

Preliminary draft for internal discussion



The Council Study: Economic assessment approach and methodology

Vientiane, 24th September 2015

Basin Development Plan (BDP) Programme
Mekong River Commission (MRC) Secretariat

Outline of Presentation

- General approach to economic assessment
- Overview of economic assessment methodology
- Economic assessment indicators
- Economic assessment of development scenarios
 - Direct benefits, costs and impacts
 - Indirect benefits and impacts

General Approach to Economic Assessment

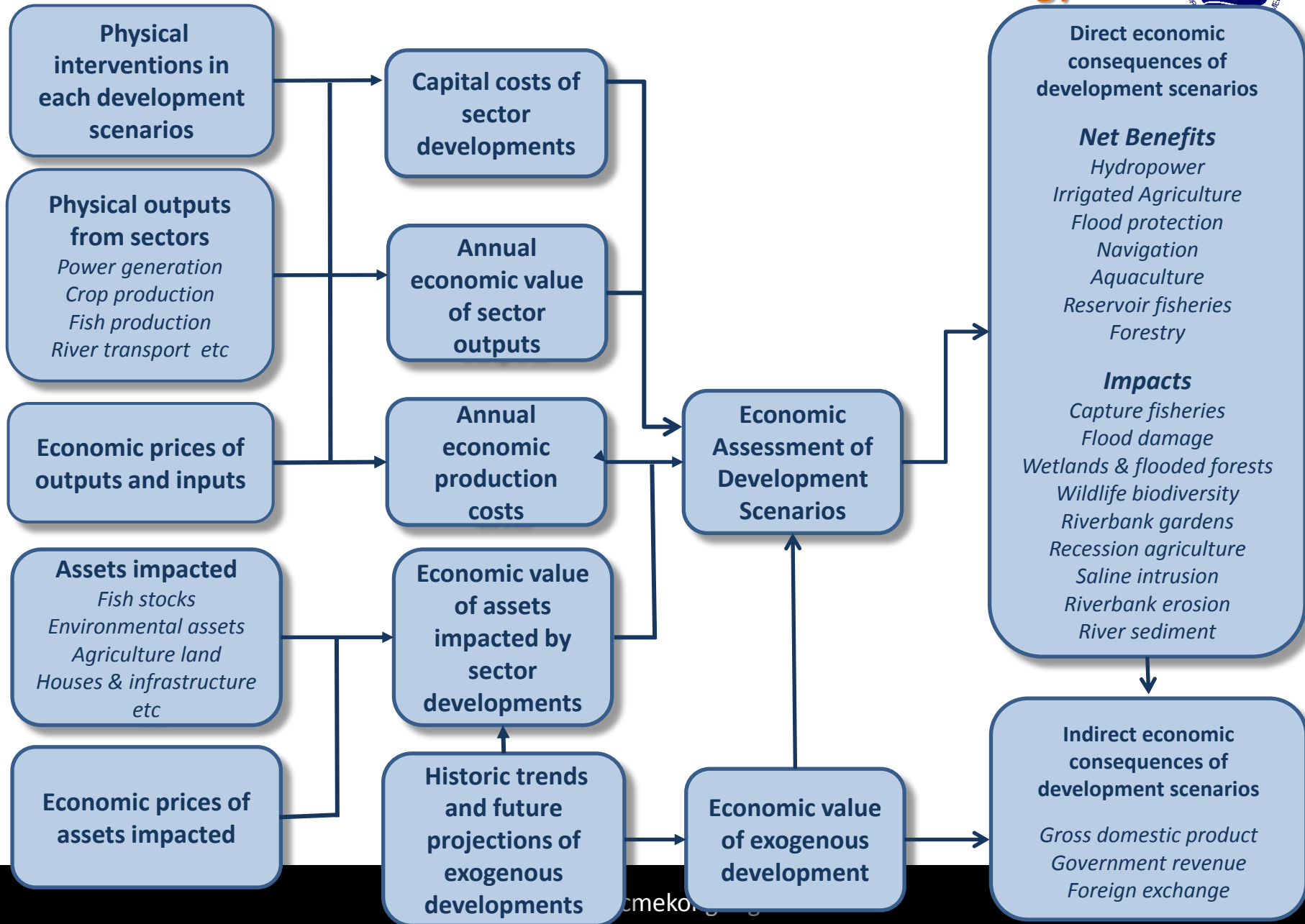


- Conventional cost : benefit analysis used by international funding agencies (World Bank, ADB) will be applied in the economic assessment of development scenarios
- Cumulative economic consequences (i.e. benefits, costs and impacts) of water resource developments will be estimated for: (i) early development scenario (2007), (ii) definite future scenario (2020), (iii) planned development scenarios (2040)
- Both direct and indirect consequences of water resource developments will be assessed
- MRC databases (e.g. hydropower, irrigation) and information from discipline teams (BioRA, hydrology, climate change) and thematic teams (hydropower, agriculture, flood protection, navigation) of the Council Study will be used
- Economic indicators to be adopted in the assessment have been based on the MRC indicator framework
- Economic assessment indicators will be quantified by applying economic values to the physical interventions, outputs and impacts of water resource developments

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Overview of Economic Assessment Methodology



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Economic Assessment of Development Scenarios: Approach and Methodology



Direct Benefits	Costs	Positive Impacts	Negative Impacts
<ul style="list-style-type: none"> i. Power production from hydropower development ii. Increased crop production from irrigation development iii. Reduced flood damages from flood protection measures iv. Increased river transport from enhanced navigation measures v. Increased fish production from aquaculture vi. Increased forest area in catchments 	<ul style="list-style-type: none"> i. Capital investment ii. Annual production costs 	<ul style="list-style-type: none"> i. Decline in capture fisheries stocks due to hydropower dams and flood protection ii. Reduced area of wetlands including flooded forests iii. Loss of wildlife biodiversity iv. Loss of land, houses and infrastructure due to increased river bank erosion v. Reduced area of recession agriculture vi. Reduced area of riverbank gardens vii. Reduced quantities of river sediment 	<ul style="list-style-type: none"> i. Fisheries production in reservoirs ii. Reduced flood damage due to hydropower dams iii. Reduced saline intrusion due to hydropower dams iv. Improved navigation due to hydropower dams v. Increased coastal erosion vi. Reduced agricultural productivity in floodplain and delta

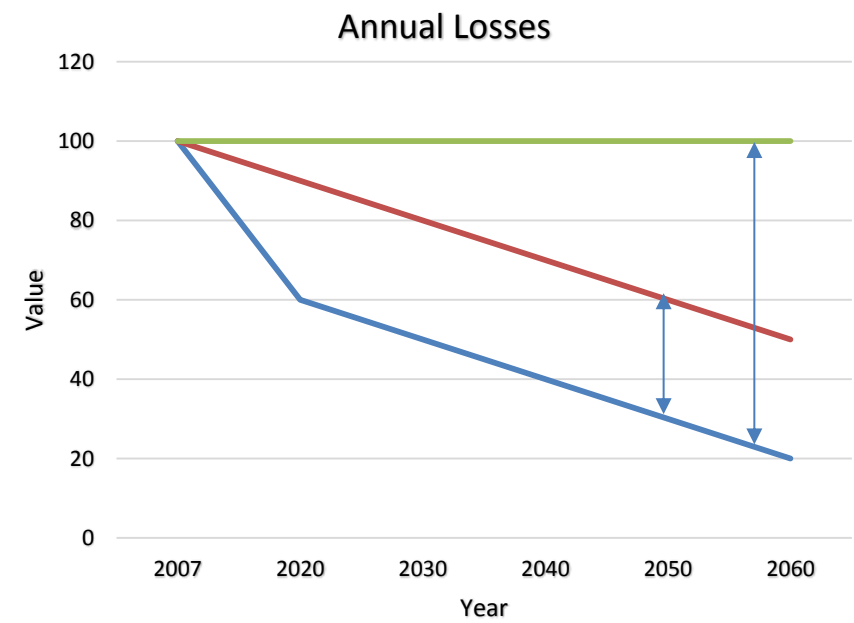
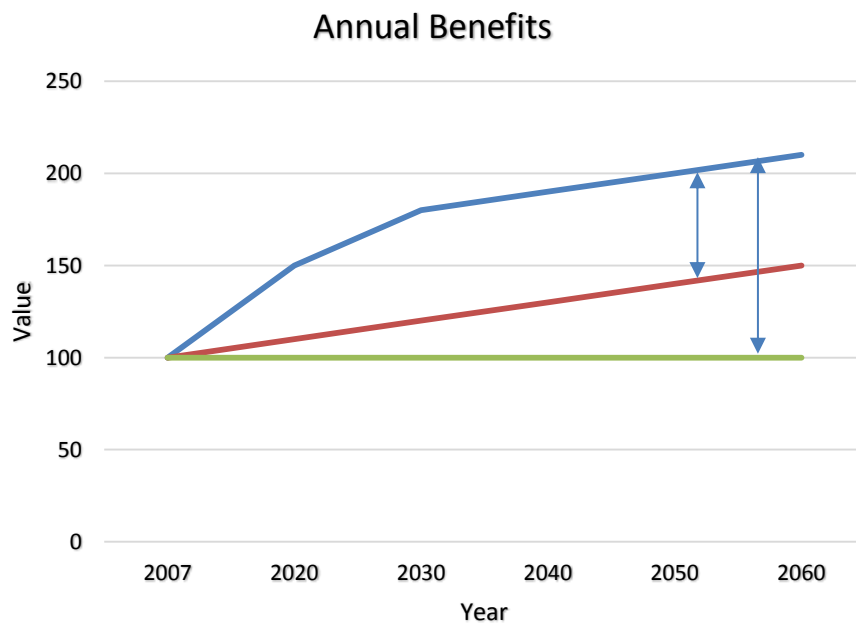
Economic Assessment of Development Scenarios: Approach and Methodology

Economic Valuation

- For **direct benefits and costs**, an opportunity cost approach will be used to determine economic prices:
 - Resources with alternative uses, e.g. land, labour and capital
 - Products with market value, e.g. power, crops and fish :
 - *Power: least cost alternative method of producing power, e.g. thermal plant*
 - *Crops: world price less processing and transport costs to farm*
 - *Capture fish: market price or replacement cost, e.g. culture fish.*
- For **environmental impacts** which have no intrinsic market value, alternative valuation methods could be used, such as:
 - direct, indirect, option and non-use value
 - benefit transfer value

Economic Assessment of Development Scenarios: Approach and Methodology

- For each development scenario, an incremental approach will be adopted which contrasts the annual benefits, costs and impacts in “future with” and “future without” development situations taking account of exogenous changes. This is illustrated in below:



- Annual Net Benefits - with water resource development
- Annual Net Benefits - without WR development; with exogenous impacts
- Annual Net Benefits - without WR development; without exogenous impacts

- Annual Losses - with water resource development
- Annual Losses - without WR development; with exogenous impacts
- Annual Losses - without WR development; without exogenous impacts

Economic Assessment of Development Scenarios: Approach and Methodology



- Based on the incremental analysis, annual net economic benefits and losses resulting from the water resource developments will be estimated for:
 - Early development scenario (2007),
 - Definite future scenario (2020)
 - Planned development scenarios (2040)
- For each scenario, annual net economic benefits arising from cumulative development will be estimated for 2007, 2020 and 2040 and then distributed between:
 - LMB countries to show positive and negative impacts in each country and as an indicator of the equitable distribution of benefits from water resource developments
 - Development sectors to show the positive and negative impacts in each sector
- Net present values (NPVs) of the annual net incremental benefits and losses will also be estimated for the existing and planned water resource developments under each scenario
- Sensitivity analysis to assess future uncertainties with respect to:
 - key variables influencing assessment results, e.g. economic prices of power and fish, discount rates for NPV calculations
 - climate change
- Employment impact: number of jobs/livelihoods in 2007, 2020 and 2040 due to planned interventions will also be estimated for each development scenario

Economic Assessment of Development Scenarios: Data Requirements



Sector/Theme	Primary data requirements	Main data sources
Hydropower	<ul style="list-style-type: none"> • Number and phasing of hydropower plants • Capital and O&M costs • Power generation • Unit production costs of thermal plant (economic price) 	<p>Hydropower database</p> <p>Hydropower thematic team (ISH)</p>
Irrigated Agriculture	<ul style="list-style-type: none"> • Number and phasing of irrigation schemes • Capital and O&M costs • Irrigated area • Cropping patterns and crop yields • Crop inputs, labour and machinery • Economic output and input prices 	<p>Irrigation database</p> <p>Agriculture/land use thematic team (AIP)</p> <p>BDP database</p>
Flood Protection	<ul style="list-style-type: none"> • Type and phasing of flood protection measures • Capital and O&M costs • Flooded areas • Flood damage assessments – crop area, number of houses and type of infrastructure • Economic value of assets affected by flooding 	<p>Flood protection thematic team (FMMP) and hydrology discipline team (IKMP)</p>

Economic Assessment of Development Scenarios: Data Requirements



MRC Sector	Primary Data Requirements	Main Data Sources
Navigation	<ul style="list-style-type: none"> Type and phasing of measures to improve navigation Capital and recurrent costs Increase in navigation resulting from improvements Unit costs and economic value of river transport 	Navigation thematic team (NAP)
Fisheries	<ul style="list-style-type: none"> Historic trends and future projections of capture fisheries Aquaculture production and reservoir fisheries: area, yields, inputs, labour and capital investment Economic price of fish and unit production costs 	BioRA team BDP database
Environment	<ul style="list-style-type: none"> Historic trends and future projections of wetland areas, wildlife biodiversity, riverbank erosion, river sediment, saline intrusion, coastal erosion. Agricultural productivity in the flood plain and delta Economic value of (i) wetlands and wildlife, (ii) crops, houses and infrastructure, (iii) sediment 	BioRA and hydrology teams
Forestry	<ul style="list-style-type: none"> Area and phasing of forestry development Capital and recurrent costs Economic value of forests 	Agriculture/land use thematic group (AIP)

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Assessment of Indirect Impacts of Development



What are indirect impacts?

Indirect impacts (sometimes also referred as “secondary” impacts) are generally defined as those impacts that accrue from sectoral development to the economy as a whole, be it **national economy or regional economy**.

- Typically include employment gains, multiplier effects (to measure impact on GDP), and foreign exchange.

Indirect impacts may also be understood as impacts of development on **government budget operations**.

- Typically include contribution of sectoral development to government budget.

Assessment of Indirect Impacts of Development



Inception Report (p. 48)

The assessment will seek to identify:

- **Contribution of domestic and international hydropower sales to GDP, government revenue and foreign exchange.**
- **Contribution from export of agriculture products, manufacturing and/or navigational services to GDP, government revenue, and foreign exchange.**
- **Multiplier effects of development in hydropower, agriculture, and manufacturing.**

Assessment of Indirect Impacts of Development



Inception Report (p. 48)

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Assessment of Indirect Impacts of Development



Impact on economy (GDP, multiplier, foreign exchange)

Note:

- Considerable debate in economics about assessment impacts on economy and especially about the use of multipliers.
- If multipliers exist, they would exist only in very specific circumstances such as deep economic recession.
- Estimating the extent of multipliers would require considerable modeling effort by 4 national teams using specific econometric models known as 'computable general equilibrium models' (CGE models).

Assessment of Indirect Impacts of Development



From a recent report:

“The Guidelines does not directly address indirect impacts. This is consistent with the practice in the region. The literature review found no analyses of this nature associated with hydropower projects. Indeed developing these impacts as costs and benefits and adding them to the direct costs and benefits is generally not advisable. In theory, positive or negative impacts along these lines could be included as non-monetised indicators. However, the knowledge base for doing this in the region is not sufficiently developed to make this practical at this point in time.”

MRC Initiative on Sustainable Hydropower. July 2015. *Guidelines on the Multi-Purpose Evaluation of Hydro-Power Projects. Annex 1: Economics Practice Guide*. Vientiane.

We agree with this assessment and suggest this is not an area which the *Council Study* could tackle effectively and with sufficient reliability in implementation phase.

Assessment of Indirect Impacts of Development



However:

- It may be of interest to seize the opportunity of the *Council Study* to raise awareness about the use and misuse of multipliers.

Suggested approach:

- Undertake a review of the theory behind multiplier effects
- Undertake a review of the measurement of multiplier effects especially associated with hydropower in other countries.
- Apply results to the Region.
- Then decide whether or not to undertake a primary study in the Region or in a specific country of the region.

Assessment of Indirect Impacts of Development



Impact on government budget operations

General Approach:

Use macro-economic indicators which are already collected and computed by governments and/or international institutions and made available in various annual reports.

Sources of information would include reports such as:

- Annual government budget documents
- National sectoral development plans and strategies;
- World Bank Economic Monitor and WB reports
- ADB Lao PDR Fact Sheet and other ADB reports;
- IMF Article IV Consultation;
- IMF Staff Report and other IMF reports

Assessment of Indirect Impacts of Development



Impact on government budget operations

For example (from IMF 2015 Article IV Consultation with Lao PDR) :

- Contribution of hydropower sector to GDP Growth
- Revenues from hydropower as % of GDP
- Exports from hydropower (\$)
- Foreign direct investment in the hydropower sector (\$)
- Revenues from hydropower as % of Total government revenues
- Taxes from hydropower as % of Total government revenues
- Royalties from hydropower as % of Total government revenues
- Dividends from hydropower as % of Total government revenues

Comprehensive review of available information from secondary sources in each country is under way.

Assessment of Indirect Impacts of Development



Potential consequences of this approach:

- Indicators would be presented on an annual basis;
- Indicators would not be limited to the Mekong River basin;
- Indicators may slightly differ across countries;
- Indicators would not be used as assessment indicators but as monitoring parameters.



Thank you