

## Appendix 1 Nomenclature

### Some Indonesian Vocabulary

Baduy	= widely used colloquially to mean Baduy Society who reside in remote area of Kanekes village, West Java, Indonesia
Baduy dalam	= widely used colloquially to mean inner Baduy society
Baduy luar	= widely used colloquially to mean outer Baduy society
Daerah	= area
Daerah Baduy	= Baduy area, also called Kanekes area or Rawayan area
Daerah Baduy dalam	= inner Baduy area, also called Girang area
Daerah Baduy luar	= outer Baduy area, also called Panamping area
Daerah luar Baduy	= non Baduy area
Desa	= village administration division
Hukum adat	= traditional law
Huma	= vernacular name of shifting cultivation in Sundanese (West Java) language
Hutan	= forest

- Hutan Kampung = Man-made forest area located in surrounding of houses in the settlement area, also called permanent talun in other areas of West Java
- Hutan muda = immature forest, also called immature reuma
- Hutan titipan = traditional forest conservation which is usually located at top of hills
- Hutan tua = mature forest, also called mature reuma
- Ladang = vernacular name of shifting cultivation in Indonesian language (bahasa Indonesia)
- Kabupaten = district administration division
- Kampung = hamlet, also called babakan for new hamlet or settlement
- Kanekes = the name of Baduy village according to formal government administration
- Kebun = a piece of land planted by annual crops, such as cassava, sweet potato, etc
- Kebun campuran = a piece of land planted by mixed annual and perennial crops, such as fruits, industrial crops, vegetables, etc

Kecamatan	= subdistrict administration division
Keresidenan	= residency administration division
Orang	= people or community, also called masyarakat
Orang Baduy	= Baduy people or Baduy Society, also called Rawayan people
Orang Baduy dalam	= inner Baduy Society, also called orang Girang or orang Kajeroan
Orang Baduy luar	= outer Baduy Society, also called orang Panamping
Orang luar	= non Baduy people
Perhutani	= the Forestry State Corporation
Provinsi	= Province administration division
Reuma	= a piece of land formed by abandonment of ladang area after harvesting rice and other annual crops in developing into mature forest or mature reuma by natural succession
Reuma muda	= immature reuma after fallow time 1-2 years
Reuma tua	= mature reuma after fallow time more than 3 years
Sunda	= West Javanese people
Sunda wiwitan	= original Sundanese, religion of Baduy Society, also called Sunda asli

Tabu = taboo, some traditional prohibitions  
in Baduy Society, also called  
pantangan, larangan or buyut

Measurements

Rupiah = Indonesian currency = 625 rupiah = 1  
US \$ in 1985/1986

1 liter of rice = 200 rupiah (unhusked rice)

1 liter of rice = 1.25 kg rice (unhusked rice)

Scaling letters of Dynamo Programme

e2 = 100  
e3 = 1000  
e4 = 10000  
e5 = 100000  
e6 = 1000000  
e7 = 10000000  
e8 = 100000000  
e9 = 1000000000

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
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Appendix 2 Equations of shifting cultivation model of Baduy, West Java, Indonesia

\* POPULATION \*

LPOP.K=POP.J+DT\*(INPOP.JK-OUTPOP.JK) POPULATION  
 NOTE POP=POPULATION  
 N POP=IPOP  
 C IPOP=4.6E3  
 NOTE IPOP=INITIAL POPULATION (PEOPLE)  
 R INPOP.KL=BR.K+MI.K  
 R OUTPOP.KL=DR.K+MO.K  
 A BR.K=(BRF\*(1+IBR.K))\*POP.K  
 NOTE BR=BIRTH RATE (PEOPLE/YEAR)  
 C BRF=0.037  
 NOTE BRF=BIRTH RATE FRACTION (BIRTH/YEAR/PERSON)  
 A IBR.K=CLIP(X1\*SURPLUS1.K,0,X1\*SURPLUS1.K,0)  
 NOTE IBR=INDEX OF BIRTH RATE FACTOR (DIMENSIONLESS)  
 A SURPLUS1.K=(FOD.K-FCNS.K)/FCNS.K  
 NOTE FOD=FOOD AVAILABILITY (RUPIAH)  
 NOTE FCNS=FOOD CONSUMPTION OR FOOD REQUIREMENT (RUPIAH)  
 NOTE SURPLUS1=SURPLUS OF FOOD, BR AND MI WILL INCREASE  
 A MI.K=(MIF\*(1+IMI.K))\*POP.K  
 NOTE MI=IN MIGRATION (PEOPLE/YEAR)  
 C MIF=0.05  
 NOTE MIF=IN-MIGRATION FRACTION (IN-MIGRATION/YEAR/PERSON)  
 A IMI.K=CLIP(X2\*SURPLUS1.K,0,X2\*SURPLUS1.K,0)  
 NOTE IMI=INDEX OF IN-MIGRATION FACTOR (DIMENSIONLESS)  
 A DR.K=(DRF\*(1+IDR.K))\*POP.K  
 NOTE DR=DEATH RATE (PEOPLE/YEAR)  
 C DRF=0.016  
 NOTE DRF=DEATH RATE FRACTION (DEATH/YEAR/PERSON)  
 A IDR.K=CLIP(0,-(X3\*SURPLUS1.K),(X3\*SURPLUS1.K),0)  
 NOTE IDR=INDEX OF DEATH RATE FACTOR (DIMENSIONLESS)  
 A MO.K=(MOF\*(1+IMO.K))\*POP.K  
 NOTE OUT-MIGRATION (PEOPLE/YEAR)  
 C MOF=0.05  
 NOTE MOF=OUT-MIGRATION FACTOR (OUT-MIGRATION/YEAR/PERSON)  
 A IMO.K=CLIP(0,-(X4\*SURPLUS1.K),(X4\*SURPLUS1.K),0)  
 NOTE IMO=INDEX OF OUT MIGRATION (DIMENSIONLESS)  
 NOTE IF SURPLUS OF FOOD IS NEGATIVE DR INCREASE BY A FRACTION OF X3 AND MO WILL INCREASE BY A FRACTION OF X4  
 C X1=0.1 IF FOOD INCREASE 1 PER CENT BR INCREASE 0.1 PER CENT  
 C X2=0.1 IF FOOD INCREASE 1 PER CENT MI INCREASE 0.1 PER CENT  
 C X3=0.1 IF FOOD DECREASE 1 PER CENT DR INCREASE 0.1 PER CENT  
 C X4=0.1 IF FOOD DECREASE 1 PER CENT MO INCREASE 0.1 PER CENT

\*FOOD\*

L FOD.K=FOD.J+DT\*(INFOD.JK-OUTFOD.JK) FOOD  
NOTE FOD=FOOD AVAILABILITY (RUPIAH)  
R INFOD.KL=AGP.K+FIM.K  
R OUTFOD.KL=FCNS.K+FEX.K+LOSS.K  
NOTE AGP=AGRICULTURAL PRODUCTION (RUPIAH)  
NOTE FIM=FOOD IMPORT (RUPIAH)  
NOTE FCNS=FOOD CONSUMPTION OR FOOD REQUIREMENT (RUPIAH)  
NOTE FEX=FOOD EXPORT (RUPIAH)  
NOTE LOSS=FOOD LOSS DUE TO HARVEST, STORAGE LOSS  
(RUPIAH)  
N FOD=IFOD  
N IFOD=442E6  
NOTE IFOD=INITIAL FOOD (RUPIAH)  
A AGP.K=LDPR.K+RMPR1.K+RMPR2.K+RMPR3.K+RMPR4.K+  
MNGDPR.K+MXGDPR.K+MMFPR.  
NOTE AGP=AGRICULTURAL PRODUCTION (RUPIAH)  
NOTE LDPR=LADANG PRODUCTION (RUPIAH)  
NOTE RMPR1=PRODUCTION OF REUMA OF FALLOW TIME ONE YEAR  
(RUPIAH)  
NOTE RMPR2=PRODUCTION OF REUMA OF FALLOW TIME TWO YEARS  
(RUPIAH)  
NOTE RMPR3=PRODUCTION OF REUMA OF FALLOW TIME THREE  
YEARS (RUPIAH)  
NOTE RMPR4=PRODUCTION OF REUMA OF FALLOW TIME FOUR  
YEARS (RUPIAH)  
NOTE MNGDPR=MONOGARDEN PRODUCTION (RUPIAH)  
NOTE MXGDPR=MIXED GARDEN PRODUCTION (RUPIAH)  
NOTE MMFPR=MAN-MADE FOREST PRODUCTION (RUPIAH)  
A LDPR.K=RDFLD.K\*(A1\*LDA.K)  
C A1=347E3  
NOTE RDFLD=REDUCTION FACTOR DUE TO STATE IN SOIL  
FERTILITY IN LADANG ARE  
NOTE A1=OUTPUT PER HA IN LADANG (RUPIAH/HA)  
NOTE LDA=LADANG AREA (HA)  
NOTE SFRT0=SOIL FERTILITY OF FALLOW TIME ZERO YEAR OR  
LADANG PHASE (KG RICE)  
A RDFLD.K=(SFRT4.K/ISFRT4)  
A RMPR1.K=RDFRM1.K\*(A2\*RMA1.K)  
NOTE RMPR1=PRODUCTION OF REUMA OF FALLOW TIME ONE YEAR  
(RUPIAH/HA)  
NOTE RMA1=AREA OF REUMA OF FALLOW TIME ONE YEAR (HA)  
NOTE A2=OUTPUT PER HA IN REUMA OF FALLOW TIME ONE YEAR  
(KG RICE)  
C A2=412E3  
A RDFRM1.K=(SFRT0.K/ISFRT0)  
NOTE SFRT1=SOIL FERTILITY OF FALLOW TIME ONE YEAR (KG  
RICE)  
NOTE ISFRT4=INITIAL SOIL FERTILITY OF FALLOW TIME 4  
YEARS (KG RICE)  
A RMPR2.K=RDFRM2.K\*(A2\*RMA2.K)  
A RDFRM2.K=(SFRT1.K/ISFRT1)

NOTE RMPR2=PRODUCTION OF REUMA OF FALLOW TIME TWO YEARS (RUPIAH/HA)  
 NOTE RMA2= REUMA OF FALLOW TIME TWO YEARS (HA)  
 NOTE SFRT2=SOIL FERTILITY OF FALLOW TIME TWO YEARS (KG RICE)  
 NOTE ISFRT4=INITIAL SOIL FERTILITY OF FALLOW TIME 4 YEARS (KG RICE)  
 A  $RMPR3.K = RDFRM3.K * (E1 * A2 * RMA3.K)$   
 NOTE RMPR3=PRODUCTION OF REUMA OF FALLOW TIME THREE YEARS (RUPIAH/HA)  
 NOTE RMA3=REUMA OF FALLOW TIME THREE YEARS (HA)  
 A  $RDFRM3.K = (SFRT2.K / ISFRT2)$   
 C  $E1 = 0.30$   
 NOTE E1=REDUCTION OF OUTPUT OF REUMA3 PRODUCTION DUE TO NATURAL VEGETATION COMPETITION  
 A  $RMPR4.K = RDFRM4.K * (E2 * A2 * RMA4.K)$   
 C  $E2 = 0.20$   
 NOTE E3=REDUCTION OF OUTPUT OF REUMA4 PRODUCTION DUE TO NATURAL VEGETATION COMPETITION  
 NOTE RMPR4=PRODUCTION OF REUMA OF FALLOW TIME FOUR YEARS (RUPIAH/HA)  
 NOTE RMA4=REUMA OF FALLOW TIME FOUR YEARS (HA)  
 NOTE SFRT4=SOIL FERTILITY OF FALLOW TIME FOUR YEARS (KG RICE)  
 A  $RDFRM4.K = (SFRT3.K / ISFRT3)$   
 NOTE ISFRT4=INITIAL SOIL FERTILITY OF FALLOW TIME YEARS (KG RICE)  
 NOTE MONOGARDEN PRODUCTION  
 A  $MNGDPR.K = RDFRM.K * (A3 * MNGDA.K)$   
 NOTE MNGDPR=MONOGARDEN PRODUCTION (RUPIAH)  
 A  $RDFRM.K = RDFLD.K$   
 NOTE RDFLD=REDUCTION IN SOIL FERTILITY IN MONOGARDEN IS ASSUMED THE SAME AS IN LADANG  
 NOTE A3=OUTPUT OF MONOGARDEN PRODUCTION PER HA (RUPIAH/HA)  
 NOTE MNGDA=MONOGARDEN AREA (HA)  
 C  $A3 = 319E3$   
 NOTE MIXED GARDEN PRODUCTION  
 A  $MXGDPR.K = RDMX.K * (A4 * MXGDA.K)$   
 NOTE MXGDPR=TOTAL OUTPUT OF MIXED GARDEN PRODUCTION (RUPIAH)  
 A  $RDMX.K = RDFRM.K$   
 NOTE RDMX=REDUCTION FACTOR IN SOIL FERTILITY IN MIXE GARDEN IS ASSUMED THE SAME AS IN MONOGARDEN  
 NOTE A4=OUTPUT OF MIXED GARDEN PRODUCTION PER HA (RUPIAH/HA)  
 NOTE MXGDA=MIXED GARDEN AREA (HA)  
 C  $A4 = 320E3$   
 NOTE MAN-MADE FOREST PRODUCTION  
 A  $MMFPR.K = RDFMM.K * (A5 * MMFA.K)$   
 NOTE MMFPR=TOTAL OUTPUT OF MAN-MADE FOREST PRODUCTION (RUPIAH)

A  $RDFMM.K = RDFRM4.K$   
 NOTE RDFMM=REDUCTION FACTOR IN SOIL FERTILITY IN  
 MAN-MADE FOREST IS ASSUMED THE SAME AS IN RMA4  
 NOTE MMFA=MAN-MADE FOREST AREA (HA)  
 NOTE A5=OUTPUT OF MAN-MADE FOREST PRODUCTION PER HA  
 (RUPIAH/HA)  
 C  $A5 = 955E3$   
 NOTE FOOD IMPORT  
 A  $FIM.K = LDPRNB.K + FODM.K$   
 NOTE FIM=FOOD IMPORT (RUPIAH)  
 NOTE LDPRNB=LADANG PRODUCTION OF NON BADUY AREA  
 (RUPIAH)  
 NOTE FODM=FOOD BUYING IN THE MARKET (RUPIAH)  
 A  $LDPRNB.K = A6 * (A1 * LDANBA.K) * RDFLD.K$   
 NOTE A6=COEFFICIENT OF LAND RENT IN NON BADUY AREA  
 NOTE LDANBA=LADANG NON BADUY AREA (HA)  
 NOTE RDFLD=REDUCTION FACTOR DUE TO STATE IN SOIL  
 FERTILITY OF LADANG OF NON BADUY  
 C  $A6 = 0.20$   
 A  $LDANBA.K = A7 * MO.K$   
 NOTE LDANBA=LADANG IN NON BADUY AREA (HA)  
 NOTE A7=COEFFICIENT OF LADANG AREA AT NON BADUY/PERSON  
 NOTE MO=OUT MIGRATION (OUT MIGRATION/YEAR/PERSON)  
 C  $A7 = 0.16$   
 A  $FODM.K = A8 * CSHINC.K$   
 NOTE FODM=FOOD BUYING IN THE MARKET (RUPIAH)  
 NOTE A8=COEFFICIENT OF FOOD BUYING IN THE MARKET  
 NOTE CSHINC=CASH INCOME (RUPIAH)  
 C  $A8 = 0.05$   
 A  $CSHINC.K = OFFARM.K + FEX.K$   
 NOTE OFFARM=OFFARM INCOME (RUPIAH)  
 NOTE FEX=FOOD EXPORT (RUPIAH)  
 A  $OFFARM.K = CLIP(PLUS2.K, 0, PLUS2.K, 0)$   
 A  $PLUS2.K = BASICN * POP.K - TAGP.K$   
 NOTE PLUS2=SURPLUS OF TOTAL AGRICULTURAL PRODUCTION AND  
 OFF-FARM WILL BE ZERO  
 C  $BASICN = 60E3$   
 NOTE BASICN=BASIC NEED OF THE PEOPLE (RUPIAH/PERSON)  
 NOTE POP=POPULATION  
 NOTE TAGP=TOTAL AGRICULTURAL PRODUCTION (RUPIAH)  
 A  $TAGP.K = LDPRNB.K + LDPR.K$   
 NOTE LDPRNB=LADANG PRODUCTION OF NON BADUY ARE (RUPIAH)  
 NOTE LDPR=LADANG PRODUCTION OF BADUY AREA (RUPIAH)  
 A  $FCNS.K = A9 * POP.K$   
 NOTE FCNS=FOOD CONSUMPTION OR FOOD REQUIREMENT (RUPIAH)  
 NOTE A9=COEFFICIENT OF FOOD REQUIREMENT/PERSON  
 NOTE POP=POPULATION (PEOPLE)  
 C  $A9 = 56E3$   
 A  $FEX.K = A10 * TAGP.K$   
 NOTE FEX=FOOD EXPORT (RUPIAH)  
 NOTE A10=COEFFICIENT OF FOOD EXPORT (RUPIAH)  
 NOTE TAGP=TOTAL AGRICULTURAL PRODUCTION (RUPIAH)



C A10=0.05  
 A LOSS.K=A11\*TAGP.K  
 NOTE LOSS=LOSS OF FOOD (RUPIAH)  
 NOTE A11=COEFFICIENT OF FOOD LOSS  
 C A11=0.05  
 \*LAND USE SECTOR\*  
 NOTE LADANG AREA  
 L LDA.K=LDA.J+DT\*(INLD.JK-OUTLD.JK) LADANG AREA  
 R INLD.KL=RMC.K  
 R OUTLD.KL=INRML.K+INMNL.K+INMML.K  
 N LDA=ILDA  
 C ILDA=736  
 NOTE LDA=LADANG AREA (HA)  
 NOTE RMC=REUMA4 CUTTING CONVERTED INTO LADANG AREA FRACT.(HA)  
 NOTE REUMA4=REUMA OF FALLOW TIME 4 YEARS (HA)  
 NOTE INRML=INPUT OF REUMA1 FRACTION DERIVED FROM LADANG OUTPUT FRACTION (HA)  
 NOTE INMNL=INPUT OF MONOGARDEN FRACTION DERIVED FROM OUTPUT OF LADANG FRACTION (HA)  
 NOTE INMML=INPUT OF MAN-MADE FOREST FRACTION DERIVED FROM OUTPUT OF LADANG FRACTION (HA)  
 NOTE ILDA=INITIAL OF LADANG AREA (HA)  
 A RMCR.K=0.16\*POP.K LADANG PER PERSON IS 0.16 HA  
 A RMC.K=CLIP(RMCR.K,MAXLDA.K,MAXLDA.K,RMCR.K)  
 A MAXLDA.K=RMA4.K  
 NOTE CONSTRAINING CUTTING ONLY AVAILABLE RMA4 AND RMA3  
 NOTE RMCR=REUMA CUTTING REQUIREMENT  
 NOTE POP=POPULATION (PEOPLE)  
 A INRML.K=B2\*LDA.K  
 NOTE B2=COEFFICIENT OF INPUT OF REUMA1 FRACTION DERIVED FROM OUTPUT OF LADANG FRACTION  
 C B2=0.50  
 A INMNL.K=B3\*LDA.K  
 NOTE B3=50 PER CENT OF LADANG GO TO MONOGARDEN  
 C B3=0.49  
 A INMML.K=B4\*LDA.K  
 NOTE INMML=INPUT OF MAN-MADE FOREST FRACTION DERIVED FROM OUTPUT LADANG FRACTION (HA)  
 NOTE B4=COEFFICIENT OF INPUT OF MAN-MADE FOREST FRACTION DERIVED FROM OUTPUT OF LADANG FRACTION  
 C B4=0.01  
 NOTE REUMA OF FALLOW TIME ONE YEAR  
 L RMA1.K=RMA1.J+DT\*(INRM1.JK-OUTRM1.JK) REUMA FALL.ONE YEAR  
 R INRM1.KL=INRML.K+OUMNGD.KL  
 R OUTRM1.KL=RMA1.K  
 NOTE RMA1=REUMA OF FALLOW TIME ONE YEAR (HA)  
 NOTE IRMA1=INITIAL OF REUMA1 (HA)  
 NOTE LDA=LADANG AREA (HA)  
 NOTE OUMNGD=OUTPUT OF MONOGARDEN FRACTION CONVERTED INTO NOTE EUMA1 FRACTION (HA)

N RMA1=IRMA1  
 C IRMA1=76  
 NOTE IRMA1=INITIAL OF REUMA OF FALLOW TIME ONE YEAR (HA)  
 R OUMNGD.KL=B5\*MNGDA.K  
 NOTE OUMNGD=OUTPUT OF MONOGARDEN FRACTION CONVERTED INTO REUMA1 FRACTION (HA)  
 NOTE MNGDA=MONOGARDEN AREA (HA)  
 NOTE B5=COEFFICIENT OF OUTPUT OF MONOGARDEN FRACTION CONVERTED INTO REUMA1 FRACTION  
 C B5=0.69  
 NOTE REUMA OF FALLOW TIME TWO YEAR (HA)  
 L RMA2.K=RMA2.J+DT\*(INRM2.JK-OUTRM2.JK) REUMA OF FALLOW 2 YEARS  
 R INRM2.KL=OUTRM1.KL  
 R OUTRM2.KL=RMA2.K  
 NOTE RMA2=REUMA OF FALLOW TIME TWO YEARS (HA)  
 NOTE OUTRM1=OUTPUT OF REUMA1 FRACTION (HA)  
 NOTE IRMA2=INITIAL OF REUMA2 (HA)  
 N RMA2=IRMA2  
 C IRMA2=76  
 NOTE IRMA2=INITIAL OF REUMA OF FALLOW TIME TWO YEARS  
 NOTE REUMA OF FALLOW TIME THREE YEARS  
 L RMA3.K=RMA3.J+DT\*(INRM3.JK-OUTRM3.JK) REUMA OF FALLOW 3 YEARS  
 R INRM3.KL=OUTRM2.KL  
 R OUTRM3.KL=RMA3.K  
 NOTE RMA3=REUMA OF FALLOW TIME THREE YEARS (HA)  
 NOTE INRM3=INPUT OF REUMA3 (HA)  
 NOTE OUTRM3=OUTPUT OF REUMA3 (HA)  
 N RMA3=IRMA3  
 C IRMA3=76  
 NOTE IRMA3=INITIAL OF REUMA OF FALLOW TIME THREE YEARS (HA)  
 NOTE REUMA OF FALLOW TIME FOUR YEAR  
 L RMA4.K=RMA4.J+DT\*(INRM4.JK-OUTRM4.JK) REUMA OF FALLOW TIME 4 YEARS  
 R INRM4.KL=OUTRM3.KL  
 R OUTRM4.KL=INLD.KL  
 NOTE RMA4=REUMA AREA OF FALLOW TIME 4 YEARS (HA)  
 NOTE INRM4=INPUT OF REUMA4 (HA)  
 NOTE OUTRM4=OUTPUT OF REUMA4 (HA)  
 NOTE OUTRM3=OUTPUT OF REUMA3 (HA)  
 NOTE INLD=INPUT OF LADANG AREA (HA)  
 N RMA4=IRMA4  
 C IRMA4=1536  
 NOTE IRMA4=INITIAL OF REUMA AREA OF FALLOW TIME 4 YEARS (HA)  
 \*NOTE MONOGARDEN AREA\*  
 L MNGDA.K=MNGDA.J+DT\*(INMN.JK-OUTMN.JK) MONOGARDEN AREA  
 R INMN.KL=INMNL.K

R  $OUTMN.KL=INMXM.KL+OUMNM.KL+OUMNGD.KL$   
 NOTE MNGDA=MONOGARDEN AREA (HA)  
 NOTE INMXM=INPUT OF MIXED-GARDEN FRACTION DERIVED FROM OUTPUT  
 NOTE MONOGARDEN FRACTION (HA)  
 NOTE OUMNGD=OUTPUT OF MONOGARDEN FRACTION CONVERTED INTO REUMA1 FRACTION (HA)  
 NOTE OUMNM=OUTPUT OF MONOGARDEN FRACTION CONVERTED INTO MAN-MADE FOREST FRACTION (HA)  
 N MNGDA=IMNGDA  
 C IMNGDA=107  
 NOTE IMNGDA=INTIAL OF MONOGARDEN AREA (HA)  
 R  $INMXM.KL=B6*MNGDA.K$   
 NOTE B6=COEFFICIENT OF INPUT OF MIXED GARDEN FRACTION DERIVED FROM OUTPUT OF MONOGARDEN FRACTION  
 C B6=0.30  
 R  $OUMNM.KL=B7*MNGDA.K$   
 NOTE B7=COEFFICIENT OF OUTPUT OF MONOGARDEN CONVERTED INTO MAN-MADE FOREST AREA  
 C B7=0.01  
 NOTE MMFA=MAN-MADE FOREST AREA (HA)  
 NOTE MIXED GARDEN AREA  
 L  $MXGDA.K=MXGDA.J+DT*(INMXGD.JK-OUTMXGD.JK)$  MIXED GARDEN AREA  
 R  $INMXGD.KL=INMXM.KL$   
 R  $OUTMXGD.KL=OUMXM.K$   
 NOTE MXGDA=MIXED-GARDEN AREA (HA)  
 NOTE INMXM=INPUT OF MIXED GARDEN FRACTION DERIVED FROM OUTPUT OF MONOGARDEN FRACTION (HA)  
 NOTE OUMXM=OUTPUT OF MIXED GARDEN CONVERTED INTO MAN-MADE FOREST FRACTION (HA)  
 N MXGDA=IMXGDA  
 C IMXGDA=50  
 NOTE IMXGDA=INITIAL OF MIXED GARDEN AREA (HA)  
 A  $OUMXM.K=B8*MXGDA.K$   
 NOTE B8=COEFFICIENT OF OUTPUT OF MIXED-GARDEN CONVERTED INTO MAN-MADE FOREST FRACTION  
 C B8=0.01  
 NOTE MAN-MADE FOREST AREA  
 L  $MMFA.K=MMFA.J+DT*(INMMF.JK-OUTMMF.JK)$  MAN-MADE FOREST AREA  
 R  $INMMF.KL=INMML.K+OUMNM.KL+OUMXM.K$   
 R  $OUTMMF.KL=TRNS.K$   
 NOTE INMML=INPUT OF MAN-MADE FOREST AREA FRACTION DERIVED FROM OUTPUT OF LADANG FRACTION (HA)  
 NOTE OUMMR1=OUTPUT OF REUMA1 FRACTION CONVERTED INTO MMFA FRAC.(HA)  
 NOTE OUMNM=OUTPUT OF MONO.GARD.FRACTION CONVERTED INTO MMFA FRAC.(HA)  
 NOTE OUMXM=OUTPUT OF MIXED-GARD.FRACTION CONVERTED INTO MMFA FRAC.(HA)  
 NOTE TRNS=ABANDONED AREA DUE TO TRANSMIGRATION (HA)

N MMFA=IMMFA  
 C IMMFA=25  
 NOTE IMMFA=INITIAL OF MAN-MADE FOREST AREA (HA)  
 A TRNS.K=B9\*MMFA.K  
 NOTE B9=COEFFICIENT OF ABANDONED AREA DUE TO  
 TRANSMIGRATION  
 C B9=0  
 NOTE MMFA=MAN-MADE FOREST AREA (HA)  
 \*SOIL FERTILITY\*  
 NOTE SOIL FERTILITY OF LADANG-REUMA PHASE  
 L SFRT0.K=SFRT0.J+DT\*(INFERO.JK-OUTFERO.JK)  
 R INFERO.KL=0.5\*SFRT4.K  
 R OUTFERO.KL=SFRT0.K  
 A SFRT1.K=1.25\*SFRT0.K  
 A SFRT2.K=1.15\*SFRT1.K  
 A SFRT3.K=1.15\*SFRT2.K  
 A SFRT4.K=1.15\*SFRT3.K  
 N SFRT0=ISFRT0  
 C ISFRT0=950  
 N SFRT1=ISFRT1  
 C ISFRT1=1194  
 N SFRT2=ISFRT2  
 C ISFRT2=1330  
 N SFRT3=ISFRT3  
 C ISFRT3=1520  
 N SFRT4=ISFRT4  
 C ISFRT4=1900

CONTROL STATEMENT

SAVE POP, BR, MI, DR, MO, FOD, AGP, FIM, FCNS, FEX, LOSS,  
 LDA, INLD, OUTLD, RMA1, INRM1, OUTRM1, RMA2, INRM2, OUTRM2,  
 RMA3, INRM3, OUTRM3, RMA4, INRM4, OUTRM4, MNGDA, INMN, OUTMN, MXGDA,  
 INMXGD, OUTMXGD, MMFA, INMMF, OUTMMF, SURPLUS1, IBR,  
 IDR, SFRT1, SFRT2, SFRT3, SFRT4, SFRT0, RMCR, RMC,  
 TAGP, OFFARM, PLUS2, RDFLD, RDFRM1, RDFRM2, RDFRM3, RDFRM4  
 SPEC DT=1/LENGTH=50/SAVPER=1

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่  
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Appendix 3. The variable description used in the model

SYMBOL	DESCRIPTION	UNIT	VALUE
FOOD	food	rupiah/yaer	442,000,000
LDA	ladang area	hectare/year	736
MMFA	man-made forest area	hectare/year	25
MNGDA	monogarden area	hectare/year	107
POP	population	people/year	4,600
RMA1	reuma, fallow time 1 year	hectare/year	76
RMA2	reuma, fallow time 2 years	hectare/year	76
RMA3	reuma, fallow time 3 years	hectare/year	76
RMA4	reuma, fallow time 4 years	hectare/year	1,536
SFRT0	soil fertility after fallow zero year	kg rice/year	950
SFRT1	soil fertility after fallow one year	kg rice/year	1,194
SFRT2	soil fertility after fallow two years	kg rice/year	1,330
SFRT3	soil fertility after fallow three years	kg rice/year	1,520
SFRT4	soil fertility after fallow four years	kg rice/year	1,900
BRF	birth rate fraction	per cent of population/yr	3.7
DRF	death rate fraction	per cent of population/yr	1.3
MIF	in-migration rate	per cent of population/yr	5
MOF	out-migration	per cent of population/yr	5
A1	ladang output	rupiah/ha/yr	347,000
A2	reumal ouput	rupiah/ha/yr	412,000
A3	monogarden output	rupiah/ha/yr	319,000
A4	mixed-garden ouput	rupiah/ha/yr	320,000
A5	man-made forest output	rupiah/ha/yr	955,000
A6	land rent in non Baduy area	per cent of total product	20
A7	ladang non Baduy area	ha/family	0.16
A8	food buying	per cent of cash income	5
A9	food requirement per person	rupiah/person	56,000
A10	food export	per cent of total agric. production	5
A11	food loss	per cent of total agric. production	5
B2	input into reumal from ladang area	per cent of ladang area	50

B3	input into monogarden from ladang area	per cent of ladang area	49
B4	input into man-made forest from ladang area	per cent of ladang area	1
B5	input into reuma1 from monogarden area	per cent of monogarden area	69
B6	input into mixed-garden from monogarden area	per cent of monogarden area	30
B7	input into man-made forest from monogarden area	per cent of monogarden area	1
B8	input into man-made forest from mixed-garden area	per cent of mixed-garden area	1
B9	abandoned settlement area due to transmigration	per cent of man-made forest	0
E1	reduction of reuma3 output due to natural vegetation competition	per cent of reuma3 output	30
E2	reduction of reuma4 output due to natural vegetation competition	per cent of reuma4 output	20
X1	response in birth rate due to food surplus	per cent of food surplus	0.1
X2	response in in-migration rate	per cent of food surplus	0.1
X3	response in death rate due to food deficit	per cent of food surplus	0.1
X4	response in out-migration rate	per cent of food surplus	0.1

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**Appendix 4 Base run data of simulation of Baduy's shifting cultivation model, West Java, Indonesia**

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	8461.8	14.51e3	16.07e3	10.51e3	-1107.7
FOD	442.e6	3425.e6	1644.e6	-3793.e6	9342.e6	-11.e9
LDA	736.	246.61	137.32	150.18	145.12	31.628
MNGDA	107.	51.085	106.46	111.34	85.15	55.008
MXGDA	50.	713.08	1088.5	1297.7	1402.5	1437.3
MMFA	25.	131.02	266.45	418.04	577.05	737.02
RMA1	76.	171.68	234.02	204.56	141.49	88.346
RMA2	76.	388.74	326.	211.46	122.79	76.895
RMA3	76.	521.98	313.47	164.98	100.24	78.054
RMA4	1536.	457.8	209.75	123.7	107.68	177.72
SFRT0	950.	572.08	344.5	207.46	124.93	75.231
SFRT1	1187.5	715.1	430.63	259.32	156.16	94.039
SFRT2	1365.6	822.37	495.22	298.22	179.59	108.15
SFRT3	1570.5	945.72	569.51	342.95	206.52	124.37
SFRT4	1806.	1087.6	654.93	394.4	237.5	143.02
BR	182.38	508.04	591.7	594.73	389.03	-763.9
DR	73.6	135.39	232.1	391.26	451.96	-17.724
MI	246.46	686.55	799.6	803.68	525.72	-1032.3
MO	230.	423.09	725.31	1222.7	1412.4	-55.387
OFFARM	30.81e6	456.e6	851.2e6	950.8e6	622.6e6	0.

Appendix 5 Alternative run: BRF=0.020

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	7047.	11.44e3	13.05e3	9582.3	2082.7
FOD	442.e6	3703.e6	3106.e6	-649.8e6	-5002.e6	-7091.e6
LDA	736.	246.61	139.1	150.8	144.99	113.27
MNGDA	107.	53.306	107.	111.1	84.91	54.93
MXGDA	50.	712.44	1088.1	1297.6	1402.5	1437.4
MMFA	25.	130.97	266.36	417.95	576.97	736.95
RMA1	76.	174.68	233.99	203.97	141.17	88.314
RMA2	76.	387.56	324.57	210.88	122.8	77.076
RMA3	76.	518.63	312.63	165.15	100.64	78.264
RMA4	1536.	457.8	210.27	124.56	108.04	95.842
BR	98.586	259.09	316.81	261.09	191.65	41.654
DR	73.6	112.75	182.99	248.33	311.57	239.26
MI	246.46	647.74	792.02	652.74	479.11	104.14
MO	230.	352.35	571.85	776.03	973.65	747.69
OFFARM	30.81e6	371.6e6	667.4e6	770.6e6	567.3e6	121.4e6

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Appendix 6 Alternative run: X1=X2=X3=X4=0

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	5662.6	6970.6	8580.8	10.56e3	13.e3
FOD	442.e6	3854.e6	4759.e6	3582.e6	537.2e6	-4314.e6
LDA	736.	246.61	137.93	150.4	145.08	113.42
MNGDA	107.	51.844	106.65	111.26	85.068	54.981
MXGDA	50.	712.86	1088.4	1297.7	1402.5	1437.3
MMFA	25.	131.	266.42	418.01	577.02	737.
RMA1	76.	172.7	234.01	204.36	141.38	88.335
RMA2	76.	388.34	325.51	211.26	122.79	76.957
RMA3	76.	520.84	313.18	165.04	100.37	78.126
RMA4	1536.	457.8	209.92	124.	107.8	95.847
BR	170.2	209.52	257.91	317.49	390.83	481.11
DR	73.6	90.601	111.53	137.29	169.01	208.05
MI	230.	283.13	348.53	429.04	528.15	650.15
MO	230.	283.13	348.53	429.04	528.15	650.15
OFFARM	30.81e6	289.e6	400.4e6	503.e6	626.8e6	776.7e6

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Appendix 7 Alternative run: SFRT1=1.31 x SFRT0

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	9261.	20.31e3	31.19e3	35.02e3	30.03e3
FOD	442.e6	5082.e6	6372.e6	2349.e6	-5090.e6	-11.75e9
LDA	736.	246.61	137.32	150.18	145.12	113.5
MNGDA	107.	51.085	106.46	111.34	85.15	55.008
MXGDA	50.	713.08	1088.5	1297.7	1402.5	1437.3
MMFA	25.	131.02	266.45	418.04	577.05	737.02
RMA1	76.	171.68	234.02	204.56	141.49	88.346
RMA2	76.	388.74	326.	211.46	122.79	76.895
RMA3	76.	521.98	313.47	164.98	100.24	78.054
RMA4	1536.	457.8	209.75	123.7	107.68	95.849
BR	182.38	644.2	1097.4	1193.7	1295.9	1111.1
DR	73.6	148.18	325.	498.96	761.85	864.17
MI	246.46	870.53	1483.	1613.1	1751.2	1501.5
MO	230.	463.05	1015.6	1559.3	2380.8	2700.5
OFFARM	19.04e6	468.7e6	1164.e6	1809.e6	2036.e6	1745.e6

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Appendix 8 Aternative run: MOF=0

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	11.95e3	25.42e3	46.77e3	80.38e3	131.1e3
FOD	442.e6	2709.e6	-2447.e6	-17.69e9	-47.91e9	-100.4e9
LDA	736.	246.61	132.43	148.48	145.47	114.11
MNGDA	107.	44.988	104.98	112.01	85.809	55.221
MXGDA	50.	714.83	1089.8	1298.1	1402.5	1437.3
MMFA	25.	131.16	266.69	418.28	577.27	737.24
RMA1	76.	163.44	234.11	206.17	142.38	88.432
RMA2	76.	391.98	329.92	213.06	122.76	76.399
RMA3	76.	531.18	315.77	164.52	99.13	77.477
RMA4	1536.	457.8	208.33	121.35	106.67	95.87
BR	182.38	577.07	940.53	1730.4	2974.2	4848.9
DR	73.6	191.26	517.31	1328.4	2783.6	5175.9
MI	246.46	779.83	1271.	2338.3	4019.2	6552.6
MO	0.	0.	0.	0.	0.	0.
OFFARM	33.24e6	668.2e6	1509.e6	2795.e6	4817.e6	7860.e6

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Appendix 9 Alternative run:MIF=0

TIME	1985	1995	2005	2015	2025	2035
POP	4600.	4620.6	6193.4	7523.1	7629.8	6346.7
FOD	442.e6	4197.e6	5600.e6	4847.e6	2728.e6	239.7e6
LDA	736.	246.61	142.56	152.01	144.75	112.84
MNGDA	107.	57.618	108.05	110.62	84.443	54.779
MXGDA	50.	711.2	1087.2	1297.3	1402.5	1437.4
MMFA	25.	130.87	266.19	417.78	576.81	736.79
RMA1	76.	180.5	233.93	202.83	140.54	88.253
RMA2	76.	385.27	321.8	209.75	122.81	77.427
RMA3	76.	512.13	311.01	165.48	101.42	78.672
RMA4	1536.	457.8	211.27	126.22	108.76	95.827
BR	182.38	431.17	576.27	570.79	434.28	234.83
DR	73.6	73.929	99.094	120.37	122.08	104.85
MI	0.	0.	0.	0.	0.	0.
MO	230.	231.03	309.67	376.15	381.49	327.67
OFFARM	30.81e6	226.8e6	353.4e6	439.6e6	451.e6	377.6e6

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## Curriculum Vitae

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