COST-BENEFITS ANALYSIS ON THE DEVELOPMENT OF BELUM-TEMENGGGOR ECOLOGICAL CORRIDOR IN GERIK, PERAK

Oleh:
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The Central Forest Spine (CFS)

- Maintaining or expanding existing permanent forest reserve areas
- Ensuring the adoption of best forest management practices among all forest stakeholders
- Rehabilitating or re-greening barren and lost wildlife corridors
- Building viaducts for wildlife crossings to reconnect fragmented forested areas

INTRODUCTION
objective

To undertake analysis to get the IRR and NPV

To make a summary and an assessment for the study area
**Location and Size**
- Situated in Gerik district (north Perak)
- Known as Belum Temenggor Forest Complex (BTFC)
- 266,370 ha

**Climate and Hydrology**
- Temperature ranges from 20°C to 35°C
- In 1977, Temenggor Dam (18,000 ha) was established

**Land Use**
- Over than 85% within BTFC is covered by forest and less than 3% is agriculture
- The forest area (400m width) is divided by Jalan Persekutuan 4, with both sides are grass and shrubs (state forest land)
- On the west, rubber and oil palm plantations owned by FELDA is located on both sides.

**Topography**
- Hilly area with more than 50% - high land and nearly 16% - low land area
- Most of the area is steep with 50% of the area 12-19.9° of slopes and nearly 35% slope area is more than 25°

**Soil type**
- 95% of the area is categorized as Type of Soil of Class 5 which is not suitable for agriculture whereas the rest is Class 2 and 4
The Central Forest Spine Project

**BENEFIT**

**ENVIRONMENTAL BENEFIT**
- Protection of wildlife
- Tourism
- Local businesses
- Increased Carbon sequestration
- Clean water quality to run hydro-electric

**COST**

**ECONOMIC COST**
- Planting trees
- Constructing the viaduct,
- Loss in opportunities to produce additional agricultural crops
The project is economically viable so long as economic benefits exceed the economic costs.

The incremental net present value (INPV) is positive. The INPV is the difference between the NPV from the CFSEC project and the NPV of the ‘without project’.
THE IMPACT OF ECOLOGICAL CORRIDOR ECOLOGICAL CORRIDOR AT GERIK

1. Impact to the Biodiversity and Environmental Services
2. Impact to the Community
3. Impact to the Economy especially Tourism Sector
## Impact to the Biodiversity and Environmental Services

<table>
<thead>
<tr>
<th>POTENTIAL BENEFITS</th>
<th>POTENTIAL PROBLEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Energy fuel saving system;</td>
<td>1. Carrying capacity</td>
</tr>
<tr>
<td>2. Preservation of natural resources; and</td>
<td>2. Site stress</td>
</tr>
<tr>
<td>3. Protection and conservation of biological diversity and sustainable use of resources.</td>
<td>3. Deforestation</td>
</tr>
<tr>
<td></td>
<td>4. Depletion of natural resources</td>
</tr>
<tr>
<td></td>
<td>5. Pollution</td>
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</tbody>
</table>
## Impact to COMMUNITY

<table>
<thead>
<tr>
<th>POSITIVE IMPACTS</th>
<th>NEGATIVE IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Poverty reduction for some of the local people and Orang Asli</td>
<td>1. Commoditisation</td>
</tr>
<tr>
<td>2. Preservation of heritage and culture- handicraft prepared by the local people and Orang Asli</td>
<td>2. Cultural clashes</td>
</tr>
<tr>
<td>3. Enhancement of unskilled workers (local tour guide with no licence)</td>
<td>3. Inequality in economics</td>
</tr>
<tr>
<td>4. Better facilities and infrastructure</td>
<td></td>
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<tr>
<td>5. Better public services</td>
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</tbody>
</table>
Impact to TOURISM SECTOR

In particular, the economic benefits that are expected to be gained based on BTFC development are as follow:

a. Increase revenue for the hotel operators through higher room occupancy and higher demand on organised eco-tourism packages.
b. Increase revenue for the independent tour operators from more frequent eco-tourism trips
c. Increase income benefits for local populations
d. Tax receipt benefits for the government from tourism employments and tourism businesses.
Impact to TOURISM SECTOR

e. Taxes and duties levied on goods and services provided to tourist.
f. Increase access right benefits (entrance fee to Royal Belum State Park)
g. Improve the employment rate for the local populations.
h. Better job opportunities for the Orang Asli.
Impact to TOURISM SECTOR

Ecotourism development may also have negative impacts to BTFC which may include:
1. Income leakage.
2. Infrastructure costs
3. Increase in prices
government involvement in the BTFC ARE required:

1. Increase the supply of public officers such as police, rangers, and others.
2. Provide more Signage/Signboard to the sites/hotels
3. Emphasise good services – must be delivered by the hotels, tour operators
4. Establish structured financial resources to support local and regional development.
5. Encourage tourism cooperation among relevant organisation; between states and region.
6. Construction and maintenance of under pass for wildlife
government involvement in the BTFC ARE required:

7. Promote participation of local and indigenous people.
8. Encourage the employment of indigenous and disable people.
9. Set up capacity building and training for the required stakeholders- especially the local tour guide who do not have national certificate as a legal tour guide.
10. Increase the effort in marketing and promotion
CBA: a decision-making tool that judges the viability of projects, policies or actions by comparing their economic costs and benefits.

Steps in conducting CBA
- ‘With Project Option’ impacts VS ‘Without Project Option’ impacts
- Economic valuation of impacts
- Developing the cashflows (in & out flows) for project options
- Discounting cashflows and obtaining discounted net flows
- Obtaining net present values of alternative with & without project options
- Sensitivity analysis
- Decision on land use
COST BENEFIT ANALYSIS

A) Net Present Value without Project (NPV\textsubscript{WoP})

<table>
<thead>
<tr>
<th>Year</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>Discounted total inflows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>542,314</td>
<td>1,693,023</td>
<td>512,129</td>
<td>18,814,845</td>
<td>3,864,000</td>
<td>25,426,311</td>
</tr>
<tr>
<td>2</td>
<td>516,490</td>
<td>1,773,643</td>
<td>487,742</td>
<td>19,710,790</td>
<td>3,680,000</td>
<td>26,168,665</td>
</tr>
<tr>
<td>3</td>
<td>491,895</td>
<td>1,858,103</td>
<td>464,516</td>
<td>20,649,399</td>
<td>3,504,762</td>
<td>26,968,674</td>
</tr>
<tr>
<td>4</td>
<td>468,471</td>
<td>1,946,584</td>
<td>442,396</td>
<td>21,632,704</td>
<td>3,337,868</td>
<td>27,828,023</td>
</tr>
<tr>
<td>5</td>
<td>446,163</td>
<td>2,039,278</td>
<td>421,330</td>
<td>22,662,833</td>
<td>3,178,922</td>
<td>28,748,526</td>
</tr>
<tr>
<td>6</td>
<td>424,917</td>
<td>2,136,387</td>
<td>401,266</td>
<td>23,742,015</td>
<td>3,027,545</td>
<td>29,732,130</td>
</tr>
<tr>
<td>7</td>
<td>404,683</td>
<td>2,238,119</td>
<td>382,159</td>
<td>24,872,587</td>
<td>2,883,376</td>
<td>30,780,924</td>
</tr>
<tr>
<td>8</td>
<td>385,412</td>
<td>2,344,696</td>
<td>363,961</td>
<td>26,056,996</td>
<td>2,746,073</td>
<td>31,897,138</td>
</tr>
<tr>
<td>9</td>
<td>367,059</td>
<td>2,456,349</td>
<td>346,629</td>
<td>27,297,805</td>
<td>2,615,307</td>
<td>33,083,150</td>
</tr>
<tr>
<td>10</td>
<td>349,580</td>
<td>2,573,318</td>
<td>330,123</td>
<td>28,597,701</td>
<td>2,490,769</td>
<td>34,341,491</td>
</tr>
</tbody>
</table>

| Total |       |       |       |       |       | 294,975,034 |

A refers to Avoidance of Human Wildlife Conflicts  
B refers to Eco-tourism and recreational services  
C refers to Local communities dependence on NTFPs collection  
D refers to Local businesses from tourism  
E refers to Non-use values of biodiversity conservation  

It is assumed that pathway trend of wildlife habitat functions and local communities dependence on NTFPs collection are unclear. The local tourism businesses and tourist values and arrivals would be raised by 10%.  

The rate of discount selected is 5%.
B. Net Present Value with Project (NPV_{WP})

With the implementation of the Ecological Corridor, there will be

i) new cost items mainly on the
   – R&D on the scientific and socio-economics of the existing forest habitat and determination of locations of strategic infra structures such as the viaduct
   – Construction of the viaduct
   – Additional staffing and vehicles

ii. Additional Benefits from ECCSF Implementation
Table 54: Carbon dioxide sequestered by BTFC

<table>
<thead>
<tr>
<th>Forest Reserves</th>
<th>Area (ha)</th>
<th>CO2 Emission (Tonne/year)</th>
<th>CO2 Sequestration (RM/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belum State Forest Park</td>
<td>117,500</td>
<td>75,464,375</td>
<td>1,396,090,938</td>
</tr>
<tr>
<td>Temenggor Forest Reserve</td>
<td>148,870</td>
<td>95,611,758</td>
<td>1,768,817,514</td>
</tr>
<tr>
<td>Belum-Temenggor Forest Complex</td>
<td>266,370</td>
<td>171,076,133</td>
<td>3,164,908,451</td>
</tr>
</tbody>
</table>
(II). Additional Benefits from ECCSF Implementation

New benefit streams

– changes to the benefits streams in comparison to that obtained under the ‘Without Project’ scenario that included:
  – potential increments in the value of tourism benefits from 10% increase per annum to 20% increase per annum
  – potential increments in the local economic revenue generations of 10% per annum by tourism related businesses
  – potential benefits from the capture of Carbon sequestration functions of the protected forests (subject to the ability of the Forestry Department to capture these values via Carbon Offset projects or REDD Plus)
Estimated Net Present Value with Project (NPV$_{WP}$) AND INCREMENTAL Net present value (WITH PROJECT – WITHOUT PROJECT)

**Table A : NPVWP under various scenario of Carbon Sequestration value capture**

<table>
<thead>
<tr>
<th>Scenario</th>
<th>NPV$_{WP}$</th>
<th>NPV$_{WoP}$</th>
<th>INPV*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% capture of Carbon Sequestration Function</td>
<td>27,242,044,287</td>
<td>294,975,034</td>
<td>26,947,069,254</td>
</tr>
<tr>
<td>51% capture of Carbon Sequestration Function 1</td>
<td>13,902,891,291</td>
<td>294,975,034</td>
<td>13,607,916,257</td>
</tr>
<tr>
<td>41% capture of Carbon Sequestration Function 2</td>
<td>11,024,795,470</td>
<td>294,975,034</td>
<td>10,729,820,436</td>
</tr>
<tr>
<td>8.5% capture of Carbon Sequestration Function 3</td>
<td>2,803,460,168</td>
<td>294,975,034</td>
<td>2,508,485,134</td>
</tr>
<tr>
<td>5% capture of Carbon Sequestration Function</td>
<td>1,594,425,969</td>
<td>294,975,034</td>
<td>1,299,450,935</td>
</tr>
<tr>
<td>0.187% capture of Carbon Sequestration Function</td>
<td>295,036,632</td>
<td>295,036,632</td>
<td>0</td>
</tr>
</tbody>
</table>

- **INPV** = NPV$_{WP}$ - NPV$_{WoP}$
- 1 proportion of TFR over BTFC
- 2 proportion of RBSP over BTFC
- 3 proportion of AJFR over BTFC
Major findings

• i. Incremental net present values $> 0$

• ii. Project is economically viable
IMPLICATIONS AND RECOMMENDATIONS

• The key to success in implementing the ecological corridor program at Gerik is the integration of management from various stakeholders especially the governing bodies, local community as well the ecotourism operators.

• In the context of BTFC, several governing bodies are involves which are Natural Resource and Environment Ministry (NRE), Perak State Government, Royal Belum State Park (RBSP), FRIM, National Wildlife Department (Perhilitan), Forestry Department, Agriculture Department and Ministry of Tourism and Culture.
Success of the ecological corridor depends on sustainable financing. Considering how much investment has to be ploughed into the ecological corridor that is providing various ecological and economic benefits to the world, and to the Malaysian economy, the Forestry Department would have to work towards obtaining global financing through Carbon Offsets, REDD PLUS and other international sponsors.
The key to success in implementing the ecological corridor program...

The integration of management from various stakeholders especially the governing bodies, local community as well the ecotourism operators.

Success of the ecological corridor depends on sustainable financing.
THANK YOU

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