1.99 M ha | 86 |
| Aquaculture/reservoir fisheries | 0.82 M tons/year | 1,135 |
| Flood damage mitigation | 0.23 M ha | 367 |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 27,987 |
| Net Economic Losses | | |
| Capture fish catch losses | -0.45 M tons/year | -1,480 |
| Wetland area lost | -51,502 ha | -17 |
| Area lost to bank erosion | n | n |
| sub-total | | -1,497 |
| Overall Net Benefits/Losses | | 26,490 |

# Foreseeable Future Scenario: All Dams
# Distribution of Economic Benefits and Losses

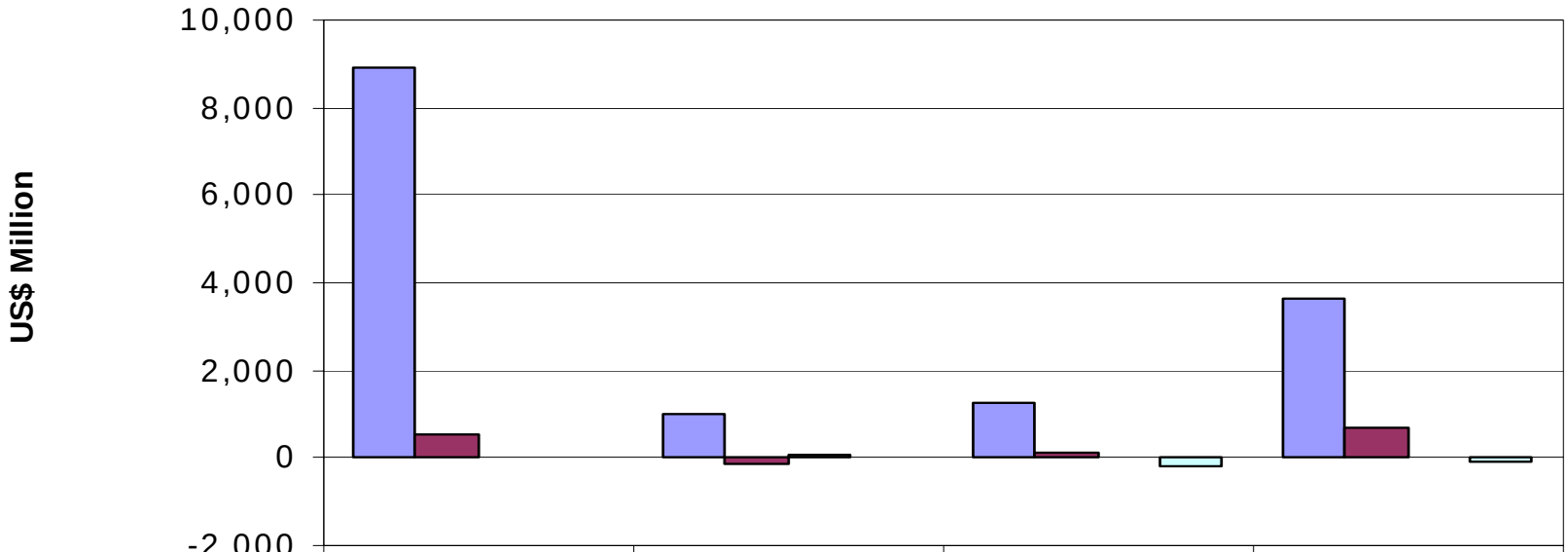



| | Lao PDR | Thailand | Cambodia | Vietnam |
|---|---|---|---|---|
| Hydro Benefits | 17,892 | 2,027 | 2,780 | 3,636 |
| Agric/Fish Benefits | 557 | -117 | 98 | 684 |
| Indirect Benefits | 126 | 189 | 49 | 72 |
| Indirect Losses | -25 | -90 | -915 | -467 |

## Foreseeable Future Scenario: Without Mainstream Dams

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower | 11,241 MW | 14,813 |
| Irrigated agriculture | 1.99 M ha | 86 |
| Aquaculture/reservoir fisheries | 0.75 M tons/year | 1,107 |
| Flood damage mitigation | 0.20 M ha? | ? |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 16,070 |
| Net Economic Losses | | |
| Capture fish catch losses | -0.06 M tons/year | -239 |
| Wetland area lost | -50,000 ha? | ? |
| Area lost to bank erosion | n | n |
| sub-total | | -239 |
| Overall Net Benefits/Losses | | 15,831 |

# Foreseeable Future Scenario: Without Mainstream Dams
# Distribution of Economic Benefits and Losses

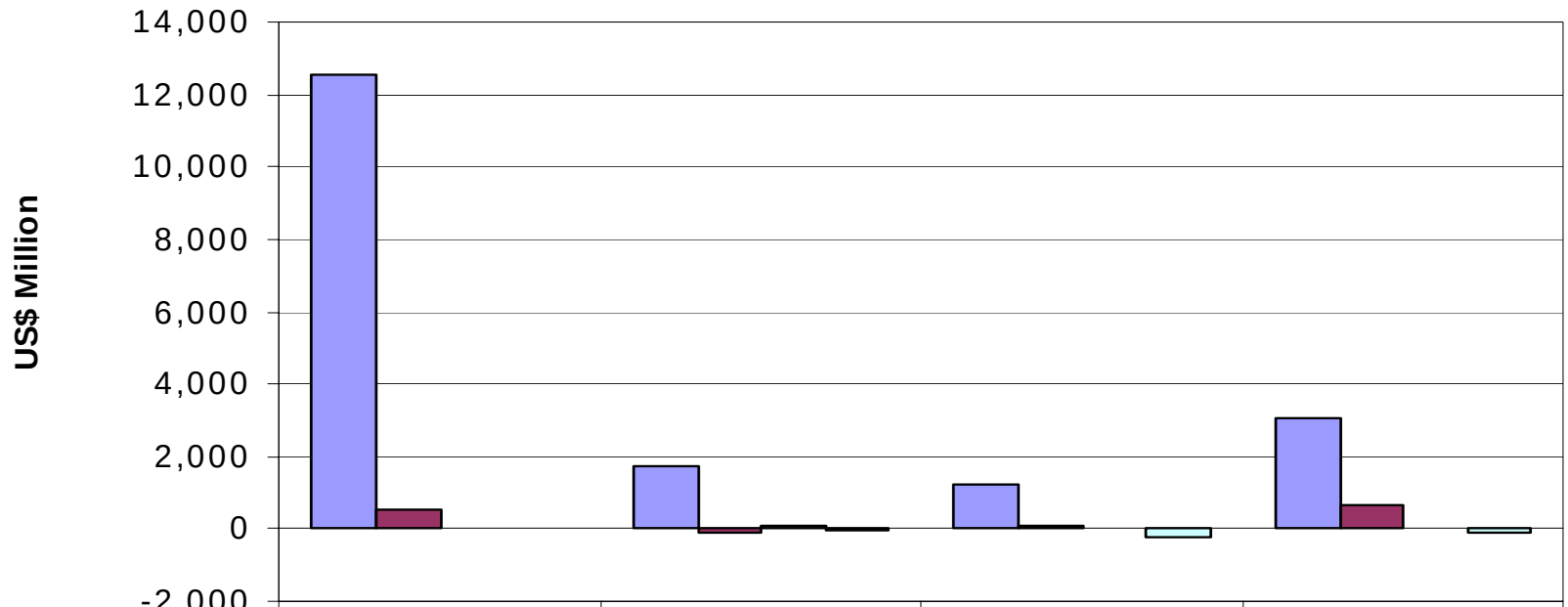



| | Lao PDR | Thailand | Cambodia | Vietnam |
|---|---|---|---|---|
| Hydro Benefits | 8,930 | 992 | 1,255 | 3,636 |
| Agric/Fish Benefits | 544 | -128 | 107 | 670 |
| Indirect Benefits | 0 | 64 | 0 | 5 |
| Indirect Losses | 23 | 1 | -165 | -98 |

## Foreseeable Future Scenario: Without Lower Mainstream Dams

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower | 18,719 MW | 18,596 |
| Irrigated agriculture | 1.99 M ha | 86 |
| Aquaculture/reservoir fisheries | 0.81 M tons/year | 1,130 |
| Flood damage mitigation | 0.20 M ha? | ? |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 19,876 |
| Net Economic Losses | | |
| Capture fish catch losses | -0.10 M tons/year | -350 |
| Wetland area lost | -50,000 ha? | ? |
| Area lost to bank erosion | n | n |
| sub-total | | -350 |
| Overall Net Benefits/Losses | | 19,526 |

# Foreseeable Future Scenario: Without Lower Mainstream Dams
## Distribution of Economic Benefits and Losses

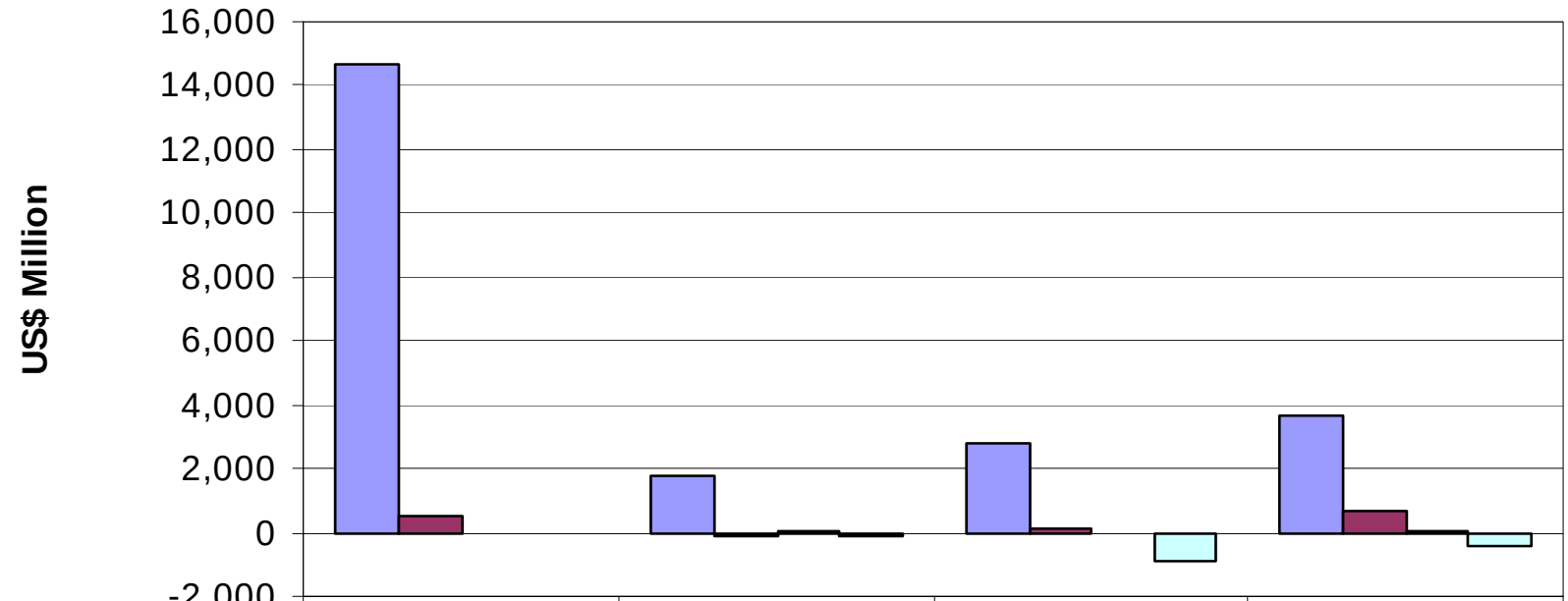



| | Lao PDR | Thailand | Cambodia | Vietnam |
|---|---|---|---|---|
| Hydro Benefits | 12,555 | 1,723 | 1,255 | 3,063 |
| Agric/Fish Benefits | 551 | -122 | 111 | 677 |
| Indirect Benefits | 0 | 64 | 0 | 5 |
| Indirect Losses | -4 | -19 | -208 | -119 |

## Foreseeable Future Scenario: Without Thai Mainstream Dams

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower | 24,556 MW | 22,821 |
| Irrigated agriculture | 1.99 M ha | 86 |
| Aquaculture/reservoir fisheries | 0.81 M tons/year | 1,124 |
| Flood damage mitigation | 0.20 M ha? | ? |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 24,095 |
| Net Economic Losses | | |
| Capture fish catch losses | -0.45 M tons/year | -1,480 |
| Wetland area lost | -50,000 ha? | ? |
| Area lost to bank erosion | n | n |
| sub-total | | -1,480 |
| Overall Net Benefits/Losses | | 22,615 |

# Foreseeable Future Scenario: Without Thai Mainstream Dams
## Distribution of Economic Benefits and Losses




| | Lao PDR | Thailand | Cambodia | Vietnam |
|---|---|---|---|---|
| Hydro Benefits | 14,648 | 1,757 | 2,780 | 3,636 |
| Agric/Fish Benefits | 554 | -120 | 97 | 680 |
| Indirect Benefits | 0 | 64 | 0 | 5 |
| Indirect Losses | -24 | -87 | -903 | -467 |

# Foreseeable Future Scenario: Without 2 Dams in Cambodia

| Net Benefits & Losses | Quantity | NPV (US$ M) |
|---|---|---|
| Net Economic Benefits | | |
| Hydropower | 23,225 MW | 24,118 |
| Irrigated agriculture | 1.99 M ha | 86 |
| Aquaculture | 0.11 M tons/year | 456 |
| reservoir fisheries | 0.71 M tons/year | 679 |
| Flood damage mitigation | 0.24 M ha | 367 |
| Saline area reduced | + | ? |
| Navigation enhanced | + | 64 |
| sub-total | | 25,770 |
| Net Economic Losses | | |
| Capture fish catch loss | -0.10 to -0.45 M tons/year | -350 to -1,480 |
| Wetland area lost | -51,502 ha | -17 |
| Area lost to bank erosion | n | n |
| sub-total | | -367 to-1,497 |
| Overall Net Benefits/Losses | | 25,403 to 24273 |

# Foreseeable Future Scenario: Without 2 Dams in Cambodia

## Distribution of Economic Benefits and Losses

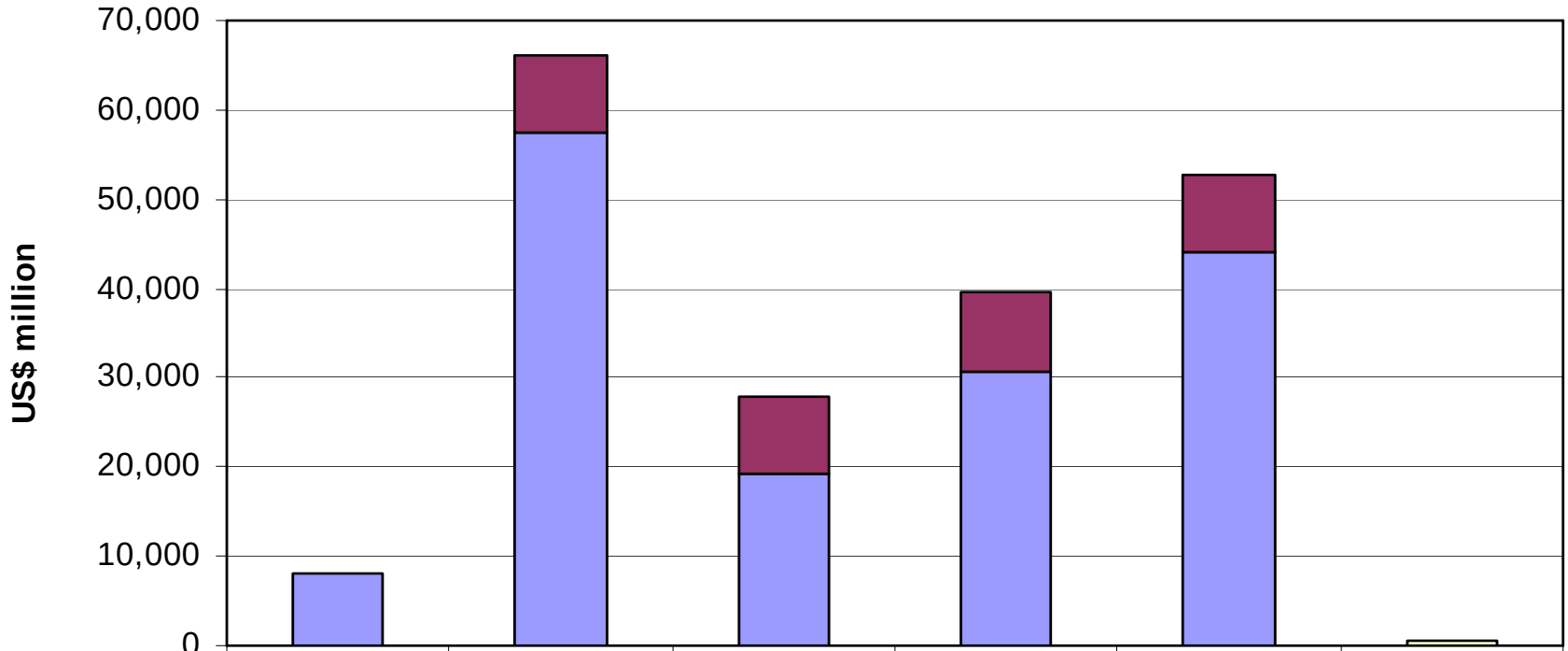
| Economic Benefits & Losses | Lao PDR | | Thailand | | Cambodia | | Vietnam | |
|---|---|---|---|---|---|---|---|---|
| | Quantity | NPV USD Million | Quantity | NPV USD Million | Quantity | NPV USD Million | Quantity | NPV USD Million |
| **Hydro-Benefits** | 18,449 MW | 17,892 | 1,784 MW | 1,909 | 480 MW | 1,255 | 2,512 MW | 3,063 |
| **Irrigated agriculture** | 0.28 M ha | 322 | 1.31 M ha | -348 | 0.27 M ha | 4 | 0.13 M ha | 108 |
| **Reservoir fisheries** | 0.035 M t/year | 141 | 0.031 M t/year | 124 | 0.002 M t/year | 41 | 0.038 M t/year | 150 |
| **Aquaculture** | 0.13 M t/year | 94 | 0.16 M t/year | 107 | 0.12 M t/year | 53 | 0.31 M t/year | 426 |
| **Flood damage mitigation** | 0.066 ha | 126 | 0.076 M ha | 125 | 0.072 M ha | 49 | 0.022 M ha | 67 |

# Foreseeable Future Scenario: Without 2 Dams in Cambodia

## Distribution of Economic Benefits and Losses (Cont's)

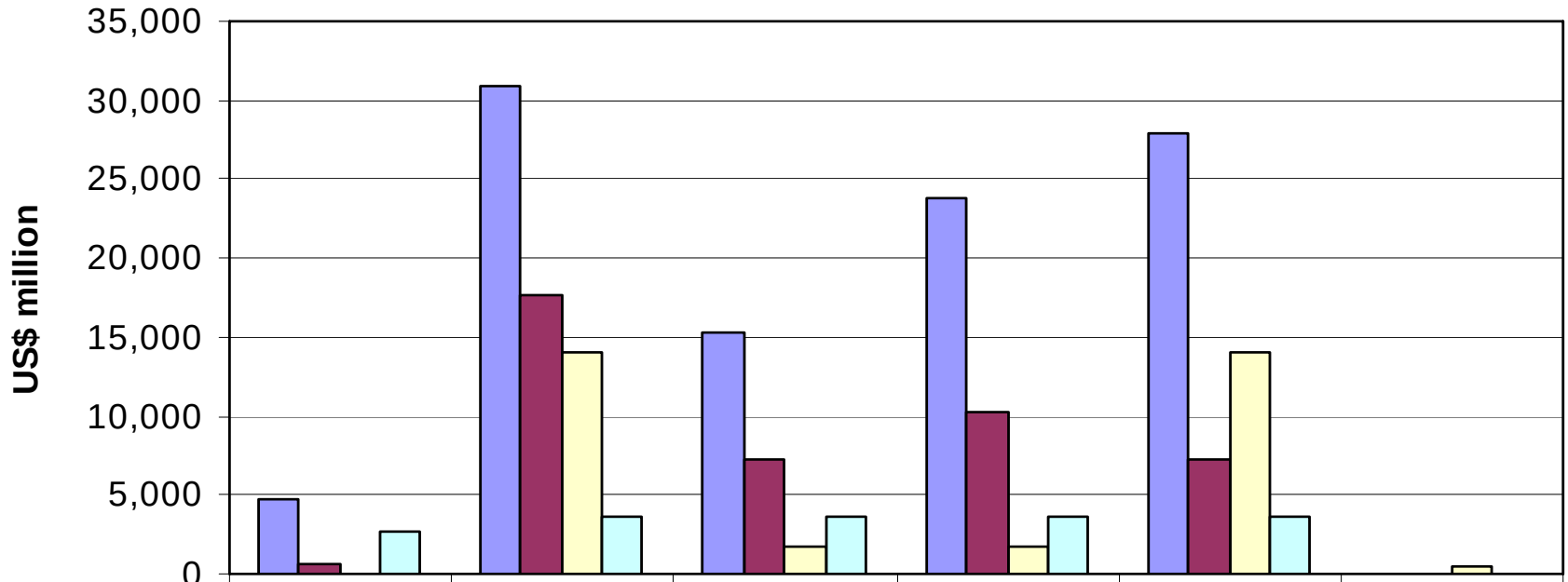
| Economic Benefits & Losses | Lao PDR | | Thailand | | Cambodia | | Vietnam | |
|---|---|---|---|---|---|---|---|---|
| | Quantity | NPV USD Million | Quantity | NPV USD Million | Quantity | NPV USD Million | Quantity | NPV USD Million |
| Saline areas reduced | | | | | N | | + | ? |
| Navigation enhanced | N | | + | 64 | N | | N | |
| Capture fish catch lost | -0.001 M t/year | -24 | -0.022 M t/year | -87 | ? | ? | ? | ? |
| Wetland value lost | | -2 | | -3 | | -12 | | 0 |
| Biodiversities | | ++ | | ++ | | +++ | | + |
| Area lost to bank erosion | N | | N | | N | | N | |
| Total | | 18,549 | | 1,891 | | ? | | ? |

# Investment Costs by Sector and Development Scenario




| | Definite Future | 20 Year Plan | No MS Dams | No Lower MS | No Thai Dams | Flood Mgt in Delta |
|---|---|---|---|---|---|---|
| Flood Mgmt | 0 | 0 | 0 | 0 | 0 | 515 |
| Irrigation | 0 | 8,695 | 8,695 | 8,695 | 8,695 | 0 |
| Hydro | 8,119 | 57,436 | 19,135 | 30,775 | 44,028 | 0 |

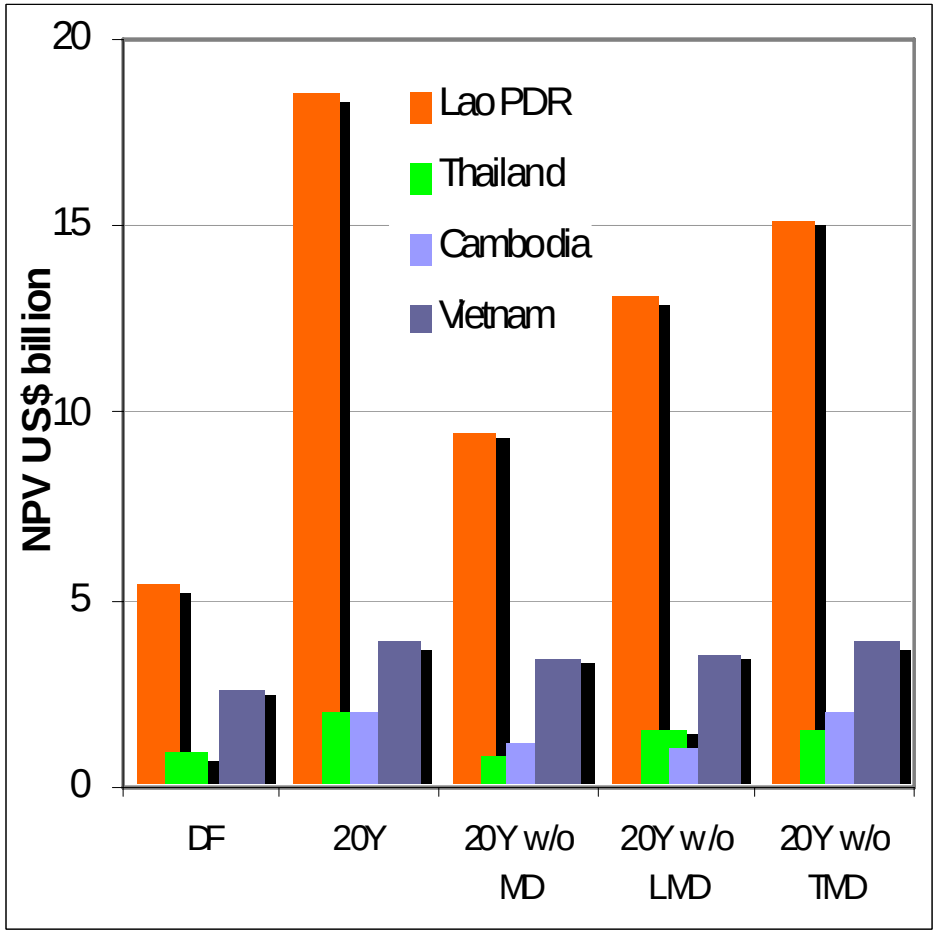
# Investment Costs by Country and Development Scenario




| | Definite Future | 20 Year Plan | No MS Dams | No Lower MS | No Thai Dams | Flood Mgt in Delta |
|---|---|---|---|---|---|---|
| Lao PDR | 4,683 | 30,872 | 15,271 | 23,853 | 27,887 | 0 |
| Thailand | 682 | 17,637 | 7,215 | 10,273 | 7,214 | 0 |
| Cambodia | 7 | 14,021 | 1,743 | 1,743 | 14,021 | 445 |
| Vietnam | 2,747 | 3,601 | 3,601 | 3,601 | 3,601 | 70 |

# Distribution of Net Economic Benefits by Scenario

- Economic benefits from hydropower are substantial but unevenly distributed
- Lao PDR will gain most as largest HEP producer, but other countries will benefit as both producers and consumers of electricity
- Under 20 Year Plan, economic benefits to Cambodia are relatively low due to adverse impact on capture fisheries and negative NPV of Stung Treng
- Economic benefits from irrigation are modest due to negative NPV for Thailand where there is little scope for dry season cropping without storage reservoirs
- Economic benefits from reservoir fisheries and aquaculture are significant



# Economic Losses and Impact on Rural Economy

- Lower mainstream dams will result in high economic losses in Cambodia and Vietnam
- Rural economy disrupted and fisheries losses mainly fall on rural poor
- Capture fisheries losses offset by aquaculture development, particularly in Vietnam
- Support to vulnerable communities required during transition period
- Investment programmes to provide alternative livelihood opportunities in agriculture, aquaculture and rural industries
- Benefit sharing mechanisms and compensatory payments

# Impact on Employment and Livelihoods

- Hydropower: substantial labour required for construction (local or migrant labour?);
- Irrigated agriculture: labour required for construction and O&M plus increased employment in agriculture (offset by crop mechanisation to improve labour productivity);
- Aquaculture: labour intensive providing jobs and livelihood opportunities for rural communities (but limited access to land and capital resources will restrict uptake by rural poor)
- Capture fisheries: negative impact on livelihoods of rural communities being evaluated (will be partially offset by employment created by reservoir fisheries)
- Navigation and tourism: minor impact on employment

# Next Steps 1

- **Hydropower**
  - Sensitivity analysis to assess impact of change with respect to key factors influencing expected benefits and costs
  - Distribution of economic benefits between LMB countries (is this a suitable method of assessing equity?)
  - Financial viability of proposed projects, financial flows, availability of funds and constraints to private sector participation
- **Fisheries**
  - Capture fisheries - analysis of subsistence livelihoods and commercial enterprises (together with social assessment team)
  - Financial returns and costs of aquaculture enterprises

# Next Steps 2

- **Irrigated agriculture**
  - Capital cost estimates for different types of irrigation scheme in LMB (i.e. small, medium, large, gravity, pumped etc) – more accurate estimates required
- **Flooding and salinity**
  - Mekong Delta: further economic analysis of flood protection, drainage and irrigation projects, if required
  - Impact on saline areas
- **Long term scenarios and impact of climate change**

**Thank you !**