

## APPENDICES

### APPENDIX A

#### QUESTIONNAIRE

#### Assessment of Sustainability of Integrated Coffee-based Farming System in Bali Province, Indonesia

No.: ..... Date of interview: .....

Name of informant : .....

Village: ..... Address: .....

Name of enumerator: .....

#### A. GENERAL INFORMATION

##### 1. Farmers and family member's age, education, and involvement in integrated-coffee based farming activity

No.	Head of HH and family member	Relation with HH	Age (year)	Gender <sup>(a)</sup>	Education <sup>(b)</sup>	Occupation		Status <sup>(c)</sup>	Involvement on farm activity <sup>(d)</sup>
						Primary	Others		

<sup>(a)</sup> 1 = Male, 2 = Female; <sup>(b)</sup> 0-12 years = According to grade; 13 years or other = Diploma/Degree; <sup>(c)</sup> M: Married, S: Single, W: Widow; <sup>(d)</sup> 1 = full time, 2 = part time, 3 = not involved

##### 2. Condition of Farming System and Land Tenure Status in 2007

No.	Land Owned (Ha)					Land Status (Ha)						Price Rent/Year (Rp)		Share (%)	
	Paddy field	Home garden	Crops	Forest <sup>1)</sup>	Others <sup>2)</sup>	Owned	Rented	Mortgaged	Rent out	share	others	Rented	Rent Out	owner	worker

Notes: 1) Forest in here means the state forest that exist under the village area; 2) Others, such as: plantation crops, ponds, fisheries, etc.

##### 3. Cropping Pattern 2007

PLOT No. Land use *)	Total Land use (Ha)	Crops	Time												Remarks		
			Sept.	Oct.	Nov.	Des.	Jan.	Feb.	Mar.	Apr.	May	June	July	Agst.			

Notes: \*) include the plot from state forest



## 7. Livestock data

Details	Kind of livestock	
	...	...
1. Amount of livestock in the early year		
1.1. young		
1.2. mature		
1.3. Total (1.1.+1.2)		
2. Total value of livestock in the early year		
2.1. young (Rp.)		
2.2. mature (Rp.)		
2.3. Total (2.1+2.2)		
3. Amount of livestock at the end of the year		
3.1. young		
3.2. mature		
3.3. Total (3.1+3.2)		
4. total value of livestock at the end of the year		
4.1. young (Rp)		
4.2. mature (Rp)		
4.3. Total (4.1+4.2)		
5. secondary output from livestock in a year (Rp.)		
5.1. manure		
5.2. wages from hiring cattle		
5.3. ....		
5.4. Total (5.1+5.2+5.3)		
6. expenses for livestock for one year (Rp.)		
6.1. pen (nest)		
6.2. rope		
6.3. other equipment		
6.4. feed		
6.5. medication		
6.6. labor cost		
6.7. ....		
6.8. Total (6.1+ ...+6.7)		
7. Livestock depreciation for a year (Rp.)		
7.1. Died		
7.2. slice		
7.3. ....		
7.4. Total (7.1+7.2+7.3)		
Income from livestock (4.3 - 2.3 + 5.4 - 6.8 - 7.4)		

## 8. Credit

No.	Kind of credit *)	source **)	Amount (Rp.)	Interest rate per year (%)	Terms of credit	Total amount that has to be paid (Rp.)	Amount of money to be paid per month

Catatan:

\*) Jenis, misalnya: KUT, Kupedes, Kredit Ketahanan Pangan (KKP), Kredit Konservasi, dsb.

\*\*) Sumber, misalnya: BRI, KUD, BPD, Rentenir, BPR, dll.

## INFORMATION ON ECOLOGICAL INDICATORS

## 9. Crop Rotation (in the past 5 years)

Plot No.	Cropping System				Reason	Remarks*
	Old pattern	Area (Ha)	New Pattern	Area (Ha)		
						<ul style="list-style-type: none"> <li>How long have you changed? .....years</li> <li>What positive results occur? .....</li> </ul>

\* Positive results should be specified in terms of increased output or income. Specify how much was obtained in the old pattern. (Excising level of output will be asked in the next section). Specify also negative results, if any.

## Fertilizer

## 10. How is the trend of fertilizer usage of coffee-based farming systems in the past 5 years? (2003 – 2007)

Kind of fertilizer	Amount (kg/ha)				
	2003	2004	2005	2006	2007
Organic .....					
Chemical .....					

## Agrochemical used

## 11. How is the trend of agrochemical usage in coffee-based farming systems during 5 years? (2003 – 2007)

Type of agrochemical	Amount (kg/ha)				
	2003	2004	2005	2006	2007

## 12. Repairs and maintenance

Items	Qty	Year purchased	Purchase Price (Rp)	Present Value (Rp)	Notes
Spraying machine					
Hoes					
Spades					
Others					
Total					

## 13. Stability status

No.	Item	2003	2004	2005	2006	2007	Average
1	Arabica coffee yield (ton/year)						
2	Price of Arabica coffee (Rp/ton)						
3	Farm Income (Rp/year)						
4	Off farm income (Rp/year)						
5	Other income (Rp/year) Please specify .....						

14. What were factors to be responsible for yield instability during last five years?

No.	Item	2003	2004	2005	2006	2007	Remarks
1	Drought						
2	Flood						
3	Landslide						
4	Favorable climate						
5	Insect and disease pest						
6	Technology						
7	Variety						
8	Other (please specify)						

15. Arabica coffee selling method

Selling method	Use $\checkmark$ in relevant answer	Remarks
At farm (middle men)		
Nearest market		
Whole sale markets		
Others (please specify)		

16. Arabica coffee transport method

Transport method	Use $\checkmark$ in relevant answer
Hire vehicle	
Own vehicle	
others(please specify)	

17. If own vehicle, detail of own vehicles – Detail of the vehicle

Vehicle	Purchase Price	Year purchased	Maintenance cost per year (Rupiah)	Operating cost for transport	
				Input transport	Output transport
Bike					
Motorbike					
Pick-up car					
Others					

18. Yield and income from Arabica Coffee during last year (2007)

Month	Yield (Kg)	For Sell			For Consume			Total Income (1) – (2)
		Amount (Kg)	Price/unit	Total Income (Rp) (1)	Amount (Kg)	Price/unit	Total Income (Rp) (2)	
April								
May								
June								
July								
August								
September								
October								

## 19. Yield and income from Arabica Coffee during last 10 year

year	Yield (Kg)	For Sell			For Consume			Total Income (1) – (2)
		Amount (Kg)	Price/ unit	Total Income (Rp) (1)	Amount (Kg)	Price/ unit	Total Income (Rp) (2)	
2007								
2006								
2005								
2004								
2003								
2002								
2001								
2000								
1999								
1998								
1997								

## 20. Other information and remarks

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## INFORMATION ON SOCIAL INDICATORS

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 Role of intercropping system

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 Different types of integrated coffee based farming systems

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 Percentage of farmers

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 Income stability/  
 Income diversification  
 Labor generation

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 Shade and windbreak  
 Reduces insect attack  
 Reduces soil erosion  
 Returns organic matters  
 Provides firewood  
 Suppresses weed  
 Moderates temperature

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 Increases pest on farm  
 Increases diseases  
 Difficult management  
 Water competition  
 Nutrient competition  
 Decreases coffee yield  
 Increases total yield

## APPENDIX B

Table B1. Reference Crop Evapotranspiration using Penman method

Detail	Jan	Feb	Mar	Apr	May	June
T mean in °C	22.20	0.00	21.60	22.80	23.00	22.80
ea in mbar	26.40	0.00	24.90	26.40	28.10	26.40
correction	0.00	0.00	0.00	0.00	0.00	0.00
corrected ea in mbar	26.40	0.00	24.90	26.40	28.10	26.40
RH mean (in %)	88.00	0.00	89.00	86.00	86.00	85.00
RH mean/100	0.88	0.00	0.89	0.86	0.86	0.85
ed = corrected ea x (RH mean/100)	23.23	0.00	22.16	22.70	24.17	22.44
<b>ea - ed</b>	<b>3.17</b>	<b>0.00</b>	<b>2.74</b>	<b>3.70</b>	<b>3.93</b>	<b>3.96</b>
Wind power relative (U) in knots	2.00	0.00	2.00	3.00	3.00	4.00
conversion factor to km/hr	1.85	1.85	1.85	1.85	1.85	1.85
U relative in km/hr	3.70	0.00	3.70	5.55	5.55	7.40
<b>U relative in km/day</b>	<b>88.80</b>	<b>0.00</b>	<b>88.80</b>	<b>133.20</b>	<b>133.20</b>	<b>177.60</b>
f (U)	0.49	0.00	0.49	0.62	0.62	0.73
correction factor	0.02	0.00	0.02	0.01	0.01	0.02
<b>corrected f(U)</b>	<b>0.51</b>	<b>0.00</b>	<b>0.51</b>	<b>0.63</b>	<b>0.63</b>	<b>0.75</b>
Weighting factor (1 - W) with conversion of altitude 1,000 m						
(1-W) at 1,000 m altitude	0.27	0.00	0.28	0.27	0.26	0.27
<b>(1-W) x f(U) x (ea - ed)</b>	<b>0.43</b>	<b>0.00</b>	<b>0.39</b>	<b>0.62</b>	<b>0.64</b>	<b>0.79</b>
Extra Terrestrial Radiation (Ra) expressed in equivalent evaporation in mm/day						
latitude = 8° southern hemisphere Ra	16.10	0.00	15.50	14.40	13.10	12.40
n/N (sunshine percentage)	0.39	0.00	0.47	0.67	0.90	0.81
<b>Rs = (0.25 + 0.5 n/N) Ra</b>	<b>7.16</b>	<b>0.00</b>	<b>7.52</b>	<b>8.42</b>	<b>9.17</b>	<b>8.12</b>
<b>Net Shortwave radiation (Rns) = (1 - α) Rs, α = 0.25</b>						
<b>Rns</b>	<b>5.37</b>	<b>0.00</b>	<b>5.64</b>	<b>6.32</b>	<b>6.88</b>	<b>6.09</b>
<b>Longwave Radiation (Rnl)</b>						
effect of T mean f(T) on Rnl	15.00	0.00	14.80	15.10	15.20	15.10
effect of f(ed) on Rnl	0.17	0.34	0.17	0.17	0.17	0.17
effect of sunshine hours f(n/N)	0.45	0.10	0.52	0.70	0.91	0.83
Rnl	1.15	0.00	1.32	1.79	2.33	2.12
<b>Rn = Rns - Rnl</b>	<b>4.23</b>	<b>0.00</b>	<b>4.32</b>	<b>4.52</b>	<b>4.55</b>	<b>3.98</b>
<b>W</b>	<b>0.73</b>	<b>1.00</b>	<b>0.72</b>	<b>0.74</b>	<b>0.74</b>	<b>0.74</b>
<b>W x Rn</b>	<b>3.09</b>	<b>0.00</b>	<b>3.11</b>	<b>3.32</b>	<b>3.37</b>	<b>2.92</b>
<b>[(1-W) x f(u) x (ea - ed)] + [W x Rn]</b>	<b>3.52</b>	<b>0.00</b>	<b>3.50</b>	<b>3.94</b>	<b>4.01</b>	<b>3.71</b>
<b>c (from table16)</b>	<b>0.96</b>	<b>0.98</b>	<b>1.10</b>	<b>1.15</b>	<b>1.16</b>	<b>1.10</b>
<b>ETo = c[(1-W) x f(u) x (ea - ed)] +</b>	<b>3.38</b>	<b>0.00</b>	<b>3.85</b>	<b>4.53</b>	<b>4.65</b>	<b>4.08</b>
<b>ETo in mm/day</b>	<b>3.38</b>	<b>0.00</b>	<b>3.85</b>	<b>4.53</b>	<b>4.65</b>	<b>4.08</b>
<b>ETo in mm/month</b>	<b>104.73</b>	<b>0.00</b>	<b>119.26</b>	<b>135.99</b>	<b>144.17</b>	<b>122.50</b>
<b>rainfall data 2002 in Kintamani (in mm/month)</b>	<b>711.00</b>	<b>883.00</b>	<b>259.00</b>	<b>90.00</b>	<b>30.00</b>	<b>0.00</b>

Table B1. (Continued)

Details	July	Aug	Sep	Oct	Nov	Dec
T mean in °C	22.50	17.70	18.40	18.60	18.00	18.10
ea in mbar	26.40	19.40	20.60	20.60	20.60	20.60
correction	0.00	0.00	0.00	0.00	0.00	0.00
corrected ea in mbar	26.40	19.40	20.60	20.60	20.60	20.60
RH mean (in %)	86.00	92.00	92.00	91.00	92.00	92.00
RH mean/100	0.86	0.92	0.92	0.91	0.92	0.92
ed = corrected ea x (RH mean/100)	22.70	17.85	18.95	18.75	18.95	18.95
<b>ea - ed</b>	<b>3.70</b>	<b>1.55</b>	<b>1.65</b>	<b>1.85</b>	<b>1.65</b>	<b>1.65</b>
Wind power relative (U) in knots	4.00	4.00	5.00	1.00	2.00	2.00
conversion factor to km/hr	1.85	1.85	1.85	1.85	1.85	1.85
U relative in km/hr	7.40	7.40	9.25	1.85	3.70	3.70
<b>U relative in km/day</b>	<b>177.60</b>	<b>177.60</b>	<b>222.00</b>	<b>44.40</b>	<b>88.80</b>	<b>88.80</b>
f (U) based on table 7 on reference book of Penman Method						
f (U)	0.73	0.73	0.86	0.38	0.49	0.49
correction factor	0.02	0.02	0.01	0.01	0.02	0.02
<b>corrected f(U)</b>	<b>0.75</b>	<b>0.75</b>	<b>0.87</b>	<b>0.39</b>	<b>0.51</b>	<b>0.51</b>
Weighting factor (1 - W) with conversion of altitude 1,000 m						
(1-W)	<b>0.28</b>	<b>0.32</b>	<b>0.31</b>	<b>0.30</b>	<b>0.31</b>	<b>0.31</b>
<b>(1-W) x f(U) x (ea - ed)</b>	<b>0.77</b>	<b>0.37</b>	<b>0.44</b>	<b>0.22</b>	<b>0.26</b>	<b>0.26</b>
<b>Extra Terrestrial Radiation (Ra) expressed in equivalent evaporation in mm/day</b>						
latitude = 8' southern hemisphere Ra	12.70	13.70	14.90	15.80	16.00	16.00
n/N (sunshine percentage)	0.80	0.59	0.76	0.75	0.46	0.35
<b>Rs = (0.25 + 0.5 n/N) Ra</b>	<b>8.26</b>	<b>7.47</b>	<b>9.39</b>	<b>9.88</b>	<b>7.68</b>	<b>6.80</b>
<b>Net Shortwave radiation (Rns) = (1 - α) Rs, α = 0.25</b>						
<b>Rns</b>	<b>6.19</b>	<b>5.60</b>	<b>7.04</b>	<b>7.41</b>	<b>5.76</b>	<b>5.10</b>
<b>Longwave Radiation (Rnl)</b>						
effect of T mean f(T) on Rnl	15.05	14.16	14.25	14.30	14.20	14.20
effect of f(ed) on Rnl	0.17	0.17	0.17	0.17	0.17	0.17
effect of sunshine hours f(n/N)	0.82	0.63	0.78	0.78	0.51	0.42
Rnl	2.09	1.56	1.94	1.92	1.27	1.03
<b>Rn = Rns - Rnl</b>	<b>4.10</b>	<b>4.04</b>	<b>5.10</b>	<b>5.48</b>	<b>4.49</b>	<b>4.07</b>
<b>W</b>	<b>0.73</b>	<b>0.68</b>	<b>0.69</b>	<b>0.70</b>	<b>0.69</b>	<b>0.69</b>
<b>W x Rn</b>	<b>2.97</b>	<b>2.75</b>	<b>3.52</b>	<b>3.84</b>	<b>3.10</b>	<b>2.81</b>
<b>[(1-W) x f(u) x (ea - ed)] + [W x Rn]</b>	<b>3.74</b>	<b>3.12</b>	<b>3.96</b>	<b>4.06</b>	<b>3.36</b>	<b>3.07</b>
<b>c (from table16)</b>	<b>1.12</b>	<b>1.08</b>	<b>1.17</b>	<b>0.87</b>	<b>1.00</b>	<b>0.98</b>
<b>ETo = c[(1-W) x f(u) x (ea - ed)] +</b>	<b>4.19</b>	<b>3.37</b>	<b>4.63</b>	<b>3.53</b>	<b>3.36</b>	<b>3.01</b>
<b>ETo in mm/day</b>	<b>4.19</b>	<b>3.37</b>	<b>4.63</b>	<b>3.53</b>	<b>3.36</b>	<b>3.01</b>
<b>ETo in mm/month</b>	<b>129.82</b>	<b>104.52</b>	<b>138.98</b>	<b>109.40</b>	<b>100.69</b>	<b>93.27</b>
<b>rainfall data 2002 in Kintamani</b>	<b>0.00</b>	<b>10.00</b>	<b>0.00</b>	<b>5.00</b>	<b>144.00</b>	<b>538.0</b>

**APPENDIX C**  
**PROFITABILITY**

Table C1 NPV and IRR of CTL

Year	Cost	Benefit	Income	PV of Income (DF 15%)
0	16,450,000	0	-16,450,000	-16,450,000.00
1	10,250,000	14,980,000	4,730,000	4,113,043.48
2	10,430,000	14,980,000	4,550,000	3,440,453.69
3	11,310,000	18,286,533	6,976,533	4,587,183.96
4	11,310,000	18,544,486	7,234,486	4,136,340.85
5	11,310,000	18,825,340	7,515,340	3,736,452.21
6	11,850,000	19,252,600	7,402,600	3,200,348.26
7	11,310,000	19,520,840	8,210,840	3,086,758.88
8	11,535,000	19,239,130	7,704,130	2,518,493.76
9	11,535,000	19,327,156	7,792,156	2,215,017.06
10	11,535,000	19,159,080	7,624,080	1,884,555.97
11	12,885,000	21,027,051	8,142,051	1,750,078.60
12	12,075,000	20,782,797	8,707,797	1,627,549.61
13	11,782,500	21,034,684	9,252,184	1,503,738.49
14	11,782,500	21,575,494	9,792,994	1,384,030.65
15	11,782,500	21,402,418	9,619,918	1,182,234.84
16	12,054,750	19,551,186	7,496,436	801,104.95
17	12,054,750	19,192,708	7,137,958	663,301.05
18	12,594,750	18,865,145	6,270,395	506,680.01
19	12,054,750	18,565,653	6,510,903	457,490.69
20	12,054,750	18,291,659	6,236,909	381,076.89
<b>Net Present Value at DF 15%</b>				<b>26,725,933.91</b>
<b>IRR of CTL</b>				<b>37.27%</b>

Table C2 NPV and IRR of CCL

Year	Cost	Benefit	Income	PV of Income (DF 15%)
0	16,265,000	0	-16,265,000	-16,265,000.00
1	10,240,000	14,980,000	4,740,000	4,121,739.13
2	10,420,000	14,980,000	4,560,000	3,448,015.12
3	11,300,000	16,415,109	5,115,109	3,363,267.46
4	11,300,000	16,574,566	5,274,566	3,015,750.23
5	11,300,000	16,751,740	5,451,740	2,710,478.29
6	11,840,000	18,247,678	6,407,678	2,770,216.03
7	11,300,000	19,847,680	8,547,680	3,213,389.52
8	11,525,000	19,887,580	8,362,580	2,733,742.24
9	11,525,000	19,334,856	7,809,856	2,220,048.50
10	11,525,000	19,425,280	7,900,280	1,952,828.39
11	12,875,000	21,657,583	8,782,583	1,887,756.77
12	12,065,000	26,556,000	14,491,000	2,708,471.51
13	11,772,500	29,894,167	18,121,667	2,945,277.46
14	11,772,500	30,286,333	18,513,833	2,616,535.22
15	11,772,500	30,328,880	18,556,380	2,280,476.77
16	12,044,750	26,928,386	14,883,636	1,590,536.38
17	12,044,750	27,603,548	15,558,798	1,445,815.08
18	12,584,750	27,883,943	15,299,193	1,236,253.11
19	12,044,750	28,213,436	16,168,686	1,136,097.92
20	12,044,750	28,590,974	16,546,224	1,010,978.93
<b>Net Present Value at DF 15%</b>				<b>32,142,674.05</b>
<b>IRR of CCL</b>				<b>35.63%</b>

Table C3 NPV and IRR of CL

Year	Cost	Benefit	Income	PV of Income (DF 15%)
0	14,285,000	0	-14,285,000	-14,285,000.00
1	10,150,000	14,980,000	4,830,000	4,200,000.00
2	10,150,000	14,980,000	4,830,000	3,652,173.91
3	10,985,000	16,415,109	5,430,109	3,570,385.07
4	10,985,000	16,574,566	5,589,566	3,195,852.50
5	10,985,000	16,751,740	5,766,740	2,867,088.97
6	11,525,000	16,948,600	5,423,600	2,344,771.95
7	10,985,000	16,960,840	5,975,840	2,246,539.60
8	11,210,000	16,679,980	5,469,980	1,788,146.16
9	11,210,000	16,483,656	5,273,656	1,499,102.17
10	11,210,000	16,574,080	5,364,080	1,325,918.54
11	12,560,000	21,877,500	9,317,500	2,002,733.48
12	11,750,000	21,695,000	9,945,000	1,858,791.61
13	11,457,500	21,912,500	10,455,000	1,699,229.79
14	11,457,500	22,863,900	11,406,400	1,612,051.20
15	11,457,500	22,523,000	11,065,500	1,359,888.93
16	11,729,750	17,578,386	5,848,636	625,013.18
17	11,729,750	17,318,548	5,588,798	519,343.99
18	12,269,750	17,084,693	4,814,943	389,072.04
19	11,729,750	16,874,224	5,144,474	361,478.09
20	11,729,750	16,684,801	4,955,051	302,755.02
<b>Net Present Value at DF 15%</b>				<b>23,135,336.21</b>
<b>IRR of CL</b>				<b>37.51%</b>

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