



Bern, 25.3.2013

LULUCF and KP-LULUCF

Comparison of Activity Data

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1 Introduction

The Swiss Greenhouse Gas Inventories under the UNFCCC¹ contain CRF-Tables related to Land Use, Land-use Change and Forestry (LULUCF) as well as supplementary information for LULUCF activities under the Kyoto Protocol (KP-LULUCF). While the CRF-Tables for LULUCF are compiled by Meteotest based on activity data (AD) produced by Sigmaphan, the CRF-Tables for KP-LULUCF are calculated independently by the FOEN Forest Division based on the same AD produced by Sigmaphan. The structures of both CRF-Tables look similar, but the data are not directly comparable due to differing definitions of the contents in each row (Figure 1).

In the Annual Review Report (UNFCCC 2012, §115.) the expert review team (ERT) recommended more transparency on the forest areas reported in LULUCF and KP-LULUCF: “In particular, it is not clear why, under the KP-LULUCF reporting, the area under forest management is higher than that reported under forest land remaining forest land in CRF table 5.A. The ERT recommends the Party to include a table transparently showing the relationship between land use reporting under the Convention and under the Kyoto Protocol in its next annual submission.”

In this study, the LULUCF and KP-LULUCF activity data for the inventory year 2010 as reported in the submission of April 2013 are exemplarily compared, the differences are analysed and their causes are documented. It is shown that activity data used for LULUCF and KP-LULUCF reporting are consistent.

¹ <http://www.bafu.admin.ch/climatereporting/00545/index.html?lang=en>

Identification code	Subdivision ⁽³⁾	Area subject to the activity (kha)
Total for activity B.1		1'234.55
<i>CC12 remaining</i>		<i>1'128.47</i>
	P/Z1/L1	54.59
	P/Z1/L2	131.10
	P/Z1/L3	9.33
	P/Z1/L4	8.38
	P/Z1/L5	20.03
	P/Z2/L1	119.33
	P/Z2/L2	93.56
	P/Z2/L3	136.11
	P/Z2/L4	99.31
	P/Z2/L5	57.54
	P/Z3/L1	23.66
	P/Z3/L2	2.65
	P/Z3/L3	71.46
	P/Z3/L4	233.44
	P/Z3/L5	68.00
<i>CC12 to CC13</i>		<i>3.81</i>
	<i>prod. to unprod.</i>	<i>3.81</i>
<i>CC13 remaining</i>		<i>91.33</i>
	<i>unproductive</i>	<i>91.33</i>
<i>CC13 to CC12</i>		<i>10.94</i>
	<i>unprod. to prod.</i>	<i>10.94</i>

Land-Use Category	Sub-division ⁽¹⁾	Area ⁽²⁾ (kha)
A. Total Forest Land		1'235.08
1. Forest Land remaining Forest Land		1'183.22
	afforestation	NO
	P/Z1/L1	54.45
	P/Z1/L2	130.78
	P/Z1/L3	9.22
	P/Z1/L4	8.11
	P/Z1/L5	19.00
	P/Z2/L1	119.07
	P/Z2/L2	93.36
	P/Z2/L3	134.60
	P/Z2/L4	96.54
	P/Z2/L5	55.88
	P/Z3/L1	23.73
	P/Z3/L2	2.64
	P/Z3/L3	70.56
	P/Z3/L4	224.06
	P/Z3/L5	64.13
	unproductive	77.09
2. Land converted to Forest Land ⁽¹⁰⁾		51.86
2.1 Cropland converted to Forest Land		0.10
	afforestation	0.08
	productive	0.02
	unproductive	NO
2.2 Grassland converted to Forest Land		48.88
	afforestation	1.29
	productive	30.15
	unproductive	17.44
2.3 Wetlands converted to Forest Land		0.66
	afforestation	0.03
	productive	0.50
	unproductive	0.13
2.4 Settlements converted to Forest Land		1.24
	afforestation	0.64
	productive	0.59
	unproductive	0.02
2.5 Other Land converted to Forest Land		0.99
	afforestation	0.05
	productive	0.67
	unproductive	0.27

Figure 1: Different structures of the KP-LULUCF Table B.1 “Forest Management” (left) and the LULUCF Table 5A “Forest Land” (right). Inventory year 2010 (FOEN 2013).

2 Comparison of the Forest Area

2.1 Preparing Data for Comparison

In a first step, the LULUCF-data for CRF-Table 5A (inventory year 2010) were calculated in the same manner as in the submission of April 2013. However, the output was aggregated in the structure of the KP-LULUCF Table B.1 so that the results can be compared directly. Figure 2 shows the area budget for the land-use categories CC12 (productive forest) and CC13 (unproductive forest). CC11 (afforestation) is processed in Table 3.

In the activity data set supplied by Sigmaplan (2013) the LUC area 'CC13 to CC12' is already included in the status table, i.e. the status table contains the total area of CC12 after the conversions that took place during the specified year (here: 2010). When calculating the area of CC12 that did not change, the area converted to CC12 must be subtracted from the value in the status table.

Furthermore, the non-Kyoto conversions and the 20-years afforestations has to be considered (see the following chapter for details).

As a consequence, 'CC12 remaining' is calculated as:

- 'status CC12' minus 'CC13 to CC12' minus '20-years afforestations' plus 'non-Koyto CC12-conversions'.

In the same way, 'CC13 remaining' is calculated as:

- 'status CC13' minus 'CC12 to CC13' plus 'non-Kyoto CC13-conversions'.

GEOGRAPHICAL LOCATION ⁽²⁾	ACTIVITY DATA			
Identification code	Subdivision ⁽³⁾	Difference	Area LULUCF	Area subject to the activity B.1
		(kha)	(kha)	(kha)
Total activity B.1 vs. 5A		0.42	1'234.12	1'234.55
Total CC12		0.23	1'139.18	1'139.41
Total CC13		0.20	94.94	95.14
<i>CC12 remaining</i>		37.58	1'090.89	1'128.47
	<i>P/Z1/L1</i>		54.03	54.59
	<i>P/Z1/L2</i>		129.73	131.10
	<i>P/Z1/L3</i>		9.13	9.33
	<i>P/Z1/L4</i>		8.00	8.38
	<i>P/Z1/L5</i>		18.83	20.03
	<i>P/Z2/L1</i>		118.40	119.33
	<i>P/Z2/L2</i>		92.99	93.56
	<i>P/Z2/L3</i>		133.62	136.11
	<i>P/Z2/L4</i>		95.76	99.31
	<i>P/Z2/L5</i>		55.06	57.54
	<i>P/Z3/L1</i>		23.39	23.66
	<i>P/Z3/L2</i>		2.59	2.65
	<i>P/Z3/L3</i>		69.27	71.46
	<i>P/Z3/L4</i>		218.51	233.44
	<i>P/Z3/L5</i>		61.57	68.00
<i>CC12 to CC13</i>				
	<i>prod. to unprod.</i>	0.00	3.81	3.81
<i>CC13 remaining</i>				
	<i>unproductive</i>	18.07	73.26	91.33
<i>CC13 to CC12</i>				
	<i>unprod. to prod.</i>	0.00	10.94	10.94
<i>Land converted to CC12</i>	<i>from 5A2</i>		37.36	
<i>Land converted to CC13</i>	<i>from 5A2</i>		17.88	
<i>CC11 to CC12</i>	<i>affor2prod</i>		5.43	
<i>CC11 to CC13</i>	<i>affor2unprod</i>		0.02	
<i>Cropland to Forest</i>	<i>productive</i>		0.02	
<i>Cropland to Forest</i>	<i>unproductive</i>		0.00	
<i>Grassland to Forest</i>	<i>productive</i>		30.15	
<i>Grassland to Forest</i>	<i>unproductive</i>		17.44	
<i>Wetland to Forest</i>	<i>productive</i>		0.50	
<i>Wetland to Forest</i>	<i>unproductive</i>		0.13	
<i>Settlements to Forest</i>	<i>productive</i>		0.59	
<i>Settlements to Forest</i>	<i>unproductive</i>		0.02	
<i>Other Land to Forest</i>	<i>productive</i>		0.67	
<i>Other Land to Forest</i>	<i>unproductive</i>		0.27	

Figure 2: Comparison of the KP-LULUCF Table B.1 and the accordingly restructured LULUCF Table 5A (blue cells) without afforestation (CC11). Inventory year 2010 (FOEN 2013).

2.2 Checking the Activity Data of CC12 and CC13

Comparing the total areas (remaining area plus converted area) of CC12, there is a difference of 0.23 kha between KP-LULUCF and LULUCF (green coloured cells in Figure 2). There are two reasons for this:

- Non-Kyoto deforestations: In the KP calculations a part of the deforested areas are kept in the Forest Land, because the deforestation processes do not fulfil the requirements of deforestation according to the Kyoto Protocol (see FOEN 2013: NIR Chapter 11.2.3). For the comparison with the LULUCF results, this area (0.51 kha, see Table 1) must be subtracted from the KP area.
- Afforestations older than 20 years: Afforestations under the Kyoto Protocol which are older than 20 years are always reported under Art. 3.3 (KP-CRF-Table 5(KP-I)A.1.2), whereas under the Convention, these afforestation are transferred to the land-use category 5A1 'Forest Land'. For the comparison with the LULUCF results, this area (0.28 kha, see Table 1) must be added to the KP area.

For CC13, the difference between KP-LULUCF and LULUCF is 0.20 kha (green coloured cells in Figure 2). It can be explained by the non-Kyoto deforestations, which remain Forest Land in the KP-reporting (see Table 1). There are no afforestations older than 20 years under CC13 as it is assumed that afforestations always evolve into productive forest (CC12).

Table 1: Area of non-Kyoto deforestations and of afforestations older than 20 years (kha). Inventory year 2010 (FOEN 2013).

Subdivision	CC12: non-Kyoto deforestation	CC12: Afforest. > 20 years	CC13: non-Kyoto deforestation
<i>P/Z1/L1</i>	0.014	0.017	0.001
<i>P/Z1/L2</i>	0.040	0.051	0.000
<i>P/Z1/L3</i>	0.006	0.006	0.000
<i>P/Z1/L4</i>	0.014	0.006	0.000
<i>P/Z1/L5</i>	0.020	0.007	0.000
<i>P/Z2/L1</i>	0.036	0.024	0.020
<i>P/Z2/L2</i>	0.012	0.017	0.001
<i>P/Z2/L3</i>	0.060	0.039	0.011
<i>P/Z2/L4</i>	0.076	0.021	0.006
<i>P/Z2/L5</i>	0.027	0.004	0.002
<i>P/Z3/L1</i>	0.005	0.004	0.009
<i>P/Z3/L2</i>	0.000	0.000	0.001
<i>P/Z3/L3</i>	0.030	0.025	0.031
<i>P/Z3/L4</i>	0.153	0.052	0.103
<i>P/Z3/L5</i>	0.013	0.004	0.012
<i>Total</i>	0.51	0.28	0.20

The resulting budgets of CC12 and CC13 areas are shown in Table 2. The difference of activity data between the reporting for KP and the Convention can be consistently explained.

Table 2: Area budget for KP-LULUCF and LULUCF on the basis of the results shown in Table 1 and Figure 2 (kha). Inventory year 2010 (FOEN 2013).

Budget CC12	KP	UNFCCC	Difference
remaining CC12	1'128.47	1'090.89	
CC13 converted to CC12	10.94	10.94	
land converted to CC12 (data from 5A2)		37.36	
non-Kyoto-deforestation	-0.51		
afforestation > 20 years	0.28		
total	1'139.18	1'139.18	0.00

Budget CC13	KP	UNFCCC	Difference
remaining CC13	91.33	73.26	
CC12 converted to CC13	3.81	3.81	
land converted to CC13 (data from 5A2)		17.88	
non-Kyoto-deforestation	-0.20		
afforestation > 20 years			
total	94.94	94.94	0.00

2.3 Checking the Activity Data of CC11

In Table 3 the cumulated area of afforestations (CC11) is compared between LULUCF (CRF-Table 5A) and KP-LULUCF (Table 5(KP-I)A.1.1). There is no difference.

Table 3: Comparison of the area of CC11 between CRF-Table 5A and Table 5(KP-I)A.1.1 (kha). Inventory year 2010 (FOEN 2013).

Year 2010	Difference	LULUCF	KP	Comment
<i>CC11 remaining</i>		-1.12		negative area (status minus converted). Not shown in CRF; see below.
<i>CC11 status</i>		0.96		value from status-table
<i>Total converted to CC11</i>	0.00	2.08	2.08	cumulated 20 years, 1991-2010
<i>Cropland to CC11</i>		0.08		cumulated 20 years, 1991-2010
<i>Grassland to CC11</i>		1.29		cumulated 20 years, 1991-2010
<i>Wetland to CC11</i>		0.03		cumulated 20 years, 1991-2010
<i>Settlements to CC11</i>		0.64		cumulated 20 years, 1991-2010
<i>Other Land to CC11</i>		0.05		cumulated 20 years, 1991-2010

There is a peculiarity illustrated in Table 3: The cumulated afforested area from 1991 to 2010 is 2.08 kha. This is larger than the total area of CC11 existing in 2010 (0.96 kha) as indicated in the status table provided by Sigmaplan (2013). Thus, the area of remaining CC11 in 2010 (status minus converted areas) becomes negative.

In the CRF-Table 5A this surplus area is not explicitly shown but it is compensated by subtracting it from the forest area in 5A1.

3 References

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