Appendix 4
List of Output Acronyms and Definition

No.	Acronym	Definition
1.	AF	"Agroforestry Zone" – overall design on the system
2.	B	Balance (carbon=BC, nutrient=BN, BS=Soil or water=BW)
3.	C	Crop (C = Crop, C_N = Crop Nutrient or CW = Crop Water)
4.	E	Erosion
5.	Light	Light
6.	P	Profitability (economic sector of the model)
7.	Rain	Rain
8.	T	Tree (T = Tree, T_N = Tree Nutrient or TW = Tree Water)
9.	TF	Oil Palm

No	Acronym	Definition	Units	Location
1.	AF_DepthLay1	Initial soil thickness in layer 1	m	Soil Balance
2.	B_T_HarvCum [DW,Tree]	Cumulative biomass harvested from each type of tree	kg m^{-2}	Yield
3.	BC_CO2FromBurn	Cumulative amount of carbon released into air from burning event	g m^{-2}	Carbon Balance
4.	BC_CPhotosynth	Amount of carbon produced by crop through photosynthesis	g m^{-2}	Carbon Balance
5.	BC_CRespforFix	Amount of carbon released by crop due to respiration needed for N fixation	g m^{-2}	Carbon Balance
6.	BC_Crop	Amount of carbon currently presence as crop biomass	g m^{-2}	Carbon Balance
7.	BC_CropInit	Initial amount of carbon presence as crop biomass	g m^{-2}	Carbon Balance
8.	BC_ExtOrgInput	Amount of carbon in external organic input eg. mulch	g m^{-2}	Carbon Balance

No	Acronym	Definition	Units	Location
9.	BC_CStockInit	Initial amount of carbon in soil organic matter and surface litter pools and tree	g m^{-2}	Carbon Balance
10.	BC_CurrentCStock	Current amount of carbon in soil organic matter, surface litter pools, tree, crop, necromass and weed	g m^{-2}	Carbon Balance
11.	BC_ExtOrgInput	Amount of carbon in external organic input eg. mulch	g m^{-2}	Carbon Balance
12.	BC_GWEffectCO2	Net global warming effect in g CO_2 equivalent per m^2 over duration of the simulation	g m^{-2}	Carbon Balance
13.	BC_HarvestedC	Amount of carbon in harvested crop/yield (average over total field length)	g m^{-2}	Carbon Balance
14.	BC_HarvestedT	Amount of carbon in harvested component of tree	g m^{-2}	Carbon Balance
15.	BC_Inflows	Total amount of carbon entered the systems through tree and crop photosynthesis, initial tree and crop biomass and weed	g m^{-2}	Carbon Balance
16.	BC_NecromassC	Amount of carbon as necromass	g m^{-2}	Carbon Balance
17.	BC_NetBal	Balance value for carbon. It is used to check model calculation and should be (virtually) 0	g m^{-2}	Carbon Balance
18.	BC_Outflows	Current amount of carbon losses from the system through crop harvested, component of tree harvested and carbon respired	g m^{-2}	Carbon Balance
19.	BC_SOM	Current amount of carbon in soil organic matter and surface litter pools	g m^{-2}	Carbon Balance Graph Overall (16)
20.	BC_SOMInit	Initial amount of carbon in soil organic matter and surface litter pools	g m^{-2}	Carbon Balance
21.	BC_TimeAvgCStock	Total amount of carbon in the whole system averaged over the simulation period	g m^{-2}	Carbon Balance
22.	BC_TotalRespired	Total carbon respired	g m^{-2}	Carbon Balance
23.	BC_Tphotosynth	Amount of carbon produced by tree through photosynthesis	g m^{-2}	Carbon Balance
24.	BC_Tree	Current amount of carbon in tree biomass	g m^{-2}	Carbon Balance

No	Acronym	Definition	Units	Location
25.	BC_TreeInitTot	Total amount of carbon initialized as tree biomass	g m^{-2}	Carbon Balance
26.	BC_TRespforFix	Amount of carbon released by crop resulted from respiration for N fixation	g m^{-2}	Carbon Balance
27.	BC_Weed	Amount of carbon currently presence as weed	g m^{-2}	Carbon Balance
28.	BC_WeedSeeds	Amount of carbon as seeds of weed	g m^{-2}	Carbon Balance
29.	BN_CBiomInit [SINut]	Initial amount of nutrient in crop biomass	g m^{-2}	N Balance, P Balance
30.	BN_CHarvCum [SINut]	Amount of nutrient in harvested crop/yield (average over whole field)	g m^{-2}	N Balance, P Balance
31.	BN_CNdfaFrac	Fraction of N derived from fixation by all crop	dimen-sionless	Yield
32.	BN_CNFixCum	Total amount of N fixed by crop	g m^{-2}	N Balance
33.	BN_CropBiom [SINut]	Current amount of nutrient (N or P) in crop biomass (average over total field length)	g m^{-2}	Graph Overall (8 – 9)
34.	BN_CropBiom [SINut]	Current amount of nutrient in tree biomass	g m^{-2}	N Balance, P Balance, Graph Overall, (8 – 9)
35.	BN_CUptTot [SINut]	Total amount of nutrient taken up by crop (average over total field length)	g m^{-2}	Graph Overall, (7)
36.	BN_EffluxTot [SINut]	Current amount of nutrient loss from the system through crop harvested, leaching, surface run off, etc	g m^{-2}	N Balance
37.	BN_ExtOrgInputs [SINut]	Total amount of nutrient entered the system from external organic input	g m^{-2}	N Balance, P Balance
38.	BN_FertCum [SINut]	Cumulative amount of fertilizer input (average over total field length)	g m^{-2}	N Balance, P Balance
39.	BN_Immob[SINut]	Current amount of nutrient in immobile pool	g m^{-2}	N Balance, P Balance
40.	BN_ImmPool [SINut]	Initial amount nutrient in immobile pool	g m^{-2}	N Balance, P Balance
41.	BN_InfluxTot [SINut]	Total amount of nutrient entered the system from initial crop biomass, fertilizer, external organic input, etc	g m^{-2}	N Balance
42.	BN_LatInCum [SINut]	Nutrient input due to lateral flow	g m^{-2}	N Balance, P Balance

No	Acronym	Definition	Units	Location
43.	BN_LatOutCum [SlNut]	Amount nutrient flows out due to lateral flow	g m^{-2}	N Balance, P Balance
44.	BN_LeachingTot [SlNut]	Total amount of nutrient leached out from bottom layers (average over total field length)	g m^{-2}	N Balance, P Balance
45.	BN_Lit[SlNut]	Current amount of nutrient in litter layer	g m^{-2}	N Balance, P Balance
46.	BN_LitInit[SlNut]	Initial amount of nutrient in litter layer	g m^{-2}	N Balance, P Balance
47.	BN_NetBal[SlNut]	Balance value for nutrient. It is used to check model calculation and should be (virtually) 0	g m^{-2}	N Balance, P Balance
48.	BN_NutVolatCum [SlNut]	Total amount of carbon volatilized from burnt necromass	g m^{-2}	N Balance, P Balance
49.	BN_SOM[SlNut]	Current amount of nutrient in soil organic matter pool	g m^{-2}	N Balance, P Balance, Graph Overall (16)
50.	BN_SOMInit[SlNut]	Initial amount of nutrient in soil organic matter pool	g m^{-2}	N Balance, P Balance
51.	BN_StockInit [SlNut]	Initial amount of nutrient (average over all zones and layers)	g m^{-2}	N Balance, P Balance
52.	BN_StockTotInit [SlNut]	Total amount of initial soil nutrient	g m^{-2}	N Balance, P Balance
53.	BN_StockTot [SlNut]	Currentl amount of nutrient in soil (average over all zones and layers)	g m^{-2}	N Balance, P Balance
54.	BN_THarvCumAll [SlNut]	Amount of nutrient in biomass harvested from tree (average over total field length)	g m^{-2}	N Balance, P Balance
55.	BN_TNdfaFrac	Fraction of N derived from fixation by tree	dimen-sionless	Yield
56.	BN_TNFixAmount Cum	Total amount of N fixed by crop	g m^{-2}	N Balance
57.	BN_TreeInit[SlNut]	Initial amount of nutrient in tree biomass	g m^{-2}	N Balance, P Balance
58.	BN_WeedBiom [SlNut]	Current amount of nutrient in weed biomass	g m^{-2}	N Balance, P Balance
59.	BN_WeedSeed Bank [SlNut]	Current amount of nutrient in seedbank	g m^{-2}	N Balance, P Balance
60.	BN_WeedSeedInit [SlNut]	Initial amount of nutrient in seedbank	g m^{-2}	N Balance, P Balance

No	Acronym	Definition	Units	Location
61.	BS_SoilCurr	Current amount of soil	kg m^{-2}	Soil Balance
62.	BS_SoilDelta	Overall balance of input and output of soil in the model. A value of 0 means that the model calculation is in balance.	kg m^{-2}	Soil Balance
63.	BS_SoilInflowcum	Total amount of soil inflow	kg m^{-2}	Soil Balance
64.	BS_SoilInit	Initial amount of soil	kg m^{-2}	Soil Balance
65.	BS_SoilLossCum	Total amount of soil loss	kg m^{-2}	Soil Balance
66.	BW_DrainCumV	Total amount of water draining (average over all zones and layers)	l m^{-2}	Water Balance
67.	BW_EvapCum	Total amount of water evaporates from soil surface (average over all zones and layers)	l m^{-2}	Water Balance
68.	BW_LatInCum	Amount of lateral inflow (subsurface) of water	l m^{-2}	Water Balance
69.	BW_LatOutCum	Amount of lateral outflow (subsurface) of water	l m^{-2}	Water Balance, Graph Overall (3)
70.	BW_NetBal	Overall balance of input and output of water in the model. A value of 0 means that the model calculation is in balance.	l m^{-2}	Water Balance, Graph Overall (10)
71.	BW_RunOffCum	Amount of (surface) run off water	l m^{-2}	Water Balance
72.	BW_RunOnCum	Amount of (surface) run on water	l m^{-2}	Water Balance
73.	BW_StockInit	Initial total amount of water in all layers and zones of soil	l m^{-2}	Water Balance
74.	BW_StockTot	Current total amount of water in soil profile	l m^{-2}	Water Balance
75.	BW_UptCCum	Cumulative amount of water uptake by crop	l m^{-2}	Water Balance, Graph Overall (6)
76.	BW_UptTCum [Tree]	Cumulative water uptake by each tree	l m^{-2}	Water Balance Graph Overall (6)
77.	C_AgronYields [Crop]	Agronomic yield for each type of crop	kg m^{-2}	Yield
78.	C_Biom[Zone,DW]	Current crop biomass in each zone (including canopy, storage, roots)	kg m^{-2}	Graph Overall (1), Graph Zone*i* (1)

No	Acronym	Definition	Units	Location
79.	C_BiomCan[Zone, DW]	Current crop canopy biomass in each zone	kg m^{-2}	Graph Overall (18)
80.	C_FracLim[LimFac]	Average value over the simulation for each limiting factor for crop growth, value between 0 and 1	-	Yield
81.	C_NDemand[Zone]	Amount of nutrient demanded by crop in each zone	kg m^{-2}	Graph Zone*i* (11 – 12)
82.	C_NPosGro [Zone,SlNut]	The effect of nutrient stress on crop growth (0=no growth, 1=no stress)	dimen-sionless	Graph Zone*i* (1)
83.	C_NUptPot[Zone]	Amount of nutrient available for crop uptake in each zone	g m^{-2}	Graph Zone*i* (11 – 12)
84.	C_NUptTot[Zone]	Amount of nutrient uptake by crop in each zone	g m^{-2} day^{-1}	Graph Zone*i* (11 – 12)
85.	Cent_BalTotal [SlNut]	Overall balance of input and output in mineralization module (adapted from CENTURY model). A value of 0 means that model calculations are in balance	g m^{-2}	N Balance, P Balance
86.	CW_PosGro[Zone]	The effect of water stress on crop growth in each zone (0=no growth, 1=no stress)	dimen-sionless	Graph Zone*i* (1)
87.	E_TopSoilDepthAct [Zone]	Current soil thickness in layer 1	m	Soil Balance
88.	GHG_CumCH4 Emission	Cumulative emission of CH_4	g m^{-2}	N Balance
89.	GHG_GWP_N2O& CH4	Global Warming Potential of the systems based on the emmsion of CH_4 and NO_2. It is expressed relative to CO_2	-	N Balance
90.	GHG_N2_Fraction	Fraction of N_2 emission	dimen-sionless	N Balance
91.	GHG_NO_Fraction	Fraction of NO emission	dimen-sionless	N Balance
92.	GHG_N2O_Fraction	Fraction of N_2O emission	dimen-sionless	N Balance
93.	Light_CRelCap [Zone]	Relative light capture by crop (on scale 0-1)	g m^{-2}	Graph Zone*i* (1)
94.	Light_CRelSupply [Zone]	Potential crop growth limited by light capture relative to the potential without presence of trees (1 = no limitation, 0 = no growth)	-	Light
95.	N_CumAtmInput [SlNut]	Amount of nutrient derived from atmospheric deposition	g m^{-2}	N Balance, P Balance

No	Acronym	Definition	Units	Location
96.	N_CUpt*i*[Zone, SlNut]	Amount of nutrient uptake by crop from *i*-th soil layer of each zone per day	g m^{-2} day^{-1}	Graph Zone*i* (7, 9)
97.	N_EdgeFFH[SlNut]	A value describing filter function horizontally at the edge of plot	dimen-sionless	Filter Function
98.	N_EdgeFFV[SlNut]	A value describing filter function vertically at the edge of plot	dimen-sionless	Filter Function
99.	N_LeachCumV [Zone,SlNut]	Total amount of nutrient leached out from bottom layer of each zone	g m^{-2}	Graph Overall (4 – 5)
100.	N_Leach*i*[Zone, SlNut]	Amount of nutrient leached out from *i*-th layer of each zone	g m^{-2}	Graph Zone*i* (13 – 14)
101.	N_LocFF3*i*[SlNut]	A value describing filter function in the 3rd layer of soil	dimen-sionless	Filter Function
102.	N_Stock*i*[Zone, SlNut]	Amount of nutrient stock in each zone of layer *i*	g m^{-2}	Graph Zone*i* (3, 4)
103.	N_TotFFTot[SlNut]	A value describing how the whole system function as a filter. Filter function defined as nutrient taken up by plant divided by total nutrient taken up and loss	dimen-sionless	Filter Function
104.	N_TUpt*i*[Zone, SlNut]	Amount of nutrient taken up by tree from *i*-th soil layer of each zone per day	g m^{-2} day^{-1}	Graph Zone*i* (8, 10)
105.	P_CCostAvg[Price]	Average cost of crop management	currency unit ha^{-1}	Economic & Financial Balance
106.	P_CReturnAvg [Price]	Amount of money contributed from crop production	currency unit ha^{-1}	Economic & Financial Balance, Yield
107.	P_CumLabUse	Total amount of labour use to manage the system	man days	Yield
108.	P_GeneralCost [Price]	Total cost needed to maintain the system	currency unit ha^{-1}	Economic & Financial Balance
109.	P_NPV[Price]	Net present value of the system	currency unit ha^{-1}	Economic & Financial Balance
110.	P_TCostTot[Price]	Total cost of crop management	currency unit ha^{-1}	Economic & Financial Balance
111.	P_TReturn[Price]	Amount of money contributed from tree production	currency unit ha^{-1}	Yield
112.	P_TReturnTot [Price]	Total amount of money contributed from tree production	currency unit ha^{-1}	Economic & Financial Balance, Yield

No	Acronym	Definition	Units	Location
113.	Rain	Amount of rain per day	l m^{-2} day^{-1}	Graph Overall (2)
114.	Rain_Cum	Cumulative amount of rainfall	l m^{-2}	Water Balance, Table 1 (1)
115.	Rain_In[Zone]	Actual amount of rain going into each zone	l m^{-2} day^{-1}	Graph Overall (2), Table 1 (1)
116.	Rain_IntercEvapCum	Amount of water evaporated from intercepted water	l m^{-2}	Water Balance
117.	T_Biom[Tree]	Current amount of biomass for each tree (above and belowground)	kg m^{-2}	Graph Overall (1)
118.	T_BiomCumTot	Total cumulative amount of tree biomass (including litterfall, rootdecay, harvested pruning)	kg m^{-2}	Yield
119.	T_CumLatexHarv[Tree]	Total latex harvested	kg m^{-2}	Yield
120.	T_FracLim[Tree,LimFrac]	Average value over the simulation for each limiting factor for tree growth, value between 0 and 1	dimensionless	Yield
121.	T_FruitHarvCum[Tree]	Total fruit harvested	kg m^{-2}	Yield
122.	T_GroRes[Tree]	Current amount of biomass in tree growth reserves	kg m^{-2}	Graph Overall (17)
123.	T_LAI[Tree]	Tree Leaf Area Index	dimensionless	Graph Tree Comp
124.	T_LfTwig[Tree]	Current amount of biomass in tree canopy	kg m^{-2}	Graph Overall (17, 18, 19)
125.	T_Light[Tree]	Fraction of light received by tree	dimensionless	Graph Overall (13 – 15)
126.	T_NBiom[SlNut, Tree]	Current amount of nutrient in tree aboveground biomass	g m^{-2}	N Balance, P Balance, Graph Overall (8 – 9)
127.	T_NDemandAll[SlNut]	Amount of nutrient demanded by tree per day	g m^{-2} day^{-1}	Graph Overall (11 – 12)
128.	T_NfixCum[SlNut,Tree]	Cumulative amount of nutrient derived from fixation by tree	g m^{-2}	N Balance
129.	T_NPosgro[SlNut]	The effect of nutrient stress on tree growth (0=no growth, 1=no stress)	dimensionless	Graph Overall (13 – 15)
130.	T_NUptPotAll[SlNut]	Total amount of nutrient in all soil layers available for tree per day	g m^{-2} day^{-1}	Graph Overall (11 – 12)

No	Acronym	Definition	Units	Location
131.	T_NUptTotAll [SlNut]	Total amount of nutrient taken up by tree (average over total field length)	g m^{-2} day^{-1}	Graph Overall (7,11 – 12)
132.	T_Root[Tree]	Current amount of tree root biomass	kg m^{-2}	Graph Overall (17)
133.	T_StemDMax	Stem diameter of tree	m	Graph Overall (17)
134.	T_Wood	Current wood/stem biomass	kg m^{-2}	Graph Overall (17)
135.	T_WoodHarvCum [Tree]	Total timber/wood harvested	kg m^{-2}	Yield
136.	TF_BunchWeight [Tree,FruitBunch]	Total weight of oil palm fruit per fruit stages	kg m^{-2}	Graph OilPalm
137.	TF_CumFruitHarv [Tree]	Cumulative amount of oil palm fruit harvested	kg m^{-2}	Graph OilPalm
138.	TF_CumOilHarvest [Tree]	Cumulative amount of oil harvested	kg m^{-2}	Graph OilPalm
139.	TF_FemBunchFrac [Tree]	Fraction of female flowers/fruit	kg m^{-2}	Graph OilPalm
140.	TF_FruitperBunch [Tree, FruitBunch]	Number of oil palm fruit per fruit stages	kg m^{-2}	Graph OilPalm
141.	TF_WatNutSuff [Tree]	The effect of water and nutrient stress on the oilpalm growth	dimen-sionless	Graph OilPalm
142.	TW_DemandActAll	Amount of water demanded by all tree per day	l m^{-2} day^{-1}	Graph Overall (10)
143.	TW_Posgro[Tree]	The effect of water stress on tree growth (0=no growth, 1=no stress)	dimen-sionless	Graph Overall (10, 13 – 15)
144.	TW_UptPotAll	Total amount of water in all soil layers available for tree per day	l m^{-2} day^{-1}	Graph Overall (10)
145.	TW_UptTotAll	Current amount of water uptake by tree from all soil layers per day	l m^{-2} day^{-1}	Graph Overall (10)
146.	W_CUpt*i*[Zone]	Amount of water taken up by crop from *i*-th soil layer of each zone per day	l m^{-2} day^{-1}	Graph Zone*i* (5)
147.	W_DrainCumV [Zone]	Cumulative amount of water drained out from bottom layer	l m^{-2}	Graph Overall (3)
148.	W_Stock*i*[Zone]	Amount of water each zone in *i*-th soil layer	l m^{-2}	Graph Zone*i* (2)
149.	W_TUpt*i*[Zone]	Amount of water taken up by all tree from *i*-th soil layer of each zone per day	l m^{-2} day^{-1}	Graph Zone*i* (6)