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**DERIVATION OF GOVERNMENT  
SHARE FROM ENERGY RESOURCE  
EXTRACTION PROJECT<sup>1</sup>**



**Department of Environment  
and Natural Resources**

*Philippine Economic – Environmental  
and Natural Resources Accounting System*



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# DERIVATION OF GOVERNMENT SHARE FROM ENERGY RESOURCE EXTRACTION PROJECT<sup>1</sup>

ENRAP IV TECHNICAL PAPER

by:

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### REFERENCES

## 1. INTRODUCTION

The Department of Environment and Natural Resources (DENR), being the primary government agency responsible for the management and development of the country's natural resources, must ensure efficient and equitable in forestland utilization.

This study aims to determine the appropriate government share/economic rent from the use of the forest for energy resource extraction. This involves estimating the monetary value of identified forest resources based on their direct, indirect, and non-use values.

### 1.1 The Study Area

The study area is the site of the Philippine National Oil Company-Southern Negros Geothermal Project (PNOC-SNGP). The area is a forest reservation by virtue of Proclamation No. 1143 dated 8 April 1975 and was delineated for the purpose of exploration, development, exploitation, and utilization of geothermal energy, natural gas, and methane gas.

The PNOC-SNGP is located within the province of Negros Oriental extending from the municipality of Pamplona in the north, to the municipality of Siaton in the South. It has an estimated area of 133,000 hectares covering 11 municipalities, as follows: Sta Catalina, Siaton, Zamboanguita, Dauin, Bacong, Valencia, Sibulan, San Jose, Amlan, Tanjay, and Pamplona. More than half of the reservation are alienable and disposable lands leaving 48% or 63,840 hectares of forestlands/public lands, of which, only 8% or 5,107 hectares contain the forest.

At present, the PNOC-SNGP operations (energy extraction) are confined to only 19 hectares. The remaining areas are considered areas open for geothermal and mining explorations.

The targeted community for this study consists of households of Barangay Puhagan, Valencia; Barangay Sta Agueda, Pamplona; and Barangay Caticugan, Siaton. The selection of these barangays was based on their strategic locations relative to the PNOC-SNGP operations and unique socio-environment characteristics.

Barangay Puhagan is within the municipality of Valencia. It has a total land area of 225 hectares with 180 hectares (80%) classified as forestland and the remaining 45 hectares (20%) classified as alienable and disposable lands. Barangay Puhagan comprises around 176 households. Since it is situated within the main operation area of the PNOC-SNGP, income sources include employment from the project and farming, with abaca and assorted vegetables as their main crops.

Barangay Sta Agueda, Pamplona is located at the northern part of the forest reservation where most of the natural forests are concentrated. It comprises 301 households and has a total land area of 1,332 hectares. Sixty-seven percent (67%) of the area or 894.5 hectares are alienable and disposable lands with an estimated 50 hectare-build up or urbanized area. Sugarcane is the main product of the Barangay with coconut considered as an alternative crop.

Barangay Caticugan, Siaton, on the other hand, is located at the southern most part of the reservation. The micro-climate of this barangay is very dry compared to the other two study sites. It has an area of 1,100 hectares with 605 hectares and 495 hectares classified as forestlands and alienable and disposable lands, respectively. Due to its dry weather condition, forestlands are generally covered with grasses with isolated patches of trees. The estimated number of households is 502.

## **1.2 Objectives of the Study**

### **1.2.1 General Objective**

To determine the appropriate government share/economic rent from the areas where energy extraction projects are located based on the opportunity cost of such forestlands.

### **1.2.2 Specific Objectives**

- a. To establish the nature and extent of dependence on forest resources by the service communities;
- b. To estimate the benefits derived by the service communities from the forest; and
- c. To determine the alternative land uses of forestland based on the views of the local communities.

## **1.3 Methodology**

The derivation of government share/economic rent is based on the opportunity cost of forestlands or other compatible land uses. The study assumes that the local community and/or other stakeholders living within or near the forest reservation are undertaking certain development activities such as, tree plantations, rattan, agroforestry, fruit crops, and other livelihood activities that the community considers beneficial. In this case, the study assumes that these activities coincide with the DENR's participatory management programs from which the government may derive monetary share or economic rent from the use of forestlands.

Information used for this study was based on a survey conducted in the three identified barangays. A seven-day field survey was conducted by the FMB-PEENRA counterparts to gather primary socio-economic and demographic data.

## 2.0 RESULTS

### 2.1 Income Profile/Livelihood Sources

Income sources are divided into three major livelihood activities—on-farm, off-farm, and non-farm. On-farm sources of income include earnings from crop, poultry and livestock production. Off-farm and non-farm income sources are income derived from gathering forest products, construction work, trading, and working as hired labor.

#### 2.2.1 Barangay Puhagan

On-farm activities are the primary sources of income of households in Barangay Puhagan. All of the household respondents are engaged in the production of agricultural crops such as abaca fibers, corn, potatoes, beans, sayote, carrots, and other vegetables. Average on-farm net income per household inclusive of income derived from livestock and poultry production is PhP58,377 per year (Table 1).

Off-farm and non-farm income amounted to PhP4,858 and PhP28,345 per annum, respectively. Non-farm activities include working with the PNOC-SNGP. Average total household income from all sources amounted to PhP91,580 per annum.

#### 2.2.2 Barangay Sta. Agueda

Table 2 shows the annual average household income at Barangay Sta. Agueda by income source. The average net income of households in this area is PhP91,948 per annum. Of this amount, non-farm sources registered the highest income share of 61% or PhP55,706 per year followed by on-farm activities at 27% or PhP25,256 and off-farm activities at 12% or PhP10,987.

Table 1. Average Annual Household Income by Activity in Barangay Puhagan, Valencia, Negros Oriental, 1998 (In pesos)

Income Source	Percent Reporting %	Based on Actual Number of Respondents with Reported Income	Based on Total Number of Respondents	Percent Share of Total Income
On-Farm		59,083	58,377	64
Agricultural crops	100	55,317	55,317	
Domesticated Animals	81	3,766	3,060	
Off-Farm	31	15,547	4,8598.50	5
Non-Farm		33,136	28,345	31
Forest Products Gatherings	56	2,077	1,168	
Other Non-farm activities	88	31,059	27,177	
<b>TOTAL</b>			<b>91,581</b>	<b>100</b>

**Table 2. Average Annual Household Income by Activity in Barangay Sta. Agueda, Pamplona, Negros Oriental, 1998 (In pesos)**

Income Source	Percent Reporting %	Based on Actual Number of Respondents with Reported Income	Based on Total Number of Respondents	Percent Share of Total Income
<b>On-Farm</b>		<b>39,248</b>	<b>25,256</b>	<b>27</b>
Agricultural crops	64	33,104	21,066	
Domesticated Animals	68	6,144	4,189	
<b>Off-Farm</b>	<b>36</b>	<b>30,214</b>	<b>10,987</b>	<b>12</b>
<b>Non-Farm</b>		<b>87,864</b>	<b>55,706</b>	<b>61</b>
Forest Products Gatherings	32	11,554	3,676	
Other Non-farm activities	68	76,310	52,030	
<b>TOTAL</b>			<b>91,948</b>	<b>100</b>

### 2.1.3 Barangay Caticugan

The households of Barangay Caticugan posted an average annual net income of PhP66,857 from all sources. Income coming from rice, corn, and livestock production amounted to PhP41,342 followed by non-farm income of PhP23,097 and off-farm income of PhP2,418 (Table 3)

**Table 3. Average Annual Household Income by Activity in Barangay Caticugan, Siaton, Negros Oriental, 1998 (In pesos)**

Income Source	Percent Reporting %	Based on Actual Number of Respondents with Reported Income	Based on Total Number of Respondents	Percent Share of Total Income
<b>On-Farm</b>		<b>46,674</b>	<b>41,342</b>	<b>62</b>
Agricultural crops	90	42,246	38,021	
Domesticated Animals	75	4,427	3,320	
<b>Off-Farm</b>	<b>45</b>	<b>5,373</b>	<b>2,418</b>	<b>4</b>
<b>Non-Farm</b>		<b>44,153</b>	<b>23,097</b>	<b>35</b>
Forest Products Gatherings	35	5,934	2,077	
Other Non-farm activities	55	38,218	21,020	
<b>TOTAL</b>			<b>66,857</b>	<b>100</b>

#### 2.1.4 All Barangays

Table 4 shows the average annual household income of Barangays Puhagan, Sta Agueda, and Caticugan. Net farm crop income per household per annum is estimated to be PhP36,362. Income derived from other non-farm activities was estimated to be PhP36,914 per year. Working on different farms yielded an off-farm income of PhP6,342 while livestock raising provided a yearly income of PhP3,578. Income derived from the sale of collected forest products amounted to PhP2,433 per annum. Total household income from all sources was PhP83,195.

Net household income from on-farm activities contributed the highest share at 48% followed by non-farm income at 44% and off-farm work at 8%.

**Table 4. Average Annual Household Income of all Barangays by Activity, 1998 (In pesos)**

Income Source	Percent Reporting %	Based on Actual Number of Respondents with Reported Income	Based on Total Number of Respondents	Percent Share of Total Income %
<b>On-Farm</b>		<b>48,763</b>	<b>39,940</b>	<b>48</b>
Agricultural crops	83	43,937	36,362	
Domesticated Animals	74	4,826	3,578	
<b>Off-Farm</b>	<b>38</b>	<b>16,718</b>	<b>6,341</b>	<b>8</b>
<b>Non-Farm</b>		<b>56,132</b>	<b>36,914</b>	<b>44</b>
Forest Products	40	6,135	2,433	
Gatherings	69	49,997	36,914	
Other Non-farm activities				
<b>TOTAL</b>			<b>83,195</b>	<b>100</b>

#### 2.2 Land Ownership

The three barangays cover a total land area of 2,657 hectares, of which 46% (1,222.5 hectares) is classified as forestlands and the remaining 54% are classified alienable and disposable lands (Table 5).

Land ownership per household respondent is shown in Table 6. For Barangay Puhagan, 69% of the respondents have reported that they are cultivating crops within forestlands with an average area of 1.31 hectares per household.

**Table 5. Land Resources (In hectares)**

Barangay	Total Land Area	Public Lands		A & D Lands	
		(Hectares)	Percent to total	(Hectares)	Percent to total
Brgy. Puhagan	225	180	80	45	20
Brgy. Sta Agueda	1,332	437	33	895	67
Brgy. Caticugan	1,100	605	55	495	45

Forty-five percent of the household respondents in Barangay Sta. Agueda also reported to be occupying land within forestland with an average area of 2.36 hectares per household. Likewise, the same percentage of the household respondents for Barangay Caticugan also reported that they are cultivating inside forestland but with a slightly larger average area of 2.86 hectares per household.

Table 6 also shows other forms of land ownership including homelots per household.

### 2.3 Utilization of Forest Products from Forestland

Table 7 shows the estimated value of forest products being utilized by the household respondents of the three barangays. Barangay Sta. Agueda, being located in the most forested part of the reservation reported the highest estimate of PhP81,125 for 1998. Fuelwood for household consumption was reported to be the most common forest product being utilized by the community with an estimated value of PhP28,400. Earnings from timber/pole extraction and hunting wild animals were reported to be around PhP25,920 and PhP21,350, respectively.

Barangay Caticugan, although located in the grassland portion of the reservation, was able to report an estimated value of PhP41,550 (1998) from the utilization of fuelwood, timber, and other forest products. Fuelwood registered an estimated value of PhP22,500, while timber extracted from the forest amounted to PhP17,240.

Among the three study sites, Barangay Puhagan reported the least value of forest product utilization. Household respondents of this barangay reported only an estimated value of forest products utilization of PhP18,694 with fuelwood as the main product consumed estimated to be PhP10,896. These relatively lower figures can be explained by the efficiency of forest protection activities of the PNOC-SNGP since Barangay Puhagan lies within their operation area.

Table 6. Average Land Ownership per Household (In hectares)

Land Resources	Total Number of Respondents	Percent Reporting %	Based on Actual Number Of Respondents	Based on Total Number of Respondents
<b>Brgy Puhagan</b>	16			1.74
Farmlot				1.65
Within Forestland		69	1.31	0.90
Titled		13	1.50	0.19
Leased		19	3.00	0.56
Homelot				0.09
Within Forestland		38	0.14	0.05
Titled		13	0.27	0.03
Within Farmlot		38		
PNOC Property		13		
<b>Brgy Sta Agueda</b>	22			1.77
Farmlot				1.66
Within Forestland		45	2.36	1.07
Titled		18	2.80	0.51
Leased		9	0.85	0.08
Homelot				0.12
Within Forestland		27	0.05	0.01
Titled		55	0.19	0.10
Within Farmlot				
<b>Brgy Caticugan</b>	20			2.70
Farmlot				2.65
Within Forestland		45	2.86	1.29
CSC		35	2.86	1.00
Titled		20	1.51	0.30
Leased		10	0.55	0.06
Homelot				0.05
Within Forestland		20	0.07	0.01
Titled		35	0.12	0.04
Within Farmlot		45		

Table 7. Utilization of Forest Products from Forestlands: 1998

Barangay/ Forest Product	Percent Reporting %	Collection per Year	
		Volume	Value (pesos)
<b>Brgy. Puhagan</b>	<b>16</b>		<b>18,694</b>
Timber/poles	6	0.39 cu.m.	1,800
Fuelwood	56	109 cu.m.	10,896
Food	6		40
Medicinal products	6		50
Bamboo	19	37 poles	1,108
Rattan			
Animal products			
Live Animals			
Ornamental Plants	6		4,800
<b>Brgy. Sta Agneda</b>	<b>22</b>		<b>81,125.00</b>
Timber/poles	5	5.66 cu.m.	25,920
Fuelwood	23	284 cu.m.	28,400
Food	9		435
Medicinal products	9		20
Bamboo	14	13 poles	400
Rattan	9	2200 poles	1,100
Animal products	5		3,500
Live Animals	14		21,350
Ornamental Plants			
<b>Brgy. Caticugan</b>	<b>20</b>		<b>41,550</b>
Timber/poles	10	3.76 cu.m.	17,240
Fuelwood	30	225 cu.m.	22,500
Food			
Medicinal products	5		10
Bamboo	10	55 poles	1,650
Rattan			
Animal products	5		150
Live Animals			
Ornamental Plants			

#### 2.4 Preferred Land Use by the Community

To determine the opportunity costs of the forestland, household respondents were asked what development activities they would venture in if they would be allowed to occupy and manage a tract of forestland. Of the 58 respondents, 41% reported that they would grow agricultural crops like corn, banana, abaca, coconut, and other vegetables. Thirty-eight (38%) percent would establish tree plantation with gmelina as the main tree crop, while 22% would establish mango plantations. Six

respondents (10%) prefer to do agroforestry. Others wanted rattan (5%), grazing (2%), and protection forest (2%). The remaining 10% preferred not to do anything with the land (Table 8).

**Table 8. Preferred Land Use by the Community**

Land Use/Activity	Frequency	Percent Share
Tree Plantation	22	38
Agroforestry	6	10
Cash Crop	24	41
Fruit Trees	13	22
Rattan Plantation	3	5
Grazing	1	2
Protection Forest	1	2
Nothing to do	6	10
Total Number of Respondents	58	

### 3.0 THE "OPPORTUNITY COSTS" OF FORESTLAND

#### 3.1 Land Use Options

The opportunity cost was assumed to be based on the estimated demand for forestland and the preferred land use of the community. Table 9 shows the estimated area used for cultivation within forestland. Households in Barangay Puhagan were estimated to be cultivating around 109 hectares of forestland. Households in Barangay Sta. Agueda and Caticugan on the other hand, were occupying 146 hectares and 291 hectares, respectively. For the three barangays, it was estimated that the community has occupied 546 hectares or 45% of the total forestland.

The preferred land uses of the community if given consideration under existing DENR regulations on participatory management are enumerated in Table 10.

**Table 9. Estimated Cultivation within Forestland**

	Brgy Puhagan, Valencia	Brgy Sta Agueda, Pamplona	Brgy Caticugan, Siaton
Number of Respondents	16	22	20
HH Cultivating Within forestland	69%	45%	45%
Total Number of Household	176	301	502
Average Area Cultivated	0.90	1.07	1.29
Area of Forest/ Public Land	180.00	437.50	605.00
Estimated Area Cultivated within Forestland	109.13	146.46	290.85

**Table 10. Land Use Allocation Based on Community Preference (In hectares)**

Land Use	Area	Percent Share %	Percent Share Against Total Public Land
Tree Plantation	280	51	23
Agroforestry/Cash Crop	110	20	9
Fruit Trees	120	22	10
Rattan Plantation	25	5	2
Grazing	10	2	1
Total Area	545	100	45

### 3.2 Financial Analysis

All assumptions used in the financial analysis were based on the existing local prices of inputs and outputs.

#### 3.2.1 Tree Plantation

The community is expected to derive a net present value of 25 million pesos from the 280-hectare gmelina plantation. This analysis was based on a conservative estimate of 18 (cubic meters/hectare) mean annual growth increment, with timber harvestable at year 12, and a domestic price for timber of PhP3,000 per cubic meter.

In terms of incremental income to the community, the net present value was translated into annualized income estimated to be PhP4,048,626 per year or PhP14,459 per hectare per year (Table 11).

#### 3.2.2 Agroforestry/Cash Crop

Cash crop production through agroforestry was assumed to be limited only to 20% (110 hectares) of the operable area. The 20% allocation for cash crop production is in conformity with the limitation provided for community-based and industrial forest plantation programs.

The annual net income for this land use is derived during the survey and estimated to be PhP3,197,547 per annum or PhP29,069 per hectare per year.

### 3.2.3 Mango Plantation

The allocated area for mango plantation is 120 hectares. Using the local technology in managing a mango plantation, this land use will provide a net present value of 12 million pesos. The annualized income of this NPV is equivalent to PhP1,528,821 per year or PhP12,740 per hectare per year.

### 3.2.4 Rattan Plantation

The computed net present value for the 25-hectare rattan plantation is PhP659,726. This value then also indicates an incremental income for the community of PhP84,116 per year or PhP3,365 per hectare per year.

### 3.2.5 Grazing

The net income used for grazing was lifted from the study conducted by the Ecosystems Research and Development Bureau (ERDB) on determining economic rent for pasturelands. It was estimated that livestock raising provides an annual income of PhP651 per hectare per year, and direct application for 10-hectare grazing lands will provide the community an annual income of PhP6,510.

Table 11. Computed Annual Net Income Based on the Preferred Land Use Allocation

Land Use	Area (hectares)	Net Present Value (net income, pesos)	Annualized Value (net Income, pesos)	Annualized Value (P/hectare)
Tree Plantation	280	25,078,705	4,048,626 3,197,547	14,459
Agroforestry/ Cash Crop	110	-	1,528,821	29,069
Fruit Trees	120	11,990,756	84,116	12,740
Rattan Plantation	25	659,736	6,510	3,365
Grazing	10	-	-	651

Considering the above-mentioned land use options, the 545 hectares of forestlands converted for cultivation can provide the community an annual income of PhP8,865,620 or an average of PhP16,267 per hectare per year.

#### 4.0 DERIVATION OF GOVERNMENT SHARE

The three barangays cover 1,222 hectares of forestlands of which 545 hectares (45%) are assumed to be managed by the community/private stakeholders. Under the DENR participatory management programs, the government share is assumed to be 30% of the gross sales for products derived from government/foreign funded forest plantations. Likewise, for forest plantation established by the private sector, government share is estimated to be 5% of the gross sales or 16%, if based on net sales.

This study prefers to use an estimation of government share using net values. Therefore, a 16% government share was applied to the net income of the community/private stakeholders based on land use option, except for agroforestry/cash crop production, which is commonly intended for household consumption.

Table 12 shows the opportunity costs and the corresponding estimated government share of forestland based on different land use options. The opportunity costs of forestlands if intended for tree plantations is estimated to be PhP2,314, mango plantation at PhP2,038, rattan plantation, PhP538.34, and grazing land estimated to be PhP651.

**Table 12. Determination of Government Share in Brgys. Puhagan, Sta Agueda, and Caticugan**

Land Use	Annual Net Income (per hectare)	Estimated GS Based on Land Use (per hectare per year)	Estimated GS Based on Total Area of Public Land
Tree Plantation	14,459	2,314	530
Agroforestry/Cash Crop	29,069	-	-
Fruit Trees	12,740	2,038	200
Rattan Plantation	3,365	538	11
Grazing	651	104	1
<b>Government Share per Hectare per year (weighted average)</b>		<b>1,664</b>	<b>742</b>

The computed government share based on the 16% annual net income is equivalent to PhP1,664 per hectare per year. However, based on the assumption that forestlands in the area are not 100% utilized (only 45% based on community demand), the government share will be PhP742 per hectare annually.

## 5.1 REVIEW OF PREVIOUS AND EXISTING GOVERNMENT SHARE/RENTALS

Table 13 shows the comparison of the government share/land rentals imposed by DENR for special land use permits. DENR Administrative Order No. 93-66 imposed an annual land rent equivalent to one percent (1%) of the total value of improvements. Under the PNOC management (PNOC Tongonan), they estimated this land rent to be PhP546,715 per hectare per year.

However, in view of the appeal made by the PNOC, citing that such imposition was considered prohibitive and confiscatory, the DENR adopted an annual interim rate of PhP3,000 per hectare (DAO 98-27), pending the result of the study to be conducted by the FMB.

Table 13. Comparison of Rentals/Government Share (PNOC-SNGP, Negros Oriental)

<i>Policy/Regulation</i>	<i>Rent/Government Share in PhP/hectare/Year</i>
DENR 93-66 (CA 141)	546,715 (1% of improvements)
DENR 98-27 (Interim Rate)	3,000
This Study	1,664

## 6.0 PNOC-SNGP RESPONSIBILITIES AND COMMUNITY CONTRIBUTIONS

### 6.1 Memorandum of Agreement between the DENR and PNOC

Based on the Memorandum of Agreement between by the DENR and PNOC on May 17, 1990, the responsibilities, areas of coordination and cooperation with the DENR were formally established. Forestry law enforcement and extension services (social forestry) will be implemented by the PNOC in coordination with the local DENR offices. On the other hand, regulatory functions such as permit processing, environmental requirements, and monitoring will be the primary concern of the DENR with the assistance of PNOC.

### 6.2 Royalties Paid by PNOC-SNGP to the Local Government

In 1996, the PNOC-SNGP was able to contribute a total amount of 19.7 million pesos as royalties paid to the local government for geothermal operations. As such 45% (PhP8.9 million) was paid to the Municipality of Valencia, 20% or PhP3.9 million to the Provincial government of Negros Oriental, and 35% (PhP6.9 million)

was shared by three barangays, namely: Malaunay, Puhagan, and Caidiocan (Table 14).

**Table 14. Royalties paid by PNOC-EDC SNGP (1996)**

Local Government Unit	Amount (pesos)
Provincial Government of Negros Oriental	3,942,425
Municipality of Valencia	8,875,454
Barangays Malaunay Puhagan Caidiocan	6,899,241
<b>TOTAL</b>	<b>19,717,120</b>

## 7.0 CONCLUSIONS AND RECOMMENDATIONS

This study estimates the opportunity costs of forestlands under the Southern Negros Geothermal Project. The purpose of this research exercise was to establish the amount of foregone benefits from the local populace and the government, based on alternative land use options from the identified barangays.

Based on the result of this study, the forestlands covered by the PNOC-SNGP is capable of earning a net income ranging from PhP651 to PhP29,069 per hectare per year if intended for agricultural and timber production. However, such land uses are less profitable compared to geothermal operations. Hence, taking into account the feasibility of the accounts, forestlands for agricultural/plantation purposes are considered undervalued or underestimated.

This study recommends the application of a government share amounting to PhP1,664 per hectare per year, in forestlands where PNOC is physically operational. However, other areas (forestlands) within the reservation should be made available for other compatible land uses to optimize the productivity of the land.

Further, the proposed new government share to be collected from the PNOC for its use of forestland for energy project should be reviewed periodically to consider the inflation rate and other technical developments. Likewise, it is also recommended that this amount be applied not only to PNOC energy projects, but also to other special land uses.

## References

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