



PBL Netherlands Environmental
Assessment Agency

Setting up a land use scenario and linking it with biodiversity

Part IV: Land use scenario training module

Scenario Planning Session
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By Wilbert van Rooij

Plansup, The Netherlands

In collaboration with the Netherlands Environmental Assessment Agency and Statistics Norway



Quantification of scenario and policy option information

This info is needed to calculate future land use map with the land use model

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Scenario information needs to be quantified for each factor that has an impact on land use change.

<u>Change in %</u>	<u>2011 – 2020</u>	<u>2021-2030</u>
■ Population growth
■ Consumption crops needed
■ Urban area growth
■ Intensive crop area
■ Extensive crop area
■ Export crops
■ Import crops
■ Plantation area
■ Protected area

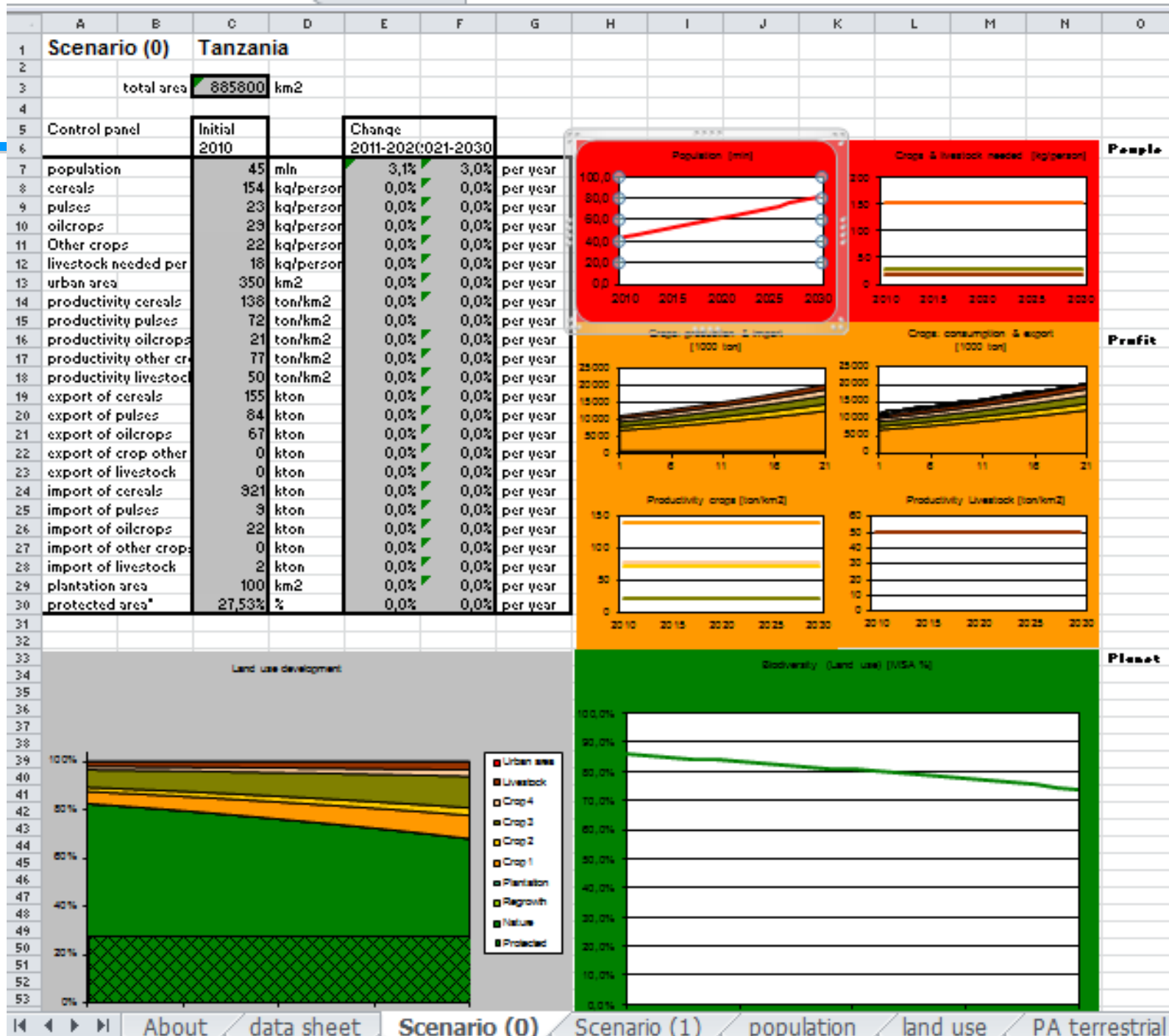
Scenario training table: Data for main scenario factors

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1	Country:	Tanzania																	
2	total area:	88580	1000 ha																
3	population:	44.841	mln																
4						Crop 1= cereals	5048500	ha											
5	Control panel		Initial			productivity	138	ton/km2											
6			2010				156	kg/person											
7	population		44,8	mln		domestic cons	154	kg/person											
8	cereals		154	kg/person		export	155	kton											
9	pulses		23	kg/person		import	921	kton											
10	oilcrops		29	kg/person															
11	Other crops		22	kg/person		Crop 2= pulses	1773000	ha											
12	livestock needed per person		18,25	kg/person			1272500	ton											
13	urban area		350	km2		productivity	72	ton/km2											
14	productivity cereals		138	ton/km2			28	kg/person											
15	productivity pulses		72	ton/km2		domestic consumpt	23	kg/person											
16	productivity oilcrops		21	ton/km2		export	84	kton											
17	productivity other crops		77	ton/km2		import	9	kton											
18	productivity livestock		50	ton/km2															
19	export of cereals		155	kton		Crop 3= oilcrops	1577400	ha											
20	export of pulses		84	kton			332934	ton											
21	export of oilcrops		67	kton		productivity	21	ton/km2											
22	export of crop other		0	kton			7	kg/person											
23	export of livestock		0	kton		domestic consumpt	29	kg/person											
24	import of cereals		921	kton		export	67	kton											
25	import of pulses		9	kton		import	22	kton											
26	import of oilcrops		22	kton															
27	import of other crops		0	kton		Other Crops		ha											
28	import of livestock		2	kton				ton											
29	plantation area		100	km2		productivity	77	ton/km2											
30	protected area*		27,53	%				kg/person											
31						domestic consumpt	22	kg/person											
32						export	0	kton											
33						import	0	kton											
34	* from WDPa national statistics table																		
35						Livestock		ha											
36								ton											

Item	Value	Unit	km2
Country area	94730	1000 Ha	947300
Agricultural area	35025	1000 Ha	350250
Forest area	34436,5	1000 Ha	344365
population 2010	44.841	million	
pa (terrestrial)	260808,29	km2	26080829,39
pa%	27,5		

	av2006-2009	2010	%av	2010%
Total (2006-2009)	94730000			
Arable (2006-2009)	9650000			
Permanent crops	1375000			ha
Permanent meadows	24000000			ha
Forest area	34436500			
Other land	19118500			
Inland water	6150000			
Total check	94730000			ha
Arable	cereals	4637736	5048500 ha	0,480594
	pulses	1456396	1773000 ha	0,150922
	oilcrops	2051769,8	1577400 ha	0,212619
	other crops	1504098	1251100 ha	0,155865
	total	9650000	9650000	1

Scenario table overview



Storyline And Simulation approach

1. People: Population, Crop and meat consumption
2. Profit: Export and import of crops and meat, crop and meat production
3. Landuse: Land area calculated based on demand and production parameters above
4. Planet: Average country MSA value based on MSA values per land use type

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
Year	Population [Mn]	Crop 1 need [Tons]	Crop 2 need [Tons]	Crop 3 need [Tons]	Crop 4 need [Tons]	Livestock porcops [Tons]	Total crop 1 production [Tons]	Total crop 2 production [Tons]	Total crop 3 production [Tons]	Total crop 4 production [Tons]	Total livestock production [Tons]	Export of crop 1 [Tons]	Export of crop 2 [Tons]	Export of crop 3 [Tons]	Export of crop 4 [Tons]	Export of livestock [Tons]	Import of crop 1 [Tons]	Import of crop 2 [Tons]	Import of crop 3 [Tons]	Import of crop 4 [Tons]	Import of livestock [Tons]	Local crop 1 production [Tons]	Local crop 2 production [Tons]	Local crop 3 production [Tons]	Local crop 4 production [Tons]	Local livestock production [Tons]	Productiv Crop 1 [Tons/M2]	Productiv Crop 2 [Tons/M2]	Productiv Crop 3 [Tons/M2]	Productiv Crop 4 [Tons/M2]	Productiv Livestock [Tons/M2]	
2010	44.8	154	23	29	22	18	6904	1043	1318	987	918	155,49175	64,3755	66,84825	0	0,475	921,1405	9,593	21,9425	0	2,319	6138	1119	1363	987	917	138,38524	17,17101	21,106479	77,097584	50	
2011	46.2	154	23	29	22	18	7120	1076	1359	1017	844	155	84	67	0	0	921	9	22	0	2	6355	1152	1404	1017	942	138	72	21	77	50	
2012	47.7	154	23	29	22	18	7344	1110	1402	1049	874	155	84	67	0	0	921	9	22	0	2	6578	1186	1447	1049	969	138	72	21	77	50	
2013	49.2	154	23	29	22	18	7574	1145	1446	1082	898	155	84	67	0	0	921	9	22	0	2	6809	1221	1491	1082	996	138	72	21	77	50	
2014	50.7	154	23	29	22	18	7812	1181	1492	1116	928	155	84	67	0	0	921	9	22	0	2	7047	1256	1536	1116	1024	138	72	21	77	50	
2015	52.3	154	23	29	22	18	8057	1219	1539	1151	955	155	84	67	0	0	921	9	22	0	2	7292	1294	1583	1151	1052	138	72	21	77	50	
2016	54.0	154	23	29	22	18	8310	1256	1587	1188	985	155	84	67	0	0	921	9	22	0	2	7545	1332	1632	1188	1083	138	72	21	77	50	
2017	55.7	154	23	29	22	18	8571	1295	1637	1225	1016	155	84	67	0	0	921	9	22	0	2	7806	1371	1681	1225	1104	138	72	21	77	50	
2018	57.4	154	23	29	22	18	8840	1336	1688	1263	1048	155	84	67	0	0	921	9	22	0	2	8075	1412	1733	1263	1126	138	72	21	77	50	
2019	59.2	154	23	29	22	18	9118	1378	1741	1303	1083	155	84	67	0	0	921	9	22	0	2	8352	1454	1786	1303	1149	138	72	21	77	50	
2020	61.1	154	23	29	22	18	9404	1421	1796	1340	1115	155	84	67	0	0	921	9	22	0	2	8638	1497	1840	1340	1173	138	72	21	77	50	
2021	62.9	154	23	29	22	18	9693	1463	1849	1384	1148	155	84	67	0	0	921	9	22	0	2	8919	1539	1894	1384	1194	138	72	21	77	50	
2022	64.8	154	23	29	22	18	9971	1507	1904	1425	1182	155	84	67	0	0	921	9	22	0	2	9205	1583	1949	1425	1219	138	72	21	77	50	
2023	66.7	154	23	29	22	18	10267	1552	1960	1467	1217	155	84	67	0	0	921	9	22	0	2	9501	1627	2005	1467	1245	138	72	21	77	50	
2024	68.7	154	23	29	22	18	10572	1598	2019	1511	1253	155	84	67	0	0	921	9	22	0	2	9806	1674	2063	1511	1271	138	72	21	77	50	
2025	70.7	154	23	29	22	18	10886	1645	2078	1556	1290	155	84	67	0	0	921	9	22	0	2	10120	1721	2123	1556	1299	138	72	21	77	50	
2026	72.8	154	23	29	22	18	11209	1694	2140	1602	1328	155	84	67	0	0	921	9	22	0	2	10444	1770	2185	1602	1327	138	72	21	77	50	
2027	75.0	154	23	29	22	18	11542	1744	2204	1649	1368	155	84	67	0	0	921	9	22	0	2	10777	1820	2249	1649	1364	138	72	21	77	50	
2028	77.2	154	23	29	22	18	11885	1796	2274	1698	1409	155	84	67	0	0	921	9	22	0	2	11120	1872	2314	1698	1407	138	72	21	77	50	
2029	79.5	154	23	29	22	18	12238	1850	2337	1749	1455	155	84	67	0	0	921	9	22	0	2	11473	1925	2382	1749	1449	138	72	21	77	50	
2030	81.9	154	23	29	22	18	12602	1905	2406	1801	1494	155	84	67	0	0	921	9	22	0	2	11836	1980	2451	1801	1492	138	72	21	77	50	

Year	MSA	Re-growth [km2]	Plantation 20%	Crop 1 [km2]	Crop 2 [km2]	Crop 3 [km2]	Crop 4 [km2]	Livestock 45%	Urban area 4%	Total area [km2]	Planet [km2]	Re-growth [km2]	Plantation [km2]	Crop 1 [km2]	Crop 2 [km2]	Crop 3 [km2]	Crop 4 [km2]	Livestock [km2]	Urban area [km2]					
2010	243888	487810	0	100	44255	15593	64576	12797	16320	350	885800	27,5%	85,7%	2010	27,5%	55,1%	0,0%	0,0%	5,0%	1,8%	7,3%	1,4%	1,9%	0,0%
2011	243888	492912	0	100	45921	16050	66537	13199	16844	350	885800	27,5%	85,3%	2011	27,5%	54,5%	0,0%	0,0%	5,2%	1,8%	7,5%	1,5%	1,9%	0,0%
2012	243888	477840	0	100	47536	16520	68558	13613	17374	350	885800	27,5%	84,8%	2012	27,5%	53,9%	0,0%	0,0%	5,4%	1,9%	7,7%	1,5%	2,0%	0,0%
2013	243888	472680	0	100	49202	17006	70444	14041	17920	350	885800	27,5%	84,3%	2013	27,5%	53,4%	0,0%	0,0%	5,6%	1,9%	8,0%	1,6%	2,0%	0,0%
2014	243888	467276	0	100	50920	17506	72795	14401	18484	350	885800	27,5%	83,8%	2014	27,5%	52,8%	0,0%	0,0%	5,7%	2,0%	8,2%	1,6%	2,1%	0,0%
2015	243888	461733	0	100	52642	18023	75013	14834	19065	350	885800	27,5%	83,3%	2015	27,5%	52,2%	0,0%	0,0%	5,9%	2,0%	8,5%	1,7%	2,2%	0,0%
2016	243888	456016	0	100	54519	18555	77201	15205	19645	350	885800	27,5%	82,8%	2016	27,5%	51,6%	0,0%	0,0%	6,2%	2,1%	8,7%	1,7%	2,2%	0,0%
2017	243888	450120	0	100	56404	19105	79661	15588	20284	350	885800	27,5%	82,3%	2017	27,5%	50,8%	0,0%	0,0%	6,4%	2,2%	9,0%	1,8%	2,3%	0,0%
2018	243888	444039	0	100	58349	19671	82095	16027	20921	350	885800	27,5%	81,7%	2018	27,5%	50,1%	0,0%	0,0%	6,6%	2,2%	9,3%	1,8%	2,4%	0,0%
2019	243888	437766	0	100	60354	20256	84605	16501	21579	350	885800	27,5%	81,1%	2019	27,5%	49,4%	0,0%	0,0%	6,8%	2,3%	9,6%	1,9%	2,4%	0,0%
2020	243888	431297	0	100	62422	20858	87194	17032	22258	350	885800	27,5%	80,5%	2020	27,5%	48,7%	0,0%	0,0%	7,0%	2,3%	9,9%	2,0%	2,5%	0,0%
2021	243888	424984	0	100	64441	21446	89721	17500	22920	350	885800	27,5%	79,9%	2021	27,5%	48,0%	0,0%	0,0%	7,3%	2,4%	10,1%	2,0%	2,6%	0,0%
2022	243888	418482	0	100	66519	22052	92323	18043	23602	350	885800	27,5%	79,3%	2022	27,5%	47,2%	0,0%	0,0%	7,5%	2,5%	10,4%	2,1%	2,7%	0,0%
2023	243888	411788	0	100	68659	22676	95002	19032	24304	350	885800	27,5%	78,7%	2023	27,5%	46,5%	0,0%	0,0%	7,8%	2,6%	10,7%	2,1%	2,7%	0,0%
2024	243888	404895	0	100	70863	23318	97761	19597	25027	350	885800	27,5%	78,1%	2024	27,5%	45,7%	0,0%	0,0%	8,0%	2,6%	11,0%	2,2%	2,8%	0,0%
2025	243888	397797	0	100	73132	23979	100602	20179	25772	350	885800	27,5%	77,4%	2025	27,5%	44,9%	0,0%	0,0%	8,3%	2,7%	11,4%	2,3%	2,9%	0,0%
2026	243888	390488	0	100	75469	24660	103527	20779	26528	350	885800	27,5%	76,7%	2026	27,5%	44,1%	0,0%	0,0%	8,5%	2,7%	11,7%	2,3%	3,0%	0,0%
2027	243888	382963	0	100	77875	25341	106539	21394	27328	350	885800	27,5%	76,1%	2027	27,5%	43,2%	0,0%	0,0%	8,8%	2,8%	12,0%	2,4%	3,1%	0,0%
2028	243888	375213	0	100	80352	26023	109640	22021	28141	350	885800	27,5%	75,2%	2028	27,5%	42,4%	0,0%	0,0%	9,1%	2,9%	12,4%	2,5%	3,2%	0,0%
2029	243888	367234	0	100	82904	26727	112834	22846	28977	350	885800	27,5%	74,6%	2										

Instructions scenario training module

1. Copy the Landuse scenario training table Nepal.xlsx and give it a new name (keep original table intact)
2. Read first the guidelines that are described in the 'About' worksheet
3. Look at the different data sheets and see from which source the data have been extracted
4. Go to the scenario 0 sheet and find out which of the factors has the largest impact on biodiversity (MSA) (*Tip: Fill in a change % (2011-2020) for each factor individually and see the difference in MSA, and compare the results*)
5. Think of a optimistic conservation scenario with the policy options that you noted down for your own country earlier and try to quantify this in the columns (2011-2020) and (2021-2030) in the Scenario 0 sheet
6. Now think of a optimistic economical scenario that regards nature as free source for exploitation and land development and quantify this in Scenario1.
7. Compare the result for each scenario.

You have ±15 minutes. Have fun!!!