

The Cagayan Valley Jatropha Industry Framework Plan



2008-2030



Regional Development Council 02
NEDA Regional Office 02
Regional Government Center
Tuguegarao City

March 2008

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2008-2030



March 2008
Tuguegarao City



RDC 02 Resolution No. 02-020-2008
Series of 2008

**APPROVING AND ADOPTING THE CAGAYAN VALLEY JATROPHA INDUSTRY
FRAMEWORK PLAN 2008-2030**

WHEREAS, it is the thrust of the national government to reduce the country's dependence on imported fuel as provided for in Republic Act 7638 otherwise known as the Department Energy Act of 1992 and supplemented by Republic Act 9367 or Biofuels Act of 1996 which mandates the use of locally-sourced biofuels as components for all liquid fuels for motors and engines and the gradual phasing out of harmful gasoline additives;

WHEREAS, the Cagayan Valley Region in its Updated Regional Development Plan 2004-2010 and Regional Physical Framework Plan 2001-2030, is committed in pushing for the development of the region's biofuel industry potentials in line with the nation's overall goal of attaining energy independence;

WHEREAS, the jatropha curcas suits well to be promoted as the major source of biodiesel in the region being a non-edible oil plant and its capability to thrive in marginal areas, thus, is seen as a potent vehicle to regenerate and develop marginal and idle areas into productive lands thereby relieving the pressure in utilizing prime agricultural areas for purposes of producing feedstock for biofuels production;

WHEREAS, the Cagayan Valley Jatropha Industry Framework Plan 2008-2030 which was formulated in support of the government's program of pursuing energy independence outlines the overall framework in the development of the Jatropha Industry by providing policy directions, specific strategies and activities within the plan period 2008-2030;

WHEREAS, the formulation of the plan involved a series of workshops conducted by the inter-agency Regional Jatropha Industry Team (RJIT) and consultations with the RDC2 Economic and Development Committee (EDC) to solicit comments and recommendations to enrich the document;

WHEREAS, the Infrastructure Development Committee (IDC), after presentation and review of the document during its 1st Quarter Meeting held on March 10, 2008, deliberated and resolved to endorse the Plan to RDC 02 for adoption and approval;

NOW THEREFORE, the Regional Development Council Region 02, in session assembled, **RESOLVES** as it is hereby **RESOLVED**, to favorably approve and adopt the Cagayan Valley Jatropha Industry Framework Plan 2008-2030.

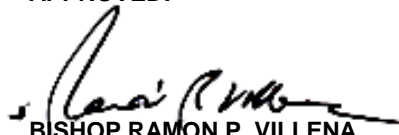
RESOLVED FURTHER, that a copy of this resolution and a copy of the Framework Plan be furnished to the members of the RDC02 and to concerned national government agencies for their information, guidance and support.

Done this 26th day of March 2008 at Aparri, Cagayan

CERTIFIED CORRECT:


MARYANNE E.R. DARAUAY
Secretary

APPROVED:


BISHOP RAMON P. VILLENA
RDC Chairman

MESSAGE



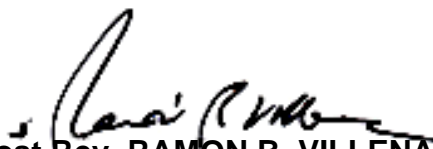
The Cagayan Valley Jatropha Industry Framework Plan is the product of a concerted regional government effort to support the thrust of the national government to promote and develop alternative energy sources such as jatropha curcas as a means of achieving self-reliance in meeting the country's energy requirement.

This Framework Plan charts the course of the region in the development of Jatropha Industry within the next 30 years. It seeks to accelerate the utilization of local energy sources particularly the jatropha curcas not only to ensure the region's self-sufficiency on fuel and energy but also with the end goal of uplifting the region's economy.

The Framework Plan is realistic in approach and comprehensive in its scope. The formulation of the Plan was guided not only by economics but also by environmental and social considerations. It defines the participation of all sectors – government institutions, agencies and instrumentalities as well as the private sector in the attainment of the envisioned goals.

Furthermore, the plan reflects the sentiments, the hopes and aspirations of the people in the region. It bespeaks of our continuing journey for a better life, confident that Divine Providence provided this region with a vast natural resource that is intended for the people to live a comfortable and self-sufficient life.

For this, it gives me great pleasure to congratulate all those who have contributed to the challenging process of producing the Cagayan Valley Regional Jatropha Industry Framework Plan. I am certain that this Plan will be well received and used for the ultimate benefit of all the people of Region 02.


Most Rev. RAMON B. VILLENA, DD
Bishop, Diocese of Bayombong and
RDC02, Chairman

MESSAGE



The biodiesel revolution had gone a long way in its bid to reduce the use of imported fuels, as countries starts to substitute fossil fuels with oil bearing plants, particularly jatropha curcas, to meet their household and commercial energy needs. Jatropha curcas holds immense untapped livelihood opportunities for farmers and rural entrepreneurs and for the populace to replace the traditional fossil fuels with homegrown and environment-friendly biodiesel.

Region 02 has sufficient marginal lands available for cultivating jatropha and the challenge would be to efficiently utilize these lands for biodiesel feedstock. It is in this concept that the Regional Jatropha Industry Team (RJIT) pushed for the formulation of the Cagayan Valley Jatropha Industry Framework Plan. The Plan lays the foundation for the establishment of a sustainable jatropha industry which is in accordance to national priorities and policies on food security and environmental integrity. The strategies to develop the region's marginal and idle lands into productive jatropha plantations are highlighted in this document. The Plan likewise brings solutions not only to the energy problems besetting the country but also in spurring investment opportunities and creating avenues for employment in the region.

In behalf of the RJIT and all the people who worked hard to come up with this Plan, I humbly dedicate this work to the people of Region II.



CLARENCE L. BAGUILAT

Regional Executive Director, DENR RO2
and Chairman, Regional Jatropha
Industry Team

F OREWORD



The unpredicted energy condition has forced many countries including the Philippines to look at biofuel as an alternative energy source in solution to the current fuel instability. In line with the Biofuel Acts or Republic Act No.9367 the government is implementing an alternative fuel program to reduce the country's dependence on imported oil, and provide cheaper, more environment-friendly alternatives to fossil fuels.

Region 02, in response to this call of the national government to look for biofuel as an alternative source of energy has chosen the jatropha curcas as its main source of biodiesel as it conforms with the food security program of the government. Likewise, studies showed that among all the oil-bearing plant, the jatropha curcas fits best and complement with the present climatic and environmental condition of the region. It is in this light, that the region crafted the Cagayan Valley Jatropha Industry Framework Plan.

The Cagayan Valley Jatropha Industry Framework Plan establishes a framework for the orderly development of a Jatropha Industry in the region. It provides an aggressive and bold but thoughtful and measured vision on how Jatropha Industry should be developed. The Plan is also realistic that it appreciates the need of further extensive research and development and extension programs as a basis to establish a sustainable Jatropha Industry in the region. The Plan likewise upholds the government's policy of utilizing alternative clean energy without any detriment to the natural ecosystem, biodiversity and food security of the region.

The preparation of this Plan is a collaborative effort among a wide spectrum of agencies involved in planning activities that affect biofuel industry. These agencies which were initially organized into Regional Jatropha Industry Team (RJIT) provided assistance and support in the crafting of the Plan. The recommended strategies and the processes used to define the Plan described in this document reflected the consensus of this Team.

Key stakeholders were likewise consulted in the review of the Plan and their collective inputs helped in understanding the many related issues which had to be addressed. It is therefore with confidence that the Regional Development Council 02 though the Framework Plan will seek to involve all levels of society - both in the private and government sector, in this noble effort to develop a Jatropha Industry in the region. Perhaps the most important task will be for all of us to reorder our priorities and come together to make the Cagayan Valley Jatropha Industry Framework Plan work.

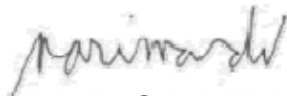

MILAGROS A. RIMANDO
NEDA Regional Director and
RDC Vice Chairman

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CHAPTER 1

INTRODUCTION AND RATIONALE

A. National Energy Development Policy

Republic Act 7638 (RA 7638) otherwise known as the Department of Energy Act of 1992, declares the policy of the state "...to ensure a continuous, adequate, and economic supply of energy with the end in view of ultimately achieving self-reliance in the country's energy requirements through the integrated and intensive exploration, production, management, and development of the country's indigenous energy resources, and through the judicious conservation, renewal and efficient utilization of energy to keep pace with the country's growth and economic development and taking into consideration the active participation of the private sector in the various areas of energy resource development; and to rationalize, integrate, and coordinate the various programs of the Government towards self-sufficiency and enhanced productivity in power and energy without sacrificing ecological concerns".

This assertive energy development declaration is supplemented by the Medium Term Philippine Development Plan which seeks energy security by (a) increasing oil and gas exploration, (b) strengthening the National Oil Corporation (PNOC) to spearhead the development of indigenous energy sources and building global partnership and collaborative undertakings, (c) pursuing the development of renewable energy sources such as geothermal, wind, solar, hydropower and biomass including the vigorous utilization of the cleaner development mechanism and the emerging carbon market, (d) expansion in the use of natural gas, and (e) adoption of energy efficiency promotion strategies

These strategies and sustainable approaches to energy development and management are expected to also reap social and environmental benefits through reduced air and other types of pollution and the concomitant beneficial effect to general health. Their positive effects on climate change are also expected to significantly reduce climate-related natural disasters.

The passage of the Republic ACT 9367 and the 2006 Philippine Biofuels Act which supports the reduced dependence on imported fuels by mandating the use of biofuels and the phasing out of harmful gasoline additives. The law provides that all liquid fuels for motors and engines sold in the Philippines shall contain locally-sourced biofuel components.

B. The Demand for a Biofuel Industry

In the Philippines, the enactment of RA No. 9367 "Biofuel Act of 2006" mandates the blending of five percent (5%) bioethanol fuel by volume within two years from the effectivity of the Act and requires ten percent (10%) bioethanol blend after four years. In

Introduction and Rationale

the same law, one percent (1%) of biodiesel blend is required within three months from the effectivity of the Act and a minimum of two percent (2%) blend after two years. This may increase taking into consideration factors including but not limited to domestic supply and availability of locally-sourced biodiesel component. In the event of supply shortage of locally-produced bioethanol during the four-year period, oil companies are allowed to import bioethanol but only to the extent of the shortage as may be determined by the National Biofuel Board (NBB).

The Philippine domestic market for biodiesel for blending (Sea Oil and Flying V) is currently above the retail price of petroleum diesel. The high price is due to the fact that local producers of biodiesel source their raw materials from Refined Bleached and Deodorized (RBD) coconut oil and it is impossible that they will be able to reduce their wholesale price because of the nature of their set up which is the trading system.

The demand for diesel fuel and the corresponding biodiesel blend requirement will continue to increase over time and will likely follow the current pricing trends. North Luzon current requirement alone under the 1% blend as mandated by MC N0. 55 is 8,940.91 barrels per year. Using this as benchmark, it translates that unless and until there is a holistic support among all government agencies and forging tandems with the private sectors, the realization of self sufficiency on biodiesel or diesel fuel per se, will remain only as a possibility.

Aside from being an energy solution, the promotion of biofuel likewise is consistent with the protection of public health and the environment aside from sustaining the country's and the region's economic growth.

The use of biodiesel and the establishment of the industry offer the following advantages;

1. **Environmental protection** – The use of biofuels will mitigate toxic and greenhouse gas emissions and thus mitigates “global warming”. The emission of sulfur dioxides and sulfates which are the main components of “acid rain” is eliminated because biodiesel does not contain sulfur. When biodiesel is burned, it has substantially less particulates and unburned hydrocarbons that produce smog as compared to mineral/petroleum diesel. Biodiesel is likewise derived from renewable resources and does not contribute to the consumption of fossil fuels. Further, production wastes can be recycled thus waste disposal is not a problem.
2. **Promoting public health** – This fuel is also non-toxic and bio-degradable and the reduction of harmful gas emissions lessens health problems among the population. Carbon monoxide, nitrated compounds and Polycyclic Aromatic Hydrocarbons (PAH) were identified as potential cause of cancer and respiratory ailments. Test results show that a reduction of 75% to 85% of PAH compounds, 90% of nitrated PAH compounds, 65% of particulates, 78% of carbon dioxide and as much as 50% of carbon monoxide is attained with the use of biodiesel. .

3. **Sustainable economic growth** – Biofuel will result in a considerable reduction of fuel importation and thereby conserving the country's dollar reserves. The industry would also boost agriculture through integrating other crops compatible with biofuel production leading to more disposable income, an increase in spending power and thus, healthier local economy.
4. **Social development** – The biofuel industry can be a major achievement of the community through their in-depth participation. It creates self reliance, confidence and a positive attitude to take firmer actions on government programs with resultant effect in the wise and sustainable development of the countryside. This would further translate to the improved economic condition of the farmers and subsequently a better quality of life in the rural community.

C. The Jatropha Industry Framework Plan for the Cagayan Valley (2008-2030)

One alternative source of biofuel is a plant scientifically known as *Jatropha Curcas* which produces biodiesel. It has been growing in many areas of Region 02 and there are plenty of potential areas in the region for development into *Jatropha Curcas* plantations. It is commonly known as "tubang bakod" or "tuba-tuba".

The *Jatropha* Framework Plan was conceptualized under the spirit of cooperativism among government agencies and some private entities that shared the vision of developing a *Jatropha* Biofuel industry as a solution not only to the current energy crisis and other environmental hazards but also uplifting the regional and national economy as well.

To support this agenda, these agencies and private entities entered into a Memorandum of Agreement (MOA) of organizing a Regional *Jatropha* Industry Team and preparing a framework plan that will lay down and chart the courses of action of fully developing the industry. The Framework Plan likewise presents the potentials of the region in terms of the available land area, partner groups, manpower and the climatic conditions that allow the establishment of *jatropha* plantations for biodiesel processing.

This *Jatropha* Framework Plan serves as a guide for the establishment of the biodiesel industry and does not present the details as to business economic feasibilities but is deemed complete to present in broad perspective the course of actions and the basic information defining the viability of the industry which are highly significant to the development of further studies and management plans by the investors.

CHAPTER 2

PROFILE OF THE CAGAYAN VALLEY

A. Regional Physical Characteristics

Jatropha curcas is well-suited for the soil and climate in the Cagayan Valley. Likewise, there are available lands that can be utilized for *jathropa curcas* plantations as the region holds abundant underutilized land where *jatropha* can be planted.

1. Location and Political Subdivision

Cagayan Valley lies within the northeastern tip of the Philippines, in the island of Luzon. It is bounded on three sides by big mountain ranges: Cordillera to the west, Caraballo to the south, and Sierra Madre to the east. To the north lies the Babuyan channel beyond which is the North China Sea. Tuguegarao City, the regional capital, is about 485 kilometers from Manila, 65 minutes by air travel and about 10 hours by land via the Maharlika Highway.

The region is composed of five (5) provinces, namely the island group of Batanes, the valley provinces of Cagayan and Isabela, and the generally mountainous provinces of Nueva Vizcaya and Quirino. Region 02 has one (1) independent component city, two (2) component cities, ninety (90) municipalities and 2,311 barangays. (**Figure 1 and 2**)

2. Land Area, Topography and Status

With a total land area of 2,683,758 hectares, Cagayan Valley is the fourth largest region in the country. The provinces of Cagayan and Isabela occupy about three-fourths of the region's area having 900,267 hectares and 1,066,456 hectares, respectively. The remaining area is shared by the provinces of Nueva Vizcaya (390,387 has.), Quirino (305,720 has.), and the island group of Batanes (20,928 has.).

Of the total land area, 965,965 hectares are classified as alienable and disposable while 1,717,793 hectares are classified as forest lands representing tenured and untenured areas both from production and protection forests. Tenurial instruments issued over these areas are either community based, socialized or industrial agreements.

Cagayan and Isabela likewise share the biggest pie in the alienable and disposable areas having 353,193 and 459,666 hectares, respectively. Nueva Vizcaya and Quirino have 88,921 and 56,753 hectares, respectively while Batanes only occupies 7,432 hectares.

The region's topography is generally sloping. About 40 percent of the land is mountainous or with slopes greater than 30 degrees. This is followed by undulating to hilly

Figure 1. Location Map

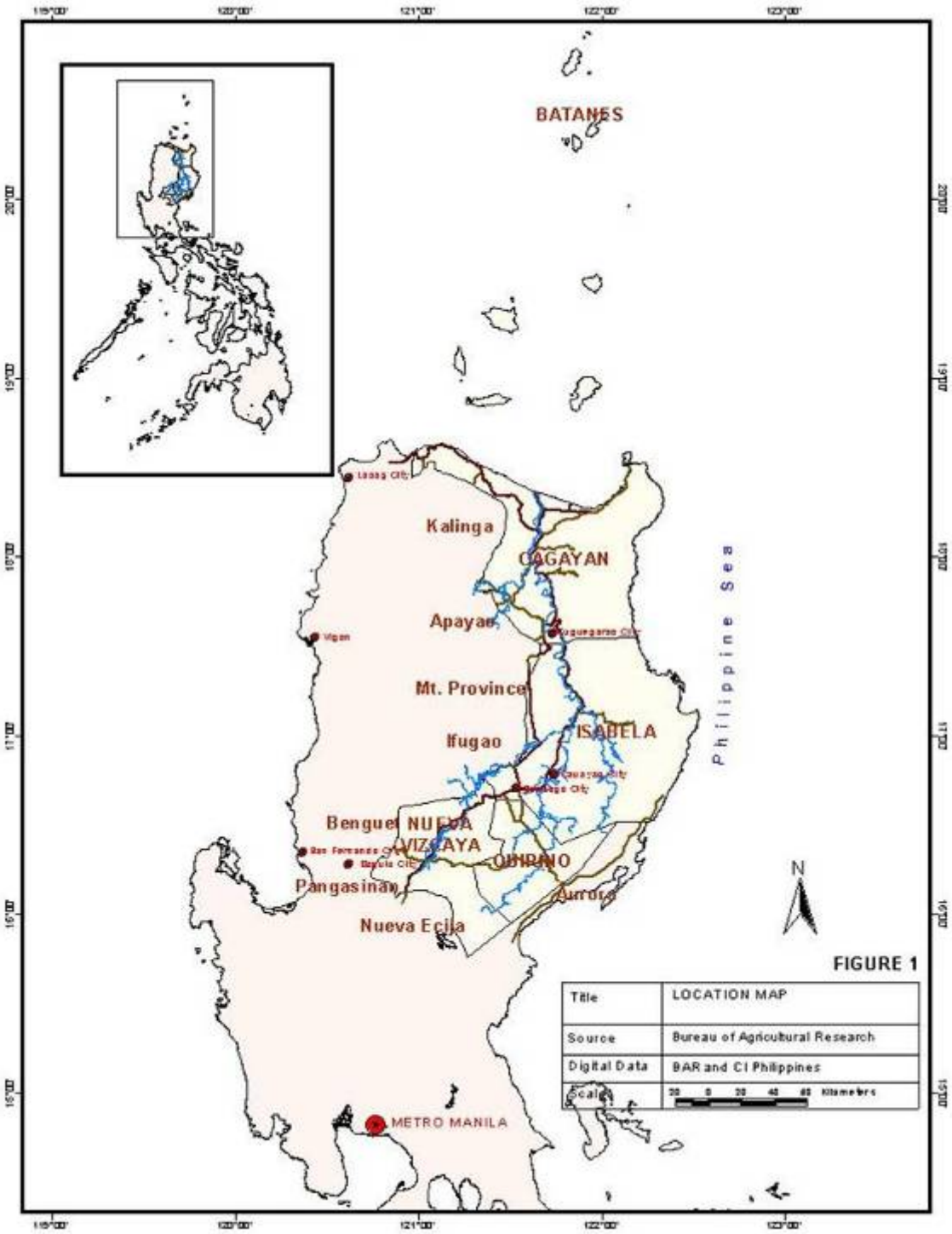
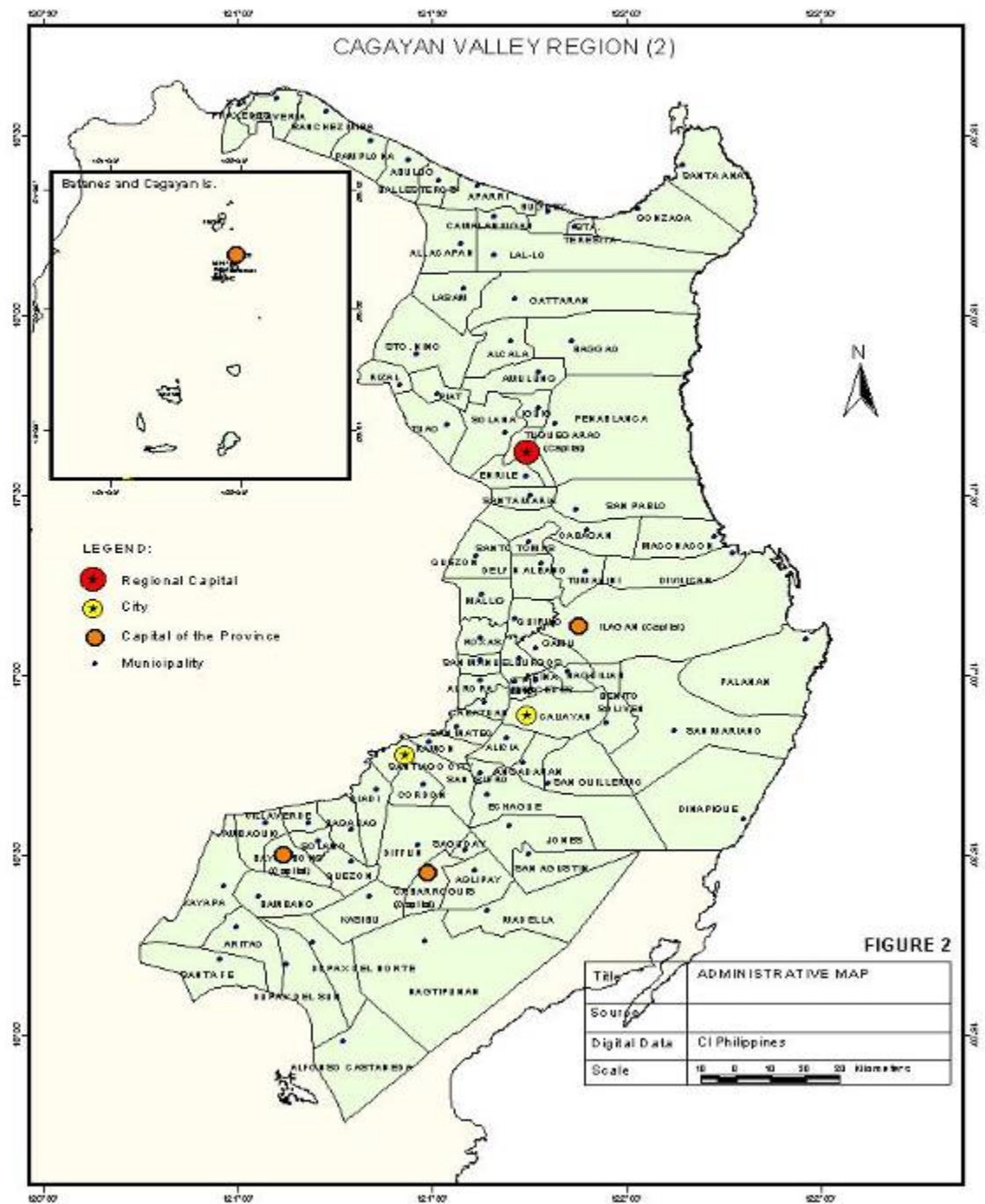


Figure 2. Administrative Map



terrain (8 to 30 degrees slope) and lowlands (below 8 degrees slope) representing 31 and 30 percent of total the area respectively (**Table 1**). Lands with elevation from 0 to 500 m. above sea level (ASL) represent about 92 percent of the total area while only 8 percent have elevation between 500 to 1000 m. ASL. (**Figure 3**)

**Table 1. Land Area and Slope Classification, Region II by Province
As of 2000**

LAND AREA/ SLOPE	REGION II		BAT.	CAG.	ISA.	VIZ.	QUI.
	Area (Has)	% Dist.	Area (Has)	Area (Has)	Area (Has)	Area (Has)	Area (Has)
Total Land Area	2,685,836	100.00	23,000	906,270	1,066,456	390,390	305,720
Slope							
0 – 3 %	665,390.50	24.79	1,065	253,831	343,615	56,193	17,186
3 – 8%	163,364.00	6.08	566	54,763	54,763	1,976	25,910
8 – 18%	367,723.30	13.69	3,373	12,316	12,316	4,230	23,962
18 – 30%	407,656.40	15.17	8,257.44	153,665	153,665	20,103	65,916
30 – 50 %	717,261.00	13.26	3,245.40	94,030	94,030	87,415	47,461
50 and above	717,261	26.71	6,532.00	223,595	222,595	224,451	111,940
Reservoir	7,986	0.3	0.00	0.00	0.00	1,627	4,175

Source: ALMED, Bureau of Soils and Water

3. Climate

Climate in the region is covered by four types generally characterized by Type III, not very pronounced climate but generally dry from November to April and wet during the rest of the year in the region's western flank or valley areas; Type IV with rainfall more or less evenly distributed throughout the year in the region's eastern flank, Type II in the island of Batanes Province and Type I with two pronounced seasons, dry from November to April and wet during the rest of the year in the western portion of the province of Nueva Vizcaya and the northwest tip of Cagayan Province. Rainfall varies from 1600 mm. in the valley areas to 4400 mm. in the mountainous areas. Temperature ranges from a low of 17°C during the period of November to February, to a high of 35°C during the months of April to June, with May as the warmest and January the coldest month. (**Figure 4**)

Figure 3. Slope Map

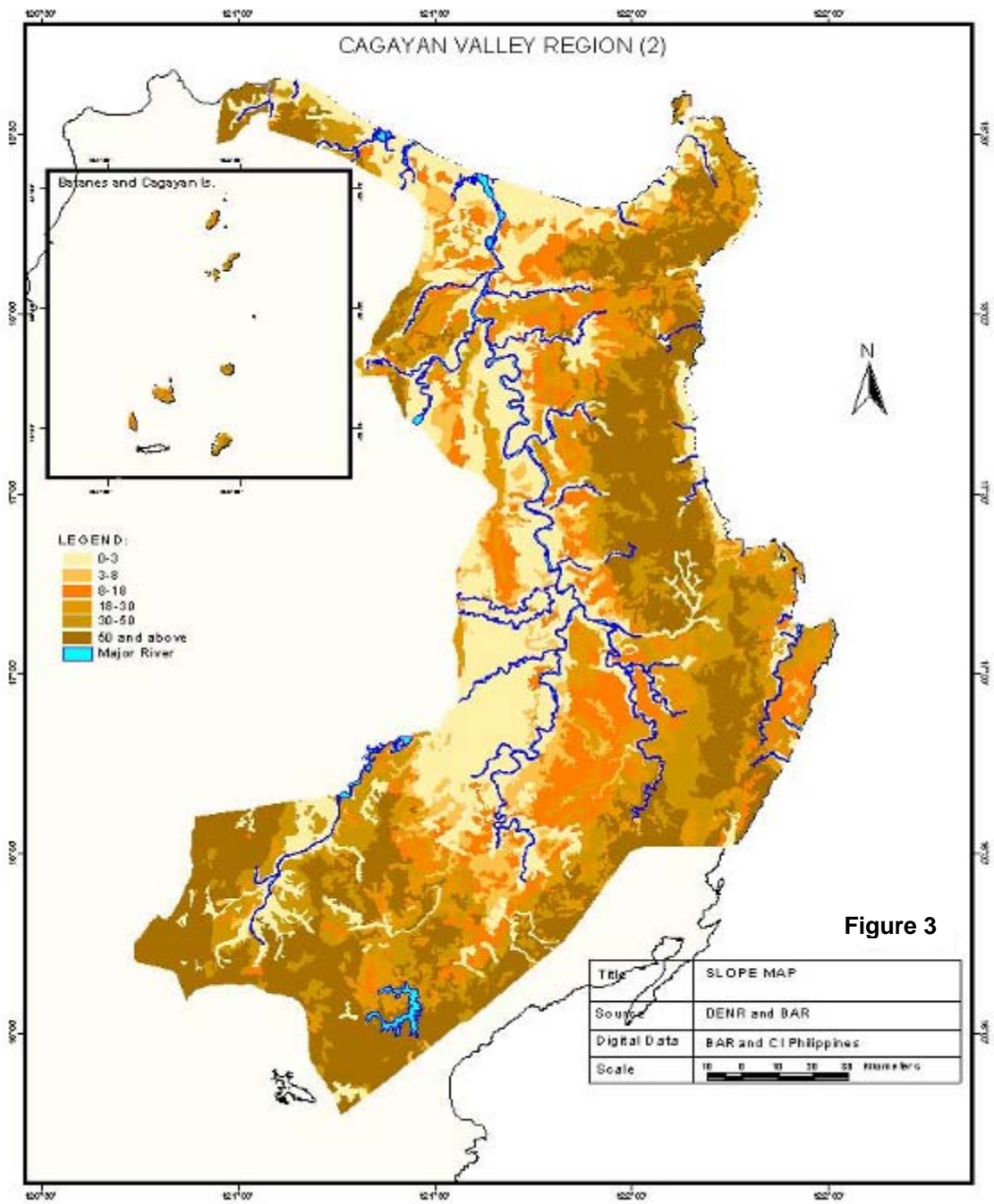
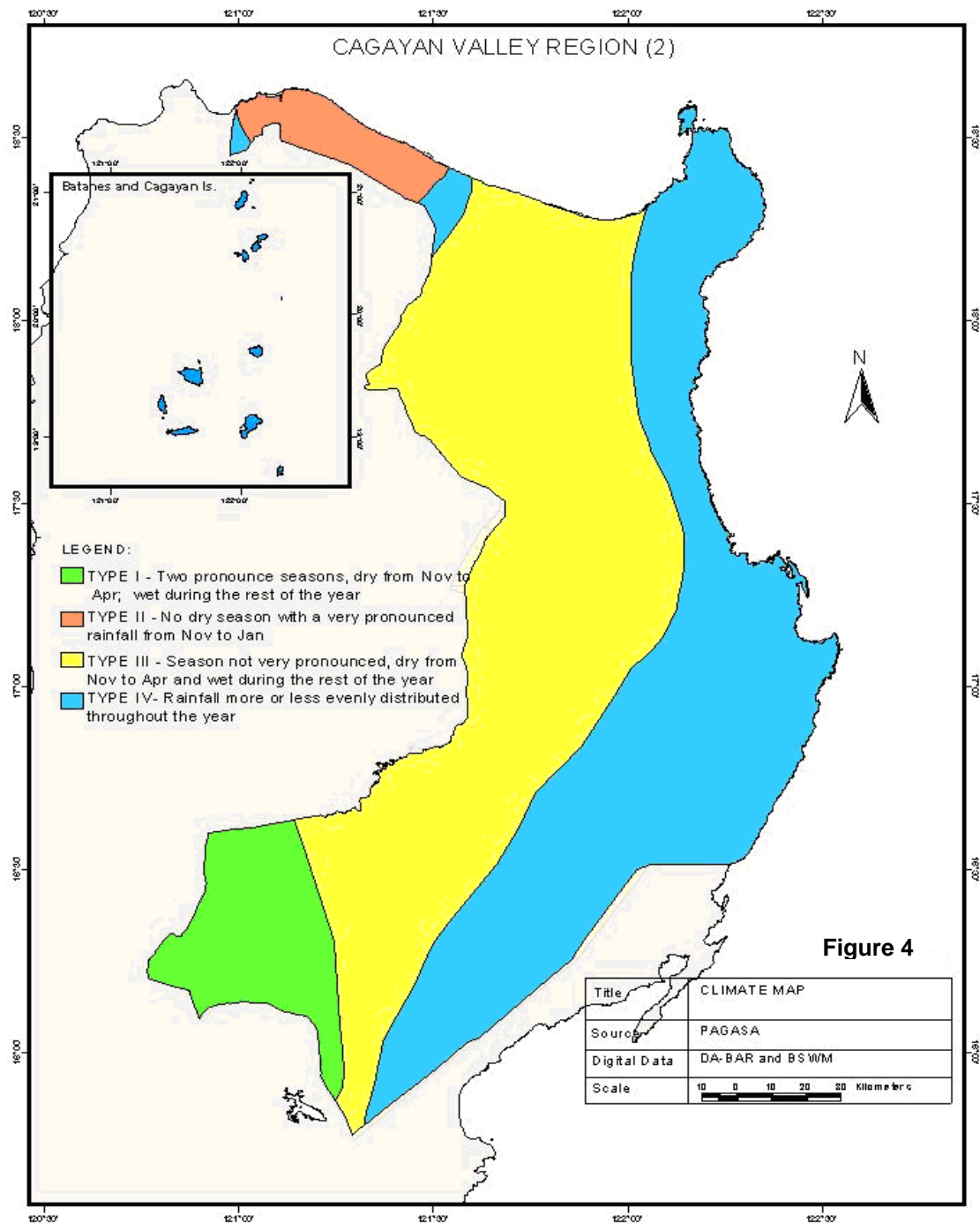


Figure 4. Climate Map



B. Population Characteristics

The region has to provide clean air to more than two million residents. This population is also an indication of the available labor supply in this part of the country.

1. Population Level

The Region's total population in the Year 2000 Census was recorded at 2,813,159, the 6th lowest among all regions of the country. During the same year, total regional population accounted for about 3.68 percent of the national total (**Table 2**).

**Table 2. Population Levels and Percent Distribution
Philippines, May 2000 Census of Population**

REGION	May 2000	% Share
Philippines	76,498,735	100.00
IV	11,793,655	15.42
NCR	9,932,560	12.98
III	8,030,945	10.50
VI	6,208,733	8.12
VII	5,701,064	7.45
XI	5,189,335	6.78
V	4,674,855	6.11
I	4,200,478	5.49
VIII	3,610,355	4.72
IX	3,091,208	4.04
II	2,813,159	3.68
X	2,747,585	3.59
XII	2,598,210	3.40
ARMM	2,412,159	3.15
XIII	2,095,367	2.74
CAR	1,365,220	1.78

Source: National Statistics Office, May 2000 CPH

For three (3) censal years (1980, 1990 and 2000 census), the Province of Quirino registered the fastest growth in population at an annual average growth rate (AAGR) of 3.31 percent followed by Nueva Vizcaya at 2.29 percent. The province with the slowest growth in population is Batanes at 1.32 percent followed by Cagayan with 1.75 percent AAGR from 1975 to 2000. In terms of growth trend, Nueva Vizcaya is the lone province with a steadily decreasing population growth rate from 1975 to 2000. The provinces of Cagayan, Isabela and Quirino showed slight increases in their respective growth rates in Year 2000 compared with their previous rates in 1995 while the Province of Batanes showed a fluctuating trend in population growth (**Table 3**).

**Table 3. Population Growth Rate, Region 02 by Province
Censal Years 1975 to 2000**

PROVINCE	Annual Average Growth Rate (AAGR)				
	1975-1980	1980-1990	1990-1995	1995-2000	1975-2000*
Batanes	0.37	2.2	-1.08	3.25	1.32
Cagayan	2.01	1.55	1.43	2.26	1.75
Isabela	3.57	2.18	1.35	2.25	2.26
Nueva Vizcaya	2.54	2.22	2.01	1.97	2.29
Quirino	4.82	3.21	2.63	2.71	3.31
Region 02	2.88	1.31	1.51	2.25	2.12

Source: Philippine Statistical Yearbook 2001

*Computed using the geometric formula of computing the AAGR

2. Population Projections

The population projection for the region is shown in Table 4. By Year 2030, the region may reach a total population of 3,984,368 or an increase of 57 percent from its level in 1995. Given the region's lower population growth compared with that of the national average, its share to the national population may further decrease to 3.57 percent in 2030 from 5.17 percent in 1995. In terms of provincial distribution, population may remain concentrated in the provinces of Cagayan and Isabela, although the aggregate share of the said provinces is expected slightly to decrease from 80.72 percent in 2000 to 79.70 percent of the total population in 2030. On the other hand, the provinces of Nueva Vizcaya and Quirino, with their relatively rapid population growth rates during the past 25 years may slightly increase their share to the regional population by 2030.

**Table 4. Population Projections, Philippines and Region 02 by Province
2010-2030**

REGION/ PROVINCE	Projected (in thousands)					% share			
	1995	2000	2010	2020*	2030*	1995	2000	2030	2030
REGION	2,563.03	2,923.53	3,338.17	3,764.04	3,984.36	100.00	100.00	100.00	100.00
Batanes	14.18	15.482	16.995	18.730	20.015	0.56	0.53	0.51	0.50
Cagayan	895.05	1,010.26	1,133.87	1,263.49	1,337.83	35.29	34.56	33.97	33.57
Isabela	1,160.72	1,349.70	1,546.11	1,736.33	1,814.63	45.77	46.17	46.32	46.13
Vizcaya	334.96	389.69	451.16	519.12	451.80	13.21	13.33	13.52	13.79
Quirino	131.11	158.37	190.02	226.36	250.07	5.17	5.42	5.69	6.01
Philippines	68,349.45	79,476.24	91,851.26	105,503.14	111,841.62				
Share of Reg 2 to National total						3.71	3.68	3.63	3.57

Source: 1995 Census Based City/Municipal Projections

*derived by the RLUC TWG adopting the growth trends reflected in the 1995 Census Based

3. Provincial Distribution

Growth trends indicate that population is concentrated in municipalities located along the region's main access roads. As of CY 2000, about 16 percent of the regions population was located in the four (4) most populated cities/ municipalities which are: Tuguegarao City, Municipality of Ilagan, Cauayan City and Santiago City. The remaining 84 percent was distributed in 89 relatively small municipalities region wide. Of the 93 municipalities, about 77 percent or 72 municipalities had less than 40,000 populations as of CY 2000. The municipal distribution of the region's population followed the same trend as that of 1990.

4. Urban-Rural Distribution

The region is predominantly rural with about 73 percent of its population living in the countryside as of CY 2000. The most urbanized province is Batanes with about half of its population living in the urban areas, followed by Isabela at 31.99 percent. In terms of the distribution of the regional urban population, about 80 percent are found in the provinces of Isabela and Cagayan. The province of Isabela alone accounts for about 54.39 of the total urban population of the region. This relatively shows the availability of labor force in the countryside where the project (biofuel plantations) will be located.

C. Regional Economy

The development of a Jathropa Curcas Industry will provide alternative livelihood of the farmers in Region 02 and boost the region's economic growth.

Gross Regional Domestic Product (GRDP) and Gross Value Added (GVA)

In Year 2004, the region's GRDP posted a total value of P24.155 Billion at constant 1985 prices. It had the lowest GRDP value among regions comprising the Island of Luzon (**Table 5**)

There is no significant change in the region's economic structure. Agriculture remains as the major contributor to GRDP and its proportion to GRDP slightly increased to 54 percent in 2004 from its share of 45 percent in 1995. In contrast, the contribution of the industry sector decreased from 19.6 percent share to GRDP in 1995 to 14 percent in 2000. Services sector dipped from 34.4 percent in 1975 to 32 percent in 2004.

**Table 5. Gross Regional Domestic Product by Region, 1995, 2000 and 2004
(in Million Pesos at Constant 1985 Prices)**

Region	1995		2000		2004	
	Value	%Dist.	Value	%Dist.	Value	%Dist.
Philippines	802,224	100	954,962	100	1,134,907	100
NCR	242,167	30.19	296,859	31.9	355,158	31.29
CAR	16,075	2.00	22,278	2.33	27,558	2.43
Region I	24,225	3.02	30,326	3.18	34,100	3.00
Region II	16,142	2.01	21,600	2.26	24,155	2.13
Region III	78,487	9.78	84,970	8.90	97,684	8.61
Region IV	125,248	15.61	144,996	15.18	176,740	15.57
Region V	23,517	2.93	25,918	2.71	32,795	2.89
Region VI	57,597	7.18	67,001	7.02	86,034	7.58
Region VII	52,327	6.52	65,031	6.81	80,537	7.10
Region VIII	18,969	2.36	22,956	2.40	25,994	2.29
Region IX	21,183	2.64	27,001	2.83	29,959	2.64
Region X	41,866	5.22	36,515	3.82	49,243	4.34
Region XI	53,501	6.67	60,275	6.31	51,671	4.55
Region XII	22,174	2.76	25,721	2.69	40,254	3.55
ARMM	8,116	1.01	9,179	0.96	9,852	0.87
CARAGA			14,336	1.50	13,172	1.16

Source: 2000 Philippine Statistical Yearbook

National Statistical Coordination Board, Regional Accounts July 2001 release

D. Labor and Employment

Employment opportunities will be increased through a *Jatropha curcas* industry. The Industry will create employment opportunities for the local population particularly in the rural areas where the cultivation of *jatropha* will be mostly undertaken.

1. Labor Force Participation

The proportion of population aged 15 years and above joining the labor force has been increasing for the past 10 years. The region's Labor Force Participation Rate (LFPR) of 66.7 percent in 1990 peaked to about 72.7 percent in 1994 and gradually tapered to 68.6 percent in 2000. In absolute levels, an average of 35,000 join the labor force per year from 1990 to 2000. Participation in the labor market is more prevalent in the rural areas and among the male population. Among provinces, the province of Batanes registered the highest LFPR at 80.0 percent as of CY 2000 (**Table 6**).

**Table 6. Labor Force Participation Rate (LFPR) By Area and Sex
Region 2: By Province CY 2000**

	Batanes	Cagayan	Isabela	N. Vizcaya	Quirino	Region2
By Area	80.0	72.1	68.4	77.6	75.0	68.6
Urban	75.0	65.0	67.5	73.1	66.6	67.0
Rural	83.3	73.5	68.7	79.1	76.3	71.3
By Sex	80.0	72.1	68.4	77.6	75.0	68.6
Male	80.0	85.0	81.4	89.4	88.2	82.0
Female	80.0	59.6	54.9	69.0	57.7	56.9

Source: National Statistics Office Quarterly

2. Employments and Underemployment

Employment levels on the other hand increased from 953,000 in 1990 to 1,266,000 in 2000. This translates to an average of 32,000 jobs created yearly. This 2.88 percent annual growth in employment was not fast enough to meet new labor requirements. Thus, regional unemployment levels increased from 46,000 in 1990 to 88,000 unemployed in 2000. In terms of rate, however, unemployment rate is only 6.5 percent in 2000 from 4.6 percent in 1990. This unemployment rate is relatively low considering that population has been increasing fast over the ten-year period widening the base of the workforce. In spite of this, the region showed an improving capacity to provide adequate productive full employment as indicated in the decreasing trend in underemployment from 21.4 percent in 1991 to 13.4 percent in 2000. With the biofuel industry, it is expected that unemployment and underemployment will be drastically reduced.

E. Health

The Region's tertiary health care is provided by 86 licensed hospitals of which 41 are under government control and 45 are private - owned. There are three tertiary level hospitals: Cagayan Valley Medical Center (CVMC) in Cagayan, Veterans Regional Hospital in Nueva Vizcaya, and Cagayan Valley Sanitarium – a private hospital in Isabela. All municipalities are provided with a Rural Health Unit (RHU) to cater to primary health care needs of the regional population. In terms of manpower resources in the local governments, data reveal the lack of doctors and other health personnel in the region's five provinces when compared to the other provinces of the country.

F. Infrastructure and Facilities

The region can be reached by land transport on a full-concrete road either via the Maharlika Highway or the Mallig region route. Air flights are also available, serviced by Air Philippines providing air transport services between Tuguegarao and Manila mostly via the Tuguegarao airport. Another airstrip is available in San Vicente, Sta. Ana which is likewise planned to be upgraded to accommodate a 50-seater DASH 7 type. Airports are also located in Cauayan, Isabela and Bagabag, Nueva Vizcaya.

For shipment and transshipment, the Port Irene will be restored and modernized by the Cagayan Economic Zone Authority (CEZA) providing gate way to international markets.

The region likewise provides financing facilities and convenient access to regular banking. The province of Cagayan alone has 21 commercial banks, 5 government banks 1 thrift and 15 rural banks which is likewise similar in key cities and municipalities. Further, all municipalities have provisions for meetings/conference venues and generally operate hotels.

G. Investment Incentives

Investors shall enjoy applicable incentives under the Omnibus Investment Code of 1987 (E. O. 226) like preferential visas, tax credits and certain tax exemptions. Specifically, for the province of Cagayan where the gateway to the Pacific and foreign markets is located, the following additional incentives were offered on top of those under E.O. 226

1. The Cagayan Economic Zone Authority (CEZA)
 - a. Income tax holiday
 - b. Tax credits for foreign corporations
 - c. Tax and duty free importation of articles, raw materials, capital goods, equipments and consumer items.
 - d. Permanent resident status for foreign investors and their immediate families but for a minimum capital of US \$ 150,000 or roughly Php 7,200.00 under current forex rate

2. The Provincial Government of Cagayan:

- a. Use of certain real properties owned by the provincial government for free for a period not exceeding 3 years
- b. Exemption from paying of basic real property tax for a period of 6 years for those established in the 5th and 6th class municipalities and 3 years under 2nd, 3rd and 4th class municipalities.
- c. Exemption from tax on transfer of real property ownership for a period not exceeding three years
- d. Exemption from franchise tax for a period not exceeding 3 years.

CHAPTER 3

DEVELOPING JATROPHA BIODIESEL INDUSTRY IN REGION 02

A. Regional Energy Development

The Cagayan Valley 2004-2010 Regional Development Plan (RDP) provides the regional direction in energy development to ensure the adequacy and reliability of power and energy. Within the plan period, the region likewise seeks to provide electrification to far-flung barangays and fully energizing the remaining 331 unenergized barangays in 2008. This will be achieved through the installation of appropriate new and renewable energy (NRE) technologies in off-grid areas and the connection of the other barangays within the reach of power grid lines. Also, the high power distribution systems loss is aimed to be reduced from the current two-digit level into a single digit regional average system loss by 2010.

Further, indigenous and renewable energy sources will be developed under the following projects:

- (a) Coal Power Plants in Cagayan and Isabela;
- (b) Northern Luzon Wind Power Project in the coastal towns of Cagayan and Batanes Province;
- (c) Commercial Wind Diesel Hybrid Project in Batanes;
- (d) Construction of Micro-Hydro Plants for Upland Dwellers in Northern Luzon; and
- (e) Region-wide Micro Solar Home Projects

Worth mentioning is the presence of a gas field in San Antonio, Isabela which, based on record is bound to produce 365 MMSCF annually from 2005 to 2006. However, natural depletion of the field is seen by this year (2007).

In the island of Fuga, Province of Cagayan, the Philippine National Oil Corporation (PNOC) conduct exploration activities in search for natural gas and oil. Exploration result yielded low volume and was found to be not commercially viable to mine. Thus, the planned development of the island into a super city was dropped.

Despite these setbacks, the region is committed in pushing for energy independence and in developing the other energy potentials. Cagayan Valley Region shall continually participate with the country's energy programs in search and development of alternative energy sources that will contribute to the nation's overall goal of attaining energy independence.

In the Updated Regional Development Plan (2008-2010), the region seeks to develop its biofuel industry potential, initially through research studies.

B. Preference to Jatropha Curcas for Biodiesel Production in Region 02

The production of biodiesel in Region 02 shall conform to national priorities and policies of food security and environmental integrity. Alternative fuel production shall not compete and in any case disrupt the present setup in the food production system in the region. This is in support to the food security policy of the government and to sustain the role of the region as the agricultural bowl and food basket of the country. Relatedly, the development of biofuels in the region shall contribute to the improvement and sustainability of biodiversity.

The variety of choices for feedstocks in biofuel production are limited to crops such as corn, coconut, sugarcane, sorghum and jatropha curcas. Corn, sorghum and sugarcane are mostly planted within prime agricultural areas while coconut can thrive in other areas but require a certain level of soil fertility. Jatropha curcas on the otherhand is found growing anywhere in the region and it is claimed having the following features and characteristics:

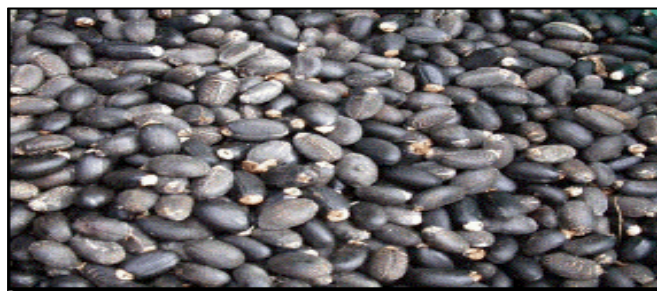
- Jatropha can be grown in areas of low rainfall (200 mm per year) and in problematical low fertility marginal areas, degraded, arid areas and even on alkaline soils. Thus, it is not selective or site exacting compared to other species.
- Easy to propagate either from seed or through cuttings. Use of branch cuttings for propagation is easy and will result in rapid growth and early flowering.
- Fruits can be harvested within 10 to 18 months depending on the planting stocks used compared to the other tree species bearing oil seeds which take years before harvesting can be done.
- Yield ranges from an initial of about 0.4 tons per hectare to an average of 7,000 tons per hectare and goes even beyond 12 tons / ha., all to an annual basis. It is prolific and it does not have any seed-off year compared to some oil bearing trees with high oil-yield ratio. Three kilos of *Jatropha curcas* seeds can yield 1 liter oil (with the use of very high efficiency oil extraction methods), and it is easy to harvest.
- Like trees, jatropha curcas removes carbon from the atmosphere, stores it in the woody tissues and assists in the build up of soil carbon. It is thus environment friendly and keeping with the national commitment to provide clean air to the citizens as part of their fundamental right by enforcing stricter emission norms.
- It is non-edible oil plant and will not compete or provide pressure on space and prices from other sources of oils like coconut, corn, sorghum and other biofuel sources.



Jatropha flowers



Jathropa fruits



Jatropha seeds

Appendix A compares jatropha curcas, sugar cane, sweet sorghum and coconut as feedstock for biofuel. Jatropha ranks second to sugarcane in terms of yield with 3,448 liters per ha. and much higher than coconut with a yield of 480 liters per hectare. Jatropha posted a competitive price in terms of production cost at PhP17.00 per liter while coconut, sugarcane and sweet sorghum cost PhP26.4, PhP14.98 and PhP13.11, respectively. The initial investment cost for a hectare of Jatropha plantation requires about PhP21,759.00, but thereafter the cost significantly decrease as the crops does not have to be replanted annually and therefore only maintenance cost are incurred. These information however shall have to be confirmed through the conduct of extensive research work and feasibility studies.

Moreover, jatropha's water requirement is low. It can survive a long period of drought by shedding most of its leaves. It can stand up to two years without rainfall. The tree has a short gestation period as it bears several fruits starting at about 8 months old and be fully fruit bearing between one to two years. The plant likewise remains useful for around 30-35 years. Jathropa curcas can also be integrated in agricultural system as hedges or alley crops and in agroforestry as understory crop to trees. Among the agricultural crops that can be planted with Jatropha are upland rice, peanut, mungbeans, and taller crops such as papaya, banana, and coffee. Intercropping with old and sparsely spaced coconut trees is also possible.

Relating the above characteristics to the parameters of selecting the priority source for biodiesel production, Jatropha suits well to be promoted as the main source of biodiesel in the region. Primarily, Jatropha does not compete in prime agricultural areas relieving pressure to food security. Relatedly the region holds abundant marginal and degraded areas where Jatropha can be planted, perfectly fitting with the parameters while complementing the present condition of the region. Given all considerations, Jatropha will be the preferred source of biodiesel production in the region.

C. Jatropha Industry Potentials and Challenges in the Region

1. Potentials

a) Adaptability of Jatropha in the Region

Periño (1993) mentioned that tubang bakod (Jatropha) is adaptable to a wide range of growing conditions being present in humid to semi-arid/arid tropical and subtropical environment even in areas with 480-2380 mm average annual rainfall. It can grow in shallow, gravel, sandy, clay, low fertility and alkaline soils. This thus explain why Jatropha is found growing anywhere in the region, in all kinds of soil even rocky and in saline areas of the coastal towns. It is not therefore site exacting and being a tropical plant, it could withstand extremes of temperature and long periods of drought.

The above statement however, should be confirmed and supported with more research works and empirical observations. On the other hand, as Cagayan Valley Region has favorable climate and possesses generally good soil condition, further research should be made to determine the best Jatropha variety that could provide the best growth requirements of Jatropha and attain optimum productivity.

b) Availability of Areas for Jatropha Biodiesel Industrial Plantations

The total forest area under the DENR is more or less about **1,717,793** hectares representing both those covered with tenurial instruments and untenured idle areas. **Table 7** shows the areas by tenurial instruments are those covered by Community-based Forest Management (CBFM), Integrated Forest Management Agreement (IFMA), Socialized Industrial Forest Management Agreement (SIFMA), Integrated Social Forestry (ISF). These instruments provide the recipients control over the areas subject to provisions set forth by the DENR for a period of twenty five years (25 years) and renewable for the same period. Total tenured areas are accounted to about **748,894.13** hectares.

Untenured areas include those cancelled pasture lease agreements, idle grasslands/brushlands and degraded forest lands not covered by any instrument from the DENR. Available statistics from the Forest Management Sector (FMS) of the Department of Environment and Natural Resources (DENR) shows that there are more or less **968,898.87** hectares. Of the foregoing figure, about 25,231.5 hectares are already under the Memorandum of Agreement between the Philippine Forest Corporation (PFC) and the DENR for the development into Jatropha industrial plantation.

**Table 7. Summary of Tenurial Instruments and Untenured Areas
By Province in Region 02
(as of December 2005)**

TENURIAL INSTRUMENT	PENR OFFICES					TOTAL
	BATANES	CAGAYAN	ISABELA	NUEVA VIZCAYA	QUIRINO	
<u>Tenured Area</u>						
TLA	0.00	0.00	20,583.00	0.00	0.00	20,583.00
IFMA	0.00	0.00	44,573.00	0.00	0.00	44,573.00
SIFMA	0.00	3,729.93	5,700.00	0.00	166.00	9,595.93
FLGLA	0.00	13,412.92	8,064.00	500.00	464.50	22,441.42
TFL/AFFLA	0.00	687.00	1,366.00	1,607.00	42.00	3,702.00
Military/Civil & School Reservation	0.00	5,553.00	32,016.00	7,365.47	10.30	44,944.77
Grow A Tree for Legacy	0.00	0.00	403.00	6,470.52	0.00	6,873.52
CBFM/CFSA/CPEU	920.86	96,012.70	52,689.18	21,918.42	86,756.08	258,297.24
CADC/CALT		54,256.83	43,270.00	104,520.00	70,212.83	272,259.66
ISF (Devolved)	422.39	17,743.46	19,105.00	16,477.00	2,863.84	56,611.69
ALMA/CBALMA	0.00	0.00	0.00	3,210.90	0.00	3,210.90
PACBRMA	0.00	0.00	5,801.00	0.00	0.00	5,801.00
Total Area Covered with Tenurial Instrument	1,343.25	191,395.84	233,570.18	162,069.31	160,515.55	748,894.13
Remaining Untenured Areas	*12,152.75	355,678.16	373,219.82	139,396.69	88,451.45	968,898.87
Total Forestland Areas (Has.)	13,496.00	547,074.00	606,790.00	301,466.00	248,967.00	1,717,793.00

Note: Remaining area of Batanes and Nueva Vizcaya are within Batanes Protected Landscape and Magat Forest reserve under Proclamation No. 573, respectively.

From the said areas, only about **223,581.50** hectares are identified as potential areas for jatropha industrial plantations. These sites include both tenured and untenured areas within (a) other land, natural, grassland; (b) other land, natural barren land and (c) other woodedland, wooded, grassland. Generally, these sites are within 8 to 18 percent slope category or areas within undulating to rolling terrain. The provinces of Cagayan and Isabela occupy about **93.43 percent** of the total area with **103,264.50** and **105,631** hectares, respectively, while the province of Nueva Vizcaya share the remaining **6.57 percent** corresponding to **14,686** hectares.

**Table 8. Potential Jatropha Areas
By Vegetative Cover and Province in Region 02
(as of December 2007)**

Vegetative Cover	Cagayan	Isabela	Nueva Vizcaya	Quirino*	Region 02
Other Woodedland, Wooded, Grassland	71,816.00	54,544.00	10,012.00		136,372.00
Other Land Natural Grassland	30,705.00	51,087.00	3,187.00		84,979.00
Other Land, Natural Barrenland	743.50		1,487.00		2,230.50
Total	103,264.50	105,631.00	14,686.00		223,581.50

Source: DENR, Region 02 - Land Evaluation Party (derived data from Vegetative Map undertaken on April 2008)

***The potential jatropha area in the province of Quirino is about 33,062.00 hectares. These areas are within 8 to 18 percent slope category mostly grasslands, woodedland and barren lands.**

c) Investment Prospects from Clean Development Mechanism (CDM)

Jathropa plantations can be established as a project under the Clean Development Mechanism (CDM) which aims to reduce greenhouse gas emissions. The Cagayan Valley can participate in the carbon market as a seller of carbon emission certificates (CERs) to developed countries. In the end, investments from these countries help the region fund and implement the projects, increase productivity and reduce environmental problems.

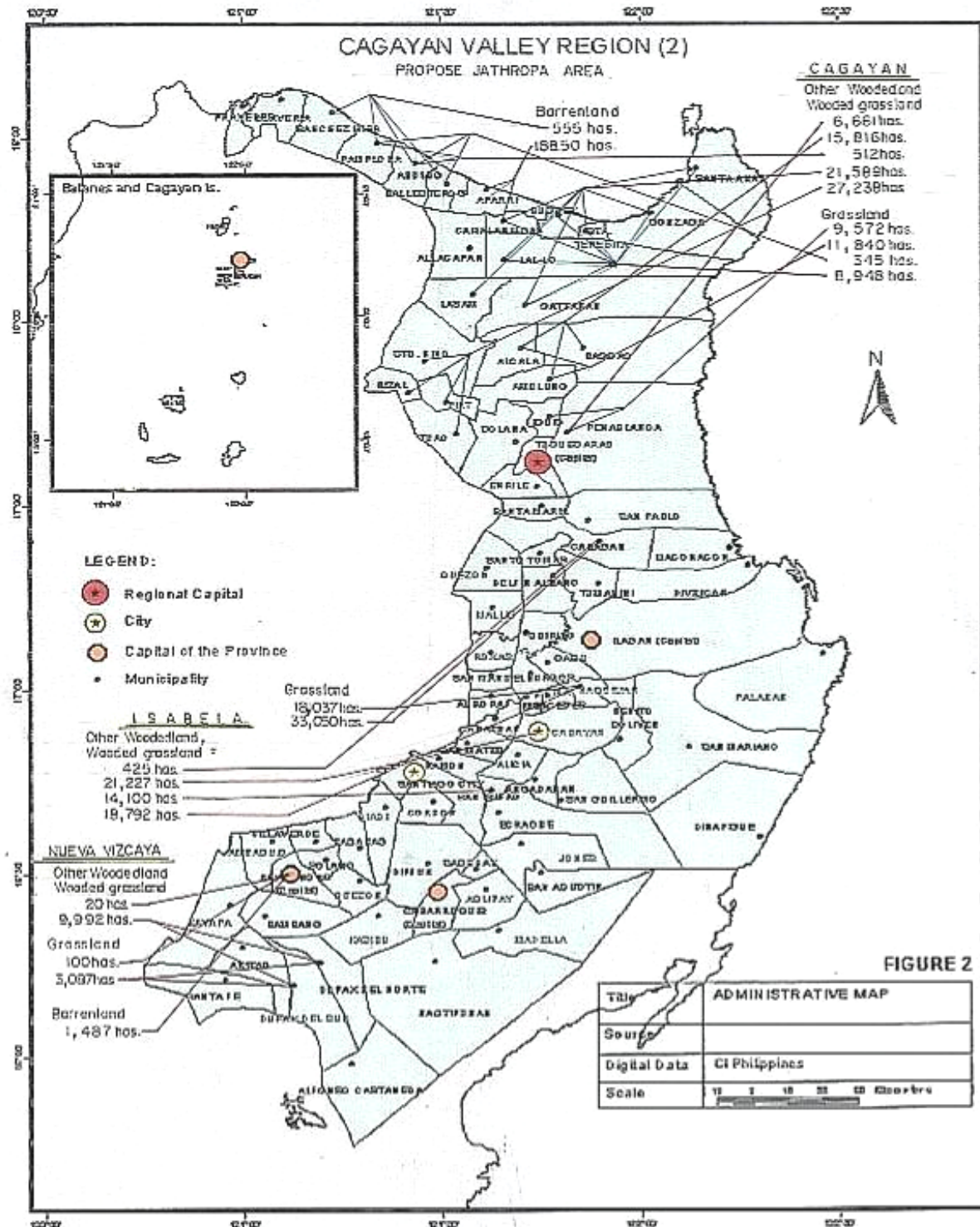


Figure 5. Potential Areas for Jatropha Plantation Map

2. Problems, Challenges and Issues

Inasmuch as the Jatropha Industry is in its introductory stage in the region and in the country, several concerns challenges and issues shall have to be resolved. This is to ensure success in the establishment and sustainability of the Jatropha industry in the Cagayan Valley Region.

a) Search and adaptability of high yielding Jatropha marginal areas in the region

Though it is claimed that Jatropha thrives in almost all kinds of soil, it is not assured that the different Jatropha varieties provide high yield or optimum productivity. Hence the issue of finding the right variety appropriate for a specific soil/area should be resolved through research to optimize production and productivity of Jatropha in the region.

b) Accessibility of potential sites among marginal areas

Aside from uncertainty in the adaptability of Jatropha in marginal areas, accessibility is among the primary concerns in the development of idle marginal lands intended for the Jatropha Plantations. Specifically for untenured areas, these are located in remote areas where it may require significant investments in developing the said sites.

c) Lack of technology and skills in jathropa oil processing

Inasmuch as the Jatropha Industry is in its infancy, the required skills and technology in the establishment and development of the Industry may not be readily available in the region.

d) Need for efficient investment promotion and marketing support

Being a new industry, the marketing system for jathropa products is not yet established. Likewise, an intensive investment promotion is needed to jump-start the industry.

CHAPTER 4

REGIONAL JATROPHA INDUSTRY DEVELOPMENT FRAMEWORK

This Chapter presents the overall framework in the development of the Jatropha (Biodiesel) Industry in the Cagayan Valley Region within the Plan period 2008-2030 by portion providing policy directions and specific strategies in the development of the industry.

A. Goal

To develop the region's renewable energy sources by developing a strong Jatropha Industry in the Cagayan Valley.

B. Specific Objectives

The above goal in the establishment of the Jatropha Industry is translated into the following specific objectives:

1. To promote and strengthen R&D programs to ensure the viability and sustainability of the Jatropha Industry in the region;
2. To promote investment for the establishment of Jatropha Industrial Plantations in viable areas preferably idle lands open grass lands, degraded lands and marginal areas and the establishment of processing plants in strategic areas regionwide;
3. To link Jatropha communities to the urban centers and to the mainstream of the regional economy in the region; and
4. To support and strengthen the marketing system for the Jatropha Industry.

C. The Jatropha Industry Development Strategy: The Marginal Area Regeneration and Development Strategy (MARDS)

Supporting the thrust of the government in pursuing biodiesel industry particularly in pushing for Jatropha as the feedstock, the Cagayan Valley Region shall develop Jatropha as the primary source of biodiesel. The Jatropha Industry is seen as a potent vehicle for countryside development, improvement of rural productivity and natural resource regeneration and conservation.

Inasmuch as some Jatropha species are perceived to thrive in marginal areas, the priority areas to be developed for Jatropha plantations shall be the region's vast undeveloped open areas, grasslands, degraded lands and marginal areas. This is to ensure the preservation of present areas devoted for agricultural production and in support to the policy on food security. These principles shall be the primary consideration and premise in the overall strategy for the development of Jatropha Industry in the region.

Giving consideration to food security, environmental regeneration and integrity and with the region's vast idle lands, marginal grasslands and degraded areas, the overall strategy in the development of Jatropha plantations shall be the "Marginal Area Regeneration and Development Strategy (MARDS)".

The MARDS Strategy will develop and convert idle and marginal areas into productive lands while regenerating and boosting soil fertility in these areas. This strategy fully supports the government's policy for food security since the areas to be developed for Jatropha Plantations do not compete with agricultural lands. Pushing for Jatropha as the primary source or feedstock for biodiesel production will also lessen pressure in other food crops namely coconut, cassava, sorghum and sugarcane.

With MARDS as the overall strategy, the region will be harnessing economic benefits from the biodiesel production while ensuring food security and at the same time regenerating degraded and marginal lands in the countryside restoring soil fertility and improving agricultural capacity.

In adopting MARDS as the overall strategy, the rural communities specifically in Jatropha areas will be clustered in a strategic location within the proximity of Jatropha Farms. This is to improve access to the workplace and provide a better inflow/provision of basic services in the countryside. Rural communities will be provided access to the mainstream of the region's economy for better opportunities and much improved quality of life.

With Jatropha in its infancy, bulk of the pump priming activities will be focused on research activities. Inasmuch as marginal and idle lands are the priority areas for Jatropha development under the MARDS strategy, a lot of research work and studies on the type of Jatropha and soil analysis will be conducted to determine the most suitable specie for a specific area.

D. Policies and Strategies

To operationalize the overall strategy (Marginal Area Regeneration and Development Strategy - MARDS) and ensure the sustainability of the Jatropha Industry in the region, the following policies and strategies shall be implemented:

D.1 Promotion and strengthening of R&D programs to ensure the viability and sustainability of the Jatropha Industry in the Cagayan Valley Region;

- a) The right specie shall be developed to ensure its suitability to the potential areas being promoted for Jatropha Plantations in the region.

Strategy:

- Conduct in-depth research to identify and develop the appropriate Jatropha variety for a particular area to ensure the adaptability and feasibility of Jatropha plantations in the region;
- Conduct soil analysis in the different areas identified for Jatropha plantations in support to the research in identifying the right species for the potential Jatropha areas;

- Establish nurseries in the different Jatropha potential areas. This is to test and ensure the adaptability of specific specie prior to the massive plantation in an area. This will be thoroughly checked because what thrives in marginal areas may not be viable in grassland areas or vice versa;
 - Conduct continuing research to determine high yielding variety of Jatropha for the improvement of production and productivity of Jatropha in the region;
- b) The appropriate machine/technology shall be developed to suit and ensure the viability of Jatropha Processing Plants.

Strategy:

- Assist in the development of appropriate technologies for the establishment of Jatropha Industry in the region;
 - Determine the appropriate size and capacity of processing facility in each of the Jatropha Plantations in the region;
 - Promote the adoption of scientific methods through mechanized farming in Jatropha plantations;
 - Pursue continuous research for the improvement of technology to optimize production and productivity of Jatropha in the Cagayan Valley Region;
- c) The quality of biodiesel sourced from Jatropha shall be ensured to meet local and international standards

Strategy:

- Conduct research studies to ensure a high quality of biodiesel (FAME) product. It should meet the specifications set by the PNOC/PNS and shall conform to international standards. Production of biodiesel sourced from Jatropha shall be allowed to cater to the international market if the product can not meet the standard set by the PNOC/PNS;
- Establish quality control in the different Jatropha Processing Plans;
- Establish an effective monitoring system to include the monitoring of the quality of the product;
- Pursue continuous research and development of technologies will be pursued to improve quality and facilitate productivity.

D.2 Promotion of investment for the establishment of Jatropha Industrial Plantations in potential areas preferably idle lands open grass lands, degraded lands and marginal areas and the establishment of processing plants in strategic locations in the region;

- a) Jatropha Plantations/Areas should not compete with agricultural areas to ensure food security.

Strategy:

- Reiterate the policy on food security in the regional and local plans and shall be reflected in Zoning Ordinances (ZOs) of Cities and Municipalities;
- Strictly enforce and implement of approved City and Municipal CLUP and Zoning Ordinances;

Regional Jatropha Industry Development Framework

- Update Strategic Agricultural and Forestry Development Zones (SAFDZ) to ensure that prime agricultural areas do not overlap with areas offered for Jatropha Plantations;
- Clearly identify and provide buffer zones/strips between agricultural areas and Jatropha Plantations.

b) Priority areas for Jatropha plantations shall be idle lands, open grassland and degraded/marginal lands.

Strategy:

- Classify priority areas to be devoted for Jatropha plantations to include Idle lands, open grassland and degraded/marginal lands;
- Promote clustering of contiguous idle lands and other tenured areas potential for Jatropha plantations;
- Promote the conversion of idle pasturelands into Jatropha plantations;
- Fast-track resolution in the utilization of priority areas for Jatropha plantations in the region

c) The establishment, development and sustainability of Jatropha Plantations in the region will be supported with extension, institutional and information services

Strategy:

- Intensify the development of nurseries and demonstration farms in appropriate State Universities and Colleges in the region;
- Establish a series of demonstration farms in every potential Jatropha plantation areas;
- Enact policies, regulations and ordinances to resolve issues and facilitate the development of the Jatropha industry in the region.

d) The conformity of Jatropha Plantation's operational policies with national laws and local regulations and ordinances shall be ensured.

Strategy:

- Ensure and improve environmental management in the different Jatropha Plantation Areas through comprehensive project studies and plans.
- Provide for Jatropha development/plantations in the preparation and updating of development plans (RPFP, PPFPs, C/MCLUPs) in the region.
- Review and ensure the conformity of national and local policies in the establishment of Jatropha Plantations in the region.

e) Sustainable practices in Jatropha Production Areas shall be promoted.

Strategy:

- Prepare/require Sustainable Management Plan in all Jatropha Farms/Plantations in the region;
- Adopt environmental-friendly farming practices;
- Promote the use of organic fertilizers in Jatropha Plantations/Farms;

- Strictly adhere to the conditions in the Environmental Impact Assessment (EIA) and Environmental Risk Assessment (ERA);
 - Monitor the activities and development in the Jatropha Farms
- f) The availability and sustainability of labor and skills requirement in the industry shall be ensured.

Strategy:

- Determine the skills and labor requirement in the establishment and operationalization of the Jatropha Industry
- Institute capability building through the conduct trainings in the development of skills required for the Jatropha Industry operation;
- Conduct skills training development in the Jatropha Industry;
- Include the capability building program in Industry Plan to be required for large Jatropha Plantations in the region;
- Optimized community participation through organized and federated steward associations;
- Conduct intensive study and identify alternative or supplemental livelihood programs and projects to ensure the availability and sustainability of labor supply in the Jatropha areas in the region;

D.3 Linking Jatropha communities to the urban centers and to the mainstream of economy in the region;

- a) The Mega Farm system will be encouraged in areas above 5,000 hectares for economies of scale.

Strategy:

- Integrate farm with oil facility complex, where feasible;
- Integrate appropriate oil-bearing plants and other crops

- b) The accessibility to upland areas/Jatropha communities in the region shall be improved.

Strategy:

- Improve accessibility of upland dwellers specifically Jatropha communities to existing urban centers in the region;
- Support clustering advocacy arrangement of Jatropha Plantations to improve access and delivery of basic services to the Jatropha communities;
- Promote convergence of government and private efforts in the delivery of basic services and development interventions in clustered Jatropha communities;
- Provide extension programs in support to production areas and provide support services in Jatropha communities in the region.

- c) Support facilities and utilities in the Jatropha Plantations and communities in the region shall be provided.

Strategy:

- Determine the required basic infrastructure facilities and utilities in the establishment of Jatropha Plantations in the region. The assessment of infrastructure support should consider upland dwellers specifically communities engaged in the Jatropha Industry;
- Strategically locate roads and utilities in Jatropha areas to improve mobility and access to support facilities;
- Provide adequate power supply to Jatropha/Biodiesel processing facilities and communities;
- Strengthen LGU-NGA collaboration in the development and improvement of infra support to Jatropha Areas/communities;
- Closely coordinate, monitor and provide necessary assistance to Jatropha areas;

D.4 Strengthening the marketing system for the Jatropha Industry;

- a) Accessible and flexible financing schemes will be promoted to support the Jatropha plantations in the region

Strategy:

- Provide technical assistance to creditors/investors in accessing the financial institutions to facilitate financing assistance;
- Liberalize financing schemes for Jatropha farm development and biodiesel production;
- Provide tax incentives to Jatropha investors that utilizes idle and marginal lands;
- Rationalize and simplify loan requirements to facilitate the access of small scale Jatropha farmers;
- Provide funding support in the plan preparation and project development for Jatropha areas in the region;

- b) Intensified IEC shall enhance the marketing of biodiesel sourced from Jatropha curcas.

Strategy:

- Intensive promotion of biodiesel anchored on a demand-driven strategy ensuring availability of local and foreign market for biodiesel;
- Advocate the importance and benefits of using biodiesel sourced from Jatropha. This will be mainly on its environmental impact, health benefits and employment/livelihood opportunities;
- Utilize different medium of advocacy such as broadcast (radio programs), cable tv and the print media.
- Sustain competitive pricing of biodiesel sourced from Jatropha as a way of promotion, creating demand and strengthening its marketing system.

CHAPTER 5

PLAN IMPLEMENTATION

The implementation of the Regional Jatropha Industry Framework Plan will be a joint effort of the different stakeholders that include RLAs, LGUs, SUCs, NGOs and other key players in the establishment of the Jatropha Industry in the region. These stakeholders shall be properly consulted in the implementation of the policies and activities under the Marginal Area Regeneration and Development Strategy. This is to make wider participation and ensure commitment and full support of the different stakeholders to the Jatropha Industry Plan.

A. Financing the Plan

The implementation of the Jatropha Industry Plan requires funding to realize its objectives. Initial activities in the implementation of the Plan which include the conduct of forum and other advocacy activities and organization of the different stewards in the target areas shall be funded by the DENR.

The bulk of the initial activities focused on research will be funded by the DENR, DOST and other concerned agencies, SUCs and investors. The National Government through its line agencies and other institutions shall allocate and provide funding support or counterpart whenever necessary.

Jatropha Industry Plantations shall be enrolled in the CDM to possibly earn Carbon Sequestration Certificates to boost funding support for the sustainability of Jatropha Farms in the region.

B. Industry Development Phasing

The development of the Jatropha Curcas Industry in the Cagayan Valley will be phased as shown in Figure 7.

The formulation of the Cagayan Valley Jatropha Industry Framework Plan involved a wide participation of RLAs, LGUs, and private sectors. The document went through a series of review before the members of the Infrastructure Development Committee which endorsed it to the Regional Development Committee 02 (RDC 02) for final adoption and approval. This process included a consultation with the Economic Development Committee (EDC) to solicit comments and recommendations to enrich the document as well as to ensure their support and commitment in the Plan's implementation.

The implementation of the Plan will be done in two phases, the Short-Term and the Long-Term. The short term phase which is targeted to be accomplished within 2008-2010 is the

Plan Implementation

most critical part as this will lay down the foundation for a sustainable Jatropha Industry in the region. This phase will deal mainly on the activities that are necessary to jump-start the development of the Jatropha Industry, namely, (a) conduct of extensive R & D and extension programs to ascertain the right jatropha variety through soil analysis in the different areas identified for Jatropha plantations, and technologies on the production and processing of jatropha by-products, among others; (b) establishment of pilot area in the different Jatropha potential sites to ensure its sustainability; (c) conduct of feasibility studies and implementation of investment projects (d) provision of flexible financing scheme (e) establishment of marketing and distribution linkages for biodiesel and identifying outlets for by-products that may be produced from the jatropha curcas; (f) integration of Jatropha Industry Framework Plan in the updating of regional and local development plans, investment priority plans, programs and projects, and local land use plans; (g) provision of initial infrastructure support facilities to improve access and facilitate development of jatropha communities; (h) institute capability building activities through trainings to develop required skills for the Jatropha Industry operations; and (i) conduct of investment promotions to establish linkages with possible investors.

Meanwhile, the Long term phase (2011 to 2030) will focus generally on activities that will institutionalize and sustain the initial accomplishments as a result of the activities done in the first phase of the Plan period. Thus, this activities generally will focus on the continuation of the initial efforts accomplished in the first phase to include (a) conduct of more in-depth R & D and extension programs which may include genetic enhancement of jatropha; (b) conduct of further feasibility studies for the expansion and implementation of more jatropha projects; (c) provision of improved flexible financing schemes to willing investors; (d) strengthening and establishment of additional marketing and distribution linkages; (e) integration of the Plan in the updating of the regional development plans and investment priority projects as well as development plans and land use plans of the municipalities; (f) provision of adequate basic infrastructure facilities to jatropha communities; (g) continuous conduct of trainings to upgrade skills and enhance expertise on jatropha industry; and (h) intensifying investment promotions to encourage more investors.

These activities set to accomplish in both the short term and long term are in support to the strategies identified and discussed in the Chapter 4 of the Plan.

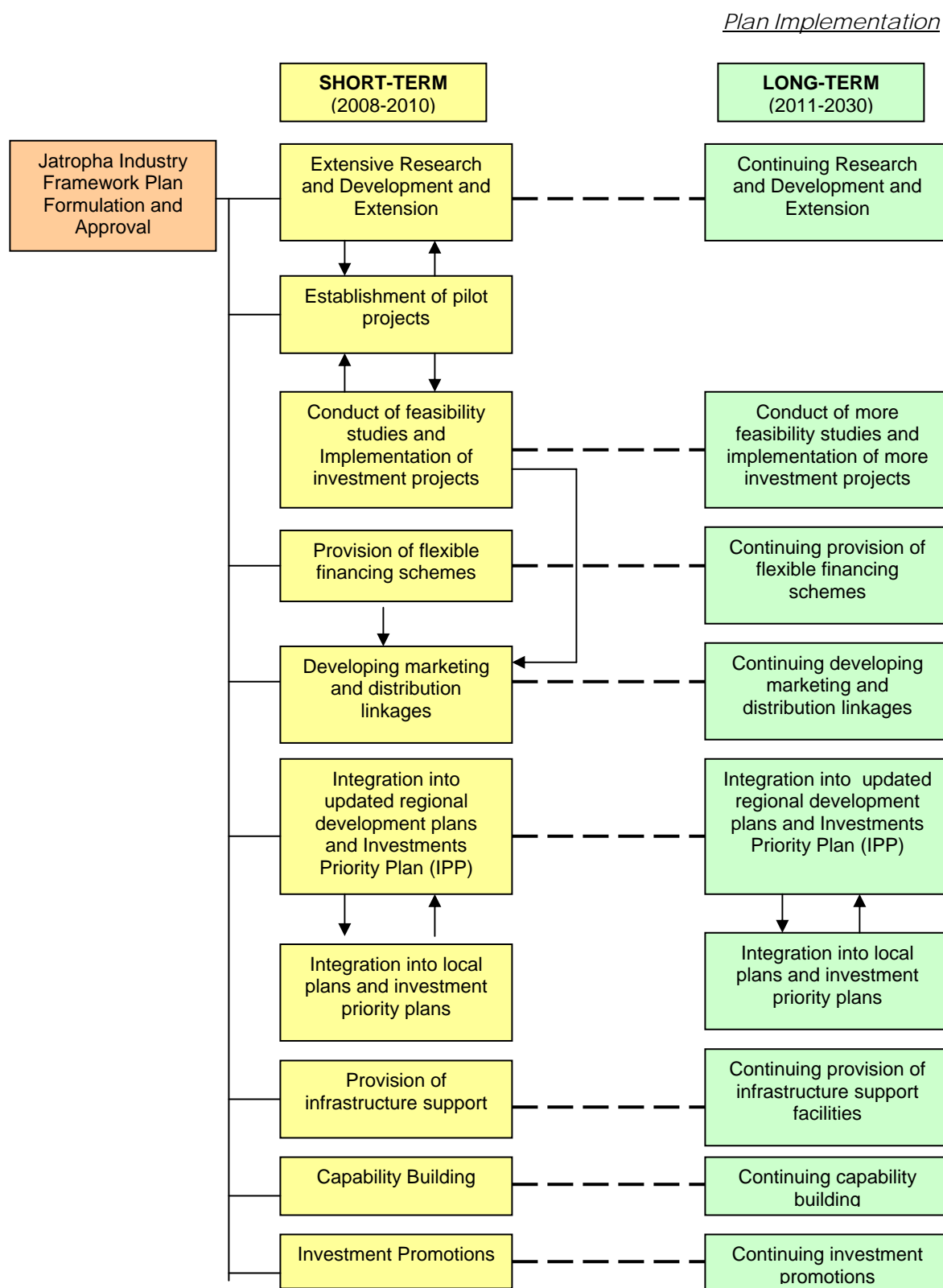


Figure 6 Jatropa Industry Development Phases

C. Institutional Framework for Inter-agency Collaboration

The Regional Development Council 02 (RDC02) as the highest development coordinating body in the region will oversee the implementation, evaluation and monitoring of the Framework Plan specifically through its support committee, the Infrastructure Development Committee, as well as through the other existing structures namely the National Economic Research and Business Assistance Center – Cagayan Valley (NERBAC – Cagayan Valley) and the Regional Jatropha Industry Team (RJIT).

The NERBAC – Cagayan Valley was organized in the region to serve as an entry point for investors to access key government services and business information. It aims to improve business environment through streamlining of procedures and establishment of closer coordination between and among the concerned government agencies on matters involving investment and business registration. This will be done through pooling of various concerned agencies' representatives in one place. This include representatives from the DTI, CDA, SEC, SSS, HDMF, BIR, Philhealth, DOLE, DENR, MGB, BFAR, DA, BID, DA, BTr, DILG, DOST, DPWH and NEDA. The Center will be located at the office of the Department of Trade and Industry – Region 02.

The Jatropha Industry will also be needing assistance and directions from the member-agencies of the Regional Jatropha Industry Team (RJIT). Various technical assistance and support were committed by the said members in accordance to their respective agency mandates, as embodied in the MOA signed on December 2006.

Meanwhile, as the Plan addresses one of the key infrastructure issues namely power and energy, the monitoring of the Plan will be anchored to the members of the Infrastructure Development Committee particularly the preparation and submission of the accomplishment reports and initiatives done in the improvement of power and energy situation in the region. These reports will be an input in the formulation of the Infrastructure sector, specifically the power and energy component of the Annual Regional Development Report.

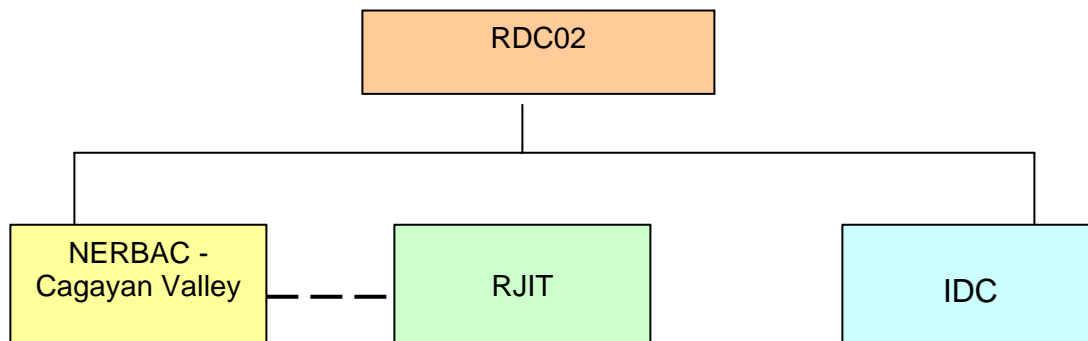


Figure 7. Institutional Framework for Inter-Agency Collaboration

D. Roles and Functions of Key Actors

The NERBAC - Cagayan Valley created under RA 7470 will be tasked to provide frontline services and assistance with the following functions: (a) provision of information to prospective investors on the different kinds of business opportunities that are in accord with set of investment priorities of the government; (b) establishment of updated data bank of all industries and business enterprises in the region; (c) preparation of feasibility studies of existing as well as possible industries in the region; (d) organization and maintenance of a centralized one-stop shop services or assistance center that shall expedite the processing of all government requirements necessary in establishing a business; (e) monitoring of technological advances relevant to business and economy; (f) formulate and coordinate the conduct of relevant research projects; (g) monitoring and collating of economic, technical and industry research output that has reference to business enterprises; (h) collecting and facilitating of the gathering of information on the kind of technology/machinery needed; and (g) facilitating of the gathering of information on how to harness indigenous resources and technology required for development efforts. All of the said functions of the Center complement to the identified strategies and activities set forth in the Plan. Thus, much of the activities laid out in the Plan will be anchored to the NERBAC – Cagayan Valley.

The different member-agencies of the Regional Jatropha Industry Framework Plan will likewise provide technical assistance roles as outlined in the Memorandum of Agreement signed in 2006, as follows: **(Appendix B)**

- *DENR and DAR* shall be responsible in identifying suitable lands in the region that can be developed into *Jatropha curcas* plantation by investors;
- *DTI, CDA and DILG* shall be assisting in providing market information for the guidance of the Industry and assist the investors in the identification and sourcing of market outlets for the distribution of the jatropha by-products;
- *DOST, TESDA, SUCs* shall be in responsible in the conduct of research and development programs specifically on the processing of *jatropha curcas* and likewise develop appropriate machine/technology to ensure the viability of jatropha processing plants;
- *DOLE, TESDA, SUCs, DA, DENR, CHED, DOST, CDA, DAR, and DTI* shall be responsible in providing human resources required by the Industry such as laborers, technical experts and industry associations and likewise institute capability building activities in the development of their skills;
- *DA, DENR and CDA* shall be largely responsible in the supply of inputs such as *jatropha curcas* seedlings and ensure its quality thru the conduct of yield trials for their basis in recommending the best yielding varieties to investors;
- *SUCs, DA, DENR, DOST and DILG* shall be assisting in the development of technologies on production and suitable farming schemes in the various areas of the region identified to be used for jatropha production;
- *CEDFI, DILG, DOLE, DOH, NEDA, CEZA and SUCs* shall be leading the promotion and advocacy activities thru the conduct of IECs and other activities to gain support on the establishment of the jatropha industry in the region; and

Plan Implementation

- *CEZA and CEDFI* shall be largely assisting in the sourcing of funds to support the activities and operations of the RJIT Team.

The local government units (LGU) shall be assisting in the implementation of the Plan through the integration of the Framework Plan in their respective local development plans, land use plans and investment priority plans. The LGU will be tapped to handle investment promotions by executing various investment campaign strategies such as investment forums, road shows, investment missions, among others. Likewise, they will be assisting in the negotiations between the probable investors and the landowners on the use of private lands.

E. Facilitation of Private Investments

The existence of a systematic and streamlined government procedures and mechanisms to assist and guide prospective investors in their bid to set-up jatropa business venture will facilitate the pouring-in of private investments. As such, the Plan identified agencies and organizations responsible in facilitating investor's establishment of jatropa business in the region.

The initial step will be for the willing investor to coordinate with DENR, DAR or LGU for the use of available lands proposed for Jatropa plantation. The DENR and DAR committed to identify suitable public lands in the region that can be developed into jatropa curcas plantation, while the LGU has the means to identify idle private lands in their locality that can be cultivated for jatropa curcas. The concern agencies will also assist in the negotiation on the use of the land between the investors and land stewards, farmer communities or private land owners. Arrangements or schemes for the use of a potential jatropa site shall be detailed in a Memorandum of Agreement to be signed between and among the concerned parties. However, there are important conditions which are preferably to be considered as a basis upon which any form of partnership shall be built such as protecting the interest of the farmers through guaranteed prices of farmer's production, assistance to the farmers by the investors through provision of jatropa inputs and technical expertise, the land to be developed still belong to local communities/government and not to transfer to the investors. Preferred mode shall be a joint venture undertaking between the land stewards, local communities or the government and the investor.

The investors will likewise avail the services of the NERBAC-Cagayan Valley as one-stop shop assistance center that expedite the processing and approval of all government requirements necessary in establishing business enterprise in the region. Further, the Center is expected to lead in the following activities: (a) provision of technical assistance in the preparation of pre-feasibility studies; (b) conduct of business, market and policy research; (c) provision of information about government policies, programs and regulatory requirements; (d) development and establishment of marketing and distribution linkages; (e) serving as link among investment centers and agencies; (e) facilitation of business licensing and other mandatory requirements; and (e) provision of after care and support

programs to investors. The operation of the NERBAC-Cagayan Valley will be integrated with the Department of Trade and Industry – Regional Office No. 02.

The investor can also request the assistance of the member-agencies of the RJIT on the following activities necessary for the development of a jatropha enterprise, (a) conduct of researches and studies on jatropha species, soil analysis, farming technology; (b) provision of required skilled laborers, technical experts and farmers association required by the business venture; (c) provision of inputs such as quality jatropha seedling; (d) development of appropriate processing and production technology; (e) provision of tree soil laboratory services in all production areas; and (f) conduct of skills training and other capability building activities to farmers and cooperatives capable to the industry.

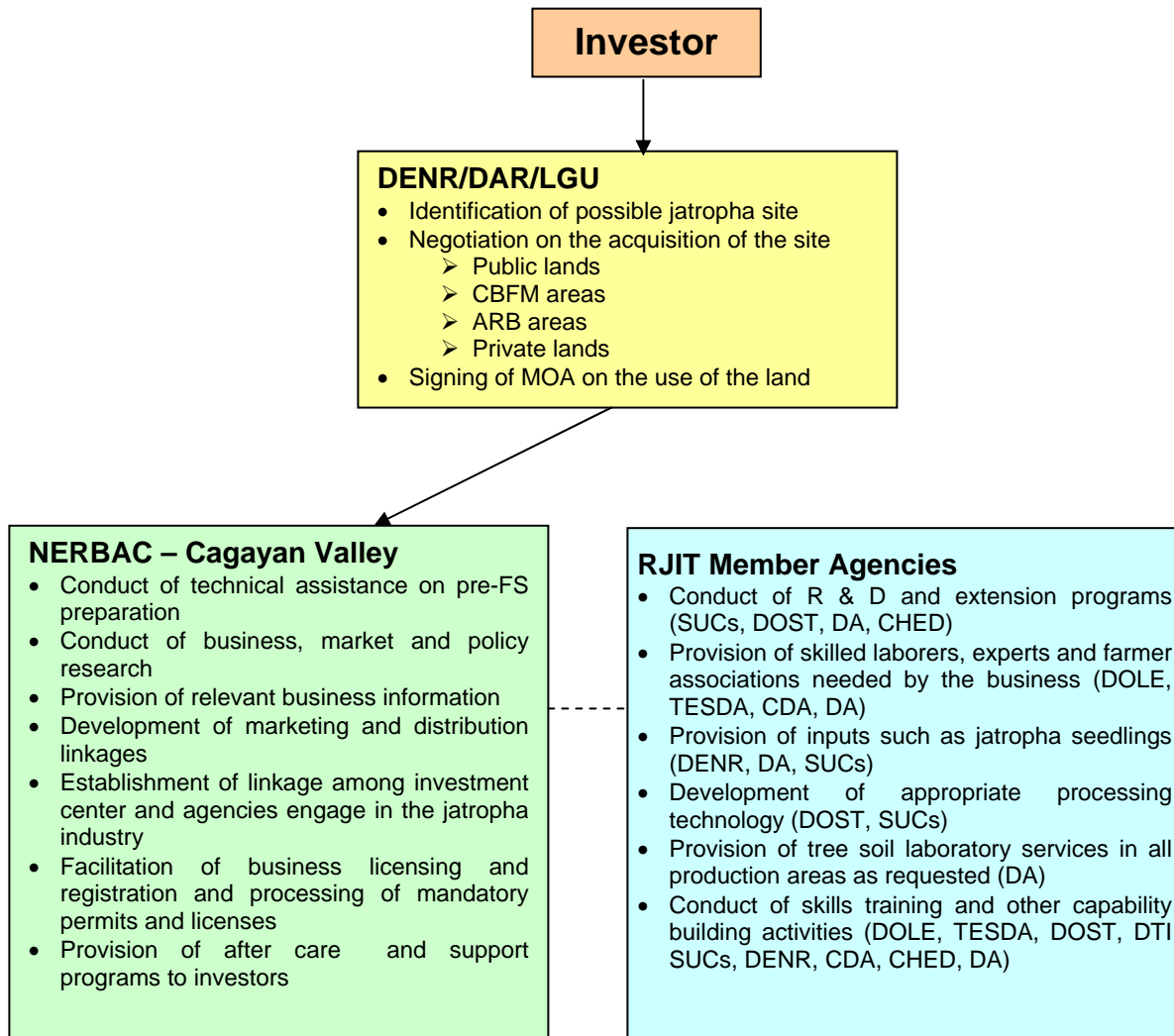


Figure 8. Steps to be followed by a prospective investor

F. Plan Monitoring and Evaluation

The success of the Plan will be marked by the achievement of the goals and objectives outlined in the Framework Plan. A constant monitoring and evaluation ascertain the Plan's success in achieving its goals and objectives and cull important lessons from the experiences and problems encountered in the course of its implementation. The monitoring and evaluation activity is often participative and consultative for further improvement of the policies in the biodiesel industry. This will require every major stakeholder in the implementation to be alert and vigilant to make sure that proper monitoring and evaluation of the Plan are successfully carried out.

The development of the Jatropha Industry in the region will be integrated in the updating of the Cagayan Valley Regional Development Plan (CVRDP) specifically in the infrastructure component of the CVRDP. The performance of the key agencies in the implementation of the strategies set forth in the CVRDP is being monitored and evaluated thru the preparation of the Annual Regional Development Report (ARDR). The ARDR summarizes the major accomplishments of the region in relation to the annual development objectives and programs outlined in the CVRDP and define major challenges and shortfalls as well as the measures and strategies needed to improve the region's performance.

G. Plan Advocacy

First level of advocacy should be at the LGU level to ensure the integration of the policies and strategies in their respective Comprehensive Land Use Plans (CLUPs) and Comprehensive Development Plans (CDPs). The commitment and support of cities and municipalities shall be translated in the inclusion of Jatropha Industry concerns in the Zoning Ordinances and other local legislations in support of the Industry.

To augment the conduct of public consultations, printed materials and articles on the advantages, updates and impact of Jatropha Plantations will be integrated in the RDC 2 linkage and other appropriate publications of other RLAs in the region.

Equally important shall be the airing of the Jatropha (Biodiesel) Industry concerns in the different radio stations that has air time allotment for government programs.

H. Capability Building

Inasmuch as the Jatropha (Biodiesel) is in its introductory stage in the country, it is important that a capability building program will be develop to provide the necessary skills required by the industry. The SUCs, DOLE, TESDA, DA, DENR, CHED, DOST, CDA, DAR and DTI shall be mainly responsible in empowering and capacitating the manpower resources to ascertain sustained skills requirement. This is also to ensure a buffer labor force to facilitate the establishment and sustainability of the Jatropha Industry in the region.

Appendix A. Potential Feedstock for Biofuel Production

Indices	Jatropha Curcas	Sugar Cane (ethanol)	Sweet Sorghum (ethanol)	Coconut (CME)
Industry Profile				
a) Total Hectarage Planted	290 has. In the pilot sites of Fort Magsaysay in Nueva Ecija and Camarines Sur (private sector plantation not accounted)	391,552 has. (not yet for biofuel use)	300 has. Pilot growing but would eventually expand to 1,500 has.	3,243,278 (2005)
b) Total annual production	1,400 kgs to 10,000 kgs/ha of Jatropha Curcas seeds	22,966,325 MT for CY 2005-2006	No data available (on pilot phase yet)	14,824,585 MT (2005)
c) Total annual importation	N/A	152.95 MT of refined sugar for CY 2005-2006	No importation	No importation
Economic				
a) Initial investment cost (Php)	21,759 ha (14,615 for set up cost and 7,144 for labor) 700,000 to 10M cost of crude oil extraction machine	Php 4-5B for infrastructure and devt of a farm with 100,000 liters bio-ethanol production capacity	Php 425M for the distillery. For the plantation/farm – no data available yet	Php 7M (for hand investments only based on a DOST project in Romblon)
b) ROI (years)	2-3 years	2 years	1-2 years	No data available
c) Biofuel yield per hectare (liters)	3,448 liters per ha (assuming 10,000 kilos of seeds per ha)	5,000 liters	3,000-3,200 liters	480 liters
d) Cost of produce per liter (Php)	Php 17.00	Php 14.98	Php 13.11	Php 26.40
e) Market	Contract growing with PFC is available	Under the National Bioethanol Program,	Gasoline companies and the transport sector are	Govt offices transport sector NPC

Appendix A

Indices	Jatropha Curcas	Sugar Cane (ethanol)	Sweet Sorghum (ethanol)	Coconut (CME)
Other uses	<p>PNOC Alternative Fuels Corporation will set up a multi feedstock processing plant.</p> <p>Economic life of 35 years</p> <p>Used as boundary demarcation and live fence</p> <p>Valuable as organic manure</p> <p>Crude jatropha oil for lighting paraffin lamps or cooking stoves</p> <p>Jatropha oil can also be used for soap production</p> <p>Oil and presscake from jatropha curcas can be sold for industrial use</p>	<p>anhydrous ethanol will be required to be blended with gasoline. Hence, gasoline companies and the transport sector would be directly affected</p> <p>Byproduct diversification (e.g., alcohol from molasses, paper and particle board from bagasse and waste product utilization (e.g., organic fertilizer from filter mud and co-generation of electricity from bagasse) but these are not yet practiced in the Philippines</p>	<p>expected to benefit from the bioethanol of sweet sorghum because it appears to be less expensive than bioethanol from sugarcane</p> <p>The silage after the extraction of juice is rich in micronutrients and minerals that can be used as forage for animals.</p> <p>Sweet sorghum can also be made into other food products such as syrup, jaggery (a kind of molasses), "basi"/wine, flour, cookies, cakes and pop sorghum kernels (like popcorn)</p>	Multiple use of plant parts
Agronomic				
a) Life cycle/Flowing Cycle	Perennial	8 months	3.5 months	12 months (flowering cycle)
b) Method of Propagation	Generative (seeds) and vegetative (cuttings)	Sugarcane cuttings	Planting of sweet sorghum seedlings	45 days (harvesting cycle)
c) Cultural Management	Well adapted to marginal areas	Sandy loam to clay loam/acidic	Semi-arid tropics	Seedling (thru seed nut)

Indices	Jatropha Curcas	Sugar Cane (ethanol)	Sweet Sorghum (ethanol)	Coconut (CME)
	with poor soils and low rainfall Water requirement is low Easy to propagate with little need for maintenance	volcanic soils to calcerous sedimentary deposits		All types of soil except clayish types
Social				
a) Health implications	Widely use as a source of local medicine	None	none	Significantly reduces serious air pollutants such as black smoke and air toxics that cause lung cancer, pulmonary tuberculosis, pneumonia, bronchitis, heart attack and stroke.
Environmental (positive/negative)				-
a) Water pollution implications	Reduces river siltation as it prevents soil erosion when used as an agroforestry material	Slops from distilleries may clog bodies of water and result to fish kill	Waste water from sweet sorghum has lower oxygen depletion effect than from sugarcane, when dispose to bodies of water.	
b) Air pollution implications	Insecticide properties and reduce the amount of nematodes in the soil Like other biodiesel products, can reduce smoke	Mitigate toxic and greenhouse gas emissions, carbon monoxide, and carcinogenic toxics such as sulfur oxide and benzene in	Sweet sorghum's productivity stems basically from its inherent C4 metabolism, which makes it more efficient at converting atmospheric	Lowers emission of nitrous oxide and sulfur oxide – the main contributor to smog (reduction of about 50% for 1% CME blend);

Appendix A

Indices	Jatropha Curcas	Sugar Cane (ethanol)	Sweet Sorghum (ethanol)	Coconut (CME)
	emissions	gasoline	carbon dioxide into sugar than most plants. Production process is less polluting with lower sulfur emission and clean burning quality.	Significantly reduces serious air pollution such as black smoke and air toxics that cause lung cancer, pulmonary tuberculosis, pneumonia, bronchitis, heart attack and stroke.
c) Biodiversity implications	No information available	No information available	No information available	Renewable and biodegradable being plant-based
Other Remarks	<p>Limitation: Seeds are toxic and seed cake cannot be used as fodder</p> <p>Found through out the country</p> <p>Pest resistant, provides additional protection to intercropped plants</p> <p>Not edible, hence would not compete against food crops</p>	<p>At present, ethanol production from sugarcane is mainly for the beverage industry (i.e., hydrous ethanol – 95% purity) but by 2007, local ethanol producers will start to produce ethanol for biofuel use (i.e., anhydrous ethanol – 95% purity) as stated in the Biofuels Act)</p>	<p>At present, ICRISAT has established a sweet sorghum plant testing center at the Mariano Marcos State University, where research on the crop is also done.</p>	<p>Average increase of 17% km for every liter of CME blend.</p> <p>Translated into savings of Php0.916 to Php 2.85 for every liter of CME blend.</p>

Source:

1. Brochure, "Tuba-tuba (Jatropha curcas L). An alternative Source of Energy", by the Philippine Forest Corporation
2. Department of Agriculture

MEMORANDUM OF AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

This Memorandum of Agreement is entered into and executed by and among:

The DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, REGION 02, with principal address at the Regional Government Center, Carig, Tuguegarao City, represented herein by its Regional Executive Director, CLARENCE L. BAGUILAT, hereinafter referred to as DENR 02;

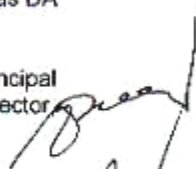


The DEPARTMENT OF SCIENCE AND TECHNOLOGY, REGION 02, with principal address at Nursery Compound, Tuguegarao City, represented herein by its Officer-in-charge, Office of the Regional Director, DR. URDUJA A. TEJADA, hereinafter referred to as DOST 02;

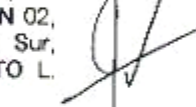


The DEPARTMENT OF AGRICULTURE, REGION 02, with principal address at Nursery Compound, Tuguegarao City, represented herein by its Regional Executive Director, DR. GUMERSINDO D. LASAM, hereinafter referred to as DA 02;

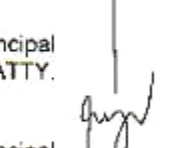
The DEPARTMENT OF AGRARIAN REFORM REGION, 02, with principal address at Carig, Tuguegarao City, represented herein by its Regional Director, ARACELI A. FOLLANTE, hereinafter referred to as DAR 02;



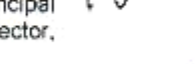
The DEPARTMENT OF INTERIOR AND LOCAL GOVERNMENT REGION 02, with principal address at the Regional Government Center, Carig Sur, Tuguegarao City, represented herein by its Regional Director, RENATO L. BRION, hereinafter referred to as DILG 02;



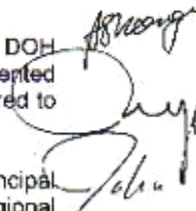
The DEPARTMENT OF TRADE AND INDUSTRY REGION 02 with principal address at Tuguegarao City represented herein by its Regional Director, ATTY. MA. ESPERANZA C. BAÑARES, hereinafter referred to as DTI 02;



The DEPARTMENT OF LABOR AND EMPLOYMENT REGION 02, with principal address at Tuguegarao City, represented herein by its Regional Director, GRACE Y. URSUA, and hereinafter referred to as DOLE 02;



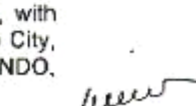
The CENTER FOR HEALTH DEVELOPMENT CAGAYAN VALLEY, DOH REGION 02, with principal address at the Carig, Tuguegarao City, represented herein by its Regional Director, DR. PURITA S. DANGA, hereinafter referred to as DOH 02;



The COOPERATIVE DEVELOPMENT AUTHORITY, REGION 02, with principal address at San Gabriel, Tuguegarao City, represented herein by its Regional Director, LAZARO G. JAVIER, JR., hereinafter referred to as CDA 02;



The NATIONAL ECONOMIC DEVELOPMENT AUTHORITY, REGION 02, with principal address at the Regional Government Center, Carig, Tuguegarao City, represented herein by its Regional Director, MILAGROS A. RIMANDO, hereinafter referred to as NEDA 02;



The COMMISSION ON HIGHER EDUCATION REGION 02, with principal address at Caritan Sur, Tuguegarao City, represented herein by its Regional Director, DR. VIRGINIA P. RESURRECCION hereinafter referred to as CHED 02;



ARTICLE IV

Effectivity

This Memorandum of Agreement shall take effect upon signing of the parties hereto and shall remain in force until revoked or superceded by other agreements.

IN WITNESS WHEREOF, the parties have signed this Memorandum of Agreement this 29th day of December, 2006 at Tuguegarao City, Cagayan.

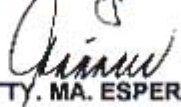

DIR. CLARENCE L. BAGUILAT
 Regional Executive Director DENR -02


DR. URDUJA A. TEJADA
 OIC, Regional Director, DOST-02

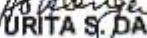

DR. GUMERSINDO D. LASAM
 Regional Director, DA-02



DIR. ARACELI A. FOLLANTE
 Regional Director, DAR -02


DIR. RENATO L. BRION
 Regional Director, DILG-02

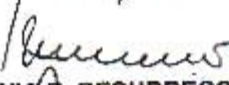

ATTY. MA. ESPERANZA C. BAÑARES
 Regional Director, DTI-02


DIR. GRACE Y. URSUA
 Regional Director, DOLE-02



DR. PURITA S. DANGA
 Regional Director, DOH-02



DIR. LAZARO G. JAVIER, JR.
 Regional Director, CDA-02



DR. MILAGROS A. RIMANDO
 Regional Director, NEDA-02


DR. VIRGINIA P. RESURRECCION
 Regional Director, CHED-02


ROMEO R. QUIANG, PhD.
 President, Regional Association of State
 Colleges and Universities and SCU


DR. VALERIO D. ROLA
 Regional Director, TESDA-02


USEC JOSE MARI B. PONCE
 Administrator, CEZA


COMMO. ARTEMIO R. ARUGAY
 President CEDFI

9.3 Train farmers on cooperative group management and team building.

9.4 Identify cooperatives capable to the Industry.

10. NEDA shall

10.1 Provide technical assistance in the preparation of the Jatropha Industry Framework Plan.

10.2 Provide data and information necessary in the preparation and execution of the Jatropha curcas Industry Framework Plan.

10.3 Serve as the Team's liaison to the RDC and its committees.

11. CHED shall

11.1 Assist in all R&D related activities of the RJIT

12. R-02ASUCs shall

12.1 In coordination with DA, establish germplasm bank for Jatropha curcas and other species potential for biodiesel.

12.2 Establish R&D roadmap for the development package of Technology for production and suitable farming systems in the various ecological zones of the Region to be used for Jatropha production.

12.3 Do R&D on product and by product development and diversification

12.4 Design, construct, test and innovate equipment needed by the industry

13. TESDA shall

13.1 Primarily responsible for the training and accreditation of the manpower requirement in the post-harvest operations for Jatropha such as:

13.1.1 Training for operators of equipment

13.1.2 Training for the maintenance and repair of equipment

13.2 Assist in designing the equipment needs and, in coordination with CHED, DOST and SUCs, construct utility models and test run the same.

14. CEZA shall

14.1 Lead in global investment promotion.

14.2 Assist in providing financial support to the activities of the Team.

15. CEDFi shall

15.1 Be the lead convener of the RJIT

15.2 Be primarily responsible for sourcing funds for the operation of the RJIT.

15.3 Be primarily responsible of linkages in investment promotion.

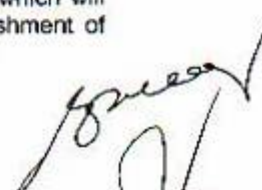
4. DAR shall

- 4.1 Provide the list of Agrarian Reform Community areas in the Region that may possibly developed into *Jatropha curcas* plantation.
- 4.2 Help assess the possibility of integrating *Jatropha curcas* culture in the Agrarian Reform communities.



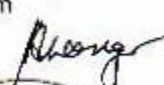
5. DILG shall

- 5.1 Primarily be responsible for the advocacy of establishing a *Jatropha*-based mini-industry at the local level.
- 5.2 Encourage the establishment of a Municipal Action Group which will monitor and evaluate agriculture development and establishment of mini-industries and industry linkages.
- 5.3 Liaise with LGUs to gain support for the program.
- 5.4 Assist in locating and facilitating loan credit assistance.



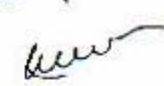
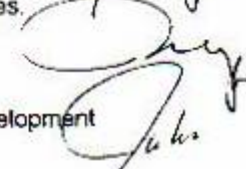
6. DTI shall

- 6.1 Primarily be responsible for providing market information for the guidance of the industry and assist in the identification and sourcing of market outlets.
- 6.2 Assist in training participants on entrepreneurship development.
- 6.3 Assist in identifying outlets for by-products that may be produced from the *Jatropha curcas* biodiesel production.
- 6.4 Assist in locating and facilitating loan credit assistance facilities.



7. DOLE shall

- 7.1 Assist in providing capability enhancement and skills development trainings for the *Jatropha* Industry.
- 7.2 Assist in job generation through the Public Employment Support Office (PESO)



8. DOH shall

- 8.1 Conduct IEC and advocacy on health related benefits by using biodiesel for a sound environment.

9. CDA shall

- 9.1 Assist in organizing the farmers into cooperatives or into industry associations
- 9.2 Assist in identifying and monitoring the provision of inputs for *Jatropha curcas* production by Cooperatives.



ARTICLE III

RESPONSIBILITIES OF THE REGIONAL JATROPHA INDUSTRY TEAM (RJIT) MEMBERS

1. DENR shall

- 1.1 Act as the lead agency and over-all coordinator, orchestrate the different activities of the Team and provide the secretariat services to the RJIT.
- 1.2 Identify areas for corporate investors with core areas either Community Based Forest Management Project sites or other public lands that may be used for *Jatropha curcas* production areas.
- 1.3 Primarily be responsible for the provision of technical assistance in the establishment of *Jatropha* plantations of any or all would-be-investors under a separate agreement that may be forged and entered in them and assist on the possibility of accreditation by the Kyoto Protocol for coverage of its Carbon Sequestration Policy.
- 1.4 Accredite nurseries/*jatropha curcas* seedling/planting stock producers to assure quality for plantation.

2. DOST shall

- 2.1 Assist SUCs in the establishment of Technology-based *Jatropha curcas* production enterprises.
- 2.2 Assist in acquisition of technology for scaled down/scaled up oil extraction.
- 2.3 Assist in R & D for by-product development from the *Jatropha curcas* plant including the meal resulting from extraction.
- 2.4 Assist in conducting extraction and test of pesticidal or pharmaceutical properties from *Jatropha curcas*.
- 2.5 Assist in conducting skills training.

3. DA shall

- 3.1 Assist in the collection and introduction of *Jatropha curcas* germplasm lines in the region.
- 3.2 Perform adaptability yield trials of the germplasm collected and recommend the best yielding varieties in coordination with State Colleges and Universities (SUCs).
- 3.3 Provide tree soil laboratory services in all production areas, as requested.
- 3.4 Provide trainings/experts as the need arises to be funded by investors.

ARTICLE I**THE REGIONAL JATROPHA INDUSTRY TEAM (RJIT)****Goal:**

To develop jatropha as an alternative source of biodiesel and have it established as a major industry in the Cagayan Valley Region.

Objectives:

- a) To improve the income/provide alternative livelihood of farmers on marginal areas where agricultural production is less or is not feasible through jatropha production.
- b) To provide avenues of employment opportunities through the Jatropha Industry.
- c) To develop premium Jatropha farms in the region.
- d) To strengthen Market Information System on the Jatropha Industry.
- e) To recommend R&D programs to develop product standards of Jatropha.
- f) To advocate the social, economic and environmental impact of the biodiesel industry.
- g) To promote Jatropha as a major industry in the region.

ARTICLE II**COMPOSITION OF THE REGIONAL JATROPHA INDUSTRY TEAM (RJIT)**

The Regional Jatropha Industry Team shall be composed of the following Agencies represented by their Heads and/or their duly designated permanent technical representatives who shall provide technical assistance in various forms in the key result areas of the Regional Agro-Industrial Program as indicated below.

- | | |
|---|------------------------------------|
| 1. DENR, DAR | : Land - |
| 2. DA, DENR, CDA | : Input Supply System |
| 3. SUCs, DA, DENR, DOST, DILG | : Production Systems |
| 4. DTI, CDA, DILG | : Marketing & Distribution Systems |
| 5. DOST, TESDA, SUCs | : Processing Systems |
| 6. CEZA, CEDFI | : Financing Systems |
| 7. DOLE, TESDA, SUCs, DA, DENR, CHED, DOST, CDA, DAR, DTI | : Human Resources Systems: |
| 8. CEDFI, DILG, DOLE, DOH, NEDA, CEZA, SUCs | : Promotion and Advocacy |

[Handwritten signatures]

The REGION 02 REGIONAL ASSOCIATION OF STATE COLLEGES AND UNIVERSITIES, with principal address at Cang Sur, Tuguegarao City represented herein by its President, **DR. ROMEO R. QUILANG** hereinafter referred to as R2SUCs;

The TECHNICAL SKILLS DEVELOPMENT AUTHORITY REGION 02, with principal address at Carig, Tuguegarao City, represented herein by its Regional Director, **VALERIO D. ROLA**, hereinafter referred to as TESDA 02;

The CAGAYAN ECONOMIC ZONE AUTHORITY, with principal address at 7/F Westar Building, Shaw Boulevard, Pasig City, represented herein by its Administrator, **USEC JOSE MARI B. PONCE**, hereinafter referred to as CEZA;

The CAGAYAN ECONOMIC DEVELOPMENT FOUNDATION, INCORPORATED, with principal address at AGFO Center, Camp Aguinaldo, Quezon City represented herein by its President, **COMMODORE ARTEMIO R. ARUGAY AFP (Ret.)**, hereinafter referred to as CEDFI.

WITNESSETH

WHEREAS, DENR, DOST, DA, DAR DILG, DTI, DOLE, DOH, CDA, NEDA, CHED, R-2 SCUs, TESDA, CEZA and CEDFI agree that the world production and supply of fossil fuels has been lower than in previous years brought about by global instability, terrorism, uncertainties in the world trade market and the fact that such production may have reached its peak, all causing oil prices to keep on rising;

WHEREAS, in response to this problem of soaring oil prices, the Philippine Government has encouraged the exploration and research of alternative sources of energy;

WHEREAS, one of the identified alternative sources is biofuel for energy generation in the form of biodiesel from a plant scientifically known as *Jatropha curcas* which is now a major industry in India and is expanding in some ASEAN countries;

WHEREAS, *Jatropha curcas* has been observed growing in various areas in Region 02 and can thrive even in marginal areas;

WHEREAS, there are potential areas in Region 02 which can be developed into *Jatropha curcas* plantation production sites following either a corporate or community-based concept;

WHEREAS, the DENR, DOST, DA, DAR, DILG, DTI, DOLE, DOH, CDA, NEDA, CHED, R-2SCUs, TESDA, CEZA AND CEDFI, agree to help establish a sustainable area-based industry consistent with energy generation.

NOW, THEREFORE, for and in consideration of the foregoing premises, the parties agreed as they hereby agree to organize an Inter-Agency Team to provide technical assistance and to support the establishment of the *Jatropha* Biodiesel Industry in the Region through the preparation of a Cagayan Valley *Jatropha* Industry Framework Plan under the following terms and conditions;

ACKNOWLEDGMENT

Republic of the Philippines
Province of Cagayan
City/Municipality of Tuguegarao

BEFORE ME, personally appeared the above-named persons whose signatures appeared on page (7) of same document and have exhibited their individual Community Tax Certificate known to me and to me known to be the same persons who executed the foregoing instrument which refers to a Memorandum of Agreement (MOA) relative to a proposed Jatropha Industry Program of Region 02 consisting of (8) pages including this acknowledgment page and acknowledged that the same is their free and voluntary act and deed.

RED CLARENCE L. BAGUILAT
CTC No. 09205974
Issued at Tuguegarao City
on January 19, 2006

DR. GUMERSINDO D. LASAM
CTC No. 22910011
Issued at Solana, Cagayan
on April 3, 2006

DIR. RENATO L. BRION
CTC No. 09206387
Issued at Tug. City
on January 23, 2006

DR. PURITA S. DANGA
CTC No. 16475435
Issued at Tug. City
on March 24, 2006

DIR. MILAGROS A. RIMANDO
CTC No. 16932623
Issued at La Trinidad, Benguet
on January 12, 2006

DR. ROMEO R. QUILANG
CTC No. 21898712
Issued at Cabagan, Isabela
on March 03, 2006

USEC JOSE MARIE B. PONCE
CTC No. 092066154
Issued at Tug. City
on January 19, 2006

DR. URDUJA A. TEJADA
CTC No. 09204338
Issued at Tug. City
on Jan. 13, 2006

DIR. ARACELI A. FOLLANTE
CTC No. 19965812
Issued at Lallo, Cagayan
on January 20, 2006

DIR. GRACE Y. URSUA
CTC No. 12815843
Issued at Ilang, Sub. Quezon City
on Feb. 17, 2006

DIR. LAZARO G. JAVIER, JR.
CTC No. 09211003
Issued at Tug. City
on February 11, 2006

DR. VIRGINIA P. RESURRECCION
CTC No. 04848876
Issued at Tuguegarao City
on January 26, 2006

DIR. VALERIO D. ROLA
CTC No. 09207051
Issued Tug. City
on January 23, 2006

COMMO. ARTEMIO R. ARUGAY
CTC No. 19951490
Issued at Tug. City
on July 07, 2006

ATTY. MA. ESPERANZA C. BAÑARES
CTC No. 09499108
Issued at Tug. City
on February 18, 2006

IN WITNESS WHEREOF, I have hereunto set my hand and seal on the date and place above-written.

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Book No. 6
Series of A181

ATTY. MA. ESPERANZA C. BAÑARES
Notary Public
PTR: 094-99108
UN. 094-99108
CTC No. 09499108