

## APPENDICES

### APPENDIX A

#### Questionnaire

Benefit, Cost and Constraints to Adoption of Integrated Rubber-based Farming Systems in Oudomxay Province, Lao PDR

#### I. General Information

##### 1.1. Farmer profile

Village name: ..... Date: .....

Name of respondent ..... Age .....

Name of interviewer .....

Ethnic/tribal groups in community :

Lao Lum ( ) ; Lao Tueng ( ) ; Lao Soung ( )

Culture/customs/religion: .....

History of farmer living:

1. How long have you been here ? .....

2. Household typologies:

Rice only ( )

Rice + other cash crop ( )

Rice + other cash crop + rubber ( )

Rice + other cash crop + fruit tree ( )

Rice + other cash crop + rubber + fruit tree ( )

3. What crops do you grow mainly? .....

## 1.2. Household member and/or group member information

- How many people in your family? .....
- How many main labor are in your farm activities?..... and
- How many reserved labor are?.....
- Sex of respondent? .....
- What is your marital status?  
Married ( ), Single ( ), Widow ( )
- Have you had some education? Yes ( ) No ( ); if yes:  
What is your last education level which you have?  
Primary School ( ); Secondary School ( ); Diploma ( )

## 1.3. Agricultural Production System (and Cropping Pattern)

1.3.1. What is the main activity in agricultural production in your family?

Activity	Variety	Area (ha)	Duration											
			1	2	3	4	5	6	7	8	9	10	11	12
<b>Crops:</b>														
<b>Lowland</b>														
<b>Upland</b>														
Non-Timber Forest Products (NTFPs):														
<b>Others</b>														
Handy craft														
Employment														

**Perennial plant:**

Activity	Variety	Amount	Area (ha)	Remark
Rubber				
Teak				
Fruit trees				

#### 1.4 . Land use:

##### 1.4.1. Land holding

- How many lands do you have?
- What type of land does farmer use?

Purpose of land use	Area (ha)	Type of land tenure	If rent land, how much per plot/year
1. Lowland - Land 1 - Land 2 - Land 3			
2. Upland - Land 1 - Land 2 - Land 3			
3. Home garden - Land 1 - Land 2 - Land 3			
4. Pastoral land			

**Remark: Type of Land tenure:** A= Ordinary own tenure, B=Taxation land, C= Temporary land document, D= Permanent land use document

##### 1.4.2. How do you use in your land in each year?

- What crop did you grow in your land since 2002 until now?
- How much the yield of each crop did you have?

Land use Pattern	2002	2003	2004	2005	2006	2007	2008
1. Lowland - Land 1 - Land 2 - Land 3							
2. Upland - Land 1 - Land 2 - Land 3							

## II. Technical Feasibility

2.1. Farming practice:  Integrated Rubber Farming System,  Shifting Cultivation

2.1.1 What crop do you grow ? Crop: .....

2.1.2 What do you do in shifting cultivation and /or IFS practice? and when do you usually carry out in duration of year?

Activity	Duration												Amount of worker	Amount of labor day			Who do it ? (0= no, 1= some, 2= moderate, 3= mainly)			
	1	2	3	4	5	6	7	8	9	10	11	12		Family labour	Hired labour	If hire, how much per day?	Female child	Male child	Female adult	Male adult
Slashing																				
Burning																				
Re-burning																				
Fencing																				
Dibbing/planting																				
Weeding																				
Harvesting																				
Threshing																				
Build bin																				
Transport																				
Other																				

- 2.2. What do you think in the traditional practicing? Is it easy or difficult? Why?
- 2.3. Do you have sufficient food for your family? If not why?
- 2.4. Do you have enough labor for your farm management? Why?
- 2.5. What is the main problem in your family in traditional practice?
- 2.6. What different kinds of foods do you consume? (rice, meat, wildlife, mushroom, bamboo shoot???)...
- 2.7. Where is the source for the different foodstuffs you consume? (Home garden, Forest, Natural resources)
- 2.8. How many months a year do you have enough rice for food consumption?
- 2.9. How do you meet your food needs if you have no rice? (as sell animal, hire labour, collect NTFPs...)
- 2.10. How many hours a day do you need for transportation/walking to and from the field?
- 2.11. Would you be interested in establishing food sources closer to where you live?  
If yes, do you have any ideas of how this could be achieved?
- 2.12 Do you ever hear the integrated rubber-based farming system practice?  
Yes ( ), or No ( ). If Yes, keep continue asking,  
if No, ask question number 2.13.  
How do you know it? .....
- 2.13. What do you think in the integrated rubber-based farming system practice? Is it easier or more difficult than traditional practice? How?
- 2.14. Please describe the integrated rubber-based farming system practice? How do you select crop, spacing, make a hold plant, watering, weeding etc.
- 2.15. Why do you decide to do the integrated rubber-based farming system in your farm?
- 2.16. What is the out put of integrated rubber-based farming system practice, if compare with traditional practice? Good or not?
- 2.17. Do you prefer it or not, if compare to traditional practice?  
Yes ( ) or No ( ) Why? If Yes, please ask question number 2.18.

2.18. Could you continue to adopt the integrated rubber-based farming system practice?

Why

2.19. Do you need some other technical support from project? (e.g. technical information, market information)

### III. Economic Viability

3.1. What is the major income sources of your family from? Please ( ✓ ) in a parenthesis

Selling agricultural production ( ), hire labor ( ), others ( )

3.2. How much the total yields of agricultural production system in your household this year?

Land/land plot Number	Crops	Variety	Total yield (kg)	Among for sale (kg)	Price (Kip/Kg)
			Unit:	Unit:	
Lowland:					
Upland:					

3.3 Farm management: Sifting Cultivation ( ), IRFS ( )

3.3.1. Annual crop Crop name .....

No.	Items	Unit	Quantity	Price (Kip)	Remark
<b>Farm input:</b>					
1. Input used:					
	Seed/Seedling				
	Chemical Fertilize				
	Organic Fertilizer				
	Pesticide				
2. Management					
	Equipments:				
<b>Farm output:</b>					
	<b>Total</b>				

### 3.3.2. Perennial crop

- Establishment (Year 1)
- Plant name:.....

No.	Items	Unit	Quantity	Price (Kip)	Remark
<b>Farm input:</b>					
1. Input used:					
	Seed/Seedling Chemical Fertilizer Organic Fertilizer Pesticide				
2. Management					
	Equipments:				
<b>Farm output:</b>					
	<b>Total</b>				

- Early stage (Year 2 to year which begin to give benefit)
  - Plant name:.....

No.	Items	Unit	Quantity	Price (Kip)	Remark
<b>Farm input:</b>					
1. Input used:					
	Seed/Seedling Chemical Fertilizer Organic Fertilizer Pesticide				
2. Management					
	Equipments:				
<b>Farm output:</b>					
	<b>Total</b>				



- Harvested stage (start at year which begin to give benefit until finished harvest)
  - Plant name:.....

No.	Items	Unit	Quantity	Price (Kip)	Remark
<b>Farm input:</b>					
1. Input used:					
	Seed/Seedling				
	Chemical Fertilizer				
	Organic Fertilizer				
	Pesticide				
2. Management					
	Equipments:				
<b>Farm output:</b>					
	<b>Total</b>				

3.3.3. Does the household have access to credits? Yes ( ) No ( )  
 If yes, do you take advantage of these credits? Why/why not?

**IV. Social acceptability and Long term effect**

**4.1. Technical change**

4.1.1. What do you think about the integrated rubber-based farming system practice?

a). What do you prefer between traditional practice and the integrated rubber-based farming system? Why?

Traditional practice ( ) integrated rubber-based farming system ( )

b). Does it support your expect? Yes ( ) No ( )

c). Will you adopt this practice in your farm? Yes ( ) No ( )  
 Why? / Why not?

d). How about your family member, do they prefer about that? Yes ( ) No ( )  
 Why? Why not?

e). How do you feel that it suitable for your land resource available? Yes ( ) No ( )

4.1.2. How is the quantity and quality harvested of each product in this practice?

a). Has there been a change of quantity since adopt a new practice? Yes ( ) No ( )  
 If yes, how much?

b). Has there been a change of quality of the products since adopt a new practice?  
 If yes, for better or worse? Yes ( ) No ( )



#### 4.2. Long term effect on environment

4.2.1. Have you noticed any change of soil quality since joining the project? Yes ( ) No ( )

If yes, in what way?

Have you noticed any change of water quality since joining the project? Yes ( ) No ( )

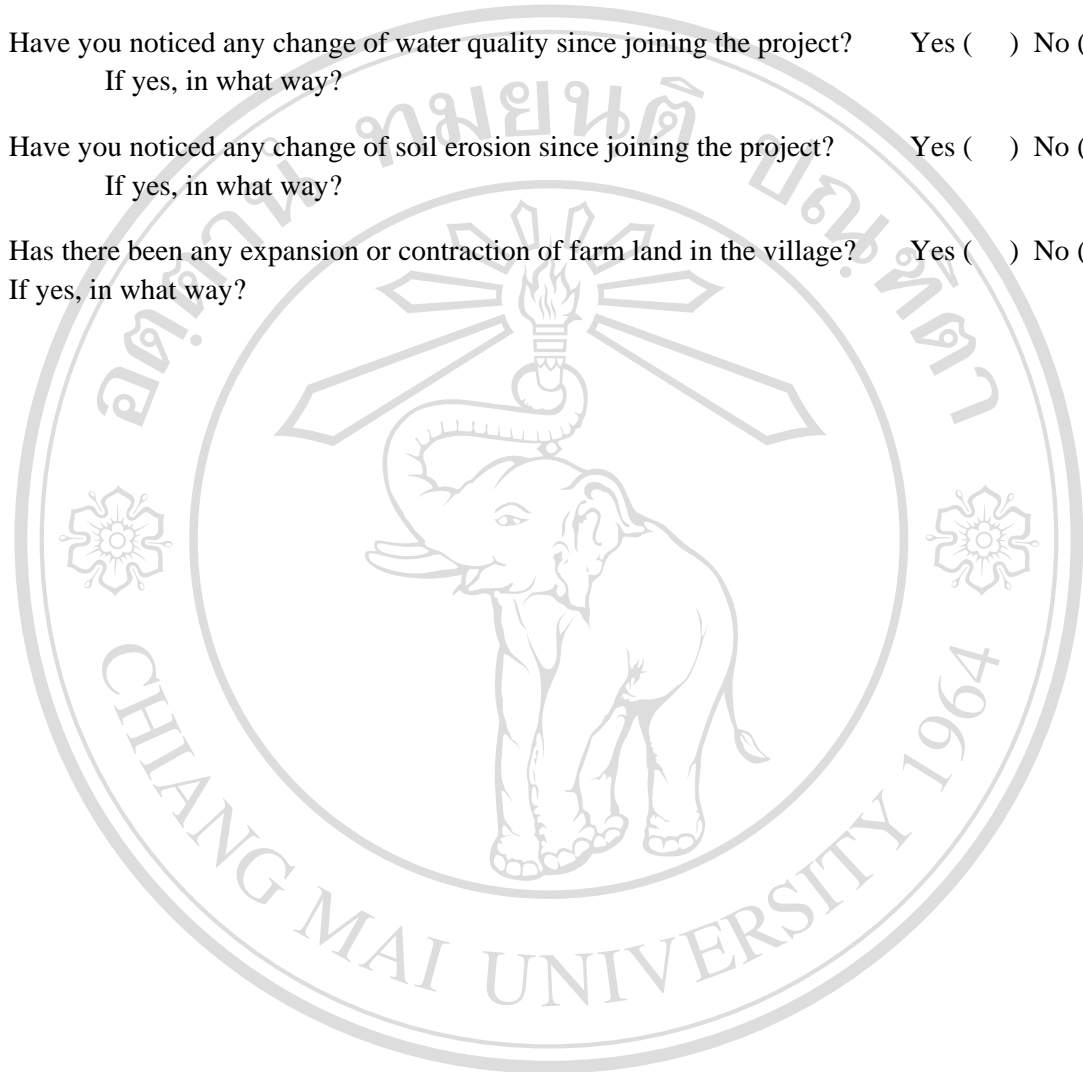
If yes, in what way?

Have you noticed any change of soil erosion since joining the project? Yes ( ) No ( )

If yes, in what way?

Has there been any expansion or contraction of farm land in the village? Yes ( ) No ( )

If yes, in what way?



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## APPENDIX B

Table B 1 The Rubber's latex yield of the BRASS model

Year	Rubber yield (Kg/ha)		Year	Rubber yield (Kg/ha)	
	Latex	Tub-lump		Latex	Tub-lump
1	0	0	18	1,542	1,387
2	0	0	19	1,562	1,406
3	0	0	20	1,575	1,418
4	0	0	21	1,237	1,114
5	0	0	22	1,577	1,419
6	0	0	23	1,557	1,401
7	0	0	24	1,543	1,388
8	0	0	25	1,499	1,349
9	936	843	26	1,502	1,351
10	878	790	27	1,514	1,362
11	1,192	1,073	28	1,490	1,341
12	1,247	1,122	29	1,463	1,316
13	1,302	1,172	30	1,432	1,289
14	1,331	1,198	31	1,399	1,259
15	1,395	1,256	32	974	876
16	1,468	1,321	33	1,321	1,189
17	1,511	1,360	34	1,262	1,136
			35	1,213	1,092

Source: Vongpaphun Manivong, 2007

Table B 2 The price of tub-lump rubber production

Year	Average price (Kip/kg)
2002	4,300
2003	4,500
2004	5,500
2005	6,500
2006	10,370
2007	10,625

Source: Lung Namtha rubber management and development Unit (NAFRI and NAFES, 2008)

**Table B 3 The annual crops' farm income in the hai system**

(Currency : Lao kip)

Year	Cost	Benefit	Income	Discount rate factor (DF 8%)	Present Value (at DF 8%)
0	2,612,000	6,100,000	3,488,000	1	3,488,000
1	2,266,000	5,800,000	3,534,000	0.925926	3,272,222
2	2,181,000	5,500,000	3,319,000	0.857339	2,845,508
3	0	0	0	0.793832	0
4	0	0	0	0.735030	0
5	0	0	0	0.680583	0
6	0	0	0	0.630170	0
7	2,612,000	6,100,000	3,488,000	0.583490	2,035,214
8	2,266,000	5,800,000	3,534,000	0.540269	1,909,310
9	2,181,000	5,500,000	3,319,000	0.500249	1,660,326
10	0	0	0	0.463193	0
11	0	0	0	0.428883	0
12	0	0	0	0.397114	0
13	0	0	0	0.367698	0
14	2,612,000	6,100,000	3,488,000	0.340461	1,187,528
15	2,266,000	5,800,000	3,534,000	0.315242	1,114,064
16	2,181,000	5,500,000	3,319,000	0.291890	968,784
17	0	0	0	0.270269	0
18	0	0	0	0.250249	0
19	0	0	0	0.231712	0
20	0	0	0	0.214548	0
21	2,612,000	6,100,000	3,488,000	0.198656	692,911
22	2,266,000	5,800,000	3,534,000	0.183941	650,046
23	2,181,000	5,500,000	3,319,000	0.170315	565,276
24	0	0	0	0.157699	0
25	0	0	0	0.146018	0
26	0	0	0	0.135202	0
27	0	0	0	0.125187	0
28	2,612,000	6,100,000	3,488,000	0.115914	404,307
29	2,266,000	5,800,000	3,534,000	0.107328	379,295
30	2,181,000	5,500,000	3,319,000	0.099377	329,833
31	0	0	0	0.092016	0
32	0	0	0	0.085200	0
33	0	0	0	0.078889	0
34	0	0	0	0.073045	0
				NPV	21,502,627
				AEV	1,844,996

**Table B 4 NPV and AEV of pure stand rubber plantation**

(Currency : Lao kip)

Year	Cost	Benefit	Income	Discount rate factor (DF 8%)	Present Value (at DF 8%)
0	4,851,000	0	- 4,851,000	1	- 4,851,000
1	3,171,000	0	- 3,171,000	0.925926	- 2,936,111
2	2,363,000	0	- 2,363,000	0.857339	- 2,025,892
3	2,363,000	0	- 2,363,000	0.793832	- 1,875,826
4	2,363,000	0	- 2,363,000	0.735030	- 1,736,876
5	2,363,000	0	- 2,363,000	0.680583	- 1,608,218
6	2,363,000	0	- 2,363,000	0.630170	- 1,489,091
7	2,363,000	0	- 2,363,000	0.583490	- 1,378,788
8	3,517,000	8,956,875	5,439,875	0.540269	2,938,995
9	3,517,000	8,393,750	4,876,750	0.500249	2,439,589
10	3,517,000	11,400,625	7,883,625	0.463193	3,651,644
11	3,517,000	11,921,250	8,404,250	0.428883	3,604,439
12	3,517,000	12,452,500	8,935,500	0.397114	3,548,410
13	3,517,000	12,728,750	9,211,750	0.367698	3,387,141
14	3,517,000	13,345,000	9,828,000	0.340461	3,346,051
15	3,517,000	14,035,625	10,518,625	0.315242	3,315,909
16	3,517,000	14,450,000	10,933,000	0.291890	3,191,238
17	3,517,000	14,736,875	11,219,875	0.270269	3,032,384
18	3,517,000	14,938,750	11,421,750	0.250249	2,858,282
19	3,517,000	15,066,250	11,549,250	0.231712	2,676,101
20	3,517,000	11,836,250	8,319,250	0.214548	1,784,880
21	3,517,000	15,076,875	11,559,875	0.198656	2,296,436
22	3,517,000	14,885,625	11,368,625	0.183941	2,091,151
23	3,517,000	14,747,500	11,230,500	0.170315	1,912,726
24	3,517,000	14,333,125	10,816,125	0.157699	1,705,696
25	3,517,000	14,354,375	10,837,375	0.146018	1,582,451
26	3,517,000	14,471,250	10,954,250	0.135202	1,481,034
27	3,517,000	14,248,125	10,731,125	0.125187	1,343,395
28	3,517,000	13,982,500	10,465,500	0.115914	1,213,095
29	3,517,000	13,695,625	10,178,625	0.107328	1,092,447
30	3,517,000	13,376,875	9,859,875	0.099377	979,848
31	3,517,000	9,307,500	5,790,500	0.092016	532,819
32	3,517,000	12,633,125	9,116,125	0.085200	776,694
33	3,517,000	12,070,000	8,553,000	0.078889	674,737
34	4,017,000	33,746,500	29,729,500	0.073045	2,171,600
				NPV	41,727,391
				AEV	3,580,346

Table B 5 NPV and AEV of IRFS1 practice

(Currentcy : Lao kip)

Year	Cost	Benefit	Income	Discount rate factor (DF 8%)	Present Value (at DF 8%)
0	5,668,000	1,800,000	- 3,868,000	1	- 3,868,000
1	4,106,000	1,650,000	- 2,456,000	0.925926	- 2,274,074
2	3,180,000	1,710,000	- 1,470,000	0.857339	- 1,260,288
3	2,363,000	0	- 2,363,000	0.793832	- 1,875,826
4	2,363,000	0	- 2,363,000	0.735030	- 1,736,876
5	2,363,000	0	- 2,363,000	0.680583	- 1,608,218
6	2,363,000	0	- 2,363,000	0.630170	- 1,489,091
7	2,363,000	0	- 2,363,000	0.583490	- 1,378,788
8	3,517,000	8,956,875	5,439,875	0.540269	2,938,995
9	3,517,000	8,393,750	4,876,750	0.500249	2,439,589
10	3,517,000	11,400,625	7,883,625	0.463193	3,651,644
11	3,517,000	11,921,250	8,404,250	0.428883	3,604,439
12	3,517,000	12,452,500	8,935,500	0.397114	3,548,410
13	3,517,000	12,728,750	9,211,750	0.367698	3,387,141
14	3,517,000	13,345,000	9,828,000	0.340461	3,346,051
15	3,517,000	14,035,625	10,518,625	0.315242	3,315,909
16	3,517,000	14,450,000	10,933,000	0.291890	3,191,238
17	3,517,000	14,736,875	11,219,875	0.270269	3,032,384
18	3,517,000	14,938,750	11,421,750	0.250249	2,858,282
19	3,517,000	15,066,250	11,549,250	0.231712	2,676,101
20	3,517,000	11,836,250	8,319,250	0.214548	1,784,880
21	3,517,000	15,076,875	11,559,875	0.198656	2,296,436
22	3,517,000	14,885,625	11,368,625	0.183941	2,091,151
23	3,517,000	14,747,500	11,230,500	0.170315	1,912,726
24	3,517,000	14,333,125	10,816,125	0.157699	1,705,696
25	3,517,000	14,354,375	10,837,375	0.146018	1,582,451
26	3,517,000	14,471,250	10,954,250	0.135202	1,481,034
27	3,517,000	14,248,125	10,731,125	0.125187	1,343,395
28	3,517,000	13,982,500	10,465,500	0.115914	1,213,095
29	3,517,000	13,695,625	10,178,625	0.107328	1,092,447
30	3,517,000	13,376,875	9,859,875	0.099377	979,848
31	3,517,000	9,307,500	5,790,500	0.092016	532,819
32	3,517,000	12,633,125	9,116,125	0.085200	776,694
33	3,517,000	12,070,000	8,553,000	0.078889	674,737
34	4,017,000	33,746,500	29,729,500	0.073045	2,171,600
				NPV	44,138,032
				AEV	3,787,187

Table B 5 NPV and AEV of IRFS2 practice

(Currency : Lao kip)

Year	Cost	Benefit	Income	Discount rate factor (DF 8%)	Present Value (at DF 8%)
0	4,768,000	1,800,000	- 2,968,000	1	- 2,968,000
1	3,781,000	1,650,000	- 2,131,000	0.925926	- 1,973,148
2	3,255,000	1,710,000	- 1,545,000	0.857339	- 1,324,588
3	2,363,000	0	- 2,363,000	0.793832	- 1,875,826
4	2,363,000	0	- 2,363,000	0.735030	- 1,736,876
5	2,363,000	0	- 2,363,000	0.680583	- 1,608,218
6	2,363,000	2,021,250	- 341,750	0.630170	- 215,360
7	2,363,000	2,021,250	341,750	0.583490	- 199,408
8	3,517,000	6,499,688	2,982,688	0.540269	1,611,453
9	3,517,000	6,218,125	2,701,125	0.500249	1,351,235
10	3,517,000	7,721,563	4,204,563	0.463193	1,947,526
11	3,517,000	7,981,875	4,464,875	0.428883	1,914,908
12	3,517,000	8,625,500	5,108,500	0.397114	2,028,656
13	3,517,000	8,763,625	5,246,625	0.367698	1,929,173
14	3,517,000	9,071,750	5,554,750	0.340461	1,891,176
15	3,517,000	9,417,063	5,900,063	0.315242	1,859,946
16	3,517,000	9,624,250	6,107,250	0.291890	1,782,648
17	3,517,000	9,767,688	6,250,688	0.270269	1,689,367
18	3,517,000	9,868,625	6,351,625	0.250249	1,589,488
19	3,517,000	9,932,375	6,415,375	0.231712	1,486,520
20	3,517,000	8,317,375	4,800,375	0.214548	1,029,912
21	3,517,000	9,937,688	6,420,688	0.198656	1,275,506
22	3,517,000	9,668,813	6,151,813	0.183941	1,131,568
23	3,517,000	9,599,750	6,082,750	0.170315	1,035,985
24	3,517,000	9,392,563	5,875,563	0.157699	926,572
25	3,517,000	9,403,188	5,886,188	0.146018	859,489
26	3,517,000	9,461,625	5,944,625	0.135202	803,724
27	3,517,000	9,518,063	6,001,063	0.125187	751,254
28	3,517,000	9,398,341	5,881,341	0.115914	681,728
29	3,517,000	9,267,994	5,750,994	0.107328	617,240
30	3,517,000	9,121,710	5,604,710	0.099377	556,981
31	3,517,000	7,100,114	3,583,114	0.092016	329,704
32	3,517,000	8,776,017	5,259,017	0.085200	448,068
33	3,517,000	8,507,545	4,990,545	0.078889	393,699
34	4,017,000	19,358,886	15,341,886	0.073045	1,120,653
NPV					21,142,755
AEV					1,814,117



## CURRICULUM VITAE

**Name:** Pasalath Khounsy

**Date of Birth:** March 17, 1979

**Nationality:** Lao

**Address:** No. 199, Unit 9, Sibounheungthong Village, Sikhottabong District,  
Vientiane Capital, Lao PDR

**Educational Background:**

1996-2001: Bachelor of Science (Forestry), National University of Laos,  
Vientiane, Lao PDR

2007-2009: Master of Science (Agricultural systems), Chiang Mai University,  
Chiang Mai, Thailand

**Employee records:**

2001 to present: Researcher in the Research Management Division,  
National Agriculture and Forestry Research Institute (NAFRI),  
Ministry of Agriculture and Forestry