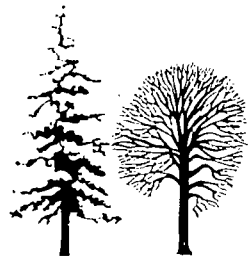

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

Zaključno poročilo naloge
Javna okoljska služba 2012

Izvajanje aktivnosti v povezavi z ocenami ponorov
toplogrednih plinov za področje
"Raba tal, sprememba rabe tal in gozdarstvo" (LULUCF)
v skladu s Pravilnikom o monitoringu ponorov in emisij toplogrednih plinov
zaradi rabe tal, spremembe rabe tal in gozdarstva (Ur. l. RS 50/2010)

Pogodba št. 2334-12-100001
Ministrstvo za kmetijstvo in okolje, Agencija RS za okolje

Ljubljana, januar 2013

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Zaključno poročilo naloge Javna okoljska služba 2012, januar 2013
Gozdarski inštitut Slovenije, Večna pot 2, 1000 Ljubljana

Tehnično uredila:

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1 Gozdna inventura 2012 – razširjena

1.1 Izvedba popisa gozdov in gozdnih ekosistemov v l. 2012 na nacionalni mreži 4x4 km

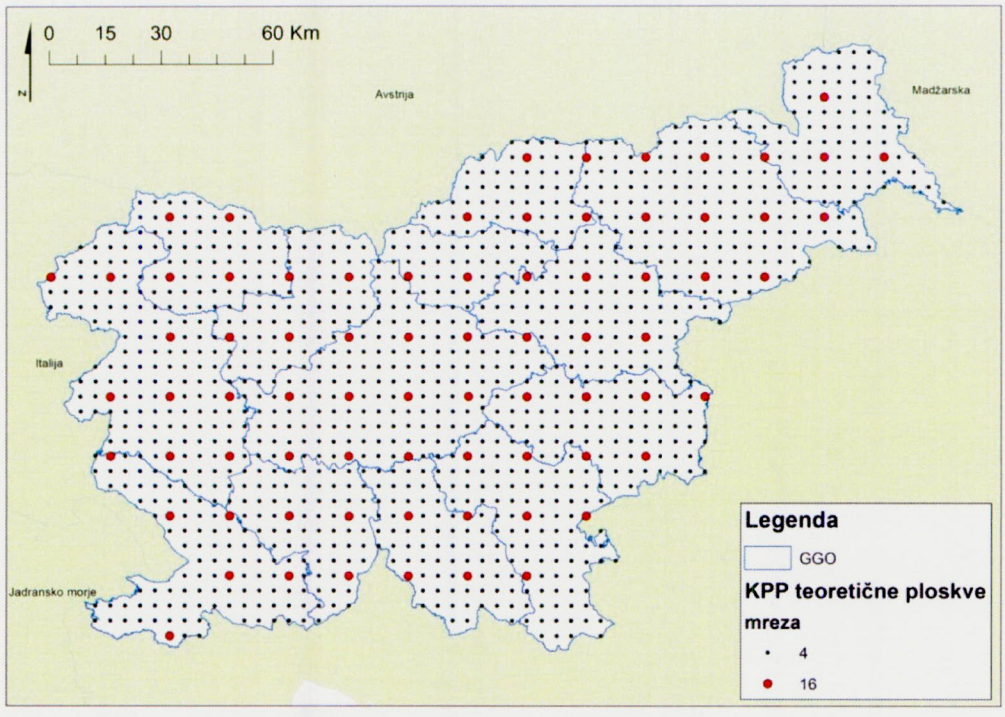
mag. Špela Planinšek, Mitja Skudnik

1.1.1 Uvod

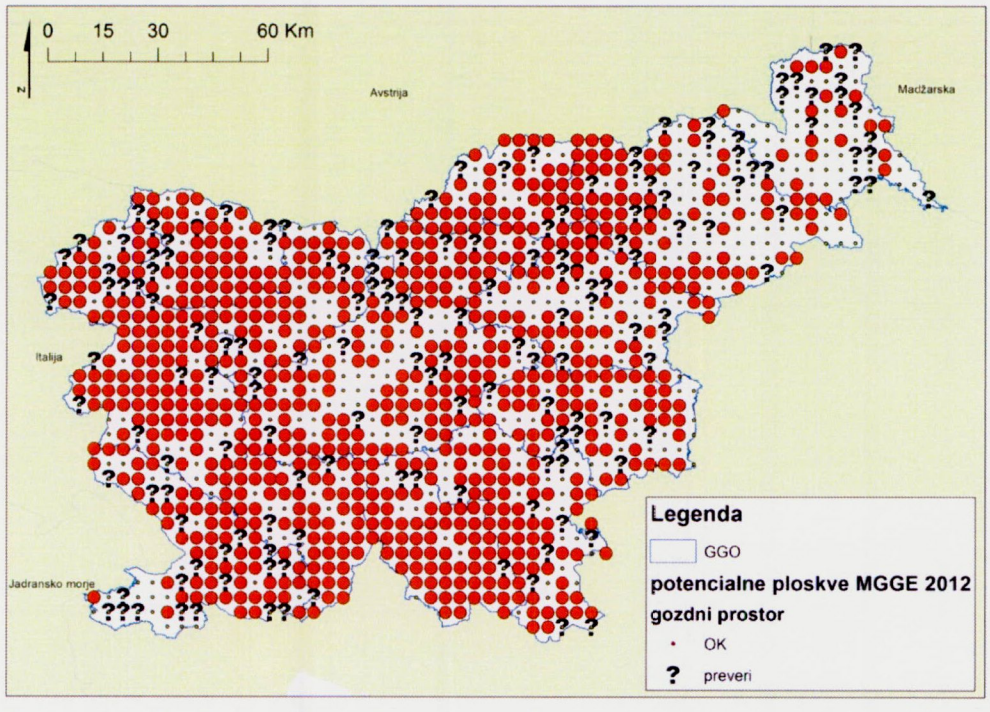
V letu 2012 je popis gozdov in gozdnih ekosistemov oz. monitoring gozdov in gozdnih ekosistemov (v nadaljevanju MGGE) potekal na presečiščih nacionalne mreže 4 x 4 km preko celotne Slovenije. Popis je bil izveden v času od 20. junija do 15. oktobra 2012. Na izbrani mreži 4 x 4 km se je do danes popis izvajal v približno petletnih intervalih in je bil v letu 2012 opravljen že sedmič (1985, 1987, 1991, 1995, 2000 in 2007). Pri tem je treba poudariti, da je bil v prvih letih popis namenjen izključno spremljanju stanja gozdov (kazalec osutosti dreves). Od vključno leta 2000 dalje pa je postal eden glavnih ciljev MGGE podati, poleg ocene stanja gozdov, tudi dendrometrijske informacije o stanju slovenskih gozdov (lesna zaloga živega in odmrlega drevja, prirastek itd.). Poleg trenutnega stanja lahko s podatki prejšnjih popisov sledimo tudi razvoju in spremembami volumna žive in odmrle lesne biomase. Gozdarski inštitut Slovenije (v nadaljevanju GIS) podatke MGGE uporablja v različnih raziskavah ter za poročanja, po konvenciji CLRTAP in Kjotski protokol. S pridobljenimi podatki lahko informacijsko podpremo oblikovanja državnih in mednarodnih poročanj in tudi za potrebe Ministrstev (MKO, MIP) pristojnih za gozd ter drugih vladnih služb (ARSO, SURS...).

1.1.2 Priprave na inventuro

V prvih korakih priprave na MGGE 2012 je bilo treba pripraviti seznam lokacij, na katerih bomo vzpostavili ploskve, ki morajo biti popisane v letu 2012. S tem smo v popis vključili lokacije, na katerih se je od leta 2007 do 2012 raba tal spremenila iz negozdne v gozdno (zaraščajoče površine) in izključili tiste, ki se jim je v tem obdobju raba tal spremenila iz gozdne v negozdno (izkrčene površine). Vseh lokacij (presečišč) sistematične mreže 4 x 4 km je v Sloveniji 1.270 (Slika 1). Pogoj, da je bila na lokaciji vzpostavljena ploskev MGGE je bil, da se je središče ploskve nahajalo v gozdu. Pri tem smo si pomagali s karto rabe tal za leto 2012 (Evidenca dejanske rabe kmetijskih in gozdnih zemljišč, http://rkg.gov.si/GERK/, Ministrstvo za kmetijstvo in okolje). Vse ploskve, ki so imele v radiju 20 m poleg gozda še katero drugo negozdno rabo tal, smo preverili na najnovejših ortofoto posnetkih in se na podlagi fotointerpretacije odločili ali lokacijo vključimo v popis MGGE 2012 ali ne. Takšnih lokacij je bilo 164 (Slika 2). Skupno je bilo za popis v letu 2012 izbranih 761 lokacij.

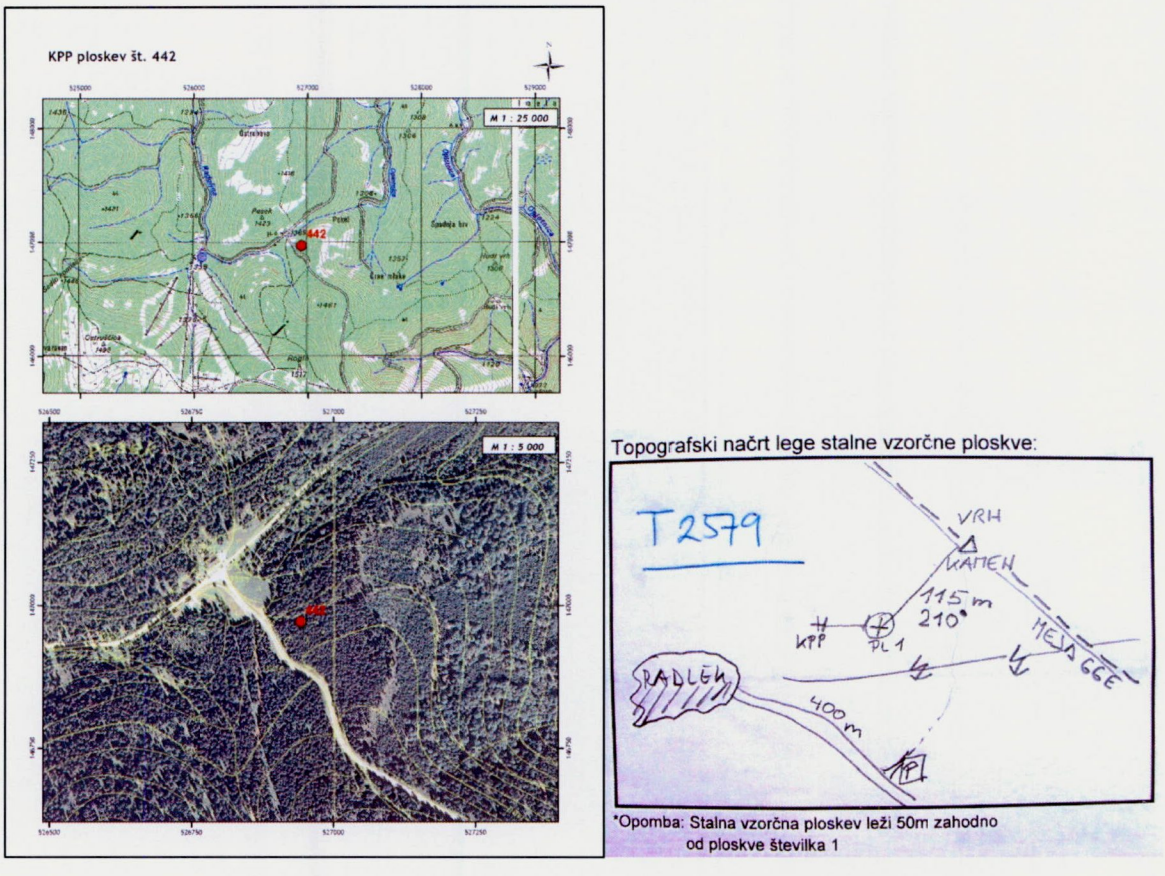


Slika 1: Lokacije na sistematični mreži 4 x 4 km preko Slovenije



Slika 2: Lokacije, ki se glede na karto rabe tal (MKO) nahajajo v gozdu in lokacije, ki smo jih preverili na DOF-ih.

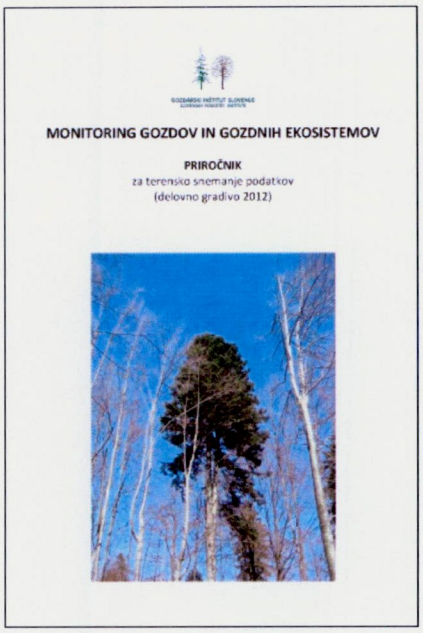
Po pripravi novega seznama ploskev smo začeli intenzivno pripravo obširne dokumentacije o ploskvah, ki jo prejmejo popisovalci. Začetni del dokumentacije vključuje list z grafičnim prikazom lokacije ploskve na karti DTK25 in na najnovejšem ortofoto posnetku. V primeru, da je bila ploskev v preteklosti že popisana, sledi tudi opis dostopa do ploskve (Slika 3).



Slika 3: Primer grafičnega prikaza lokacije ploskve na zemljevidu in primer opisa dostopa do ploskve.

Za vsako ploskev smo v nadaljevanju pripravili tudi popisne liste, kjer so bili navedeni: splošni podatki o ploskvi, podatki o drevesih, podatki o odmrli lesni biomasi in podatki o tankem živem drevju. Če je bila ploskev že popisana v preteklosti, so bili kazalci v nekaterih popisnih listih že izpolnjeni in so jih morali popisovalci na terenu samo preveriti ter v primeru sprememb popraviti oz. dopolniti. Na popisnem listu o drevesih so bile tako že zapisane lokacije vseh dreves iz popisa 2007 in popisovalci so morali istim drevesom na terenu ponovno izmeriti obseg oz. z določeno kodo označiti drevesa, ki so se posušila ali so bila posekana. Na popisne liste so dodali vsa vrasla drevesa.

Vzporedno z izbiro lokacij in pripravo dokumentacije je potekala priprava terenskega priročnika za popisovalce (Slika 4). Dopolnili smo obstoječa navodila in določili nekaj novih kazalcev, ki se jih bo merilo na terenu.



Slika 4: Naslovnica terenskega priročnika za popis MGGE 2012.

Med osnovne pripravljalne aktivnosti sodita tudi priprava in pregled ustreznosti terenske opreme in merilnih inštrumentov. Zaradi obsežnosti Popisa je bilo treba dokupiti nekaj inštrumentov (kompleti prve pomoči, busole in stative za busole, razdaljemere Haglof (4 kos), terenske GPS naprave (3 kos), PI metre, tablične računalnike, napravo za merjenje premerov dreves na različnih višinah (CRITERION RD 1000), premerke, sekaške metre, terenske nahrbtnike, cevasto železo in barvo za količke, pisarniški material, Atlas Slovenije (2 kos), adapterje za polnjenje baterij ...). Večino inštrumentov smo posodili terenskim ekipam Zavoda za gozdove Slovenije.

Usklajevanje s koordinatorji z Zavoda za gozdove Slovenije (ZGS) smo večinoma opravili v prvi polovici junija, ko smo prejeli tudi seznam oseb, ki so nato opravljale terenski popis.

1.1.3 Izvedba tečaja za terenske popisovalce

V juniju (20. 6. in 22. 6. 2012) smo na Gozdarskem inštitutu Slovenije pripravili dvodnevni uvajalni seminar in terensko delavnico, ki se ju je udeležilo 47 popisovalcev iz Zavoda za gozdove Slovenije in Gozdarskega inštituta Slovenije. Prvi dan smo popisovalcem predstavili pomen MGGE 2012 za Slovenijo. Natančneje so bili predstavljeni namen in posamezni sklopi terenskega popisa (Priloga 1):

- pomen monitoringa gozdov in gozdnih ekosistemov 2012 za Slovenijo (dr. Marko Kovač),
- predstavitev posameznih sklopov terenskega popisa 2012:
  - splošni opis znakov ploskve (Laura Žižek Kulovec),
  - dendrometrijski znaki snemani na ploskvi (doc. dr. David Hladnik),
  - snemanje odmrle biomase in tankega živega drevja (Mitja Skudnik),
  - funkcije gozdov (mag. Špela Planinšek).

Slika 5: Udeleženci uvajalnega seminarja v dvorani Gozdarskega inštituta (arhiv Oddelka NMGK, GIS).

Sledil je odhod na učne vzorčne ploskve v Mostecu (Ljubljana), ki jih za namene izobraževanja študentov vzdržuje Biotehniška fakulteta – Oddelek za gozdarstvo in obnovljive gozdne vire. Na ploskvah je bil predstavljen protokol dela na terenu, temu je sledilo delo v manjših skupinah (po dva udeleženca) na izbranih vzorčnih ploskvah. Po opravljenem delu so se skupine zamenjale in vsaka skupina je kontrolirala delo prejšnje skupine. Namen izobraževanja je bil natančno predstaviti delo na terenu in se na praktičnih primerih pogovoriti o nejasnostih.

Slika 6: Terenska delavnica s predstavitvijo dela na terenu v Mostecu (arhiv Oddelka NMGK, GIS).

1.1.4 Uvajanje terenskih ekip v samostojno delo na terenu

Uvajanje terenskih ekip je poleg 20. 6. potekalo še 22. 6. 2012, ko smo popisovalce ZGS razdelili na dve skupini in sicer na skupino z zahodnega dela Slovenije, ki se je sestala v Postojni in na skupino z vzhodnega dela Slovenije, ki se je sestala v Celju. Predstavniki Gozdarskega inštituta Slovenije smo se porazdelili v terenske skupine s popisovalci in odšli na teren, kjer smo popisali eno ali dve ploskvi vključeni v MGGE 2012. Delo so opravljali popisovalci sami, predstavniki GIS smo jim bili podpora pri odločanju. Med snemanjem so se reševala različna teoretična in praktična vprašanja. Z vpeljavo skupin v terensko delo je bilo zagotovljeno, da so bili postopki meritev razumljeni in morebitne

nejasnosti takoj odpravljene. Večini popisovalcev način terenskega popisa ni bil neznan (terenske meritve se izvajajo na stalnih vzorčnih ploskvah (SVP) Zavoda za gozdove Slovenije), zato smo pozornost usmerili predvsem v razlago novih znakov in uvajanje novih sodelavcev. Po tem datumu je vsaka območna enota terenski del popisa usklajevala glede na njihove stalne delovne obveze in možnosti.

1.1.5 Izvedba popisa

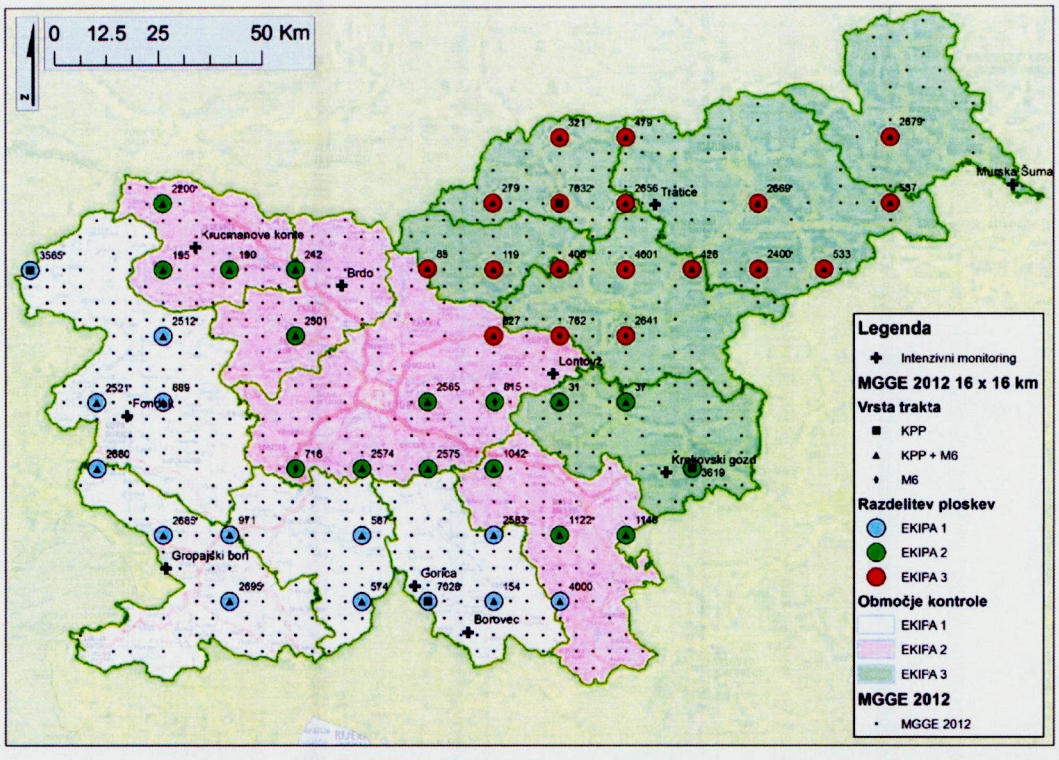
Od 761 ploskev, ki so bile preverjene na terenu, je bilo popisanih 744 ploskev in od tega jih je bilo 42 na mreži 16 x 16 km ter 719 na mreži 4 x 4 km. Za 3 ploskve je bilo na terenu ocenjeno, da ne ležijo v gozdnem prostoru; 14 ploskev je bilo na nedostopnem terenu in se bo ocena hektarske lesne zaloge, temeljnice in števila dreves naredila naknadno na podlagi stereofotointerpretacije letalskih posnetkov. Na 9 ploskvah ni bilo prisotnega merskega drevja (mladje, rušje,...).

Ploskve, ki so del sistematične mreže 16 x 16 km, so popisale terenske ekipe GIS, vse ostale ploskve na mreži 4 x 4 km pa terenske ekipe ZGS. Na njih se je snemalo splošne lastnosti rastišča in sestoja, dendrometrijske podatke dreves (stanje in koda drevesa, obseg debla, socialni položaj in višini tretjega ter četrtega najdebelejšega drevesa), prisotnost in dimenzije tankega živega drevja ter odmrle lesne biomase.

Velikost vzorčne ploskve je 20 arov (r = 25,23 m), sestavljena je iz 4 koncentričnih ploskev, ki pogojujejo kako in kateri znak se na različnih površinah ploskve snema. Ploskev in drevesa na njem, zaradi zagotavljanja nepristranskega gospodarjenja na vzorčni ploskvi in s tem pravilnosti snemanih podatkov, ne smejo biti označena s številkami ali znaki, ampak le z zadiračem. Vsa podrobnejša navodila so predstavljena v priročniku, ki je priloga poročila (Priloga 3).

Popisovalce smo prosili tudi za izboljšavo opisov dostopov do ploskev, saj s tem lahko prihranimo kar nekaj delovnih minut, včasih celo ur. Večina popisovalcev je redno sodelovala s terenskimi ekipami Gozdarskega inštituta in s tem skrbela za ustrezen pretok informacij o poteku snemanja. Določena neskladja smo vodje skupin reševali neposredno s popisovalci, kar nam je predstavljalo nekaj delovnih obvez.

Terenski del popisa je bil zaključen 15. 10. 2012.



Slika 7: Lokacije ploskev MGGE 2012 (mreža 16 x 16 km in mreža 4 x 4 km), ter delitev ploskev mreže 16 x 16 km na tri skupine GIS in območja kontrole.

1.1.6 Kontrola pravilnosti snemanj na terenu

Znotraj Oddelka za načrtovanje in monitoring gozdov in krajine Gozdarskega inštituta Slovenije so bile organizirane tri terenske ekipe. Poleg snemanja ploskev na mreži 16 x 16 km je njihovo delo zajemalo tudi kontrolo dela popisovalcev ploskev na mreži 4 x 4 km. Kontrola 5 % vseh ploskev na mreži 4 x 4 km je namenjena čimprejšnjemu ugotavljanju napak (slučajnostnih in sistematičnih) in njihovemu odpravljanju. Skupna ocena kontrolorjev služi oceni zanesljivosti popisa. V letu 2012 smo ponovno snemali 36 ploskev. Izbrali smo jih naključno, vendar tako, da smo za vsako terensko ekipo preverili vsaj eno ploskev.

Tabela 1: Število ploskev, ki jih je bilo treba kontrolirati, in njihovo število po območnih enotah.

Območna enota ZGS	Število ploskev	Število kontrol
Bled	42	2
Brežice	45	2
Celje	47	2
Kočevje	59	3
Kranj	43	2
Ljubljana	85	4
Maribor	54	3
Murska Sobota	22	1
Nazarje	28	1
Novo mesto	59	3
Postojna	51	3
Sežana	54	3
Slovenj Gradec	37	2
Tolmin	93	5
Skupaj	**719**	**36**

Postopek kontrole, si je sledil v naslednjem vrstnem redu:

1. izbor ploskve,
2. fotokopiranje izpolnjenih snemalnih listov za izbrano ploskev,
3. kontrolne meritve dopišemo na fotokopiran izpolnjen snemalni list,
4. uporaba kontrolnega lista, ocena opravljenega dela po 4 stopenjski lestvici ter zapis opomb.

Če smo pri kontroli odkrili kakšno (sistematično) nepravilnost, smo nemudoma obvestili vodjo ekipe. Rezultati kontrol so pokazali, da je največ nejasnosti in netočnosti pri meritvah odmrle lesne biomase, ki jo merimo na najširšem radiju ploskve (25,23 m). Napake zaradi spremembe načina merjenja premera oz. obsega (premerka-PI meter) so bile izrazitejše le v posameznih območnih enotah. Različni načini oz. inštrumenti za merjenje višin pa so prav tako botrovali razlikam v višinah dreves (do 3 m). Vse napake smo zabeležili in jih bomo pri logičnih kontrolah, obdelavi vnesenih podatkov ter popravkih terenskega priročnika upoštevali. Poročilo o rezultatih kontrole smo pripravili vodje terenskih skupin (mag. Planinšek, Japelj, Skudnik) oktobra in novembra 2012 in ga posredovali koordinatorjem MGGE 2012 na ZGS, ki so ga predstavili sodelavcem na internih kolegijih. Sočasno s poročilom smo vsem popisovalcem podelili Potrdilo o uspešnem sodelovanju na seminarju in delavnici MGGE 2012 (Priloga 6).

1.2 Izvedba inventure na negozdnih rabah tal

Mitja Skudnik, dr. David Hladnik, dr. Milan Kobal, Gašper Okršlar, Laura Žižek Kulovec

1.2.1 Uvod

Nacionalni izračuni emisij in ponorov toplogrednih plinov so kompleksni. Mednarodna navodila za izračun ponorov in emisij TGP "Smernice dobre prakse" (IPCC 2003, 2006) za področje "Rabe tal, spremembe rabe tal in gozdarstvo" (LULUCF) vključujejo metode za izračun ponorov po petih t. i. "pool-ih" oz. zbiralnikih ogljika.

To so:

1a) nadzemna biomasa,
1b) podzemna biomasa,
2a) mrtev / odmrli les,
2b) opad in
3) tla.

V Tabela 2 je glede na navodila Good Practice Guidance (IPCC, 2003) predstavljeno, za katere zbiralnike ogljika so predvidene metodologije za izračun zalog ogljika in nato emisij oz. ponorov toplogrednih plinov.

Tabela 2: Pregled, za katere zbiralnike ogljika (pool-e) po posameznih kategorijah IPCC 2003 predvideva metodologijo za izračun zaloge.

			Živa biomasa		**Odmrla organska snov**		**Tla**
			Nadzemna biomasa	Podzemna biomasa	Mrtev (odmrli) les	Opad	Tla
Kategorija rabe	Podkategorija rabe	Oznaka	AGB	BGB	DW	LIT	SOILS
Gozd	Gozd	FL	+	+	+	+	+
Obdelovana zemljišča	Njive in vrtovi	CL_a	-	-	-	-	+
	Trajni nasadi	CL_w	+	+	-	-	+
Travinje	Travniki	GL_a	+	+	-	-	+
	Travniki z drevjem	GL_w	+	+	-	-	+
Mokrišča	Mokrišča	WL	+	+	-	-	+
Naselja	Naselja	SL	+	+	-	-	-*
Ostala raba	Ostala raba	OL	-	-	-	-	-

* v skladu z navodili JRC (november 2012) je potrebno poročati o spremembah ogljika tudi za tla v kategoriji naselja (Priloga 7).

1.2.2 Določitev mreže in izbor ploskev

Za osnovo vzorčenja na negozdnih rabah tal, smo vzeli že obstoječo sistematično vzorčno mrežo Gozdarskega inštituta Slovenije (4x4 km), ki ima 1270 točk, ki so med seboj oddaljene 4 km in imajo koordinate (XXX.950, YY.000 v Gauss-Kruegerjevem koordinatnem sistemu).

Mrežo točk smo v GIS orodju položili na karto rab tal (RABA, MKO, rkg.gov.si/GERK/documents/RABA_2012_03_07.RAR) in vsaki izmed točk pripisali podatek, na kateri izmer rab tal (stolpec: RABA_ID) se nahaja.

V letu 2012 je bila prvič popisana tudi drevnina na negozdnih rabah tal. Ploskve na negozdnih rabah tal lahko, glede na opravljene meritve, delimo na:

A. ploskve na katerih smo izmerili drevnino in
B. ploskve na katerih smo poleg drevnine vzorčili tudi tla.

Ad A) Drevnina je bila izmerjena na naslednjih rabah tal: zaraščajoče njivske površine (CL_w), travišča (GL_a in GL_w) in naselja (SL). Teh ploskev je bilo na mreži 4 x 4 km 367 in nato še dodatnih 11 ploskev v mokriščih (WL), ki pa niso del sistematične mreže 4x4 km. Sistematična mreža 4x4 km namreč ni zajela nobene površine mokrišč (kategorije: 4100, 4210 in 4220), zajela je le 12 ploskev, ki pa so se vse nahajale v kategoriji 7000 (Voda), ki pa glede na navodila IPCC ne predvidevajo izračunov zalog organskega ogljika. Mokrišča smo vzorčili na površinah rab 4100, 4210 in 4220 (po šifrantu RABA).

Skupaj je bilo vzorčenih ploskev 378. Lege ploskev v Sloveniji so predstavljene na Slika 5 in na Slika 6 ploskve, kjer so bila vzorčena tudi tla. Število ploskev po posameznih rabah in njihov delež pa sta predstavljena v Tabeli 3.

Ad B) Ploskev na katerih smo poleg drevnine vzorčili tudi tla je bilo 61 (Slika 6). V negozdnih rabah CL_a in CL_w smo izbrali po 15 ploskev, v ostalih rabah pa po 10 ploskev (v rabi SL in OL ni bila izbrana nobena ploskev). Ploskve smo izbirali glede na lokacijo po zemljepisni dolžini (od zahoda proti vzhodu) in ko smo izbrali zadnjo ploskev v vrsti (skrajno vzhodno), smo izbrali naslednjo po geografski širini (od juga proti severu). Prva ploskev je bila torej vedno v JZ delu Slovenije in zadnja v SV delu. Katera v vrstici je bila prva ploskev, smo določili z žrebom. Po določitvi prve smo izbrali vsako N-to ploskev. N smo določili glede na število vseh ploskev v določeni rabi tal. Tako smo dosegli, da so bile izbrane ploskve enakomerno izbrane preko cele Slovenije.

Tabela 3: Število točk sistematične mreže 4x4km, ki padejo v posamezno kategorijo RABA (MKO).

RABA_ID		število točk na mreži 4x4 km	delež [%]
1100	njiva	115	9.1
1160	hmeljišče	2	0.2
1211	vinograd	15	1.2
1221	intenzivni sadovnjak	1	0.1
1222	ekstenzivni oz. travniški sadovnjak	14	1.1
1230	oljčnik	2	0.2
1300	trajni travnik	223	17.6
1321	barjanski travnik	5	0.4
1410	kmetijsko zemljišče v zaraščanju	14	1.1
1500	drevesa in grmičevje	9	0.7
1600	neobdelano kmetijsko zemljišče	3	0.2
1800	kmetijsko zemljišče, poraslo z gozdnim drevjem	7	0.6
2000	gozd	751	59.1
3000	pozidano in sorodno zemljišče	74	5.8
5000	suho odprto zemljišče s posebnim rastlinskim pokrovom	14	1.1
6000	odprto zemljišče brez ali z nepomembnim rastlinskim pokrovom	9	0.7
7000	voda	12	0.9
	skupaj	1270	100.0

Rabo tal smo lokaciji pripisali iz karte rabe tal (MKO). Zaradi večje podrobnosti kategorij karte rabe tal smo kategorije združili v kategorije LULUCF, opredeljene v navodilih IPCC (GPG, 2003). Združitev posameznih kategorij RABA (MKO) v kategorije LULUCF je predstavljena v Tabeli 4.

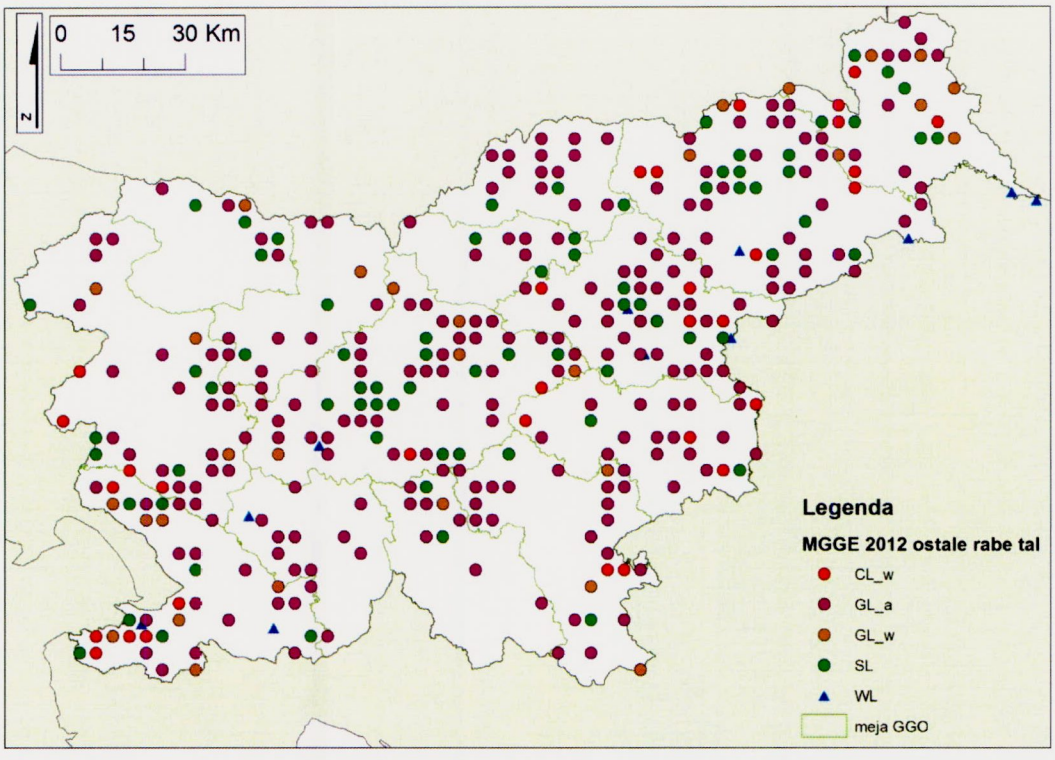
Tabela 4: Rabe tal glede na Evidenco dejanske rabe kmetijskih in gozdnih zemljišč (MKO), združene v kategorije rab tal po LULUCF.

LULUCF koda	Raba tal koda (MKO)	Raba opis
FL	2000	Gozd
CL_a	1100	Njiva oz. vrt
CL_a	1130	Začasni travnik
CL_a	1160	Hmeljišče
CL_a	1190	Rastlinjak
CL_w	1180	Trajne rastline na njivskih površinah
CL_w	1211	Vinograd
CL_w	1212	Matičnjak
CL_w	1221	Intenzivni sadovnjak
CL_w	1222	Ekstenzivni oz. travniški sadovnjak
CL_w	1230	Oljčnik
CL_w	1240	Ostali trajni nasadi
CL_w	1420	Plantaža gozdnega drevja
GL_a	1300	Trajni travnik
GL_a	1321	Barjanski travnik
GL_a	1330	Gorski pašnik
GL_a	1600	Neobdelano kmetijsko zemljišče
GL_w	1410	Kmetijsko zemljišče v zaraščanju
GL_w	1500	Drevesa in grmičevje
GL_w	1800	Kmetijsko zemljišče, poraslo z gozdnim drevjem
WL	4100	Barje
WL	4210	Trstičje
WL	4220	Ostalo zamočvirjeno zemljišče
WL	7000	Voda
SL	3000	Pozidano in sorodno zemljišče
OL	5000	Suho odprto zemljišče s posebnim rastlinskim pokrovom
OL	6000	Odprto zemljišče brez ali z nepomembnim rastlinskim pokrovom

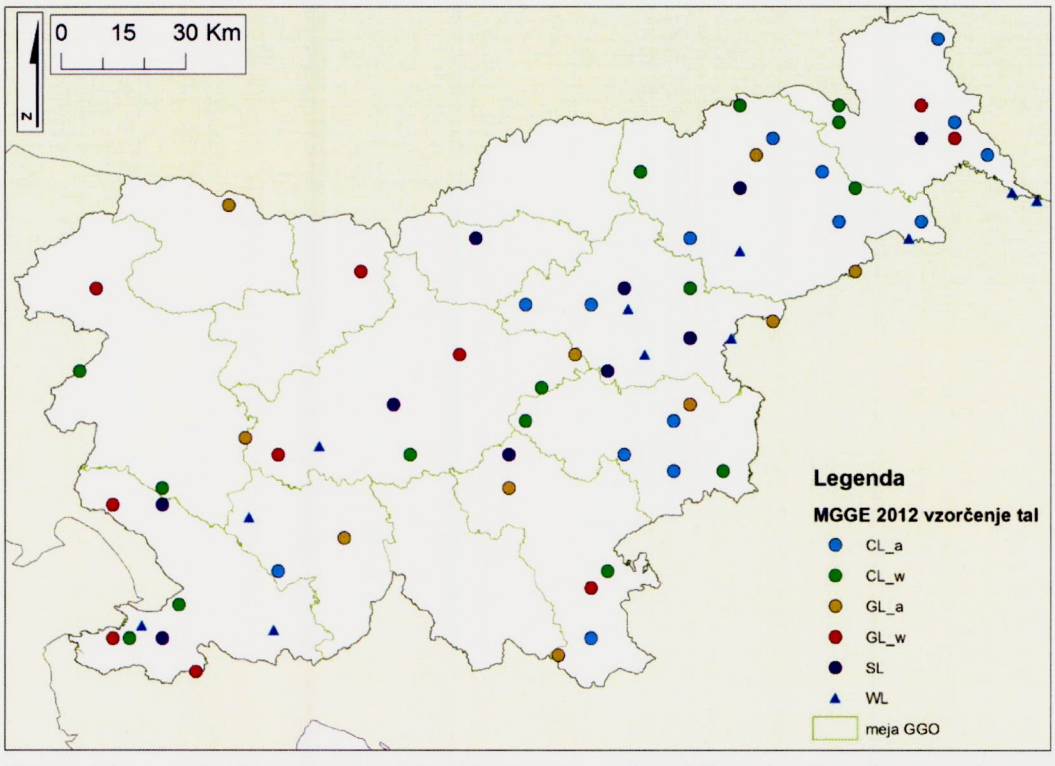
Tabela 5: Število ploskev na mreži 4 x 4 km v različnih rabah tal.

		LULUCF Raba tal	**Število ploskev**
Gozd	Gozd	Forest land - FL	751
Obdelovana zemljišča	Njive in vrtovi	Cropland_annual - CL_a	117
	Trajni nasadi	Cropland_woody - CL_w	32
Travinje	Travniki	Grassland_annual - GL_a	231
	Travniki z drevjem	Grassland_woody - GL_w	30
Mokrišča	Mokrišča	Wetlands - WL	12 (11 izbranih)
Naselja	Naselja	Settlements - SL	74
Ostala raba	Ostala raba	Other land - OL	23
		Skupaj	**1270**

S temno ze eno barvo so označene tiste rabe tal, ki smo jih vključili v zmero drevnine.



Slika 5: Lokacije ploskev na mreži 4 x 4 km, ki so bile na negozdni rabi tal in smo jim izmerili drevnino.



Slika 6: Izbrane ploskve na negozdni rabi tal na katerih so bila poleg drevnine vzorčena tudi tla.

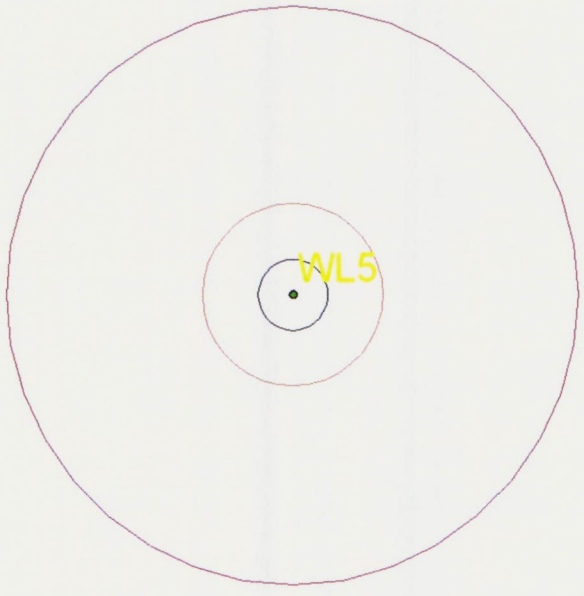
1.2.3 Opis uporabljene metodologije

Vzorčenje nadzemne biomase na negozdnih rabah tal

Zasnovali smo metodologijo, ki je mednarodno primerljiva in je bila prilagojena možnostim v raziskovalnem projektu (stroški, število sodelavcev in časovni roki). Primerjavo z drugimi državami smo naredili na podlagi poročil v akciji COST EU (Tomppo in sod., 2010), ki je bila namenjena harmonizaciji nacionalnih gozdnih inventur v Evropi. Po pregledu 37 poročil evropskih in držav po svetu (Brazilija, Kanada, ZDA, Japonska, Nova Zelandija, Koreja) smo iz različnih pristopov pri ocenjevanju drevnine in lesnatih rastlin na negozdnih zemljiščih povzeli najpogosteje uporabljene metodologije.

Kar 81 % držav, zajetih v primerjavi, za popise uporablja krožne ploskve, koncentrične krožne ploskve pa 27 držav med 37. V večini poročil je posebej izpostavljeno, da za prehod med ploskvami porabijo večino delovnega časa (npr. Švica 65 % časa, na Hrvaškem v eni uri popišejo skupino 4 koncentričnih krogov, za dostop pa potrebujejo 6 ur), zato je bolj razširjena uporaba klastrov vzorčnih ploskev, ki zmanjšajo število prehodov in tako povečajo učinkovitost dela. Ker je za Slovenijo značilna razdrobljena posest tudi na negozdnih zemljiščih, nismo uporabili klastrskega načina vzorčenja. Na sistematični vzorčni mreži smo na vsaki izbrani lokaciji postavili samo eno koncentrično skupino krožnih ploskev.

Predlagana metodologija temelji na sistematičnem dvofaznem vzorčenju. Prva faza vzorčenja je potekala na vzorčni mreži 4 x 4 km, nato pa na zgoščeni mreži 500 x 500 metrov. Metodologija je sestavljena iz terenskega dela in obdelave daljinsko pridobljenih podatkov (letalski posnetki). Terensko delo je zajemalo 60 vzorčnih mest, ki so bila slučajnostno izbrana na sistematični vzorčni mreži gostote 4 x 4 km. Ta mesta so bila analizirana tudi na letalskih posnetkih.



Slika 7: Skica koncentričnih krogov.

Ploskev

0,3 a r = 3,09 m število lesnatih rastlin $d_{1,3} > 0$ cm in višina na 0,5 m natančno

po debelinskih stopnjah 0 - 2,49 cm oznaka $d_{1,3}$ 2,5

2,5 - 4,9 cm 5

5,0 - 7,49 cm 7,5

7,5 – 9,9 cm 10

Za grmovnice s premerom $d_{1,3} \geq 10$ cm izmerimo premer.

2 a r = 7,98 m premer drevesnih vrst $d_{1,3} \geq 10$ cm

20 a r = 25,23 m premer drevesnih vrst $d_{1,3} \geq 30$ cm

Na vsaki ploskvi veliki 20 arov smo izbrali tri (3) najbližja drevesa s premerom $d_{1,3} \geq 10$ cm in jim izmerili višino. Za merjenje višin so tako lahko izbrana tudi tanjša drevesa, ki ne ležijo na 2 arski ploskvi. Podatke o drevesni vrsti, premeru in višini takih dreves napišemo na dno snemalnega lista in tako posebej opozorimo, da niso bila merjena na 2 arih, smo jih pa zajeli v vzorec za merjenje drevesnih višin. Podatke o višinah dreves s premerom $d_{1,3} \geq 30$ cm napišemo v vrstico na vrhu snemalnega lista, kjer smo že zapisali njihovo drevesno vrsto in premer ob merjenju na 20 arski ploskvi.

Z izborom treh najbližjih dreves na 20 arski ploskvi za merjenje višin bomo zagotovili v vzorcu tudi drevesa, ki sicer ne bi bila izbrana na 2 arih. To je posebej pomembno, ker je pričakovati, da bo na travnikih z lesnatimi rastlinami le malo dreves, ki so debelejša od 30 cm, tanjša drevesa pa merimo le na 2 arskih ploskvah. Tako bi se lahko zgodilo, da ne bi na ploskvah s tankim drevjem zajeli nobenega drevesa na 2 arih, čeprav so sicer pogosta na preostalem delu 20 arske ploskve. Z izborom 3 takih dreves za merjenje višin bo ta pomanjkljivost odpravljena.

Grmovnice in drevesa v liinijskih elementih (omejki, živice, obvodna vegetacija, drevoredi)

Slika 8: Primer ene izmed ploskev sistematične mreže 4x4 km.

Linijske elemente merimo posebej, če vsaj njihov del leži na ploskvi 20 arov. Na delu omejka, ki leži najbližje središču vzorčne ploskve, postavimo pravokotno ploskev. Na zgornji sliki bi bila krajša stranica pravokotnika usmerjena proti središču vzorčne ploskve.

Za lesnate rastline s premerom $d_{1,3} > 0$ cm naj bo pravokotnik velik 0,3 a oziroma 30 m^2.

Pri širini omejka na primer	20 m je dolžina pravokotnika	1,5 m
	15 m	2 m
	10 m	3 m
	5 m	6 m
	3 m	10 m
	1 m	30 m

Linijskih elementov, širokih 1 m, ni pričakovati. Če bo kakšen le zajet, verjetno ne bo težko prešteti število vej ali poganjkov na razdalji 30 m. Majhna vrbovja ob drenažnih jarkih bodo verjetno široka vsaj 2 m, zato bo štetje narejeno na dolžini 15 m.

Drevesne vrste s premerom $d_{1,3} \geq 10$ cm merimo v linijskih elementih na pravokotnikih s površino 2 arov oziroma 200 m^2.

Če je linijski element širok 20 m, je dolžina pravokotnika 10 m,
pri širini 15 m je dolžina 13,3 m,
pri širini 10 m je dolžina 20 m,
pri širini 5 m je dolžina 40 m.

Zelo ozke linijske elemente je pričakovati v mestih (mladi drevoredi), na območju vinogradov (na primer pletarske vrbe). Na dolžini 40 m ali celo več, če bi bili omejki še ožji od 5 m, ne bi bilo težko izmeriti premerov takih drevesnih vrst. Drevesa v linijskih elementih ne morejo biti izmerjena na dolžini, večji od premera 20 arske ploskve.

Drevesne vrste s premerom d1,3 ≥ 30 cm so v linijskih elementih zajete že na ploskvi s površino 20 arov. Izmerimo tista debelejša drevesa v linijskem elementu, ki ležijo na 20 arski ploskvi.

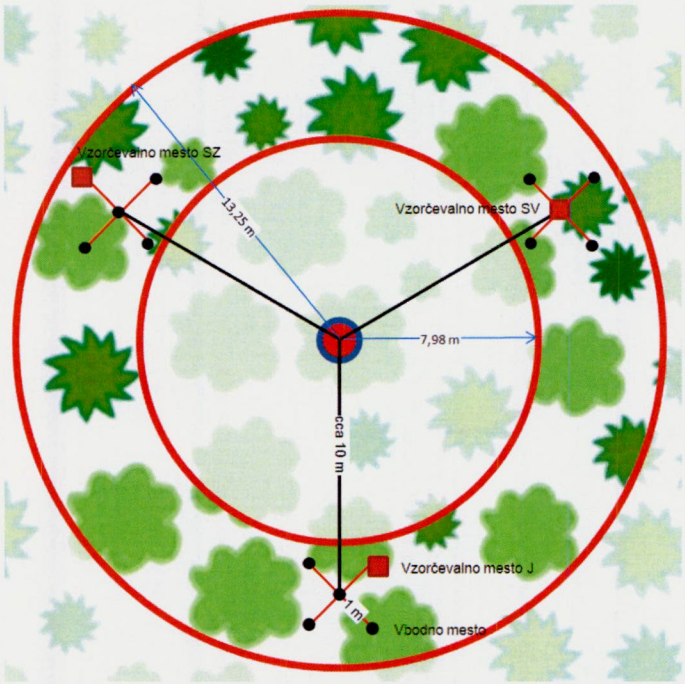
Podatke o drevesnih vrstah in grmovnicah v linijskih elementih pišemo v poseben snemalni list ali del snemalnega lista, da bodo linijski elementi jasno ločeni od podatkov za posamična drevesa, skupine dreves in majhnih zaplat. Ta drevesa bodo zajeta na koncentričnih krogih in obračunana ločeno od linijskih elementov.

V prilogi 8 je predstavljen snemalni list za terenski popis nadzemne biomase na negozdnih rabah tal.

Vzorčenje tal na negozdnih rabah tal

Vzorčenje na ploskvi

Na vzorčni ploskvi se talne vzorce odvzame na treh mestih, ki so cca. 10 m oddaljena od središča ploskve in sicer v smeri SZ, SV, in J. Kje natančno bomo na posameznem vzorčevalnem mestu (SZ, SV, J) odvzeli vzorec tal, se odločimo na podlagi sondiranja na vbodnih mestih (C, SV,SZ, JV, JZ). Vzorcev iste globine tal iz vzorčevalnih mest ne združujemo.



Slika 9: Tloris (skica) ploskve ter izbira vzorčevalnega mesta na reprezentativnem vbodnem mestu.

Osnovne definicije

Tla so naravna tvorba na površju zemeljske skorje, ki je nastala in se razvijala pod vplivom tlotvornih dejavnikov; matične podlage, klime, organizmov, reliefa in časa. Za gozdna tla so značilni ohranjeni talni horizonti ter zlasti z vidika poročanja pomemben opad.

Talni profil je navpični presek tal skozi vse talne horizonte do matične podlage.

Talni horizont je talni površini bolj ali manj vzporedna plast, nastala v procesu nastanka in razvoja tal. Od sosednjega talnega horizonta tal se razlikuje npr. po barvi, teksturi, strukturi, stopnji kislostih in/ali še po drugih (morfoloških, fizikalnih, kemičnih, bioloških) lastnostih.

Horizonte označimo s simboli, ki so sestavljeni iz ene velike črke (npr.: O, T, A, E, G), nekateri pa še z eno podpisano malo črko (npr.: $(B)_v$, B_t, B_h) ali dvema podpisanima malima črkama ($(B)_{rz}$, B_{fe}).

Razvrščanje tal - Pedološka klasifikacija razvršča tla na osnovi njihovega nastanka, razvoja, zgradbe in značilnih lastnosti v oddelke, razrede, tipe, podtipe, različice in oblike. V oddelek **avtomorfnih tal** naših gozdov (ta tla so nastala in se razvijala samo pod vplivom padavinske vode; prehajanje vode skozi njih je prosto, brez zastajanja) razvrščamo šest razredov tal: nerazvita, humusno akumulativna, kambična, izprana, antropogena in tehnogena tla. **Hidromorfna tla** so zaradi talne, površinske in/ali poplavne vode trajno do začasno mokra tla, ki imajo izražene znake prekomernega navlaževanja. Razvrščamo jih v pet razredov: v nerazvita hidromorfna tla, psevdoglejna, oglejena, šotna in antropogena hidromorfna tla.

Nadzemna biomasa je definirana kot biomasa vseh živih nadzemnih delov vključno z debli, panji, vejami, lubjem, semeni in krošnjami/listjem.

Podzemna biomasa predstavlja biomaso vseh živih korenin. Korenine tanjše od 2 mm se običajno izključi, saj jih empirično pogosto ne moremo ločiti od organske snovi v tleh in opada.

Kot **mrtev / odmrli les** je mišljena vsa odmrla lesna biomasa (stoječa, na površini tal ali v tleh) brez opada. Pod mrtev les štejemo les, ki leži na površini tal, mrtve korenine in panje premera 10 cm ali več oz. velikosti, kot je določena za posamezne države (IPCC 2003). Mrtev les predstavlja pestro skladišče z mnogimi praktičnimi težavami pri merjenju na terenu in negotovostmi glede stopenj prehoda v opad, tla ali emisije v atmosfero.

Opad je vsa neživa lesna biomasa s premerom, manjšim od mejne vrednosti, določene v posameznih državah (npr. < 10 cm), ki leži nad organskimi ali mineralnimi tlemi – vključuje odpadlo listje, fermentizirane in humificirane plasti. Žive tanke korenine, ki jih empirično ne moremo ločiti od opada, obravnavamo kot opad (IPCC 2003).

Organska snov v tleh (SOM) vključuje organski ogljik v mineralnih in organskih tleh (vključno s šoto) do določene globine, ki jo določi posamezna država in se jo uporablja v skladu s časovno vrsto. Žive drobne korenine (tanjše od predlagane omejitve premera za nadzemno biomaso) so vključene v organsko snov v tleh, če jih ni mogoče empirično razlikovati (IPCC 2006).

Predvidena dela za vzorčenje tal v letu 2012

Za vzorčenje tal se predvideva za izvedbo pedoloških del na terenu vsaj dva vzorčevalca, ki bosta v letu 2012 na vsakem od za vzorčenje tal izbranih traktih 4 × 4 km mreže:

- izbrala tri vzorčevalna mesta, od središča ploskve oddaljena 10 metrov (±1 m) v smereh jug (J), severovzhod (SV), severozahod (SZ);
- izvedla vzorčenje mineralnega dela tal z valjasto sondo na vsakem od treh vzorčevalnih mest;
- dostavila v plastične vrečke nabrane in ustrezno označene talne vzorce v laboratorij Gozdarskega inštituta Slovenije in ustrezno izpolnjen obrazec s podatki o vzorčevalnih mestih in talnih vzorcih.

Potrebna oprema za vzorčenje tal v letu 2012

Na terenu je za vzorčenje tal potrebno imeti:

- obrazec za vpis podatkov (Priloga 9);
- kompas, s katerim določimo smeri vzorčevalnih mest;
- merilni trak ali vrvico za izmero 10-metrske oddaljenosti vzorčevalnih;
- pedološko sondo ter meter za izmero globin tal;
- plastičen pladenj za nabiranje vzorcev ter plastične vrečke (3 in 5-kilogramske)
- jeklena cevasta sonda (dolžine 80 cm, premera 7 cm) za odvzem vzorcev mineralnega dela tal, ročaj za izvlek ter glava sonde, po kateri se tolče z batom;
- lesen bat za zabijanje cevaste sonde v tla
- krpa za čiščenje sonde,
- flomastre za označevanje globin 10 cm in 40 cm na valjasti sondi;
- pisala in obrazec za vpis podatkov o datumu vzorčenja, o ploskvi, o vzorčevalnih mestih in o odvzetih talnih vzorcih;
- etikete za vpis podatkov o datumu vzorčenja, o ploskvi, o vzorčevalnih mestih in o odvzetih talnih vzorcih;
- mrežaste vreče za prenos vrečk s talnimi vzorci.

V prilogi 9 je predstavljen Snemalni list za vzorčenje tal na negozdnih rabah tal.

1.2.4 Meritve na terenu

Popis drevnine na negozdnih rabah tal so izvedle štiri terenske ekipe GIS-a. Terenski popis je potekal jeseni 2012 in je bil zaključen 22. decembra 2012. Za lažjo orientacijo na terenu smo za vsako ploskev pripravili podroben zemljevid lokacije z označeno GPS lokacijo središča ploskve in popisne liste. Orientacija na terenu je potekala s pomočjo GPS naprave in atlasa Slovenije. V primeru, da je bila v bližini ploskve kakšna hiša smo pred terenskim delom svoje početje pojasnili stanovalcem.

1.3 Vnos meritev in priprava računalniške aplikacije za izračune zalog ogljika

Mitja Skudnik, mag. Špela Planinšek

1.3.1 Vnos meritev gozdne inventure in logična kontrola vnesenih podatkov

Septembra 2012 smo vzpostavili obširno podatkovno bazo, v katero se je vnašalo vse podatke ploskev, ki so bile v gozdu (opis dostopa do ploskve, splošni podatki o ploskvi, dendrometrijski podatki, popis odmrle drevesne biomase in popis tankega živega drevja). Povezava med posameznimi bazami je vedno zaporedna številka ploskve (ZST). Pri splošnih podatkih za ploskev ter podatkih za drevje so bili iz baze za l. 2007 podatki avtomatsko preneseni že na popisne liste pred terenskim popisom in v novo bazo 2012 (npr. pri drevju: zaporedna številka drevesa, drevesna vrsta, azimut, razdalja, obseg iz leta 2007). Dne 9. 11. 2012 (po zaključku uradnega zaključka popisa dne 15. 10. 2012) so bili v vložišču GIS zbrani vsi popisni listi, vneseni so bili podatki za 90 % popisnih listov. Dne 28. 11. 2012 je bil vnos podatkov zaključen. V novembru in decembru 2012 je potekalo urejanje podatkovne baze o dostopih do vseh ploskev MGGE 2012. Dostopi so se v večini primerov izboljšali (boljša kakovost slik, optično shranjenih dokumentov, besedil), ponekod pa dostopov kljub pozivom še vedno nimamo.

Z željo po usklajenem preverjanju konsistentnosti zbirk podatkov MGGE 2012, smo decembra 2012 začeli sestavljati dokument z zbranimi logičnimi kontrolami podatkov. Logične kontrole so nanizane po vsebinskih sklopih kot poteka snemanje podatkov na terenu in jih tako sledimo tudi pri preverjanju zbirk podatkov. Vsebinsko je delo ločeno na:

- PRVO (rutinsko) preverjanje, ali je popisana vrednost (koda, merska enota, oblika zapisa) v skladu s predpisanimi nizom kod oz. možnim intervalom vrednosti (min, max) v priročniku za MGGE 2012,
- DRUGO (vsebinsko) preverjanje s pomočjo logičnih zank med »odvisnimi znaki« (npr. koda drevesa in obseg drevesa). Te temeljijo na načelu: če nek znak zavzame določeno vrednost oz. vrednosti z določenega intervala, mora tudi »odvisni« znak zavzeti določene vrednosti.

V decembru 2012 se je izvedel del prvega preverjanja podatkov za sklopa *opis dostopa do ploskve* in *splošni podatki o ploskvi.*

Pri preverjanju zbirke podatkov je treba imeti na razpolago najnovejši priročnik s kodami znakov, ki so veljale za popis ter popisne liste. Napake lahko nastanejo pri terenskem popisu ali pri vnosu podatkov v računalniško bazo. Predvsem na podlagi podatkov na popisnem listu je mogoče opredeliti, kje je do napake prišlo. Ob morebitni ugotovljeni napaki postopamo po dogovorjenih navodilih tj. se napaka v bazi oz. na popisnem listu popravi. Vsako popravek se zapiše v poseben dokument. To nam omogoča kasnejše sledenje popravkom.

1.3.2 Vnos meritev inventure na negozdnih rabah tal in logična kontrola vnesenih podatkov

Terenski vnosni obrazci za vseh 378 ploskev so bili pregledani in urejeni. Za vnos meritev (digitalni format) so bili konec decembra pripravljeni vnosni dokumenti. Vnos bo začel potekati predvidoma v mesecu februarju.

1.3.3 Priprava računalniške aplikacije za izračune zalog ogljika

V skladu z dogovorom z naročnikom, se je večji del aktivnosti prenesel v leto 2013. Konec leta 2012 se je oblikovala delovna skupina pod vodstvom doc. dr. Davida Hladnika.

1.3.4 Obdelava podatkov in interpretacija izračunov (preneseno v 2013)

V skladu z dogovorom z naročnikom, se je ta aktivnost prenesla v leto 2013.

1.4 Viri

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KOVAČ, Marko, BATIČ, Franc, KUŠAR, Gal, JAPELJ, Anže, SKUDNIK, Mitja, PLANINŠEK, Špela. Monitoring gozdov in gozdnih ekosistemov : priročnik za terensko snemanje podatkov. Ljubljana: Gozdarski inštitut Slovenije, 2009. II, 38 stolp., ilustr. ISBN 978-961-6425-43-8. [COBISS.SI-ID 245158400]

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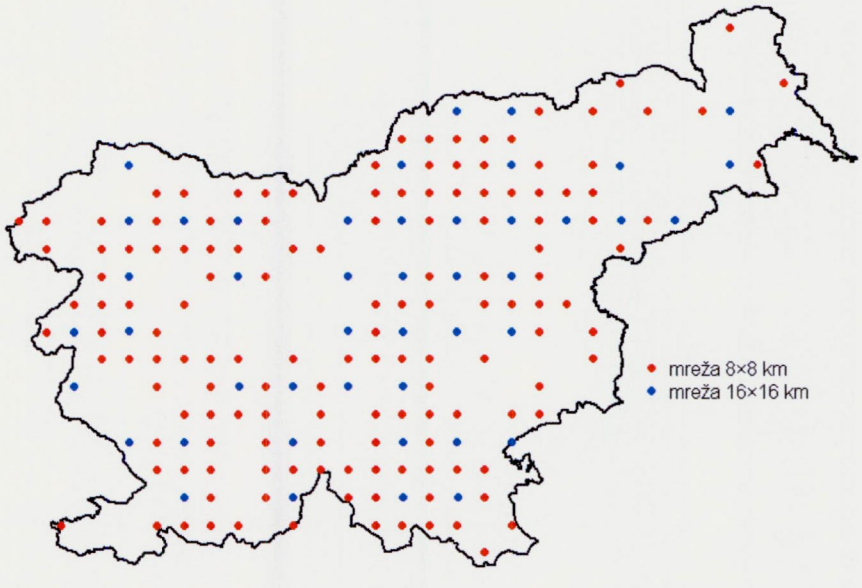
2 Zaloge ogljika in njihove spremembe v tleh in opadu

dr. Milan Kobal, dr. Primož Simončič, Daniel Žlindra

Obdelava rezultatov analiz ogljika v talnih vzorcih mreže 8x8 km: Izračun zaloge (organskega) ogljika v gozdnih tleh na ravni Slovenije iz podatkov 8 × 8 km mreže

V izračun zaloge ogljika v gozdnih tleh so vključeni podatki za 145 KPP ploskev 8 × 8 km mreže (podatkovna baza LGE GIS, n = 147), za dve točki (z oznako 3545 ter 7005) ni na voljo podatkov. V analizo niso bili vključeni podatki 16 × 16 km mreže (n = 45) (Slika 10). Vzorci so bili vzorčeni v l. 2007, analize ogljika in ostalih nujno potrebnih parametrov, pa so bili zaradi pomanjkanja namenskih sredstev postopoma izvedeni do vključno l. 2011. Podroben opis celotnega postopka je opisan v poročilu GIS za l. 2011 (ŽIŽEK, L. s sod. 2012. Izvajanje aktivnosti v povezavi z ocenami ponorov toplogrednih plinov za področje »Raba tal, spremembe rabe tal in gozdarstvo« (LULUCF) Končno poročilo), in sicer v prilogi »Vzorčenje tal na 8 × 8 kilometrski mreži velikoprostorskega popisa poškodovanosti gozdov in gozdnih ekosistemov v l. 2007« ter prilogi »Zaloge ogljika v opadu in mineralnem delu tal – zalogovnika »Litter« in »Organic Carbon in Mineral Soils« s ploskev 8 × 8 km mreže Slovenije«.

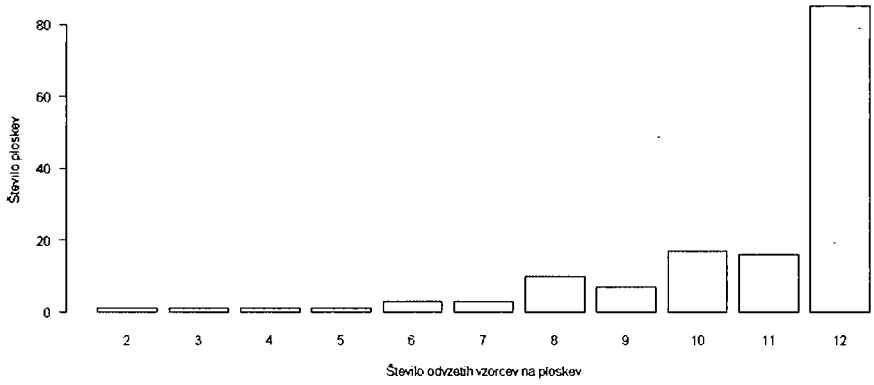


Slika 10: Vzorčne mreže na ravni Slovenije.

Na 85 ploskvah je bilo odvzetih vseh 12 vzorcev tal (3 × O_l, O_{fh}, M_{10} ter M_{40}), na 16 ploskvah je bilo odvzetih 11 vzorcev, ter na 17 ploskvah 10 (Slika 11). Skupno je bilo odvzetih 1562 vzorcev gozdnih

tal. Koncentracija organskega ogljika (*C_org*) se v analiziranih vzorcih giblje med 0.21 % ter 55.2 % (Slika 3), masa vzorca suhih tal pri 105°C (*Tla_105*) med 0.008 kg in 3.6795 kg, delež skeleta (*Skel_proc*) dosega vrednosti do 54,6 %, prav tako delež skeleta in korenina skupaj (*Proc*) dosega vrednost do 54,6 % (Slika 11).

```
     C_org            Tla_105          Skel_proc          Proc
Min.   : 0.2156   Min.   :0.000887   Min.   : 0.000   Min.   : 0.000
1st Qu.: 3.1809   1st Qu.:0.041702   1st Qu.: 0.000   1st Qu.: 0.000
Median :13.2080   Median :0.206251   Median : 0.000   Median : 0.000
Mean   :20.8350   Mean   :0.345441   Mean   : 3.038   Mean   : 3.104
3rd Qu.:41.2491   3rd Qu.:0.459298   3rd Qu.: 2.598   3rd Qu.: 2.727
Max.   :55.2143   Max.   :3.679471   Max.   :54.567   Max.   :54.567
```



Slika 11: Število odvzetih vzorcev tal na ploskev.

REZULTATI

Podane se povprečne vrednosti (aritmetična sredina) ter 95 % interval zaupanja.

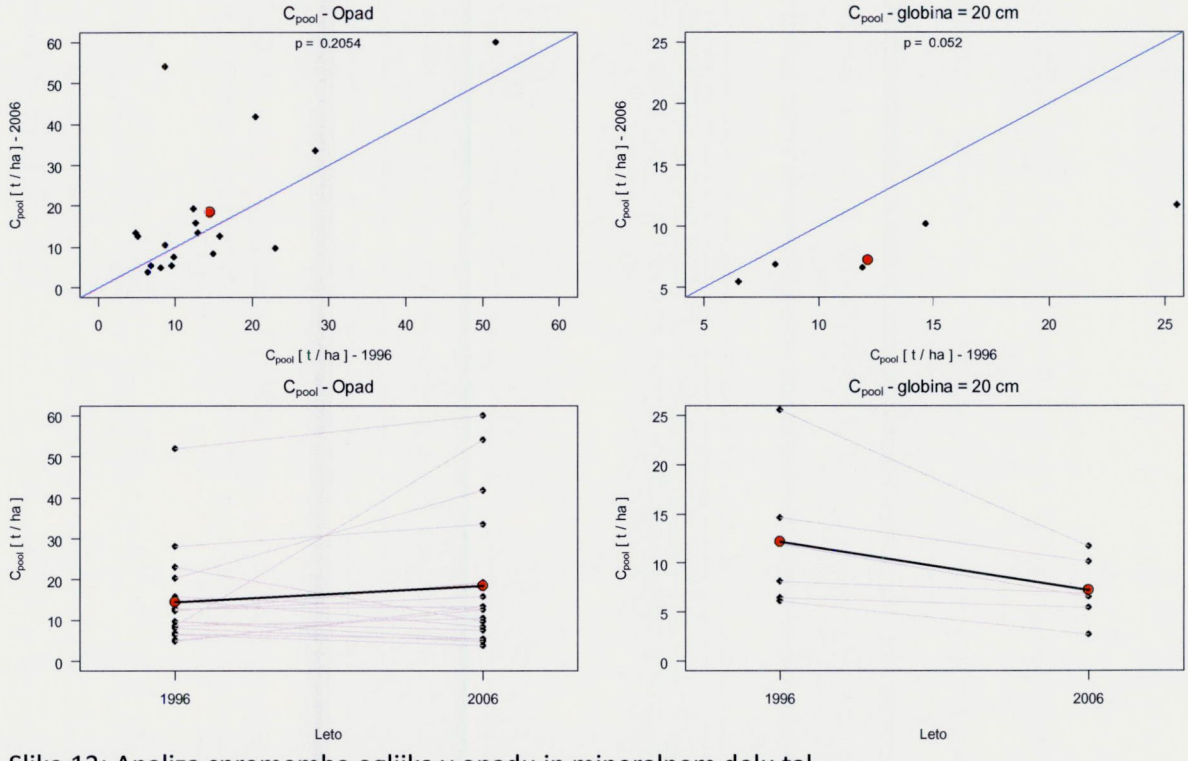
- Povprečna zaloga ogljika v O_l horizontu (n = 143) je 1.44 ± 0.15 t/ha.
- Povprečna zaloga ogljika v O_{fh} horizontu (n = 145) je 8.85 ± 1.42 t/ha.
- Povprečna zaloga ogljika v $O_l + O_{fh}$ horizontu (n = 143) je 10.41 ± 1.50 t/ha.
- Povprečna zaloga organskega ogljika v plasti M_{10} (n = 141) je 35.25 ± 2.06 t/ha.
- Povprečna zaloga organskega ogljika v plasti M_{40} horizontu (n = 136) je 68.32 ± 6.22 t/ha.
- Povprečna zaloga ogljika v globini do 40 cm (n = 136) je 103.31 ± 7.90 t/ha.

2.2 Rezultati analize zaloge ogljika v gozdnih tleh

2.2.1 Podatki ploskev nacionalne 16 x 16km mreže za ogljik v gozdnih tleh zA l. 2006/07 ter 1995/96

Za analizo spremembe količine Corg v **opadu** med leti 1996 in 2006 je bilo vključenih 18 lokacij. Povprečna (povprečje ± sd) vsebnost količine Corg leta 1996 je 14.47 ± 11.28 tC/ha, leta 2006 pa 18.43 ± 17.14 tC/ha. Povprečna letna sprememba je 0.40 ± 1.28 tC/ha in je statistično neznačilna (p = 0.2054).

Za analizo spremembe količine Corg v **mineralnem delu tal** do globine 20 cm med leti 1996 in 2006 je bilo vključenih 6 lokacij. Povprečna (povprečje ± sd) vsebnost količine Corg leta 1996 je 12.16 ± 7.33 tC/ha, leta 2006 pa 7.28 ± 3.23 tC/ha. Povprečna letna sprememba je -0.49 ± 0.47 tC/ha in je statistično neznačilna (p = 0.0520).

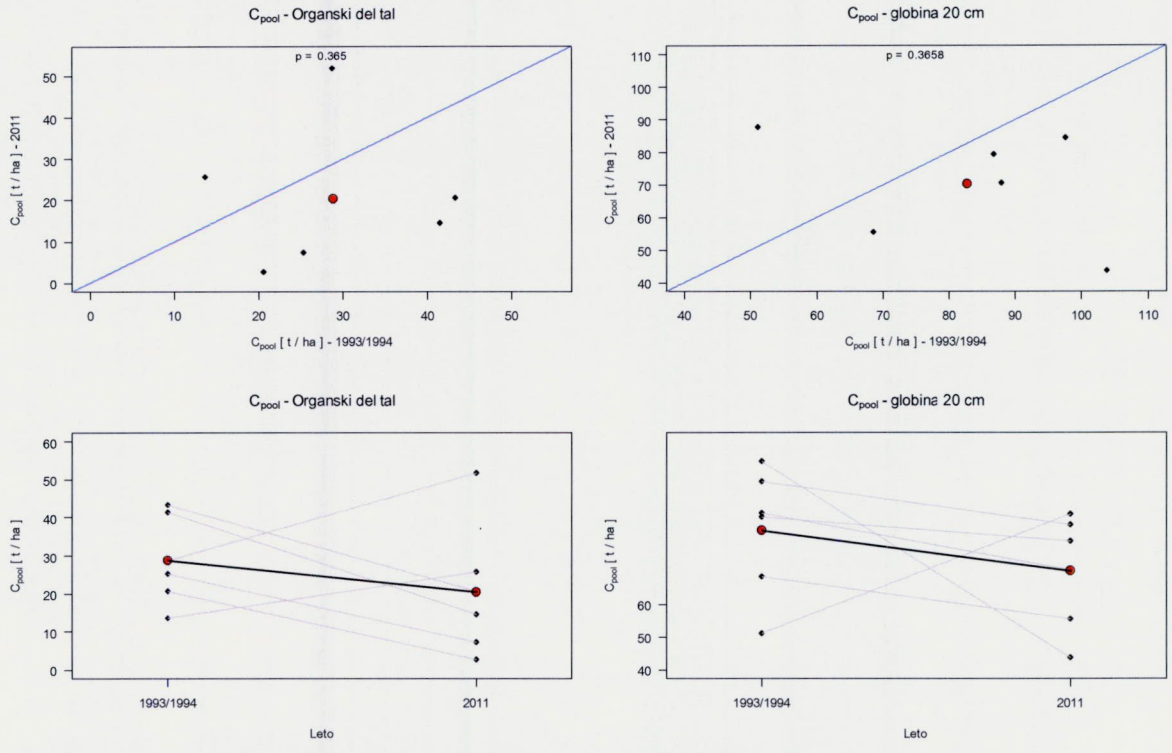


Slika 12: Analiza spremembe ogljika v opadu in mineralnem delu tal.

2.2.2 Analiza vzorcev s trajnih objektov (vzorčenje izvedeno okt. in nov. 2011): Podatki hektarskih ploskev za ogljik v gozdnih tleh za 1993/94 in 2012

Za analizo spremembe količine Corg v **opadu** med leti 1993/1994 in 2011 je bilo vključenih 6 lokacij. Povprečna (povprečje ± sd) vsebnost količine Corg leta 1993/1994 je 28.83 ± 11.88 tC/ha, leta 2011 pa 20.43 ± 17.50 tC/ha. Povprečna letna sprememba je -0.48 ± 1.98 tC/ha in je statistično neznačilna (p = 0.3650).

Za analizo spremembe količine Corg v **mineralnem delu tal** do globine 20 cm med leti 1993/1994 in 2011 je bilo vključenih 6 lokacij. Povprečna (povprečje ± sd) vsebnost količine Corg leta 1993/1994 je 82.67 ± 19.56 tC/ha, leta 2011 pa 70.20 ± 17.36 tC/ha. Povprečna letna sprememba je -0.74 ± 1.77 tC/ha in je statistično neznačilna (p = 0.3658).



Slika 13: Analiza spremembe ogljika v opadu in mineralnem delu tal

Rezultati analize zaloge ogljika v gozdnih tleh (na 6 stalnih objektih)

Analiza vzorcev s trajnih objektov (vzorčenje izvedeno okt. in nov. 2011)

Za potrebe analize zaloge ogljika v gozdnih tleh smo v oktobru 2011 obiskali 6 stalnih vzorčnih ploskev GIS in vzorčili tla po enakih protokolih kot je bilo to opravljeno že leta 1993/94. Vzorčenje je potekalo po genetskih horizontih (organska plast) in vnaprej določenih globinah (mineralna plast). Te globine so bile: 0 do 10 cm, 10 do 20 cm, 20 do 40 cm, 40 do 60 cm in 60 do 80 cm. Na štirih ploskvah je potekalo vzorčenje do globine 60 cm, na dveh pa do 40 cm oziroma do 80 cm. Ploskve, datumi vzorčenja, število vzorcev in tipi vzorcev so navedeni v Tabeli 6.

Tabela 6: Vzorčenje na stalnih vzorčnih ploskvah Gozdarskega inštituta Slovenije.

Ploskev	Datum ponovnega vzorčenja	Število vzorcev	Globina
Prednji Vrh (bukev)	13. 10. 2011	28	60 cm
Prednji Vrh (smreka)	13. 10. 2011	30	60 cm
Polom	14. 10. 2011	63	60 cm
Krakovski gozd	17. 10. 2011	30	60 cm
Osankarica-Pohorje	18. 10. 2011	26	40 cm
Cigonca	18. 10. 2011	93	80 cm

Za potrebe določitve zaloge ogljika v tleh je bilo potrebno izvesti naslednje fizikalno-kemijske analize: masa svežega vzorca, vsebnost vode v svežem vzorcu, masa skeleta, masa korenin, masa zračno-suhega vzorca, vsebnost vode v zračno suhem vzorcu, pH vrednost v suspenziji z 0,01 M $CaCl_2$, vsebnost skupnega ogljika (C), vsebnost mineralnega ogljika (v karbonatni obliki – $CaCO_3$). Vse fizikalno-kemijske analize so bile izvedene v Laboratoriju za gozdno ekologijo Gozdarskega inštituta Slovenije v času od novembra 2011 do avgusta 2012. Vsega skupaj je bilo v LGE analiziranih 270 vzorcev, ki so bili vzorčeni v letu 2011. Poleg tega smo ponovili analize vzorcev iz leta 1993/94, saj vzorce hranimo v arhivu vzorcev. Prav tako smo imeli shranjene tudi vrednosti analiz iz let 1993 in 1994. Tako smo lahko na podlagi na novo izmerjenih vrednosti določili tudi odvisnost rezultata od merilnega inštrumenta. Namreč, od leta 1994 do danes so se v LGE zamenjali vsi inštrumenti, s katerimi so bile opravljene prej naštete analize.

2.2.3 Podatki modela YASOO07 za ogljik v gozdnih tleh – raziskovalni objekt Brdo

Podatki modela YASOO07 za ogljik v gozdnih tleh – raziskovalni objekt brdo

Uvod

Gozdovi, ki prekrivajo 61,1 % ± 0,7 % površine celotne Slovenije (Hladnik in Žižek, 2012), lahko delujejo kot vir ali ponor organskega ogljika C_{org} (Liski s sod., 2006). Pomen gozdov kot skladišča (ponora) organskega ogljika je priznan / prepoznan v Okvirni konvenciji Združenih narodov (ZN) o spremembi podnebja (UNFCCC) ter v Kjotskem protokolu .
Gozdna tla se kot zbiralnik C_{org} v nacionalnih poročilih pojavijo v poglavju o zalogah C_{org} v opadu in poglavju o zalogah C_{org} mineralnem delu tal. Količina skladiščenega C_{org} v gozdnih tleh je prim,erljiva s količino C_{org}, vezanega v biomasi (Perruchoud et al., 2000). Kljub pomenu oz vlogi, ki jo gozdna tla imajo v samem Kjotskem protokolu, je težava zaradi pomanjkanja enotne metodologije spremljanja sprememb nežive organske snovi v tleh (Liski s sod., 2006). Tudi v nacionalnih popisih gozdov se sprememb ogljika v gozdnih tleh običajno ne meri (Tomppo s sod., 2010). Dodatno težavo pri vrednotenju sprememb količine C_{org} v gozdnih tleh predstavlja prostorska variabilnost gozdnih rastišč, saj so pričakovane časovne spremembe manjše od prostorske variabilnosti zaloge C_{org} v gozdovih (Liski 1995; Liski s sod., 1998; ICP Forests, EP Soil, Tuomi s sod., 2011). Alternativo rešitev predstavljajo modeli, ki se pogosto uporabljajo za oceno zaloge C_{org} v gozdnih tleh in njihove spremembe (Peltoniemi s sod., 2006; Peltoniemi s sod., 2007; Mäkipää s sod., 2008).

Obstaja večje število dinamičnih modelov kroženja C_{org} v tleh, ki se uporabljajo v okviru spremljanja sprememb C_{org}, npr. CENTURY (Parton s sod., 1987), RothC (Coleman in Jenkinson, 1996); SOILN (Eckersten in Beier, 1998); ROMUL (Chertov s sod., 2001), Yasso oziroma novejša različica Yasso07 (Liski s sod., 2005; Tuomi s sod., 2009) ter ANAFORE (Deckmyn s sod., 2008). Modeli se med seboj razlikujejo v kompleksnosti in količini vhodnih podatkov (Peltoniemi et al., 2007). Tako veljata Yasso07 in RothC za preprosta modela, medtem ko predstavlja npr. ROMUL bolj zapleten model kroženja C_{org} v gozdnih tleh z večjim številom zahtevanih vhodnih podatkov.

Namen prispevka je na ploskvi "Brdo", ki je vključena v mrežo intenzivnega spremljanja stanja gozdov v Sloveniji od leta 2003 (GIS 2011; http://www.gozdis.si/fileadmin/user_upload/publikacije/zgibankemonitoring/Zgibanka%20Monitoring%20gozdov.pdf), poskusno pognati model Yasso07 in primerjati ocene sprememb količine organske snovi v tleh glede na različne spremembe temperature zraka ter količine padavin v prihodnosti.

Materiali in metode

Ploskev Brdo

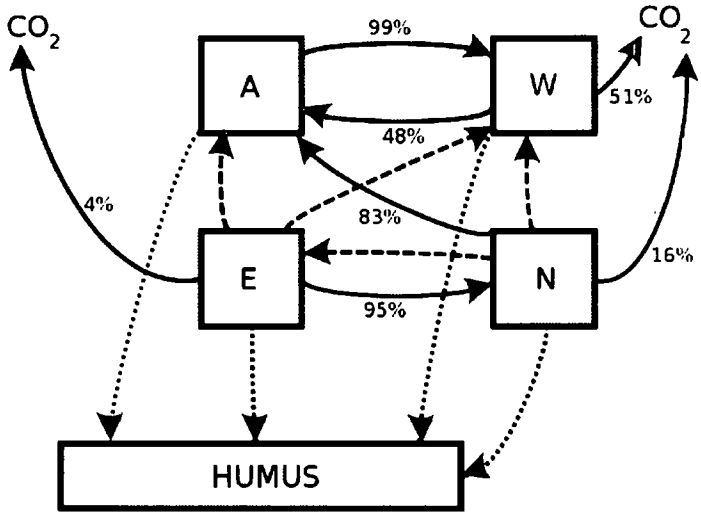
Ploskev Brdo je ena od desetih ploskev intenzivnega spremljanja stanja gozdov v Sloveniji (raven II) in se nahaja znotraj posestva Brdo pri Kranju (http://www.brdo.si/). Osnovana je bila leta 2003 na površini 1 ha. Osrednji del ploskev, kjer potekajo intenzivnejše meritve (glej Poročilo projektne naloge..., 2011) meri 50 × 50 m. Matična podlaga je prodni zasip, tla so distrična rjava. Na ploskvi je prisoten drugotni kisloljubni gozd rdečega bora (*Pinus sylvestris*) z borovnico (*Vaccinio myrtilli - Pinetum*); tekom stoletij je bil namreč domnevno prvotni gozd gradna in belega gabra z borovnico degradiran zaradi stalnega steljarjenja, pretiranega odpiranja gozdnih sestojev in izsekavanja

listavcev. V močno spremenjenih razmerah se je delež listavcev zmanjševal, danes na ploskvi prevladuje rdeči bora, graden, pravi kostanja in smreka so prisotni le posamič. Povprečna starost dreves na ploskvi je okoli 120 let.

Model Yasso 07

Model Yasso07 je model kroženje organske snovi v gozdnih tleh (Tuomi et al. 2009, 2011) in je nadgrajena različica predhodnega modela Yasso (Liski et al. 2005), saj je bil razvit na večjem številu vhodnih podatkov ter deluje z uporabo bolj naprednih matematičnih metod (Tuomi et al. 2008). Model Yasso07 temelji na štirih predpostavkah razgradnje organske snovi (Tuomi et al. 2009, 2011) in sicer:

1. ne-lesni opad sestavljajo štiri skupine snovi (AWEN spojine): spojine topne v nepolarnih topilih, etanolu ali diklorometanu (označujemo z E), vodotopne snovi (označujemo z W), snovi, ki hidrolizirajo v kislinah (označujemo z A) ter nevodotopne snovi, ki ne hidrolizirajo (označujemo z N). Vsaka skupina ima svojo stopnjo / hitrost izgube mase (ang.: *mass loss rate*) neodvisno od izvora opada. Te skupine spojin imenujemo labilne skupine.
2. stopnja izgube mase posamezne skupine spojin je odvisna od klimatskih razmer, ki jih lahko enostavno opišemo s podatki o temperaturi zraka in podatki o padavinah.
3. razgradnja posameznih skupin spojin povzroči izgubo mase iz sistema in iz snovnih tokov med posameznimi skupinami spojin. Izguba mase omenjenih štirih skupin spojin rezultira v tvorbi na razgradnjo bolj odpornega humusa (H).
4. razgradnja lesa / lesnatih ostankov je počasnejša kot razgradnja ne-lesnega opada in je odvisna od velikosti lesnatih delov.



Slika 14: Shema modela Yasso07. Kroženje ogljika med AWEN spojinami in humusom. Pikaste puščice pomenijo majhne tokove (približno 0,5 %), črtkane statistično neznačilne tokove.

Ker je izhod modela Yasso07 skupna količina organskega ogljika do globine 1 m, vključno z ogljikom v odmrlem lesu, v pod-horizontih Ol, Of in Oh ter organski snovi v mineralnem delu tal, rezultati modela niso primerni za ločevanje na zalogo v mrtvem lesu, opadu ter organski snovi v tleh.

Priprava vhodnih podatkov za Yasso07

Za zagon modela Yasso07 potrebujemo podatke o količini in kakovosti vnosov organske snovi v tla, podatke o temperaturi in padavinah ter podatke o začetki količini C_{org} v tleh.

Podatki o vnosu organske snovi v tla

Predpostavili smo, da lahko na ploskvi Brdo organska snov prihaja v tla iz šestih različnih virov:

- ne-lesni opad nad zemljo, npr. odpadlo listje oz. odpadle iglice;
- lesni opad nad zemljo manjših dimenzij, npr. veje in vejice;
- lesni opad nad zemljo večjih dimenzij, npr. debla podrtih dreves
- ne-lesni opad pod zemljo, npr. drobne korenine;
- lesni opad pod zemljo manjših dimenzij, npr. korenine;
- lesni opad pod zemljo večjih dimenzij, npr. panji;

Ker za ploskev Brdo podatkov o vnosu organske snovi v tla nimamo, smo vnose prevzeli iz literature oz. smo jih izračunali podobno kot v primerljivih poročilih (Finish GHG report). Najprej smo s pomočjo ekspanzijskih faktorjev za rdeči bor (Lehtonen s sod., 2004) na podlagi volumna posameznega drevesa izračunali količino suhe snovi za posamezne dele posameznega drevesa ter jih na koncu preračunali na površino 1 ha (v t/ha). Količino drobnih korenine smo povzeli po Makkonen in Helmisaari (2001). Nato smo iz literaturnih podatkov (Finish GHG report) prevzeli delež posameznega dela drevesa, ki vsako leto odmre oz. postane vir organske snovi v tla ($opad_{vnos}$) in sicer na podlagi količine taistega vira (W_i) ter letno produkcijo opada (r_i) po enačbi $opad_{vnos} = r_i \times W_i$. Delež C_{org} v posameznem delu drevesa smo povzeli po Jenssens s sod. (1998). Posamezni podatki so predstavljeni v Tabela 7.

Tabela 7: Podatki o suhi masi (t/ha), letni produkciji opada r_i ter vnosu v tla (t/ha/leto oz tC/ha/leto) za posamezne dele drevesa.

	Debla	**Listje**	**Veje**	**Odmrle veje**	**Panji**	**Debele korenine**	**Korenine**	**Drobne korenine**
Suha masa [t/ha]	73.20	26.48	23.94	4.78	9.86	8.22	17.15	0.86
r_i	0.00	0.25	0.02	0.50	0.02	0.02	0.02	0.85
Vnos v tla [t/ha/leto]	0.00	6.49	0.48	2.39	0.20	0.15	0.32	0.00
Koncentracija C_{org} [%]	48.9	48.2	51.6	51.6	48.9	49.4	52.6	55.4
Vnos v tla [tC/ha/leto]	0.00	3.13	0.25	1.23	0.04	0.10	0.08	0.47
Vhod za Yasso07[tC/ha/leto]	**0.00**	**3.13**		**1.48**	**0.10**		**0.24**	**0.47**

Za lesni opad je v model Yasso07 potrebno podati tudi povprečno velikost in sicer premer. Za veje smo predpostavili, da znaša premer 2 cm; isti premer smo predpostavili tudi za korenine. Za panje smo prevzeli, da je povprečni premer 10 cm. AWEN spojine smo povzeli iz literature za rdeči bor.

Klimatski podatki

Za zagon model Yasso07 potrebuje podatke o povprečni mesečni oz. letni temperaturi zraka, povprečni amplitudi temperature (povprečna polovica razlike med najtoplejšim in najhladnejšim mesecem v letu) ter povprečni mesečni oz. letni količini padavin. Klimatske podatke smo pridobili iz spletne strani ARSO (http://meteo.arso.gov.si) in sicer za letališče Brnik za obdobje 1996 - 2011, ki se nahaja v neposredni bližini ploskev Brdo. Povprečna letna količina padavin znaša 1324,9 mm, povprečna letna temperatura je 9,3 °C, povprečna amplituda temperature pa je 11,3 °C. Povprečne mesečne vrednosti so prikazane v Tabela 8.

Tabela 8: Podatki o povprečni mesečni temperaturi zraka in količinah padavin za vremensko postajo Brnik za obdobje 1996 – 2011.

Mesec	Jan	Feb	Mar	Apr	Maj	Jun	Jul	Avg	Sep	Okt	Nov	Dec	Leto
Temperatura [°C]	-1.15	0.24	4.59	9.34	14.66	17.92	19.70	19.22	14.44	9.64	4.31	-0.52	**9.37**
Padavine [mm]	60.24	63.03	83.90	96.25	96.67	136.81	126.55	135.12	138.82	141.44	147.79	102.52	**1326.24**

Spremembe količine padavin in temperature zraka tekom 21. stoletja smo povzeli po projekcijah sprememb količine padavin ter povprečne temperature zraka, ki jih je za slovenijo izdelal Bergant (2003), in so že bili uporabljeni v gozdarstvu na primeru pričakovane prerazporeditve tipov vegetacije (Kutnar s sod., 2009). Njegovi izračuni kažejo predvsem izrazitejši dvig temperature zraka v topli polovici leta v primerjavi s hladno polovico leta ter zmanjšanje količine padavin v topli polovici leta in porast količine padavin v hladni polovici leta. Tekom 21. stoletja kaže na najbolj intenzivno ogrevanje poleti (junij – avgust; med 3,5 °C in 8 °C), temu pa sledijo zime (december – februar; med 3,5 °C in 7,5 °C), pomladi (marec – maj; med 2,5 °C in 6 °C) in jeseni (september – november; med 2,5 °C in 5 °C). Vsa odstopanja so izračunana glede na obdobje 1961-1990. V količini padavin ni ugotovil izrazitih sprememb spomladi in jeseni, medtem ko v zimskih mesecih (december – februar) kaže na porast količine padavin (med 0 % do 30 %), poleti pa na zmanjšanje (med -20 % in 0 %).

Za simulacijo sprememb količine organske snovi v tleh v prihodnosti smo oblikovali štiri scenarije, na podlagi intervalnih vrednosti za posamezno podnebno spremenljivko:

- Scenarij A temelji na minimalnem dvigu temperature ter maksimalnem zmanjšanju količine padavin;
- Scenarij B temelji na minimalnem dvigu temperature ter maksimalnem povečanju količine padavin;
- Scenarij C temelji na maksimalnem dvigu temperature ter maksimalnem zmanjšanju količine padavin;
- Scenarij D temelji na maksimalnem dvigih temperature ter maksimalnem povečanju količine padavin;

Klimatske podatke smo tekom 21. stoletja interpolirali in sicer po linearni zvezi tako, da npr. temperatura spomladi po scenariju C v stotih letih naraste za 6.0 °C.

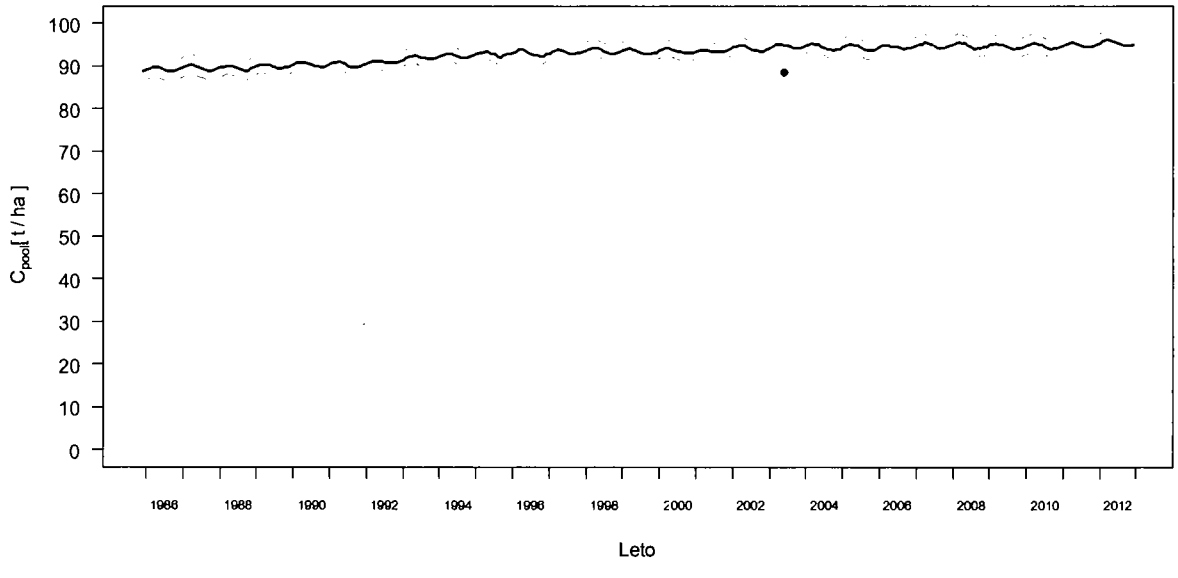
Tabela 9: Spremembe količine padavin in temperature zraka tekom 21. stoletja glede na različne podnebne scenarije.

Letni čas	Pomlad		Poletje		Jesen		Zima	
Spremenljivka	Temp.	Pada.	Temp.	Pada.	Temp.	Pada.	Temp.	Pada.
Scenarija A	+ 2.5°C	+ 0 %	+ 3.5°C	- 20 %	+ 2.5°C	+ 0 %	+ 3.5°C	± 0 %
Scenarija B	+ 2.5°C	+ 0 %	+ 3.5°C	± 0 %	+ 2.5°C	+ 0 %	+ 3.5°C	+ 30 %
Scenarija C	+ 6.0°C	+ 0 %	+ 8.0°C	- 20 %	+ 5.0°C	+ 0 %	+ 7.5°C	± 0 %
Scenarija D	+ 6.0°C	+ 0 %	+ 8.0°C	± 0 %	+ 5.0°C	+ 0 %	+ 7.5°C	+ 30 %

Začetna količina C_{org} v tleh

Za leto 2003 smo količino C_{org} v tleh na ploskvi Brdo izmerili v sklopu pedoloških preučevanj intenzivnega spremljanja stanja gozdov v Sloveniji in znaša 17.7 ± 3.1 tC/ha za organski del tal ter 70.6 ± 15.5 tC/ha za mineralni del tal, skupaj torej 88.6 ± 18.5 tC/ha. Dodatno smo izračunali uravnoteženo količino C_{org} v tleh za posamezne frakcije C_{org} tudi z uporabo modela Yasso07 in sicer glede na konstantni vnos opada ter povprečnih vrednosti klimatskih parametrov. Ravnotežne vrednosti so običajno doseže po 10.000 letih.

Z modelom smo izračunali spremembo C_{org} v tleh za ploskev Brdo. Podane se skupne vrednosti za **opad in organski del tal, do globine 1 m**. Na podlagi rezultatov modela sklepamo, da je v 27 letih (stanje januar 1986 – december 2012) količina C_{org} narastla iz 89.09 ± 2.33 tC/ha na 95.03 ± 1.13 tC/ha, povprečno 0.22 ± 0.05 tC/ha letno.

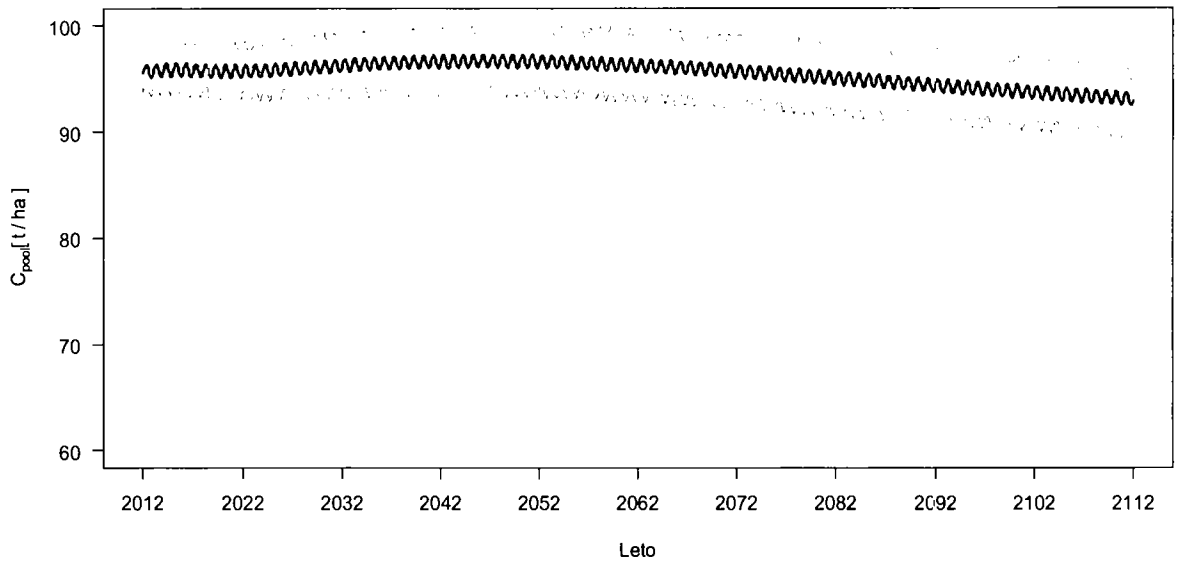


Slika 15: Sprememba zaloge C_{org} v tleh v obdobju 1986 – 2012, izračunana z modelom Yasso07 ob upoštevanju ocenjenega vnosa opada na ploskvi Brdo ter na podlagi klimatskih podatkov glavne meteorološke postaje Brnik. Rdeča točka označuje izmerjeno stanje na terenu leta 2003.

REZULTATI

Začetna ZALOGA C_{org} v tleh ter njeno spreminjanje ob nespremenjeni klimi

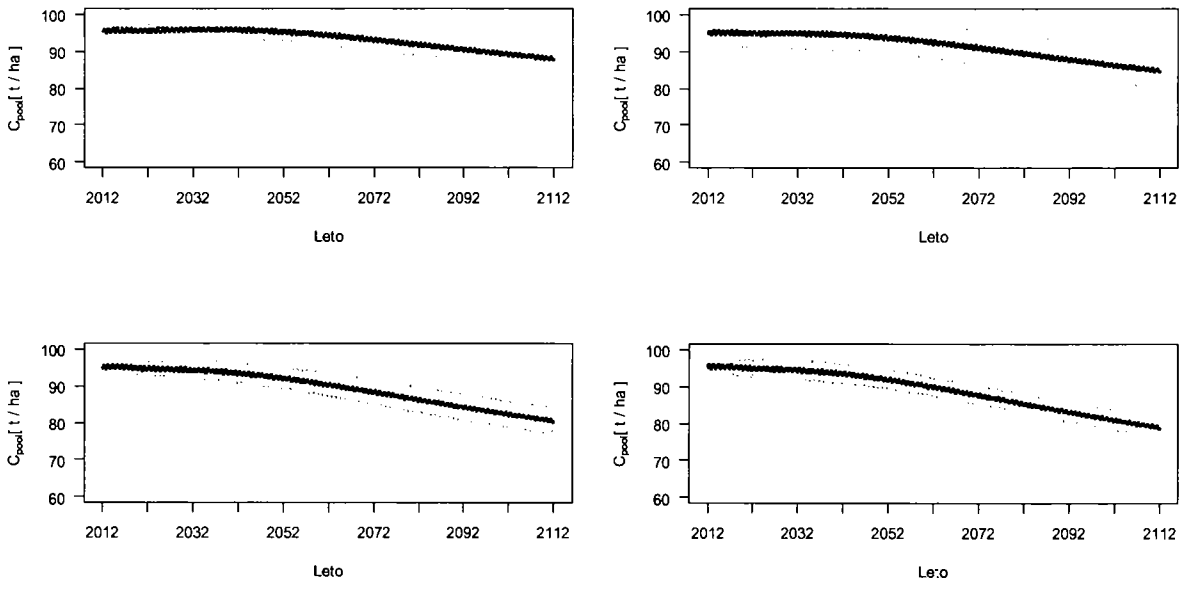
Izračunana zaloga C_{org} v tleh z uporabo modela Yasso07 za leto 2012 znaša 95.03 ± 1.13 tC/ha. Na sliki 3 je prikazano gibanje C_{org} v tleh do globine 1 m ob upoštevanju enake temperature in enake količine padavin kot znaša letno povprečje za obdobje 1.1.1986 – 31.12.2012 (Preglednica 2). Zaloga C_{org} v tleh najprej rahlo pade, potem naraste na največjo vrednost (97.23 tC/ha leta 2046) in nato konstantno pada (92.44 tC/ha leta 2112).



Slika 16: Sprememba zaloge C_{org} v tleh v času na ploskvi Brdo ob nespremenjeni klimi.

SPREMINAJNJE ZALOGE Corg v tleh glede na različne spremembe podnebnih scenarijev

Če upoštevamo scenarije podnebnih sprememb za Slovenijo lahko glede na napovedi modela Yasso07 opazimo, da se bo zaloga C_{org} v tleh na ploskvi Brdo v prihodnosti zmanjševala (Slika 4). Največje zmanjšanje je pričakovati v primeru spremembe temperature in količine padavin po scenariju D, ki predvideva maksimalno povečanje temperature v celotnem letu ter povečanje količine padavin v zimskem času (glej preglednico 3). Sledi zmanjšanje zaloga C_{org} v tleh, ki je predvideno po scenariju C – maksimalno povečanje temperature v celotnem letu ter zmanjšanje količine padavin v poletnih mesecih. Najmanjše zmanjšanje zaloge C_{org} v tleh na ploskvi Brdo, in sicer iz 96.46 tC/ha na 87.51 tC/ha v stotih letih, je predvideno v primeru uresničitve napovedi scenarija A, kjer je pričakovan dvig temperatur minimalen, poleti pa zmanjšanje padavin za 20 %.



Slika 17: Sprememba zaloge C_{org} v tleh v času na ploskvi Brdo glede na različne podnebne scenarije.

2.3 Določitev zalog ogljika v tleh za negozdne rabe tal – laboratorijske analize (deloma preneseno v 2013)

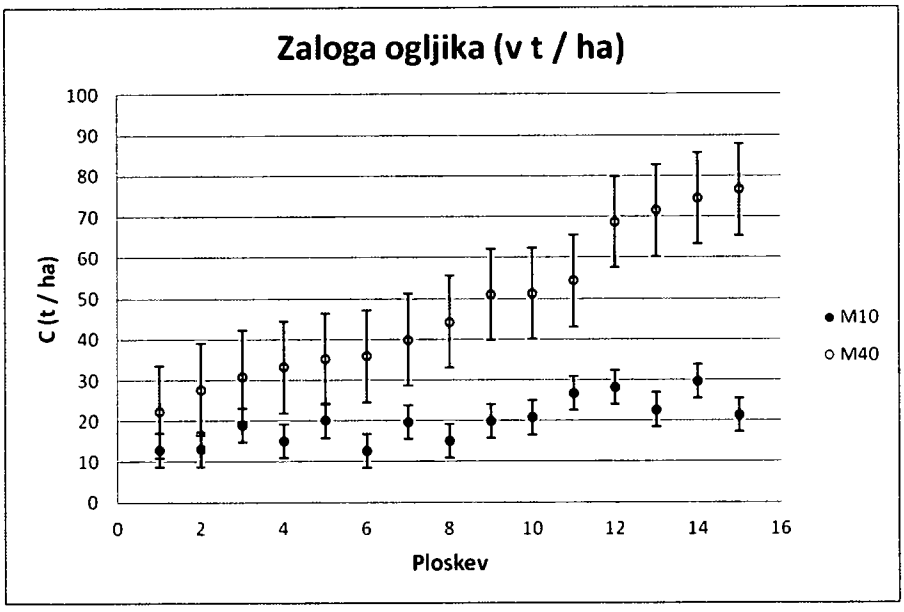
Za določitev zalog ogljika v tleh negozdne rabe je bilo določenih in predvidenih 61 točk s skupaj 366 vzorci (vsako ploskev smo razdelili na 3 podploskve s po dvema vzorcema: eden globine 0 - 10 cm, drugi od 10 do 40 cm). V jeseni 2012 je bilo v resnici na 60 točkah negozdnih površin skupaj odvzeto 345 vzorcev. Razlika je nastala zaradi same globine gozdnih tal, saj na nekaterih točkah tla niso bila povsod globoka vsaj 40 cm.

Ko so bili vzorci prineseni na Gozdarski inštitut Slovenije, smo jih v Laboratoriju za gozdno ekologijo (LGE) Gozdarskega inštituta Slovenije obravnavali po predpisanih protokolih. Vsak vzorec je dobil svojo evidenčno številko. Nato smo vzorce vsakega posebej stehtali, ga stresli na pladenj in mu gravimetrično določili vsebnost vlage. Vzorci so se sušili vsaj 7 dni na zraku. Ko so bili zračno suhi, smo izbrali korenine in večji skelet, ter jih presejali skozi nekovinsko 2 mm sito. Ostanek na situ se je dodal skeletu. Korenine smo posušili na 105 °C in jih stehtali. Skelet smo stehtali in mu z dodajanjem znane količine vode določili prostornino. Presejane zračno suho vzorce smo pretresli v prahovke in jim določili vsebnost vlage.

Naprej smo vzorcem določili pH vrednosti v suspenziji z 0,01 M $CaCl_2$, nato skupni ogljik, mineralni (karbonatni) ogljik in skupni dušik.

Zaradi težav z aparatom za določanje skupnega ogljika (LECO CNS-2000, v okvari, čakamo na rezervni del) smo do konca leta 2012 opravili v celoti predvidene analize samo na 92 vzorcih oz. vzorcih 15 vzorčenih ploskev.

Vrednosti ogljika so bile izračunane iz podatkov o masi presejanih tal, površini, globini in številu odvzemov ter analizirane vrednosti vsebnosti organskega ogljika v vzorcu. Iz omenjenih podatkov smo izračunali povprečno vrednost vsebnosti ogljika na ploskev. Za globino od 0 do 10 cm se zaloga ogljika giblje med 12,7 in 29,6 tonami na hektar, za globino od 10 do 40 cm pa je ta razpon večji, saj se vrednosti ogljika v tonah na hektar gibljejo od 22,3 do 76,6. Posamezne vrednosti so predstavljene na Slika 18, kjer so ploskve nanizane urejeno po vsebnosti ogljika v plasti M40.



Slika 18: Zaloga ogljika v plasti M10 in M40 po ploskvah s povprečnim standardnim odklonom analiz.

KONČNI REZULTATI

Podane so povprečne vrednosti (aritmetična sredina) ter 95 % interval zaupanja.

- Povprečna zaloga organskega ogljika v plasti M_{10} (n = 45) je 19.78 ± 4.17 t/ha.
- Povprečna zaloga organskega ogljika v plasti M_{40} horizontu (n = 45) je 47.80 ± 11.22 t/ha.
- Povprečna zaloga organskega ogljika v globini do 40 cm (n = 45) je 67.58 ± 7.90 t/ha.

2.4 Vključitev rezultatov analiz zalog ogljika v gozdnih tleh in opadu v izračune emisij

Izračuni in ocene analiz zalog ogljika za gozdna tla in opad v času so imeli različne rezultate glede na uporabljeni pristop, metodologijo.

V primeru uporabe modela Yasso07 so bile ocenjene spremembe vsebnosti – zaloge Corg v gozdnih tleh za ploskev Brdo pri Kranju. Podane se skupne vrednosti za opad in organski del tal, do globine 1 m. Na podlagi rezultatov modela sklepamo, da je v 27 letih (stanje januar 1986 – december 2012) količina Corg narastla iz 89.09 ± 2.33 tC/ha na 95.03 ± 1.13 tC/ha, povprečno 0.22 ± 0.05 tC/ha letno. Drugi pristopi, npr. uporaba analiznih rezultatov za gozdna tla za vzorce trajnih objektov (vzorčenje izvedeno okt. in nov. 2011 ter 1993/94) pa kaže za večino objektov na zmanjševanje zalog ogljika v gozdnih tleh. Glede na različne ocene sprememb zalog ogljika v tleh ta trenutek predlagamo, da se za letošnje poročilo uporabijo vrednosti, ki so bile uporabljene tudi v lasnkem poročilu. Analize naših in tujih podatkov za tla bomo intenzivno preučevali tudi v naslednjih mesecih. Predvidevamo, da ostajajo zaloge ogljika v gozdnih tleh v gozdovih s trajnostnim gospodarjenjem na podobni ravni, v določenih obdobjih po ukrepih (sečnja, nega...) se zmanjšajajo, nato pa zopet povečujejo.

3 Priprava poročil NIR za l. 2012 in deloma za l. 2013

Laura Žižek Kulovec, dr. Primož Simončič

3.1 Delovni obisk v Joint Research Center EU v Ispri v Italiji (7. in 8. maj 2012)

Na novembrski delavnici LULUCF v Bruslju, smo se z mednarodnima revizorjema dr. Giacomom Grassijem in dr. Viorel Blujdeaom iz Joint Research Centra dogovorili, da ju lahko Laura Žižek Kulovec spomladi 2012 obišče na delovnem obisku, kjer bi skupaj pregledali slovenske izračune toplogrednih plinov in emisij zaradi rabe tal, spremembe rabe tal in gozdarstva.

Delovni obisk v Joint Research Centru v Italiji (Ispra) je potekal 7. in 8. maja 2012. Z mednarodnima revizorjema dr. Grassijem in dr. Blujdeaom smo pregledali naše izračune emisij in ponorov. Največ pozornosti sta namenila matriki sprememb rab tal (land use change matrix), saj smo ugotovili, da je tu največji vir napak.

Pri izračunih moramo upoštevati 20-letno obdobje spremembe ene rabe tal v drugo. Tako se npr. površina gozda, ki so jo v nekem letu spremenili v travnik, v kategoriji 'forestland converted to grassland' nahaja 20 let, nato se jo vodi pod kategorijo 'grassland remaining grassland'. Emisije, ki nastanejo zaradi spremembe rabe tal – v nadzemni in podzemni biomasi, mrtvem letu in opadu, se evidentirajo v istem letu. Emisije, ki nastanejo v tleh, pa so postopne in sicer vsako leto 1/20 emisij. Opozorili so nas tudi na pomembnost virov podatkov, ki morajo biti pregledni, čimbolj konsistentni skozi čas in predvsem, primerljivi med seboj. Pravtako je pomembno, da so vsi podatki, ki so vključeni v izračune, tudi v besedilu poročila opremljeni z navedbo vira.

3.2 Izdelava letnega poročila NIR 2012 (poglavji 7. LULUCF in 11. KP-LULUCF)

Poglavji 7. LULUCF in 11. KP-LULUCF za National Inventory Report 2012 sta bili oddani 6. aprila 2012.

V skladu z dogovorom z revizorjema EU iz Joint Research Centra, da skupaj pregledamo izračune, večjih vsebinskih sprememb v primerjavi z NIR 2011 ni bilo. Izboljšani pa so bili izračuni emisij toplogrednih plinov, nastalih zaradi gozdnih požarov.

Priloga 10: National Inventory Report 2012, poglavji 7. LULUCF in 11. KP-LULUCF.

3.3 Izboljšanje metodologije in ažuriranje podatkov glede površin rabe tal in sprememb rab tal

Glede na ugotovitve revizorjev v JRC, je bila naša prednostna naloga lotiti se izboljšanja metodologije in ažuriranja podatkov o površinah rab tal in njihovih spremembah.

Rezultati dela so predstavljeni v prilogi 11: Izboljšanje metodologije in ažuriranje podatkov glede površin rabe tal in sprememb rab tal – rezultati.

3.4 Sodelovanje na delavnicah in strokovnih srečanjih v povezavi s poročanjem LULUCF.

Ekspertno srečanje za poročanje LULUCF (Working Group I), Bruselj, Belgija, 18. September2012

Working Group I – "Annual inventories" under the Climate Change Committee

Delavnice se je udeležil Primož Simončič (GIS).

Na srečanju ***Working Group I – "Annual inventories" under the Climate Change Committee, Expert Meeting on LULUCF Accounting***, ki je potekalo 18. septembra v Bruslju (Albert Borschette Conference Centre) so svoje poglede na problematiko poročanja predstavili Peter WEHRHEIM (Unit Climate Finance and Deforestation, DG Climate Action, EC, v drugem delu srečanja), Asger OLESEN (Policy Officer, EC), Giacomo GRASSI (Scientific Officer, JRC-EC), Paolo Carnivaro (Portugalsko poročanje za cropland in grassland),Steen GYLDENKÆRNE (Senior Researcher, University of Aarhus, National Environmental Research Institute - Accounting for agricultural lands in Denmark).

Na srečanju so bile odprte razprave glede težav, ki nastanejo pri t.i. obveznem poročanju za travišča in obdelovalne površine. Največ težav je pri natančnem poročanju glede obdelave obdelovalnih površin (v času, intenziteta, spremljanje po lokacijah...), različni so bili tudi finančni in strokovni vložki Portugalske in Danske v pripravo poročil. Predstavnik JRC je predlagal različne poenostavitve pri poročanju, npr. uporabo naslednjih priporočil:
1) IPCC allows a cost-effective and flexible reporting,e.g.the majority of the C pools can be estimated with tier 1. 2) MS do not start from zero: in most cases, CL/GL reporting is already a good starting point for accounting. 3) Large unexploited potential. Many of the potential challenges not addressed so far because there was no urgent need to do so, i.e. most of past efforts focused on forest activities. It is likely that in most MS there is large potential in terms of better analysis of already known national datasets and/or use of still largely unexploited EU datasets (e.g. LPIS and LUCAS).
4) Much time to improve. Given that the accounting will occur and the end of the accounting period, enough time is available to MS for improving estimates. Reporting is a learning-by-doing process.
5) A number of simplifying assumptions may be done if available data does not allow obtaining accurate estimates (e.g. for the base year). As long as these assumptions can be shown to be conservative, estimates shall be accepted for accounting purposes.

Priloga 12: Delavnica v Bruslju

Delavnica Združenih narodov, Bonn, Nemčija, 8.-10. oktober 2012

V začetku oktobra (8.-10. oktober 2012) je v prostorih Združenih narodov v Bonnu (Nemčiji) potekala delavnica: ***Workshop on the implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol.*** Delavnice sta se udeležili Tajda Mekinda-Majaron (ARSO) in Laura Žižek Kulovec (GIS).

Delavnica je bila namenjena pregledu in dopolnitvi besedil (Decisions), ki opredeljujejo obveznosti poročanja držav članic Konvencije (UNFCCC) in podpisnic Kjotskega protokola. Besedila, ki so opredeljevala pravila poročanja o emisijah toplogrednih plinov za prvo poročevalsko obdobje Kjotskega protokola (2008-2012, first commitment period, CP1), so bila dopolnjena s predlogi za besedila, ki bodo veljala za post-kjotsko obdobje (CP2) – glede na odločitve, ki so jih sprejeli na prejšnjem srečanju držav podpisnic, leta 2011 v Durbanu (JAR). Rezultati delavnice so bili osnova za končno oblikovanje besedila na Konferenci Združenih narodov o podnebnih spremembah, novembra 2012 v Dohi (Katar).

Priloga 13: Delavnica UNFCCC – Bonn, oktober 2012

3.5 Sodelovanje pri revizijah Sekretariata UNFCCC

Revizija poročila NIR 2012 je potekala konec avgusta in prvi teden v septembru preko elektronske pošte (centralized review). Prejeli smo dva sklopa vprašanj za LULUCF sektor. Prvi sklop (25. avgust 2012) je vseboval 12 vprašanj, drugi sklop (5. september 2012) pa 7 vprašanj. Na vsa vprašanja revizorjev smo odgovorili v predvidenem roku.

Priloga 14: Revizija Sekretariata UNFCCC, september 2012 – vprašanja in odgovori

3.6 Priprava izračunov za letno poročilo NIR 2013 in priprava CRF preglednic

Priloga 15: CRF preglednice za NIR 2013

3.7 Koordinacija vseh aktivnosti na GIS in z zunanjimi sodelavci in institucijami

Koordinacija dela na GIS je potekala med oddelki, znotraj oddelkov ter v sodelovanju z zunanjimi sodelavci Zavoda za gozdove Slovenije, strokovnjaki z Biotehniške fakultete, Oddelka za gozdarstvo in obnovljive gozdne vire, s strokovnjaki iz Kmetijskega inštituta Slovenije in z drugimi sodelavci.

Na Agenciji Republike Slovenije za okolje je potekala kontinuirana komunikacija s Tajdo Mekinda - Majaron, na MKO pa z mag. Janezom Zafranom. V tujini smo se povezali s strokovnjaki Joint Research

Centra (JRC, Ispra, Italija); sodelovali smo s predstavniki Hrvaške ter posredno sodelovali s predstavniki EU Cost akcije FP0803 »Belowground carbon turnover in European forests«, predvsem v povezavi z reševanjem problematike spremljanja zalog ogljika v gozdnih tleh (modeliranje zalog v tleh v času).

Koordinacija:
MKO, ARSO, Tajda Mekinda - Majaron
MKO, Krajnc Andrej
MKO, Zafran Janez
Kmetijski inštitut Slovenije (Verbič, Vrščaj)
Joint Research Centre, Italija, EU, (Viorel Blujdea, Giacomo Grassi)
Agencija za zaštitu okoliša (Hrvaška), Dino Križnjak
Institut Jožef Stefan, Center za energetsko učinkovitost, Česen Matjaž
Statistični urad Republike Slovenije
Sekretariat Združenih narodov

Cost Action (http://www.wsl.ch/fe/boden/ projekte/cost-action/mou-document.pdf)

Seznam prilog:

1. Predstavitev namena in posameznih sklopov terenskega popisa 2012 (PPT predstavitev)
2. Lista prisotnosti in seznam sodelujočih na uvajalnem seminarju (2 dni, uvajalni seminar in delavnica, junij 2012)
3. Terenski priročnik MGGE 2012
4. Pregledna karta ploskev na mreži 4x4 km
5. Članek v Gozdarskem vestniku (10/2012)
6. Potrdilo o udeležbi – vzorec
7. JRC navodila za 'Settlements'
8. Snemalni list za drevnino na negozdnih rabah tal
9. Snemalni list za vzorčenje tal na negozdnih rabah tal
10. NIR 2011 (poglavji 7 in 11)
11. Izboljšanje metodologije in ažuriranje podatkov glede površin rabe tal in sprememb rab tal – rezultati
12. Delavnica – Bruselj
13. Delavnica UNFCCC – Bonn, oktober 2012
14. Revizija Sekretariata UNFCCC, september 2012 – vprašanja in odgovori
15. CRF preglednice za NIR 2013

PRILOGA 1:

Predstavitev namena in posameznih sklopov terenskega popisa 2012 (PPT predstavitev)

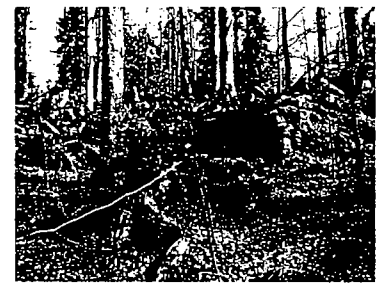
GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

Seminar in delavnica
Monitoring gozdov in gozdnih ekosistemov (MGGE 2012)

Ljubljana, 20. junij 2012

UVODNI DEL

Uvod in pozdravne besede organizatorjev seminarja

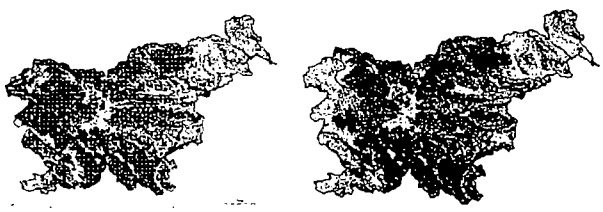


PREDSTAVITEV

Pomen monitoringa gozdov in gozdnih ekosistemov 2012 za Slovenijo
(dr. Marko Kovač)

SISTEMATIČNA MREŽA PLOSKEV 2012

- Sistematična vzorčna mreža na Slovenskem



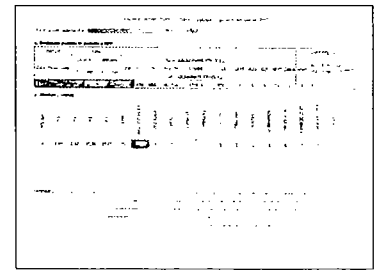
POTEK DELAVNICE

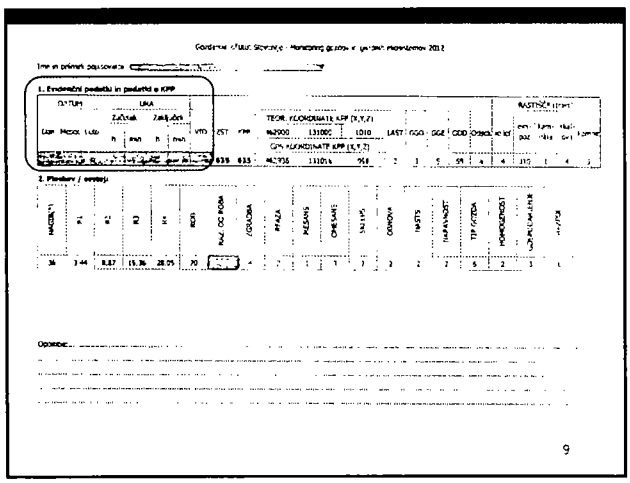
9:00	
9:15	
9:30	Predstavitev posameznih sklopov terenskega popisa 2012: -splošni opis znakov ploskve (**Laura Žižek Kulovec**), -dendrometrijski znaki snemani na ploskvi (**doc. dr. David Hladnik**), -snemanje odmrle biomase in tankega živega drevja (**Mitja Skudnik**), -funkcije gozdov (**Špela Planinšek**)
11:00	Odmor (malica in kava)
11:30	Odhod na vzorčne ploskve (Rožnik in Mostec) in delo po skupinah **(doc. dr. David Hladnik s sodelavci oddelka NMGK)**
15:00	Razprava in zaključki uvajalnega dne seminarja (**doc. dr. David Hladnik**)

SPLOŠNI OPIS ZNAKOV PLOSKVE

SPLOŠNI OPIS ZNAKOV PLOSKVE

- splošni opis znakov ploskve (**Laura Žižek Kulovec**)



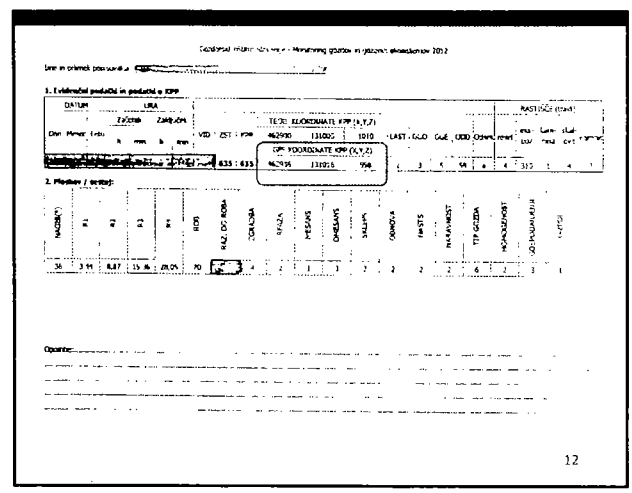


URA

- začetek in zaključek dela <u>na ploskvi</u>
- pod opombe: čas za prihod na ploskev

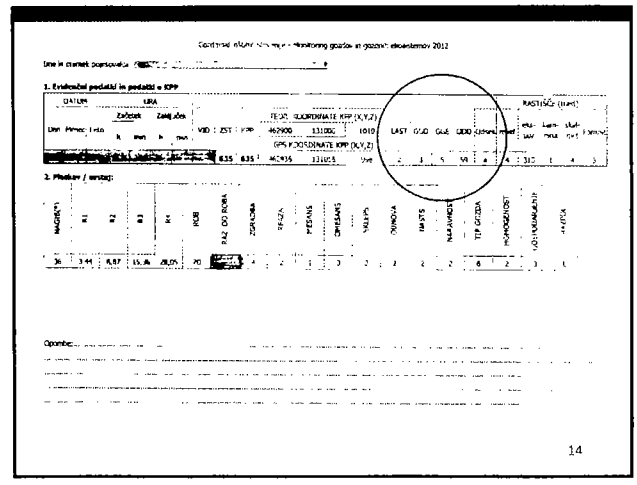
VIDLJIVOST

1) normalna
2) poslabšana



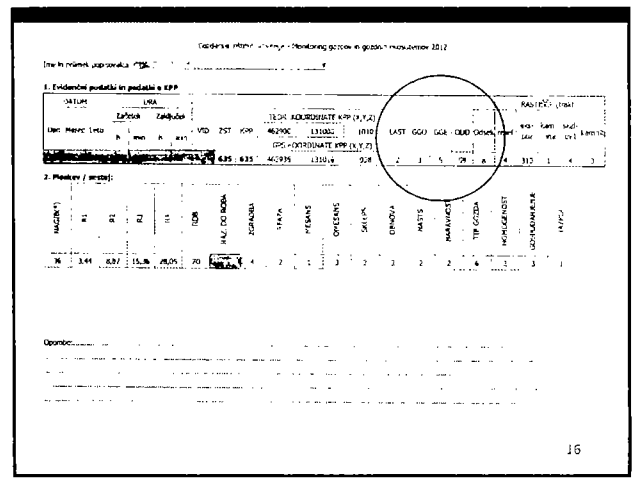
GPS KOORDINATE

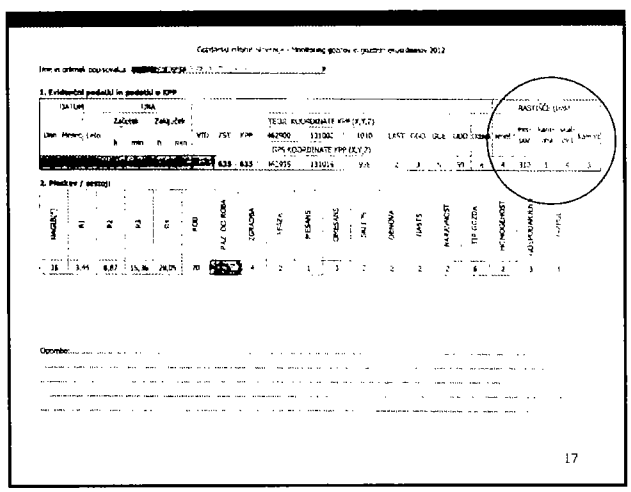
- dopolniti manjkajoče koordinate (0)



LASTNIŠTVO

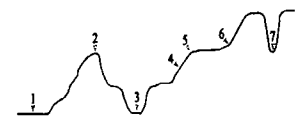
1) državno
2) zasebno
3) neznano





RELIEF

1) ravnina
2) vrh hriba, greben
3) dno kotanje
4) pobočje
5) konveksni prelom pobočja
6) konkavni prelom pobočja
7) jarek, ozka dolinica



EKSPOZICIJA

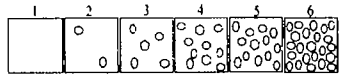
- Kot med nebesnim severom in smerjo padnice terena.
- Vpis odčitka na busoli na 5° natančno.

KAMNINA

1) karbonatna
2) nekarbonatna
3) mešana

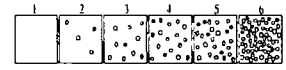
SKALOVITOST

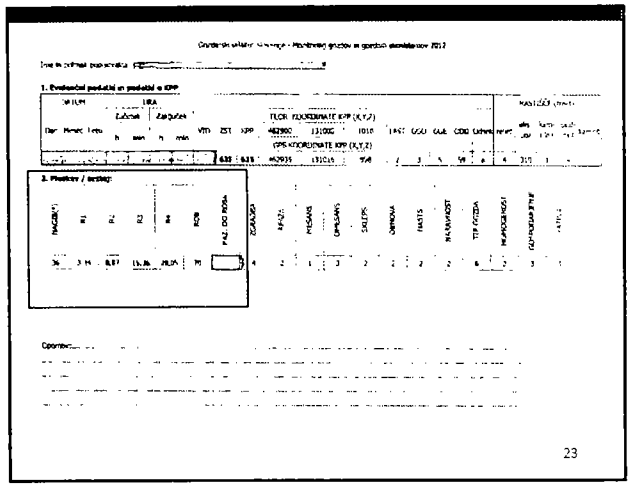
1) brez skal
2) posamične skale; $P_{sk} \leq 5$ %
3) majhna skalovitost; $P_{sk} = 6–25$ %
4) srednja skalovitost; $P_{sk} = 26–50$ %
5) velika skalovitost; $P_{sk} = 51–75$ %
6) izjemna skalovitost; $P_{sk} \geq 76$ %



KAMNITOST

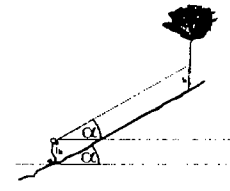
1) brez kamnov
2) posamični kamni; $P_{ka} \leq 5$ %
3) majhna kamnitost; $P_{ka} = 6–25$ %
4) srednja kamnitost; $P_{ka} = 26–50$ %
5) velika kamnitost; $P_{ka} = 51–75$ %
6) izjemna kamnitost; $P_{ka} \geq 76$ %



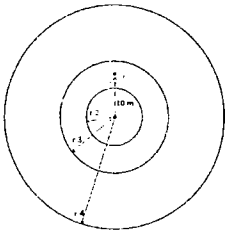


NAGIB

- v stopinjah [°]



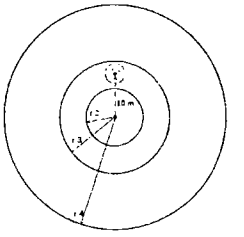
POLMERI – R1, R2, R3, R4



POLMERI – R1, R2, R3, R4

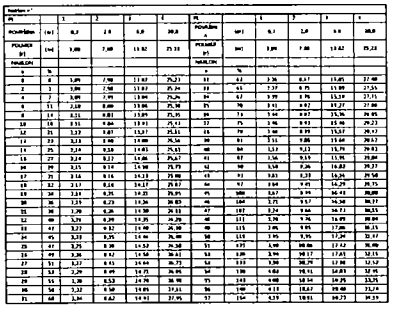
- R1 = 3,09 m (0,3 ar)
- R2 = 7,98 m (2,0 ar)
- R3 = 13,82 m (6,0 ar)
- R4 = 25,23 m (20,0 ar)

- ustrezna korekcija polmera glede na nagib



POLMERI – R1, R2, R3, R4

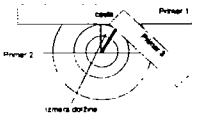
v prilogi priročnika



ROB

- Delež ploskve, ki leži v gozdu.

- v odstotkih [%]
- ocenjujemo na KPP 3
  - (R3 = 13,82 m)

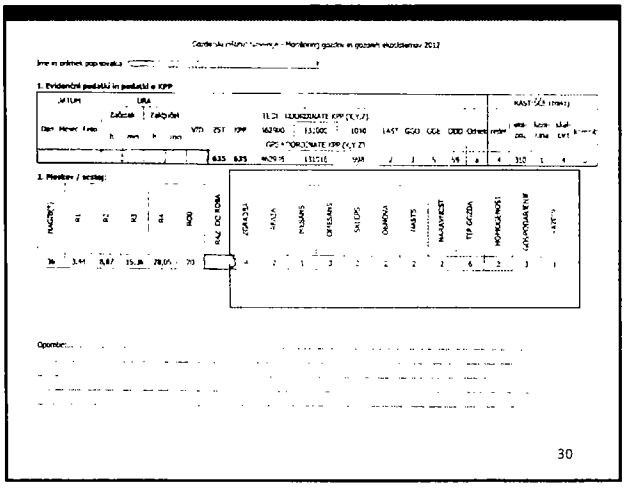


RAZDALJA DO ROBA

- Izmera razdalje do roba gozda v dm.

- Razdalja se vpiše na dm natančno
  (npr. 63 dm).

- Če je ploskev v celoti v gozdu, v obrazec napišemo 0.



ZGRADBA

1) prebiralna
2) kmečka (neprava) prebiralna
3) enomerna (enodobna) - visoki gozd
4) malopovršinska raznomerna (raznodobna)
5) velikopovršinska raznomerna (raznodobna)
6) dvoslojna
7) panjevec (nizki gozd)
8) grmičast gozd

RAZVOJNA FAZA

1) mladovje (mladje, gošča, letvenjak); $D < 10$ cm
2) tanjši drogovnjak; $10 \leq D < 20$ cm
3) močnejši drogovnjak; $20 \leq D < 30$ cm
4) tanjši debeljak; $30 \leq D_{dom} < 40$ cm
5) srednji debeljak; $40 \leq D_{dom} < 50$ cm
6) močnejši debeljak; $D_{dom} \geq 50$ cm
7) neopredeljena; vsi premeri

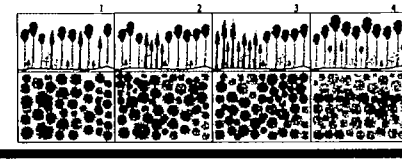
MEŠANOST SESTOJA

- Mešanost je mera za **površinski delež** (pokrovnost krošenj) drevesnih vrst v strehi sestoja.

1) iglavci; $P_{igl} > 75$ %
2) iglavci z listavci; $50 \leq P_{igl} \leq 75$ %
3) listavci z iglavci; $25 \leq P_{igl} < 50$ %
4) listavci; $P_{igl} < 25$ %

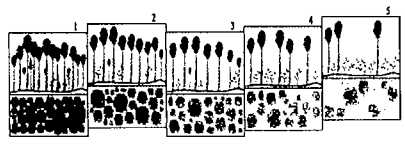
OBLIKA MEŠANOSTI SESTOJA

1) posamična
2) šopasta
3) skupinska
4) velikopovršinsko enaka



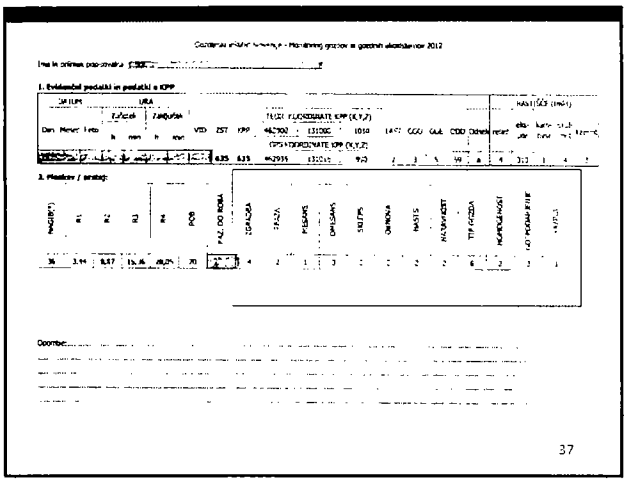
SKLEP SESTOJA

1) tesen
2) normalen
3) rahel
4) vrzelast
5) pretrgan



OBNOVA

1) sestoj ni v obnovi
2) sestoj je v obnovi



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NASTANEK SESTOJA

1) naraven
2) naraven/antropogen
3) antropogen
4) neznan

NARAVNOST

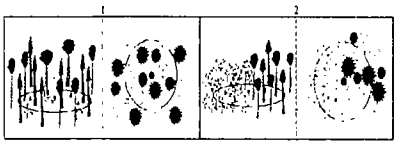
1) od človeka nemoten gozd
2) sonaravno gospodarjen gozd
3) gozd z izmenjano drevesno sestavo

TIP GOZDA

1) Hrastovi gozdovi
2) Gozdovi bukve in hrasta
3) Bukovi gozdovi
4) Drugi pretežno listnati gozdovi
5) Gozdovi bukve in jelke
6) Gozdovi bukve in smreke
7) Jelovi gozdovi
8) Smrekovi gozdovi
9) Borovi gozdovi
10) Rušje
11) Drugi pretežno iglasti gozdovi
12) Drugi gozdovi iglavcev in listavcev; vsi drugi gozdovi, ki niso uvrščeni v eno izmed predhodnih kategorij.

HOMOGENOST

1) celotna ploskev leži v istem sestoju
2) ploskev leži na meji vsaj dveh različnih sestojev

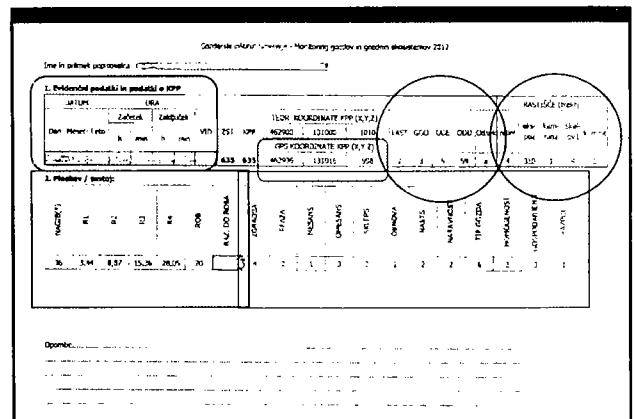


GOSPODARJENJE

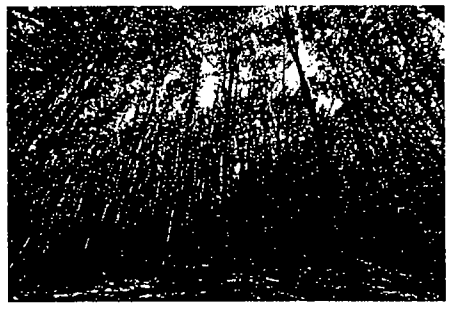
1) negospodarjeno (npr. pragozd)
2) gospodarjenje opuščeno (npr. mreža rezervatov, osnovanih pred 20 leti)
3) gospodarjeno (tudi gospodarski gozd, kjer se trenutno ne gospodari – ni vidnih znakov sečenj)
4) ni mogoče opredeliti

RAZPOLOŽLJIVOST

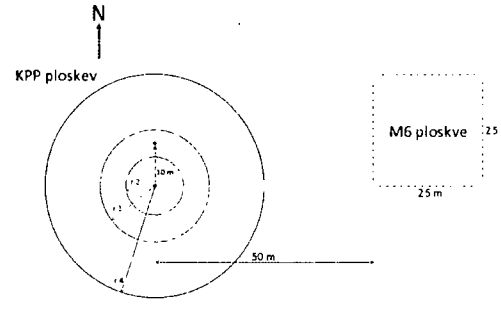
1) večnamenski gozdovi
2) gozdovi s posebnim namenom (ukrepi dovoljeni)
3) gozdovi s posebnim namenom (ukrepi niso dovoljeni)
4) varovalni gozdovi
5) neznano



DREVJE



Dendrometrijski znaki na vzorčnih ploskvah
doc. dr. David Hladnik



• Koncentrične krožne ploskve

Preglednica 1: Osnovni podatki o KPP z sekatorimi mejnimi vrednostmi

Znak ploskve	KPP1	KPP2	KPP3	KPP4
Polmer ploskve [m]	3,09	7,98	13,82	25,23
Površina ploskve [ar]	0,3	2,0	6,0	20,0
Lastnosti rastišča	kamnitost, skalovitost, nagib ploskve, ...			
Lastnosti sestoja	razvojna faza, mešanost, sklep, ...			
Stoječe živo drevje	$D_{1,3} > 0$ cm H ≥ 1,3 m, po višinskih razredih	$D_{1,3} \geq 10$ cm	$D_{1,3} \geq 30$ cm	/
Stoječe odmrlo drevje (sušice)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Ležeče odmrlo drevje (podrtke)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Panj, štor (ang.: *stump*)	D ≥10 cm H ≥ 20 cm		/	
Štrcelj (ang.: *snag*)	D ≥ 10 cm H ≥ 50 cm		D ≥ 30 cm H ≥ 50 cm	
Kos drevesa (veja, del debla ipd.)	D ≥ 10 cm L ≥ 50 cm		D ≥ 30 cm L ≥ 50 cm	

• Povečani polmeri na pobočju

Naklon v °

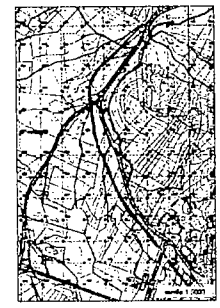
PL		1	2	3	4	PL		1	2	3	4
POVRŠINA	[ar]	0,3	2,0	6,0	20,0	POVRŠINA	[ar]	0,3	2,0	6,0	20,0
POLMER (r)	(m)	3,09	7,98	13,82	25,23	POLMER (r)	(m)	3,09	7,98	13,82	25,23
NAKLON						NAKLON					
α	%					α	%				
0	0	3,09	7,98	13,82	25,23	32	62	3,36	8,67	15,01	27,40
2	3	3,09	7,98	13,82	25,24	33	65	3,37	8,71	15,09	27,55
4	7	3,09	7,99	13,84	25,26	34	67	3,39	8,76	15,18	27,71
6	11	3,10	8,00	13,86	25,30	35	70	3,41	8,82	15,27	27,88
8	14	3,11	8,02	13,89	25,35	36	73	3,44	8,87	15,36	28,05

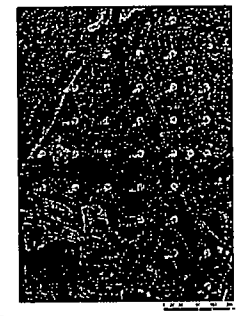
- Dendrometrijski znaki na vzorčnih ploskvah

Šifrant za meritve dreves:

Merimo: (KPP2: $D_{1,3} \geq 10$ cm; KPP3: $D_{1,3} \geq 30$ cm)
- ZSD – zaporedna številka drevesa
- DV – drevesna vrsta, šifrant
- AZM – azimut v °
- DIST – razdalja v dm
- STARI OBSEG
- NOVI OBSEG – v cm
- KODA:
- SOCIALNI POLOŽAJ
- Hd – dominantna višina - 3. in 4. najdebelejše drevo na ploskvi v m, na dm natančno

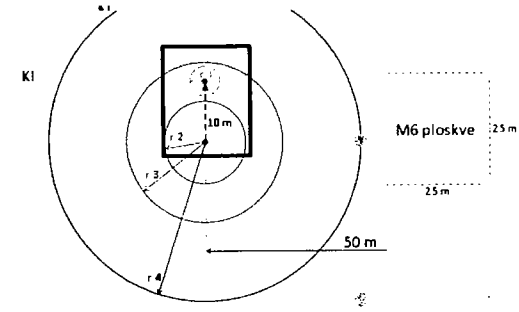
- Priprava na terenski popis in merjenje





TANKO ŽIVO DREVJE

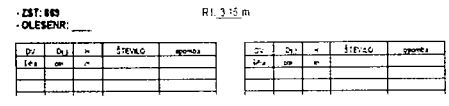
TANKO ŽIVO DREVJE



TANKO ŽIVO DREVJE

Znak ploskve	KPP1	KPP2	KPP3	KPP4
Polmer ploskve [m]	3,09	7,98	13,82	25,23
Površina ploskve [arov]	0,3	2,0	6,0	20,0
Lastnosti rastišča	kamnitost, skalovitost, nagib ploskve, ...			
Lastnosti sestoja	razvojna faza, mešanost, sklep, ...			
Stoječe živo drevje	$0 < D_{1,3} < 10$ cm $H \geq 1,3$ m, po višinskih razredih	$D_{1,3} \geq 10$ cm	$D_{1,3} \geq 30$ cm	/
Stoječe odmrlo drevje (sušice)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Ležeče odmrlo drevje (podrtice)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Panj, štor (ang.: *stump*)	D ≥10 cm H ≥ 20 cm		/	
Štrcelj (ang.: *snag*)	D ≥ 10 cm H ≥ 50 cm		D ≥ 30 cm H ≥ 50 cm	
Kos drevesa (veja, del debla ipd.)	D ≥ 10 cm L ≥ 50 cm		D ≥ 30 cm L ≥ 50 cm	

TANKO ŽIVO DREVJE



ZNAKI, KI SE MERIJO NA KPP 1:

1. OLESENR – število dodatnih drevesnih vrst
2. DV – drevesna vrsta drevesca (tanko živo drevje)
3. D1,3 – prsni premer drevesca (na 0.5 cm)
4. H – višina drevesca (na 0.5 m)

ODMRLA LESNA BIOMASA

ODMRLA LESNA BIOMASA

Znak ploskve	KPP1	KPP2	KPP3	KPP4
Polmer ploskve [m]	3,09	7,98	13,82	25,23
Površina ploskve [arov]	0,3	2,0	6,0	20,0
Lastnosti rastišča	kamnitost, skalovitost, nagib ploskve, ...			
Lastnosti sestoja	razvojna faza, mešanost, sklep, ...			
Stoječe živo drevje	$0 < D_{1,3} < 10$ cm $H \geq 1,3$ m, so višinsko razredi	$D_{1,3} \geq 10$ cm	$D_{1,3} \geq 30$ cm	/
Stoječe odmrlo drevje (sušice)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Ležeče odmrlo drevje (podrtice)	$D_{1,3} \geq 10$ cm		$D_{1,3} \geq 30$ cm	
Panj, štor (ang.: *stump*)	D ≥10 cm H ≥ 20 cm		/	
Štrcelj (ang.: *snag*)	D ≥ 10 cm H ≥ 50 cm		D ≥ 30 cm H ≥ 50 cm	
Kos drevesa (veja, del debla ipd.)	D ≥ 10 cm L ≥ 50 cm		D ≥ 30 cm L ≥ 50 cm	

ODMRLA LESNA BIOMASA

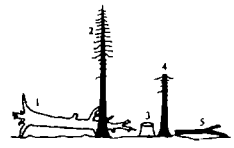
ZST: 889 R4 25,73 m

TIP	DV	$D_{1,3}$	H	D	L	RAZK	Opombe
kos	kos	cm	m	cm	m	kos	

TIP	DV	$D_{1,3}$	H	D	L	RAZK	Opombe
kos	kos	cm	m	cm	m	kos	

TIP ODMRLE LESNE BIOMASE:

1. Ležeče odmrlo drevo (podrtica).
2. Stoječe odmrlo drevo (sušica).
3. Panj (štor).
4. Štrcelj.
5. Lesni kos
6. ~~Akumulacija sečnih ostankov (kup vej – gozdni red)~~



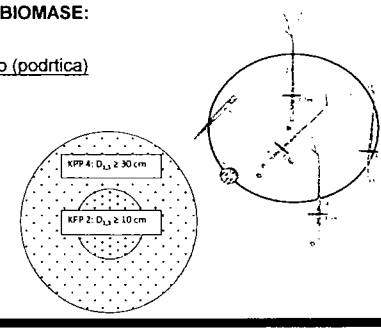
ODMRLA LESNA BIOMASA

TIP ODMRLE LESNE BIOMASE:

1. Ležeče odmrlo drevo (podrtica)

IZMERJENI ZNAKI:

- *DV*
- $D_{1,3}$
- *RAZKROJENOST*



ODMRLA LESNA BIOMASA

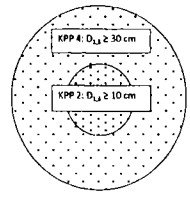
TIP ODMRLE LESNE BIOMASE:

2. Stoječe odmrlo drevo (sušica).

Samo sušice, ki se niso posušile v obdobju 2007 do 2012! Te so že evidentirane na popisnem listu drevje.

IZMERJENI ZNAKI:

- *DV*
- $D_{1,3}$
- *RAZKROJENOST*



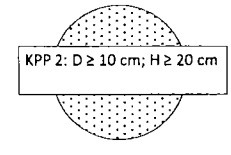
ODMRLA LESNA BIOMASA

TIP ODMRLE LESNE BIOMASE:

3. Panj (štor)

IZMERJENI ZNAKI:

- *DV*
- *H - višina*
- *D – srednji premer*
- *RAZKROJENOST*

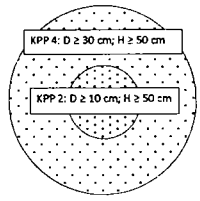


ODMRLA LESNA BIOMASA

TIP ODMRLE LESNE BIOMASE:

4. Štrcelj

IZMERJENI ZNAKI:
- *DV*
- *H - višina*
- *D – srednji premer*
- *RAZKROJENOST*

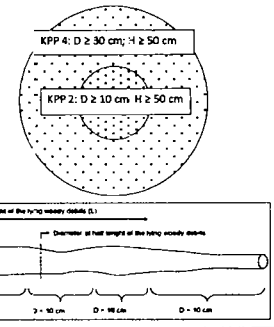


ODMRLA LESNA BIOMASA

TIP ODMRLE LESNE BIOMASE:

5. Lesni kos

IZMERJEN ZNAKI:
- *DV*
- *D – srednji premer*
- *L - dolžina*
- *RAZKROJENOST*

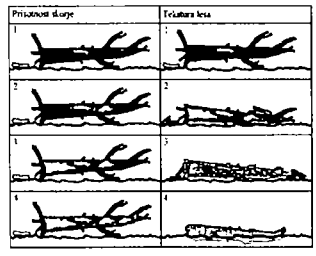


ODMRLA LESNA BIOMASA

RAZKROJENOST

Prisotnost skorje:
1. *≥ 90 %*
2. *90–61 %*
3. *60–31 %*
4. *≤ 30 %*

Tekstura lesa:
1. *≥ 90 % – popolnoma trdo*
2. *90–61 % – večinoma trdo*
3. *60–31 % – večinoma mehko*
4. *≤ 30 % – popolnoma mehko*



FUNKCIJE GOZDOV

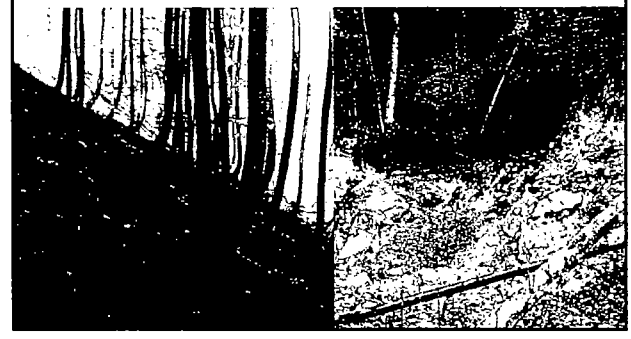
FUNKCIJE GOZDOV

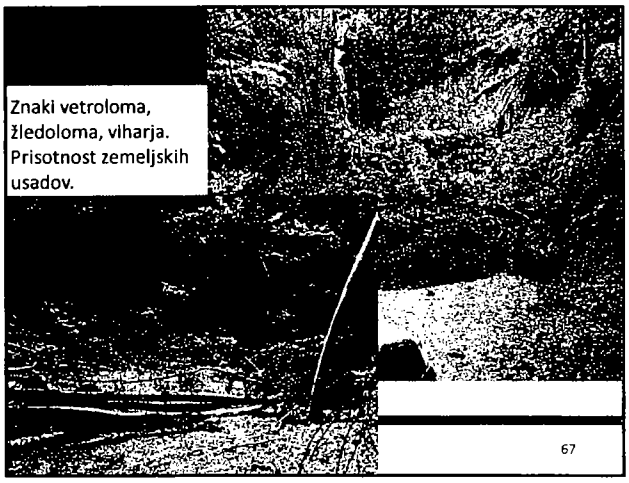
Kazalci vezani na KPP4
(najširše območje ploskve MGGE, r =25,23 m; 20 arov):

Skalni podori in kamninski plazovi
Vodna erozija
Prisotnost zemeljskih plazov ali usadov
Prisotnost počasnih premikov snežne odeje
Prisotnost snežnih plazov
Prisotnost poškodb drevja zaradi požarov
Znaki vetroloma, žledoloma, viharja
Prisotnost habitatnega drevja
Prisotnost rekreacijskih objektov

FUNKCIJE GOZDOV (PRIMERI)

Prisotnost zemeljskih plazov ali usadov
Prisotnost počasnih premikov snežne odeje





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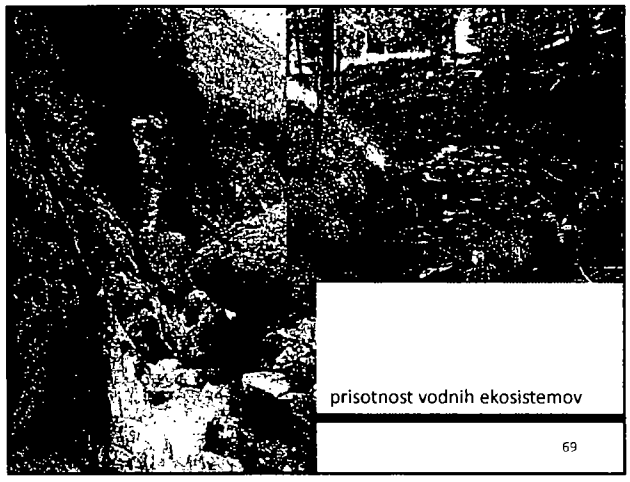
FUNKCIJE GOZDOV

Kazalci, ki jih spremljamo na poti od avtomobila do ploskve:

-prisotnost rekreacijskih objektov
-onesnaževanje in druge antropogene motnje
-akumulacije lesa
-plodonosne drevesne vrste
-prisotnost vodnih ekosistemov

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE



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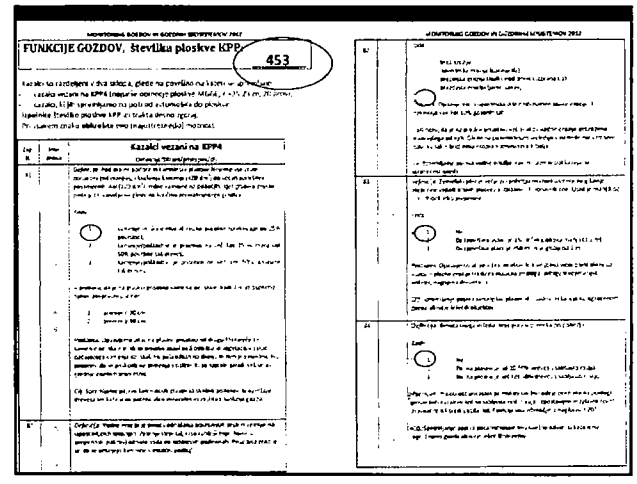

TERENSKO DELO
SREDA, 20. 6. 2012

Terenski del bo potekal v Mostecu, neposredno ob parkiriščih ZOO. Tja se bomo odpravili peš izpred GISa. Vzemite svojo opremo in malico.

11:30	Odhod na vzorčne ploskve (Rožnik in Mostec) in delo po skupinah **(doc. dr. David Hladnik s sodelavci oddelka NMGK)**
15:00	Razprava in zaključki uvajalnega dne seminarja **(doc. dr. David Hladnik)**

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

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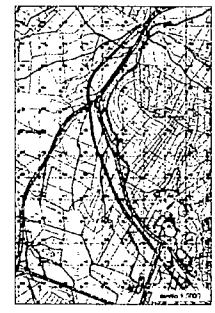
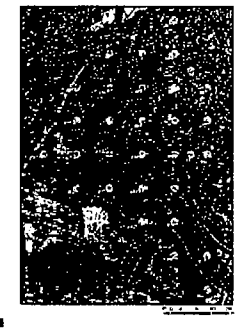
- Priprava na terenski popis in merjenje





GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

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TERENSKO DELO
PETEK, 22. 6. 2012

Terenski dan bo potekal na OE Postojna (skupine iz Z Slovenije) in OE Celje (skupine iz V Slovenije).

8:00	Zbor udeležencev seminarja pred OE Postojna in OE Celje ter odhod na izbrane ploskve 4x4 km mreže
9:15	Prihod na ploskev in predstavitev dela na ploskvi
9:30	Samostojno delo na ploskvi
11:00	Odmor (malica)
11:30	Odhod na novo ploskev 4x4 km mreže
12:00	Samostojno delo na ploskvi
14:00	Razprava in zaključki

ZAHVALA

-prevzem popisnih listov na info pultu
-malica in kava
-odhod na teren s svojo opremo

PRILOGA 2:

Lista prisotnosti in seznam sodelujočih na uvajalnem seminarju
(2 dni, uvajalni seminar in delavnica, junij 2012)

Gozdarski inštitut Slovenije
Slovenian Forestry Institute

Seminar in delavnica
Monitoring gozdov in gozdnih ekosistemov
(MGGE 2012)

Datum: sreda, 20.6.2012
Lokacija: GIS, Večna pot 2, 1000 Ljubljana
in terensko delo v Mostecu

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
1.	ZDRAVKO TURK	ZGS	041/657-464	NE		
2.	MARKO BEBER	ZGS	041/657-207	NE		
3.	GORAZD MEDVED	ZGS	041 657 715	NE		
4.	AVGUST KUNE	ZGS	041 657 683	NE		
5.	ŽDENKA JAMNIK	ZGS	041 657 713	NE		
6.	ROK PISEK	ZGS	041 657 014	NE		
7.	ROMAN GARTNER	ZGS	041 657 184	DA		
8.	ANDRAŽ BERNIK	ZGS	041 657 186	DA		
9.	MOJCA BREJC	ZGS	041 657 181	DA		
10.	Blaž Černe	ZGS	041 657 139	DA		
11.	SIMON RESMAN	ZGS	041 657 125	DA		
12.	MARJAN KLINEC	ZGS	041 657 496	NE		
13.	ALEŠ POLJANEC	ZGS	041 652 123	NE		

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
14.	DRAGAN MARKOVIĆ	OE TOLMIN	041 657 079	DA		
15.	Uroš Otoničar	OE Postojna	041 657 287	NE		
16.	SEBASTJAN BIZJAK	OE POSTOJNA	041 657 283	DA		
17.	KLADNIK Tone	OE Nova Gorica	041 657 629	DA		
18.	Igor Bizjak	OE Postojna	041 657 281	NE		
19.	Viki Čižmek	OE Bovec	041 657 530	NE		
20.	Gregor Bogovič	-11-	041 657 403	DA		
21.	Boris Bošnjak	OE Bled	041-617-170	DA		
22.	~~Bostjan KREK~~	OE CELJE	041 657 657	DA		
23.	Matej	OE Sežana	051-681-257	NE		
24.	David Gril	OE Sežana	041 657 907	DA		
25.	JAKOB BOVHA	OE CELJE	041/667-597	NE		
26.	Maja Vrščaj	STUDENTKA	041 002 917	DA		

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
27.	ALEŠ PREGL	ZGS	041/365-335	DA		
28.	JAN MAKLIN	ZGS	041 657 215	DA		
29.	BOŠTJAN TANKO	ZGS	051 391-340	NE		
30.	PETER KRMA	ZGS	041 657 301	NE		
31.	SIMON POTOČNIK	ZGS	041 272 903	DA		
32.	TADEJ HERLOG	STUDENT	041 369 358	DA		
33.	[illegible]	ZGS	041 657 203	NE		
34.	ŠTEFAN KOVAČ	ZGS	041-657 945	NE		
35.	VANDOR PETER B.	ZGS	041-657-832	NE		
36.	EVA VIHER	ZGS	041 [illegible]7-851	DA		
37.	Nejc [illegible]	ZGS	041 657 [illegible]	NE		
38.	Matjaž ŽUPANC	ZGS	041 657 785	NE		
39.	Saša Vochl	GIS	01 200 78 30	DA		

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
40.	JURE ŽLOGAR	GIS	031/302-578	DA		
41.	ŠPELA PLANINŠEK	GIS	031 325 326	NE	Planinšek	
42.	LAURA ŽIŽEK KULOVEC	GIS	040/453-483	DA	Laura	
43.	MARKO BOVAČ	GIS		NE		
44.	ANŽE JAPELJ	GIS	031/488-476	HE	Anže Japelj	
45.	BOŠTJAN MALI	GIS	040 713 523	DA		
46.	ANDREJA FERREIRA	-11-	031 376 193	NE	Ferreira	
47.	Andrej Kobler	"	041 881 205	NE	Kobler	
48.						
49.						
50.						
51.						
52.						

Gozdarski inštitut Slovenije
Slovenian Forestry Institute

Seminar in delavnica
Monitoring gozdov in gozdnih ekosistemov
(MGGE 2012)

Datum: petek, 22.6.2012
Lokacija:
terensko delo, OE Celje in OE Postojna

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na terenskem seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
1.	AHŽE JAPELJ	GIS	031/488-476	NE		
2.	LAURA ŽIŽEK KULOVEC	GIS	040/453-483	NE		
3.	MITJA SKUDNIK	GIS	031 327 432	NE		
4.	AUGUST KUMC	ZGS	041 657 683	NE		
5.	ŠTEFAN KOVAČ ml.	ZGS	041/657 845	NE		
6.	ELA VIHER	ZGS	041/657 851	DA		
7.	Tone KLADNIK	ZGS	041 657 629	NE		
8.	Zdenka JAMNIK	ZGS	041 657 713	NE		
9.	Gorazd MLINŠEK	ZGS	041 657 715	NE		
10.	ALEŠ PREGL	ZGS	041 365 335	DA		
11.	Hemad Zargam	ZGS	041 657 779	NE		
12.	Matjaž ZUPANČIČ	ZGS	041 657 785	NE		
13.	Vinjem Čimeh	ZGS	041 657 53[illegible]	[illegible]		

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
14.	Gregor Bogataj	ZGS	041/657403	DA		
15.	JAKOB BOVHA	ZGS	041/657-597	NE		
16.	BOŠTJAN HREN	ZGS	041/657581	DA		
17.	DAVID HLADNIK	BF GIS		DA		
18.	BOŠTJAN MALI	GIS		DA		
19.	ZDRAVKO TURK	ZGS		NE		
20.						
21.						
22.						
23.						
24.						
25.						
26.						

Seminar in delavnica
Monitoring gozdov in gozdnih ekosistemov
(MGGE 2012)

Gozdarski inštitut Slovenije
Slovenian Forestry Institute

Datum: petek, 22.6.2012
Lokacija:
terensko delo, OE Celje in OE Postojna

Št.	Ime in priimek	Organizacija (ZGS/GIS)	Kontaktna številka	Ste prvič na terenskem seminarju za MGGE? (DA/NE)	Podpis	Posebne zahteve (VEGI malica)
1.	MARKO BEBER	ZGS	041 657 207	NE	Marko Beber	550
2.	JAN MAKLIN	ZGS	041 657 215	DA	[illegible]	~~550~~
3.	ANDRAŽ BERNIK	ZGS	041 657 186	DA	[illegible]	
4.	MOJCA BREJC	ZGS	041 657 181	DA	[illegible]	
5.	ROMAN GARTNER	ZGS	041 657 188	DA	[illegible]	
6.	Matej Kravanja	ZGS	041 681 251	NE	[illegible]	* pošlji seč. ŠKO ~~Pest~~ pike
7.	JURE ŽLOGAR	GIS	031/302-578	NE	[illegible]	
8.	Blaž Červek	ZGS	041 657-139	DA	[illegible]	
9.	SIMON RESMAN	ZGS	041 657 125	DA	[illegible]	
10.	David Grl	OE Sežana	041 657 907	NE	[illegible]	
11.	Uroš Stonič	ZGS	041 657 287	NE	[illegible]	
12.	BOŠTJAN TANKO	ZGS	051 391-340	NE	Tank	
13.	SIMON POTOČNIK	ZGS	041 272-903	DA	[illegible]	

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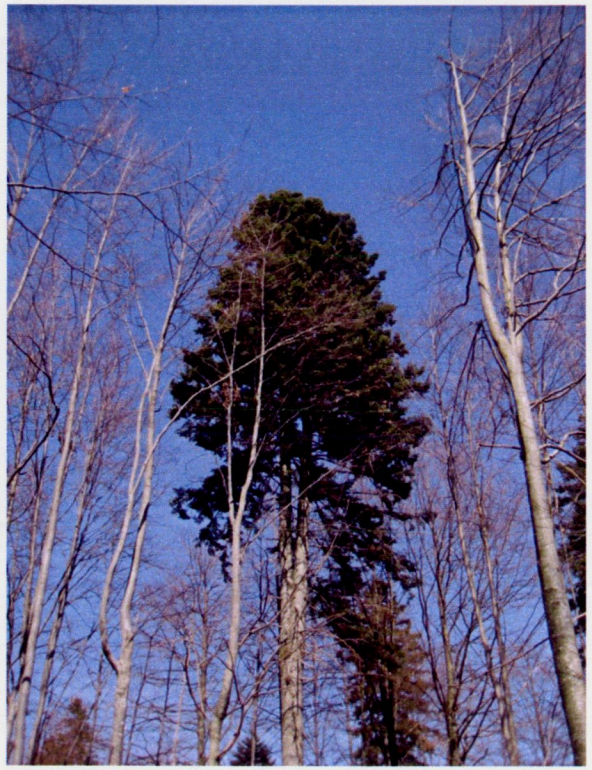
PRILOGA 3:

Terenski priročnik MGGE 2012

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

MONITORING GOZDOV IN GOZDNIH EKOSISTEMOV

PRIROČNIK
za terensko snemanje podatkov
(delovno gradivo 2012)



Ljubljana, 2012

Naslov:
Monitoring gozdov in gozdnih ekosistemov – priročnik za terensko snemanje podatkov

Izdal in založil:
Gozdarski inštitut Slovenije, Večna pot 2, Ljubljana

Izdelava in tisk:
2010 - 2012

Predstavnik izdajatelja:
direktor Gozdarskega inštituta Slovenije, dr. Mirko Medved

Odgovorni urednik:
Marko Kovač

Tehnični urednik:
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Strokovna podpora:
Oddelek za načrtovanje in monitoring gozdov in krajine, Gozdarski inštitut Slovenije
Doc. dr. David Hladnik

PREDGOVOR

Slovenska gozdarska stroka se povezav med gozdom in človekom zaveda že dolgo. Predvsem zaradi optimalnega delovanja in ohranjanja gozdov pri gospodarjenju z njimi zato uveljavlja tri načela. Najstarejše med njimi, načelo trajnosti, je tako sprva rabilo nadzoru višine sečnje, danes pa rabi predvsem krepitvi uravnoteženosti gozdov. Poleg tega se danes pri gospodarjenju z gozdovi upoštevata še načelo sonaravnega gojenja gozdov, čigar namen je krepiti in pospeševati naravno obnovo gozdnih sestojev in vzgajati zdrave in vitalne sestoje z rastišču primernimi drevesnimi vrstami in zgradbami ter načelo večnamenske rabe gozdov, katerega namen je zagotavljati različne ekosistemske storitve kot so: zaščita človekovega premoženja in življenja pred različnimi erozijskimi pojavi (plazovi, hudourniki), ohranjanje habitatov rastlinskih in živalskih vrst, rekreacija, itn. Gospodarjenje, ki zasleduje več raznovrstnih ciljev hkrati, se seveda ne more izvajati brez kakovostnih informacij, ki se v Sloveniji pridobivajo v okviru statističnega monitoringa.

Slovenski "Monitoring gozdov in gozdnih ekosistemov", čigar metodologija in vsebina sta prikazani v tem priročniku, je eden izmed številnih, ki operativno tečejo v svetu; metodološko je verodostojen, vsebinsko pa je usklajen z najpomembnejšimi nacionalnimi in mednarodnimi priporočili ter navodili. Posledično zadošča ali podpira zahteve, ki jih izpostavljajo:

- Nacionalni program razvoja gozdov Slovenije,
- Zakon o gozdovih,
- Pravilnik o varstvu gozdov,
- Pravilnik o načrtih za gospodarjenje z gozdovi in upravljanje z divjadjo,
- Zakon o zdravstvenem varstvu rastlin,
- Kjoto protokol (KP) in Okvirna konvencija Združenih narodov o klimatskih spremembah (UNFCCC),
- Forest Europe (prej Ministrska konferenca o varstvu gozdov v Evropi -MCPFE), Globalne ocene gozdnih virov (GFRA, UN–FAO/ECE),
- Konvencija o onesnaževanju zraka na velike razdalje preko meja (CLRTAP) in njen programi ICP Forest, ICP mapping and modelling, itn.

S prenovljenim priročnikom za terensko snemanje podatkov, za katerega si avtorji želimo, da bi bil razumljiv tudi negozdarskim strokovnjakom, želimo prispevati k dvigu ravni znanja pri inventarizaciji gozdnega (in tudi negozdnega) prostora in k dvigu kakovosti prostorskih podatkov. Pri tem ne pričakujemo, da bi se priročnik s strani morebitnih uporabnikov rabil z enako mero intenzivnosti kot se rabi v okviru inventarizacije gozdov. Pričakujemo pa, da bo uporabnikom v pomoč pri njihovih morebitnih inventarizacijah gozdov in gozdne krajine, da jim bo kot zgled služil pri razvoju novih znakov (kazalcev) in da se bodo z njegovo rabo krepila načela na katerih naj bi temeljila vsa terenska snemanja in na katerih je sleherni monitoring tudi teoretično utemeljen. Ta načela so:

- objektivnost, ponovljivost in primerljivost snemanih in ocenjevanih znakov v času in prostoru,
- stroškovna sprejemljivost snemanja in zadostna informacijska učinkovitost znakov,
- korektna statistična zasnova vzorca s ciljem izračunavanja zanesljivih ocen parametrov znakov,
- korektna interpretacija rezultatov.

Za vse soavtorje: Marko Kovač

V Ljubljani, maj 2012

I. GOZDNA INVENTURA

1. SPLOŠNO O GOZDNI INVENTURI

1.1 RAZVOJ STATISTIČNEGA MODELA

V Sloveniji so se podatki o gozdovih za raven države dolgo časa pridobivali s seštevanjem podatkov, ki so bili zbrani in veljavni za gozdnogospodarske enote (v nadaljevanju GGE). Čeprav je bilo tako pridobivanje podatkov cenovno ugodno (enkratno zbiranje podatkov), je bila kakovost podatkov vprašljiva. Razlogi zanjo so bile različne metode zbiranja podatkov v GGE (sistematično vzorčenje s SVP na Bledu, namensko vzorčenje s kotnoštevno metodo na Postojnskem), vizualno ocenjevanje parametrov znakov in zato različno točne vrednosti parametrov snemanih znakov ter neenaka referenčna obdobja, na katera so se vrednosti parametrov znakov v posameznih GGE nanašale.

Z metodološko korektnim slučajnostnim vzorčenjem na ravni države se je slovensko gozdarstvo prvič srečalo ob pridruženju programu UN/ECE ICP Forest, v okviru katerega se je v sredini 80. let izvajal čezmejni popis zdravstvenega stanja gozdov. Zaradi potreb po ocenah različnih znakov so se že v okviru takratnih inventarizacij, poleg ocen zdravstvenega stanja, pridobivale ocene o gozdni površini, rastiščih, sestavi gozdnih sestojev, lesnih zalogah, itn. Ker pa se je v ponovitvah snemanj pokazalo, da na terenu lahko prepoznavne vzorčne ploskve s stalnim številom drevja niso bile več reprezentativne in z njimi na dolgi rok ne bi bilo mogoče zagotavljati verodostojnih ocen o stanju gozdov, je bil inventurni model leta 2000 spremenjen; obstoječim grozdom s po štirimi ploskvami s stalnim številom drevja so bile dodane nevidne koncentrične vzorčne ploskve z odmerjeno površino (v nadaljevanju KPP), na katerih se odtlej snemajo vsi znaki. Centri teh ploskev določajo koordinato celotnega trakta in tudi, ali je trakt izbran v vzorec (center KPP leži v gozdu) ali ne (center KPP ne leži v gozdu). Zato prej obstoječi grozdi danes rabijo samo še ocenjevanju zdravstvenega stanja gozdov.

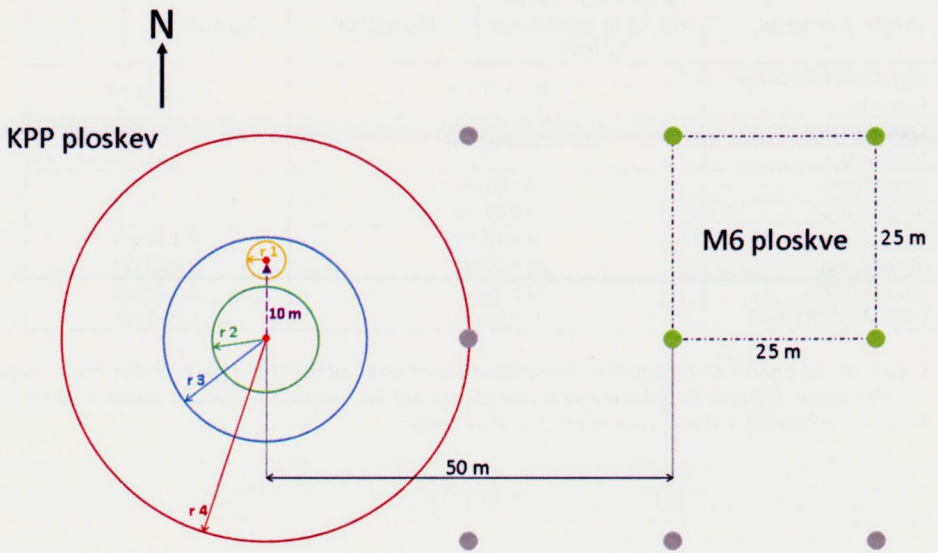
Izhajajoč iz zapisanega so najpomembnejše lastnosti obstoječega inventurnega modela naslednje:

- ustrezanje zahtevam slučanostnega vzorčenja,
- odprt grozd, sestavljen iz ene KPP in več (2 oz. 4) ploskev s stalnim številom drevja, ki ga je z dvo ali tri člansko terensko ekipo mogoče posneti v enem dnevu,
- možnost uporabe različnih statističnih tehnik za izračunavanje ocen parametrov spremenljivk,
- odprtost za možne nove prilagoditve in dopolnjevanje.

Večina znakov inventure izvira iz predhodnih popisov razvrednotenja in poškodovanosti gozdov (Kovač in sod., 2000, 2007). Zaradi domačih zakonodajnih potreb, mednarodnih procesov in zahtev ter potreb stroke po novih znakih so bili v preteklih letih nekateri med njimi vsebinsko in definicijsko spremenjeni, izpuščeni oz. razviti in vpeljani na novo.

1.2 SHEMA IN RAZPOREDITEV GROZDOV

Slika 1 prikazuje grozd oz. trakt, ki je osnovna enota inventarizacije gozdov v Sloveniji. Kot je prikazano, leži KPP 50 m zahodno od osnovnega (levega spodnjega) ogljišča kvadranta, na katerem so ploskve s stalnim številom drevja. KPP s 4 različno velikimi vzorčnimi površinami, rabi predvsem racionalnemu snemanju znakov. Konkretno, ker bi npr. snemanje mladovja na najpogosteje uporabljeni vzorčni površini (R=7,98 m, P=200 m^2) zahtevalo precej časa, se ta znak snema znotraj meja najmanjšega kroga. Nasprotno temu, pa redek znak kot je npr. drevo izjemnih dimenzij, zahteva snemanje znotraj meja največjega kroga. Podrobnosti prikazuje Preglednica 1.



Slika 1: Prostorska razporeditev ploskev - KPP in M6 ploskve (osenčene). Shematski prikaz vzorčne enote prve stopnje (M6 ploskve so osenčene).

Preglednica 1: Osnovni podatki o KPP z nekaterimi mejnimi vrednostmi

Znak ploskve	KPP1	KPP2	KPP3	KPP4
Polmer ploskve [m]	3,09	7,98	13,82	25,23
Površina ploskve [arov]	0,3	2,0	6,0	20,0
Lastnosti rastišča	kamnitost, skalovitost, nagib ploskve, ...			
Lastnosti sestoja	razvojna faza, mešanost, sklep, ...			
Stoječe živo drevje	0 cm < $D_{1,3}$ < 10 cm H ≥ 1,3 m, po višinskih razredih	$D_{1,3}$ ≥ 10 cm	$D_{1,3}$ ≥ 30 cm	/
Stoječe odmrlo drevje (sušice)	$D_{1,3}$ ≥ 10 cm		$D_{1,3}$ ≥ 30 cm	
Ležeče odmrlo drevje (podrtice)	$D_{1,3}$ ≥ 10 cm		$D_{1,3}$ ≥ 30 cm	
Panj, štor (ang.: *stump*)	D ≥10 cm H ≥ 20 cm		/	
Štrcelj (ang.: *snag*)	D ≥ 10 cm H ≥ 50 cm		D ≥ 30 cm H ≥ 50 cm	
Kos drevesa (veja, del debla ipd.)	D ≥ 10 cm L ≥ 50 cm		D ≥ 30 cm L ≥ 50 cm	

Grozdi so razporejeni na sistematični, hierarhično organizirani mreži, ki je razpotegnjena preko vsega ozemlja države. Aktualna nacionalna mreža ima gostoto 4x4 km (površinska utež slehernega trakta je 16 km2) in jo je mogoče, v skladu s potrebami, redčiti oz. gostiti.

2 PRIPOROČILA ZA IZVEDBO INVENTURE

2.1 Delovne faze

Korektna izvedba terenske gozdne inventure obsega naslednje delovne faze:

a) Izdelava seznama popisnih traktov

Pripravimo popisne liste že evidentiranih in inventariziranih traktov ter pregled potencialnih lokacij traktov (zaradi zaraščanja ali drugih procesov). Pregled slednjih mora temeljiti na točnih virih kot so aktualni digitalni ortofoto posnetki (DOF) in GERK (grafične enote rabe zemljišča kmetijskega gospodarstva) in seveda na terenskem ogledu.

b) Priprava formularjev

Zaradi popravljanja napak izmer naj formularji vsebujejo tudi vrednosti znakov iz prejšnje inventure (npr. stari obseg drevesa, stara osutost drevesa, ...).

c) Pregled in dokup terenske opreme

d) Izvedba tečaja za terenske ekipe

e) Uvajanje terenskih ekip v delo

Uvajanju ekip je treba nameniti skrb v prvih dneh, ko ekipe začenjajo s samostojnim delom. Cilj uvajanja je zagotovitev pravilnega izvajanja meritvenih postopkov in odprava morebitnega nerazumevanja navodil.

f) Vzpostavitev načina komuniciranja in kontaktne točke

Določitev načina komuniciranja in delovanje kontaktne točke v času terenskega snemanja sta nujna pogoja za enolično izvedbo inventure. Poleg posredovanja splošnih navodil so naloge komuniciranja in kontaktne osebe tudi obravnava nerešenih (novonastalih na terenu) meritvenih postopkov, iskanje rešitev zanje in posredovanje enotnih navodil glede teh postopkov vsem ekipam.

g) Izvedba snemanja

h) Kontrola

Kontrolira se 5% traktov, ki so lahko izbrani na katerikoli način, ki ustreza predpisom slučajnostnega vzorčenja.

2.2 Dela na traktu (meritve in ocenjevanje)

Meritve in ocenjevanje na posamezni vzorčni ploskvi KPP obsegajo:

- določitev časa hoje od avtomobila do trakta in nazaj ter čas dela na traktu,
- določitev trakta in ploskev,
- ocena znakov vezanih na širšo okolico trakta oz. KPP (opis rastišča in sestoja),
- meritve in ocena znakov vezanih na drevesa na KPP (drevesna vrsta, razdalja od središča, azimut, socialni položaj, prsni premer, višina in starost (določena na tretjem in četrtem najdebelejšem drevesu), osutost, itn.
- meritve in ocena znakov vezanih na odmrlo drevesno biomaso na KPP (klasifikacija, razkrojenost, znaki za izračun volumna mrtve biomase),
- posebne meritve in popisi kot so: popis talne vegetacije, popis in odvzem materiala za kemijsko analizo tal in humusa, popis zdravstvenega stanja dreves na KPP in preostalih ploskvah, določanje tipa lišajev in ocenjevanje njihove pokrovnosti na izbranih drevesih.

2.3. Kontrola meritev

Kakovostno terensko delo je pogoj za kakovostne rezultate inventure. Pomembno je, da se uvajalnega seminarja in treninga udeležijo vse terenske ekipe. Prav tako pa naj bodo prve meritve ploskev opravljene ob prisotnosti vodilnih ekip, da se preveri, če aktualne ekipe delajo pravilno.

Namen

V začetni fazi terenskih meritev je potrebno prekontrolirati vsaj 5 % vseh ploskev, z namenom **ugotavljanja morebitnih napak** posameznih ekip ter **ocene zanesljivosti** terenskih meritev.

Prostorska in časovna razporeditev:

- kontrolo opravljajo vodilne ekipe, vsaka na **področju**, ki ga pokrivajo,
- kontrolo se načeloma izvede **čimprej** (po **enem** do najkasneje **dveh tednih)** od **začetka dela** (uvajanja) posamezne ekipe,
- če je možno se, zaradi racionalizacije, kontrolo izvede **istočasno** s snemanjem točk na **mreži 16x16 km.**

Izbor in število ploskev :

- kontroliramo **5 %** vseh ploskev na mreži 4x4km,
- ploskve za kontrolo izberemo tako, da za **vsako ekipo** kontroliramo **vsaj eno ploskev,**
- če za posamezno ekipo **kontroliramo več ploskev**, izberemo za kontrolo tudi ploskev, ki jo je ekipa **postavila na novo** (KPP), da preverimo ustreznost zakoličbe/lokacije nove ploskve.

Postopek kontrole:

- **izberemo** ploskev,
- **fotokopiramo izpolnjene** snemalne liste za izbrano ploskev,
- pri kontroli uporabljamo **KONTROLNI LIST** in ocenjujemo po 4 stopenjski lestvici ter zapišemo opombe (glej Prilogo 5),
- **kontrolne meritve pišemo** na **fotokopiran** izpolnjen **snemalni list,**
- pri snemalnem listu **DREVJE** ne merimo vseh dreves, ampak preverimo **vse parametre** le:
  - drevesom (vsaj 5 dreves) v tistem kvadrantu, kjer je največje število dreves (1: 0° – 90°, 2: 90° – 180°, 3: 180° – 270°, 4: 270° – 360°),
  - vsa vrasla drevesa (razdalje),
  - dominantna drevesa,
- **tolerance (odstopanja)** pri kontrolnih meritvah:
  - **razdalj:** ± 10 cm (dobro), ± 20 cm (zadovoljivo),
  - **kotov (azimut, naklon):** ± 2° (dobro), ± 5° (zadovoljivo),
  - **obsegov:** ± 1 cm (dobro), ± 3 cm (zadovoljivo),
  - **višin dreves**: ± 0,5 m (dobro), ± 1 m (zadovoljivo),
  - **starosti:** ± 10 let (dobro), ± 20 let (zadovoljivo),
  - **socialnega položaja:** 0 (dobro), ± 1 (zadovoljivo),
- **TANKO DREVJE:** bistveno je, da bomo dobili pravo oceno lesne zaloge pod merskim pragom.
- **ODMRLA LESNA BIOMASA:** štetje kosov, kot so zapisani v spisku. V primeru večjega števila kosov se kontrolira samo veliki krog, torej vse, kar je nad 30 cm premera in 50 cm dolžine. Bistveno je, da bomo dobili pravo oceno volumna odmrle biomase.
- **Povzetek** in **splošna ocena** povzameta ugotovitve kontrole.
- Če pri kontroli **odkrijemo** kakšno (sistematično) **nepravilnost**, nemudoma **obvestimo vodjo ekipe** in mu povemo, kako naj pravilno dela naprej.

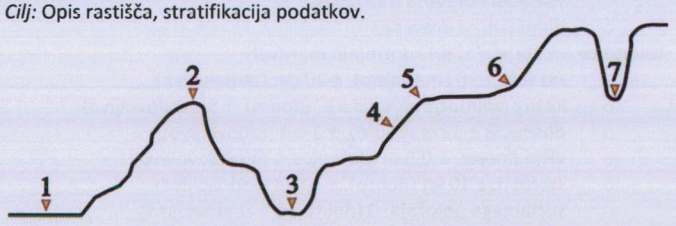
2.3 SEZNAM ZNAKOV VEZANIH NA PLOSKEV KPP

2.3.1 Evidenčni podatki

Zap. št. znaka	Ime znaka	Definicija/šifrant/postopek/cilj
1	IME	*Postopek:* Vpis imena in priimka s tiskanimi črkami. *Cilj:* Kontrola kvalitete popisovalca.
2	DATUM	*Postopek:* Vpis dneva, meseca in leta popisa. *Cilj:* Izračunavanje znakov glede na obdobje snemanja.
3	URA	*Definicija:* čas delovnega dne se deli na čas prevozov na ploskev in nazaj, čas premikov med ploskvami, čas iskanja ploskve, čas dela na ploskvi in pripravljalni čas v pisarni. Za nas je **pomemben čas dela na ploskvi**. *Postopek:* Vnos absolutnih časov začetka in konca dela izključno na KPP ploskvi na terenu (v urah in minutah) brez prevoza in prehodov. *Cilj:* Študije časa in optimiranje popisa.
4	VID – vidljivost	*Definicija:* Vidljivost je normalna, če je drevesne krošnje mogoče dobro videti in je njihove znake mogoče ocenjevati. Vidljivost je poslabšana, če krošenj zaradi megle, oblačnosti, dežja ali drugih vremenskih okoliščin ni mogoče opazovati oz. ocenjevati. *Koda:* 1 normalna 2 poslabšana *Postopek:* Izbira primerne šifre glede na trenutno vreme. *Cilj:* Poznavanje splošnih vremenskih okoliščin v času snemanja.

2.3.2 Znaki vezani na snemalno ploskev

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
5	ZST – zaporedna številka trakta	*Postopek:* Vpis zaporedne številke trakta. *Cilj:* Identifikacija trakta.
6	KPP – zaporedna številka KPP	*Postopek:* Vpis zaporedne številke KPP. Če KPP že obstaja, ima enako ID št. kot trakt, v nasprotnem primeru se pripiše novo oznako. *Cilj:* Identifikacija KPP.
7	TEOR. KOORDINATE KPP – matematične koordinate KPP (X (km), Y (km), Z (m))	*Postopek:* Predizpolnjen obrazec celih kilometrskih koordinat s karte brez oznake geografske cone. *Cilj:* Prostorska opredelitev.
8	REALNE KOORDINATE KPP – GPS koordinate KPP (X (km), Y (km), Z (m))	*Postopek:* Vpis odčitkov X in Y koordinat iz GPS instrumenta brez oznake geografske cone. *Cilj:* Prostorska opredelitev. *Snemalna površina*: Točkovna ocena, vezana na središče KPP, ki je tudi koordinatno izhodišče trakta.
9	LAST – lastništvo	*Definicija:* Pravno priznana pravica do zemljišča. *Koda:* 1 državno 2 zasebno 3 neznano *Postopek:* vpis kode. Vir podatkov: podatkovna zbirka ZGS. *Snemalna površina:* Točkovna ocena, vezana na središče KPP, ki je tudi koordinatno izhodišče trakta. *Cilj:* Spremljanje lastniške strukture, stratifikacija podatkov.
10	GGO, GGE, ODD, ODS – gozdnogospodarsko območje, enota, oddelek, odsek	*Definicija:* Notranja ureditvena členitev gozdnega prostora. *Postopek:* Vpis oznake gozdnogospodarskega območja, gozdnogospodarske enote, oddelka in odseka. Vir podatkov: podatkovna zbirka ZGS. *Snemalna površina:* Točkovna ocena vezana na središče KPP. *Cilj:* Identifikacija in poststratifikacija trakta.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
11	RELIEF	*Definicija:* Oblika zemeljskega površja, na kateri leži trakt. *Koda:* 1 ravnina 2 vrh hriba, greben 3 dno kotanje 4 pobočje 5 konveksni prelom pobočja 6 konkavni prelom pobočja 7 jarek, ozka dolinica *Postopek:* Izbor kode, ki najbolj ustreza stanju na terenu. Dolžina pobočja (v smeri padnice terena), za katerega se določa obliko reliefa, naj znaša vsaj 50 m, od tega 25 m na vsako stran KPP. *Snemalna površina:* Točkovna ocena vezana na središče KPP. *Cilj:* Opis rastišča, stratifikacija podatkov. 
12	EKSPOZ – ekspozicija rastišča	*Definicija:* Kot med nebesnim severom in smerjo padnice terena. *Postopek:* Vpis odčitka na busoli na 5° natančno. Dolžina pobočja (v smeri padnice terena), za katerega se določa ekspozicija, naj znaša vsaj 25 m, od tega 12,5 m na vsako stran. *Snemalna površina:* Točkovna ocena vezana na središče KPP. *Cilj:* Opis rastišča, poststratifikacija podatkov.
13	KAMNINA – tipična kamnina na rastišču	*Definicija:* Kamnina predstavlja matično podlago, iz katere so se razvila gozdna tla. *Koda:* 1 karbonatna 2 nekarbonatna 3 mešana

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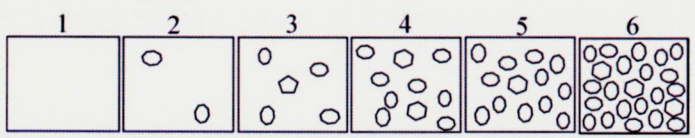
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
13	KAMNINA – tipična kamnina na rastišču	*Postopek:* Najprej se izbere tipični vzorec, ki naj leži čim bližje središču KPP. S solno kislino (HCl) se nato omoči matično kamnino. Šumenje in penjenje sta znaka za karbonatno in mešano kamnino. Če te tipične reakcije ni, je kamnina nekarbonatna. *Snemalna površina:* KPP. *Cilj:* Opis rastišča.
14	SKALOVIT – skalovitost rastišča	*Definicija:* Skala je prostoležeči ali matični kos kamnine z dimenzijo vsaj 30 x 30 x 30 cm. *Koda:* 1 brez skal 2 posamične skale; $P_{sk} \leq 5\%$ 3 majhna skalovitost; $P_{sk} = 6–25\%$ 4 srednja skalovitost; $P_{sk} = 26–50\%$ 5 velika skalovitost; $P_{sk} = 51–75\%$ 6 izjemna skalovitost; $P_{sk} \geq 76\%$ *Postopek:* Okularna cenitev in izbira primerne šifre. *Snemalna površina:* KPP. 
15	KAMNIT – kamnitost	*Definicija:* Kamen je prostoležeči kos kamnine z dimenzijo manj od 30 x 30 x 30 cm. *Koda:* 1 brez kamnov 2 posamični kamni; $P_{ka} \leq 5\%$ 3 majhna kamnitost; $P_{ka} = 6–25\%$ 4 srednja kamnitost; $P_{ka} = 26–50\%$ 5 velika kamnitost; $P_{ka} = 51–75\%$ 6 izjemna kamnitost; $P_{ka} \geq 76\%$ *Postopek:* Okularna cenitev in izbira primerne šifre. *Snemalna površina:* KPP.

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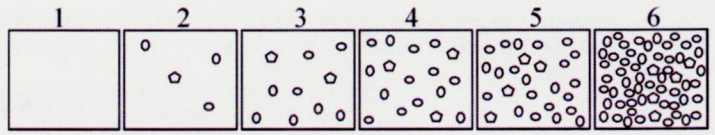
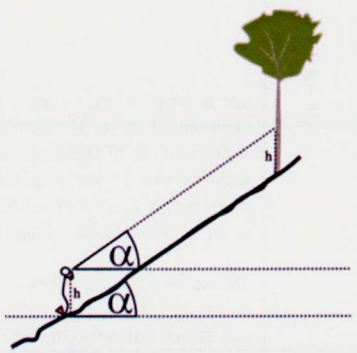
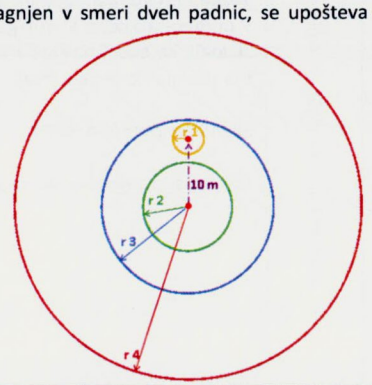
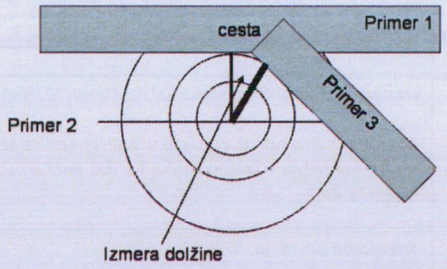
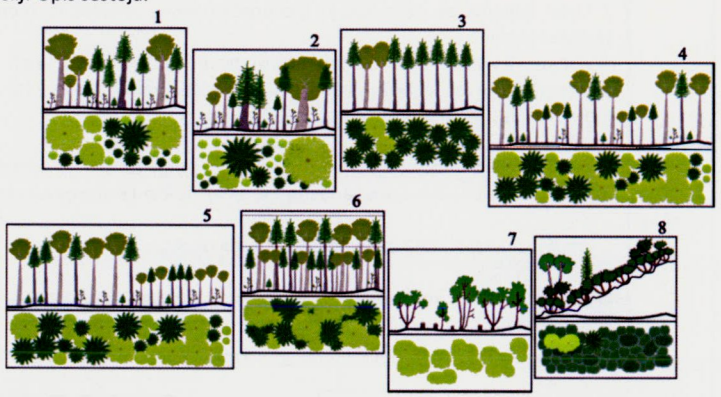
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
15	KAMNIT – kamnitost	
16	NAGIB – nagib	*Definicija:* Kot med navidezno horizontalno ravnino in smerjo padnice terena. *Postopek:* Vpis odčitka. Nagib v smeri padnice terena KPP se izmeri s klinometrom na 1° natančno. Dolžina pobočja naj znaša vsaj 50 m, 25 m na vsako stran od središča KPP. *Snemalna površina:* KPP. *Cilj:* Opis rastišča, korekcija temeljnice in polmerov ploskev. 
17	RADIJ: R_1 - R_4 (m/cm)	*Definicija:* Polmer ploskve je horizontalno merjena razdalja med središčem in robom ploskve. *Postopek:* Vpis mejnih korigiranih polmerov koncentričnih krogov KPP v metrih in centimetrih. V primeru, da je teren nagnjen v smeri dveh padnic, se upošteva povprečje obeh. Glej PRILOGO: Preglednice horizontalnih razdalj. *Snemalna površina:* KPP. *Cilj:* Izračun horizontirane površine ploskve. 

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
18	ROB – delež površine v gozdu	*Definicija:* Delež ploskve, ki leži v gozdu. *Postopek:* Ocena deleža površine KPP3, ki leži v gozdu. Delež se vpiše v odstotkih (0–100 %) na deset natančno (npr. 50 %, 80 %, če je npr. ploskev v celoti v gozdu 100 %).  Ker delež površine ne more biti enak za vse ploskve, ampak se površinski ponder spreminja (primer 1) s polmerom ploskev (enak ponder bi se lahko uporabil samo v primeru, če bi cesta npr. sekala ploskev prav po polovici – v smislu linije, ki jo kaže primer 2), se v izogib napačnemu površinskemu ponderju poleg deleža površine (% površine) izmeri še razdalja od središča ploskve do izločene gozdne ceste ali meje gozda z drugo rabo tal (GROB). *Snemalna površina:* KPP3. *Cilj:* Izračun dejanske (korigirane) površine ploskve.
19	RAZDOROB – razdalja do roba gozda	*Definicija:* Razdalja od središča KPP ploskve do spremembe rabe tal. *Postopek:* Izmera razdalje do roba gozda v dm. Razdalja se vpiše na dm natančno (npr. 63 dm). Če je ploskev v celoti v gozdu, v obrazec napišemo 0. Za pravilnejšo oceno površine izmerimo razdaljo od središča ploskve do gozdne ceste ali meje gozda z drugo rabo tal (npr. 127 dm – na shemi debela črta). V primeru, ko cesta ali rob gozda ne teče v ravni liniji, ampak zaviti (primera 1 in 3 skupaj), se oceni najkrajša razdalja od središča ploskve do spremembe rabe tal (na shemi zelo debela črta). *Snemalna površina:* KPP4. *Cilj:* Izračun dejanske (korigirane) površine ploskve.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
20	ZDRUŽBA – združba na rastišču	*Postopek:* Ustrezno šifro za tip združbe se prepiše iz gozdnogospodarskega načrta enote ali iz podatkovne zbirke ZGS. V primeru, da tega podatka ni, se združba določi s fitocenološko karto ali neposredno z Braun–Blanquetovo metodo. Vedno se določi prevladujoča združba. *Površina:* KPP in njena neposredna okolica. *Cilj:* Opis sestoja, ocena kakovosti rastišča.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
20	ZGRADBA – zgradba sestoja	*Definicija:* oblika vertikalne slojevitosti sestoja vključujoč nastanek sestoja (semenovec, panjevec). *Koda:* 1 prebiralna 2 kmečka (neprava) prebiralna (netipično prebiranje v drobnoposestniških gozdovih; določi se lahko samo za sestoje razvojne faze 7 – neopredeljena) 3 enomerna (enodobna) - visoki gozd 4 malopovršinska raznomerna (raznodobna) 5 velikopovršinska raznomerna (raznodobna) 6 dvoslojna 7 panjevec (nizki gozd) 8 grmičast gozd (rušje in ostalo grmičevje višine cca. 5 m) *Postopek:* Določitev kode prevladujoče zgradbe sestoja. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Opis sestoja. 
21	RAZFAZ – razvojna faza	*Definicija:* Življenjsko obdobje sestoja, izraženo z velikostjo prevladujočega prsnega premera dreves v njem. *Koda:* 1 mladovje (mladje, gošča, letvenjak); D < 10 cm 2 tanjši drogovnjak; 10 ≤ D < 20 cm 3 močnejši drogovnjak; 20 ≤ D < 30 cm 4 tanjši debeljak; 30 ≤ D_{dom} < 40 cm 5 srednji debeljak; 40 ≤ D_{dom} < 50 cm 6 močnejši debeljak; D_{dom} ≥ 50 cm 7 neopredeljena; vsi premeri

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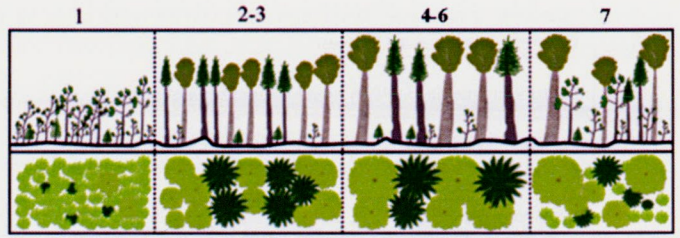
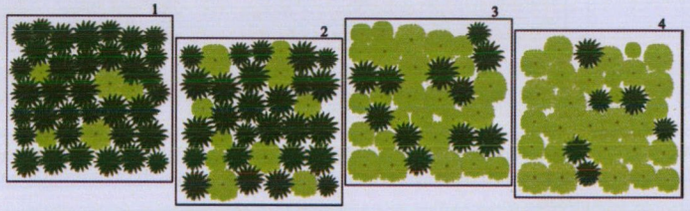
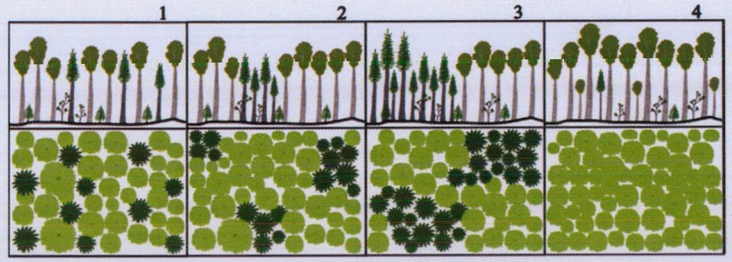
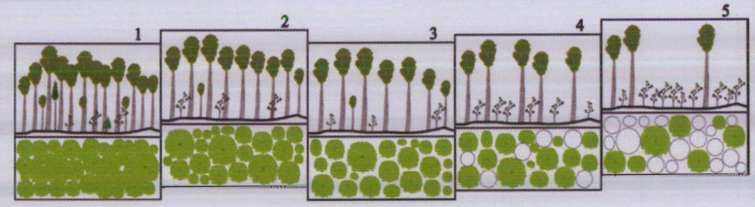
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
21	RAZFAZ – razvojna faza	*Postopek:* Določitev kode prevladujoče razvojne faze. V mladovju in drogovnjaku se razvojna faza določi z upoštevanjem površine, ki jo razvojna faza porašča. V debeljakih se razvojna faza določi na podlagi števila dominantnih dreves (najmanj 100 dreves/ha) oz. prevladujočega deleža dreves, ki tvorijo streho sestoja (1, 2 in 3 soc. položaj). V primeru dvoslojnega sestoja se ocena nanaša na zgornji ocenjevani sloj. *Snemalna površina:* KPP in njena neposredna okolica.  *Cilj:* Sestojna karta, izračun modela trajnosti.
22	STARS – starost sestoja	*Definicija*: Povprečna starost sestoja je pridobljena na osnovi meritev (oz. strokovnih ocen) starosti individualnih dreves, ki tvorijo prevladujočo razvojno fazo. *Koda:* 1. <= 20 let 2. 21 – 40 3. 41 – 60 4. 61 – 80 5. 81 – 100 6. 101 – 120 7. > 121 8. raznodobno (v primeru, da je razvojna faza neopredeljena) *Postopek:* Vpis števila let. Povprečna starost sestoja se določa: 1) na osnovi ocene let (starost), ki jih drevo potrebuje, da zraste do opazovanega premera. V primeru ocenjevanja se ocenjuje gospodarska starost, ki se ji doda pribitek let, ki jih drevo potrebuje, da zraste do višine 1,3 m. 2) S štetjem letnic na obstoječih panjih na ploskvi ali njeni neposredni bližini, 3) z vrtanjem dreves na ploskvi, 4) na podlagi informacij iz gozdnogospodarskih načrtov ali kronik. *Cilj*: Opis sestoja, poznavanje zgodovine sestoja.

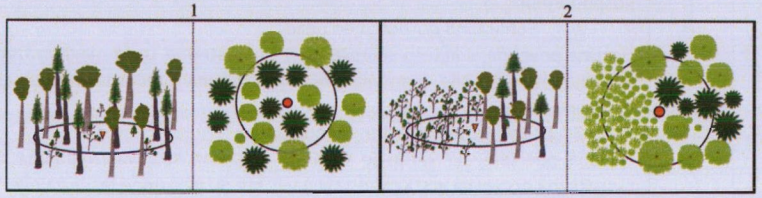
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
23	MESANS – mešanost sestoja	*Definicija:* Mešanost je mera za **površinski delež** (pokrovnost krošenj) drevesnih vrst v strehi sestoja. *Koda:* 1 iglavci; P_{igl} >75 % 2 iglavci z listavci; 50 ≤ P_{igl} ≤ 75 % 3 listavci z iglavci; 25 ≤ P_{igl} < 50 % 4 listavci; P_{igl} < 25 % *Postopek:* Izbira kode. Delež drevesnih vrst se lahko poda na osnovi stanja videnega na terenu ali DOF–u. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Ocena pestrosti, ocena stabilnosti sestojev. 
24	OMESANS – oblika mešanosti sestoja	*Definicija:* Oblika mešanosti je mera, ki izraža način porazdelitve iglastih in listnatih dreves v sestoju. Koda: 1 posamična (v sestoju se posamezno izmenjujejo igl. in list.) 2 šopasta (v sestoju se v šopih izmenjujejo igl. in list., posamezni šop tvori od 5 – 15 osebkov iste skupine – igl. oz. list.) 3 skupinska (v sestoju se v skupinah izmenjujejo igl. in list., posamezno skupino tvori najmanj 16 osebkov iste skupine). 4 velikopovršinsko enaka (v sestoju se na večji površini pojavljajo le igl. oz. list.) *Postopek:* Določitev prevladujoče oblike mešanosti. Izbira kode. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Ocena pestrosti.

Nadaljevanje znaka na naslednji strani...⇨

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
24	OMESANS – oblika mešanosti sestoja	
25	SKLEPS – sklep sestoja	*Definicija:* Sklep je mera za sklenjenost krošenj v sestojni strehi. Sinonim za sklep je zastornost, ki izraža razmerje med tlorisom krošenj in interpretacijsko površino. *Koda:* 1 tesen (utesnjene krošnje segajo ena v drugo), 2 normalen (krošnje se dotikajo z vršički vejic), 3 rahel (krošnje se ne dotikajo, povprečno velike krošnje ni mogoče vriniti v sestojno streho), 4 vrzelast (v vrzeli je možno vriniti do eno povprečno veliko krošnjo), 5 pretrgan (v vrzeli je možno vriniti več povprečno velikih krošenj (spodnja meja za pretrgan sklep je 20 % zastrte površine)). *Postopek:* Izbira kode. Določi se prevladujoči sklep za KPP in njeno neposredno okolico. V primeru dvoslojnega sestoja se sklep določi za ocenjevani (zgornji) sloj. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Spoznavanje konkurenčnih odnosov v sestoju, sestojna karta, kontrola gospodarjenja. 

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
26	OBNOVA – obnova sestoja	*Definicija:* Sestoj v obnovi je ponavadi presvetljen sestoj v razvojni fazi debeljaka, izjemoma tudi drogovnjaka, ki je načrtno vpeljan v obnovo in to potrjujejo tudi gozdnogojitvenimi ukrepi zapisani v GGN. *Koda:* 1 sestoj ni v obnovi 2 sestoj je v obnovi *Postopek:* Izbira primerne šifre po presoji razmer na terenu. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Spremljanje intenzitete obnove, mednarodne statistike.
27	NASTS – nastanek sestoja	*Definicija:* Nastanek sestoja je določen z načinom pomladitve obstoječega sestoja. *Koda:* 1. Naraven: sestoj je nastal izključno z naravnim pomlajevanjem (nasemenitvijo ali vegetativno obnovo). 2 Naraven/antropogen: sestoj je nastal z naravnim pomlajevanjem, v katerega je oz. še vedno posega človek (sadnja, setev), predvsem z namenom spopolniti preredko mladje ali povečati vrstno pestrost. 3 Antropogen: sestoj je nastal izključno z delovanjem človeka (sadnja ali setev). 4 Neznan: ni mogoče določiti porekla sestoja. *Postopek:* Izbira primerne kode po presoji razmer na terenu, zaželen je razgovor z revirnim gozdarjem. Opomba: če je v okviru kazalnika o obnovi sestoj opredeljen kot sestoj v obnovi, naj se ocena nastanka sestoja nanaša na prisotno mladje, ki bo nadomestilo preostanek sedanjega matičnega sestoja. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Poznavanje nastanka in zgodovine sestoja, mednarodna statistika.
28	TARIFA	*Koda:* • prebiralni gozdovi (Alganove tarife) P; tarife od 1–20 • raznodobni gozdovi (vmesne tarife) V; tarife od 21–40 • enodobni gozdovi (Schaefferjeve tarife) E; tarife od 41–60 *Postopek:* Izbira primerne tarife. Tarife za vseh osem skupin drevesnih vrst se določijo v primeru spremembe tarifnih razredov na že izmerjenih traktih, v vsakem primeru pa pri novi izmeri trakta. Ob cikličnih snemanjih preverjamo tarife. Vir podatkov so gozdnogospodarski načrti enot oz. podatkovna zbirka ZGS. *cilj:* Obračun volumna in prirastka.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
29	NARAVNOST – ocena naravnosti gozda	*Definicija:* Naravnost se izraža s stopnjo dosedanjega človekovega vpliva na gospodarjenje z opazovanim sestojem. Ocena se običajno nanaša na značilnosti sestoja kot so: ohranjenost drevesne sestave, prisotnost odmrlega drevja, starostne strukture in načina pomlajevanja. *Koda:* 1 Od človeka nemoten gozd Gozdna površina, katere razvoj usmerjajo izključno naravne sile in posledično določajo naravna drevesna sestava, primerna količina odmrlega lesa, naravna starostna struktura in naravna obnova. Od človeka nemoten gozd je lahko tudi dovolj velika gozdna površina, ki omogoča ohranjanje njenih naravnih značilnosti in na njej ni bilo pomembnejših človekovih vplivov ali pa so ti bili prisotni tako daleč v preteklosti, da so se od takrat lahko ponovno vzpostavili naravna drevesna sestava in podobni procesi (pragozdni ostanki, varovalni gozdovi, gozdni rezervati, ki so že daljše obdobje izvzeti iz gospodarjenja,...). 2 Sonaravno gospodarjen gozd Gozdna površina, s katero se gospodari trajnostno in se za njegov razvoj v največji meri koristijo naravne sile (naravna obnova, naravna drevesna sestava, rastišču domače drevesne vrste). 3 Gozd z izmenjano drevesno sestavo Gozdna površina, na kateri je naravna drevesna sestava izmenjana. Tuja oz. rastišču neustrezna drevesna vrsta predstavlja več kot 90 % skupne lesne zaloge. *Postopek:* Izbira primerne kode po presoji razmer na terenu. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Poznavanje spremenjenosti gozdov, mednarodne statistike.
30	TIP GOZDA	Definicija: Tip gozda je opredeljen na podlagi pokrovnosti oz. deleža skupne površine, ki jo zastirajo posamezne drevesne vrste. Koda: 1 Hrastovi gozdovi (hrast > 75 %) 2 Gozdovi bukve in hrasta (bukev + hrast > 75 % in hrast 26 % ≤ 75 % in bukev 26 % ≤ 75 %) 3 Bukovi gozdovi (bukev > 75 %) 4 Drugi pretežno listnati gozdovi, če niso izpolnjeni pogoji pod 1–3 in je listavcev > 75 % 5 Gozdovi bukve in jelke (jelka + bukev > 75 % in jelka 26 % ≤ 75 % in bukev 26 % ≤ 75 %) 6 Gozdovi bukve in smreke (smreka + bukev > 75 % in smreka 26 % ≤ 75 % in bukev 26 % ≤ 75 %) 7 Jelovi gozdovi (jelka > 75 %) 8 Smrekovi gozdovi (smreka > 75 %) 9 Borovi gozdovi (bor (razen rušja) > 75 %) 10 Rušje (rušje > 75 % površine) 11 Drugi pretežno iglasti gozdovi, če niso izpolnjeni pogoji pod 5–10 in je iglavcev > 75 % 12 Drugi gozdovi iglavcev in listavcev vsi drugi gozdovi, ki niso uvrščeni v eno izmed predhodnih kategorij.

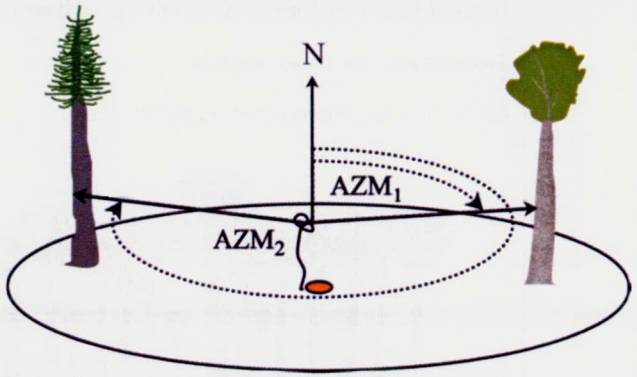
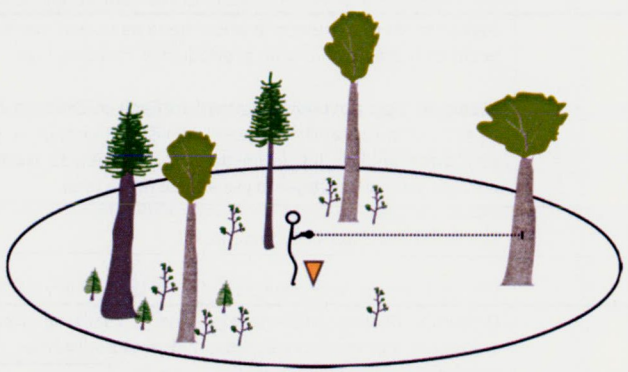
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
31	HOMOGENOST	*Definicija:* Homogenost KPP oz. trakta je mera, s katero se izraža enakost (raznolikost) razvojnih faz na opazovani površini. *Koda:* 1 celotna ploskev leži v istem sestoju 2 ploskev leži na meji vsaj dveh različnih sestojev *Postopek:* Izbira primerne kode po presoji razmer na terenu. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Poznavanje pestrosti sestojnih zgradb oz. strukturne raznovrstnosti gozda. 
32	GOSPODARJENJE	*Definicija:* Gospodarjenje je oblika človekovega delovanja v gozdu s ciljem pridobivanja lesnih sortimentov in drugih dobrin. *Koda:* 1 negospodarjeno (npr. pragozd) 2 gospodarjenje opuščeno (npr. mreža rezervatov, osnovanih pred 20 leti) 3 gospodarjeno (tudi gospodarski gozd, kjer se trenutno ne gospodari – ni vidnih znakov sečenj) 4 ni mogoče opredeliti *Postopek:* Izbira primerne šifre na podlagi presoje na terenu. *Snemalna površina:* KPP in njena neposredna okolica. *Cilj:* Poznavanje intenzitete gospodarjenja, mednarodne statistike.

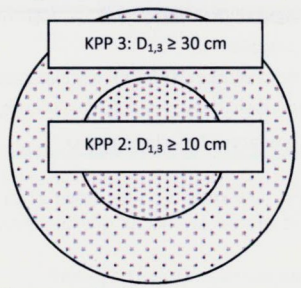
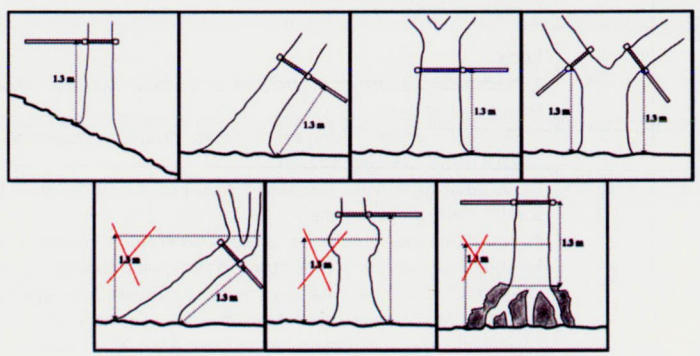
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
33	RAZPOL – razpoložljivost gozda za izkoriščanje	*Definicija:* Razpoložljivost je normativno določena oblika gospodarjenja z gozdom. *Koda:* 1 večnamenski gozdovi 2 gozdovi s posebnim namenom (ukrepi dovoljeni) 3 gozdovi s posebnim namenom (ukrepi niso dovoljeni) 4 varovalni gozdovi 5 neznano *Postopek:* Izbira primerne šifre na podlagi poznavanja razmer na terenu oz. iz podatkovne zbirke ZGS. *Snemalna površina:* KPP in njena širša okolica. *Cilj:* Poznavanje obsega omejitev za gospodarjenje, mednarodne statistike.

2.3.3 Znaki vezani na drevje

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
34	ZSD – zaporedna številka drevesa	*Postopek:* Vpis zaporedne številke. Če je drevo na KPP novo (vrast), se mu dodeli novo zaporedno številko in se ga vpiše v spodnji neizpolnjeni del formularja. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Prepoznavanje drevesa v naslednji inventuri.
35	DV – drevesna vrsta	*Postopek:* Vpis trimestne kode. V primeru, da drevesne vrste ni v osnovnem seznamu drevesnih vrst, vpišemo šifro drevesne vrste, ki ji je najbližja, z razliko, da na tretje mesto namesto ničle vpišemo ena. To označimo tudi v opombah, kamor z besedo vpišemo dejansko drevesno vrsto. Glej PRILOGO: Šifrant drevesnih vrst. Upoštevajo se le drevesne vrste, grmovne vrste se ne upoštevajo, tudi če presegajo merski prag. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Evidenca, spremljanje zdravstvenega stanja dreves, ocena mešanosti sestojev.
36	AZM – azimut	*Definicija:* Azimut je kot med nebesnim severom in nebesno lego opazovanega objekta, izražen v stopinjah. *Postopek:* Vpis odčitka. Azimut se odmeri z busolo na 1° natančno. Meri se kot od središča ploskve do levega roba drevesa (levi rob drevesa gledano od središča ploskve proti drevesu). Magnetne deklinacije ne upoštevamo. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Prepoznavanje drevesa v naslednji inventuri

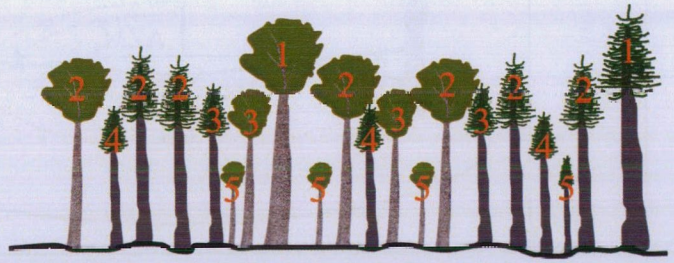
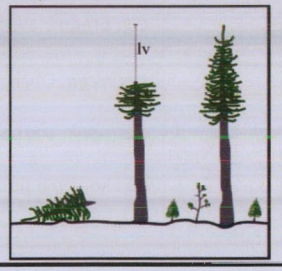
Nadaljevanje znaka na naslednji strani...⇨

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
36	AZM – azimut	
37	DIST – razdalja od središča ploskve do drevesa	*Definicija:* Razdalja je oddaljenost od središča ploskve do sredine debla opazovanega drevesa. Razdalja se meri vzporedno z zemljiščem. *Postopek:* Vpis izmerjene razdalje na 1 dm natančno (izmera v centimetrih, matematična zaokrožitev na najbližji decimeter). Pri določanju razdalje upoštevamo korekcijske faktorje polmerov ploskev zaradi nagiba (glej Priloga 1). *Snemalna površina:* Drevo na ploskvi.  *Cilj:* prepoznavanje drevesa v naslednji inventuri.
38	STARI OBSEG ($obseg_{1,3}$) – obseg debla v prsni višini	*Definicija:* Obseg debla v prsni višini, ki je bil izmerjen v predhodni inventuri. *Postopek:* stari obseg je na snemalni list prepisan iz zbirke podatkov. Cilj: kontrola podatkov in popravki morebitnih napak.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
39	NOVI OBSEG ($obseg_{1,3}$) – obseg debla v prsni višini	*Definicija:* Obseg debla v prsni višini (1,3 m od tal), izmerjen pravokotno na os drevesa. Obseg se zapiše v celih centimetrih. *Postopek:* Meritev obsega debla z merskim trakom se izvaja na višini 1,3 m na mestu predhodne meritve (po sledi zadirača). Na KPP2 (R2 je 7,98 m) se meri drevje z **$obseg_{1,3}$≥ 31 cm** ($D_{1,3}$ ≥ 10 cm), na KPP3 (R3 je 13,82 m) pa drevje z **$obseg_{1,3}$≥ 94 cm** ($D_{1,3}$ ≥ 30 cm). Novi obseg ne more biti manjši od starega! Glej tudi PRILOGO 1 Preglednice horizontalnih razdalj.  *Snemalna površina:* Drevo na ploskvi. *Cilj:* Izračun volumna drevesa. PRIMERI PRAVILNE MERITVE PREMERA DREVESA (velja tudi za meritev obsega z merskim trakom) 

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
40	KODA	*Definicija:* Številka, s katero se spremlja zgodovino drevesa na ploskvi. Koda izraža stanje med sedanjim in predhodnim popisom. *Koda KPP:* 0 ni sprememb – drevo je točno identificirano 1 posekano – viden panj 2 sušica – odmrlo drevo 3 vraslo drevo (nad 10 cm) 4 prej pozabljeno drevo 9 popravljen stari premer/obseg 11 drevo je pri prejšnjem popisu bilo na ploskvi, sedaj pa ni posekano, vendar ne raste več – leži na tleh (naravno padlo, vetrolom, snegolom...) 13 nova ploskev KPP (novo drevo zaradi nove ploskve) 15 preraslo drevo (nad 30 cm; pri prejšnjem popisu ni bilo merjeno) 16 prej preveč merjeno drevo *Postopek:* Vpis kode. Če ima drevo kodo 2 (sušica), se pod opombe vpišeta obe kodi za razkrojenost RAZ XX (glej poglavje Odmrla biomasa). *Snemalna površina:* Drevo na ploskvi. *Cilj:* Kontrola podatkov, spremljanje zgodovine ploskve.
41	SOC – socialni položaj drevesa	*Definicija:* Višinski položaj krošnje drevesa glede na položaj ene ali več krošenj sosednjih dreves. Socialni položaj drevesa označuje socialni vzpon ali sestop drevesa v sestoju. Koda: 1 Nadvladajoča drevesa (drevesa z izjemno razvitimi krošnjami močno nad sestojno streho). 2 Vladajoča drevesa (drevesa z dobro razvitimi krošnjami, ki tvorijo glavnino sestoja v vrhu sestojne strehe). 3 Sovladajoča drevesa (drevesa z nekoliko slabše razvitimi krošnjami ki tvorijo spodnji del sestojne strehe). 4 Potisnjena oz. obvladana drevesa (običajno drevesa z enostransko razvito krošnjo, ki je utesnjena z več strani in se zariva v spodnji del sestojne strehe. Če je konkurent odstranjen, imajo ta drevesa možnost socialnega vzpona). 5 Podstojna drevesa (obvladana drevesa. Drevesa običajno nimajo možnosti socialnega vzpona in prej odmrejo (razen jelke, ki je čakalec).

Nadaljevanje znaka na naslednji strani...⇨

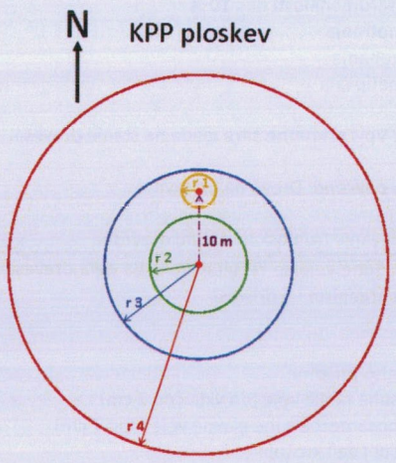
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
41	SOC – socialni položaj drevesa	*Postopek:* Vpis kode na osnovi stanja videnega na terenu. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Ocena konkurenčnih odnosov v sestojni strehi. 
42	VIŠINA – višina drevesa (H_d)	*Definicija:* Višina je navpična razdalja med dniščem drevesa in njegovim vrhom (iglavci) oz. najvišjim poganjkom (listavci). Dominantna višina je višina najdebelejših dreves na ploskvi oz. 100. najdebelejših dreves/ha. *Postopek:* Vpis izmerjene višine tretjega in četrtega dominantnega, nedeformiranega drevesa na KPP3 v metrih na dm natančno. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Preverjanje zanesljivosti tarif, izračun bonitete rastišča.
43	STAR – starost dominantnega drevesa	*Definicija*: starost drevesa je pridobljena na osnovi meritev (oz. strokovnih ocen) treh dreves, ki tvorijo prevladujočo razvojno fazo. *Postopek:* Vpis povprečne starosti tretjega in četrtega dominantnega drevesa na KPP, katerima je bila merjena tudi višina. Ocenjuje se gospodarska starost, ki se ji doda pribitek let, ki jih drevo potrebuje, da zraste do višine 1,3 m. V primeru vrtanja preštejemo vse letnice do stržena. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Opis sestoja, poznavanje zgodovine sestoja, izračun bonitete rastišča.
44	VRH – dolžina odlomljenega vrha (lv)	*Definicija:* Dolžina odlomljenega vrha je okularna ocena dolžine vrha, ki je odlomljen, v primerjavi s podobnim drevesom (premer, drevesna vrsta, socialni položaj) z neodlomljenim vrhom. *Postopek:* Vpis dolžine odlomljenega vrha v m. *Snemalna površina:* Drevo na ploskvi. *Cilj*: Natančnejša ocena volumna drevesa. 

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
45	OSUT – osutost	*Definicija:* Osutost je okularno ocenjen delež (%) manjkajočih asimilacijskih organov (listov, iglic) v primerjavi z namišljenim normalnim drevesom istega socialnega položaja, iste drevese vrste in z enakega rastišča. Ocenjuje se na 5 % natančno. *Postopek:* Vpis okularne ocene osutosti na 5 % natančno. Drevo se opazuje z mesta najboljše vidljivosti krošnje (nikoli proti soncu), z oddaljenosti vsaj ene drevesne višine. Vedno se ocenjuje samo primarno krošnjo (glej Priloga 6). Če je drevo sušica (99 % osutost), se pod opombe vpišeta obe šifri za razkrojenost RAZ XX (glej poglavje Odmrla biomasa) *Snemalna površina:* Drevo na ploskvi. *Cilj:* Ocena vitalnosti drevesa, povezava kazalca z drugimi znaki, npr. prirastkom.
46	TIPOSUT – tip osutosti	*Definicija:* Natančna lokacija (položaj v krošnji) manjkajočih asimilacijskih organov (listi, vejice). *Koda:* 1 osutosti ni 2 notranja 3 zunanja 4 netipična 5 omejena rast iglic/listov *Postopek:* Vpis primerne kode glede na stanje drevesa. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Preučevanje vzročnih zvez.
47	PORUM – porumenelost	*Definicija:* Sprememba količine barvil v asimilacijskih organih in kazalec fizioloških motenj gozdnega drevja. *Koda:* 1 porumenelosti ni; < 10 % 2 šibka; 11–25 % 3 srednja; 26–60 % 4 močna; več kot 60 % *Postopek:* Izbira primerne šifre na podlagi okularne ocene deleža porumenelih iglic/listov. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Preučevanje fizioloških motenj drevesa.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
48	TIPPORUM – tip porumenelosti	*Definicija:* Natančna lokacija (položaj v krošnji) porumenelih asimilacijskih organov (listje, iglice). *Koda:* 1 porumenelosti ni < 10 % 2 notranja 3 zunanja 4 netipična *Postopek:* Vpis primerne šifre glede na stanje drevesa. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Preučevanje fizioloških motenj drevesa.
49	SHVEJE – suhe veje	*Definicija:* Suhe veje so rezultat odmrtja dela drevesa in so izločene iz aktivnega delovanja organizma – drevesa. *Koda:* 1 niso prisotne 2 suhe tanke veje (do vključno 7 cm) 3 posamezne suhe glavne veje (nad 7 cm) 4 suhi deli krošnje 5 suh vrh 6 skupaj (3+5) 7 skupaj (4+5) 8 odlomljen vrh *Postopek:* Vpis primerne šifre glede na stanje drevesa. *Snemalna površina:* Drevo na ploskvi. *Cilj:* Proučevanje fizioloških motenj drevesa.

2.3.4 Znaki vezani na tanko živo drevje

Pri snemanju tankega živega drevja se upošteva drevesa **debeline do 10 cm** ter **višine do 1,3 m**. Drevesa se meri in vpisuje v snemalni list Tanko živo drevje. Drevesnih vrst, ki se jih je že evidentiralo pri popisu dreves, ne upoštevamo. Suhih dreves ne upoštevamo. Grmovnic (leska, bezeg, dren in pdb.) ne upoštevamo.



Ploskev KPP1 je iz središča ploskve oddaljena 10 m proti severu. Njen polmer je 3,09 m, korigiran je glede na naklon ploskve. V kolikor ploskvice ne moremo postaviti na severu (sprememba rabe tal oz. negozd), jo prestavimo na jug, nato vzhod, zatem zahod.

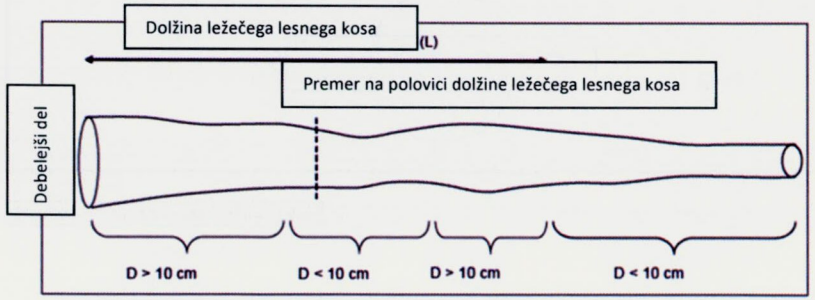
Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
50	OLESENR – število drevesnih vrst	*Postopek:* Vpis števila drevesnih vrst, ki so prisotne na ploskvici in se jih pri popisu dreves še ni upoštevalo. Glej PRILOGO Šifrant drevesnih vrst. KPP 1: $0 < D_{1,3} < 10$ cm Višina drevesa ≥ 1,3 m *Snemalna površina:* KPP1 (P=0,3 ar; R1 je 3,09 m). *Cilj:* Ocena številčnosti vrst kot podlaga za oceno pestrosti in sonaravnosti sestojev.
51	DV – drevesna vrsta drevesca (tanko živo drevje)	*Postopek:* Določitev in vpis trimestne šifre drevesne vrste. Vpišejo se drevesa, ki so enaka ali višja od 1,3 m, ter imajo prsni premer manjši od 10 cm. V primeru, da drevesne vrste ni v osnovnem seznamu drevesnih vrst, vpišemo šifro drevesne vrste, ki ji je najbližja, z razliko, da na tretje mesto namesto ničle vpišemo ena. To označimo tudi v opombah, kamor napišemo dejansko drevesno vrsto. Glej PRILOGO Šifrant drevesnih vrst *Snemalna površina:* KPP1 (P=0,3 ar; R1 je 3,09 m). *Cilj:* Evidenca, ocena mešanosti sestojev.
52	$D_{1,3}$ – prsni premer drevesca	*Definicija:* Premer debla v prsni višini izmerjen pravokotno na os drevesa, v višini 1,3 m od tal. Vpisuje se na 0,5 cm natančno. *Postopek:* Vpis odčitka. Na KPP1 (0,3 ar) se izmeri premer vseh drevesc na višini 1,3 m na 0,5 cm natančno, vendar le za tista s premerom v intervalu $0 < D_{1,3} < 10$ cm. Izmerjena drevesca se na mestu meritve označi s kredo. KPP 1: $0 < D_{1,3} < 10$ cm Višina drevesa ≥ 1,3 m *Snemalna površina:* KPP1 (P=0,3 ar; R1 je 3,09 m). *Cilj:* Ocena lesne zaloge pod merskim pragom.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
53	H – višina drevesca	*Definicija:* Navpična razdalja med tlemi in najvišjim delom (poganjkom) drevesca. *Postopek:* Vpis odčitka. Na KPP1 (0,3 ar) se oceni višino vseh drevesc na 0,5 m natančno, vendar le za tista s premerom v intervalu $0 < D_{1,3} < 10$ cm. *Cilj:* Ocena lesne zaloge pod merskim pragom.
54	N – število	*Definicija:* Število dreves enake DV, enakega $D_{1,3}$ in enake H. *Postopek:* Prešteje in zapiše se število vseh dreves z enakimi DV, $D_{1,3}$ in H. *Snemalna površina:* KPP1 (P=0,3 ar; R1 je 3,09 m). *cilj:* Ocena lesne zaloge pod merskim pragom.

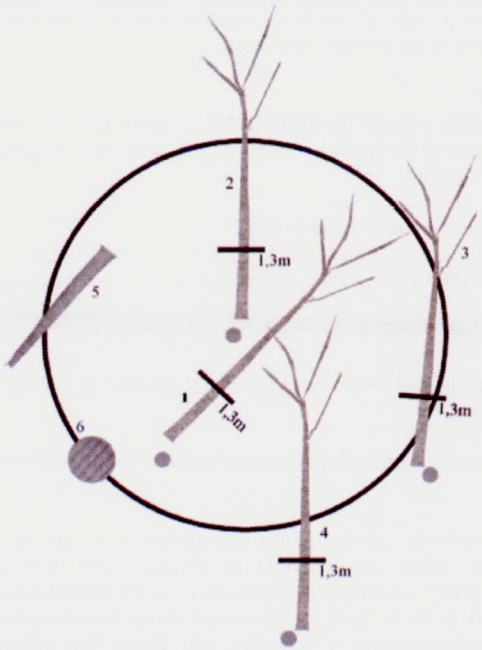
2.3.5 Znaki vezani na odmrlo lesno biomaso

Splošno:

- **odmrla drevesa** (stoječa, ležeča) merimo ne glede na prisotnost skorje,
- **če je sušica** evidentirana **na prvič posneti ploskvi,** jo merimo in evidentiramo v sklopu **meritev Odmrla biomasa,**
- **če je sušica nastala od leta 2007 do 2012, jo vpišemo v obrazec Drevje** (merimo vse parametre kot za stoječa živa drevesa, razkrojenost pa vpišemo pod OPOMBE).
- **ležeče odmrlo drevje** je vključeno v izmero, kadar je njegov **prsni premer ($D_{1,3}$ – od začetka ležečega drevesa) znotraj mejnega radija ploskve** in je ≥ 10 cm na KPP2 in ≥ 30 cm na KPP3 (Slika 5, primer 1, 2 in 3). V zadnjem primeru mu izmerimo samo prsni premer in v opombe zapišemo, da gre za celo drevo. Kot celo drevo se lahko upošteva **le v primeru, ko so veje še prisotne!** V nasprotnem primeru ga merimo po principu večjega lesnega kosa.
- če **večji lesni kos** leži **deloma na ploskvi**, deloma izven nje (Slika 5, primer 5), upoštevamo le del kosa do mejnega radija (izmerimo dolžino in srednji premer (D) in obenem upoštevamo vse merske pragove preglednice 1 (glej tudi Sliko 4)). Kos mora biti dolg vsaj 0,5 m.

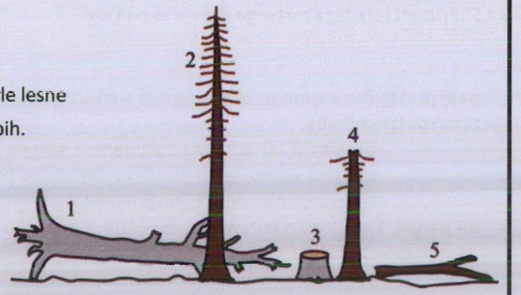


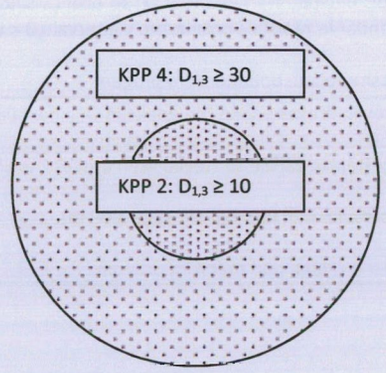
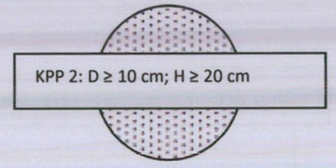
Slika 4: Primer večjega mrtvega kosa (dolžino merimo od najdebelejšega konca do najtanjšega, ki še ima premer ≥ 10 cm)



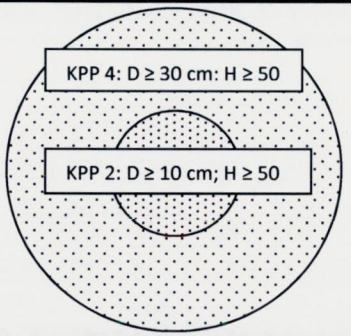
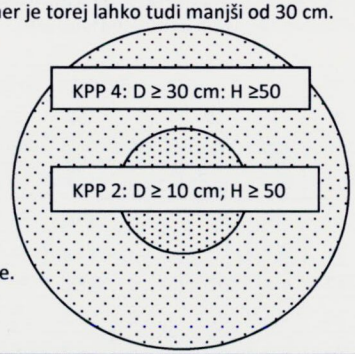
Slika 5: Primeri ležečega mrtvega drevja in panjev

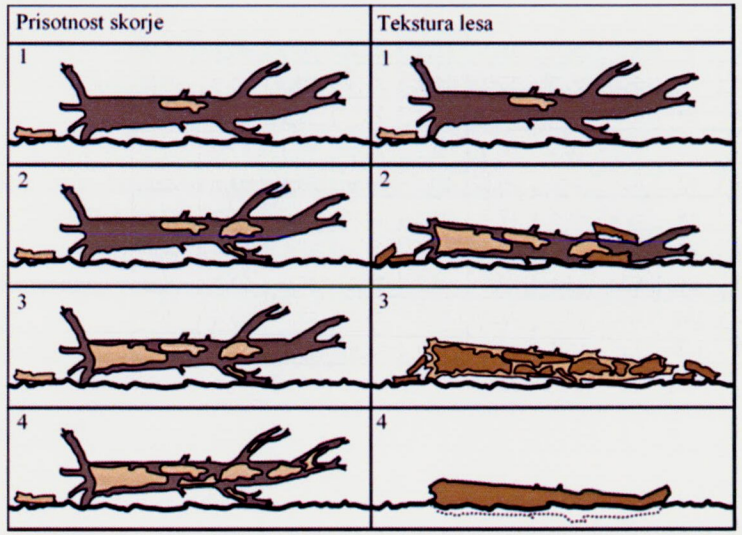
- **panj** je vključen v izmero, če je njegovo središče (Slika 5, primer 6) znotraj mejnega radija ploskve. Ob tem upoštevamo da:
  - pri **panjih**, ki ležijo na **nagnjenem terenu** in imajo **različne oblike**, izmerimo zgornjo in spodnjo višino, ter zapišemo aritmetično povprečje (H). Izmerimo večji in manjši premer, ter zapišemo aritmetično povprečje (D).
- pri **panjih**, kjer gledajo **korenine iz tal** – izmerimo in upoštevamo samo štore, brez koreninskega dela.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
55	TIP – tip odmrle lesne biomase	*Definicija:* Pod tipom odmrle lesne biomase se razume razdelitev glede na lego, velikost in njene ostale značilnosti. Koda: **1 Ležeče odmrlo drevo (podrtica)** je vsako odmrlo drevo, katerega kot med deblom in horizontalo – tlemi je manjši od 45°; drugače je to stoječe odmrlo drevo (sušica). **2 Stoječe odmrlo drevo (sušica).** **3 Panj (štor)** je del drevesa, ki po sečnji ostane na mestu, kjer je raslo drevo. **4 Štrcelj** je stoječi odlomljeni del debla drevesa (sušica ali podrtica brez vej). **5 Kos** je vsak večji lesni kos ali del drevesa, ki presega določene minimalne dimenzije. *Postopek:* Za vsak kos odmrle lesne biomase se oceni tip in zapiše šifro. Stoječe drevo (sušico) se evidentira na popisnem listu Odmrla biomasa, vendar s pomembno razliko, da se sušice z $D_{1,3} \geq 30$ cm evidentira na površini celotne KPP4 (P=20 ar; R4 je 25,23 m). Drevesa, ki so se posušila v obdobju 2007 – 2012 so evidentirana samo v popisnem listu drevje. **Pod opombe se vpiše še šifra razkrojenosti RAZ XX.** *Snemalna površina:* KPP. *Cilj:* Ocena količine odmrle lesne biomase, struktura po tipih. 
56	DV – drevesna vrsta	*Postopek:* Vpis trimestne šifre iz šifranta drevesnih vrst. Če drevesna vrsta ni poznana, je pa poznana skupina drevesnih vrst, se zapiše šifro za iglavce (100) ali za listavce (400). Če je tudi skupina drevesnih vrst nepoznana oz. se ne da ugotoviti, se zapiše šifro za neopredeljeno (880). Glej PRILOGO: Šifrant drevesnih vrst. *Cilj:* Izbira primerne tarife za oceno količine odmrle biomase, struktura po drevesnih vrstah.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
57	$D_{1,3}$ – prsni preme	*Definicija:* Pri celem ležečem drevju se prsni premer ($D_{1,3}$) izmeri na ocenjeni prsni višini – 1,3 m od panja. *Postopek:* Prsni premer ($D_{1,3}$) se izmeri s premerko na cel cm natančno.  *Cilj:* Ocena količine odmrle lesne biomase.
58	D – srednji premer	*Postopek:* Pri panjih, štrcljih in kosih se srednji premer (D) izmeri kot sledi: - panj (štor) – srednji premer (aritmetična sredina najdebelejšega in najtanjšega dela panja) - štrcelj – izmeri/oceni se srednji premer - kos – srednji premer (aritmetična sredina najdebelejšega in najtanjšega dela kosa) Premer (D) se izmeri s premerko na cel cm natančno. Glej Primeri ležečega mrtvega drevja in panjev (Slika 5). *Snemalna površina:* **Panje se meri samo na KPP2,** če imajo srednji premer večji kot 10 cm in so višji od 20 cm. **Panji** 

Nadaljevanje znaka na naslednji strani...⇨

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
59	D – srednji premer	**Štrclji**  Štrclje merimo, ko so višji od 0,5 m in če so debelejši od 10 cm (KPP2) oz. 30 cm (KPP4). **Kosi** Če leži del večjega **lesnega kosa** znotraj kroga KPP2 in del znotraj KPP4, se v primeru, da je premer kosa < 30 cm izmeri samo del, ki leži znotraj KPP2. Če del, ki leži znotraj KPP4 izpolnjuje minimalne pogoje, se ga izmeri in upošteva v celoti. Pri KPP4 mora imeti večji lesni kos minimalni premer 10 cm in premer na debelejšem koncu ≥ 30 cm. Srednji premer je torej lahko tudi manjši od 30 cm.  *Cilj*: Ocena količine odmrle lesne biomase.
60	H – višina	*Postopek*: Pri **panju** (štoru) se izmeri srednja višina (H), ki je aritmetična sredina najvišjega in najnižjega dela panja. Pri **štrclju** se izmeri/oceni višina (H). Višino (H) se izmeri z merilnim trakom ali premerko oz. višinomerom, na cel dm natančno. *Cilj:* Ocena količine odmrle lesne biomase.
61	L – dolžina	Postopek: Pri ležečih **kosih** se meri dolžina (L). Dolžino (L) se izmeri z merilnim trakom ali premerko, cel dm natančno. Glej Primeri ležečega mrtvega drevja in panjev (Slika 5). *Cilj:* Ocena količine odmrle lesne biomase.

Zap. št.	Ime znaka	Definicija/šifrant/postopek/cilj
62	RAZK – razkrojenost	*Definicija:* Razkrojenost je definirana na podlagi **prisotnosti skorje** in **teksture lesa**. *Koda:* Prisotnost skorje: 1 ≥ 90 % 2 90–61 % 3 60–31 % 4 ≤ 30 % Tekstura lesa: 1 ≥ 90 % – popolnoma trdo 2 90–61 % – večinoma trdo 3 60–31 % – večinoma mehko 4 ≤ 30 % – popolnoma mehko *Postopek:* Zapiše se dvomestna šifra. Prvo cifro predstavlja ocena prisotnosti skorje, drugo pa ocena teksture lesa. *Snemalna površina:* Ležeče odmrlo drevje, panji, štrclji in kosi dreves. *Cilj:* Ocena količine odmrle biomase. 

3 PRILOGE – GOZDNA INVENTURA

PRILOGA 1: PREGLEDNICE HORIZONTALNIH RAZDALJ

Preglednica 1: Razdalje v padcu v odvisnosti od naklona terena (vhoda sta horizontalna razdalja v m ter nagib v %)

NAKLON		Horizontalna razdalja (m)							
%	°	5	10	15	20	25	30	40	50
10	6	5,0	10,0	15,1	20,1	25,1	30,1	40,2	50,2
20	11	5,1	10,2	15,3	20,4	25,5	30,6	40,8	51,0
30	17	5,2	10,4	15,7	20,9	26,1	31,3	41,8	52,2
40	22	5,4	10,8	16,2	21,5	26,9	32,3	43,1	53,9
50	27	5,6	11,2	16,8	22,4	28,0	33,5	44,7	55,9
60	31	5,8	11,7	17,5	23,3	29,2	35,0	46,6	58,3
70	35	6,1	12,2	18,3	24,4	30,5	36,6	48,8	61,0
80	39	6,4	12,8	19,2	25,6	32,0	38,4	51,2	64,0
90	42	6,7	13,5	20,2	26,9	33,6	40,4	53,8	67,3
100	45	7,1	14,1	21,2	28,3	35,4	42,4	56,6	70,7

Preglednica 2: Razdalje v padcu v odvisnosti od naklona terena (vhoda sta horizontalna razdalja v metrih ter nagib v stopinjah)

NAKLON		Horizontalna razdalja (m)							
°	%	5	10	15	20	25	30	40	50
5	9	5,0	10,0	15,1	20,1	25,1	30,1	40,2	50,2
10	18	5,1	10,2	15,2	20,3	25,4	30,5	40,6	50,8
15	27	5,2	10,4	15,5	20,7	25,9	31,1	41,4	51,8
20	36	5,3	10,6	16,0	21,3	26,6	31,9	42,6	53,2
25	47	5,5	11,0	16,6	22,1	27,6	33,1	44,1	55,2
30	58	5,8	11,5	17,3	23,1	28,9	34,6	46,2	57,7
35	70	6,1	12,2	18,3	24,4	30,5	36,6	48,8	61,0
40	84	6,5	13,1	19,6	26,1	32,6	39,2	52,2	65,3
45	100	7,1	14,1	21,2	28,3	35,4	42,4	56,6	70,7
50	119	7,8	15,6	23,3	31,1	38,9	46,7	62,2	77,8

Preglednica 3: Horizontalne razdalje v odvisnosti od naklona terena (vhoda v preglednico sta razdalja v padcu v metrih ter nagib izražen v %)

NAKLON		Razdalja v padcu (m)							
%	°	5	10	15	20	25	30	40	50
10	6	5,0	10,0	14,9	19,9	24,9	29,9	39,8	49,8
20	11	4,9	9,8	14,7	19,6	24,5	29,4	39,2	49,0
30	17	4,8	9,6	14,4	19,2	23,9	28,7	38,3	47,9
40	22	4,6	9,3	13,9	18,6	23,2	27,9	37,1	46,4
50	27	4,5	8,9	13,4	17,9	22,4	26,8	35,8	44,7
60	31	4,3	8,6	12,9	17,1	21,4	25,7	34,3	42,9
70	35	4,1	8,2	12,3	16,4	20,5	24,6	32,8	41,0
80	39	3,9	7,8	11,7	15,6	19,5	23,4	31,2	39,0
90	42	3,7	7,4	11,1	14,9	18,6	22,3	29,7	37,2
100	45	3,5	7,1	10,6	14,1	17,7	21,2	28,3	35,4

Preglednica 4: Horizontalne razdalje v odvisnosti od naklona terena (vhoda v preglednico sta razdalja v padcu v metrih ter nagib izražen v stopinjah)

NAKLON		Razdalja v padcu (m)							
°	%	5	10	15	20	25	30	40	50
5	9	5,0	10,0	14,9	19,9	24,9	29,9	39,8	49,8
10	18	4,9	9,8	14,8	19,7	24,6	29,5	39,4	49,2
15	27	4,8	9,7	14,5	19,3	24,1	29,0	38,6	48,3
20	36	4,7	9,4	14,1	18,8	23,5	28,2	37,6	47,0
25	47	4,5	9,1	13,6	18,1	22,7	27,2	36,3	45,3
30	58	4,3	8,7	13,0	17,3	21,7	26,0	34,6	43,3
35	70	4,1	8,2	12,3	16,4	20,5	24,6	32,8	41,0
40	84	3,8	7,7	11,5	15,3	19,2	23,0	30,6	38,3
45	100	3,5	7,1	10,6	14,1	17,7	21,2	28,3	35,4
50	119	3,2	6,4	9,6	12,9	16,1	19,3	25,7	32,1

Preglednica 5: Polmeri vzorčnih krogov KPP v odvisnosti od naklona

Naklon v °											
PL		1	2	3	4	PL		1	2	3	4
POVRŠINA	**(ar)**	**0,3**	**2,0**	**6,0**	**20,0**	**POVRŠINA**	**(ar)**	**0,3**	**2,0**	**6,0**	**20,0**
POLMER (r)	**(m)**	**3,09**	**7,98**	**13,82**	**25,23**	**POLMER (r)**	**(m)**	**3,09**	**7,98**	**13,82**	**25,23**
NAKLON						**NAKLON**					
o	**%**					**o**	**%**				
0	0	3,09	7,98	13,82	25,23	**32**	62	3,36	8,67	15,01	27,40
2	3	3,09	7,98	13,82	25,24	**33**	65	3,37	8,71	15,09	27,55
4	7	3,09	7,99	13,84	25,26	**34**	67	3,39	8,76	15,18	27,71
6	11	3,10	8,00	13,86	25,30	**35**	70	3,41	8,82	15,27	27,88
8	14	3,11	8,02	13,89	25,35	**36**	73	3,44	8,87	15,36	28,05
10	18	3,11	8,04	13,93	25,42	**37**	75	3,46	8,93	15,46	28,23
12	21	3,12	8,07	13,97	25,51	**38**	78	3,48	8,99	15,57	28,42
13	23	3,13	8,08	14,00	25,56	**39**	81	3,51	9,05	15,68	28,62
14	25	3,14	8,10	14,03	25,61	**40**	84	3,53	9,12	15,79	28,83
15	27	3,14	8,12	14,06	25,67	**41**	87	3,56	9,19	15,91	29,04
16	29	3,15	8,14	14,10	25,73	**42**	90	3,58	9,26	16,03	29,27
17	31	3,16	8,16	14,13	25,80	**43**	93	3,61	9,33	16,16	29,50
18	32	3,17	8,18	14,17	25,87	**44**	97	3,64	9,41	16,29	29,75
19	34	3,18	8,21	14,21	25,95	**45**	100	3,67	9,49	16,43	30,00
20	36	3,19	8,23	14,26	26,03	**46**	104	3,71	9,57	16,58	30,27
21	38	3,20	8,26	14,30	26,11	**47**	107	3,74	9,66	16,73	30,55
22	40	3,21	8,29	14,35	26,20	**48**	111	3,78	9,76	16,89	30,84
23	42	3,22	8,32	14,40	26,30	**49**	115	3,81	9,85	17,06	31,15
24	45	3,23	8,35	14,46	26,40	**50**	119	3,85	9,95	17,24	31,47
25	47	3,25	8,38	14,52	26,50	**51**	123	3,90	10,06	17,42	31,80
26	49	3,26	8,42	14,58	26,61	**52**	128	3,94	10,17	17,61	32,15
27	51	3,27	8,45	14,64	26,73	**53**	133	3,98	10,29	17,81	32,52
28	53	3,29	8,49	14,71	26,85	**54**	138	4,03	10,41	18,03	32,91
29	55	3,30	8,53	14,78	26,98	**55**	143	4,08	10,54	18,25	33,31
30	58	3,32	8,58	14,85	27,11	**56**	148	4,13	10,67	18,48	33,74
31	60	3,34	8,62	14,93	27,95	**57**	154	4,19	10,81	18,73	34,19

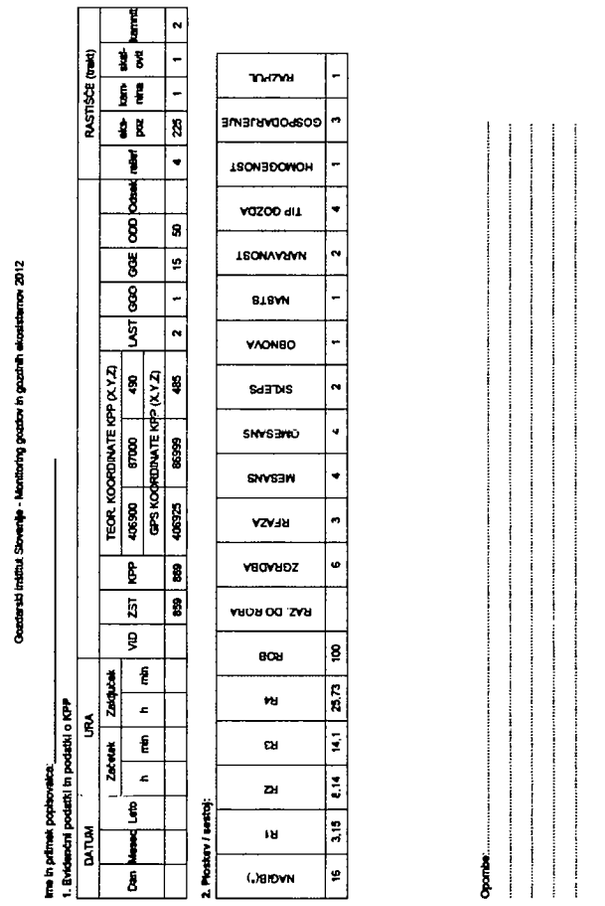
PRILOGA 2: DREVESNE VRSTE

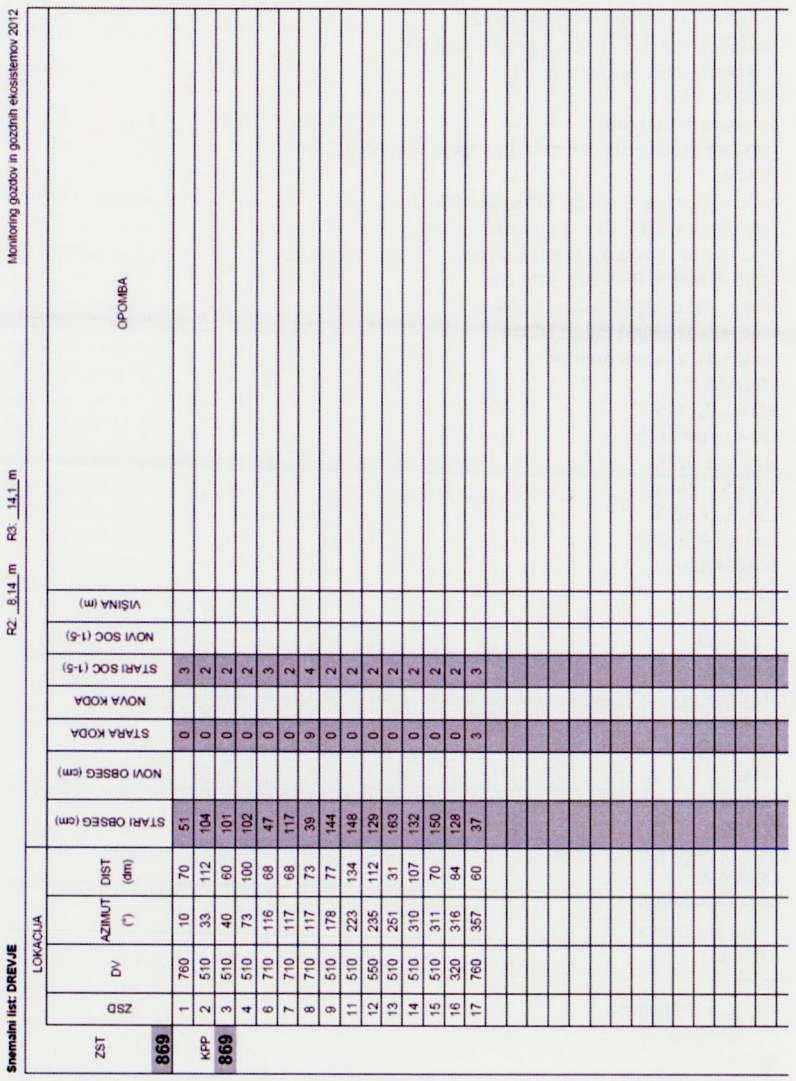
Preglednica 6: Seznam drevesnih vrst

Slovensko ime	latinsko ime	šif.	d.š.
Iglavci		**10**	**0**
Navadna smreka	*Picea abies*	11	0
Sitka	*Picea sitkaensis*	12	0
Omorika	*Picea omorika*	12	1
Bela jelka	*Abies alba*	21	0
Kavkaška jelka	*Abies nordmanniana*	21	1
Tisa	*Taxus baccata*	22	0
Rdeči bor	*Pinus sylvestris*	31	0
Črni bor	*Pinus nigra*	32	0
Zeleni bor	*Pinus strobus*	33	0
Obmorski bor	*Pinus maritima*	33	1
Macesen	*Larix decidua*	34	0
Ostali macesni	*Larix* sp.	35	1
Japonski macesen	*Larix leptolepis*	35	0
Duglazija	*Pseudotsuga menziesii*	36	0
Pacipresa	*Chamaecyparis* sp.	37	0
Navadna cipresa	*Cupressus sempervire.*	37	1
Ostali bori	*Pinus* sp.	38	0
Ostali iglavci		38	1
Listavci		**40**	**0**
Bukev	*Fagus sylvatica*	41	0
Graden	*Quercus sessiliflora*	51	0
Dob	*Quercus robur*	52	0
Rdeči hrast	*Quercus rubra*	53	0
Močvirski hrast	*Quercus palustris*	54	0
Pravi kostanj	*Castanea sativa*	55	0
Ostali hrasti	*Quercus* sp.	54	1
Robinja	*Robinia pseudoacacia*	56	0
Oreh	*Juglans regia*	57	0
Črni oreh	*Juglans nigra*	57	1
Gorski javor	*Acer pseudoplatanus*	61	0
Ostrolistni javor	*Acer platanoides*	62	0
Topokrpi javor	*Acer obtusatum*	63	0
Trokrpi javor	*Acer monspessulanum*	63	1
Veliki jesen	*Fraxinus excelsior*	64	0
Ostroplodni jesen	*Fraxinus angustifolia*	65	0
Gorski brest	*Ulmus glabra*	66	0
Nadaljevanje preglednice na naslednji strani...			

Slovensko ime	latinsko ime	šif.	dš.
Poljski brest	*Ulmus minor*	67	0
Lipa	*Tilia* sp.	68	0
Lipovec	*Tilia cordata*	68	1
Velikolistna lipa	*Tilia platyphyllos*	68	2
Navadni beli gaber	*Carpinus betulus*	71	0
Kraški beli gaber	*Carpinus orientalis*	71	1
Češnja	*Prunus avium*	72	0
Čremsa	*Prunus padus*	72	1
Maklen	*Acer campestre*	73	0
Brek	*Sorbus torminalis*	74	0
Skorš	*Sorbus domestica*	74	1
Mokovec	*Sorbus aria*	75	0
Črni gaber	*Ostrya carpinifolia*	76	0
Mali jesen	*Fraxinus ornus*	77	0
Ameriški jesen	*Fraxinus americana*	77	1
Puhasti hrast	*Quercus pubescens*	78	0
Cer	*Quercus cerris*	79	0
Črnika	*Quercus ilex*	79	1
Trepetlika	*Populus tremula*	81	0
Črni topol	*Populus nigra*	81	1
Topol	*Populus* sp.	82	0
Topol – klon	*P.x Euramer.I–214*	82	1
Črna jelša	*Alnus glutinosae*	83	0
Siva jelša	*Alnus incana*	84	0
Navadna breza	*Betula pendula*	85	0
Vrba	*Salix* sp.	86	0
Bela vrba	*Salix alba*	86	1
Jerebika	*Sorbus aucuparia*	87	0
Nagnoj	*Laburnum* sp.	88	0
Gledičija	*Gleditsia triacanthos*	88	1
Ostali listavci		88	2
Neopredeljivo		88	3
Grmovne vrste		90	0

PRILOGA 3: POPISNI OBRAZCI





ZSD	DV	AZIMUT (°)	DIST (dm)	STARI OBSEG (cm)	NOVI OBSEG (cm)	STARA KODA	NOVA KODA	STARI SOC (1-5)	NOVI SOC (1-5)	VIŠINA (m)	OPOMBA
1	760	10	70	51		0		3			
2	510	33	112	104		0		2			
3	510	40	60	101		0		2			
4	510	73	100	102		0		2			
6	710	116	68	47		0		3			
7	710	117	68	117		0		2			
8	710	117	73	39		9		4			
9	510	178	77	144		0		2			
11	510	223	134	148		0		2			
12	550	235	112	129		0		2			
13	510	251	31	163		0		2			
14	510	310	107	132		0		2			
15	510	311	70	150		0		2			
16	320	316	84	128		0		2			
17	760	357	60	37		3		3			

Snemalni list: TANKO (ŽIVO) DREVJE **Monitoring gozdov in gozdnih ekosistemov 2012**

- ZST: 869 R1: 3,15 m
- OLESENR: ____

DV šifra	$D_{1,3}$ cm	H m	ŠTEVILO	opomba

DV šifra	$D_{1,3}$ cm	H m	ŠTEVILO	opomba

Snemalni list: ODMRLA BIOMASA **Monitoring gozdov in gozdnih ekosistemov 2012**

ZST: 869 R4: 25,73 m

TIP šifra	DV šifra	$D_{1,3}$ cm	H m	D cm	L m	RAZK šifra	Opomba

TIP šifra	DV šifra	$D_{1,3}$ cm	H m	D cm	L m	RAZK šifra	Opomba

PRILOGA 4: ŠIFRANTI ZA POPIS

Šifrant za meritve na KPP:

- **IME IN PRIIMEK** popisovalca
- **DATUM** – dan, mesec, leto
- **URA** – pričetek in zaključek popisa
- **VID** – vidljivost:

1. normalna
2. poslabšana

- **ZST** – zap. številka trakta
- **KPP** – zaporedna številka KPP
- **TEOR. KOORDINATE KPP** – matematična koordinata
- **GPS KOORDINATE KPP** – GPS koordinate KPP
- **LAST:**

1. državno
2. zasebno
3. neznano

- **GGO, GGE, ODD, ODS** – šifre ZGS
- **RELIEF:**

1. ravnina
2. vrh hriba, greben
3. dno kotanje
4. pobočje
5. konveksni prelom pobočja
6. konkavni prelom pobočja
7. jarek, ozka dolinica

- **EKSPOZ** – ekspozicija v °
- **KAMNINA:**

1. karbonatna
2. nekarbonatna
3. mešana

- **SKALOVIT:**

1. brez skal
2. posamične skale; $P_{sk} \leq 5\%$
3. majhna skalovitost; $P_{sk}=6–25\%$
4. srednja skalovitost; $P_{sk}=26–50\%$
5. velika skalovitost; $P_{sk}=51–75\%$
6. izjemna skalovitost; $P_{sk} \geq 76\%$

- **KAMNIT:**

1. brez kamnov
2. posamični kamni; $P_k \leq 5\%$
3. majhna kamnitost; $P_k=6–25\%$
4. srednja kamnitost; $P_k=26–50\%$
5. velika kamnitost; $P_k=51–75\%$
6. izjemna kamnitost; $P_k \geq 76$ %

- **NAGIB** – nagib v °
- **R1, R2, R3, R4** – korigirani radiji
- **ROB** – delež površine ploskve v gozdu
- **ZDRUŽBA** – šifre ZGS

- **ZGRADBA:**

1. prebiralna
2. kmečka prebiralna (netipično prebiranje v drobnoposestniških gozdovih)
3. enodobna in enomerna (visoki gozd)
4. raznodobna in raznomerna (malopovršinska)
5. raznodobna (velikopovršinska)
6. dvoslojna
7. panjevec (nizki gozd)
8. grmičast gozd (rušje in ostalo grmičevje višine cca. 5 m)

- **RFAZA:**
- mladovje (mladje, gošča, letvenjak); $D < 10$ cm
- tanjši drogovnjak; $10 \leq D < 20$ cm
- močnejši drogovnjak; $20 \leq D < 30$ cm
- tanjši debeljak; $30 \leq D_{dom} < 40$ cm
- srednji debeljak; $40 \leq D_{dom} < 50$ cm
- močnejši debeljak; $D_{dom} \geq 50$ cm
- neopredeljena; vsi premeri
- **MESANS:**

1. iglavci; $P_{igl} > 75$ %
2. iglavci z listavci; $50 \leq P_{igl} \leq 75$ %
3. listavci z iglavci; $25 \leq P_{igl} < 50$ %
4. listavci; $P_{igl} < 25$ %

- **OMESANS:**

1. posamična
2. šopasta
3. skupinska
4. homogen sestoj

- **SKLEPS:**

1. tesen
2. normalen
3. rahel
4. vrzelast
5. pretrgan

- **OBNOVA:**

1. sestoj ni v obnovi
2. sestoj je v obnovi

- **NASTS:**

1. naravno
2. narav./antropogeno
3. antropogeno
4. neznano

- **TARIFA** – šifra ZGS

- **NARAVNOST:**
1. od človeka nemoteno
2. sonaravno gospodarjeni gozdovi
3. gozdovi z izmenjano drevesno sestavo
- **TIP GOZDA:**
1. Hrastovi gozdovi (hrast > 75%)
2. Gozdovi bukve in hrasta (bukev+hrast > 75% in hrast 26% ≤75%) in bukev 26% ≤ 75%)
3. Bukovi gozdovi (bukev >75%)
4. Drugi pretežno listnati gozdovi, če niso izpolnjeni pogoji pod 1–3 in je listavcev > 75%
5. Gozdovi bukve in jelke (jelka+bukev > 75% in jelka 26% ≤ 75% in bukev 26% ≤ 75%)
6. Gozdovi bukve in smreke (smreka+bukev > 75% in smreka 26% ≤ 75% in bukev 26% ≤ 75%)
7. Jelovi gozdovi (jelka > 75%)
8. Smrekovi gozdovi (smreka > 75%)
9. Borovi gozdovi (bor (razen rušja) > 75%)
10. Rušje (rušje > 75% površine)
11. Drugi pretežno iglasti gozdovi, če niso izpolnjeni pogoji pod 5–10 in je iglavcev > 75%
12. Drugi gozdovi iglavcev in listavcev vsi drugi gozdovi, pri katerih niso izpolnjeni pogoji pod 1–11.
- **HOMOGENOST:**
1. cela ploskev leži v istem sestoju
2. ploskev leži na meji vsaj dveh različnih sestojev
- **GOSPODARJENJE:**
1. negospodarjeno
2. gospodarjenje opuščeno
3. gospodarjeno
4. ni mogoče opredeliti
- **RAZPOL:**
1. večnamenski gozdovi
2. gozdovi s posebnim namenom (ukrepi dovoljeni)
3. gozdovi s posebnim namenom (ukrepi niso dovoljeni)
4. varovalni gozdovi
5. neznano

Šifrant za meritve dreves:

Merimo: (KPP2: $D_{1,3} \geq 10$ cm; KPP3: $D_{1,3} \geq 30$ cm)
- **ZSD** – zaporedna številka drevesa
- **DV** – drevesna vrsta, šifrant
- **AZM** – azimut v °
- **DIST** – razdalja v dm
- **STARI OBSEG**
- **NOVI OBSEG**– prsni premer, v cm
- **KODA**:
  0. ni sprememb – drevo je točno identificirano
  1. posekano
  2. sušica
  3. vraslo ali pozabljeno drevo
  9. popravljen stari premer
  11. drevo je pri prejšnjem popisu bilo na ploskvi, sedaj pa ni posekano, vendar ne raste več – leži na tleh (naravno padlo, vetrolom, snegolom...)
  12. drevesa, ki so bila v bazi, na popisnem listu pa ne
  13. nova ploskev KPP (novo drevo zaradi nove ploskve)
  14. stara osutost je 99 (sušica), nova osutost je manjša

- **SOC**:
  1. nadvladajoča drevesa z izjemno močno razvitimi krošnjami
  2. vladajoča drevesa z dobro razvitimi krošnjami – ta tvorijo glavnino sestoja
  3. sovladajoča drevesa z nekoliko slabše razvitimi krošnjami in tvorijo spodnji del strehe sestoja
  4. potisnjena oz. obvladana drevesa
  5. podstojna drevesa
- **Hd** – dominantna višina 3 najdebelejših (dominantnih) dreves na ploskvi v m, na dm natančno
- **VRH** – v primeru odlomljenega vrha ocenimo dolžino odlomljenega vrha stoječega drevesa v metrih.
- **OSUT** – ocena osutosti
- **TIPOSUT**
  1. ni osutosti
  2. notranja
  3. zunanja
  4. netipična
  5. omejena rast iglic/listov
- **PORUM**
  1. ni; <10 %
  2. šibka; 11 – 25 %
  3. srednja; 26 – 60 %
  4. močna; več kot 60 %
- **TIPPORUM**
  1. ni
  2. notranja
  3. zunanja
  4. netipična

- **SHVEJE**
  1. niso prisotne
  2. suhe tanke vejice
  3. posamezne suhe glavne veje
  4. suhi deli krošnje
  5. suh vrh
  6. skupaj (3+5)
  7. skupaj (4+5)
  8. odlomljen vrh

Šifrant za meritve tankega živega drevja:

- **OLESENR** – število vrst olesenelih rastlin
- **DV** – drevesna vrsta, šifrant
- **$D_{1,3}$** – prsni premer drevesca
- **H** – višina drevesca na 0,5 m natančno
- **ŠTEVILO** – zapišemo število vseh dreves z enakim DV, $D_{1,3}$ in H
- **OPOMBA**

Šifrant za odmrlo lesno biomaso:

- **TIP**
  1. ležeče drevo (podrtica),
  2. stoječe drevo (sušica), evidentirano na snemalnem listu DREVESA
  3. štor (panj),
  4. štrcelj (*snag*)
  5. kos
- **DV** – šifra iz šifranta, če poznana drevesna vrsta, drugače:
  100. za iglavce
  400. za listavce
  880. neopredeljeno/ nepoznano/ne moremo ugotoviti
- **$D_{1,3}$** – prsni premer drevesa (ležeče drevo)
- **D** – srednji premer (štor, štrcelj, kos)
- **H** – višina (štor, štrcelj)
- **L** – dolžina (lesni kos)
- **RAZK** dvoštevilčna šifra iz šifranta
  Prisotnost skorje:
  1_ ≥ 90 %
  2_ 90–60 %
  3_ 60–30 %
  4_ ≤ 30 %

Tekstura lesa:

_1 ≥ 90 % – popolnoma trdo
_2 90–60 % – večinoma trdo
_3 60–30 % – večinoma mehko
_4 ≤ 30 % – popolnoma mehko

- **OPOMBA**

PRILOGA 5: KONTROLNI LIST

Kontrolor:
Datum:
ZST/KPP:

Ocene:

1. *dobro*
2. *zadovoljivo*
3. *nezadovoljivo/napačno*
4. *ni/manjka*

Ploskev KPP: **Opombe:**

- evidenčni podatki:
- GPS koordinate:
- rastišče:
- ploskev/sestoj:
- nagib in korigirani radiji:
- opis/skica dostopa:

Drevje:

Lokacija:	**Dendrometrija:**	**Poškodovanost:**	**Opombe:**
DV:	D:	OSUT:	
AZM:	KODA:	porum:	
DIST:	SOC:	pošk. krošnje:	
	Hd:	pošk. debla:	
	STAR:		
	Vrh:		

Tanko (živo) drevje: **Opombe:**

- OLESENR:
- DV:
- $D_{1,3}$:
- H:
- Število:

Odmrla biomasa: **Opombe:**

- TIP:
- DV:
- $D_{1,3}$:
- H:
- D:
- L:
- RAZK:

Lišaji:

- izbor dreves: **Opombe:**
- ZSD:
- DV:
- Orientacija:

	1	2	3	4	5	6	**Opombe:**
Drevesa:							
Skorjasti:							
Listasti:							
Grmičasti:							

Mahovi:

M6:

Dendrometrija:	**Poškodovanost:**	**Opombe:**
KODA:	OSUT	
SOC:	porum:	
	pošk. krošnje:	
	pošk. debla:	

Anketa: **Opombe:**

Povzetek – snemalni listi: **Opombe:**

- Ploskev KPP:
- Drevje:
- Tanko (živo) drevje:
- Odmrla biomasa:
- Lišaji:
- M6:
- Anketa:

Splošna ocena: **Opombe:**

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PRILOGA 4:

Pregledna karta ploskev na mreži 4x4 km

0 12.5 25 50 Km

Z

Legenda

MGGE 2012 pregledna

vzorčna mreža

4 x 4 km

16 x 16 km

meja GGO

PRILOGA 5:

Članek v Gozdarskem vestniku (10/2012)

Popis gozdov in gozdnih ekosistemov za leto 2012

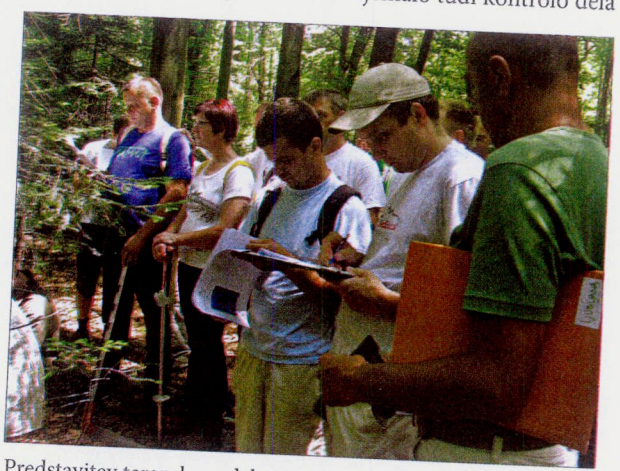
Od 20. junija do 15. oktobra 2012 je na območju celotne Slovenije potekal obsežen popis gozdov in gozdnih ekosistemov. V tem obsegu popis poteka vsakih pet let in zagotavlja pomembne podatke o stanju gozdov. Cilj je ugotavljanje osnovnih in zanesljivih podatkov o trenutnem stanju gozdov na nivoju celotne države. S podatki prejšnjih velikoprostorskih popisov (inventur, monitoringov) pa lahko sledimo tudi različnim procesom, ki se dogajajo v njih.

V juniju (20. 6. in 22. 6. 2012) smo na Gozdarskem inštitutu Slovenije pripravili uvajalni seminar in terensko delavnico, ki se ju je udeležilo 47 popisovalcev, predvsem sodelavcev iz Zavoda za gozdove Slovenije. Prvi dan smo predstavili pomen monitoringa gozdov in gozdnih ekosistemov 2012 za Slovenijo. V nadaljevanju pa smo natančneje predstavili posamezne sklope terenskega popisa. Nato je sledil odhod na vzorčne ploskve v Mostecu, kjer je bil predstavljen protokol dela na terenu, temu je sledilo delo po skupinah na ploskvah. Povprečna velikost vzorčne ploskve je 2 ara (r = 25,23 m), sestavljena je iz štirih koncentričnih ploskev, ki pogojujejo kako in kateri znak se snema na različnih površinah ploskve. Zaradi zagotavljanja nepristranskega gospodarjenje na vzorčni ploskvi in s tem pravilnosti snemanih podatkov ploskev in drevesa na njem ne smejo biti označena s številkami ali znaki.

Terenska delavnica je potekala 22. 6. 2012 na območju Postojne (skupine iz Z Slovenije) in Celja (skupine iz V Slovenije). Z vključitvijo skupin v terensko delo je bilo zagotovljeno, da so bili postopki meritev razumljeni in morebitne nejasnosti takoj odpravljene. Po tem datumu je vsaka območna enota terenski del popisa usklajevala glede na njihove stalne delovne obveznosti.

Na 712 stalnih koncentričnih vzorčnih ploskvah (KPP), na vzorčni mreži 4 x 4 km, smo snemali splošne lastnosti rastišča in sestoja, dendrometrijske podatke dreves (stanje in koda drevesa, obseg debla, socialni položaj in višini tretjega ter četrtega najdebelejšega drevesa), prisotnost in dimenzije tankega živega drevja ter odmrle lesne biomase ter izpolnjevali anketni opis prisotnih funkcij gozdov. Popisovalce smo prosili tudi za izboljšavo opisov dostopov do ploskev, saj s tem lahko prihranimo kar nekaj delovnih minut, včasih celo ur. Večina popisovalcev je redno sodelovala s terenskimi ekipami Gozdarskega inštituta in s tem skrbela za ustrezen pretok informacij o poteku snemanja.

Znotraj Oddelka za načrtovanje in monitoring gozdov in krajine Gozdarskega inštituta Slovenije so bile organizirane tri terenske ekipe. Poleg snemanja ploskev je njihovo delo zajemalo tudi kontrolo dela popisovalcev. Kontrola 5 % vseh ploskev na mreži 4 x 4 km je obvezna in namenjena čimprejšnjemu ugotavljanju napak (slučajnostnih in sistematičnih) in njihovemu odpravljanju. Skupna ocena kontrolorjev služi oceni zanesljivosti in kakovosti popisa 2012. V letu 2012 smo ponovno snemali šestintrideset ploskev. Izbrali smo jih tako, da smo za vsako terensko ekipo preverili vsaj eno ploskev. Rezultati kontrol so pokazali, da je največ nejasnosti in netočnosti pri meritvah odmrle lesne biomase, ki jo merimo na najširšem radiju ploskve (25,23 m). Napake zaradi spremembe načina merjenja premera oz. obsega (premerka-PI meter) so bile izrazitejše le na posameznih območnih enotah. Različni načini oz. inštrumenti za merjenje višin pa so prav tako botrovali razlikam v višinah dreves (do 3 m). Vse napake smo zabeležili in jih bomo upoštevali pri logičnih kontrolah, obdelavi vnesenih podatkov ter popravkih terenskega priročnika.



Predstavitev terenskega dela popisa v Mostecu (foto: GIS)

V letu 2012 je bilo poleg 712 stalnih koncentričnih vzorčnih ploskev posnetih tudi 47 ploskev na vzorčni mreži 16 x 16 km in deset intenzivneje snemanih večjih ploskev. Na njih vsako leto zbiramo naslednje informacije o sestojih in drevesih: splošne lastnosti rastišča in sestoja, dendrometrijske podatke dreves (stanje in kodo drevesa, obseg, socialni položaj, osutost in vidljivost krošenj, porumenelost krošenj, višini tretjega in četrtega najdebelejšega drevesa), prisotnost in mere tankega živega drevja ter odmrle lesne biomase, prisotnost funkcij gozdov ter bolezni in poškodb drevja.

V vložišču GIS so bili 9.11. 2012 zbrani vsi popisni listi; vnesenih je bilo 90 % popisnih listov. Po vnosu vseh podatkov in logičnih kontrolah podatkovnih zbirk ter protokolih za popravljanje napačnih podatkov bodo podatki pripravljeni za osnovno obdelavo. Gozdarski inštitut Slovenije podatke velikoprostorskih popisov uporablja v različnih raziskavah ter za poročanje Konvenciji o onesnaževanju zraka na velike razdalje in Kjotskem protokolu. Pridobljene podatke potrebujejo tudi pristojni Ministrstvi (MKO, MIP) ter druge vladne službe (ARSO, SURS ...) za oblikovanja državnega in mednarodnega poročanja in gozdarske politike.

Sodelavcem Gozdarskega inštituta Slovenije in Zavoda za gozdove Slovenije se zahvaljujemo za sodelovanje pri popisu gozdov in gozdnih ekosistemov za leto 2012. Za dodatne informacije o popisih gozdov in gozdnih ekosistemov od leta 1985 naprej priporočamo branje *Strokovnih in znanstvenih del* Kontrolna vzorčna metoda v Sloveniji (št. 134) iz leta 2009.

Mag. Špela PLANINŠEK
za Oddelek za načrtovanje in monitoring
gozdov in krajine

Prva evropska konferenca na temo kmetijsko-gozdarskega sistema

Prva evropska konferenca na temo kmetijsko-gozdarskega sistema (ang.: *Agroforestry*), organizirana pod okriljem European Agroforestry Federation-EURAF), je potekala od 9. do 10. oktobra letos v Bruslju.

EURAF je novoustanovljena nevladna organizacija, katere namen je promocija kmetijsko-gozdarskega sistema (KGS). Organizacija je še posebno dejavna na področju oblikovanja Skupne kmetijske politike (SKP); politike, ki je v minulem obdobju spregledala pomen KGS in pripomogla k zmanjšanju števila dreves in gozdnih ostankov v kmetijski krajini. EURAF si tako prizadeva, da KGS dobi prostor v obeh stebrih SKP.

V ta namen je bila organizirana konferenca, na kateri so sodelovali znanstveniki iz sedemnajstih držav Evropske unije ter iz Severne Amerike in Afrike. Predstavljenih je bilo več kot petdeset prispevkov, s katerimi je bila prikazana izjemna pestrost KGS v Evropi in njihov pomen pri reševanju izzivov na področju obnovljivih virov energije, podnebnih sprememb, ohranjanja okolja ter biotske pestrosti.

Gozdarski inštitut Slovenije je s prispevkom *Agroforestry systems – its implementation in research and forestry practice in Slovenia* predstavil doslej znane ugotovitve o KGS v Sloveniji in možnost za uveljavitev posameznih podsistemov pri nas.

Udeleženci konference smo svoje poglede o KGS povzeli v sedmih točkah:

1. tradicionalne oblike KGS morajo biti prepoznane, nove prakse pa promovirane,
2. KGS mora dobiti mesto v okviru SKP,
3. drugi steber SKP mora vsebovati širok nabor ukrepov spodbujanja KGS, s čimer bi se povečale možnosti implementacije SKP v različnih okoljih,
4. drugi steber SKP naj vsebuje ukrepe, s katerimi bo kmetom omogočeno ohranjanje in obnavljanje tradicionalnih oblik KGS,
5. Program razvoja podeželja vseh EU držav naj vsebuje ukrepe za spodbujanje in ohranjanje KGS,
6. površine KGS na kmetiji naj se štejejo v kvoto zemljišč, prepuščenim za ekološke funkcije,
7. učinke, ki jih KGS prispeva k ublažitvi podnebnih sprememb, je treba upoštevati tudi v politiki EU iz področja podnebnih sprememb in okolja.

Tine PREMRL

PRILOGA 6:

Potrdilo o udeležbi – vzorec

GOZDARSKI INŠTITUT SLOVENIJE
SLOVENIAN FORESTRY INSTITUTE

Večna pot 2, 1000 Ljubljana, Slovenija
tel: + 386 (0)1 200 78 00 / fax: + 386 (0)1 257 35 89

izdaja **POTRDILO**, da je

Anže Japelj

sodeloval pri organizaciji ter vodenju seminarja in delavnice
»Monitoring gozdov in gozdnih ekosistemov 2012«
(20. in 22. junija 2012)

Oddelek za načrtovanje in
monitoring gozdov in krajine
dr. Andreja Ferreira

Andreja Ferreira

V Ljubljani, 19. 10. 2012

v.d. direktorja GIS
doc.dr. Tomislav Levanič

PRILOGA 7:

JRC navodila za 'Settlements'

JRC analysis: methods used by EU MS for estimating and reporting emissions from SOM and DOM pools in FL converted to SL

Conversion from Forest land to Settlements is an important component of the total deforestation, being some 30 % of total area reported as deforested and some 15 % of total area reported under conversion's categories. While conversion to WL and OL may be caused by natural effects, direct human induced action is indisputable for conversion to SL, thus all GHG emissions are anthropogenic. Generally, the C pools are not uniformly disturbed over the whole area converted (i.e. usually only part of converted area is sealed, trees or upper soils layer is removed) and carbon transfer to DW, LT and SOM pools diminish significantly.

Although decision 16/CMP.1 requires that all five carbon pools need be reported for KP accounting purpose, and despite the presence of CO2 emissions from all C pools in FL converted to SL seems extremely likely, *IPCC 2033 GPG* does not to provide methods to estimate changes in all pools in conversions to SL (Table 1).

Table 1. GPG LULUCF 2003 methodologies for FL converted to SL

TIER 1		SL	
		SL to SL	FL to SL
Living Biomass	AGB		Y [2]
	BGB	-	Y [2]
Dead Organic Matter	DW		0
	L	-	0
SOM	Mineral		0
	Organic	-	0
Y	To be mandatorily reported		
0	Failure in making mandatory the reporting of stock losses in case of conversion (from forest)		
-	Non mandatory		
2	To be reported as instantaneously oxidized in conversion.		

Using the argument of lack of methods under IPCC GPG 2003, some MS do not report emissions from dead wood, litter and/or mineral soil from FL converted to SL. For the MS reporting emissions from these pools in FL converted to SL (14 MS out of 25), the following methods are applied.

DOM (DW, LT). It is assumed that entire C stock in DOM pools is instantaneously oxidized in the initial moment of conversion from FL to SL. It is also assumed that there is no dead wood and litter on settlements lands. Emissions are estimated based on per area average C stock of DW and LT determined either at national or regional scale or specific to each deforestation site.

SOM. Several assumptions are involved based on expert judgment or, occasionally, from some scientific studies. For instance, in Sweden C stock in SL is estimated as the weighted average of C stocks under two strata: unsealed and sealed. Unsealed area is considered to cover 40-66% of national SL or conversion to SL area (i.e. AT, LU), going down to 2-3% in cities (i.e. BG). Associated C stock is derived from (depending on MS):

- data from measurements in green area of the city (from scientific studies);
- same C stock as under 'GL remaining GL' (assuming that under national circumstances GL is the source of land for settlement's expansion);
- lowest C stock value among the major land categories FL, CL and GL (assuming limited change of C stock in the soil under construction);
- applying a factor against C stock in previous land use (i.e. constant loss of 50 % by FR).

For sealed areas C stock is conservatively set to zero (assuming all C was emitted/removed) or very low values (1.8tC/ha by BG).

Further issues to be considered in estimation and reporting:

- For dead wood and litter pools, IPCC Guidelines 2006 provides in Ch.8 a Tier 1 default which assumes all carbon is lost during conversion and it does not take into account any subsequent accumulation in these pools under SL.
- For soil organic matter, IPCC Guidelines 2006 provides in Ch.8 a Tier 1 default which assumes a linear change in the C stocks between final and initial land use. Settlement's C stock is estimated according to reference C stock (SOC_{REF}) and default stock change factors (F_{LU}, F_{MG}, F_I) according to the 'sealing' status (i.e. paved, grass or tree covered, gardens associated with closest land use category).
- Share of sealed/unsealed differs in urban and rural;

In conclusion, given the need to account for all C pools under KP reporting, unless evidence is provided that the pool is not a source, the lack of method in IPCC 2003 GPG cannot be used as argument for not accounting a C pool. For estimating changes in DOM and SOM in FL converted to SL in the absence of country-specific methods, it could be considered that methods do exist in the IPCC 2006 GL.

PRILOGA 8:

Snemalni list za drevnino na negozdnih rabah tal

PLOSKEV:	**Popisovalci:**				
Datum	**Relief**	**Nagib [%]**	**Ekspozicija**	**Skalovitost**	**Kamnitost**

ZSD	DV	Obseg [cm]	Višina [m]	Pod-ploskev	N

PRILOGA 9:

Snemalni list za vzorčenje tal na negozdnih rabah tal

Priloga: Obrazec za vpis podatkov o ploskvi, vbodnih in vzorčevalnih mestih ter talnih vzorcih

PLOSKEV:	Ime in priimek popisovalca 1:	Krajevno ime:	Koordinate središča ploskve
			X: m
Datum vzorčenja:	Ime in priimek popisovalca 2:		Y: m
			Nadmorska višina: m

Podatki o vbodnih mestih		**Vbodna mesta na jugu - J**					**Vbodna mesta na severovzhodu - SV**					**Vbodna mesta na severozahodu - SZ**				
		J - 1	J – 2	J – 3	J – 4	J – 5	SV – 1	SV – 2	SV – 3	SV – 4	SV – 5	SZ – 1	SZ – 2	SZ –3	SZ – 4	SZ – 5
Globina M	cm															
Skelet	%															
Tip tal (neobvezno)																

Opomba: *obvezno obkroži vbodno mesto, izbrano za vzorčevalno mesto!*

Podatki o odvzetih talnih vzorcih na vzorčevalnih mestih	**Globine mineralnega dela tal**		**Značilnosti mikroreliefa na vzorčevalnem mestu – okularna ocena**			
	M10 (0-10 cm)	M40 (10-40 cm)	Ekspozicija	Nagib	Skalnatost	Kamnitost
Jug - **J**	cm	cm		%	%	%
Severovzhod - **SV**	cm	cm		%	%	%
Severozahod - **SZ**	cm	cm		%	%	%

Posebnosti vzorčenih tal, opombe:	

PRILOGA 10:

National Inventory Report 2012, poglavji 7. LULUCF in 11. KP-LULUCF

7 LULUCF (CRF sector 5)

Forest Land remaining Forest Land	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	Level	CO_2	29.10		1
2010	Level, Trend	CO_2	32.63	10,28	1

Land converted to Cropland	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	Level	CO_2	3.44		7
2010	Level, Trend	CO_2	3.61	0.49	4

Land converted to Settlements	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	Level	CO_2	1.49		11
2010	Level, Trend	CO_2	1.82	0.97	8

Cropland Remaining Cropland	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	Level	CO_2	0.39		28
2010	Level, Trend	CO_2	1.24	2.44	9

Land converted to Grassland	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	no	CO_2	0.20		39
2010	Level, Trend	CO_2	1.03	2.39	15

Land converted to Forest Land	KS	Gas	Contribution to Level %	Contribution to Trend %	Rank KS level
Base Year	Level	CO_2	0.85		20
2010	Level	CO_2	0.81	0.13	17

7.1 Overview of sector

The Land Use, Land-Use Change and Forestry (LULUCF) sector in 2010 as a whole acted as a CO_2 sink of –8,757.95 Gg CO_2 because total emissions arising from the sector were smaller than the total removals.

Figure 7.1.1: Net emissions and removals in the LULUCF sector in 1986-2010 by land-use category, Gg CO2.

The land use, land-use change, and forestry (LULUCF) sector deals with greenhouse gas (GHG) emissions and removals resulting from land use and land use changes. According to Good Practice Guidance for LULUCF (2003) Slovenia classifies its national land into 6 land use categories — Forest land, Cropland, Grassland, Wetlands, Settlements and Other land. GHG emission and removal estimates in this sector are calculated from carbon stock changes in the five carbon pools (aboveground biomass, belowground biomass, deadwood, litter and soil), direct N_2O emissions from N fertilization, N_2O emissions from drainage of soils, N_2O emissions from disturbance associated with land-use conversion to cropland, CO_2 emissions from agricultural lime application, and non-CO_2 emissions from biomass burning.

For this inventory, above- and belowground biomass are referred to collectively as "living biomass", and deadwood and litter collectively as "dead organic matter". Data acquisition and calculations are based on the Good Practice Guidance for Land Use, Land- Use Change and Forestry (IPCC 2003) and are completed by country specific methodologies.

Country specific emission factors and carbon stock values for forests and partially for agricultural land and grassland are derived from surveys and measurements. For other land use categories, IPCC default values or expert judgements are used. Forest growth factors depend on climate conditions; their annual variation is therefore modelled against climatic parameters.

Land uses in reporting year are presented in Table 7.1.1.

Table 7.1.1: Land use by categories in year 2010.

Area	kha	%
Forests	1,244.268	61.4
Cropland	222.700	11.0
Grassland	407.817	20.1
Wetlands	13.440	0.7
Settlements	112.836	5.6
Other land	26.240	1.3
Sum	2,027.300	100.0

Table 7.1.2 summarizes the CO2 emissions and removals in consequence of carbon losses and gains for the years 1986 – 2010. The total net removals of CO_2 from LULUCF sector from 1986 to 2010 vary between -7,215.1 Gg (1998) and -8,575.9 Gg (2010). The main sink category in LULUCF in Slovenia is forest land remaining forest land.

Table 7.1.2: Emissions and removals from sector 5 LULUCF by sub categories in Gg CO2

	Total	Forestland	Cropland	Grassland	Wetland	Settlements	Other land
year	Gg CO2 /yr	Gg CO2 /yr	Gg CO2 /yr	Gg CO2 /yr	Gg CO2 /yr	Gg CO2 /yr	Gg CO2 /yr
2010	-8,575.946	-11,138.328	1,612.649	343.038	NE,NO	606.695	NA,NO
2009	-8,477.231	-11,039.613	1,612.649	343.038	NE,NO	606.695	NA,NO
2008	-8,492.442	-11,043.132	1,600.957	343.038	NE,NO	606.695	NA,NO
2007	-8,489.025	-11,027.510	1,588.752	343.038	NE,NO	606.695	NA,NO
2006	-8,349.067	-10,875.788	1,576.988	343.038	NE,NO	606.695	NA,NO
2005	-8,490.502	-11,006.733	1,566.498	343.038	NE,NO	606.695	NA,NO
2004	-8,507.001	-11,009.662	1,552.927	343.038	NE,NO	606.695	NA,NO
2003	-8,288.390	-10,778.966	1,540.843	343.038	NE,NO	606.695	NA,NO
2002	-8,504.088	-10,995.364	1,541.542	343.038	NE,NO	606.695	NA,NO
2001	-8,506.877	-10,965.219	1,508.609	343.038	NE,NO	606.695	NA,NO
2000	-7,280.714	-9,500.637	1,450.998	222.213	NE,NO	546.712	NA,NO
1999	-7,259.739	-9,468.012	1,439.348	222.213	NE,NO	546.712	NA,NO
1998	-7,215.097	-9,409.167	1,425.145	222.213	NE,NO	546.712	NA,NO
1997	-7,275.193	-9,449.242	1,405.125	222.213	NE,NO	546.712	NA,NO
1996	-7,298.452	-9,461.707	1,394.331	222.213	NE,NO	546.712	NA,NO
1995	-7,318.100	-9,467.814	1,380.790	222.213	NE,NO	546.712	NA,NO
1994	-7,347.139	-9,479.847	1,363.783	222.213	NE,NO	546.712	NA,NO
1993	-7,352.261	-9,473.518	1,352.333	222.213	NE,NO	546.712	NA,NO
1992	-7,318.355	-9,430.693	1,343.414	222.213	NE,NO	546.712	NA,NO
1991	-7,279.474	-9,391.337	1,342.939	222.213	NE,NO	546.712	NA,NO
1990	-7,295.184	-9,387.883	1,323.774	222.213	NE,NO	546.712	NA,NO
1989	-7,652.228	-9,435.576	1,250.660	64.347	NE,NO	468.340	NA,NO
1988	-7,653.245	-9,423.298	1,237.366	64.347	NE,NO	468.340	NA,NO
1987	-7,680.288	-9,435.543	1,222.567	64.347	NE,NO	468.340	NA,NO
1986	-7,689.869	-9,429.214	1,206.658	64.347	NE,NO	468.340	NA,NO

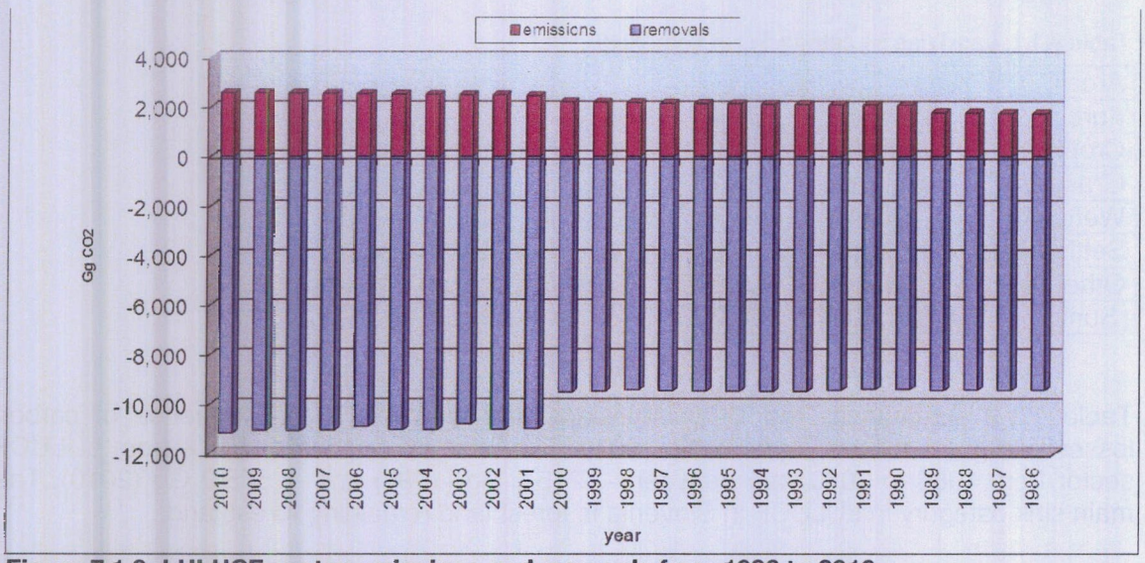


Figure 7.1.2: LULUCF sector emissions and removals from 1986 to 2010.

7.2 Methodological issues for LULUCF in Slovenia

7.2.1 Land use and land use change in time period 1986 -2010

In previous National Inventory Reports updated version of the Agricultural Land Use Map (ALUM) of Ministry of Agriculture, Forestry and Food (MAFF) was used. Two versions of ALUM map were used to capture land cover changes: the one published in the year 2002 (reflecting the land use / land cover situation from the year 1998), and the other published in 2008 (reflecting the situation in the year 2007). This is the first Slovenian database, where directly comparable data could be used for estimation of land use cover change. This enabled us acquiring a much better estimation of land use cover trends, as compared to the former auxiliary and less accurate data source used to land use cover change in earlier reports.

Table 7.2.1: References to sources of information (GFRA 2010)

References to sources of information	Variable(s)	Year(s)	Additional comments
Cadastre of Actual Agricultural Land Use. Ministry of Agriculture, Forestry and Food (MAFF) 2002 and 2008.	Land use / Land cover	1998, 2007	Land use photo interpreted in scale 1:5,000 from aerial imagery acquired in years 1994 to 2001; 1998 is the average year; covers also all the forested and urban areas.

The ALUM 2002 and 2008 have seven main categories: agricultural land, forest, built-up areas and related surfaces, swamps and other marshy areas, dried open areas with special vegetation, open areas with little or no vegetation and on the end waters (Table 7.2.2 and Table 7.2.3). In IPCC GPG 2003 Slovenian land use category the agricultural land is separated on two categories cropland and grassland, and categories dried open areas with special vegetation, open areas with little or no vegetation are in the one class (see Table 7.2.4).

Rules and information on data processing, analysis and assessment of ALUM is defined in Slovenian legislan, in act: Rules on evidence of actual agricultural and forestal land use (UL 122/2008). ALUM is publicly available on internet on URL: http://rkg.gov.si/GERK/WebViewer

Currently used land use change matrix is under revision (internal and external). Discrepancies in areas were noticed during preparation of NIR and by ERT during centralized review. Results of the revision will be implemented in 2013 submission.

Definitions about specific land use from GPG 2003 for Slovenia are described below.

Definition of forest: Land spanning more than 0,5 hectares with trees higher than 5 meters and canopy cover more than 10 percent, or trees able to reach this threshold *in situ*. It includes abandoned agricultural land with natural expansion of forest. Abandoned agricultural land on area more than 0.25 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.

Definition of cropland:

- **Annual:** arable land breed more than 2 meters and grow the non woody vegetation (cereals, potatoes, forage crops, vegetable crops, oilseed, ornamental plants, herbs, strawberries, hop fields...) and agricultural fallows ground. There are temporary meadows, uncultivated agricultural land and greenhouses.

- **Perennial:** permanent crops on arable land such as vineyards, extensive and intensive orchards, olive groves, nursery (for grapevines, fruit and forest trees), forest plantations, riparian overgrowths and forest hedges (by watercourses, field hedges...) and forest trees on agricultural land.

Definition of grassland: Agricultural areas grown by grass and other herbs that are regularly cut or grazed. These areas are not in tillage or fallow ground. Included are areas covered with some of forest trees (less than 50 trees/ ha) and the mountain pastures too. In this class there are swamp pastures and meadows on organic or mineral-organic soils, where the groundwater rises few times in the year

Definition of wetlands: there are fens and raised bogs. Vegetation is higher than swamp pastures and meadows and there is no cutting of the grass or grazing. There are the areas with reeds and low placed areas frequently floated. All that areas are not in agricultural use. In this class there are the inland water bodies (major rivers, lakes and water reservoirs) too.

Definition of settlements: all piece of land where the buildings, roads, parking places, mines, stone pits and all other infrastructure are in human use.

Definition of other land: non-forest land covered with vegetation lover than 2 meters or covered less than 75 percent, which is not used in agriculture. There are inbuilt areas with little or no vegetation as rocks, sands, sand banks (bigger than 5000 m2), waste and other opened areas. This is all land that is not classified in other land use definitions.

In NIR 2009 in the area of forest land three National land use classes were included: forest (ID 2000), overgrown areas (ID 1410) and dried open areas with special vegetation (ID 5000). The last category (ID 5000) is not comparable with definition of forestland. So that class is now in category Other land.

Distribution of national classes of land uses from ALUM into six main categories from GPG IPCC 2003 are presented in next tables (Table 7.2.2, 7.2.3, and Table 7.2.5).

Table 7.2.2: Categories in ALUM in 2002

Main category	National class ID	remarks
Arable land		
	1100	Arable land
	1160	Hop fields
	1211	Vineyards
	1221	Intensive orchards
	1222	Extensive orchards
	1230	Olive groves
	1240	Other permanent crops
	1310	Intensive meadows and pastures
	1321	Swampy meadows and pastures
	1322	Extensive meadows and pastures
	1410	Overgrown areas
	1420	Forest plantation
	1500	Mixed land use areas (arable land and forest, small areas)
Forest		
	2000	Forest
Built-up areas and related surfaces		
	3000	Built-up areas and related surfaces
Marshy areas		
	4100	Swamps
	4210	Reeds
	4220	Other marshy areas
Dried open areas with special vegetation		
	5000	Dried open areas with special vegetation
Dried open areas with special vegetation		
	6000	Open areas with little or no vegetation
Waters		
	7000	Waters

Table 7.2.3: Categories in ALUM in 2008

Main category	National class ID	remarks
Arable land		
	1100	Arable land
	1130	Temporary meadows
	1160	Hop fields
	1180	Other permanent crops on arable land
	1190	Green houses
	1211	Vineyards
	1212	Nursery
	1221	Intensive orchards
	1222	Extensive orchards
	1230	Olive groves
	1240	Other permanent crops
	1300	Meadows and pastures
	1321	Swampy meadows and pastures
	1330	Alpine meadows
	1410	Overgrown areas
	1420	Forest plantation
	1500	Mixed land use areas (arable land and forest, small areas)
	1600	Uncultivated agriculture land
	1800	Forest trees on agricultural land
Forest		
	2000	Forest
Built-up areas and related surfaces		
	3000	Built-up areas and related surfaces
Marshy areas		
	4100	Swamps
	4210	Reeds
	4220	Other marshy areas
Dried open areas with special vegetation		
	5000	Dried open areas with special vegetation
Dried open areas with special vegetation		
	6000	Open areas with little or no vegetation
Waters		
	7000	Waters

Table 7.2.4: Uncertainties for ALUM database.

	% errors in land use
ALUM 2002 (agricultural land use map)	4,68
ALUM 2007	4,68

Table 7.2.5: Categories from ALUM 2002 and 2008 delivered in six main categories from GPG IPCC 2003.

Main category in IPCC	Sub category in IPCC	National class ID	remarks
Cropland 5.B			
	annual	1100	Arable land
		1130	Temporary meadows
		1160	Hop fields
		1190	Green houses
	perennial	1180	Other permanent crops on arable land
		1211	Vineyards
		1212	Nursery
		1221	Intensive orchards
		1222	Extensive orchards
		1230	Olive groves
		1240	Other permanent crops
		1420	Forest plantation
		1800	Forest trees on agricultural land
Grassland 5.C			
		1300	Meadows and pastures
		1321	Swampy meadows and pastures
		1330	Alpine meadows
		1500	Mixed land use (arable land and forest, small areas)
		1600	Uncultivated agriculture land
Forest 5.A			
		2000	Forest
		1410	Overgrown areas
Wetlands 5.D			
		4100	Swamps
		4210	Reeds
		4220	Other marshy areas
		7000	Waters (inland water bodies)
Settlements 5.E			
		3000	Built-up areas and related surfaces
Other land 5.F			
		6000	Open areas with little or no vegetation
		5000	Dried open areas with special vegetation

The cropland is separated on two subcategories: annual and perennial cropland.

7.2.1.1 Land use change matrix

The land areas in the period 1986-2010 are represented by geographically explicit land-use data with a resolution of 0.25 hectare (following approach 3 for representing land areas; IPCC 2003). Direct and repeated assessment of land use with full spatial coverage also enables to calculate spatially explicit land-use change matrices. In 2002 the new Slovenian land-use map (ALUM) has been launched from Ministry for agriculture, forestry and food (MAFF) and presented land use situation in 1998. The method was repeated in 2007. With these two maps of land use we could find out the land use changes between period 1998 and 2007. The annual figures for areas in transition between different land uses have been derived from basic assumption (informed by expert judgment) that known patterns of land use changes in Slovenia are constant. To estimate the land use and land-use change for each year in that period, a spatial extrapolation based on the presently available ALUM data was made. For previous period from 1986 till 1998 the down dating method was used. For land use changes in years 2008, 2009 and 2010 it is presumed that the changes stay the same as in years before.

Table 7.2.6: The average annual land use change matrix for IPCC land use categories.

ha / year	Forest land	Cropland perenial	Cropland annual	Grassland	Wetlands	Settlemets	Other land	Total
Forest land		754	86	1,982	82	984	199	**4,086**
Cropland perenial	807		195	1,271	50	402	1	**2,726**
Cropland annual	299	396		4,560	34	560	0	**5,849**
Grassland	3,083	1,651	1,967		111	1,146	6	**7,964**
Wetlands	74	42	9	203		72	15	**414**
Settlemets	221	401	70	1,163	31		3	**1,888**
Other land	362	56	1	647	10	11		**1,087**
Total	**4,845**	**3,299**	**2,328**	**9,825**	**319**	**3,174**	**225**	**24,015**

Currently used land use change matrix is under revision (internal and external). Discrepancies in areas were noticed during preparation of NIR and by ERT during centralized review. Results of the revision will be implemented in 2013 submission.

Land use areas for each land use were calculated using following equation.

$$Area_{LU,yearofinventory} = Area_{LU,previousinventoryyear} + Area_{landconvertedtoLU} - Area_{LUconvertedtootherlandcategory}$$

(Equation 1)

$Area_{LU,yearofinventory}$ - *area of selected land use category in year of inventory [ha]*
$Area_{LU,previousinventoryyear}$ - *area of selected land use category in previous year [ha]*
$Area_{landconvertedtoLU}$ - *area of land converted to selected land use category [ha]*
$Area_{LU,convertedtootherlandcategory}$ - *area of selected land use category converted to other land use category [ha]*

The final areas of individual land use were corrected with total area of Slovenia. Areas from basic year to 2010 are in Table 7.2.7. The results were compared with a spatial sampling

approach method (Kobler 2008) and the results were very similar. A spatial sampling method is described in Slovenian National Inventory Report 2008, Chapter 7.2.).

Table 7.2.7: Areas for land uses from 1986 to 2010.

Year	5. Total	5.A Forest Land	5.B. Cropland	5.C Grassland	5.D Wetland	5.E Settlement	5.F Other land
	kha	kha	kha	kha	kha	kha	kha
2010	2,027.300	1,244.268	222.700	407.817	13.440	112.836	26.240
2009	2,027.300	1,243.426	228.183	403.542	13.544	111.407	27.198
2008	2,027.300	1,242.583	233.667	399.267	13.648	109.978	28.156
2007	2,027.300	1,241.741	239.151	394.992	13.752	108.550	29.114
2006	2,027.300	1,240.898	244.635	390.717	13.856	107.121	30.072
2005	2,027.300	1,240.056	250.119	386.441	13.961	105.693	31.030
2004	2,027.300	1,239.214	255.603	382.166	14.065	104.264	31.988
2003	2,027.300	1,238.371	261.087	377.891	14.169	102.835	32.946
2002	2,027.300	1,237.529	266.571	373.616	14.273	101.407	33.905
2001	2,027.300	1,236.687	272.055	369.341	14.377	99.978	34.863
2000	2,027.300	1,235.844	277.539	365.065	14.481	98.550	35.821
1999	2,027.300	1,235.002	283.022	360.790	14.586	97.121	36.779
1998	2,027.300	1,234.159	288.506	356.515	14.690	95.693	37.737
1997	2,027.300	1,233.317	293.990	352.240	14.794	94.264	38.695
1996	2,027.300	1,232.475	299.474	347.964	14.898	92.835	39.653
1995	2,027.300	1,231.632	304.958	343.689	15.002	91.407	40.611
1994	2,027.300	1,230.790	310.442	339.414	15.107	89.978	41.569
1993	2,027.300	1,229.948	315.926	335.139	15.211	88.550	42.527
1992	2,027.300	1,229.105	321.410	330.864	15.315	87.121	43.486
1991	2,027.300	1,228.263	326.894	326.588	15.419	85.692	44.444
1990	2,027.300	1,227.420	332.378	322.313	15.523	84.264	45.402
1989	2,027.300	1,226.578	337.861	318.038	15.627	82.835	46.360
1988	2,027.300	1,225.736	343.345	313.763	15.732	81.407	47.318
1987	2,027.300	1,224.893	348.829	309.488	15.836	79.978	48.276
1986	2,027.300	1,224.051	354.313	305.212	15.940	78.549	49.234

7.2.2 Carbon stocks in litter and soils

The existent databases in Slovenia were not established to be used for mineral soil carbon pool and litter pool assessment. For our assessment there are a total of 909 soil profiles (mineral soil) descriptions with analytical data. Soil database includes data about soil physiscal and chemical properties, but no data of soil bulk density, so pedotransfer functions were used.

LITTER

The separate estimate of carbon stock in O_l, O_f and O_h sub horizon was provided, due to fact that each organic subhorizon were sampled within an area of 25 × 25 cm. separately. Volume of roots and coarse fragments (soil skeleton > 2 mm) were subtracted from volume of soil sample. Carbon stock in litter was calculated according to equation 4:

$$C_{pool} = \sum_{i=1}^{k} (\%C_{org,i} \cdot M_{105°C,i} / 100) \qquad \text{(Equation 2)}$$

C_{pool} - carbon stock [Gg ha^{-1}]
C_{org} - the organic carbon content and clay content (both in %)
$M_{105°C,i}$ - quantity [Gg ha^{-1}] of dry soil in sub horizon i
k - number of soil horizon in soil profile

Table 7.2.8: Average carbon stock in litter (from 8x8km grid survey)

	average carbon stock [t ha^{-1}]	n
O_l horizon	1.44 ± 0.15	143
O_{fh} horizon	8.85 ± 1.42	145
litter (O_l + O_{fh})	**10.41 ± 1.50**	**143**

SOILS

Carbon stock in mineral part of soil (SOM) was calculated from the following equation 2.

$$C_{pool} = \sum_{i=1}^{k} (\%C_{org,i} \cdot d_i \cdot \rho_i \cdot 100) \qquad \text{(Equation 3)}$$

C_{pool} - carbon stock [Gg ha^{-1}]
D_i - thickness [m] of soil horizon I
ρ_i - soil bulk density [g cm^{-3}]
k - number of sub horizon in soil profile

Because no measurements of bulk density were available, the soil bulk density [g/cm^3] was estimated from the following transfer function, equation 3.

$$\rho_i = \begin{cases} 1/(0{,}625 + 0{,}05 \cdot \%C_{org} + 0{,}0015 \cdot \%clay) \rightarrow if\ \%C_{org} \leq 5\% \\ 1{,}55 - 0{,}0814 \cdot \%C_{org} \rightarrow if\ 5\% < \%C_{org} \leq 15\% \\ 0{,}725 - 0{,}337 \cdot \log_{10} \%C_{org} \rightarrow if\ \%C_{org} \geq 15\% \end{cases} \quad \text{(Equation 4)}$$

ρ_i - soil bulk density [g cm^{-3}]
C_{org} - the organic carbon content and clay content (both in %)

The top equation for mineral soils is based on data by Hoekstra and Poelman (1982), the bottom equation for peat(y) soils is derived from Van Wallenburg (1988) and the central equation is a linear interpolation (for clay=0) between the two (Reinds *et al.* 2001).

Carbon stock in mineral part of soil (SOM) was calculated for 0–30 cm soil depth. For soil horizons with the depth of the lower boundaries below 30 cm, a constant value of carbon stock within horizon were assumed.

Table 7.2.9: Average carbon stock (SOC) on 30 cm depth in mineral part of soil.

Land use	Average carbon stock [t ha^{-1}]	n
Cropland annual	100	187
Cropland perrenial	68	31
Forest land	105	318
Grassland	107	407

For improvements of carbon stock data for litter and mineral soil we re-analyzed (chemical and physical properties: Corg, texture) archived soil data and recalculation of changes in Carbon stock in mineral soil depth 0–20 cm, include carbon stock data for litter and soil organic matter from 8×8 km grid survey (from 145 plots).

Table 7.2.10: Average carbon stock in mineral soils for forest land (from 8x8km grid survey)

	average carbon stock [t ha^{-1}]	n
M_{10} horizon	35.25 ± 2.06	141
M_{40} horizon	68.32 ± 6.22	136
Mineral soils	**103.31 ± 7.90**	**136**

Recalculations will be made in 2013 submission.

For estimation of temporal changes in carbon stock and changes due to land conversion, the YASSO07 model will be used. Local pedotransfer functions will be developed for improvements of bulk density estimation. This will enable us use soil profile from the past, for which data about soil bulk density were not available.

7.3 Forest Land (5A)

7.3.1 Source category description

Forest land category includes CO_2 emissions from changes in carbon stock in living biomass (above and below ground biomass), in dead organic matter (dead wood and litter) and in soils. Carbon stock changes are reported in Forest land remaining forest land and in Land converted to forest land. Also non-CO_2 emissions from biomass burning are reported.

Area of forest land in Slovenia is 1,243,426 ha and covers 61.3 % of country area. Most Slovenian forests are located within the area of beech, fir-beech and beech-oak sites (70 %), which have a relatively high production capacity. The share of growing stock of coniferous trees is 46.4 %, of deciduous trees 53.6 %. Main tree species are beech (*Fagus sylvatica*), spruce (*Picea abies*), fir (*Abies alba),* oak (*Quercus sp.*) and scotch pine (*Pinus sylvestris*). These species represents 80.0 % of total growing stock (beech – 31.0 %, spruce – 33.9 %, fir – 8.2 %, oak – 5.8 %, pine – 4.1 %).

Majority, 74 % of forests in Slovenia are private property, 26 % of forests are public (owned by the state or communes). Larger and undivided forest estates of state-owned forests enable good professional management. Private forest estates are small, with an average area of only 3 ha and even these are further fragmented into several separate plots. For the great majority of these estates forests are not of economic interest. Private forest property is becoming even more fragmented as the number of forest owners is increasing. According to the latest data there are already 314,000 (with co-owners even 489,000) forest owners in Slovenia. The major fragmentation of forest property, the number of forest owners and co-owners, present a serious obstacle to professional work in private forests, to optimal timber production and utilisation of forest potential (Slovenia Forest Service, 2011).

All forests in Slovenia are considered managed, because forest management plans are prepared for all forests, regardless ownership, conservation degree or natural conditions.

According to Slovenian Act on Forests (1995, section 2) forest land is defined as area overgrown with forest trees in the form of stands or other forest plants which provides any of the functions of a forest. Forest according to this Act also includes overgrown plots of land defined as forest in the spatial element of the forest management plan.

(2) The forest infrastructure not allocated into separate lot is an integral part of the forest land.

(3) The following are not forest within the meaning of this act: individual forest trees, groups of forest trees up to an area of 0.05 hectares, non-autochthonous riverine and windbelt trees, avenues, parks, plantations of forest trees, pens for rearing game, and pastures overgrown with forest trees if used for pasturing, irrespective of how they are described in the land register.

(4) The provisions of this act and regulations issued on the basis hereof shall also apply to forest trees which grow outside forests insofar as they are specifically defined.

According to Slovenian Act on Forests (2007), the definition of forest land was novelated. Forest land area is covered with forest trees in the form of stands with minimal tree height 5 m and with minimal area of 0.25 hectares (2,500 m^2). Abandoned agricultural land on area more than 0.25 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.

Table 7.3.1: Activity data for forest land (1986 – 2010) in kha.

Year	A. Total Forest Land	A.1. Forest Land remaining Forest Land	A.2. Land converted to Forest Land	A.2.1 Cropland converted to Forest Land	A.2.2 Grassland converted to Forest Land	A.2.3 Wetlands converted to Forest Land	A.2.4 Settlements converted to Forest Land	A.2.5 Other Land converted to Forest Land
	kha	kha	kha	kha	kha	kha	kha	kha
2010	1,244.268	1,239.423	4.845	1.106	3.083	0.074	0.221	0.362
2009	1,243.426	1,238.581	4.845	1.106	3.083	0.074	0.221	0.362
2008	1,242.583	1,237.739	4.845	1.106	3.083	0.074	0.221	0.362
2007	1,241.741	1,236.896	4.845	1.106	3.083	0.074	0.221	0.362
2006	1,240.898	1,236.054	4.845	1.106	3.083	0.074	0.221	0.362
2005	1,240.056	1,235.212	4.845	1.106	3.083	0.074	0.221	0.362
2004	1,239.214	1,234.369	4.845	1.106	3.083	0.074	0.221	0.362
2003	1,238.371	1,233.527	4.845	1.106	3.083	0.074	0.221	0.362
2002	1,237.529	1,232.684	4.845	1.106	3.083	0.074	0.221	0.362
2001	1,236.687	1,231.842	4.845	1.106	3.083	0.074	0.221	0.362
2000*	1,235.844	1,231.000	4.845	1.106	3.083	0.074	0.221	0.362
1999	1,235.002	1,230.157	4.845	1.106	3.083	0.074	0.221	0.362
1998	1,234.159	1,229.315	4.845	1.106	3.083	0.074	0.221	0.362
1997	1,233.317	1,228.473	4.845	1.106	3.083	0.074	0.221	0.362
1996	1,232.475	1,227.630	4.845	1.106	3.083	0.074	0.221	0.362
1995	1,231.632	1,226.788	4.845	1.106	3.083	0.074	0.221	0.362
1994	1,230.790	1,225.945	4.845	1.106	3.083	0.074	0.221	0.362
1993	1,229.948	1,225.103	4.845	1.106	3.083	0.074	0.221	0.362
1992	1,229.105	1,224.261	4.845	1.106	3.083	0.074	0.221	0.362
1991	1,228.263	1,223.418	4.845	1.106	3.083	0.074	0.221	0.362
1990	1,227.420	1,222.576	4.845	1.106	3.083	0.074	0.221	0.362
1989	1,226.578	1,221.734	4.845	1.106	3.083	0.074	0.221	0.362
1988	1,225.736	1,220.891	4.845	1.106	3.083	0.074	0.221	0.362
1987	1,224.893	1,220.049	4.845	1.106	3.083	0.074	0.221	0.362
1986	1,224.051	1,219.206	4.845	1.106	3.083	0.074	0.221	0.362

Table 7.3.2: Emissions/removals from forestland (1986 – 2010) in Gg CO2

Year	A. Total Forest Land	A.1. Forest Land remaining Forest Land	A.2. Land converted to Forest Land	A.2. Land converted to Forest Land				
				A.2.1 Cropland converted to Forest Land	A.2.2 Grassland converted to Forest Land	A.2.3 Wetlands converted to Forest Land	A.2.4 Settlements converted to Forest Land	A.2.5 Other Land converted to Forest Land
	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	-11,138.328	-10,869.439	-268.889	-227.155	-34.269	NE	NO	-7.466
2009	-11,039.613	-10,770.724	-268.889	-227.155	-34.269	NE	NO	-7.466
2008	-11,043.132	-10,774.243	-268.889	-227.155	-34.269	NE	NO	-7.466
2007*	-11,027.510	-10,758.620	-268.889	-227.155	-34.269	NE	NO	-7.466
2006	-10,875.788	-10,606.899	-268.889	-227.155	-34.269	NE	NO	-7.466
2005	-11,006.733	-10,737.843	-268.889	-227.155	-34.269	NE	NO	-7.466
2004	-11,009.662	-10,740.772	-268.889	-227.155	-34.269	NE	NO	-7.466
2003	-10,778.966	-10,510.077	-268.889	-227.155	-34.269	NE	NO	-7.466
2002	-10,995.364	-10,726.474	-268.889	-227.155	-34.269	NE	NO	-7.466
2001	-10,965.219	-10,696.330	-268.889	-227.155	-34.269	NE	NO	-7.466
2000*	-9,500.637	-9,231.747	-268.889	-227.155	-34.269	NE	NO	-7.466
1999	-9,468.012	-9,199.123	-268.889	-227.155	-34.269	NE	NO	-7.466
1998	-9,409.167	-9,140.277	-268.889	-227.155	-34.269	NE	NO	-7.466
1997	-9,449.242	-9,180.353	-268.889	-227.155	-34.269	NE	NO	-7.466
1996	-9,461.707	-9,192.817	-268.889	-227.155	-34.269	NE	NO	-7.466
1995	-9,467.814	-9,198.925	-268.889	-227.155	-34.269	NE	NO	-7.466
1994	-9,479.847	-9,210.957	-268.889	-227.155	-34.269	NE	NO	-7.466
1993	-9,473.518	-9,204.628	-268.889	-227.155	-34.269	NE	NO	-7.466
1992	-9,430.693	-9,161.804	-268.889	-227.155	-34.269	NE	NO	-7.466
1991	-9,391.337	-9,122.448	-268.889	-227.155	-34.269	NE	NO	-7.466
1990	-9,387.883	-9,118.994	-268.889	-227.155	-34.269	NE	NO	-7.466
1989	-9,435.576	-9,166.686	-268.889	-227.155	-34.269	NE	NO	-7.466
1988	-9,423.298	-9,154.409	-268.889	-227.155	-34.269	NE	NO	-7.466
1987	-9,435.543	-9,166.654	-268.889	-227.155	-34.269	NE	NO	-7.466
1986	-9,429.214	-9,160.325	-268.889	-227.155	-34.269	NE	NO	-7.466

* Inventory year

Removals CO_2 in category forest land range from –9,429.2 Gg CO_2 (1986) to – 11,138.3 Gg CO_2 (2010).

Forest land remaining forest land (CO_2) and Land converted to forest land (CO_2) were identified as key source categories. Concerning the CH_4 or N_2O emissions, forest land remaining forest land and land converted to forest land have not resulted as a key source.

7.3.2 Methodological issues

7.3.2.1 Forestland remaining forestland

In time period from 1986 to 2010 the annual removals were between -9,122.4 Gg CO_2 (1991) and -10,869.4 Gg CO_2 (2010).

Carbon stock changes in living biomass

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in living biomass in Forest land remaining Forest land are estimated by Tier 3, stock change method. The method requires biomass carbon stock inventories at two points in time. Biomass change is the difference between the biomass at two points in time, divided by the number of years between the inventories. Data from national forest inventories (NFI), made in years 2000 and 2007, were used for our calculations.

For calculations the equation 3.2.3 from GPG-LULUFC was used:

$$\Delta C = \frac{(C_{t2} - C_{t1})}{t_2 - t_1} * A \qquad \text{(Equation 5)}$$

ΔC – living biomass [t CO_2]
A – area of forest land [ha]
C_t – total carbon biomass calculated at time t_1 or t_2 [t C]

The carbon stock in living biomass was calculated from the merchantable volume multiplied by wood density (WD), biomass expansion factor (BEF_2), root-to-shoot ratio (R) and carbon fraction of dry matter (CF). These parameters, except carbon fraction of dry matter, are determined separately for tree species.

$$C = (GS_j * WD_j * BEF_{2j}) * (1 + R_j) * CF \qquad \text{(Equation 6)}$$

GS – growing stock
WD – basic wood density
BEF_2 – biomass expansion factor for conversion of merchantable volume to aboveground tree biomass
R – root shoot ratio
j – tree species

Parameters

Growing stock

Growing stock is volume over bark of all living trees more than 9.99 cm in diameter at breast height. Includes the stem from ground to a top diameter of 6.99 cm, and may also include branches to a minimum diameter of 6.99 cm.

The data are from the Slovenian National Forest inventory (NFI). The NFI was carried out in the years 2000 and 2007. Assessment was made on grid 4 x 4 km. Growing stock in 2000 was 283.19 m^3/ha (confidence interval: 269.37 – 297.01 m^3/ha) and in year 2007 was 326.43 m^3/ha (confidence interval: 312.30 – 340.57 m^3/ha).

The NFI increment data include all possible reasons for biomass increments and losses in the forest. That means that biomass increments due to abandonment of managed land or biomass loses due to traditional (non-commercial) fuel wood consumption, forestland conversion, forest fires and other damages are already considered in calculations based on the inventory data.

For the estimation of growing stock of Slovenian forests from 1986 to 2010, the following methodology was applied:

- the initial growing stock volume is from NFI 2000 and NFI 2007;
- the growing stock between these years were interpolated;
- the growing stock from 2000 to year 1986 was extrapolated;
- the growing stock for 2008, 2009 and 2010 remains the same as in 2007 (326.43 m^3/ha).

Next NFI is planned for 2012. When data from NFI_2012 will be available, recalculations of growing stock for years 2008 – 2012 will be made.

Table 7.3.3: Growing stock in Slovenian forests from 1986 to 2010.

Year	Growing stock	Year	Growing stock
	[m3/ha]		[m3/ha]
2010	326.4	1997	264.7
2009	326.4	1996	258.5
2008	326.4	1995	252.3
2007*	326.4	1994	246.1
2006	320.3	1993	240.0
2005	314.1	1992	233.8
2004	307.9	1991	227.6
2003	301.7	1990	221.4
2002	295.5	1989	215.2
2001*	289.4	1988	209.1
2000	283.2	1987	202.9
1999	277.0	1986	197.0
1998	270.8	* Inventory year	

Table 7.3.4: Growing stock composition (in percent) by tree species in inventory years.

% of growing stock		year	
Scientific name	Common name	2000	2007
Picea abies	Spruce	33.39	30.94
Fagus sylvatica	Beech	31.65	31.02
Abies alba	Fir	9.27	8.20
Quercus petraea	Oak	5.09	5.75
Pinus sylvestris	Scots Pine	4.09	4.12
Acer pseudoplatanus	Maple	3.24	3.22
Carpinus betulus	Hornbeam	1.62	2.30
Castanea sativa	Chestnut	1.52	1.89
Pinus nigra	Black Pine	1.16	1.57
Ostrya carpinifolia	Hop Hornbeam	0.82	1.25
Remaining		8.15	9.75
TOTAL		**100.00**	**100.00**

Biomass expansion factor (BEF_2) and Root-to-shoot ratio (R)

The default value given in the GPG-LULUCF (Table 3A.1.10) has been adopted in calculations (BEF_2 = 1,15 for conifers and broadleaves). Values were used from lower limits of the range (for temperate climatic zone), because they are more suitable for mature forests or those with high growing stock.

For two tree species – fir (*Abies alba)* and oak (*Quercus sp.)* the national biomass expansion factor (BEF_2) and Root-to-shoot ratio (R) are in determination.
Root-to-shoot ratio (R) values were adopted from Table 3A.1.8. Mean values (aboveground biomass > 150 t/ha) for conifers (0.23) and for broadleaves (0.24) were used.

Wood density (WD)

According to analyses of national data from previous researches done by Slovenian Forestry Institute (SFI), basic wood density is for *Fagus sylvatica* (WD = 0.584 t/m^3) and *Alnus glutinosa* (WD = 0.445 t/m^3). These national data are not different from default values in Table 3A.1.9-1 of GPG LULUCF. Further analyses on the approach and methodology are in progress (will be finished until 2012).

Carbon fraction of dry matter (CF)

The default value given in the GPG-LULUCF has been adopted as the carbon fraction of dry matter (CF = 0.5 t C/ t d.m.).

Table 7.3.5: Parameters (WD, BEF2, R, CF and) used for selected tree species.

Common name	WD	BEF2	R	CF
	[t/m^3]	[dimensionless]	[dimensionless]	[t C/ t d.m.]
Spruce	0.400	1.15	0.23	0.50
Beech	0.584	1.15	0.24	0.50
Fir	0.400	1.15	0.23	0.50
Oak	0.580	1.15	0.24	0.50
Scotch Pine	0.420	1.15	0.23	0.50
Maple	0.520	1.15	0.24	0.50
Hornbeam	0.630	1.15	0.24	0.50
Chestnut	0.480	1.15	0.24	0.50
Black Pine	0.420	1.15	0.23	0.50
Hop Hornbeam	0.630	1.15	0.24	0.50

Carbon stock changes in dead organic matter

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in dead organic matter in Forest land remaining Forest land are estimated by Tier 2, in acoordance with equation 3.2.10. from GPG- LULUCF.

$$\Delta C_{FF_{DOM}} = \Delta C_{FF_{DW}} + \Delta C_{FF_{LT}} \qquad \textbf{(Equation 7)}$$

$\Delta C_{FF_{DOM}}$ – **annual change in carbon stocks in dead organic matter [t C yr^{-1}]**

$\Delta C_{FF_{DW}}$ – **change in carbon stocks in dead wood [t C yr^{-1}]**

$\Delta C_{FF_{LT}}$ – **change in carbon stocks in litter [t C yr^{-1}]**

Dead wood content is all non-living woody biomass not contained in the litter, either standing, lying on the ground, or in the soil. According to definition from NFI 2007, dead wood in Slovenia includes:

- dead trees (DBH > 10 cm);
- stumps (D > 10 cm and H > 20 cm);
- snags (D > 10 cm and H > 50 cm);
- coarse woody debris (D > 10 cm and L > 50 cm).

National data on the stock of dead wood are available just from the NFI 2007. So the dead wood biomass for year 2000 and 1990 was estimated applying with dead mass conversion percent from dead wood in NFI 2007, as only available information. For calculations the equation 3.2.12 from GPG-LULUFC was used.

$$\Delta C_{FF}(DW) = \left[A * \frac{(B_{t2} - B_{t1})}{T} \right] * CF \qquad \textbf{(Equation 8)}$$

$\Delta C_{FF}(DW)$ – annual change in carbon stocks in dead wood [t yr^{-1}]
A – area of managed forest land remaining forest land [ha]
B_{t2} – dead wood stock at time t_2 for managed forest remaining forest [t d.m.]
B_{t1} – dead wood stock at time t_1 for managed forest remaining forest [t d.m.]
T – time period between t_1 and t_2 [yr]
CF – carbon fraction of dry matter [t d.m.]

According to NFI 2007 the dead wood stock was 8.97 t d.m./ha (18.56 m^3/ha). That represents 5.69 % of growing stock. For year 2000 value for dead wood stock was 7.47 t d.m./ha (16.12 m^3/ha) and for year 1990 was 5.83 t d.m./ha (12.60 m^3/ha).

Planned NFI 2012 will also include measurements and data of dead wood stock. Then we will have reliable data for years 2007 and 2012, because the dead wood stock will be measured and assessed with the same methodology as in the 2007 NFI. We will explore more accurate methodologies for the estimation of the carbon stock changes in dead wood for the years prior to 2007.

For calculations of carbon stock changes in litter Tier 1 methodology was used. Under Tier 1, it is assumed thet the average transfer rate into the litter pool is equal to the transfer rate out of the litter pool, so the net change is zero. Results of our preliminary expertise for period 1996 – 2006 (Kobal M., Simoncic P., 2011), show relative stable carbon stocks in litter in forest land remaining forest land. Results are explained in 'carbon stock changes in soils'. We are going to reinvestigate the current research objective and national available data.

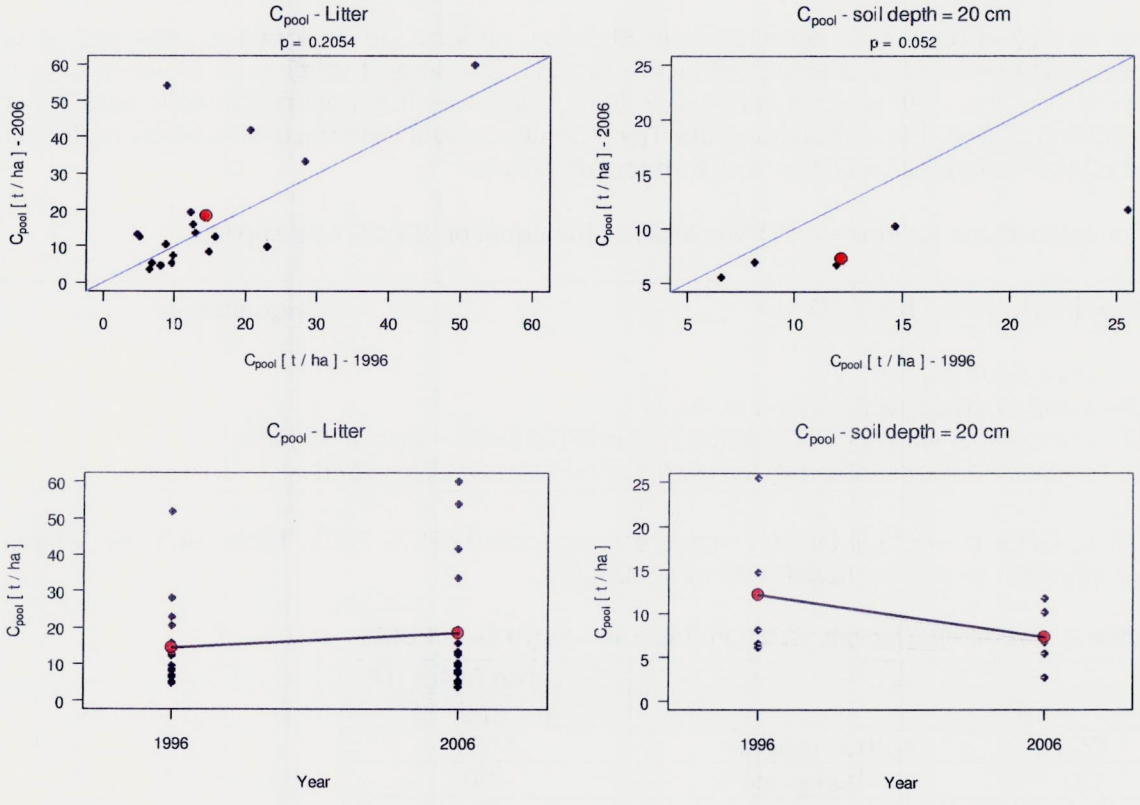
Carbon stock changes in soils

In accordance with GPG-LULUCF, carbon stock changes in soils are estimated by Tier 1 methodology. Under Tier 1, it is assumed that when forest remains forest, the carbon stock in soil organic matter does not change, regardless of change in forest management, types, and disturbances regimes; in other words that the carbon stock in mineral soil remains constant so long as the land remains forest. Results of our preliminary expertise for period 1996 – 2006 (Kobal M., Simoncic P., 2011), show relative stable carbon stocks in forest soils.

Changes in carbon stock in litter and soils in forest land remaining forest land in period 1996 – 2006

For year 1996, at each plot, three soil subsamples were taken for organic (Litter) and mineral layer (SOM). For mineral part of soil, samples were taken with soil auger (∅ = 7 cm) at fixed depth (0–5, 5–10 and 10–20 cm) and for organic layer within 25 × 25 cm square. Subsamples were taken 5 m apart from plot centre, 120°clockwise and were combined for laboratory analysis (composite samples). Volume of roots and coarse fragments (soil skeleton > 2 mm) were subtracted from volume of soil sample. For year 2006, soil survey was made according to methodology for BioSoil demonstration project. Soil subsamples for organic and mineral layer were taken as in year 1996, with 5 replicates in each plot (centre of a plot and celestial direction). Volume of roots and coarse fragments were subtracted from volume of soil sample. For evaluation of temporal changes paired t-test was performed.

Figure 7.3.1: Carbon stock in forest soils and litter (1996-2006).



The carbon stock changes in litter slightly increase from year 1996 to year 2006, when national forest soil surveys as a part of ICP Forest and BioSoil Soil demonstration projects/surveys, were carried out. The differences for litter stock changes are not statistically significant (p = 0.205). Carbon stock changes in mineral soils for the same period decrease, but the changes are not significant (p = 0.052).

Preliminary results on limited number of sampling plots, show us relative stable carbon stocks in forest soils for observed period with insignificant differences between organic - litter layers and also for mineral layer. If we take in account literature values for central European forests, in the moment, we conclude that there are not significant changes in

forest soils within periods e.g. 5-10 years if the land use is not changed (forest remaining forest; source: SFI project report 2011). For final conclusions we will proceed with analysis of existing historical and archived soil and litter data, partly additional soil sampling and new, improved recalculations (future improvements).

7.3.2.2 Non-CO_2 greenhouse gas emission

N_2O Emissions from N Fertilization and Drainage of Soils

Fertilization of forests is not usual in Slovenia – this is not a common practice. Therefore, no emissions are reported in CRF Table 5(I).

Drainage of forests is not common practice in Slovenia. There are no survey data available, but the drained area is probably very small, if existing at all.

Emissions from Wildfires

As controlled burning is not allowed in Slovenia, all fires are assigned to "wildfires". It is assumed that all fires affected productive forests. The area of wildfires in Slovenia is very small, less than half percent in the year 2003, which was the most problematic year in the following period. For calculations the Tier 2 (country level estimated of area burned) was used and estimation of GHGs directly released in fires.

For calculations for emissions from wildfires the equation 3.2.20 was applied.

$$Lfire[tGHG] = A * B * C * D * 10^{-6} \quad \text{(Equation 9)}$$

A – area burnt [ha]
B – mass of available fuel [kg d.m. ha $^{-1}$]
C – combustion efficiency (Table 3A.1.12 in IPCC GPG – LULUCF 2003)
D – emission factor (Table 3A.1.16 in IPCC GPG – LULUCF 2003)

For all GHG, the default emission factors were applied (IPCC 2003, Table 3A.1.16). Values for emission factors for forest fires were adopted.

Table 7.3.6: Emission factors used from Table 3A.1.16 (GPG- LULUCF)

Gas		Emission factor (D) [g / kg d.m.]
CO_2	carbon dioxide	1580
CO	carbon oxide	130
CH_4	methane	9
NO_x	nitrogen oxide	0.7
N_2O	nitrous oxide	0.11
NMHC	non methane hydrocarbons	10

Mass of availble fuel (B) was calculated from average growing stock for each year. The fraction of the biomass combusted (C = 1–0545) was adopted from Table 3A.1.12 (GPG-LULUCF). Inserting these values in equation 3.2.20 of IPCC (2003), the emissions shown in Table 7.3.7 were calculated.

Table 7.3.7: Productive forest land affected by wildfires and resulting GHG emissions 1986-2010.

Year	Area	Mass of available fuel	CO_2	CO	CH_4	NO_x	N_2O	NMHC
	ha	t/ha	t	t	t	t	t	t
2010	52.06	183.62	8,307.02	683.49	47.32	3.68	0.58	52.58
2009	114.73	183.62	18,307.05	1,506.28	104.28	8.11	1.27	115.87
2008	46.69	183.62	7,450.15	612.99	42.44	3.30	0.52	47.15
2007	98.61	183.62	15,734.84	1,294.64	89.63	6.97	1.10	99.59
2006	1,022.81	180.15	160,118.73	13,174.33	912.07	70.94	11.15	1,013.41
2005	142.23	176.67	21,836.49	1,796.67	124.39	9.67	1.52	138.21
2004	76.87	173.20	11,569.66	951.93	65.90	5.13	0.81	73.23
2003	1,592.84	169.72	234,927.17	19,329.45	1,338.19	104.08	16.36	1,486.88
2002	77.47	166.25	11,192.06	920.87	63.75	4.96	0.78	70.84
2001	240.36	162.77	33,998.83	2,797.37	193.66	15.06	2.37	215.18
2000	124.14	159.30	17,184.66	1,413.93	97.89	7.61	1.20	108.76
1999	321.10	155.82	43,480.19	3,577.48	247.67	19.26	3.03	275.19
1998	725.10	152.35	95,996.43	7,898.44	546.82	42.53	6.68	607.57
1997	383.33	148.87	49,591.82	4,080.34	282.49	21.97	3.45	313.87
1996	243.75	145.40	30,798.19	2,534.03	175.43	13.64	2.14	194.93
1995	148.88	141.92	18,361.67	1,510.77	104.59	8.13	1.28	116.21
1994	NA	138.45	NA	NA	NA	NA	NA	NA
1993	NA	134.97	NA	NA	NA	NA	NA	NA
1992	319.37	131.50	36,495.51	3,002.80	207.89	16.17	2.54	230.98
1991	624.90	128.03	69,522.57	5,720.21	396.01	30.80	4.84	440.02
1990	615.77	124.55	66,647.49	5,483.65	379.64	29.53	4.64	421.82
1989	120.00	121.08	12,625.78	1,038.83	71.92	5.59	0.88	79.91
1988	181.75	117.60	18,574.00	1,528.24	105.80	8.23	1.29	117.56
1987	NA	114.13	NA	NA	NA	NA	NA	NA
1986	NA	110.65	NA	NA	NA	NA	NA	NA

All data related to burned areas are based on databases of Slovenia Forest Service (SFS). The areas are identified and geo-located. The annual data related to fires are annually published by SFS. All GHG emission from forest fires are reported under Forest land remaining Forest Land.

Calculations of emissions from biomass burning were rechecked and recalculated. Areas of burned forests in previous reports included whole burned areas (forest land and other land uses, e.g. grassland), not only forestland. Recalculations were made.

7.3.2.3 Land converted to forest land

Data for land use change from other land use to forestland are described in chapter 7.2.1 and chapter 7.2.2. For the calculation of the annual change in carbon stocks in other land converted to forestland the IPCC GPG Tier 2 approach is used.

The average annual area converted from other land uses to forest land is 4,845 ha. As described in chapter 7.2.1 the land use change to forests mainly appear from grassland and from cropland (Table 7.2.8). When conversion from cropland or grassland to forest land occurs, based on ALUM data, no distinction is made about intensity of forest management. Conversions to forest land are not direct human induced, the areas are under spontaneously expansion of forest. However, SFS system of forest management differentiates forest lands covered by management plans according to production function and other ecological and social functions.

Definition of forest (Slovenian Forestry Act) related to management plans: Land spanning more than 0.25 hectares with trees higher than 2 meters and canopy cover more than 30 percent, or trees able to reach these threshold in situ. It includes abandoned agricultural land (cropland, grassland) with natural expansion of forest (covered with trees 20-75 %). When natural expansion during more than 20 years or more, trees covered more than 75 % and diameter in breast hight (DBH) is more than 10 cm, this land becomes forest.

Carbon stock changes in living biomass

The carbon stock change of living biomass has been calculated taking into account the increase and the decrease of carbon stock related to the areas in transition into forest land. The annual increment of stem wood over bark on areas which converted to forests was estimated with 2,16 m^3/ha (Wisdom Slovenia, 2006). For the calculation the equation 3.2.23 (following equations 3.2.4 and 3.2.5) from GPG LULUCF was used. No distinction between intensively and extensively managed forests was made, because all land converted to forest land are managed extensively (naturally regenerated forests with minimum human intervention).

$$\Delta C_{LF\ growth} = A * G_{total} * CF \qquad \text{(Equation 10)}$$

A – area of land converted to forest land [ha]
G_{total} – average annual increment rate in total biomass in units of dry matter[t d.m. ha $^{-1}$ yr $^{-1}$]
CF – carbon fraction of dry matter (default = 0.5 t C / t d.m.]

$$G_{total} = G_W * (1+R)$$

G_W – average annual aboweground biomass increment [t d. m. ha $^{-1}$ yr $^{-1}$]
R – root shoot ratio appropriate to increments

$$G_W = I_v * WD * BEF_1$$

I_v – average annual net increment [m^3 ha $^{-1}$ yr $^{-1}$]
WD – basic wood desity [t d.m. m^{-3}]
BEF_1 – biomass expansion factor for conversion of annual net increment (including bark) to aboveground tree biomass increment

BEF_1 values were used according to table 3A.1.10 (GPG LULUCF, 2003) for temperate climatic zone. Values from the upper limit of the range (representing young forests or forests with low growing stock) were taken: BEF_1= 1.3 for conifers and for broadleaves.

Average wood densities were used for conifers (WD = 0.400 t d.m. m^{-3}) and for broadleaves (WD = 0.580 t d.m. m^{-3}).

Average annual increment (I_v) on areas converted to forestland was 2.16 m^3 ha $^{-1}$ yr $^{-1}$ (Wisdom Slovenia, 2006, p. 57, class 1410).

Root-to-shoot ratio (R) values were adopted from Table 3A.1.8. Mean values for conifers (R = 0.46; aboveground biomass <50 t/ha) and for broadleaves (R = 0.43; aboveground biomass <75 t/ha) were used.

Table 7.3.8: Factors for calculation of CO2 accumulation in land converted to forest land.

	I_v	WD	R	BEF_1
	[m^3 ha^{-1} yr^{-1}]	[t d.m. m^{-3}]	[dimensionless]	[dimensionless]
Conifers	2.16	0.400	0.46	1.3
Broadleaves	2.16	0.580	0.43	1.3

Carbon stock changes in dead organic matter

In the Tier 1 calculation, the average transfer rate into dead wood pool equals the transfer rate out of the dead wood pool. The net change is therefore equal to zero.

It is assumed (Tier 1, default) that the litter carbon stocks in non-forest lands converting to forests are stable. Slovenia does not experience significant changes in forest types or management regimes. The net effect of emission and removal factors is therefore equal to zero (GPG-LULUCF).

Carbon stock changes in soils

For calculations of carbon stock changes in soils in land converted to forest land the Tier 2 method was applied, using equation 3.2.31 form GPG-LULUCF. As mentioned before no distinction between intensively and extensively managed forests was made, because all land converted to forest land are managed extensively (naturally regenerated forests with minimum human intervention).

$$\Delta C_{LF\,\text{min}\,eral} = \frac{\left[(SOC_{ExtForest} - SOC_{non-forestland}) * A_{ExtForest}\right]}{T_{ExtForest}} \qquad \textbf{(Equation 11)}$$

$\Delta C_{LFmineral}$ – annual change in carbon stock in mineral soils [t C yr^{-1}]
$SOC_{Ext\ Forest}$ – stable soil organic carbon stocks of the new, extensively managed forest [t C ha^{-1}]
$SOC_{non\text{-}forestland}$ – soil organic carbon stocks of the non-forest land prior to its conversion [t C ha^{-1}]
$A_{Ext\ Forest}$ – land area [ha]
$T_{Ext\ Forest}$ – time [default 20 years]

$SOC_{Ext\ Forest} = SOC_{ref} * f_{forest\ type} * f_{man\ intensity} * f_{dist\ regime}$

SOC_{ref} - SOC_{30} - Slovenian national value for organic carbon stock in mineral soil for forest land [t C ha^{-1}]
$f_{forest\ type}$ – adjustment factor for a forest different from the native forest vegetation
$f_{man\ intensity}$ – adjustment factor for the effect of management intensity
$f_{dist\ regime}$ – adjustment factor reflecting the effect on SOC of a disturbance regime different from the natural ones

Country specific value for SOC_{ref} (SOC_{30} = 105 t C ha^{-1}) was determined from national soil profiles data and it is presented in Table 7.2.9. Also values for soil organic stock of previous land uses ($SOC_{non\text{-}forestland}$: grassland = 107 t C ha^{-1}, cropland perennial = 68 t C ha^{-1}, cropland annual = 100 t C ha^{-1},) are presented in Table 7.2.9. and used in calculations. According to spontaneously expansion of forest on converted areas, with

minimum human intervention, values for adjustment factors ($f_{forest\ type} = f_{man\ intensity} = f_{dist\ regime} = 1.00$) were used.

7.3.3 Uncertainties and time-series consistency

A process of using models to time-shift the forest estate forwards to represent future forest growth and forest managed, and backwards to improve historical estimates, is performed to minimize errors. As the estimation of carbon stocks is continuously being improved, both past and future will be recalculated.

The NFI is based on a very comprehensive quality assurance system, which allows the exact identification of the right location of the grid and sample points guarantees the repeated measurement of the same trees. It also indicates at once implausible figures for individual parameters during the measurements on site and any missing trees compared to the period before.

One of the goals of NFI 2007 was to obtain accurate and reliable data about the state of volume of wood growing stock (carbon stock) as basis for KP/UNFCCC reporting for all Slovenian forests. Some of indicators from NFI 2007 are in Table 7.3.9.

Table 7.3.9: Indicators from NFI 2007

Carbon stock	326.40 m^3/ha	± 4.30 %
Living trees growing stock	8.65 m^3/ha	± 6.50 %
Dead wood	18.64 m^3/ha	± 16.60 %
Soil and litter	see chapter 7.2.2	

Estimated uncertainty in land managed factors	± 12 % (GPG-LULUCF table 3.3.4)

7.3.4 Source specific QA/QC and verification

The data based on forest statistics are produced by the Slovenian Forestry Institute (SFI). Data descriptions are available in Slovenian language.

QC measures related to national Forestry Inventory data were:

- A manual for NFI was prepared.
- Field instruments were calibrated and checked.
- All methods were tested in pilot inventory in 2006 (grid 16 x 16 km).
- In preparatory phase all field personnel was trained for:
  - correct use equipments,
  - correct measurements and classifications,
  - understanding of the guidelines and specific instructions.
- Verification measurements were carried out during field seasons - 4 teams from SFI were controlling the field measurements and work of Slovenian Forest Service (SFS) teams.
- Field data was entered in data base and checked for major discrepancies.
- All data used for our calculation is saved on our data server and are protected from unauthorized access.

All soil samples (from soil inventory on 8x8 km) were delivered and stored in laboratory at SFI according to internal quality management system.

7.3.5 Source specific recalculations

Calculations of emissions from biomass burning were rechecked and recalculated. Areas of burned forests in previous reports included whole burned areas (forest land and other land uses, e.g. grassland), not only forestland. Recalculations were made.

7.3.6 Source specific planed improvements

Currently used land use change matrix is under revision (internal and external). Discrepancies in areas were noticed during preparation of NIR and by ERT during centralized review. Also from diferent natonal data on land use areas in 2010, a change in land use changes was noticed (e.g. area of forestland is smaller than previous years, natural afforestation of abandoned agricultural land has slowly stopped). Results of the revision will be implemented in 2013 submission and all the recalculations will be made.

7.4 Cropland (5B)

7.4.1 Source category description

Cropland category includes CO_2 emissions from changes in carbon stock in living biomass and in soils. Carbon stock changes are reported in Cropland remaining cropland and in Land converted to cropland. Also CO_2 emissions from agricultural lime application and N_2O emissions associated with land conversion to cropland.

Cropland covers 222,700 ha and that represents 11.0 % of country total area. Cropland land use is separated in two subcategories: anuual cropland (arable land, temporary meadows, hop fields, green houses) and perrenial cropland (other permanent crops on arable land, vineyards, nursery, intensive orchards, extensive orchards, olive groves, other permanent crops, forest plantation, forest trees on agricultural land).

Table 7.4.1: Activity data for cropland (1986 – 2010) in kha

Year	5.B. Total Cropland	5.B. Organic soil	5.B.1. Cropland remaining Cropland	5.B .2. Land converted to Cropland[12]	5.B.2.1 Forest Land converted to Cropland	5.B.2.2 Grassland converted to Cropland	5.B.2.3 Wetlands converted to Cropland	5.B.2.4 Settlements converted to Cropland	5.B.2.5 Other Land converted to Cropland
	kha	kha	kha	kha	kha	kha	kha	kha	kha
2010	222.700	6.884	210.762	5.037	0.840	3.618	0.051	0.471	0.057
2009	228.183	6.884	216.262	5.037	0.840	3.618	0.051	0.471	0.057
2008	233.667	6.868	221.762	5.037	0.840	3.618	0.051	0.471	0.057
2007	239.151	6.864	227.251	5.037	0.840	3.618	0.051	0.471	0.057
2006	244.635	6.885	232.714	5.037	0.840	3.618	0.051	0.471	0.057
2005	250.119	6.906	238.176	5.037	0.840	3.618	0.051	0.471	0.057
2004	255.603	6.876	243.690	5.037	0.840	3.618	0.051	0.471	0.057
2003	261.087	6.846	249.204	5.037	0.840	3.618	0.051	0.471	0.057
2002	266.571	6.816	254.718	5.037	0.840	3.618	0.051	0.471	0.057
2001	272.055	6.786	260.232	5.037	0.840	3.618	0.051	0.471	0.057
2000	277.539	6.755	265.747	5.037	0.840	3.618	0.051	0.471	0.057
1999	283.022	6.725	271.261	5.037	0.840	3.618	0.051	0.471	0.057
1998	288.506	6.695	276.775	5.037	0.840	3.618	0.051	0.471	0.057
1997	293.990	6.665	282.289	5.037	0.840	3.618	0.051	0.471	0.057
1996	299.474	6.732	287.706	5.037	0.840	3.618	0.051	0.471	0.057
1995	304.958	6.800	293.121	5.037	0.840	3.618	0.051	0.471	0.057
1994	310.442	6.867	298.538	5.037	0.840	3.618	0.051	0.471	0.057
1993	315.926	6.934	303.955	5.037	0.840	3.618	0.051	0.471	0.057
1992	321.410	7.001	309.372	5.037	0.840	3.618	0.051	0.471	0.057
1991	326.894	7.069	314.788	5.037	0.840	3.618	0.051	0.471	0.057
1990	332.378	7.136	320.205	5.037	0.840	3.618	0.051	0.471	0.057
1989	337.861	7.203	325.622	5.037	0.840	3.618	0.051	0.471	0.057
1988	343.345	7.270	331.039	5.037	0.840	3.618	0.051	0.471	0.057
1987	348.829	7.338	336.455	5.037	0.840	3.618	0.051	0.471	0.057
1986	354.313	7.405	341.872	5.037	0.840	3.618	0.051	0.471	0.057

Table 7.4.2: Emission from cropland (1986 – 2010) in Gg CO_2

Year	5.B. Total Cropland	5.B.1. Cropland remaining Cropland	5.B.2. Land converted to Cropland	5.B.2.1 Forest Land converted to Cropland	5.B.2.2 Grassland converted to Cropland	5.B.2.3 Wetlands converted to Cropland	5.B.2.4 Settlements converted to Cropland	5.B.2.5 Other Land converted to Cropland
	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	1,612.649	411.873	1,200.776	538.826	661.950	NO	NO	NO
2009	1,612.649	411.873	1,200.776	538.826	661.950	NO	NO	NO
2008	1,600.957	400.181	1,200.776	538.826	661.950	NO	NO	NO
2007	1,588.752	387.975	1,200.776	538.826	661.950	NO	NO	NO
2006	1,576.988	376.212	1,200.776	538.826	661.950	NO	NO	NO
2005	1,566.498	365.722	1,200.776	538.826	661.950	NO	NO	NO
2004	1,552.927	352.151	1,200.776	538.826	661.950	NO	NO	NO
2003	1,540.843	340.066	1,200.776	538.826	661.950	NO	NO	NO
2002	1,541.542	340.766	1,200.776	538.826	661.950	NO	NO	NO
2001	1,508.609	307.833	1,200.776	538.826	661.950	NO	NO	NO
2000	1,450.998	301.420	1,149.578	487.628	661.950	NO	NO	NO
1999	1,439.348	289.770	1,149.578	487.628	661.950	NO	NO	NO
1998	1,425.145	275.567	1,149.578	487.628	661.950	NO	NO	NO
1997	1,405.125	255.547	1,149.578	487.628	661.950	NO	NO	NO
1996	1,394.331	244.752	1,149.578	487.628	661.950	NO	NO	NO
1995	1,380.790	231.212	1,149.578	487.628	661.950	NO	NO	NO
1994	1,363.783	214.205	1,149.578	487.628	661.950	NO	NO	NO
1993	1,352.333	202.755	1,149.578	487.628	661.950	NO	NO	NO
1992	1,343.414	193.835	1,149.578	487.628	661.950	NO	NO	NO
1991	1,342.939	193.361	1,149.578	487.628	661.950	NO	NO	NO
1990	1,323.774	174.196	1,149.578	487.628	661.950	NO	NO	NO
1989	1,250.660	167.975	1,082.685	420.735	661.950	NO	NO	NO
1988	1,237.366	154.681	1,082.685	420.735	661.950	NO	NO	NO
1987	1,222.567	139.882	1,082.685	420.735	661.950	NO	NO	NO
1986	1,206.658	123.973	1,082.685	420.735	661.950	NO	NO	NO

Emissions CO_2 in category cropland range from 1,206.7 Gg CO_2 (1986) to 1,612.7 Gg CO_2 (2009, 2010).

Cropland remaining cropland (CO_2) and Land converted to cropland (CO_2) were identified as key source categories. Concerning the N_2O emissions, land converted to cropland have not resulted as a key source category.

7.4.2 Methodological issues

7.4.2.1 Cropland remaining cropland

Carbon stock changes in living biomass

Perennial cropland remaining cropland

For calculating the carbon stock change in living biomass on perennial cropland equation 3.2.2 (GPG- LULUCF) and Tier 1/Tier 2 method were applied.

(Equation 12)

*Annual change in biomass = (area of perennial cropland * biomass accumulation rate) – (area of perennial cropland before 30 years * 0,033 * biomass carbon loss)*

Table 7.4.3: Areas of perennial cropland in reporting years, comparing with areas of perennial cropland 30 years before.

Year	Area of perennial cropland		Year	Area of perennial cropland
	kha			kha
2010	48.379		1980	57.490
2009	49.812		1979	57.299
2008	51.245		1978	57.289
2007	52.678		1977	57.159
2006	54.111		1976	56.961
2005	55.544		1975	56.930
2004	56.977		1974	56.742
2003	58.409		1973	56.749
2002	59.842		1972	58.433
2001	61.275		1971	55.705
2000	62.708		1970	56.456
1999	64.141		1969	56.520
1998	65.574		1968	56.249
1997	67.007		1967	55.215
1996	68.439		1966	54.924
1995	69.872		1965	54.268
1994	71.305		1964	53.162
1993	72.738		1963	52.785
1992	74.171		1962	52.740
1991	75.604		1961	53.798
1990	77.036		1960	52.409
1989	78.469		1959	52.718
1988	79.902		1958	52.099
1987	81.335		1957	51.278
1986	82.768		1956	50.316

Values for the biomass accumulation rate (2.1 t C ha $^{-1}$ yr $^{-1}$) in perennial vegetation and biomass carbon loss (63.0 t C ha^{-1}) were adopted from Table 3.3.2 (GPG-LULUCF). The values for temperate climate were chosen as this is default regime applicable to Slovenia (Europe).

The observation period started in 1956 and the data were taken from SORS (Statistical office of the Republic of Slovenia). We have taken into account the 30 years rotation period for perennial cropland according to the same table mentioned above. We estimate that 3.33 % area per year of perennial cropland is harvested.

Perrenial cropland converted to annual cropland

The average annual land use change from perennial cropland to annual in the time period from 1986 to 2010 was 195 ha.

For the calculation of annual change in carbon stocks in living biomass of perrenial cropland converted to annual cropland the Tier 1/Tier 2 method was applied and equation 3.3.8 (GPG-LULUCF) was used.

(Equation 13)

*Annual change in biomass = annual area of converted land * ($L_{conversion} + \Delta C_{growth}$)*

$L_{conversion} = C_{after} - C_{before}$

C_{after} – carbon after conversion is 0
C_{before} – IPCC default value for carbon stock in wood biomass before is 63.0 t C ha^{-1}
ΔC_{growth} – IPCC default value for annual crops carbon accumulation rate 5.0 t C ha^{-1}

Value for the annual crops carbon accumulation rate (ΔC_{growth} = 5.0 t C ha $^{-1}$ yr $^{-1}$) was adopted from Table 3.3.8 (GPG-LULUCF) and value for carbon stock in wood biomass before conversion (C_{before} = 63.0 t C ha^{-1}) was adopted from Table 3.3.2 (GPG-LULUCF). The values for temperate climate were chosen as this is default regime applicable to Slovenia (Europe).

Annual cropland converted to perennial cropland

The average of annual land use change from annual cropland to perennial in the time period from 1986 to 2010 was 396 ha.

For the calculation of annual change in carbon stocks in living biomass of annual cropland converted to perrenial cropland the Tier 1/Tier 2 method was applied and equation 3.3.8 (GPG-LULUCF) was used.

(Equation 14)

*Annual change in biomass = annual area of converted land * ($L_{conversion} + \Delta C_{growth}$)*

$L_{conversion} = C_{after} - C_{before}$
C_{after} – carbon after conversion is 0
C_{before} – IPCC default value for carbon stock in biomass before is 5.0 t C ha^{-1}
ΔC_{growth} – IPCC default value for perrenial crops carbon accumulation rate 2.1 t C ha^{-1}

Value for the perrenial crops carbon accumulation rate (ΔC_{growth} = 2.1 t C ha $^{-1}$ yr $^{-1}$) was adopted from Table 3.3.8 (GPG-LULUCF) and value for carbon stock in annual crops biomass before conversion (C_{before} = 5.0 t C ha^{-1}) was adopted from Table 3.3.8 (GPG-LULUCF). The values for temperate climate were chosen as this is default regime applicable to Slovenia (Europe).

Carbon stock changes in soils

Mineral soils

Emissions were estimated applying the Tier1/Tier 2 methodology and equation 3.3.3 (GPG-LULUCF) was used.

$$\Delta C_{CC\,min\,eral} \frac{[SOC_0 - SOC_{0-T}) * A]}{T} \qquad \text{(Equation 15)}$$

$\Delta C_{CCmineral}$ – annual change in carbon stock in mineral soils [t C yr^{-1}]
SOC_0 – soil organic carbon stock in the inventory year [t C ha^{-1}]
SOC_{0-T} – soil organic carbon stock T years prior to the inventory [t C ha^{-1}]
T – time [default 20 years]
A – land area [ha]

$$SOC = SOC_{30} * F_{LU} * F_{MG} * F_I$$

SOC_{30} – Slovenian national value for organic carbon stock in mineral soil for cropland
F_{LU}; F_{MG}; F_I – relative stock change factors from GPG - LULUCF

Values for relative stock change factors (F_{LU}; F_{MG}; F_I) were adopted from Table 3.3.4 (GPG-LULUCF). Values for relative stock change factors: F_{LU} = 0.71 (land use, long term cultivated, temperate, wet); F_{MG} = 1.09 (tillage, reduced, temperate, wet) and F_I = 1.11 (input, high – without manure, temperate and tropical, wet).

Slovenian national value for organic carbon stock in mineral soil for cropland (cropland annual: SOC_{30} = 100 t/ha; cropland perrenial: SOC_{30} = 68 t/ha) are presented in Table 7.2.9.

Organic soils

Total area of organic soils in cropland category in year 2010 was 6,884 ha. The expert judgement is that areas of arable land on organic soils are constant from 1995 till 2006 and will be further on (Agricultural institute of Slovenia, 2006).

For calculations emissions from organic soil Tier 1/Tier 2 methodology and equation 3.3.5 from GPG-LULUCF was used:

$$\Delta C = \sum (A * EF) \qquad \text{(Equation 16)}$$

A – land area of organic soils
EF – emission factor for climate type (10 t ha^{-1})

Emission factor (EF = 10 t ha^{-1}) for warm temperate climatic temperature regime) from Table 3.3.5 (GPG-LULUCF) was adopted.

Liming

For calculations of emissions due to liming Tier 1 methodology and equation 3.3.6 (GPG-LULUCF) were used.

$$\Delta C_{lime} = M_{limestone} * EF_{limestone} + M_{dolomite} * EF_{dolomite} \quad \textbf{(Equation 17)}$$

ΔC_{lime} – annual C emissions from agricultural lime application [t C yr^{-1}]
M – the annual amount of calic limestone or dolomite [t yr^{-1}]
EF – emission factor (default value 0.12)

According to expert judgement in time period 1986 and 1996 on average 100.000 Mg per year of calcic limestone ($CaCO_3$) or dolomite ($CaMg(CO_3)_2$) were used in Slovenia for liming. Default emission factor (EF = 0.12) was adopted.

7.4.2.2 Land converted to cropland

The average annual area converted from other land uses to cropland is 5,037 ha. Conversions from forest land to cropland and grassland to cropland appear. According to expert judgement there are no conversions from wetland, settlements and other land to cropland. Due to necessary assurance for Slovenian land area consistency through whole time series, also conversions from wetland, settlements, other land to cropland are included in land use change matrix.

The average annual area converted from forest land to cropland is 840 ha (to cropland annual: 86 ha; to cropland perrenial: 754 ha). The average annual area converted from grassland to cropland is 3,618 ha (to cropland annual: 1,967 ha; to cropland perrenial: 1,651 ha).

Carbon stock changes in living biomass

For the calculations of the annual change in carbon stocks in living biomass on land converted to cropland the Tier1/Tier2 methoholody and equation 3.3.8 (GPG-LULUCF) were used.

(Equation 18)

*Annual change in biomass = annual area of converted land * ($L_{conversion} + \Delta C_{growth}$)*

$L_{conversion} = C_{after} - C_{before}$

ΔC_{growth} – IPCC default value for carbon accumulation rate
accumulation rates: annual crops is 5.0 t C ha^{-1}, perennial crops is 2.1 t C ha^{-1}
C_{after} – carbon after conversion is 0
C_{before} – growing stock (forest land), biomass carobn stocks (grassland)

Values for the perrenial crops carbon accumulation rate (ΔC_{growth} = 2.1 t C ha^{-1}) and for the annual crops accumulation rate (ΔC_{growth} = 5.0 t C ha^{-1}) were adopted from Table 3.3.8 (GPG-LULUCF). The growing stock in forest land (C_{before}) is represented in Table 7.3.3. Value for grassland biomass carbon stocks (C_{before} = 13.5 t C ha^{-1}, warm temperate, wet) was adopted from Table 3.4.9 (GPG-LULUCF).

Carbon stock changes in dead organic matter

Carbon stock changes in dead organic matter were calculated for dead wood and litter pool in conversion from forest land to cropland. The following equation was used.

$$\Delta C_{LC_{DOM}} = \Delta C_{LC_{DW}} + \Delta C_{LC_{LT}} \quad \textbf{(Equation 19)}$$

$\Delta C_{LC_{DOM}}$ – **annual change in carbon stocks in dead organic matter [t C yr $^{-1}$]**

$\Delta C_{LC_{DW}}$ – **change in carbon stocks in dead wood [t C yr $^{-1}$]**

$\Delta C_{LC_{LT}}$ – **change in carbon stocks in litter [t C yr $^{-1}$]**

For calculations of annual change in carbon stocks in dead wood the following equation was used:

(Equation 20)

$\Delta C_{LC_{DW}}$ = *annual area of converted land* * $L_{conversion}$

$L_{conversion} = C_{after} - C_{before}$

C_{after} – *carbon after conversion is 0*
C_{before} – *carbon stock in dead wood [t C ha^{-1}]*

Values for carbon stock in dead wood (C_{before}) were calculated from NFI 2007 data (5.69 % of growing stock).

For calculations of annual change in carbon stocks in litter the following equation was used:

$\Delta C_{LC_{LT}}$ = *annual area of converted land* * $L_{conversion}$

$L_{conversion} = C_{after} - C_{before}$
C_{after} – *carbon after conversion is 0*
C_{before} – *carbon stock in liiter [t C ha^{-1}]*

Value for carbon stock in litter (C_{before} = 5.6 t C ha^{-1}) was used from Slovenian Forestry Institute Research study (Kobal M., Simoncic P., 2008).

Carbon stock changes in soils

Mineral soils

For calculations of emissions from soils in land converted to cropland Tier 2 methodology and equation 3.3.3 (GPG-LULUCF) were used.

$$\Delta C_{LC\,\text{min}\,eral} \frac{[SOC_0 - SOC_{0-T}) * A]}{T} \quad \text{(Equation 21)}$$

$\Delta C_{LCmineral}$ – annual change in carbon stock in mineral soils [t C yr^{-1}]
SOC_0 – soil organic carbon stock in the inventory year [t C ha^{-1}]
SOC_{0-T} – soil organic carbon stock T years prior to the inventory [t C ha^{-1}]
T – time [default 20 years]
A – land area [ha]

$$SOC = SOC_{30} * F_{LU} * F_{MG} * F_I$$

SOC_{30} – Slovenian national value for organic carbon stock in mineral soil
F_{LU}; F_{MG}; F_I – relative stock change factors from GPG - LULUCF

Country specific value for organic carbon stock in cropland SOC_0 (SOC_{30} = 100 t C ha^{-1} for annual cropland; SOC_{30} = 68 t C ha^{-1} for perrenial cropland) was determined from national soil profiles data. Also values for soil organic stock of previous land uses (SOC_{0-T}: grassland = 107 t C ha^{-1}, forest land = 105 t C ha^{-1},) were calculated and used in calculations.

Values for relative stock change factors (F_{LU}; F_{MG}; F_I) were adopted from Table 3.3.4 (GPG-LULUCF). Values for relative stock change factors: F_{LU} = 0.71 (land use, long term cultivated, temperate, wet); F_{MG} = 1.00 (tillage, full, temperate, dry and wet) and F_I = 1.00 (input, medium, temperate, dry and wet).

Organic soils

N_2O emissions in soils of land converted to cropland

For calculations of N_2O emmisions associated with land conversion to cropland Tier 1 methodology and equations 3.3.14 and 3.3.15 (GPG-LULUCF) were used.

$$N_2O - N_{conv} = N_2O_{net-min} - N$$

(Equation 22)

$$N_2O_{net-min} - N = EF_1 * N_{net-min}$$

N_2O-N_{conv} – N_2O emissions as a result of the disturbance associated with land-use conversion of forest land, grassland, or other land to cropland, [kg N_2O-N yr^{-1}]

$N_{net-min}$ – N released annually by net soil organic matter mineralisation as a result of the disturbance, [kg N yr^{-1}]

EF_1 – IPCC default emission factor used to calculate emissions from agricultural land caused by added N, whether in the form of mineral fertilisers, manures, or crop residues, [kg N_2O-N/kg N]. (The default value is 0.0125 kg N_2O-N/kg N)

$$N_{net-min} = \Delta C_{LC\,min\,eral} * 1/C : N_{ratio}$$

(Equation 23)

$$N_{net-min} = \Delta C_{LC\ min\ eral} * 1/C : N_{ratio}$$ **(Equation 24)**

$N_{net-min}$ – annual N released by net soil organic matter mineralisation as a result of the disturbance, [kg N yr^{-1}]

$\Delta C_{LCmineral}$ – annual carbon stock change in soils (land converted to cropland)[kg C yr^{-1}]

C:N ratio – the ratio by mass of C to N in the soil organic matter (SOM),[kg C (kg N)$^{-1}$]

According to expert judgement the C/N ratio in mineral soil organic matter was assumed to be 15.6. Values for annual carbon stock change in soils ($\Delta C_{LCmineral}$) were taken from calculations of carbon stock changes in soils for land (forest land and grassland) converted to cropland. For emission factor (EF_1), the default value (0.0125 kg N_2O-N/kg N) was used.

The average annual emissions of N_2O from land converted to cropland were 0.271 Gg N_2O.

Table 7.4.4: Areas of grassland and forestland converted to cropland (annual, perennial) and N2O emissions.

	from forest land		from grassland		sum	
	ha	t N2O-N / yr	ha	t N2O-N /yr	ha	t N2O-N / yr
to cropland annual	86	5.9	1,967	116.0	2,053	121.9
to cropland perennial	754	51.4	1,651	97.3	2,404	148.7
to cropland	840	57.3	3,618	213.3	4,458	270.6

7.4.3 Uncertainties and time-series consistency

Uncertainties can be analysed as uncertainty in activity data and uncertainty in variables such as emission factors, growth rates, effect of land management factors etc. It is the uncertainty in the IPCC default variables that dominates the overall uncertainty in the estimated provided by Slovenia.

The following uncertainties for 2010 were estimated. They are based on uncertainly values for IPCC default values taken from the IPCC-GPG (for the most sources these default values were used) and on expert judgement.

Variable		Uncertainty (95% CI)
Uncertainty in cropland remaining cropland		
Uncertainty in biomass accumulation rates		± 75 % (GPG-LULUCF table 3.3.2)
Uncertainty from land converted to cropland		
Carbon stocks in previous land use	Grassland	± 75 %; ± 95 %(GPG-LULUCF table 3.4.2; 3.4.3)
	Forestland	
Estimated uncertainty in land managed factors		± 12 % (GPG-LULUCF table 3.3.4)

7.4.4 Category-specific QA/QC and verification

No specific QA/QC and verification was used for cropland.

7.4.5 Category-specific recalculations

No recalculations were made for this category.

7.4.6 Source-specific planned improvements

Data about organic soils will be reviewed and synchronized with data for Agricultural sector. Also the better information about liming is in progress. Missing national uncertainties will be estimated and reported.

7.5 Grassland (5C)

7.5.1 Source category description

Grassland category includes CO_2 emissions from changes in carbon stock in living biomass and in soils. Carbon stock changes are reported in Grassland remaining grassland and in Land converted to grassland. CO_2 emissions from agricultural lime application are included in cropland category.

Table 7.5.1: Activity data for grassland in 1986 – 2010 in ha.

Year	5.C. Total Grassland	5.C. Organic soil	5.C.1. Grassland remaining Grassland	5.C.2. Land converted to Grassland[12]	5.C.2.1 Forest Land converted to Grassland	5.C.2.2 Cropland converted to Grassland	5.C.2.3 Wetlands converted to Grassland	5.C.2.4 Settlements converted to Grassland	5.C.2.5 Other Land converted to Grassland
	kha	kha	kha	kha	kha	kha	kha	kha	kha
2010	407.817	IE	397.992	9.825	1.982	5.831	0.203	1.163	0.647
2009	403.542	IE	393.717	9.825	1.982	5.831	0.203	1.163	0.647
2008	399.267	IE	389.442	9.825	1.982	5.831	0.203	1.163	0.647
2007	394.992	IE	385.167	9.825	1.982	5.831	0.203	1.163	0.647
2006	390.717	IE	380.892	9.825	1.982	5.831	0.203	1.163	0.647
2005	386.441	IE	376.616	9.825	1.982	5.831	0.203	1.163	0.647
2004	382.166	IE	372.341	9.825	1.982	5.831	0.203	1.163	0.647
2003	377.891	IE	368.066	9.825	1.982	5.831	0.203	1.163	0.647
2002	373.616	IE	363.791	9.825	1.982	5.831	0.203	1.163	0.647
2001	369.341	IE	359.515	9.825	1.982	5.831	0.203	1.163	0.647
2000	365.065	IE	355.240	9.825	1.982	5.831	0.203	1.163	0.647
1999	360.790	IE	350.965	9.825	1.982	5.831	0.203	1.163	0.647
1998	356.515	IE	346.690	9.825	1.982	5.831	0.203	1.163	0.647
1997	352.240	IE	342.415	9.825	1.982	5.831	0.203	1.163	0.647
1996	347.964	IE	338.139	9.825	1.982	5.831	0.203	1.163	0.647
1995	343.689	IE	333.864	9.825	1.982	5.831	0.203	1.163	0.647
1994	339.414	IE	329.589	9.825	1.982	5.831	0.203	1.163	0.647
1993	335.139	IE	325.314	9.825	1.982	5.831	0.203	1.163	0.647
1992	330.864	IE	321.039	9.825	1.982	5.831	0.203	1.163	0.647
1991	326.588	IE	316.763	9.825	1.982	5.831	0.203	1.163	0.647
1990	322.313	IE	312.488	9.825	1.982	5.831	0.203	1.163	0.647
1989	318.038	IE	308.213	9.825	1.982	5.831	0.203	1.163	0.647
1988	313.763	IE	303.938	9.825	1.982	5.831	0.203	1.163	0.647
1987	309.488	IE	299.662	9.825	1.982	5.831	0.203	1.163	0.647
1986	305.212	IE	295.387	9.825	1.982	5.831	0.203	1.163	0.647

Grassland covers 407,817 ha and that represents 20.1 % of country total area. Grassland land use includes: meadows and pastures, swampy meadows and pastures, alpine meadows, mixed land use (arable land and forest, small areas) and uncultivated agriculture land.
Area of organic soils in grassland is included in area of organic soils in cropland.

Table 7.5.2: Emission from grassland (1986 – 2010) in Gg CO2

Year	5.C. Total Grassland	5.C.1. Grassland remaining Grassland	5.C.2. Land converted to Grassland[12]	5.C.2.1 Forest Land converted to Grassland	5.C.2.2 Cropland converted to Grassland	5.C.2.3 Wetlands converted to Grassland	5.C.2.4 Settlements converted to Grassland	5.C.2.5 Other Land converted to Grassland
	Gg CO_2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2009	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2008	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2007	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2006	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2005	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2004	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2003	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2002	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2001	343.038	NE, IE	343.038	829.769	-527.419	NE	NO	NE
2000	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1999	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1998	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1997	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1996	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1995	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1994	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1993	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1992	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1991	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1990	222.213	NE, IE	222.213	708.944	-527.419	NE	NO	NE
1989	64.347	NE, IE	64.347	551.079	-527.419	NE	NO	NE
1988	64.347	NE, IE	64.347	551.079	-527.419	NE	NO	NE
1987	64.347	NE, IE	64.347	551.079	-527.419	NE	NO	NE
1986	64.347	NE, IE	64.347	551.079	-527.419	NE	NO	NE

Emissions from organic soils in grassland remaining grassland are included in emissions from organic soils in cropland.

CO_2 emissions in category grassland range from 64.3 Gg CO_2 (1986) to 343.0 Gg CO_2 (2010).

Land converted to grassland (CO_2) was identified as key source category. Grassland remaining grassland (CO_2) was not identified as key source category.

7.5.2 Methodological issues

7.5.2.1 Grassland remaining grassland

Carbon stock changes in living biomass

The Tier 1 assumption is no change in living biomass carbon stocks. The rational is that in grassland where management practices are static, biomass carbon stock will be in an approximate steady-state where carbon accumulation trough plant growth is roughly balanced by losses.

Carbon stock changes in soils

For calculations of carbon stock changes in soils in grassland remaining grassland, the equation 3.4.7 (GPG-LULUCF) was used.

$$\Delta C_{GGsoils} = \Delta C_{GG\,mineral} - \Delta C_{GGorganic} - \Delta C_{GG\,liming} \qquad \text{(Equation 25)}$$

$\Delta C_{GGsoils}$ - *annual change in carbon stocks in soil [t C yr $^{-1}$]*

$\Delta C_{GG\,mineral}$ - *annual change in carbon stocks in mineral soils [t C yr $^{-1}$]*

$\Delta C_{GGorganic}$ - *annual changes in carbon stocks in organic soils [t C yr $^{-1}$]*

$\Delta C_{GG\,liming}$ - *annual C emissions from lime application to grassland [t C yr $^{-1}$]*

Mineral soils

For calculations of annual carbon stock changes in mineral soils in grassland remaining grassland Tier 2 methodology and equation 3.4.8 (GPG-LULUCF) were used.

Due to the expert judgment it is assumed that there have been no change in grassland managment in the default period of 20 years. The equation includes relative stock change factor for land use (F_{LU}), for management regime (F_{MG}) and for input of organic matter (F_I) (Table 3.4.5 in GPG-LULUCF). Therefore for areas of grassland remaining grassland, the values for F_{MG}, F_I and F_{LU} are considered to be constant (F_{LU} = 1.00, all; F_{MG} = 1.00, nominally managed (non-degraded); F_I = 1.00, nominal) through whole time series. Consequently the calculation shows there is no net change in carbon stocks in soils.

Organic soils

Area of organic soils and emissions are presented together for cropland and grassland (in section cropland).

Liming

All information about liming in Slovenia is included under cropland category, because there are no separate data for lime application in cropland and grassland.

7.5.2.2 Land converted to grassland

The average annual area converted from other land uses to grassland is 9,825 ha. Conversions from forest land to grassland and cropland to grassland appear. According to expert judgement there are no conversions from wetland, settlements and other land to grassland. Due to necessary assurance for Slovenian land area consistency through whole time series, also conversions from wetland, settlements, other land to grassland are included in land use change matrix.

The average annual area converted from forest land to grassland is 1,982 ha. The average annual area converted from cropland to grassland is 5,831 ha (from cropland perrenial: 1,271 ha; from cropland annual: 4,560 ha).

Carbon stock changes in living biomass

For the calculations of the annual change in carbon stocks in living biomass on land converted to grassland the Tier 2 methoholody and equation 3.4.13 (GPG-LULUCF) were used.

(Equation 26)

*Annual change in biomass = annual area of converted land * ($L_{conversion} + \Delta C_{growth}$)*

$L_{conversion} = C_{after} - C_{before}$

ΔC_{growth} *– default value for carbon accumulation rate (1.7 t d.m. ha $^{-1}$, 0.85 t C ha^{-1})*
C_{after} *– carbon after conversion is 0*
C_{before} *– carbon stock (forest land), biomass carbon stocks (cropland)*

Values for the carbon accumulation rate (ΔC_{growth} = 0.85 t C ha $^{-1}$; 1.7 t d.m. ha^{-1} * 0.5) were adopted from Table 3.4.2 (GPG-LULUCF). The carbon stock in forest land (C_{before}) is represented in Table 7.3.3. Value for cropland biomass carbon stocks (C_{before} = 63.0 t C ha^{-1}, warm temperate, wet) was adopted from Table 3.3.2 (GPG-LULUCF).

Carbon stock changes in dead organic matter

Carbon stock changes in dead organic matter were calculated for dead wood and litter pool in conversion from forest land to grassland. The following equation was used.

$$\Delta C_{LG_{DOM}} = \Delta C_{LG_{DW}} + \Delta C_{LG_{LT}} \quad \textbf{(Equation 27)}$$

$\Delta C_{LG_{DOM}}$ – **annual change in carbon stocks in dead organic matter [t C yr^{-1}]**

$\Delta C_{LG_{DW}}$ – **change in carbon stocks in dead wood [t C yr^{-1}]**

$\Delta C_{LG_{LT}}$ – **change in carbon stocks in litter [t C yr^{-1}]**

For calculations of annual change in carbon stocks in dead wood the following equation was used:

(Equation 28)

$\Delta C_{LG_{DW}}$ = *annual area of converted land* * $L_{conversion}$

$L_{conversion} = C_{after} - C_{before}$

C_{after} – *carbon after conversion is 0*
C_{before} – *carbon stock in dead wood [t C ha^{-1}]*

Values for carbon stock in dead wood (C_{before}) were calculated from NFI 2007 data (5.69 % of growing stock).

For calculations of annual change in carbon stocks in litter the following equation was used:

$\Delta C_{LG_{LT}}$ = *annual area of converted land* * $L_{conversion}$

$L_{conversion} = C_{after} - C_{before}$
C_{after} – *carbon after conversion is 0*
C_{before} – *carbon stock in liiter [t C ha^{-1}]*

Value for carbon stock in litter (C_{before} = 5.6 t C ha^{-1}) was used from Slovenian Forestry Institute Research study (Kobal M., Simoncic P., 2008).

Carbon stock changes in soils

For calculations of emissions from soils in land converted to grassland Tier 2 methodology and equation 3.3.3 (GPG-LULUCF) were used.

$$\Delta C_{LG\,mineral} \frac{[SOC_0 - SOC_{0-T}) * A]}{T}$$ (Equation 29)

$\Delta C_{LGmineral}$ – *annual change in carbon stock in mineral soils [t C yr^{-1}]*
SOC_0 – *soil organic carbon stock in the inventory year [t C ha^{-1}]*
SOC_{0-T} – *soil organic carbon stock T years prior to the inventory [t C ha^{-1}]*
T – time [default 20 years]
A – land area [ha]

$SOC = SOC_{30} * F_{LU} * F_{MG} * F_I$

SOC_{30} – *Slovenian national value for organic carbon stock in mineral soil*
F_{LU}; F_{MG}; F_I – *relative stock change factors from GPG - LULUCF*

Country specific value for organic carbon stock in grassland SOC_0 (SOC_{30} = 107 t C ha^{-1} for grassland) was determined from national soil profiles data. Also values for soil organic stock of previous land uses (SOC_{0-T} = 100 t C ha^{-1} for annual cropland; SOC_{30} = 68 t C ha^{-1} for perrenial cropland, SOC_{0-T} = 105 t C ha^{-1}for forest land) were calculated and used in calculations.

Values for relative stock change factors (F_{LU}; F_{MG}; F_I) were adopted from Table 3.4.10 (GPG-LULUCF). Default values for relative stock change factors in forest land are F_{LU} = 1.00; F_{MG} = 1.00; F_I = 1.00. Values for relative stock change factors in cropland: F_{LU} = 0.71

(land use, long term cultivated, temperate, wet); F_{MG} = 1,09 (tillage, reduced, temperate, wet) and F_I = 1.11 (input, high without manure, temperate and tropical, wet) adopted from Table 3.3.4.

7.5.3 Uncertainties and time-series consistency

The following uncertainties for 2010 were estimated. They are based on uncertainly values for IPCC default values taken from the IPCC-GPG (for the most sources these default values were used) and on expert judgement.

Variable		Uncertainty (95% CI)
Uncertainty in grassland remaining grassland		
Uncertainty in biomass accumulation rates		± 75 % (GPG-LULUCF table 3.4.2)
Uncertainty from land converted to grassland		
Carbon stocks in previous land use	Cropland	± 75 % (GPG-LULUCF table 3.3.2)
	Forestland	
Uncertainty total non woody biomass		± 75 % (GPG-LULUCF table 3.4.9)
Estimated uncertainty in land managed factors		± 12 % (GPG-LULUCF table 3.3.4)

7.5.4 Category-specific QA/QC and verification

No specific QA/QC and verification was used for grassland.

7.5.5 Category-specific recalculations

No recalculations in this chapter were made.

7.5.6 Source-specific planned improvements

Missing uncertainties will be estimated and reported.
Data about organic soils will be reviewed and synchronized with data for Agricultural sector.

7.6 Wetlands (5D)

7.6.1 Source category description

Wetlands are defined (GPG-LULUCF) as land that is covered or saturated by water for all or part of the year and that does not fall into the forestland, cropland, grassland or settlements categories. Emissions in Wetlands remaining wetlands are not estimated, conversions from other land uses to wetlands do not occur in Slovenia.

Wetland covers 13,544 ha and that represents 0.7 % of country total area. Wetland land use includes: swamps, reeds, other marshy areas and waters (inland water bodies).

Table 7.6.1: Activity data of wetland 1986 – 2010 in ha

Year	5.D Total wetland	5.D.1 Wetland remaining wetland	Land converted to wetland					
			5.D.2 Land converted to wetland	5.D.2.1 Forest converted to wetland	5.D.2.2 Cropland converted to wetland	5.D.2.3 Grassland converted to	5.D.2.4 Settlements converted to	5.D.2.5 Other land converted to wetland
	kha	kha	kha	kha	kha	kha	kha	kha
2010	13.440	13.121	0.319	0.082	0.084	0.111	0.031	0.010
2009	13.544	13.225	0.319	0.082	0.084	0.111	0.031	0.010
2008	13.648	13.329	0.319	0.082	0.084	0.111	0.031	0.010
2007	13.752	13.433	0.319	0.082	0.084	0.111	0.031	0.010
2006	13.856	13.537	0.319	0.082	0.084	0.111	0.031	0.010
2005	13.961	13.641	0.319	0.082	0.084	0.111	0.031	0.010
2004	14.065	13.746	0.319	0.082	0.084	0.111	0.031	0.010
2003	14.169	13.850	0.319	0.082	0.084	0.111	0.031	0.010
2002	14.273	13.954	0.319	0.082	0.084	0.111	0.031	0.010
2001	14.377	14.058	0.319	0.082	0.084	0.111	0.031	0.010
2000	14.481	14.162	0.319	0.082	0.084	0.111	0.031	0.010
1999	14.586	14.266	0.319	0.082	0.084	0.111	0.031	0.010
1998	14.690	14.371	0.319	0.082	0.084	0.111	0.031	0.010
1997	14.794	14.475	0.319	0.082	0.084	0.111	0.031	0.010
1996	14.898	14.579	0.319	0.082	0.084	0.111	0.031	0.010
1995	15.002	14.683	0.319	0.082	0.084	0.111	0.031	0.010
1994	15.107	14.787	0.319	0.082	0.084	0.111	0.031	0.010
1993	15.211	14.892	0.319	0.082	0.084	0.111	0.031	0.010
1992	15.315	14.996	0.319	0.082	0.084	0.111	0.031	0.010
1991	15.419	15.100	0.319	0.082	0.084	0.111	0.031	0.010
1990	15.523	15.204	0.319	0.082	0.084	0.111	0.031	0.010
1989	15.627	15.308	0.319	0.082	0.084	0.111	0.031	0.010
1988	15.732	15.412	0.319	0.082	0.084	0.111	0.031	0.010
1987	15.836	15.517	0.319	0.082	0.084	0.111	0.031	0.010
1986	15.940	15.621	0.319	0.082	0.084	0.111	0.031	0.010

Table 7.6.2: Emission from wetlands (1986 – 2010) in Gg CO2

Year	5.D Total wetland	5.D.1 Wetland remaining wetland	Land converted to wetland					
			5.D.2 Land converted to wetland	5.D.2.1 Forest converted to wetland	5.D.2.2 Cropland converted to wetland	5.D.2.3 Grassland converted to grassland	5.D.2.4 Settlements converted to wetland	5.D.2.5 Other land converted to wetland
	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	NE, NO	NE	NO	NO	NO	NO	NO	NO
2009	NE, NO	NE	NO	NO	NO	NO	NO	NO
2008	NE, NO	NE	NO	NO	NO	NO	NO	NO
2007	NE, NO	NE	NO	NO	NO	NO	NO	NO
2006	NE, NO	NE	NO	NO	NO	NO	NO	NO
2005	NE, NO	NE	NO	NO	NO	NO	NO	NO
2004	NE, NO	NE	NO	NO	NO	NO	NO	NO
2003	NE, NO	NE	NO	NO	NO	NO	NO	NO
2002	NE, NO	NE	NO	NO	NO	NO	NO	NO
2001	NE, NO	NE	NO	NO	NO	NO	NO	NO
2000	NE, NO	NE	NO	NO	NO	NO	NO	NO
1999	NE, NO	NE	NO	NO	NO	NO	NO	NO
1998	NE, NO	NE	NO	NO	NO	NO	NO	NO
1997	NE, NO	NE	NO	NO	NO	NO	NO	NO
1996	NE, NO	NE	NO	NO	NO	NO	NO	NO
1995	NE, NO	NE	NO	NO	NO	NO	NO	NO
1994	NE, NO	NE	NO	NO	NO	NO	NO	NO
1993	NE, NO	NE	NO	NO	NO	NO	NO	NO
1992	NE, NO	NE	NO	NO	NO	NO	NO	NO
1991	NE, NO	NE	NO	NO	NO	NO	NO	NO
1990	NE, NO	NE	NO	NO	NO	NO	NO	NO
1989	NE, NO	NE	NO	NO	NO	NO	NO	NO
1988	NE, NO	NE	NO	NO	NO	NO	NO	NO
1987	NE, NO	NE	NO	NO	NO	NO	NO	NO
1986	NE, NO	NE	NO	NO	NO	NO	NO	NO

7.6.2 Methodological issues

7.6.2.1 Wetland remaining wetlands

A methodology for this category is not covered in GPG-LULUCF but is addressed in Appendix 3A.3 Wetlands remaining wetlands: Basic for future methodological development. Slovenia has not reported emissions from wetlands due to lack of data.

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7.6.2.2 Land converted to wetlands

According to expert judgement there are no conversions from other land uses to wetlands. Due to necessary assurance for Slovenian land area consistency through whole time series, also conversions from forest land, cropland, grassland, settlements and other land to wetlands are included in land use change matrix.

7.6.3 Uncertainties and time-series consistency

The uncertainty estimates are not reported here.

7.6.4 Category-specific QA/QC and verification

No specific QA/QC and verification was used for wetland.

7.6.5 Category-specific recalculations

There are no recalculations for this category.

7.6.6 Source-specific planned improvements

No specific improvements are planned for wetland.

7.7 Settlements (5E)

7.7.1 Source category description

This land use category is described (GPG-LULUCF) as including all development land, including transportation infrastructure and human settlements of any size, unless they are already included under other land use categories. Settlements includes trees grown along streets, in public and private gardens, and different kinds of parks and green areas, if they are included to urban area.

Settlements cover 112,836 ha and that represents 5.6 % of country total area. Settlements land use includes: built-areas and related surfaces.

Table 7.7.1: Activity data of settlements in ha (1986-2010)

Year	5.E Total settlement	5.E.1. Settlements remaining settlements	Land converted to settlements					
			5.E.2 Land converted to settlement	5.E.2.1 Forest converted to settlement	5.E.2.2 Cropland converted to settlement	5.E.2.3 Grassland converted to settlement	5.E.2.4 Wetland converted to settlement	5.E.2.5 Other lands converted to settlement
	kha	kha	kha	kha	kha	kha	kha	kha
2010	112.836	109.661	3.174	0.984	0.962	1.146	0.072	0.011
2009	111.407	108.233	3.174	0.984	0.962	1.146	0.072	0.011
2008	109.978	106.804	3.174	0.984	0.962	1.146	0.072	0.011
2007	108.550	105.376	3.174	0.984	0.962	1.146	0.072	0.011
2006	107.121	103.947	3.174	0.984	0.962	1.146	0.072	0.011
2005	105.693	102.518	3.174	0.984	0.962	1.146	0.072	0.011
2004	104.264	101.090	3.174	0.984	0.962	1.146	0.072	0.011
2003	102.835	99.661	3.174	0.984	0.962	1.146	0.072	0.011
2002	101.407	98.233	3.174	0.984	0.962	1.146	0.072	0.011
2001	99.978	96.804	3.174	0.984	0.962	1.146	0.072	0.011
2000	98.550	95.376	3.174	0.984	0.962	1.146	0.072	0.011
1999	97.121	93.947	3.174	0.984	0.962	1.146	0.072	0.011
1998	95.693	92.518	3.174	0.984	0.962	1.146	0.072	0.011
1997	94.264	91.090	3.174	0.984	0.962	1.146	0.072	0.011
1996	92.835	89.661	3.174	0.984	0.962	1.146	0.072	0.011
1995	91.407	88.233	3.174	0.984	0.962	1.146	0.072	0.011
1994	89.978	86.804	3.174	0.984	0.962	1.146	0.072	0.011
1993	88.550	85.375	3.174	0.984	0.962	1.146	0.072	0.011
1992	87.121	83.947	3.174	0.984	0.962	1.146	0.072	0.011
1991	85.692	82.518	3.174	0.984	0.962	1.146	0.072	0.011
1990	84.264	81.090	3.174	0.984	0.962	1.146	0.072	0.011
1989	82.835	79.661	3.174	0.984	0.962	1.146	0.072	0.011
1988	81.407	78.233	3.174	0.984	0.962	1.146	0.072	0.011
1987	79.978	76.804	3.174	0.984	0.962	1.146	0.072	0.011
1986	78.549	75.375	3.174	0.984	0.962	1.146	0.072	0.011

Table 7.7.2: Emissions from settlements (1986– 2010) in Gg CO2

Year	5.E Total settlement	5.E.1. Settlements remaining settlements	Land converted to settlements					
			5.E.2 Land converted to settlement	5.E.2.1 Forest converted to settlement	5.E.2.2 Cropland converted to settlement	5.E.2.3 Grassland converted to settlement	5.E.2.4 Wetland converted to settlement	5.E.2.5 Other lands converted to settlement
	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2009	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2008	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2007	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2006	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2005	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2004	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2003	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2002	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2001	606.695	NE	606.695	444.578	133.754	28.363	NO	NO
2000	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1999	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1998	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1997	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1996	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1995	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1994	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1993	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1992	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1991	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1990	546.712	NE	546.712	384.595	133.754	28.363	NO	NO
1989	468.340	NE	468.340	306.224	133.754	28.363	NO	NO
1988	468.340	NE	468.340	306.224	133.754	28.363	NO	NO
1987	468.340	NE	468.340	306.224	133.754	28.363	NO	NO
1986	468.340	NE	468.340	306.224	133.754	28.363	NO	NO

CO_2 emissions in category settlements range from 468.3 Gg CO_2 (1986) to 606.7 Gg CO_2 (2010). Land converted to settlements (CO_2) was identified as key source category.

7.7.2 Methodological issues

7.7.2.1 Settlements remaining settlements

GPG-LULUCF provides a basic method for estimating CO_2 emissions/removals in settlements remaining settlements in Appendix 3A.4. The methods and available default data for this land use are preliminary and based on an estimation of changes in carbon

stocks per tree crown cower area or carbon stocks per number of trees as a removal factor. Data for calculations of emissions in settlements remaining settlements are not available in Slovenia.

7.7.2.2 Land converted to settlements

The average annual area converted from other land uses to settlements is 3,174 ha. The average annual area converted from forest land to settlements is 984 ha. The average annual area converted from cropland to settlements is 962 ha (from perrenial cropland: 402 ha and from annual cropland: 560 ha) and from grassland to settlements is 1,146 ha

According to expert judgement there are no conversions from wetlands and other land to settlements. Due to necessary assurance for Slovenian land area consistency through whole time series, also these conversions were included in land use change matrix.

The fundamental equation for estimating changes in carbon stocks associated with land use conversions is the same as applied for other areas of land use conversion (land converted to forest land, cropland or grassland). The default assumption for Tier 2 estimate is that all living biomass present before conversion to settlement will be lost in the same year as the conversion takes place, and that carbon stocks in living biomass following conversion are equal to zero.

For calculations of emissions from other land uses converted to settlements Tier 2 methodology and equation 3.6.1 (GPG- LULUCF) were used.

$$\Delta C_{FS_{LB}} = A * (C_{after} - C_{before}) \qquad \textbf{(Equation 30)}$$

ΔC_{FSLB} – annual change in carbon stocks in living biomass due to conversion of forest land to settlements [t C yr^{-1}]
A – area of land annualy converted [ha yr^{-1}]
C_{after} – carbon stocks in living biomass immediately following conversion to settlements [t C ha^{-1}]
C_{before} - carbon stocks in living biomass immediately before conversion to settlements [t C ha^{-1}]

7.7.3 Uncertainties and time-series consistency

The uncertainty estimates are not reported here.

7.7.4 Category-specific QA/QC and verification

No specific QA/QC and verification was used for settlements.

7.7.5 Category-specific recalculations

No recalculations were made for this category.

7.7.6 Category-specific planed improvements

No specific improvements are planned for settlements.

7.8 Other land (5F)

7.8.1 Source category description

Other land is defined (GPG-LULUCF) as including the bare soil, rock, ice and all unmanaged land areas which do not fall into any of other land use categories. This land use category is included to allow the total of identified land areas to match the national area.

Other land covers 26,240 ha and that represents 1.3 % of country total area. Other land includes: open areas with little or no vegetation and dried open areas with special vegetation.

Table 7.8.1: Activity data of other land in ha (1986-2010)

Year	5.F Other land	5.F.1. Other land remaining other land	Land converted to other land					
			5.F.2. Land converted to other land[1]	5.F.2.1 Forest Land converted to other land	5.F.2.2 Cropland converted to other land	5.F.2.3 Grassland converted to other land	5.F.2.4 Wetlands converted to other land	5.F.2.5 Settlements converted to other land
	kha	kha	kha	kha	kha	kha	kha	kha
2010	26.240	26.015	0.225	0.199	0.001	0.006	0.015	0.003
2009	27.198	26.973	0.225	0.199	0.001	0.006	0.015	0.003
2008	28.156	27.931	0.225	0.199	0.001	0.006	0.015	0.003
2007	29.114	28.889	0.225	0.199	0.001	0.006	0.015	0.003
2006	30.072	29.847	0.225	0.199	0.001	0.006	0.015	0.003
2005	31.030	30.806	0.225	0.199	0.001	0.006	0.015	0.003
2004	31.988	31.764	0.225	0.199	0.001	0.006	0.015	0.003
2003	32.946	32.722	0.225	0.199	0.001	0.006	0.015	0.003
2002	33.905	33.680	0.225	0.199	0.001	0.006	0.015	0.003
2001	34.863	34.638	0.225	0.199	0.001	0.006	0.015	0.003
2000	35.821	35.596	0.225	0.199	0.001	0.006	0.015	0.003
1999	36.779	36.554	0.225	0.199	0.001	0.006	0.015	0.003
1998	37.737	37.512	0.225	0.199	0.001	0.006	0.015	0.003
1997	38.695	38.470	0.225	0.199	0.001	0.006	0.015	0.003
1996	39.653	39.428	0.225	0.199	0.001	0.006	0.015	0.003
1995	40.611	40.386	0.225	0.199	0.001	0.006	0.015	0.003
1994	41.569	41.345	0.225	0.199	0.001	0.006	0.015	0.003
1993	42.527	42.303	0.225	0.199	0.001	0.006	0.015	0.003
1992	43.486	43.261	0.225	0.199	0.001	0.006	0.015	0.003
1991	44.444	44.219	0.225	0.199	0.001	0.006	0.015	0.003
1990	45.402	45.177	0.225	0.199	0.001	0.006	0.015	0.003
1989	46.360	46.135	0.225	0.199	0.001	0.006	0.015	0.003
1988	47.318	47.093	0.225	0.199	0.001	0.006	0.015	0.003
1987	48.276	48.051	0.225	0.199	0.001	0.006	0.015	0.003
1986	49.234	49.009	0.225	0.199	0.001	0.006	0.015	0.003

Table 7.8.2: Emissions from other land (1986–2010) in Gg CO2

Year	5.F Other land	5.F.1. Other land remaining other land	Land converted to other land					
			5.F.2. Land converted to other land[1]	5.F.2.1 Forest Land converted to other land	5.F.2.2 Cropland converted to other land	5.F.2.3 Grassland converted to other land	5.F.2.4 Wetlands converted to other land	5.F.2.5 Settlements converted to other land
	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2	Gg CO2
2010	NE, NO	NE	NO	NO	NO	NO	NO	NO
2009	NE, NO	NE	NO	NO	NO	NO	NO	NO
2008	NE, NO	NE	NO	NO	NO	NO	NO	NO
2007	NE, NO	NE	NO	NO	NO	NO	NO	NO
2006	NE, NO	NE	NO	NO	NO	NO	NO	NO
2005	NE, NO	NE	NO	NO	NO	NO	NO	NO
2004	NE, NO	NE	NO	NO	NO	NO	NO	NO
2003	NE, NO	NE	NO	NO	NO	NO	NO	NO
2002	NE, NO	NE	NO	NO	NO	NO	NO	NO
2001	NE, NO	NE	NO	NO	NO	NO	NO	NO
2000	NE, NO	NE	NO	NO	NO	NO	NO	NO
1999	NE, NO	NE	NO	NO	NO	NO	NO	NO
1998	NE, NO	NE	NO	NO	NO	NO	NO	NO
1997	NE, NO	NE	NO	NO	NO	NO	NO	NO
1996	NE, NO	NE	NO	NO	NO	NO	NO	NO
1995	NE, NO	NE	NO	NO	NO	NO	NO	NO
1994	NE, NO	NE	NO	NO	NO	NO	NO	NO
1993	NE, NO	NE	NO	NO	NO	NO	NO	NO
1992	NE, NO	NE	NO	NO	NO	NO	NO	NO
1991	NE, NO	NE	NO	NO	NO	NO	NO	NO
1990	NE, NO	NE	NO	NO	NO	NO	NO	NO
1989	NE, NO	NE	NO	NO	NO	NO	NO	NO
1988	NE, NO	NE	NO	NO	NO	NO	NO	NO
1987	NE, NO	NE	NO	NO	NO	NO	NO	NO
1986	NE, NO	NE	NO	NO	NO	NO	NO	NO

7.8.2 Methodological issues

7.8.2.1 Other land remaining other land

Consistent with the IPCC Guidelines, change in carbon stocks and non-CO_2 emissions and removals would not need to be assessed for the category of "Other land remaining Other land" assuming that it is typically managed. At present, no guidance can be given for "Other land" that is managed. "Other land" is included, however, for checking overall consistency of land area and tracking conversions to and from other land.

7.8.2.2 Land converted to other land

According to expert judgement there are no conversions from other land uses to other land. Due to necessary assurance for Slovenian land area consistency through whole time series, also conversions from forest land, cropland, grassland, settlements and wetlands to other land are included in land use change matrix.

7.8.3 Uncertainties and time-series consistency

The uncertainty estimates are not reported here.

7.8.4 Category-specific QA/QC and verification

No specific QA/QC and verification was used for other land.

7.8.5 Category-specific recalculations

There are no recalculations for this category.

7.8.6 Category-specific improvements

No specific improvements are planned for other land.

PART II: SUPPLEMENTARI INFORMATION UNDER ARTICLE 7, PARAGRAPH 1

11 KP-LULUCF

11.1 *General information*

Under Article 3, paragraph 3, of the Kyoto Protocol (KP), Slovenia reports emissions and removals from Deforestation (D), and uder Article 3, paragraph 4, Slovenia reports emissions and removals from Forest management (FM). The estimates for emissions and removals under Articles 3.3 and 3.4 are prepared and reported consistent with the IPCC GPG LULUCF 2003 and Decisions 15/CMP.1 and 16/CMP.1 of the Kyoto Protocol.

Emissions from Article 3.3 activity (D) in 2010 were 359.43 Gg CO_2 eq. The area subjected to D was 6.051 kha at the end of the third year of the commitment period.

Removals from Article 3.4 activity (FM) in 2010 were -10,307.99 Gg CO_2 eq.. The area subjected to FM was 1,185,169 ha at the end of the third year of the commitment period.

Table 11.1.1: Emissions from activities under Article 3.3 (Deforestation) in 1990 - 2010, Gg CO_2.

	Annual area	Total area	Living biomass	DOM	Soils	Total	N_2O
	kha	kha	Gg CO_2	Gg CO_2	Gg CO_2	Gg CO_2	kg N2O-N / yr
2010	0.724	6.051	300.17	27.33	25.79	356.86	10.34
2009	0.676	5.327	280.27	25.52	24.08	329.87	9.66
2008	0.309	4.652	127.00	11.55	8.73	147.28	3.47
2007	0.163	4.343	67.15	6.04	1.32	74.50	0.52
2006	0.240	4.180	97.63	8.80	0.31	106.74	0.12
2005	0.114	3.939	45.23	4.13	0.52	49.88	0.21
2004	0.211	3.825	81.72	7.54	0.96	90.23	0.38
2003	0.182	3.614	67.67	6.34	4.69	78.69	1.66
2002	0.279	3.432	75.14	7.05	0.51	82.71	0.18
2001	0.241	3.154	115.24	11.12	14.92	141.28	5.29
2000	0.190	2.913	65.98	6.49	3.70	76.17	1.47
1999	0.312	2.723	105.59	10.51	3.02	119.11	1.20
1998	0.228	2.411	75.16	7.62	3.25	86.04	1.30
1997	0.280	2.183	90.87	9.29	3.09	103.26	1.23
1996	0.248	1.903	78.02	8.14	3.83	89.99	1.53
1995	0.255	1.655	78.94	8.31	3.08	90.34	1.23
1994	0.399	1.400	121.09	12.90	4.11	138.10	1.64
1993	0.100	1.001	29.11	3.20	2.07	34.37	0.82
1992	0.100	0.901	28.41	3.17	2.07	33.65	0.82
1991	0.100	0.802	27.72	3.14	2.07	32.93	0.82
1990	0.702	0.702	193.34	21.92	7.41	222.68	2.95

Table 11.1.2: Emissions and removals from activities under Article 3.4 (Forest management) in 1990 - 2010, Gg CO_2.

	Area	Living biomass	DOM	Soils	Biomass burning	Total
	kha	Gg CO_2	Gg CO_2	Gg CO_2	Gg CO_2	Gg CO_2
2010	1,185.2	-9,851.70	-465.75	NA	8 31	-10,309.14
2009	1,186.1	-9,859.89	-466.14	NA	18.31	-10,307.72
2008	1,185.1	-9,854.96	-465.91	NA	7.45	-10,313.42
2007	1,183.3	-9,840.43	-465.22	NA	15.73	-10,289.92
2006	1,173.8	-9,761.56	-461.49	NA	160.12	-10,062.93
2005	1,169.2	-9,723.93	-459.71	NA	21.84	-10,161.80
2004	1,163.8	-9,678.34	-457.56	NA	11.57	-10,124.33
2003	1,157.8	-9,628.77	-455.21	NA	234.93	-9,849.05
2002	1,149.6	-9,559.84	-451.95	NA	11.19	-10,000.60
2001	1,142.9	-9,503.90	-449.31	NA	34.00	-9,919.21
2000	1,134.2	-8,211.19	-309.23	NA	17.18	-8,503.24
1999	1,115.7	-8,075.87	-304.14	NA	43.48	-8,336.53
1998	1,111.0	-8,042.77	-302.89	NA	96.00	-8,249.66
1997	1,109.7	-8,033.01	-302.52	NA	49.59	-8,285.94
1996	1,098.8	-7,954.57	-299.57	NA	30.80	-8,223.34
1995	1,097.9	-7,947.89	-299.32	NA	18.36	-8,228.85
1994	1,094.2	-7,919.85	-298.26	NA	NA	-8,218.11
1993	1,089.9	-7,890.89	-297.17	NA	NA	-8,188.06
1992	1,085.6	-7,859.75	-296.00	NA	36.50	-8,119.25
1991	1,081.3	-7,828.61	-294.83	NA	69.52	-8,053.92
1990	1,077.0	-7,793.11	-293.49	NA	66.65	-8,019.95

11.1.1 Definition of forest and any other criteria

Definition of forest: Land spanning more than 0,25 hectares with trees higher than 2 meters and canopy cover more than 30 percent, or trees able to reach these threshold *in situ.* It includes abandoned agricultural land on area more than 0.25 ha, which have been abandoned for more than 20 years, with minimal tree height 5.00 m and have a tree crown cover between up to 75 % are defined as forests.

Table 11.1.3: Elected values for forest parameters.

Parameter	range	Selected value
Minimum land area	0.05 -1 ha	0.25 ha
Minimum crown cover	10 - 30%	30%
Minimum tree height	2 – 5 m	2 m

Values of forest land areas under KP and under UNFCCC reporting are not completely comparable, due to methodological differences in data acquirements. Data of forest land areas in forest management plans (data for KP reporting) are updated annually for 1/10 of forest management units (10 years period cycle for whole country). Data of forest land

areas from land cover map (ALUM) of Ministry of Agriculture, Forestry and Food (data for UNFCCC reporting), represents land uses in specific year.

All land converted to forest land occurs through process of natural afforestation of abandoned agricultural lands. There was no human planting or seedling of forests in the specified time period. According to national policy it is also unlikely that this will occur in the future. Areas of land converted to forest land are included in areas under FM.

The selected threshold values are consistent with those values used in the reporting to the FAO and FRA 2005 forest definition. Differences of definitions are not relevant for final estimation of CO_2 sinks under Articles 3.3 and 3.4.

11.1.2 Elected activities under Article 3, paragraph 4, of the Kyoto Protocol

In accordance with Paragraph 6 of the Annex to Decision 16/CMP.1 Slovenia has decided to elect the activity Forest Management (FM) under Article 3.4 of the Kyoto Protocol, for inclusion in the accounting for the first commitment period.

For all forests fulfulling the definition of forest (**Napaka! Vira sklicevanja ni bilo mogoče najti.**11.0.2), forest management plans are prepared, regardless ownership, conservation degree or natural conditions. Also practically all these forests are used either for wood harvesting, protecting and protective purposes, recreation and/or to a greater or smaller extent for hunting and picking berries.

11.1.3 Description of how the definitions of each activity under Article 3.3 and each elected activity under Article 3.4 have been implemented and applied consistently over time

The information about the areas for activities under Articles 3.3. and 3.4 for time period 1990 – 1993 is adopted from annual reports of Statistical office of Republic of Slovenia (SORS). The needed data for time period 1994 – 2010 is adopted from Slovenia Forest Service (SFS) database. SFS will continue with providing data about areas for activities under Articles 3.3. and 3.4.

11.1.4 Description of precedence conditions and/or hierarchy among Article 3.4 activities, and how they have been consistently applied in determining how land was classified

Slovenia has elected to report forest management under Article 3.4 activities. Therefore there is no need to build up a hierarchy between forest management and other Article 3.4 activities. To ensure that the reported forest management activities have occurred on forest land, the total land area was classified into six land-use categories as for the UNFCCC reporting, and each land area was classified only under one land-use category.

11.2 Land-related information

11.2.1 Spatial assessment unit used for determining the area of the units of land under Article 3.3

The spatial assessment unit to determine the area of units of land under Article 3.3 is 0.25 ha, which is the same as the minimum area of the forest.

11.2.2 Methodology used to develop the land transition matrix

Table 11.2.1: Land transition matrix for 2008.

From previous inventory year (2007) \ To current inventory year (2008)		Article 3.3 activities		Article 3.4 activities				Other	Total area at the beginning of the current inventory year
		Afforestation and Reforestation	Deforestation	Forest Management (if elected)	Cropland Management (if elected)	Grazing Land Management (if elected)	Revegetation (if elected)		
		(kha)							
Article 3.3 activities	Afforestation and Reforestation	0.00	0.00						0.00
	Deforestation		4.34						4.34
Article 3.4 activities	Forest Management (if elected)		0.31	1,182.78					1,183.09
	Cropland Management (if elected)	NA	NA		NA	NA	NA		NA
	Grazing Land Management (if elected)	NA	NA		NA	NA	NA		NA
	Revegetation (if elected)	NA			NA	NA	NA		NA
Other		NA	NA	2.37	NA	NA	NA	837.50	839.87
Total area at the end of the current inventory year		0.00	4.65	1,185.15	NA	NA	NA	837.50	2,027.30

Annual and total areas under Articles 3.3 and 3.4 for Deforestation (D) and Forest management (FM) were adopted from Slovenia Forest Service (SFS) and Statistical Office of the Republic of Slovenia (SORS). Areas of D were subtracted from areas of FM. Areas of spontaneous expansion of forest were added from Other to FM.

Table 11.2.2: Land transition matrix for 2009.

From previous inventory year (2008) \ To current inventory year (2009)		Article 3.3 activities		Article 3.4 activities				Other	Total area at the beginning of the current inventory year
		Afforestation and Reforestation	Deforestation	Forest Management (if elected)	Cropland Management (if elected)	Grazing Land Management (if elected)	Revegetation (if elected)		
		(kha)							
Article 3.3 activities	Afforestation and Reforestation	0.00	0.00						0.00
	Deforestation		4.65						4.65
Article 3.4 activities	Forest Management (if elected)		0.68	1,184.47					1,185.15
	Cropland Management (if elected)	NA	NA		NA	NA	NA		NA
	Grazing Land Management (if elected)	NA	NA		NA	NA	NA		NA
	Revegetation (if elected)	NA			NA	NA	NA		NA
Other		NA	NA	1.63	NA	NA	NA	835.87	837.50
Total area at the end of the current inventory year		0.00	5.33	1,186.10	NA	NA	NA	835.87	2,027.30

Table 11.2.3: Land transition matrix for 2010.

From previous inventory year (2009) \ To current inventory year (2010)		Article 3.3 activities		Article 3.4 activities				Other	Total area at the beginning of the current inventory year
		Afforestation and Reforestation	Deforestation	Forest Management (if elected)	Cropland Management (if elected)	Grazing Land Management (if elected)	Revegetation (if elected)		
		(kha)							
Article 3.3 activities	Afforestation and Reforestation	0.00	0.00						0.00
	Deforestation		5.33						5.33
Article 3.4 activities	Forest Management (if elected)		0.72	1,188.17					1,185.89
	Cropland Management (if elected)	NA	NA		NA	NA	NA		NA
	Grazing Land Management (if elected)	NA	NA		NA	NA	NA		NA
	Revegetation (if elected)	NA			NA	NA	NA		NA
Other		NA	NA	1.63	NA	NA	NA	836.08	836.08
Total area at the end of the current inventory year		0.00	6.05	1,185.17	NA	NA	NA	836.08	2,027.30

11.2.3 Maps and/or database to identify the geographical locations, and the system of identification codes for the geographical locations

Forestry spatial information system, managed by SFS, is based on stand level inventory for forest management purposes. Smallest spatial unit for forest management is compartment (2 – 5 ha). All data is georefferenced and can be aggregated to higher levels.

Due to strict environmental legislation at all conversions from forest, a permit from SFS is needed. Therefore, all areas converted from forests are documented in forestry spatial information system database and included in annual reports. Slovenian legislation forbids clear cutting as forest management practices. Deforestation activities occur mostly due to infrastructure projects (e.g. roads, housing areas, commercial areas ...).

Areas of spontaneous expansion of forest are annually documented in forestry spatial information system database for 1/10 of forest management units (10 years period cycle for whole country) and added to FM area and included in annual reports.

11.3 Activity-specific information

11.3.1 Methods for carbon stock change and GHG emission and removal estimates

11.3.1.1 Description of the methodologies and the underlying assumptions used

Methodological principles used for estimatons of carbon stock changes and greenhouse gas emissions/removals under Kyoto Protocol were the same as for estimations under UNFCCC reporting. Calculations were made in accordance with Good Practice Guidance for LULUCF (2003).

Under Article 3.3 activities (D) estimation of carbon stock changes in living biomass (above and belowground biomass), dead organic matter (dead wood, litter) and soils were made. Also calculations for N_2O emission from disturbance associated with conversion of forest land to cropland are presented below.

Main methodological approach for calculations of carbon stock change estimates during the commitment period was by determining the carbon stocks in all pools prior to and after deforestation event. Carbon stock after deforestation was assumed to be equal to zero. More detailed description of calculations for conversion of forest to other land uses were made in accordance to chapters 7.4.2.2 , 7.5.2.2 and 7.7.2.2.

Under Article 3.4 activities (FM) estimation of carbon stock changes in living biomass (above and belowground biomass), dead organic matter (dead wood, litter) and soils were made. Also calculations for N_2O emission from biomass burning are presented below.

Carbon stock changes in living biomass

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in living biomass in Forest land remaining Forest land are estimated by Tier 3, stock

change method. The method requires biomass carbon stock inventories at two points in time. Biomass change is the difference between the biomass at two points in time, divided by the number of years between the inventories. Data from national forest inventories (NFI), made in years 2000 and 2007, were used for our calculations.

Carbon stock changes in dead organic matter

In accordance with the decision tree provided in the GPG-LULUCF, carbon stock changes in dead organic matter in Forest land remaining Forest land are estimated by Tier 2.

For calculations of carbon stock changes in litter Tier 1 methodology was used. Under Tier 1, it is assumed thet the average transfer rate into the litter pool is equal to the transfer rate out of the litter pool, so the net change is zero. Results of our preliminary expertise for period 1996 – 2006 (Kobal M., Simoncic P., 2011), show relative stable carbon stocks in litter in forest land remaining forest land and confirm Tier 1 assumption.

Carbon stock changes in soils
In accordance with GPG-LULUCF, carbon stock changes in soils are estimated by Tier 1 methodology. Under Tier 1, it is assumed that when forest remains forest, the carbon stock in soil organic matter does not change, regardless of change in forest management, types, and disturbances regimes; in other words that the carbon stock in mineral soil remains constant so long as the land remains forest. Results of our preliminary expertise for period 1996 – 2006 (Kobal M., Simoncic P., 2011), show relative stable carbon stocks in forest soils and confirm Tier 1 assumption.

Emissions from Wildfires
As controlled burning is not allowed in Slovenia, all fires are assigned to "wildfires". It is assumed that all fires affected productive forests. The area of wildfires in Slovenia is very small, less than half percent in the year 2003, which was the most problematic year in the following period. For calculations the Tier 2 (country level estimated of area burned) was used and estimation of GHGs directly released in fires.

More detailed explanation about calculations are described in chapter 7.3.2 (7.3.2.1 Forest land remaining forest land and 7.3.2.2 Non-CO2 greenhouse gas emission).

11.3.1.2 Justification when omitting any carbon pool or GHG emissions and removals from activities under Article 3.3 and elected activities Article 3.4

For calculations of carbon stock changes in litter and soils Tier 1 methodology (GPG-LULUCF) was used. According to Tier 1 assumption, the net emissions/removals from litter and soils is balanced and therefore equal to zero. Results of our preliminary expertise for period 1996 – 2006 (Kobal M., Simoncic P., 2011), show relative stable carbon stocks in litter in forest land remaining forest land and confirm Tier 1 assumption. Estimates under FM for carbon stock changes in litter and soils were not reported.

Table 11.3.1: NIR 1, summary table.

Activity		Change in carbon pool reported					Greenhouse gas sources reported						
		Above-ground biomass	Below-ground biomass	Litter	Dead wood	Soil	Fertilization	Drainage of soils under forest management	Disturbance associated with land-use conversion to croplands	Liming	Biomass burning		
							N_2O	N_2O	N_2O	CO_2	CO_2	CH_4	N_2O
Article 3.3 activities	Afforestation and Reforestation	NO	NO	NO	NO	NO	NO			NO	NO	NO	NO
	Deforestation	R	R	R	R	R			R	NO	NO	NO	NO
Article 3.4 activities	Forest Management	R	R	NR	R	NR	NO	NO		NO	R	R	R
	Cropland Management	NA	NA	NA	NA	NA			NA	NA	NA	NA	NA
	Grazing Land Management	NA	NA	NA	NA	NA				NA	NA	NA	NA
	Revegetation	NA	NA	NA	NA	NA				NA	NA	NA	NA

11.3.1.3 Information on whether or not indirect and natural GHG emissions and removals have been factored out

Slovenia has not factored out emissions or removals from elevated carbon dioxide concentrations, indirect nitrogen deposition or the dynamic effects of age structure resulting from activities prior to 1 January 1990. The IPCC do not give methods for factoring out.

11.3.1.4 Changes in data and methods since the previous submission (recalculations)

Considering ERT revision report and recommendations data and methodologies were internally revised and recalculations were made.

11.3.1.5 Uncertainty estimates

The uncertainties for Article 3.4 have not been estimated separately for lands under FM. It was assumed that uncertainty estimates for forest land remaining forest land apply also for lands under FM (Section 7.3.3). The uncertanties for Article 3.3 activities have not been estimated seperately.

11.3.1.6 Information on other methodological issues

Slovenia has decided to account for the emissions and removals under Article 3, paragraphs 3 and 4 at the end of the commitment period. Slovenia will further develop the methods for area estimation as well the methods to estimate emissions and removals of greenhouse gases and their uncertainties. For that reason, the estimates presented in submissions for 2008, 2009, and 2010 may change for the final report of the commitment period.

National Forest Inventory (NFI) provides data about growing stock, dead organic matter and soils (in forest land). The argument for applying NFI data is that it is the only large scale sample plot based monitoring system in Slovenia that covers all forest land and gives reliable estimates for the living biomass and dead organic matter. It is also a system, which can produce the input data for the soil model.

11.3.1.7 For the purpose of accounting as required in paragraph 18 of the annex to draft decision -/CMP. 1 (Land use, land-use change and forestry) attached to decision 11/CP.7, an indication of the year of the onset of an activity, if after 2008.

No indication of an activity in this submission.

11.4 Article 3.3

11.4.1 Information that demonstrates that activities under Article 3.3 began on or after 1 January 1990 and before 31 December 2012 and are direct human-induced

All data for areas under Artilcles 3.3 were adopted from annual reports of SORS and SFS for time period 1990 – 2010.

Deforestation in Slovenia is human induced, because for all conversions of forest to other land uses have to be permitted by legal entities. Act of Forests (Section 2, paragraph 1) states: "A permit for a spatial intervention in accordance with regulations on regional planning shall be necessary for interventions in forests or a forest land. The Forest Service must give its agreement to the permit for a spatial intervention (clearing a forest)." Human induced Afforestation/Reforestation (AR) do not occur in Slovenia, because all land converted to forest land occurs through process of natural afforestation of abandoned agricultural lands. There was no human planting or seedling of forests in the specified time period. According to national policy it is also unlikely that this will occur in the first commitment period.

11.4.2 Information on how harvesting or forest disturbance that is followed by the re-establishment of forest is distinguished from deforestation

Extensive forest disturbances have been rare in Slovenia. If a large forest area is mainly or tottaly damaged, the legislation on prevention of insect and fungus disturbances binds owners to remove the rest of the damaged trees. After that, the reastablishment work should be started immediatelly if possible. That areas remain registrated as forest land in forestry spatial information system database.

11.4.3 Information on the size and geographical location of forest areas that have lost forest cover but which are not yet classified as deforested

All areas converted from forests are documented in forestry spatial information system database and are included in annual reports. Therefore, there are no forest areas without forest cover, which are not yet classified as deforested.

11.4.4 Emissions and removals from Deforestation

Deforestation was a net source in 2008, 2009 and in 2010. The net emissions from carbon stock changes were 144.93 Gg CO2 eq. (in 2008), 316.71 Gg CO2 eq. (in 2009) and 359.43 Gg CO2 eq. (2010).

11.5 Article 3.4

11.5.1 Information that demonstrates that activities under Article 3.4 have occurred since January 1990 and are human-induced

All data for areas under Articles 3.4 were adopted from annual reports of SORS and SFS for time period 1990 – 2010. All selected forest areas (for KP reporting) were at 1 January 1990 under FM activities, because Slovenia includes all these forests in forest management plans.

11.5.2 Information relating to Cropland Management, Grazing Land Management and Revegetation, if elected, for the base year

Slovenia has not elected Cropland Management, Grazing Land Management or Revegetation under Article 3.4.

11.5.3 Information relating to Forest Management:

All forests in Slovenia are considered managed, because forest management plans are prepared for all forests, regardless ownership, conservation degree or natural conditions.

Slovenian forests are part of sustainable and multipurpose management with the principles of environmental protection and natural values. Our main concerns are: permanent and optimal functioning of forest as ecosystems and implementation of all of their functions (productive, ecological and social) on a permanent basis.

11.5.4 Emissions and removals from Forest management

Forest management was a net sink in 2008, 2009 and in 2010. The net removals from carbon stock changes were -10,312.37 Gg CO2 eq. (in 2008), -10,305.14 Gg CO2 eq. (in 2009) and -10,307.99 Gg CO2 eq. (in 2010).

11.6 Other information

11.6.1 Key category analysis for Article 3.3 activities and any elected activities under Article 3.4

Key category analysis for KP-LULUCF was performed according to section 5.4 of the IPCC good practice guidance for LULUCF (IPCC 2003). The key categories, also reported in CRF table NIR.3, are CO_2 emissions from deforestation (conversion to grassland). CO_2 removals due to forest management is also a key category.

11.7 Information relating to Article 6

There are no Article 6 activities concerning the LULUCF sector in Slovenia.

11.8 Legal entities authorized to participate in mechanisms under Article 6, 12 and 17 of the Kyoto Protocol

In order to reduce GHG emissions installation operators may use up to 15,761 % of their issued allowances in the period 2008-2012.They can surrender emission reduction units (ERU) from the projects of joint investment (JI) and certified emission reductions (CER) from the projects of clean development mechanism (CDM).

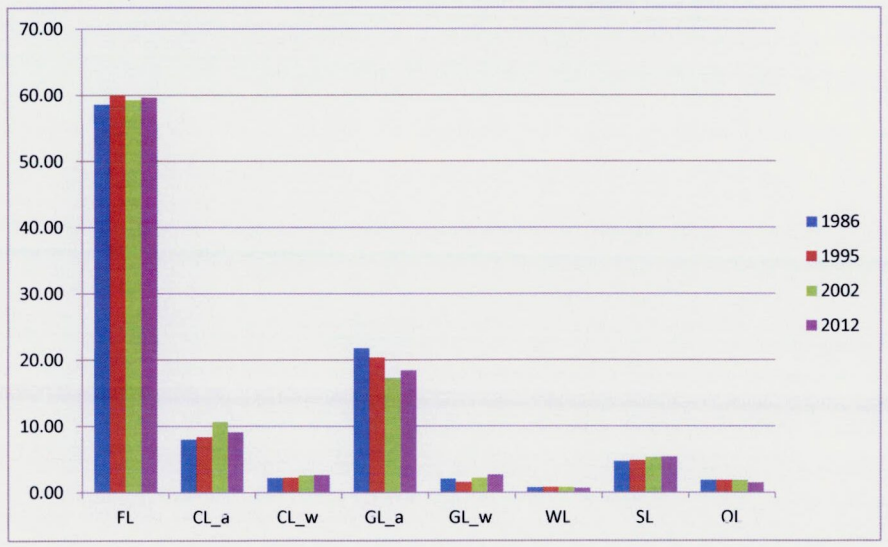
There is no project under Article 6, 12 or 17 of the Kyoto Protocol in Slovenia.

PRILOGA 11:

Študija: Izboljšanje metodologije in ažuriranje podatkov glede površin rabe tal in sprememb rab tal

		površina [ha]			
šifra LULUCF	kategorija LULUCF	1986	1995	2002	2012
10	FL	1188201	1216177	1201536	1209550
21	CL_a	162005	169231	216538	184412
22	CL_w	44860	45435	51977	52826
31	GL_a	441871	412986	350664	373550
32	GL_w	41357	31626	44264	53866
40	WL	15306	15793	15975	13762
50	SL	95654	98005	108300	109038
60	OL	38046	38046	38046	30296
	skupaj	2027300	2027300	2027300	2027300

		delež [%]			
šifra LULUCF	kategorija LULUCF	1986	1995	2002	2012
10	FL	58.61	59.99	59.27	59.66
21	CL_a	7.99	8.35	10.68	9.10
22	CL_w	2.21	2.24	2.56	2.61
31	GL_a	21.80	20.37	17.30	18.43
32	GL_w	2.04	1.56	2.18	2.66
40	WL	0.76	0.78	0.79	0.68
50	SL	4.72	4.83	5.34	5.38
60	OL	1.88	1.88	1.88	1.49
	skupaj	100.00	100.00	100.00	100.00



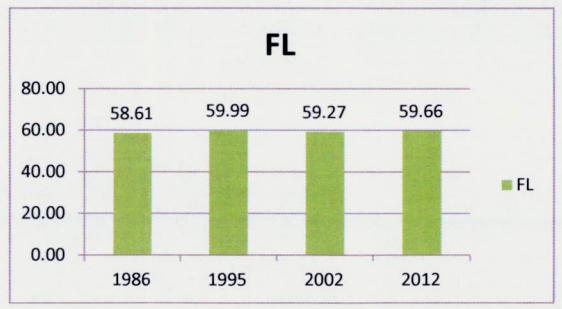
viri podatkov za površine

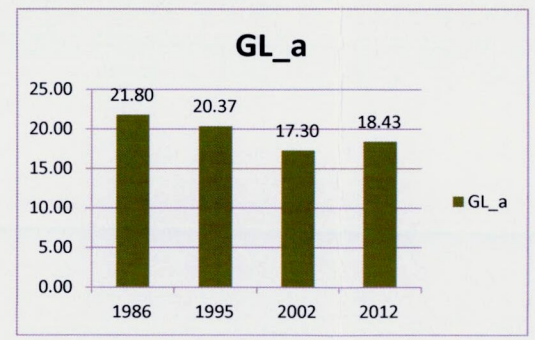
1986 analiza Kobler in sod., 2006, preglednica 3, za 4 združene kategorije
razdeljeno na 8 LULUCF kategorij, proporcionalno glede na površinske deleže posameznih kategorij iz SURS
za FL, GL_w - neposredno iz analize Kobler in sod., 2006
za OL - enako kot v RABA_2002_vektorsko
za CL_a, CL_w, GL_a - proporcionalno glede na površinske deleže iz Statističnega letopisa 1987 za leto 1986
glej list: 1986_izračun površin
pri WL - poleg površine 'ribniki, trstičja in močvirja' iz SURS - dodamo še površino stoječih in tekočih voda iz RABA_2002 (kategorija 7000), saj sklepamo, da površina voda ostaja enaka

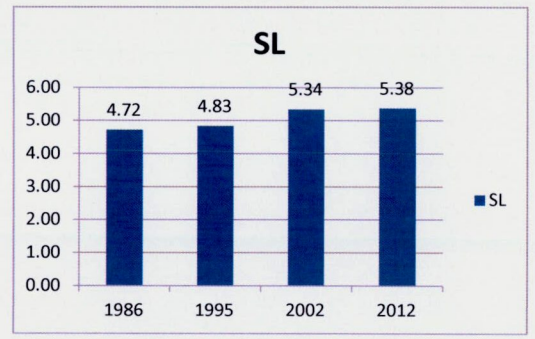
1995 analiza Kobler in sod., 2006, preglednica 3, za 4 združene kategorije
razdeljeno na 8 LULUCF kategorij, proporcionalno glede na površinske deleže posameznih kategorij iz SURS
za FL, GL_w - neposredno iz analize Kobler in sod., 2006
za OL - enako kot v RABA_2002_vektorsko
za CL_a, CL_w, GL_a - proporcionalno glede na površinske deleže iz Statističnega letopisa 1987 za leto 1986
glej list: 1995_izračun površin
pri WL - poleg površine 'ribniki, trstičja in močvirja' iz SURS - dodamo še površino stoječih in tekočih voda iz RABA_2002 (kategorija 7000), saj sklepamo, da površina voda ostaja enaka

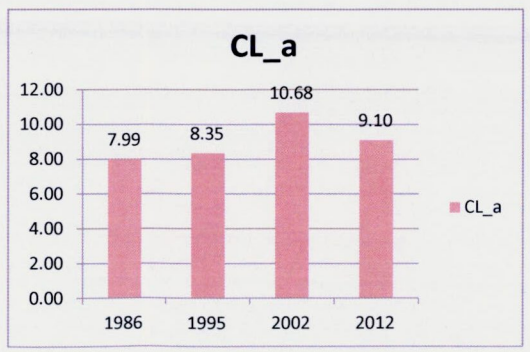
2002 Evidenca dejanske rabe kmetijskih in gozdnih zemljišč
iz .shp datoteke (2002), vektorsko, obrezano z državno mejo
in nato korigirano na točno površino države
glej list: površine_vektorsko_02 do 12

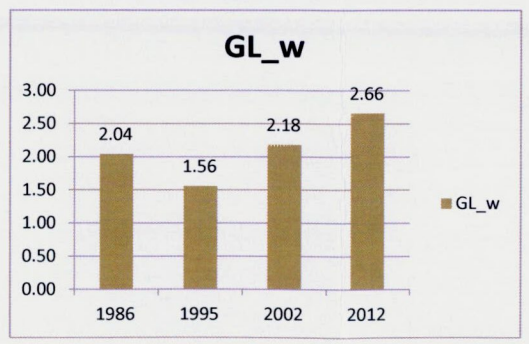
2012 Evidenca dejanske rabe kmetijskih in gozdnih zemljišč
iz .shp datoteke (20120910), vektorsko, obrezano z državno mejo
in nato korigirano na točno površino države
glej list: površine_vektorsko_02 do 12

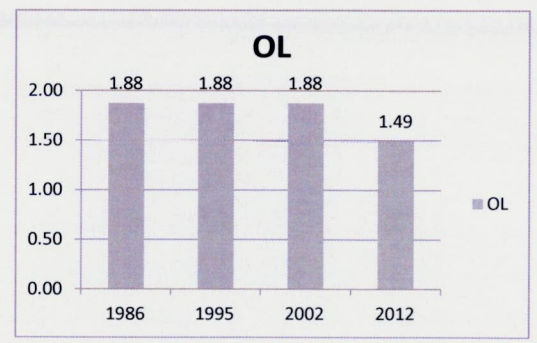


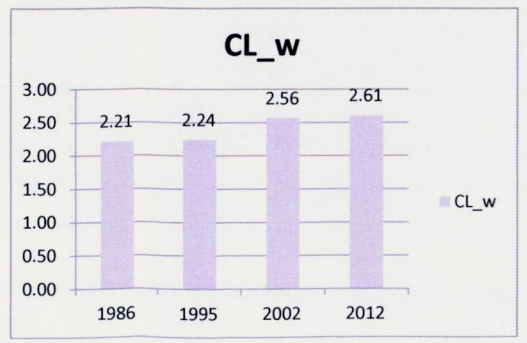


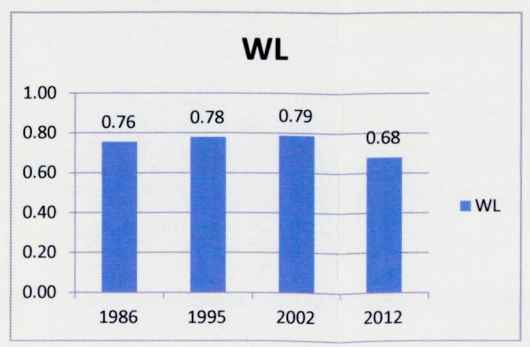












leto 1986

osnovni podatki: analiza Kobler in sod., 2006, preglednica 3

dodatno: podatki iz Statističnega letopisa SRS 1987

poglavje: Kmetijstvo, 10-5. Zemljiške kategorije, stran 216

kategorija SURS	kategorija LULUCF	šifra LULUCF	površina [ha]	delež [%]
njive in vrtovi	CL_a	21	248,154	12.3
sadovnjaki	CL_w	22	35,825	1.8
vinogradi	CL_w	22	21,438	1.1
travniki	GL_a	31	341,327	16.9
pašniki	GL_a + GL_w	31 + 32	222,715	11.0
ribniki, trstičje, močvirje	WL	40	2,725	0.1
gozdovi	FL	10	1,015,105	50.1
nerodovitno	SL + OL	50 + 60	137,734	6.8
			2,025,023	100.0

površina se razlikuje, zaradi različnih virov zajema - poglavji ozemlje in po

sklepamo, da je

	površina [ha]	delež [%] v SURS, 1986
SL	99688	4.9
OL	38046	1.9
	137734	6.8

šifra LULUCF	kategorija LULUCF	delež [%], SURS	površina [ha]_S	površina SURS [ha], z upoštevano razliko pri GL_w
10	FL	50.1	1015105	1015105
21	CL_a	12.3	248154	206797 tu odštejemo GL_w
22	CL_w	2.8	57263	57263
31	GL_a	27.9	564042	564042
32	GL_w	IE	vključeno v GL_	41357 iz Kobler, 2006
40	WL	0.1	2725	2725
50	SL	4.9	99688	99688
60	OL	1.9	38046	38046
		100.0	2025023	2025023

SL + OL 6.8 %

če sklepamo, da se površina OL bistveno ne spreminja, lahko privzamemo, da je površina OL enaka kot v letu 2002

v letu 2002 je površina OL =

38046 ha

tako je SL v letu 1986

99688 ha

in CL v letu 1986

38046 ha

Kategorija rabe tal	Leto 1986	Leto 1995
1. Kmetijske površine	32.00	30.96
2. Neporasle površine	7.35	7.49
3. Gozdne površine	58.61	59.99
4. Površine v zaraščanju	2.04	1.56
Skupaj	100.00	100.00

	Leto 1986		Leto 1995	
Kategorija rabe tal	delež [%]	površina [ha]	delež [%]	površina [ha]
1. Kmetijske površine	32.00	648736	30.96	627652
2. Neporasle površine	7.35	149007	7.49	151845
3. Gozdne površine	58.61	1188201	59.99	1216177
4. Površine v zaraščanju	2.04	41357	1.56	31626
Skupaj	100.00	2027300	100	2027300

1986, SURS
površina [ha]
828102
140459
1015105
41357
2025023

površine v zaraščanju - za toliko zmanjšamo v kategoriji 1. Kmetijske površine, ker so po evidenci SURS, 1987 vključene v to kategorijo (1.)

	Leto 1986			
Kategorija rabe tal	kategorija LULUCF	delež [%]	površina [ha]	
1. Kmetijske površine	**skupaj**	**32.00**	**648736**	
	CL_a	7.99	162005	proporcionalno glede na deleže iz SURS
	CL_w	2.21	44860	proporcionalno glede na deleže iz SURS
	GL_a	21.80	441871	proporcionalno glede na deleže iz SURS
2. Neporasle površine	**skupaj**	**7.35**	**149007**	
	WL	0.76	15306	proporcionalno glede na deleže iz SURS
	SL	4.72	95654	proporcionalno glede na deleže iz SURS
	OL	1.88	38046	iz RABA_2002
3. Gozdne površine	**skupaj**	**58.61**	**1188201**	
	FL	58.61	1188201	iz analize Kobler, 2006
4. Površine v zaraščanju	**skupaj**	**2.04**	**41357**	
	GL_w	2.04	41357	iz analize Kobler, 2006
Skupaj_država		**100.00**	**2027300**	

		1986	
šifra LULUCF	**kategorija L**	**delež [%]**	**površina [ha]**
10	**FL**	**58.6**	**1188201**
21	**CL_a**	**8.0**	**162005**
22	**CL_w**	**2.2**	**44860**
31	**GL_a**	**21.8**	**441871**
32	**GL_w**	**2.0**	**41357**
40	**WL**	**0.8**	**15306**
50	**SL**	**4.7**	**95654**
60	**OL**	**1.9**	**38046**
	skupaj	**100.0**	**2027300**

1. Kmetijske površine

so v letu 1986 po analizi Kobler, 2006 predstavljale:

648736 ha

glede na podatke SURS pa:

828102 ha

znotraj te kategorije pa so površine iz SURS razporejene:

	površina [ha]	delež znotraj kategorije 1. Kmetijske površine [%]
CL_a	206797	25.0
CL_w	57263	6.9
GL_a	564042	68.1
skupaj	828102	100.0

zato sklepamo, da se površine iz analize Kobler, 2006 porazdeljujejo po enakih deležih v sledečih površinah

	delež posamezne ka	površina [ha]
CL_a	25.0	162005
CL_w	6.9	44860
G_a	68.1	441871
skupaj	100.0	648736

648736 površina združene kategorije 1. kmetijske površine (Kobler, 2006)

enako sklepamo za združeno kategorijo 2. Neporasle površine, ki združuje LULUCF kategorije: WL, SL in OL

2. Neporasle površine

so v letu 1986 po analizi Kobler, 2006 predstavljale:

149007 ha

glede na podatke SURS, pa:

140459 ha

znotraj te kategorije pa so površine iz SURS razporejene:

	površina [ha]	delež znotraj kategorije 2. Neporasle površine
WL	15952	10.4
SL	99688	64.9
OL	38046	24.8
skupaj	153685.6966	100.0

	površina [h	delež znotraj kategorije 2. Neporasle površine [%] (WL+SL)
	15952	13.8
	99688	86.2
WL+SL	115639	100.0

raba_id:7000 iz 2002

13227 ha

površini 'ribniki, trstičja in močvirja' iz SURS prištejemo še površino voda iz RABA_2002 (raba_ID:7000), saj sklepamo, da se površina tekočih in stoječih voda ne spreminja bistveno

ker sklepamo, da površina OL ostaja enaka, proporcionalno razdelimo le SL in WL

	delež posamezne ka	površina [ha]
WL	13.8	15306
SL	86.2	95654
skupaj	100.0	110960

110960 površina združene kategorije 2. Neporasle površine (Kobler, 2006), zmanjšana za OL

zato sklepamo, da se površine iz analize Kobler, 2006 porazdeljujejo v sledečih površinah

	površina [ha]
WL	15306
SL	95654
OL	38046
skupaj	149007

leto 1995

osnovni podatki: analiza Kobler in sod., 2006, preglednica 3

podatki iz Statističnega letopisa Republike Slovenije, 1996

poglavje: Kmetijstvo in ribištvo, 16.3 Zemljiške kategorije, stran 257

kategorija SURS	kategorija LULUCF	šifra LULUCF	površina [ha]	delež [%]
njive in vrtovi	CL_a	21	234,432	11.6
sadovnjaki	CL_w	22	31,494	1.6
vinogradi	CL_w	22	22,955	1.1
travniki	GL_a	31	345,091	17.0
pašniki	GL_a + GL_w	31 + 32	149,831	7.4
ribniki, trstičje, močvirje	WL	40	3,299	0.2
gozdovi	FL	10	1,097,929	54.2
nerodovitno	SL + OL	50 + 60	140,596	6.9
			2,025,627	100.0

površina se razlikuje, zaradi različnih virov zajema - poglavji ozemlje in podnebje ter pog

sklepamo, da je

	površina [ha]	delež [%] v SURS, 1995
SL	102550	5.1
OL	38046	1.9
	140596	6.9

šifra LULUCF	kategorija LULUCF	delež [%], SURS	površina [ha]_S	površina SURS [ha], z upoštevano razliko pri GL_w
10	FL	54.2	1097929	1097929
21	CL_a	11.6	234432	202806 tu odštejemo GL_w
22	CL_w	2.7	54449	54449
31	GL_a	24.4	494922	494922
32	GL_w	IE	vključeno v GL_	31626 iz Kobler, 2006
40	WL	0.2	3299	3299
50	SL	5.1	102550	102550
60	OL	1.9	38046	38046
		100.0	2025627	2025627

SL + OL 6.9 %

če sklepamo, da se površina OL bistveno ne spreminja, lahko privzamemo, da je površina OL enaka kot v letu 2002

v letu 2002 je površina OL =

38046 ha

tako je SL v letu 1995

102550 ha

in OL v letu 1995

38046 ha

Kategorija rabe tal	Leto 1986	Leto 1995
1. Kmetijske površine	32.00	30.96
2. Neporasle površine	7.35	7.49
3. Gozdne površine	58.61	59.99
4. Površine v zaraščanju	2.04	1.56
Skupaj	100.00	100.00

	Leto 1986		Leto 1995	
Kategorija rabe tal	delež [%]	površina [ha]	delež [%]	površina [ha]
1. Kmetijske površine	32.00	648736	30.96	627652
2. Neporasle površine	7.35	149007	7.49	151845
3. Gozdne površine	58.61	1188201	59.99	1216177
4. Površine v zaraščanju	2.04	41357	1.56	31626
Skupaj	100.00	2027300	100.00	2027300

1995, SURS
površina [ha]
752177
143895
1097929
31626
2025627

površine v zaraščanju - za toliko zmanjšamo v kategoriji 1. Kmetijske površine, ker so po evidenci SURS, 1996 vključene v to kategorijo (1.)

	Leto 1995			
Kategorija rabe tal	kategorija LULUCF	delež [%]	površina [ha]	
1. Kmetijske površine	**skupaj**	**30.96**	**627652**	
	CL_a	8.35	169231	proporcionalno glede na deleže iz SURS
	CL_w	2.24	45435	proporcionalno glede na deleže iz SURS
	GL_a	20.37	412986	proporcionalno glede na deleže iz SURS
2. Neporasle površine	**skupaj**	**7.49**	**151845**	
	WL	0.78	15793	proporcionalno glede na deleže iz SURS
	SL	4.83	98005	proporcionalno glede na deleže iz SURS
	OL	1.88	38046	iz RABA_2002
3. Gozdne površine	**skupaj**	**59.99**	**1216177**	
	FL	59.99	1216177	iz analize Kobler, 2006
4. Površine v zaraščanju	**skupaj**	**1.56**	**31626**	
	GL_w	1.56	31626	iz analize Kobler, 2006
Skupaj_država		**100.00**	**2027300**	

		1995	
šifra LULUCF	**kategorija**	**delež [%]**	**površina [ha]**
10	**FL**	**60.0**	**1216177**
21	**CL_a**	**8.3**	**169231**
22	**CL_w**	**2.2**	**45435**
31	**GL_a**	**20.4**	**412986**
32	**GL_w**	**1.6**	**31626**
40	**WL**	**0.8**	**15793**
50	**SL**	**4.8**	**98005**
60	**OL**	**1.9**	**38046**
	skupaj	**100.0**	**2027300**

1. Kmetijske površine

so v letu 1995 po analizi Kobler, 2006 predstavljale:

627652 ha

glede na podatke SURS, pa:

752177 ha

znotraj te kategorije pa so površ ne iz SURS razporejene:

	površina [ha]	delež znotraj kategorije 1. Kmetijske površine [%]
CL_a	202806	27.0
CL_w	54449	7.2
GL_a	494922	65.8
skupaj	752177	100.0

zato sklepamo, da se površine iz analize Kobler, 2006 porazdeljujejo po enakih deležih v sledečih površinah

	delež posamezne ka	površina [ha]
CL_a	27.0	169231
CL_w	7.2	45435
GL_a	65.8	412986
skupaj	100.0	627652

627652 površina združene kategorije 1. kmetijske površine (Kobler, 2006)

enako sklepamo za združeno kategorijo 2. Neporasle površine, ki združuje LULUCF kategorije: WL, SL in OL

2. Neporasle površine

so v letu 1995 po analizi Kobler, 2006 predstavljale:

151845 ha

glede na podatke SURS, pa:

143895 ha

znotraj te kategorije pa so površine iz SURS razporejene:

	površina [ha]	delež znotraj kategorije 2. Neporasle površine
WL	16526	10.5
SL	102550	65.3
OL	38046	24.2
skupaj	157121.6966	100.0

	površina [h	delež znotraj kategorije 2. Nepcrasle površine [%] (WL+SL)
	16526	13.9
	102550	86.1
WL+SL	119075	100.0

raba_id:7000 iz 2002

13227 ha

površini 'ribniki, trstičja in močvirja' iz SURS prištejemo še površino voda iz RABA_2002 (raba_ID:7000), saj sklepamo, da se površina tekočih in stoječih voda ne spreminja bistveno

ker sklepamo, da površina OL ostaja enaka, proporcionalno razdelimo le SL in WL

	delež posamezne ka	površina [ha]
WL	13.9	15793
SL	86.1	98005
skupaj	100.0	113798

113798 površina združene kategorije 2. Neporasle površine (Kobler, 2006), zmanjšana za OL

zato sklepamo, da se površine iz analize Kobler, 2006 porazdeljujejo v sledečih površinah

	površina [ha]
WL	15793
SL	98005
OL	38046
skupaj	151845

Površina [ha]

kategorija LULUCF	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
FOREST LAND	1188201	1191309	1194418	1197526	1200635	1203743	1206852	1209960	1213069	1216177	1214086	1211994	1209902	1207811	1205719	1203627	1201536	1202337	1203139	1203940	1204741	1205543	1206344	1207145	1207947	1208748	1209550
CROPLAND_annual	162005	162808	163611	164414	165217	166019	166822	167625	168428	169231	175989	182747	189505	196263	203021	209780	216538	213325	210113	206900	203687	200475	197262	194050	190837	187624	184412
CROPLAND_woody	44860	44924	44988	45052	45115	45179	45243	45307	45371	45435	46369	47304	48239	49173	50108	51043	51977	52062	52147	52232	52317	52402	52486	52571	52656	52741	52826
GRASSLAND_annual	441871	438662	435452	432243	429033	425824	422615	419405	416196	412986	404083	395180	386277	377374	368471	359567	350664	352953	355242	357530	359819	362107	364396	366685	368973	371262	373550
GRASSLAND_woody	41357	40276	39194	38113	37032	35951	34870	33788	32707	31626	33431	35237	37042	38847	40653	42458	44264	45224	46184	47144	48105	49065	50025	50985	51946	52906	53866
WETLANDS	15306	15360	15414	15469	15523	15577	15631	15685	15739	15793	15819	15845	15871	15897	15923	15949	15975	15754	15532	15311	15090	14869	14647	14426	14205	13983	13762
SETTLEMENTS	95654	95915	96176	96438	96699	96960	97221	97483	97744	98005	99476	100946	102417	103888	105359	106829	108300	108374	108448	108522	108595	108669	108743	108817	108891	108965	109038
OTHER LAND	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	38046	37271	36496	35721	34946	34171	33396	32621	31846	31071	30296
skupaj [ha]	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300	2027300

neto LETNE spremembe [ha/leto]

šifra LULUCF	kategorija LULUCF	1986 - 1995	1995 - 2002	2002 - 2012
10	FL	3109	-2092	801
21	CL_a	803	6758	-3213
22	CL_w	64	935	85
31	GL_a	-3209	-8903	2289
32	GL_w	-1081	1805	960
40	WL	54	26	-221
50	SL	261	1471	74
60	OL	0	0	-775
	skupaj	0	0	0

VZOREC			VALUE_3	VALUE_1	VALUE_4	VALUE_2	
1986 - 1995, spremembe v celotnem obdobju, vzorec			gozdne površine	kmetijske površine	površine v zaraščanju	neporasle površine	skupaj
			FL	CL_a + CL_w + GL_a	GL_w	WL + SL + OL	[ha]
3	gozdne površine	FL	15286	31	10	17	15345
1	kmetijske površine	CL_a + CL_w + GL_a	26	7302	210	32	7570
4	površine v zaraščanju	GL_w	458	12	476	1	946
2	neporasle površine	WL + SL + OL	1	3	13	1706	1723
	skupaj	[ha]	15771	7347	708	1756	25583

VZOREC			3	1	4	2	
Letne spremembe [ha/leto], 1986-1995, vzorec			gozdne površine	kmetijske površine	površine v zaraščanju	neporasle površine	skupaj
			FL	CL_a + CL_w + GL_a	GL_w	WL + SL + OL	[ha]
3	gozdne površine	FL	1698	3	1	2	1705
1	kmetijske površine	CL_a + CL_w + GL_a	3	811	23	4	841
4	površine v zaraščanju	GL_w	51	1	53	0	105
2	neporasle površine	WL + SL + OL	0	0	1	190	191
	skupaj	[ha]	1752	816	79	195	2843

VZOREC			10	21	22	31	32	40	50	60	skupaj
1995 - 2002, spremembe v celotnem obdobju, vzorec			FL	CL_a	CL_w	GL_a	GL_w	WL	SL	OL	[ha]
			gozdne površine	njive in vrtovi	trajni nasadi	travniki	travniki z drevjem	mokrišča	naselja	ostala raba	
3	gozdne površine	FL	15430	8	6	112	163	2	12	39	15771
1	kmetijske površine	CL_a + CL_w + GL_a	98	2085	574	4283	192	11	96	8	7347
4	površine v zaraščanju	GL_w	299	4	9	152	181	3	1	61	708
2	neporasle površine	WL + SL + OL	29	12	17	25	11	99	903	658	1756
	skupaj	[ha]	15856	2109	606	4572	547	114	1013	766	25583

VZOREC			10	21	22	31	32	40	50	60	skupaj
Letne spremembe [ha/leto], 1995-2002, vzorec			FL	CL_a	CL_w	GL_a	GL_w	WL	SL	OL	[ha]
			gozdne površine	njive in vrtovi	trajni nasadi	travniki	travniki z drevjem	mokrišča	naselja	ostala raba	
3	gozdne površine	FL	2204	1	1	16	23	0	2	6	2253
1	kmetijske površine	CL_a + CL_w + GL_a	14	298	82	612	27	2	14	1	1050
4	površine v zaraščanju	GL_w	43	1	1	22	26	0	0	9	101
2	neporasle površine	WL + SL + OL	4	2	2	4	2	14	129	94	251
	skupaj	[ha]	2265	301	87	653	78	16	145	109	3655

Spremembe v celotnem obdobju [ha], 2002-2012, celotna država

2002-2012		FL	CL_a	CL_w	GL_a	GL_w	WL	SL	OL	skupaj
		gozdne površine	njive in vrtovi	trajni nasadi	travniki	travniki z drevjem	mokrišča	naselja	ostala raba	[ha]
gozdne površine	FL	1164783	714	1550	17852	9424	578	5841	2152	1202894
njive in vrtovi	CL_a	1286	159584	2899	46268	2587	229	4238	1	217092
trajni nasadi	CL_w	1317	1915	33484	11431	1791	23	2080	0	52042
travniki	GL_a	19296	21891	8825	271055	22426	750	7930	101	352274
travniki z drevjem	GL_w	18857	574	1217	8900	12360	607	1451	241	44207
mokrišča	WL	545	143	12	2167	834	11020	719	192	15633
naselja	SL	2470	1122	5160	14295	1399	217	80379	46	105087
ostala raba	OL	2792	6	9	5966	1495	118	107	27540	38033
skupaj	[ha]	1211346	185948	53157	377933	52316	13543	102747	30272	2027262

Letne spremembe [ha/leto], 2002-2012, celotna država

2002-2012		FL	CL_a	CL_w	GL_a	GL_w	WL	SL	OL	skupaj
		gozdne površine	njive in vrtovi	trajni nasadi	travniki	travniki z drevjem	mokrišča	naselja	ostala raba	[ha]
gozdne površine	FL		71	155	1785	942	58	584	215	3811
njive in vrtovi	CL_a	129		290	4627	259	23	424	0	5751
trajni nasadi	CL_w	132	192		1143	179	2	208	0	1856
travniki	GL_a	1930	2189	883		2243	75	793	10	8122
travniki z drevjem	GL_w	1886	57	122	890		61	145	24	3185
mokrišča	WL	55	14	1	217	83		72	19	461
naselja	SL	247	112	516	1429	140	22		5	2471
ostala raba	OL	279	1	1	597	149	12	11		1049
skupaj	[ha]	4656	2636	1967	10688	3996	252	2237	273	26706

PRILOGA 12:

Delavnica – Bruselj

Working Group I – "Annual inventories" under the Climate Change Committee

Expert Meeting on LULUCF Accounting

18 September 2012
Time: 9:00– 12:30
Albert Borschette Conference Centre, Room 1A
36 Rue Froissart, B- 1040 Brussels

All costs related to attending the meeting (travel, accommodation, meals, daily allowance) are to be supported by the expert's organization

AGENDA

09.00 hrs Welcome coffee

09.15 hrs Opening /agenda adoption
Chair: Peter WEHRHEIM, Head of Unit "Climate Finance and Deforestation", DG Climate Action, European Commission

09.25 hrs Presentation of the Commission Proposal for a Decision of the European Parliament and of the Council on accounting rules and action plans on greenhouse gas emissions and removals resulting from activities related to land use, land use change and forestry

Asger OLESEN, Policy Officer, European Commission

Questions and answers

10.00 hrs On the feasibility of cropland management and grazing land management accounting
Giacomo GRASSI, Scientific Officer, Joint Research Centre, European Commission

Questions and answers

11.15 hrs Case Study: Accounting for agricultural lands in Denmark

Steen GYLDENKÆRNE, Senior Researcher, University of Aarhus, National Environmental Research Institute

Questions and answers

12.15 hrs Final questions and conclusions

12.30 hrs END

PRILOGA 13:

Delavnica UNFCCC – Bonn, oktober 2012

United Nations
Climate Change Secretariat

Nations Unies
Secrétariat sur les changements climatiques

UNFCCC National Focal Point of Slovenia
Mr. Andrej Kranjc
Head
International Cooperation Department
Government Office of Climate Change
Gregorciceva 25
1000 Ljubljana
Slovenia

Date: 2 July 2012
Reference: VM/SK/AO/sbk
Direct line: +49 228 815-1269

Workshop on the implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8

Langer Eugen, Hermann-Ehlers-Str. 10, 53113 Bonn, Germany
8 – 10 October 2012

Dear Mr. Kranjc,

On behalf of the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC), I am pleased to invite Slovenia to nominate up to two experts to participate in the workshop on the implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, to be held from 8 to 10 October 2012 in Bonn, Germany.

The Subsidiary Body for Scientific and Technological Advice (SBSTA), at its thirty-sixth session, requested the secretariat to organize a technical workshop to be held before the thirty-seventh session of the SBSTA (FCCC/SBSTA/2011/L.16, para. 3(d)). This workshop will address, *inter alia*, the technical paper to be prepared by the secretariat prior to the workshop, as requested by the SBSTA at its thirty-sixth session.

Martin-Luther-King-Strasse 8 · 53175 Bonn · Germany
Telephone +49 228 815 1000 · Fax +49 228 815 1999
secretariat@unfccc.int · unfccc.int

The technical paper will include a comprehensive identification of the implications of decisions 2/CMP.7 to 5/CMP.7 on the previous CMP decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8, and indicate the technical issues that are relevant to the implementation of these decisions in the second commitment period. The technical paper should include options to address the relevant methodological decisions, with annotations explaining the rationale for these suggested options and the relationship of the suggested options to decisions 2/CMP.7 to 5/CMP.7. This would include identification of paragraphs in methodological decisions where further guidance from Parties is needed. Where applicable, the implications identified should be clustered into generic categories with the aim of ensuring a consistent approach across decisions.

The secretariat will prepare a workshop report which shall be considered by the SBSTA at its thirty-seventh session.

The agenda for this workshop will be made available over the ensuing weeks on the secretariat's webpage <http://unfccc.int/national_reports/accounting_reporting_and_review_under_the_kyoto_protocol/items/6961.php>. All background information on the workshop will also be available on this web page.

Please note that **participants are responsible for making their own visa and hotel arrangements**. Participants are strongly encouraged to apply for a German visa, if required, and any necessary transit visas, as soon as possible. A copy of this invitation letter should be attached to the visa request in order to facilitate its issuance.

If you choose to accept this invitation, please complete and return the attached registration form by 16 July 2012. Additional logistical information will be provided at a later date. If you have any questions, please contact Ms. Sarah Klinghammer (phone: +49 228 815 1269) and Mr. Ian Tout (phone: 49 228 815 1098), e-mail to both is MDAWorkshop@unfccc.int and fax is +49 228 815 0350, or Ms. Astrid Olsson (phone: +49 228 815 1450, e-mail: aolsson@unfccc.int).

We look forward to hearing from you.

Yours sincerely,

Vitaly Matsarski
Coordinator
Mitigation, Data and Analysis Programme

Workshop on the implications of the implementation of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol

8–10 October 2012
Langer Eugen, room 1916, Bonn, Germany

DRAFT AGENDA

DAY 1: Monday, 8 October	
08:00 – 08:45	**Registration**
09:00 – 09:30	**Welcome and Opening** *Welcome (Mr. Sergey Kononov, Manager Inventories and Data Services)* *Opening, mandate, objectives and agenda* (Mr. Richard Muyungi, SBSTA Chair) *Linkages between the AWG-KP and the SBSTA* (Ms. Madeleine Diouf Sarr, AWG-KP Chair)
09:30 – 09:45	**Background** *Information about what happened at CMP 7 and SBSTA 36* (Ms. Astrid Olsson, UNFCCC secretariat)
09:45 – 10:15	**Introduction of technical paper (FCCC/TP/2012/6)** *Introduction of the technical paper "Implications of decisions 2/CMP.7 to 5/CMP.7 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol"* (Ms. Astrid Olsson, UNFCCC secretariat)
10:15 – 11:15	**General discussion of technical paper and Parties' submissions** *General discussion of the technical paper, Parties' submissions and work of the next days of the workshop*
11:15 – 11:30	**Coffee break**
11:30 – 13:00	**General discussion of technical paper and Parties' submissions (continued)**
13:00 – 14:30	**Lunch**
14:30 – 16:00	**Discussion in break-out groups** *Discussion of the technical paper and Parties' submissions* Group A: Reporting and accounting issues (decisions 12/CMP.1, 13/CMP.1, 14/CMP.1 and 15/CMP.1) Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3)
16:00 – 16:30	**Coffee break**
16:30 – 18:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group A: Reporting and accounting issues (decisions 12/CMP.1, 13/CMP.1, 14/CMP.1 and 15/CMP.1) Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3)
18:00	**End day 1**

DAY 2: Tuesday, 9 October	
09:00 – 10:00	**Plenary meeting** *Reports from Groups A and B* Discussion
10:00 – 11:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group A: Reporting and accounting issues (decisions 12/CMP.1, 13/CMP.1, 14/CMP.1 and 15/CMP.1) Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3)
11:00 – 11:15	**Coffee break**
11:15 – 13:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group A: Reporting and accounting issues (decisions 12/CMP.1, 13/CMP.1, 14/CMP.1 and 15/CMP.1) Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3)
13:00 – 14:00	**Lunch**
14:00 – 16:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3) Group C: Review issues and adjustments (decisions 20/CMP.1, 22/CMP.1, 24/CMP.1 and 8/CMP.5)
16:00 – 16:15	**Coffee break**
16:15 – 18:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3) Group C: Review issues and adjustments (decisions 20/CMP 1, 22/CMP.1, 24/CMP.1 and 8/CMP.5)
18:00	**End day 2**

DAY 3: Wednesday, 10 October	
09:00 – 11:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3) Group C: Review issues and adjustments (decisions 20/CMP.1, 22/CMP.1, 24/CMP.1 and 8/CMP.5)
11:00 – 11:15	**Coffee break**
11:15 – 13:00	**Discussion in break-out groups (continued)** *Discussion of the technical paper and Parties' submissions* Group B: Land use, land-use change and forestry (decisions 5/CMP.1, 6/CMP.1, 16/CMP.1, 17/CMP.1, 18/CMP.1 and 6/CMP.3) Group C: Review issues and adjustments (decisions 20/CMP.1, 22/CMP.1, 24/CMP.1 and 8/CMP.5)
13:00 – 14:00	**Lunch**
14:00 – 16:00	**Plenary meeting** *Reports from Groups A, B and C* Discussion
16:00 – 16:15	**Coffee break**
16:15 – 16:45	**Summary by the Chair and next steps**
16:45 – 17:00	**Wrap-up by the Chair**
17:00	**End of workshop**

PRILOGA 14:

Revizija Sekretariata UNFCCC, september 2012 – vprašanja in odgovori

2nd centralized review 3-8 September 2012

Questions to Slovenia concerning the LULUCF sector 1

1. Slovenia responded on the following question from the set of preliminary questions: In table 7.4.3 on p. 212 of the NIR, area of perennial cropland is provided. From 1956 to 1980, the area is slightly increasing and from 1986 to 2010 decreasing. In the gap from 1980 to 1986 an increase from 57 to 82 kha is reported. Is there any explanation for this change? Further, according to the data in the LUC matrix, an increase of the area of perennial cropland is expected, whereas in table 7.4.3 a decrease is reported.

The area for perennial cropland from 1986 to 2010 is from ALUM (Agricultural Land Use Map). The values for the perennial cropland area for the period 1956 to 1980 are from SORS (Statistical Office of the Republic of Slovenia) – as the only available data for that time period.
The ERT would like to ask additionally whether the assumption is correct that Slovenia applied the SORS data as they are and interpolated linearly between the two datasets?

The gap between years 1980 and 1986 can be explained only with the use of two different datasets. With revision of land use change matrix, we hope we will be able to assure consistent and complete data for whole time series (from 1956 to 2011).

2. Slovenia also responded when it will be able to implement the recommendations made in the last review report concerning LULUCF (question 12 of preliminary questions). Could Slovenia provide the same information concerning the KP LULUCF recommendations in paras 92 – 103?

According to the efforts being undertaken, we should be able to in majority achieve in 2013 submission the recommendations in paragraphs 92, 94, 95, 99, 100 and 101. Regarding estimations of carbon stock change in litter and soils (paragraph 103), it will be a priority in the next and in 2014 submission.

3. On page 184 of the NIR, Slovenia explains that the annual variation of forest growth is modelled against climatic parameters. On page 199 is said the stock changes of living biomass are estimated by stock change method. It is not clear how modelled data were applied in the stock change method.

For the estimations of carbon stock changes in living biomass – the stock change method is used. The available data is from surveys in years 2000, 2007 and (when finished) 2012. The explanation an annual variation of forest growth (in this context) should not be included.

4. The area of FM und KP is about 5 % smaller than the area of forest land remaining forest land. Quite a big difference was also detected between the emission of D under the KP (356 Gg CO2) and for forestland converted to other land uses (1853 Gg CO2). The ERT notes that the lower emissions of D under the KP could result in an underestimation of emissions if it could not be explained by emissions from soils. Could Slovenia explain the differences?

The discrepancies between the values of areas under forestland remaining forestland and under FM (KP) and also between FL converted to other land uses and D (KP) arise from data, used in chapters 7 and 11 of the report. As explained in the NIR (p. 276-277), the differences arise from different methodology and purpose of gathering data. The aerial imagery (orthophoto) used for ALUM database (Convention part), and the data of forest management units (KP part). The data on land uses for ALUM are available for the years 1998 on, when orthophoto images for the whole country were available. The data on forest land from management plans is available also for the years before. The same applies for the data of deforestation area (note: the explanation regarding legislation on deforestation in Slovenia; NIR, p. 284).

To harmonise the available data and to be able to provide adequate, consistent, complete and transparent data sources, we are reviewing land use change matrix, compiling and researching all available data on land use changes in Slovenia within the last three decades.

5. In CRF5(KP-I)A.2 the implied emission factors for the loss of living biomass varies considerably although there is no information provided that different forest stands were removed for the conversions to different land uses. This is likely to affect the emissions of D mentioned in the upper paragraph. The ERT notes that inappropriate factors for losses could cause an underestimation of emissions. Could Slovenia provide some explanations for the differences?

This issue is also one of the ones we try to resolve with reviewing the land use change areas and calculations used.

6. Slovenia explains in the NIR (p. 192) that areas are represented by geographically explicit land-use data with a resolution of 0.25 ha and that approach 3 of the GPG LULUCF is applied. On page 280 is said that forestry spatial information is based on a stand level information with a smallest spatial unit of 2 – 5 ha. It has not become clear whether the resolution of the land-use database is fine enough to completely meat the requests of 15/CMP.1. It has also not become clear whether Slovenia uses method 1 (grid system) or method 2 (polygon system) according to ch. 4.2.2 of the GPG LULUCF. According to the GPG LULUCF (p. 4.25 and Table 4.2.2) only approach 3 can meet the Marrakesh accords if the spatial resolution is consistent with the size parameters of forest definition. Otherwise supplemental information aggregating data within within geographic boundaries should be provided. It would mean that Slovenia should stratify the country into subdivisions. Could Slovenia clarify the method used and in case the resolution is not fine enough provide data for subdivisions in the KP CRFs?

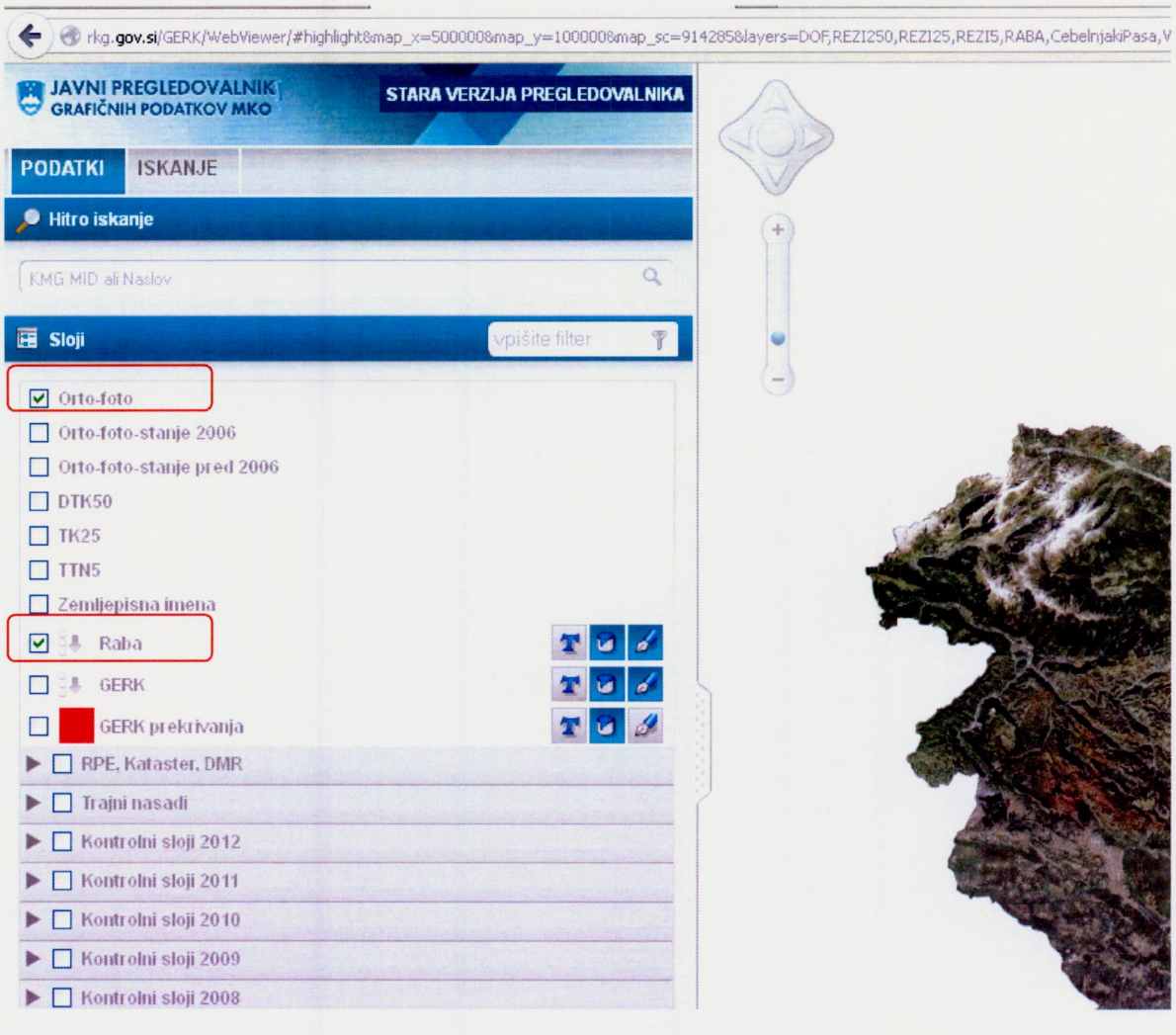
Slovenia uses approach 3 and polygon system (Method 2).

The ALUM (Agricultural Land use Map) is made by dividing the country area into polygons of different land uses according to national classification (NIR, p. 191). It is publicly available on URL: http://rkg.gov.si/GERK/WebViewer/

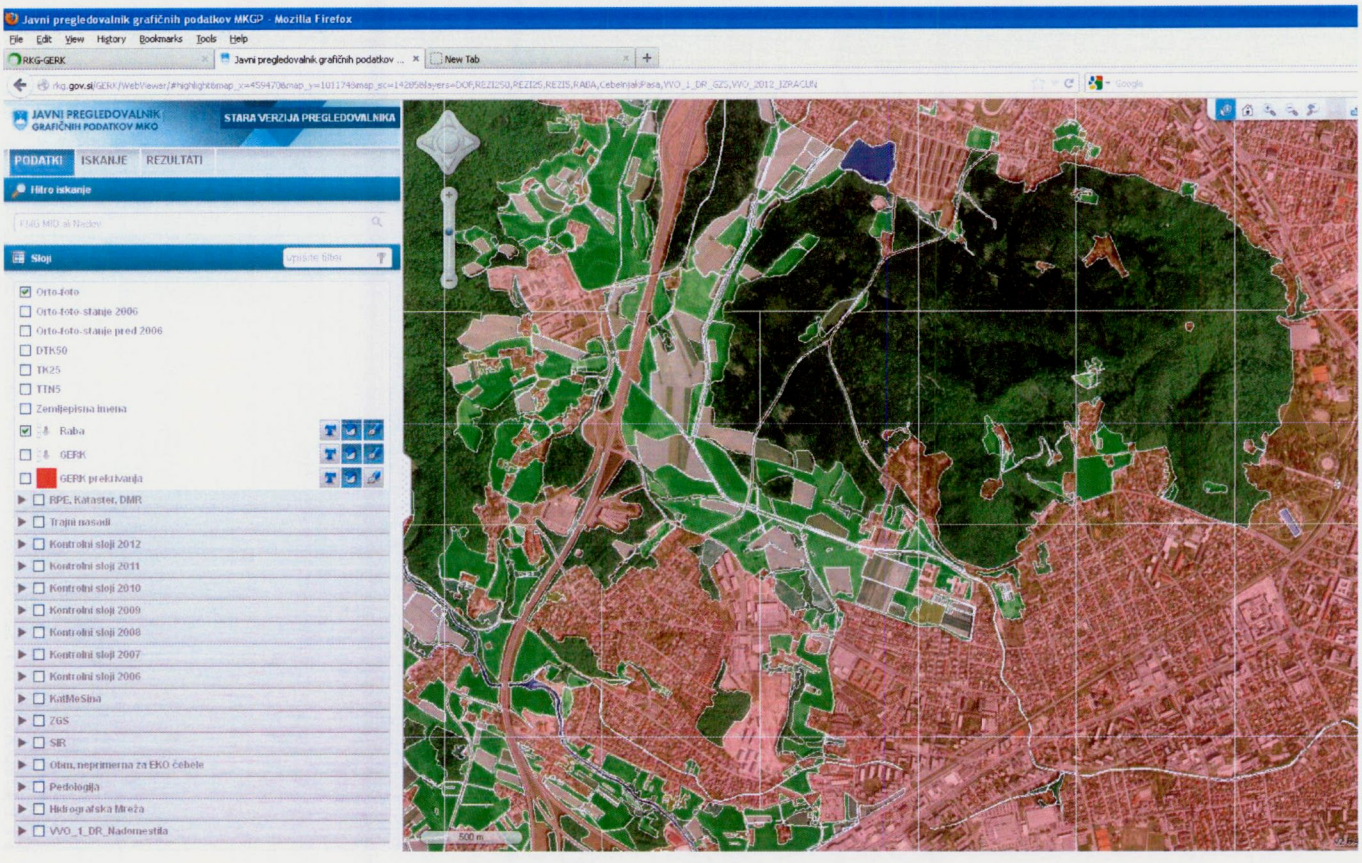
Also the data on forest land, gathered for management plans, is derived from orthophoto imagery (and field work). Some of the differences of areas (comparing Table 7.3.1 and Table 11.1.2 in NIR) arise from changes in legislation – the obligation to include the naturally afforested areas on abandoned agricultural land - in management plans. While in conducting the ALUM the abandoned agricultural land was included according to the situation on orthophoto images.

For better explanation of ALUM you can access: http://rkg.gov.si/GERK/WebViewer/

To see the layer of land uses – you should tick the box orthophoto and RABA (land use). Then you can zoom in and see the polygons of different land uses. Also the .shp format is publicly available at http://rkg.gov.si/GERK/ or http://rkg.gov.si/GERK/documents/RABA_verzije.rar



For example, the vicinity of Slovenian Forestry institute:



7. Slovenia often uses the notation key "NA" in the CRFs. According to the reporting guidelines "NA" is used for activities that do not result in emissions or removals in the given category. The IPCC 2006 GL makes it even clearer saying that it means that such emissions and removals are considered never to occur. In most cases such cells in the CRFs are shaded. It is assumed that in most cases were "NA" is reported "NO" or "NE" would be correct. Could Slovenia check in which cases "NA" is really appropriate?

In majority of cases, the reason for inappropriate use of abbreviations is in less experienced staff, preparing the CRF tables. We are going to implement all the recommendations from this and previous reviews and improve the QA/QC within preparing the CRF and NIR.

2nd centralized review 3-8 September 2012

Preliminary questions to Slovenia concerning the LULUCF sector

1. Slovenia describes in table 7.2.10 in the NIR (p. 195) M_{10} and M_{40} horizons. Could Slovenia explain what M_{10} and M_{40} mean?

M_{10} and M_{40} stand for mineral part of the soil on different depths.

M_{10}: 0 – 10 cm
M_{40}: 10 – 40 cm

2. Slovenia writes on p. 199 of the NIR that it applies a tier 3 stock change method for living biomass on forestland remaining forestland. On page 201 it says that it adopts a default value from the GPG LULUCF for BEF2. To apply a default value is not really tier 3. Could Slovenia explain whether country specific information was introduced in the BEF value?

For estimation of aboveground living biomass on forestland remaining forestland country specific values for wood density (WD) for two species and growing stock (GS) for all species were used. For the values of the BEF_2, the default values were used, as the country specific values are not available.

3. On page 194 of the NIR, it is described that data from 909 soil profiles are used to estimate SOC in mineral soils of the different land-use categories. On page 202, it is said that Tier 1 is applied for soils under forestland remaining forestland regardless of a change in forest management. It would be interesting to know whether it would be possible from the 909 soil profiles to estimate stocks of different forest types and to apply a tier 2 method.

Yes, potentially it is possible for forest soils of total LU soil profiles estimate carbon stocks for different forest types (potential vegetation types), e.g. EUNIS habitats according EUNIS classification.

4. On page 204 (bottom paragraph), the factor C of equation 9 is calculated as C = 1-0545. It is not clear how the value 0545 was found.

For the estimation of GHG's directly released in fires, the Equation 3.2.20 from GPG IPCC 2003 was used. The combustion efficiency factor (C) was adopted from Table 3A.1.12 (GPG, Annex 3A.1). The mean value for "All 'other' temperate forests" was used: C = 0.45. We apologise for the mistake.

5. In table 7.3.7 for the years 1986, 1987, 1993 and 1994 and in CRF tables 5(V) of those years "NA" is reported for area and emissions from wildfires. According to UNFCCC Reporting Guidelines "NA" is "for activities in a given source/sink category

that do not result in emissions or removals of a specific gas". As far as fires always cause emissions, "NA" is not understood in this context. Could Slovenia explain the "NA"? Could it be that there were no forest fires (NO) or they were not estimated (NE)?

For the years 1986, 1987, 1993 and 1994 there is no available data of burned area. The NA in the table 7.3.7 stands for not available (n.a.), but in context of emission reporting, it should be NE (not estimated).

6. On page 206 of the NIR the definition of the forest according to the Slovenian Forestry Act is given, the same as provided in the CRF Table KP NIR.1 . For abandoned agricultural land, parameters are differently defined, also on page 196 (minimum tree height 3 instead of 2 m). Please explain what definition is applied for land converted to forest.

Forestland definition (according to Slovenian Act on Forests, 2007) is:

- Forest land area is covered with forest trees in the form of stands with minimal tree height 5 m and with minimal area of 0.25 hectares (2,500 m^2).

- Abandoned agricultural land on area more than 0.25 ha, which has been abandoned for more than 20 years, with minimal tree height 5 m and with a tree crown cover more than 75 %.

As the increase of forest area in Slovenia is only by natural afforestation of abandoned agricultural land, the definition applied for land converted to forest is: Abandoned agricultural land on area more than 0.25 ha, which has been abandoned for more than 20 years, with minimal tree height 5 m and with a tree crown cover more than 75 %.

7. On page 208 of the NIR "a process of using models to time-shift the forest estate ..." is mentioned. It is understood that those models will improve estimates of past years. Will it also improve estimates of future years based on stock change approach? Could Slovenia explain what exactly will be improved?

Currently (June – October 2012) the field work for forest inventory is being conducted. The measurements are done on the same plots of the systematic grid (4 x 4 km) as in year 2007. Using the stock change method, the results of both surveys will give us reliable data on forest growing stock and dead wood in Slovenian forests. In this and previous NIRs, for the years after 2007 the same value for the growing stock was used, therefore the estimates of carbon stock change will be improved; especially the data on dead wood, as the first available data was in 2007.

8. In table 7.4.3 on p. 212 of the NIR, area of perennial cropland is provided. From 1956 to 1980, the area is slightly increasing and from 1986 to 2010 decreasing. In the gap from 1980 to 1986 an increase from 57 to 82 kha is reported. Is there any explanation for this change? Further, according to the data in the LUC matrix, an

increase of the area of perennial cropland is expected, whereas in table 7.4.3 a decrease is reported.

The area for perennial cropland from 1986 to 2010 is from ALUM (Agricultural Land Use Map). The values for the perennial cropland area for the period 1956 to 1980 are from SORS (Statistical Office of the Republic of Slovenia) – as the only available data for that time period.

9. In table 7.5.1 of the NIR (p. 220) the area of land converted to grassland is the sum of all categories in the following columns of the table. In table 7.5.2 emissions from wetlands, settlements and other land converted to grassland are reported as NE or NO. Emissions and removals from forestland and cropland converted to grassland are reported. However the total of land converted to grassland is not equal to sum of forestland and cropland converted to grassland. Could Slovenia explain the difference?

In table 7.5.2 the values for forestland converted to grassland were mistakenly copied without the emissions from litter. The correct values are:

Year	5.C.2.1 Forest Land converted to Grassland
	Gg CO_2
2010	870.457
2009	870.457
2008	870.457
2007	870.457
2006	870.457
2005	870.457
2004	870.457
2003	870.457
2002	870.457
2001	870.457
2000	749.632
1999	749.632
1998	749.632
1997	749.632
1996	749.632
1995	749.632
1994	749.632
1993	749.632
1992	749.632
1991	749.632
1990	749.632
1989	591.766
1988	591.766
1987	591.766
1986	591.766

10. On page 222 of the NIR, ΔC_{Growth} is calculated by applying the default value from table 3.4.2 of the GPG LULUCF, where it is 2.7 t d.m/ha for temperate wet or 1.6 t d.m./ ha for temperate dry. In the equation 1.7 is used. Please check.

The correct value is 2.7 t d.m. / ha (for temperate wet).

11. For land converted to settlements, only the change in living biomass is explained (p. 230 of the NIR). Is there any change in dead organic matter or in soil organic carbon included in the estimates?

In the estimates the change in dead organic matter is included in forestland converted to settlements. The estimation was done the same as described in land converted to grassland (p. 222-223).

12. Slovenia provides in chapter 10 of the NIR a comprehensive list on how it will respond to the recommendations of the 2011 review report. According to this list, all recommended items in the LULUCF sector would be included in the 2013 submission. This is an evidence of big efforts being undertaken by Slovenia. For the actual review, it would be good to know whether Slovenia still can confirm that it will be apple to achieve the recommended improvements and to provide all the requested information in the 2013 submission.

As mentioned above (question 7) this year Slovenia is conducting the forest inventory survey on systematic grid (4 x 4 km, app. 750 plots). The final results will be available by the end of year 2013, therefore the values for growing stock (living biomass) and dead wood (dead organic matter) will be applicable in 2014 submission. Together with forest inventory, also smaller survey on other land uses is taking place. We are gathering soil samples on cropland (annual, woody), grassland (annual, woody), wetlands and settlements. Results of this survey will be also available for 2014 submission.

During previous reviews it has been noticed that the land use change matrix needs improvements (non-existing small areas...) and also that the converted areas should take into consideration the 20 years conversion period. Our reports showed only one year's values. The land use change matrix is under revision, with appreciated help from Joint Research Centre in Italy. Recalculations will be presented in 2013 submission.

According to the efforts being undertaken, we should be able to in majority accomplish in 2013 submission the recommendations in paragraphs 71, 73, 74, 78, 81, 82 and partly 77, 79. With final results of this year's forest inventory, the recommendations from paragraphs 72, 75, 76 and 80 can be accomplished in 2014 submission.

Carbon storage changes in time for forest soils will be estimate by YASSO 07. C stock changes for soils of different LU will be estimated on additional soil sampling and analysis which are performed in year 2012 and will be finish in next half years (analysis and estimations).

PRILOGA 15:

CRF preglednice za NIR 2013

CONTENTS

TABLE 5 SECTORAL REPORT FOR LAND USE, LAND-USE CHANGE AND FORESTRY
(Sheet 1 of 1)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Net CO_2 emissions/removals[1], [2]	CH_4 [2]	N_2O [2]	NO_x	CO	NMVOC
	(Gg)					
Total Land-Use Categories	**-9,620.116860**	**0.055645**	**0.000680**	**0.004328**	**0.803758**	**0.061828**
A. Forest Land	**-12,042.543791**	**0.055645**	**0.000680**	**0.004328**	**0.803758**	**0.061828**
1. Forest Land remaining Forest Land	-11,577.808214	0.055645	0.000680	0.004328	0.803758	0.061828
2. Land converted to Forest Land	-464.735576	IE,NO	IE,NO	NE	NE	NE
B. Cropland	**433.393101**	**NA**	**NA,NO**	**NA,NE**	**NA,NE**	**NA,NE**
1. Cropland remaining Cropland	61.035333	NA	NA	NE	NE	NE
2. Land converted to Cropland	372.357768	NA	NA,NO	NA	NA	NA
C. Grassland	**633.396550**	**NA,NO**	**NA,NO**	**NA**	**NA**	**NA**
1. Grassland remaining Grassland	IE,NA,NO	NO	NO	NA	NA	NA
2. Land converted to Grassland	633.396550	NA,NO	NA,NO	NA	NA	NA
D. Wetlands	**157.931868**	**NE,NO**	**NE,NO**	**NE**	**NE**	**NE**
1. Wetlands remaining Wetlands [3]	NE,NO	NO	NO	NE	NE	NE
2. Land converted to Wetlands	157.931868	NE,NO	NE,NO	NE	NE	NE
E. Settlements	**744.520205**	**NE,NO**	**NE,NO**	**NE**	**NE**	**NE**
1. Settlements remaining Settlements [3]	NA,NO	NE	NE	NE	NE	NE
2. Land converted to Settlements	744.520205	NE	NE	NE	NE	NE
F. Other Land	**453.185205**	**NO**	**NO**	**NE**	**NE**	**NE**
1. Other Land remaining Other Land [4]						
2. Land converted to Other Land	453.185205	NO	NO	NE	NE	NE
G. Other *(please specify)* [5]	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
Harvested Wood Products [6]	NE	NE	NE	NE	NE	NE
Information items [7]						
Forest Land converted to other Land-Use Categories	NA	NA	NA	NA	NA	NA
Grassland converted to other Land-Use Categories	NA	NA	NA	NA	NA	NA

[1] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[2] For each land-use category and sub-category, this table sums net CO_2 emissions and removals shown in tables 5.A to 5.F, and the CO_2, CH_4 and N_2O emissions showing in tables 5(I) to 5(V).

[3] Parties may decide not to prepare estimates for these categories contained in appendices 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

[4] This land-use category is to allow the total of identified land area to match the national area.

[5] The total for category 5.G Other includes items specified only under category 5.G in this table as well as sources and sinks specified in category 5.G in tables 5(I) to 5(V).

[6] Parties may decide not to prepare estimates for this category contained in appendix 3a.1 of the IPCC good practice guidance for LULUCF, although they may do so if they wish and report in this row.

[7] These items are listed for information only and will not be added to the totals, because they are already included in subcategories 5.A.2 to 5.F.2.

Documentation box:

• Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

• If estimates are reported under 5.G Other, use this documentation box to provide information regarding activities covered under this category and to provide reference to the section in the NIR where background information can be found.

TABLE 5.A SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Forest Land
(Sheet 1 of 1)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA		IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK						
Land-Use Category	Sub-division[1]	Area[2] (kha)	Area of organic soil[2] (kha)	Carbon stock change in living biomass per area[3] [4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area[4]		Carbon stock change in living biomass[3] [4]			Net carbon stock change in dead organic matter[4]	Net carbon stock change in soils[4] [6]		Net CO_2 emissions/ removals[8] [9]
				Gains	Losses	Net change		Mineral soils[5]	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils[7]	
				(Mg C/ha)						(Gg C)						(Gg)
A. Total Forest Land		1,208.688207	NA,NO	2.589061	NA	2.589061	0.097673	0.032738	NA,NO	3,129.368090	NA	3,129.368090	118.056239	39.570000	NA,NO	-12,052.312540
1. Forest Land remaining Forest Land		1,116.748207	NA	2.724152	NA	2.724152	0.105714	NO	NO	3,042.192024	NA	3,042.192024	118.056239	NO	NO	-11,587.576964
2. Land converted to Forest Land[10]		91.940000	NA,NO	0.948184	NA	0.948184	NA,NO	0.430389	NA,NO	87.176066	NA	87.176066	NA,NO	39.570000	NA,NO	-464.735576
2.1 Cropland converted to Forest Land		4.000000	NA,NO	0.990000	NA	0.990000	NA,NO	0.965000	NA,NO	3.960000	NA	3.960000	NA,NO	3.860000	NA,NO	-28.673333
	Cropland annual conv	2.000000	NA	0.990000	NA	0.990000	NO	0.165000	NA	1.980000	NA	1.980000	NO	0.330000	NA	-8.470000
	Cropland woody conv	2.000000	NO	0.990000	NA	0.990000	NA	1.765000	NO	1.980000	NA	1.980000	NA	3.530000	NO	-20.203333
2.2 Grassland converted to Forest Land		76.000000	NO	0.990000	NA	0.990000	NA,NO	-0.185000	NA,NO	75.240000	NA	75.240000	NA,NO	-14.060000	NA,NO	-224.326667
	Grassland annual conv	38.000000	NO	0.990000	NA	0.990000	NO	-0.185000	NA	37.620000	NA	37.620000	NO	-7.030000	NA	-112.163333
	Grassland woody conv	38.000000	NO	0.990000	NA	0.990000	NA	-0.185000	NO	37.620000	NA	37.620000	NA	-7.030000	NO	-112.163333
2.3 Wetlands converted to Forest Land		2.000000	NA	0.990000	NA	0.990000	NO	4.410000	NA	1.980000	NA	1.980000	NO	8.820000	NA	-39.600000
2.4 Settlements converted to Forest Land		4.000000	NO	0.990000	NA	0.990000	NO	2.490000	NO	3.960000	NA	3.960000	NO	9.960000	NO	-51.040000
2.5 Other Land converted to Forest Land		5.940000	NO	0.342772	NA	0.342772	NO	5.217172	NO	2.036066	NA	2.036066	NO	30.990000	NO	-121.095576

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Forest Land report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] Implied carbon-stock-change factors for mineral soils are calculated by dividing the net C stock change estimate for mineral soil by the difference between the area and the area of organic soil.

[6] When Parties are estimating fluxes for organic soils but cannot separate these fluxes from mineral soils, these fluxes should be reported under mineral soils.

[7] The value reported for organic soils is estimated as a flux. For consistency with other entries in this column, these fluxes should be expressed in the unit required in this column, i.e. in Gg C.

[8] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[9] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[10] A Party may report aggregate estimates for all conversions of land to forest land when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for grassland conversion should be provided in table 5 as an information item.

Documentation box:
Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.B SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Cropland
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA		IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK						
Land-Use Category	Sub-division [1]	Area [2] (kha)	Area of organic soil [3] (kha)	Carbon stock change in living biomass per area [6] [4]			Net carbon stock change in dead organic matter per area [4]	Net carbon stock change in soils per area [4]		Carbon stock change in living biomass [3], [4], [6]			Net carbon stock change in dead organic matter [4] [7]	Net carbon stock change in soils [4] [8]		Net CO_2 emissions/ removals [10] [11]
				Gains	Losses	Net change		Mineral soils [5]	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils [9]	
				(Mg C/ha)						(Gg C)						(Gg)
D. Total Cropland		240.865477	NA,NO	0.007128	-0.159567	-0.152438	-0.018533	-0.269931	NA,NO	1.717000	-38.434119	-36.717119	-4.464000	-65.017000	NA,NU	389.393101
1. Cropland remaining Cropland		169.065477	NA,NO	NA,NO	-0.029373	-0.029373	NA,NO	0.001893	NA,NO	NA,NO	-4.966000	-4.966000	NA,NO	0.320000	NA,NU	17.035333
	Cropland annual conv	0.300000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Cropland annual rema	139.624376	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Cropland woody conv	0.200000	NA	NA	-24.830000	-24.830000	NO	1.600000	NA	NA	-4.966000	-4.966000	NO	0.320000	NA	17.035333
	Cropland woody rema	28.941101	NA	NA	NA	NA	NO	NO	NO	NA	NA	NA	NO	NO	NO	NA,NO
2. Land converted to Cropland [12]		71.800000	NA,NO	0.023914	-0.466130	-0.442216	-0.062173	-0.909986	NA,NO	1.717000	-33.468119	-31.751119	-4.464000	-65.337000	NA,NO	372.357768
2.1 Forest Land converted to Cropland		5.800000	NA,NO	NA	-4.406917	-4.406917	-0.769655	-1.213276	NA	NA	-25.560119	-25.560119	-4.464000	-7.037000	NA	135.890768
	Forest land converted	2.000000	NO	NA	-4.714732	-4.714732	-0.744000	-0.165000	NA	NA	-9.429463	-9.429463	-1.488000	-0.330000	NA	41.240699
	Forest land converted	3.800000	NA	NA	-4.244909	-4.244909	-0.783158	-1.765000	NA	NA	-16.130655	-16.130655	-2.976000	-6.707000	NA	94.650068
2.2 Grassland converted to Cropland		66.000000	NA	0.026015	-0.119818	-0.093803	NO	-0.883333	NA	1.717000	-7.908000	-6.191000	NO	-58.300000	NA	236.467000
	Grassland annual conv	44.000000	NA	NA	-0.087500	-0.087500	NO	-0.350000	NA	NA	-3.850000	-3.850000	NO	-15.400000	NA	70.583333
	Grassland annual conv	18.000000	NA	NA	-0.087500	-0.087500	NO	-1.950000	NA	NA	-1.575000	-1.575000	NO	-35.100000	NA	134.475000
	Grassland woody conv	2.000000	NA	NA	-1.241500	-1.241500	NO	-1.950000	NA	NA	-2.483000	-2.483000	NO	-3.900000	NA	23.404333
	Grassland woody conv	2.000000	NA	0.858500	NA	0.858500	NO	-1.950000	NA	1.717000	NA	1.717000	NO	-3.900000	NA	8.004333
2.3 Wetlands converted to Cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Settlements converted to Cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other Land converted to Cropland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Cropland report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] Implied carbon-stock-change factors for mineral soils are calculated by dividing the net C stock change estimate for mineral soil by the difference between the area and the area of organic soil.

[6] For category 5.B.1 Cropland remaining Cropland this column only includes changes in perennial woody biomass.

[7] No reporting on dead organic matter pools is required for category 5.B.1. Cropland remaining Cropland.

[8] When Parties are estimating fluxes for organic soils but cannot separate these fluxes from mineral soils, these fluxes should be reported under mineral soils.

[9] The value reported for organic soils is estimated as a flux. For consistency with other entries in this column, these fluxes should be expressed in the unit required in this column, i.e. in Gg C.

[10] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[11] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[12] A Party may report aggregate estimates for all land conversions to cropland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest land and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.C SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Inventory 2011

Submission 2013 v1.1

SLOVENIA

Grassland

(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA		IMPLIED CARBON-STOCK-CHANGE FACTORS						CHANGES IN CARBON STOCK						Net CO_2 emissions/ removals [10] [11]
Land-Use Category	Sub-division [1]	Area [2] (kha)	Area of organic soil [2] (kha)	Carbon stock change in living biomass per area [3] [4]			Net carbon stock change in dead organic matter per area [4]	Net carbon stock change in soils per area [4]		Carbon stock change in living biomass [3], [4], [6]			Net carbon stock change in dead organic matter [6] [7]	Net carbon stock change in soils [4] [8]		
				Gains	Losses	Net change		Mineral soils [5]	Organic soils	Gains	Losses	Net change		Mineral soils	Organic soils [9]	
				(Mg C/ha)						(Gg C)						(Gg)
C. Total Grassland		424.167536	NA,NO	0.059823	-0.559528	-0.499705	-0.094717	0.187167	NA,NO	25.375000	-237.333514	-211.958514	-40.176000	79.390000	NA,NO	633.396550
1. Grassland remaining Grassland		246.167536	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Grassland annual conv	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Grassland annual rem	246.167536	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Grassland woody con	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Grassland woody rem	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2. Land converted to Grassland [12]		178.000000	NA,NO	0.142556	-1.333334	-1.190778	-0.225708	0.446011	NA,NO	25.375000	-237.333514	-211.958514	-40.176000	79.390000	NA,NO	633.396550
2.1 Forest Land converted to Grassland		54.000000	NA	NA	-4.395065	-4.395065	-0.744000	0.185000	NA,NO	NA	-237.333514	-237.333514	-40.176000	9.990000	NA,NO	980.904884
	Forest land converted	36.000000	NA	NA	-4.627232	-4.627232	-0.744000	0.185000	NO	NA	-166.580342	-166.580342	-26.784000	6.660000	NO	684.582589
	Forest land converted	18.000000	NA	NA	-3.930732	-3.930732	-0.744000	0.185000	NA	NA	-70.753171	-70.753171	-13.392000	3.330000	NA	296.322295
2.2 Cropland converted to Grassland		124.000000	NA,NO	0.204637	NA	0.204637	NO	0.559677	NA	25.375000	NA	25.375000	NO	69.400000	NA	-347.508333
	Cropland anual conver	92.000000	NO	0.087500	NA	0.087500	NO	0.350000	NA	8.050000	NA	8.050000	NO	32.200000	NA	-147.583333
	Cropland anual conver	6.000000	NA	0.990000	NA	0.990000	NO	0.350000	NA	5.940000	NA	5.940000	NO	2.100000	NA	-29.480000
	Cropland woody conv	22.000000	NA	0.337500	NA	0.337500	NO	1.950000	NA	7.425000	NA	7.425000	NO	42.900000	NA	-184.525000
	Cropland woody conv	4.000000	NA	0.990000	NA	0.990000	NO	-1.950000	NA	3.960000	NA	3.960000	NO	-7.800000	NA	14.080000
2.3 Wetlands converted to Grassland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Settlements converted to Grassland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other Land converted to Grassland		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Grassland report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] Implied carbon-stock-change factors for mineral soils are calculated by dividing the net C stock change estimate for mineral soil by the difference between the area and the area of organic soil.

[6] For category 5.C.1 Grassland remaining Grassland this column only includes changes in perennial woody biomass.

[7] No reporting on dead organic matter pools is required for category 5.C.1 Grassland remaining Grassland.

[8] When Parties are estimating fluxes for organic soils but cannot separate these fluxes from mineral soils, these fluxes should be reported under mineral soils.

[9] The value reported for organic soils is estimated as a flux. For consistency with other entries in this column, these fluxes should be expressed in the unit required in this column, i.e. in Gg C.

[10] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[11] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[12] A Party may report aggregate estimates for all land conversions to grassland, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest land conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.D SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Wetlands
(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED CARBON-STOCK-CHANGE FACTORS					CHANGES IN CARBON STOCK					
Land-Use Category	Sub-division [1]	Area[2] (kha)	Carbon stock change in living biomass per area [3] [4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area [4]	Carbon stock change in living biomass[3] [4]			Net carbon stock change in dead organic matter[4]	Net carbon stock change in soils [4]	Net CO_2 emissions/ removals [5] [6]
			Gains	Losses	Net change			Gains	Losses	Net change			
			(Mg C/ha)					(Gg C)					(Gg)
D. Total Wetlands		13.983452	NA,NE,NO	-1.028668	-1.028668	-0.106411	-1.945156	NA,NE,NO	-14.384328	14.384328	1.488000	-27.200000	157.931868
1. Wetlands remaining Wetlands [7]		7.983452	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
2. Land converted to Wetlands [8]		6.000000	NA,NO	-2.397388	-2.397388	-0.248000	-4.533333	NA,NO	-14.384328	-14.384328	-1.488000	-27.200000	157.931868
2.1 Forest Land converted to Wetlands		2.000000	NA	-5.876164	-5.876164	-0.744000	-4.410000	NA	-11.752328	-11.752328	-1.488000	-8.820000	80.887868
2.2 Cropland converted to Wetlands		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Cropland annual conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Cropland woody conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Grassland converted to Wetlands		4.000000	NA	-0.658000	-0.658000	NO	-4.595000	NA	-2.632000	-2.632000	NO	-18.380000	77.044000
	Grassland annual conv	2.000000	NA	-0.081000	-0.081000	NO	-4.595000	NA	-0.162000	-0.162000	NO	-9.190000	34.290667
	Grassland woody conv	2.000000	NA	-1.235000	-1.235000	NO	-4.595000	NA	-2.470000	-2.470000	NO	-9.190000	42.753333
2.4 Settlements converted to Wetlands		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other Land converted to Wetlands		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Wetlands report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[6] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[7] Parties may decide not to prepare estimates for this category contained in appendix 3a.3 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

[8] A Party may report aggregate estimates for all land conversions to wetlands, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest land and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.E SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Settlements

(Sheet 1 of 1)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED CARBON-STOCK-CHANGE FACTORS					CHANGES IN CARBON STOCK					
Land-Use Category	Sub-division [1]	Area[2] (kha)	Carbon stock change in living biomass per area [3] [4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area [4]	Carbon stock change in living biomass[3], [4], [5]			Net carbon stock change in dead organic matter[4]	Net carbon stock change in soils [4]	Net CO_2 emissions/ removals [6] [7]
			Gains	Losses	Net change			Gains	Losses	Net change			
			(Mg C/ha)					(Gg C)					(Gg)
E. Total Settlements		108.964597	0.004919	-0.873026	-0.868107	-0.081935	-0.913416	0.536000	-95.128965	-94.592965	-8.928000	-99.530000	744.520205
1. Settlements remaining Settlements [8]		66.964597	NA	NA	NA	NO	NA	NA	NA	NA	NO	NA	NA,NO
2. Land converted to Settlements [9]		42.000000	0.012762	-2.264975	-2.252213	-0.212571	-2.369762	0.536000	-95.128965	-94.592965	-8.928000	-99.530000	744.520205
2.1 Forest Land converted to Settlements		12.000000	NA	-5.815664	-5.815664	-0.744000	-2.490000	NA	-69.787965	-69.787965	-8.928000	-79.880000	398.185205
2.2 Cropland converted to Settlements		12.000000	0.044667	-1.888667	-1.844000	NO	-1.791667	0.536000	-22.664000	-22.128000	NO	-21.500000	159.969333
	Cropland annual conv	8.000000	0.067000	NA	0.067000	NO	-2.325000	0.536000	NA	0.536000	NO	-18.600000	66.234667
	Cropland woody conv	4.000000	NA	-5.666000	-5.666000	NO	-0.725000	NA	-22.664000	-22.664000	NO	-2.900000	93.734667
2.3 Grassland converted to Settlements		18.000000	NA	-0.148722	-0.148722	NO	-2.675000	NA	2.677000	-2.677000	NO	-48.150000	186.365667
	Grassland woody con	2.000000	NA	-1.174500	-1.174500	NO	-2.675000	NA	-2.349000	-2.349000	NO	-5.350000	28.229667
	Grassland annual conv	16.000000	NA	-0.020500	-0.020500	NO	-2.675000	NA	-0.328000	-0.328000	NO	-42.800000	158.136000
2.4 Wetlands converted to Settlements		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Other Land converted to Settlements		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Settlements report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] For category 5.E.1 Settlements remaining Settlements this column only includes changes in perennial woody biomass.

[6] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[7] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[8] Parties may decide not to prepare estimates for this category contained in appendix 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

[9] A Party may report aggregate estimates for all land conversions to settlements, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest land and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5.F SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY
Other land
(Sheet 1 of 1)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED CARBON-STOCK-CHANGE FACTORS					CHANGES IN CARBON STOCK					
Land-Use Category	Sub-division [1]	Area[2] (kha)	Carbon stock change in living biomass per area [3] [4]			Net carbon stock change in dead organic matter per area[4]	Net carbon stock change in soils per area [4]	Carbon stock change in living biomass[3] [4]			Net carbon stock change in dead organic matter[4]	Net carbon stock change in soils [4]	Net CO_2 emissions/ removals [5] [6]
			Gains	Losses	Net change			Gains	Losses	Net change			
			(Mg C/ha)					(Gg C)					(Gg)
F. Total Other Land		39.070731	NA,NO	-1.786196	-1.786196	-0.228509	1.148686	NA,NO	69.787965	-69.787965	-8.928000	-44.880000	453.185205
1. Other Land remaining Other Land [7]		27.070731											
2. Land converted to Other Land [8]		12.000000	NA,NO	-5.815664	-5.815664	-0.744000	-3.740000	NA,NO	69.787965	-69.787965	-8.928000	-44.880000	453.185205
2.1 Forest Land converted to Other Land		12.000000	NA	-5.815664	-5.815664	-0.744000	-3.740000	NA	-69.787965	-69.787965	-8.928000	-44.880000	453.185205
2.2 Cropland converted to Other Land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Cropland annual conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Cropland woody conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.3 Grassland converted to Other Land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Grassland annual conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	Grassland woody conv	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.4 Wetlands converted to Other Land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2.5 Settlements converted to Other Land		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

[1] Land categories may be further divided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone or national land classification.

[2] The total area of the subcategories, in accordance with the sub-division used, should be entered here. For lands converted to Other Land report the cumulative area remaining in the category in the reporting year.

[3] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses.

[4] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[5] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+). Note that carbon stock changes in a single pool are not necessarily equal to emissions or removals, because some carbon stock changes result from carbon transfers among pools rather than exchanges with the atmosphere.

[6] Where Parties directly estimate emissions and removals rather than carbon stock changes, they may report emissions/removals directly in this column and use notation keys in the stock change columns.

[7] This land-use category is to allow the total of identified land area to match the national area.

[8] A Party may report aggregate estimates for all land conversions to other land, when data are not available to report them separately. A Party should specify in the documentation box which types of land conversion are included. Separate estimates for forest land and grassland conversion should be provided in table 5 as an information item.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (I) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Direct N_2O emissions from N fertilization[1] of Forest Land and Other

(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS[4]
Land-Use Category[2]	Total amount of fertilizer applied	N_2O-N emissions per unit of fertilizer	N_2O
	(Gg N/yr)	(kg N_2O-N/kg N)[3]	(Gg)
Total for all Land Use Categories	**NO**	**NA,NO**	**NA,NO**
A. Forest Land[5][6]	**NO**	**NO**	**NO**
1. Forest Land remaining Forest Land	NO	NO	NO
2. Land converted to Forest Land	NO	NO	NO
G. Other ***(please specify)***			**NA**

[1] Direct N_2O emissions from fertilization are estimated using equations 3.2.17 and 3.2.18 of the IPCC good practice guidance for LULUCF based on the amounts of fertilizers applied to forest land.

[2] N_2O emissions from N fertilization of cropland and grassland are reported in the Agriculture sector; therefore only Forest Land is included in this table.

[3] In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

[4] Emissions are reported with a positive sign.

[5] If a Party is not able to separate the fertilizer applied to forest land from that applied to agriculture, it may report all N_2O emissions from fertilization in the Agriculture sector. This should be explicitly indicated in the documentation box.

[6] A Party may report aggregate estimates for all N fertilization on forest land in the category Forest Land remaining Forest Land when data are not available to report Forest Land remaining Forest Land and Land converted to Forest Land separately.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (II) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Inventory 2011

Submission 2013 v1.1

SLOVENIA

Non-CO_2 emissions from drainage of soils and wetlands[1]

(Sheet 1 of 1)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES		ACTIVITY DATA	IMPLIED EMISSION FACTORS		EMISSIONS[5]	
Land-Use Category[2]	Sub-division[3]	Area (kha)	N_2O-N per area[4] (kg N_2O-N/ha)	CH_4 per area (kg CH_4/ha)	N_2O (Gg)	CH_4 (Gg)
Total all Land Use Categories					**NA,NE,NO**	**NA,NE,NO**
A. Forest Land[6]			**NO**	**NO**	**NO**	**NO**
Organic Soil		NO	NO	NO	NO	NO
Mineral Soil		NO	NO	NO	NO	NO
D. Wetlands			**NE,NO**	**NE,NO**	**NE,NO**	**NE,NO**
Peatland[7]		NE	NE	NE	NE	NE
Flooded Lands[7]		NO	NO	NO	NO	NO
G. Other (please specify)					**NA**	**NA**

(1) Parties may decide not to prepare estimates for these categories contained in appendices 3a.2 and 3a.3 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

(2) N_2O emissions from drained cropland and grassland soils are covered in the Agriculture tables of the CRF under Cultivation of Histosols.

(3) A Party should report further disaggregations of drained soils corresponding to the methods used. Tier 1 disaggregates soils into "nutrient rich" and "nutrient poor" areas, whereas higher-tier methods can further disaggregate into different peatland types, soil t

(4) In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

(5) Emissions are reported with a positive sign.

(6) In table 5, these emissions will be added to 5.A.1 Forest Land remaining Forest Land.

(7) In table 5, these emissions will be added to 5.D.2 Land converted to Wetlands.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (III) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

N_2O emissions from disturbance associated with land-use conversion to cropland [1]

(Sheet 1 of 1)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS [4]
Land-Use Category [2]	Land area converted	N_2O-N emissions per area converted [3]	N_2O
	(kha)	(kg N_2O-N/ha)	(Gg)
Total all Land-Use Categories [5]	**NA,NO**	**NA,NO**	**NA,NO**
B. Cropland	**NA,NO**	**NA,NO**	**NA,NO**
2. Lands converted to Cropland [6]	NA,NO	NA,NO	NA,NO
Organic Soils	NA,NO	NA,NO	NA,NO
Mineral Soils	NA,NO	NA,NO	NA,NO
2.1 Forest Land converted to Cropland	NA	NA	NA
Organic Soils	NA	NA	NA
Mineral Soils	NA	NA	NA
2.2 Grassland converted to Cropland	NA	NA	NA
Organic Soils	NA	NA	NA
Mineral Soils	NA	NA	NA
2.3 Wetlands converted to Cropland [7]	NO	NO	NO
Organic Soils	NO	NO	NO
Mineral Soils	NO	NO	NO
2.5 Other Land converted to Cropland	NO	NO	NO
Organic Soils	NO	NO	NO
Mineral Soils	NO	NO	NO
G. Other *(please specify)*			

[1] Methodologies for N_2O emissions from disturbance associated with land-use conversion are based on equations 3.3.14 and 3.3.15 of the IPCC good practice guidance for LULUCF. N_2O emissions from fertilization in the preceding land use and new land use should not be reported.

[2] According to the IPCC good practice guidance for LULUCF, N_2O emissions from disturbance of soils are only relevant for land conversions to cropland. N_2O emissions from Cropland remaining Cropland are included in the Agriculture sector of the good practice guidance. The good practice guidance provides methodologies only for mineral soils.

[3] In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

[4] Emissions are reported with a positive sign.

[5] Parties can separate between organic and mineral soils, if they have data available.

[6] If activity data cannot be disaggregated to all initial land uses, Parties may report some initial land uses aggregated under Other Land converted to Cropland (indicate in the documentation box what this category includes).

[7] Parties should avoid double counting with N_2O emissions from drainage and from cultivation of organic soils reported in Agriculture under Cultivation of Histosols.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF Sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (IV) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

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CO_2 emissions from agricultural lime application [1]

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(Sheet 1 of 1)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA	IMPLIED EMISSION FACTORS	EMISSIONS [3]
Land-Use Category	Total amount of lime applied (Mg/yr)	CO_2-C per unit of lime [2] (Mg CO_2-C /Mg)	CO_2 (Gg)
Total all Land-Use Categories [4], [5], [6]	**100,000.000000**	**0.120000**	**44.000000**
B. Cropland [6] [7]	**100,000.000000**	**0.120000**	**44.000000**
Limestone $CaCO_3$	100,000.000000	0.120000	44.000000
Dolomite $CaMg(CO_3)_2$	IE	IE	IE
C. Grassland [6] [8]	**IE**	**IE**	**IE**
Limestone $CaCO_3$	IE	IE	IE
Dolomite $CaMg(CO_3)_2$	IE	IE	IE
G. Other ***(please specify)*** [6] [9]			**NA**

[1] CO_2 emissions from agricultural lime application are addressed in equations 3.3.6 and 3.4.11 of the IPCC good practice guidance for LULUCF.

[2] The implied emission factor is expressed in unit of carbon to faciliate comparison with published emission factors.

[3] Emissions are reported with a positive sign.

[4] If Parties are not able to separate liming application for different land-use categories, they should include liming for all land-use categories in the category 5.G Other.

[5] Parties that are able to provide data for lime application to forest land should provide this information under 5.G Other and specify in the documentation box that forest land application is included in this category.

[6] A Party may report aggregate estimates for total lime applications when data are not available for limestone and dolomite.

[7] In table 5, these CO_2 emissions will be added to 5.B.1 Cropland remaining Cropland.

[8] In table 5, these CO_2 emissions will be added to 5.C.1 Grassland remaining Grassland.

[9] If a Party has data broken down to limestone and dolomite at national level, it can report these data under 5.G Other.

Documentation box:

Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 5 (V) SECTORAL BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY

Biomass Burning [1]

(Sheet 1 of 1)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA			IMPLIED EMISSION FACTOR			EMISSIONS [5]		
	Description [3]	Unit	Values	CO_2	CH_4	N_2O	CO_2 [4]	CH_4	N_2O
Land-Use Category [2]		(ha or kg dm)		(Mg/activity data unit)			(Gg)		
Total for Land-Use Categories	**Area burned**	**ha**	**159.080000**	**61.407780**	**0.349791**	**0.004275**	**9.768750**	**0.055645**	**0.000680**
A. Forest Land	**Area burned**	**ha**	**159.080000**	**61.407780**	**0.349791**	**0.004275**	**9.768750**	**0.055645**	**0.000680**
1. Forest land remaining Forest Land	Area burned	ha	159.080000	61.407780	0.349791	0.004275	9.768750	0.055645	0.000680
Controlled Burning	Area burned	ha	NO	NO	NO	NO	NO	NO	NO
Wildfires	Area burned	ha	159.080000	61.407780	0.349791	0.004275	9.768750	0.055645	0.000680
2. Land converted to Forest Land	Area burned	ha	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO	IE,NO
Controlled Burning	(specify)		NO	NO	NO	NO	NO	NO	NO
Wildfires	Area burned	ha	IE	IE	IE	IE	IE	IE	IE
B. Cropland	**Area burned**		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
1. Cropland remaining Cropland [6]			NA	NA	NA	NA	NA	NA	NA
Controlled Burning	(specify)		NA	NA	NA	NA	NA	NA	NA
Wildfires	(specify)		NA	NA	NA	NA	NA	NA	NA
2. Land converted to Cropland	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
Controlled Burning	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
Wildfires	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
2.1. Forest Land converted to Cropland	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
Controlled Burning	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
Wildfires	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
C. Grassland	**Area burned**	**ha**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**
1. Grassland remaining grassland [7]			NO	NO	NO	NO	NO	NO	NO
Controlled Burning	(specify)		NO	NO	NO	NO	NO	NO	NO
Wildfires	(specify)		NO	NO	NO	NO	NO	NO	NO
2. Land converted to Grassland	Area burned	ha	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Controlled Burning			NO	NO	NO	NO	NO	NO	NO
Wildfires	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
2.1. Forest Land converted to Grassland	Area burned	ha	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Controlled Burning	(specify)		NO	NO	NO	NO	NO	NO	NO
Wildfires	Area burned	ha	NA	NA	NA	NA	NA	NA	NA
D. Wetlands			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
1. Wetlands remaining Wetlands [8]			NO	NO	NO	NO	NO	NO	NO
Controlled Burning	(specify)		NO	NO	NO	NO	NO	NO	NO
Wildfires	(specify)		NO	NO	NO	NO	NO	NO	NO
2. Land converted to Wetlands			NO	NO	NO	NO	NO	NO	NO
Controlled Burning			NO	NO	NO	NO	NO	NO	NO
Wildfires			NO	NO	NO	NO	NO	NO	NO
2.1. Forest Land converted to Wetlands			NO	NO	NO	NO	NO	NO	NO
Controlled Burning	(specify)		NO	NO	NO	NO	NO	NO	NO
Wildfires	(specify)		NO	NO	NO	NO	NO	NO	NO
E. Settlements [8]	(specify)		NE	**NO**	**NO**	**NO**	NO	NO	NO
F. Other Land [9]	(specify)		NE	**NO**	**NO**	**NO**	NO	NO	NO
G. Other (please specify)									

[1] Methodological guidance on burning can be found in sections 3.2.1.4 and 3.4.1.3 of the IPCC good practice guidance for LULUCF.

[2] Parties should report both controlled/prescribed burning and wildfires emissions, where appropriate, in a separate manner.

[3] For each category activity data should be selected between area burned or biomass burned. Units for area will be ha and for biomass burned kg dm. The implied emission factor will refer to the selected activity data with an automatic change in the units.

[4] If CO_2 emissions from biomass burning are not already included in tables 5.A - 5.F, they should be reported here. This should be clearly documented in the documentation box and in the NIR. Double counting should be avoided. Parties that include all carbon stock changes in the carbon stock tables (5.A, 5.B, 5.C, 5.D, 5.E and 5.F), should report IE (included elsewhere) in this column.

[5] Emissions are reported with a positive sign.

[6] In-situ above-ground woody biomass burning is reported here. Agricultural residue burning is reported in the Agriculture sector.

[7] Includes only emissions from controlled biomass burning on grasslands outside the tropics (prescribed savanna burning is reported under the Agriculture sector).

[8] Parties may decide not to prepare estimates for these categories contained in appendices 3a.2, 3a.3 and 3a.4 of the IPCC good practice guidance for LULUCF, although they may do so if they wish.

[9] This land-use category is to allow the total of identified land area to match the national area.

Documentation box:
Parties should provide detailed explanations on the Land Use, Land-Use Change and Forestry sector in Chapter 7: Land Use, Land-Use Change and Forestry (CRF sector 5) of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and/or further details are needed to understand the content of this table.

TABLE 10 EMISSION TRENDS
CO_2
(Part 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1986)	1987	1988	1989	1990	1991	1992	1993	1994	1995
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**15,330.163267**	**14,782.997059**	**14,432.682124**	**14,409.729136**	**13,747.888637**	**12,902.351378**	**12,884.962280**	**13,389.440996**	**13,370.203473**	**14,180.109792**
A. Fuel Combustion (Sectoral Approach)	15,209.918384	14,669.679639	14,320.176956	14,285.576920	13,649.501989	12,811.583713	12,787.107175	13,299.263657	13,284.672749	14,093.907523
1. Energy Industries	6,700.708138	6,349.314352	6,432.594624	6,536.966494	6,238.742879	5,321.333515	5,840.144451	5,620.136686	5,230.605852	5,601.040338
2. Manufacturing Industries and Construction	4,352.108122	3,856.823122	3,633.432680	3,409.437023	3,085.368903	3,029.003788	2,637.595784	2,480.120918	2,640.314538	2,586.885243
3. Transport	1,979.039533	2,263.491113	2,439.360895	2,470.458170	2,671.710637	2,522.527058	2,604.699660	3,005.272178	3,312.238593	3,635.521839
4. Other Sectors	2,136.969539	2,168.297329	1,783.035035	1,836.961511	1,621.925849	1,931.870509	1,703.297512	2,192.364106	2,100.143998	2,269.090334
5. Other	41.093052	31.753722	31.753722	31.753722	31.753722	6.848842	1.369768	1.369768	1.369768	1.369768
B. Fugitive Emissions from Fuels	120.244883	113.317420	112.505169	124.152216	98.386648	90.767665	97.855105	90.177338	85.530724	86.202270
1. Solid Fuels	120.238274	113.310452	112.498156	124.145387	98.379884	90.760741	97.847635	90.170358	85.525645	86.196481
2. Oil and Natural Gas	0.006609	0.006967	0.007013	0.006829	0.006763	0.006925	0.007470	0.006980	0.005079	0.005789
2. Industrial Processes	**1,026.737238**	**1,010.219624**	**1,082.580390**	**1,046.041539**	**1,046.533093**	**881.707858**	**815.836675**	**678.028346**	**833.484192**	**846.820125**
A. Mineral Products	794.565399	756.656925	803.237501	757.273138	725.093081	606.272868	554.206943	450.392328	571.616148	608.925555
B. Chemical Industry	44.985188	53.054789	54.830099	49.458101	36.728795	27.975420	23.051561	21.883979	31.737933	26.859710
C. Metal Production	187.186651	200.507910	224.512790	239.310300	284.711217	247.459570	238.578170	205.752040	230.130110	211.034860
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
4. Agriculture										
A. Enteric Fermentation										
B. Manure Management										
C. Rice Cultivation										
D. Agricultural Soils										
E. Prescribed Burning of Savannas										
F. Field Burning of Agricultural Residues										
G. Other										
5. Land Use, Land-Use Change and Forestry(2)	**-9,193.317602**	**-9,169.771597**	**-9,135.064729**	**-9,115.310654**	**-9,061.320515**	**-9,037.213857**	**-9,032.429771**	**-9,028.495569**	**-9,004.703898**	**-8,972.015503**
A. Forest Land	-10,808.531833	-10,816.090098	-10,812.487499	-10,823.837695	-10,800.951825	-10,807.949437	-10,834.269621	-10,861.439689	-10,868.997954	-10,867.413828
B. Cropland	377.056319	379.212009	381.367699	383.523390	385.679080	387.834771	389.990461	392.146151	394.547508	396.703199
C. Grassland	197.071726	213.846749	230.621773	247.396796	264.171819	280.946843	297.721866	314.496889	331.271913	348.046936
D. Wetlands	137.966399	138.733596	139.500792	140.267989	141.035185	141.802382	142.569579	143.336775	144.103972	144.871168
E. Settlements	624.727394	629.330573	633.933753	638.536933	643.140113	647.743292	652.346472	656.949652	661.552831	666.156011
F. Other Land	278.392394	285.195573	291.998753	298.801933	305.605113	312.408292	319.211472	326.014652	332.817831	339.621011
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**1.338026**	**1.338026**	**1.338026**	**1.338026**	**0.858990**	**0.439989**
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
B. Waste-water Handling										
C. Waste Incineration	NO	NO	NO	NO	1.338026	1.338026	1.338026	1.338026	0.858990	0.439989
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total CO_2 emissions including net CO_2 from LULUCF	**7,163.582903**	**6,623.445085**	**6,380.197786**	**6,340.460021**	**5,734.439242**	**4,748.183406**	**4,669.707210**	**5,040.311799**	**5,199.842756**	**6,055.354403**
Total CO_2 emissions excluding net CO_2 from LULUCF	**16,356.900505**	**15,793.216683**	**15,515.262515**	**15,455.770675**	**14,795.759756**	**13,785.397263**	**13,702.136981**	**14,068.807368**	**14,204.546654**	**15,027.369906**
Memo Items:										
International Bunkers	**57.097212**	**57.097212**	**52.941460**	**49.881260**	**48.045140**	**20.809360**	**32.927752**	**47.004672**	**52.513032**	**56.185272**
Aviation	57.097212	57.097212	52.941460	49.881260	48.045140	20.809360	32.927752	47.004672	52.513032	56.185272
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Multilateral Operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CO_2 Emissions from Biomass	2,253.738522	2,212.239431	2,170.740339	2,129.241248	2,088.435156	2,031.991727	2,043.970170	2,032.319619	2,060.509502	2,036.295180

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
CO_2
(Part 2 of 3)

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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**14,845.621570**	**15,137.935394**	**14,883.134619**	**14,239.735650**	**14,328.909952**	**15,183.674564**	**15,342.158924**	**15,047.607818**	**15,372.855006**	**15,603.154374**
A. Fuel Combustion (Sectoral Approach)	14,762.105753	15,050.622000	14,797.077222	14,159.361242	14,249.919946	15,110.839797	15,258.453654	14,960.937091	15,286.601511	15,521.875519
1. Energy Industries	5,213.830805	5,624.804438	5,858.665564	5,170.944844	5,473.409917	6,175.954532	6,423.624940	6,156.895241	6,286.396161	6,296.732105
2. Manufacturing Industries and Construction	2,449.158414	2,189.791823	2,253.821554	2,271.626630	2,240.461845	2,182.155648	2,216.030647	2,129.396041	2,242.397484	2,449.819032
3. Transport	4,206.401553	4,269.807260	3,686.055227	3,503.434134	3,646.081142	3,775.626407	3,786.361042	3,923.670376	4,070.902151	4,342.061869
4. Other Sectors	2,891.345213	2,964.848709	2,995.857603	3,210.491573	2,886.916195	2,973.865575	2,829.199392	2,747.737798	2,683.512426	2,429.962617
5. Other	1.369768	1.369768	2.677275	2.864061	3.050848	3.237634	3.237634	3.237634	3.393290	3.299897
B. Fugitive Emissions from Fuels	83.515816	87.313394	86.057396	80.374408	78.990006	72.834767	83.705269	86.670728	86.253495	81.278855
1. Solid Fuels	83.511115	87.309338	86.052736	80.369899	78.985676	72.830662	83.701451	86.667046	86.250125	81.275541
2. Oil and Natural Gas	0.004702	0.004056	0.004660	0.004510	0.004330	0.004105	0.003818	0.003682	0.003370	0.003314
2. Industrial Processes	**849.278066**	**868.392627**	**860.035485**	**875.085279**	**895.121039**	**954.273018**	**943.546481**	**991.409843**	**1,016.186104**	**1,082.311506**
A. Mineral Products	627.335556	647.029457	660.889405	670.789599	681.573459	726.096518	654.785351	681.616023	702.340296	761.292458
B. Chemical Industry	26.381840	30.476520	33.092070	31.631660	27.960090	36.651300	33.138870	41.021300	43.001380	46.170010
C. Metal Production	195.560670	190.886650	166.054010	172.664020	185.587490	191.525200	255.622260	268.772520	270.844428	274.849038
D. Other Production	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO
4. Agriculture										
A. Enteric Fermentation										
B. Manure Management										
C. Rice Cultivation										
D. Agricultural Soils										
E. Prescribed Burning of Savannas										
F. Field Burning of Agricultural Residues										
G. Other										
5. Land Use, Land-Use Change and Forestry[2]	**-8,942.643742**	**-8,910.526440**	**-8,865.993098**	**-8,867.255837**	**-9,902.302472**	**-9,869.707475**	**-9,854.252005**	**-9,735.738313**	**-9,803.372482**	**-9,773.900685**
A. Forest Land	-10,869.146337	-10,868.133305	-10,854.704233	-10,887.071241	-11,953.222146	-11,954.400536	-11,972.718453	-11,887.978148	-11,989.385703	-11,993.687294
B. Cropland	398.858889	401.014580	403.170270	405.325960	407.481651	409.837237	412.192824	414.548410	416.903996	419.259583
C. Grassland	364.821960	381.596983	398.372006	415.147030	431.922053	450.237917	468.553780	486.869643	505.185507	523.501370
D. Wetlands	145.638365	146.405562	147.172758	147.939955	148.707152	149.545762	150.384373	151.222983	152.061594	152.900204
E. Settlements	670.759191	675.362370	679.965550	684.568730	689.171909	694.203573	699.235236	704.266899	709.298562	714.330226
F. Other Land	346.424191	353.227370	360.030550	366.833730	373.636909	380.868573	388.100236	395.331899	402.563562	409.795226
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**0.638641**	**0.298752**	**0.721366**	**1.763704**	**2.161371**	**2.187763**	**1.921772**	**2.715323**	**2.366482**	**2.270704**
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
B. Waste-water Handling										
C. Waste Incineration	0.638641	0.298752	0.721366	1.763704	2.161371	2.187763	1.921772	2.715323	2.366482	2.270704
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total CO_2 emissions including net CO_2 from LULUCF	**6,752.894535**	**7,096.100333**	**6,877.898372**	**6,249.328797**	**5,323.889890**	**6,270.427868**	**6,433.375171**	**6,305.994670**	**6,588.035110**	**6,913.835899**
Total CO_2 emissions excluding net CO_2 from LULUCF	**15,695.538277**	**16,006.626772**	**15,743.891470**	**15,116.584634**	**15,226.192362**	**16,140.135344**	**16,287.627176**	**16,041.732984**	**16,391.407592**	**16,687.736584**
Memo Items:										
International Bunkers	**51.931594**	**54.704135**	**48.886695**	**58.618131**	**67.599818**	**76.540651**	**78.907808**	**75.226603**	**56.273559**	**129.190359**
Aviation	51.931594	54.704135	48.886695	58.618131	67.599818	76.540651	78.907808	75.226603	56.273559	60.902359
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA,NO	68.288000
Multilateral Operations	NA	0.186787	0.249049	0.373573	0.498098	0.560360	0.560360	0.622622	0.622622	0.435835
CO_2 Emissions from Biomass	2,081.257614	2,113.083473	2,135.613070	1,867.504337	1,896.759315	1,884.664030	1,947.476851	2,093.956049	2,167.488990	2,298.506787

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
CO_2
(Part 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	**15,743.762337**	**15,849.592721**	**16,872.238845**	**15,294.134035**	**15,378.070704**	**15,423.826656**	**0.610975**
A. Fuel Combustion (Sectoral Approach)	15,662.769743	15,767.760624	16,790.466695	15,214.276489	15,297.441355	15,341.976986	0.868240
1. Energy Industries	6,350.366840	6,566.798283	6,355.818856	6,062.357136	6,189.593642	6,234.036897	-6.964506
2. Manufacturing Industries and Construction	2,550.265700	2,311.183568	2,268.760827	1,888.238620	1,874.455056	1,682.646649	-61.337205
3. Transport	4,554.795349	5,127.805695	6,043.999500	5,243.273538	5,182.006362	5,632.263661	184.595814
4. Other Sectors	2,204.041958	1,758.517526	2,118.361887	2,017.093883	2,048.519778	1,789.916669	-16.240422
5. Other	3.299897	3.455552	3.525625	3.313312	2.866518	3.113110	-92.424242
B. Fugitive Emissions from Fuels	80.992593	81.832098	81.772149	79.857545	80.629348	81.849670	-31.930850
1. Solid Fuels	80.989385	81.828984	81.769119	79.854600	80.626424	81.846766	-31.929523
2. Oil and Natural Gas	0.003209	0.003114	0.003030	0.002946	0.002925	0.002904	-56.062825
2. Industrial Processes	**1,130.162257**	**1,154.519926**	**1,097.715332**	**748.615903**	**738.953612**	**NA,NO**	**-100.000000**
A. Mineral Products	822.693490	865.101380	895.416874	662.724571	628.775298		-100.000000
B. Chemical Industry	46.200530	34.284650	14.185838	0.827200	1.141800		-100.000000
C. Metal Production	261.268237	255.133897	188.112621	85.064132	109.036514	NA,NO	-100.000000
D. Other Production	NA	NA	NA	NA	NA	NA	0.000000
E. Production of Halocarbons and SF_6							
F. Consumption of Halocarbons and SF_6							
G. Other	NA	NA	NA	NA	NA	NA	0.000000
3. Solvent and Other Product Use	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	NA,NE,NO	0.000000
4. Agriculture							
A. Enteric Fermentation							
B. Manure Management							
C. Rice Cultivation							
D. Agricultural Soils							
E. Prescribed Burning of Savannas							
F. Field Burning of Agricultural Residues							
G. Other							
5. Land Use, Land-Use Change and Forestry[2]	**-9,694.368038**	**-9,725.662925**	**-9,703.393033**	**-9,673.756663**	**-9,652.146905**	**-9,620.116860**	**4.642494**
A. Forest Land	-11,947.928034	-12,012.996307	-12,024.499802	-12,028.636820	-12,040.800448	-12,042.543791	11.417017
B. Cropland	421.615169	423.970756	426.326342	428.681928	431.037515	433.393101	14.941212
C. Grassland	541.817233	560.133097	578.448960	596.764824	615.080687	633.396550	221.404071
D. Wetlands	153.738815	154.577425	155.416036	156.254646	157.093257	157.931868	14.471254
E. Settlements	719.361889	724.393552	729.425216	734.456879	739.488542	744.520205	19.175214
F. Other Land	417.026889	424.258552	431.490216	438.721879	445.953542	453.185205	62.786490
G. Other	NE	NE	NE	NE	NE	NE	0.000000
6. Waste	**2.745732**	**3.400307**	**3.574647**	**4.414740**	**5.227801**	**14.337591**	**100.000000**
A. Solid Waste Disposal on Land	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
B. Waste-water Handling							
C. Waste Incineration	2.745732	3.400307	3.574647	4.414740	5.227801	14.337591	100.000000
D. Other	NA	NA	NA	NA	NA	NA	0.000000
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.000000**
Total CO_2 emissions including net CO_2 from LULUCF	**7,182.302288**	**7,281.850030**	**8,270.135791**	**6,373.408014**	**6,470.105212**	**5,818.047387**	**-18.782996**
Total CO_2 emissions excluding net CO_2 from LULUCF	**16,876.670326**	**17,007.512955**	**17,973.528824**	**16,047.164677**	**16,122.252117**	**15,438.164247**	**-5.616811**

Memo Items:							
International Bunkers	**163.367044**	**250.890688**	**316.205105**	**182.233876**	**132.674083**	**174.489567**	**205.600855**
Aviation	69.809380	93.395280	103.803330	77.743419	73.062475	69.394335	21.537170
Marine	93.557664	157.495408	212.401775	104.490457	59.611608	105.095232	100.000000
Multilateral Operations	0.435835	0.435835	0.449940	0.414187	0.375143	0.404704	100.000000
CO_2 Emissions from Biomass	2,258.238721	2,229.809634	2,520.746178	2,582.904464	2,797.434037	2,604.222786	15.551239

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
CH_4
(Part 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1986)	1987	1988	1989	1990	1991	1992	1993	1994	1995
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	28.694091	27.725439	26.856192	26.911946	24.990451	24.291358	25.439258	24.032364	23.113932	23.077568
A. Fuel Combustion (Sectoral Approach)	8.906775	8.648180	7.846828	7.850278	7.811738	8.013785	7.810763	7.777878	7.607384	7.525146
1. Energy Industries	0.089985	0.093708	0.085776	0.089540	0.092000	0.073368	0.074304	0.070606	0.071184	0.075121
2. Manufacturing Industries and Construction	0.494495	0.445566	0.417408	0.391712	0.359649	0.317749	0.280240	0.267402	0.274030	0.263061
3. Transport	1.118243	1.291732	1.377881	1.410152	1.460775	1.387603	1.529865	1.691569	1.761126	1.769259
4. Other Sectors	7.203478	6.816731	5.965318	5.958430	5.898870	6.234969	5.926335	5.748281	5.501025	5.417686
5. Other	0.000575	0.000444	0.000444	0.000444	0.000444	0.000096	0.000019	0.000019	0.000019	0.000019
B. Fugitive Emissions from Fuels	19.787316	19.077259	19.009363	19.061667	17.178713	16.277573	17.628496	16.254487	15.506548	15.552422
1. Solid Fuels	17.090783	16.236551	16.148918	16.275884	14.419419	13.452450	14.573049	13.377459	12.769291	12.955864
2. Oil and Natural Gas	2.696533	2.840708	2.860446	2.785784	2.759294	2.825123	3.055446	2.877028	2.737257	2.596558
2. Industrial Processes	**0.176763**	**0.173676**	**0.308467**	**0.257302**	**0.160243**	**0.174399**	**0.009139**	**0.032773**	**0.123441**	**0.185670**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	0.176763	0.173676	0.308467	0.257302	0.160243	0.174399	0.009139	0.032773	0.123441	0.185670
C. Metal Production	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use										
4. Agriculture	**54.709030**	**54.643968**	**54.001819**	**53.545639**	**53.931637**	**50.720946**	**53.312578**	**51.468532**	**51.731740**	**51.175350**
A. Enteric Fermentation	32.406531	31.869094	31.770155	31.735525	31.228260	29.708031	30.229231	28.970370	29.308685	30.787476
B. Manure Management	22.302499	22.774873	22.231663	21.810114	22.703377	21.012915	23.083347	22.498163	22.423055	20.387874
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land Use, Land-Use Change and Forestry	**NA,NE,NO**	**NA,NE,NO**	**0.063575**	**0.041975**	**0.215391**	**0.218584**	**0.111713**	**NA,NE,NO**	**NA,NE,NO**	**0.052077**
A. Forest Land	NA,NO	NA,NO	0.063575	0.041975	0.215391	0.218584	0.111713	NA,NO	NA,NO	0.052077
B. Cropland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**20.568273**	**21.130445**	**21.676659**	**22.338482**	**22.432957**	**22.570386**	**22.759079**	**23.114050**	**23.313082**	**23.488150**
A. Solid Waste Disposal on Land	14.228605	14.790231	15.347395	16.014422	16.433807	16.692048	17.056611	17.417098	17.776891	17.927077
B. Waste-water Handling	6.339668	6.340214	6.329264	6.324059	5.999151	5.878338	5.702469	5.696951	5.536191	5.561073
C. Waste Incineration	NO	NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total CH_4 emissions including CH_4 from LULUCF	**104.148157**	**103.673528**	**102.906711**	**103.095343**	**101.730679**	**97.975673**	**101.631768**	**98.647719**	**98.282194**	**97.978814**
Total CH_4 emissions excluding CH_4 from LULUCF	**104.148157**	**103.673528**	**102.843137**	**103.053368**	**101.515288**	**97.757089**	**101.520055**	**98.647719**	**98.282194**	**97.926738**
Memo Items:										
International Bunkers	0.000799	0.000809	0.000740	0.000698	0.000672	0.000291	0.000461	0.000657	0.000734	0.000786
Aviation	0.000799	0.000809	0.000740	0.000698	0.000672	0.000291	0.000461	0.000657	0.000734	0.000786
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Multilateral Operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CO_2 Emissions from Biomass										

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
CH_4
(Part 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	22.525532	23.059938	22.344632	21.169233	20.751662	19.112355	20.424407	20.747641	20.487429	19.735884
A. Fuel Combustion (Sectoral Approach)	7.642701	7.400532	7.017889	6.796186	6.688039	6.089675	6.054904	6.059251	6.001923	5.999035
1. Energy Industries	0.066050	0.063544	0.066768	0.059439	0.061446	0.068085	0.069663	0.069315	0.069351	0.083919
2. Manufacturing Industries and Construction	0.278021	0.276887	0.293605	0.215170	0.222225	0.274430	0.293405	0.321117	0.335094	0.366214
3. Transport	1.862662	1.727406	1.369145	1.208318	1.149901	1.073258	0.965683	0.879915	0.757718	0.686188
4. Other Sectors	5.435949	5.332676	5.288335	5.313218	5.254424	4.673858	4.726107	4.788859	4.839712	4.862668
5. Other	0.000019	0.000019	0.000037	0.000040	0.000043	0.000045	0.000045	0.000045	0.000047	0.000046
B. Fugitive Emissions from Fuels	14.882830	15.659405	15.326742	14.373047	14.063623	13.022680	14.369503	14.688390	14.485506	13.736849
1. Solid Fuels	12.371549	13.262248	13.108569	12.225624	12.005596	11.076708	12.559552	12.943095	12.888275	12.166007
2. Oil and Natural Gas	2.511281	2.397157	2.218174	2.147423	2.058027	1.945972	1.809951	1.745295	1.597230	1.570842
2. Industrial Processes	**0.163414**	**0.251142**	**0.255194**	**0.272316**	**0.259476**	**0.277736**	**0.243212**	**0.302356**	**0.247132**	**0.287299**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	0.163414	0.251142	0.255194	0.272316	0.259476	0.277736	0.243212	0.302356	0.247132	0.287299
C. Metal Production	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use										
4. Agriculture	**49.773764**	**48.719877**	**50.239056**	**49.445660**	**53.610548**	**52.997757**	**55.331498**	**52.997061**	**51.293090**	**52.017029**
A. Enteric Fermentation	30.399914	28.901414	29.657010	30.951138	33.063330	32.391582	33.024684	31.399548	30.981694	31.519730
B. Manure Management	19.373849	19.818463	20.582046	18.494522	20.547219	20.606176	22.306814	21.597513	20.311396	20.497299
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Agricultural Soils	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land Use, Land-Use Change and Forestry	**0.085262**	**0.134085**	**0.253634**	**0.112318**	**0.043423**	**0.084076**	**0.027098**	**0.557161**	**0.026888**	**0.049751**
A. Forest Land	0.085262	0.134085	0.253634	0.112318	0.043423	0.084076	0.027098	0.557161	0.026888	0.049751
B. Cropland	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
E. Settlements	NE	NE	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**23.650130**	**24.319685**	**25.097051**	**25.879601**	**26.684673**	**27.402258**	**28.034130**	**28.426477**	**30.583582**	**31.059811**
A. Solid Waste Disposal on Land	18.151203	18.797075	19.480534	20.169177	20.901166	21.545667	22.104455	22.423719	22.984010	23.164421
B. Waste-water Handling	5.498927	5.522609	5.616517	5.710423	5.783507	5.856591	5.929675	6.002758	7.599572	7.895389
C. Waste Incineration	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total CH_4 emissions including CH_4 from LULUCF	**96.198101**	**96.484727**	**98.189567**	**96.879128**	**101.349783**	**99.874183**	**104.060346**	**103.030696**	**102.638122**	**103.149773**
Total CH_4 emissions excluding CH_4 from LULUCF	**96.112839**	**96.350641**	**97.935933**	**96.766810**	**101.306360**	**99.790107**	**104.033248**	**102.473535**	**102.611234**	**103.100022**
Memo Items:										
International Bunkers	0.000726	0.000765	0.000684	0.000820	0.000945	0.001070	0.001104	0.001052	0.000787	0.004372
Aviation	0.000726	0.000765	0.000684	0.000820	0.000945	0.001070	0.001104	0.001052	0.000787	0.000852
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA,NO	0.003520
Multilateral Operations	NA	0.000003	0.000003	0.000005	0.000007	0.000008	0.000008	0.000009	0.000009	0.000006
CO_2 Emissions from Biomass										

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
CH_4
(Part 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	19.601187	19.498582	19.646233	19.793899	20.127373	19.633649	-31.575987
A. Fuel Combustion (Sectoral Approach)	5.962290	5.905930	6.095606	6.528483	6.867630	6.193409	-30.464064
1. Energy Industries	0.089285	0.089122	0.144325	0.109254	0.106064	0.113499	26.131110
2. Manufacturing Industries and Construction	0.346239	0.303329	0.300988	0.255309	0.269091	0.256447	-48.139479
3. Transport	0.619405	0.572815	0.565392	0.478880	0.435875	0.387028	-65.389609
4. Other Sectors	4.907315	4.940616	5.084852	5.684995	6.056561	5.436391	-24.531020
5. Other	0.000046	0.000048	0.000049	0.000046	0.000040	0.000044	-92.424242
B. Fugitive Emissions from Fuels	13.638896	13.592653	13.550628	13.265415	13.259743	13.440239	-32.076491
1. Solid Fuels	12.118065	12.116770	12.114522	11.869192	11.873461	12.063937	-29.412613
2. Oil and Natural Gas	1.520832	1.475882	1.436106	1.396223	1.386282	1.376302	-48.960305
2. Industrial Processes	**0.259338**	**0.296853**	**0.182358**	**0.208756**	**0.163937**		**-100.000000**
A. Mineral Products	NA	NA	NA	NA	NA	NA	0.000000
B. Chemical Industry	0.259338	0.296853	0.182358	0.208756	0.163937		-100.000000
C. Metal Production	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
D. Other Production							
E. Production of Halocarbons and SF_6							
F. Consumption of Halocarbons and SF_6							
G. Other	NA	NA	NA	NA	NA	NA	0.000000
3. Solvent and Other Product Use							
4. Agriculture	**52.498935**	**54.624683**	**52.487379**	**52.551132**	**52.213502**		**-100.000000**
A. Enteric Fermentation	31.600693	33.049371	32.334676	32.083899	31.725475		-100.000000
B. Manure Management	20.898241	21.575312	20.152703	20.467233	20.488027		-100.000000
C. Rice Cultivation	NO	NO	NO	NO	NO	NO	0.000000
D. Agricultural Soils	NO	NO	NO	NO	NO	NO	0.000000
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	0.000000
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
G. Other	NO	NO	NO	NO	NO	NO	0.000000
5. Land Use, Land-Use Change and Forestry	**0.357770**	**0.034493**	**0.016332**	**0.040132**	**0.018210**	**0.055645**	**100.000000**
A. Forest Land	0.357770	0.034493	0.016332	0.040132	0.018210	0.055645	100.000000
B. Cropland	NA	NA	NA	NA	NA	NA	0.000000
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0.000000
E. Settlements	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0.000000
F. Other Land	NO	NO	NO	NO	NO	NO	0.000000
G. Other	NE	NE	NE	NE	NE	NE	0.000000
6. Waste	**31.829300**	**30.015088**	**26.502622**	**24.357278**	**24.434334**	**16.273621**	**-20.879984**
A. Solid Waste Disposal on Land	22.682201	21.588191	19.035807	17.202875	16.952513	16.273621	14.372567
B. Waste-water Handling	9.147099	8.426898	7.466816	7.154403	7.481821		-100.000000
C. Waste Incineration	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
D. Other	NA	NA	NA	NA	NA	NA	0.000000
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.000000**
Total CH_4 emissions including CH_4 from LULUCF	**104.546529**	**104.469700**	**98.834924**	**96.951195**	**96.957356**	**35.962914**	**-65.469466**
Total CH_4 emissions excluding CH_4 from LULUCF	**104.188759**	**104.435207**	**98.818592**	**96.911064**	**96.939146**	**35.907270**	**-65.522895**
Memo Items:							
International Bunkers	0.005799	0.009425	0.012400	0.006473	0.004095	0.006388	699.916217
Aviation	0.000976	0.001306	0.001452	0.001087	0.001022	0.000971	21.537170
Marine	0.004823	0.008118	0.010949	0.005386	0.003073	0.005417	100.000000

Multilateral Operations	0.000006	0.000006	0.000006	0.000006	0.000005	0.000006	100.000000
CO_2 Emissions from Biomass							

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
N_2O
(Part 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1986)	1987	1988	1989	1990	1991	1992	1993	1994	1995
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**0.584494**	**0.562155**	**0.543231**	**0.530472**	**0.514691**	**0.493365**	**0.466803**	**0.491454**	**0.550818**	**0.596923**
A. Fuel Combustion (Sectoral Approach)	0.584494	0.562155	0.543231	0.530472	0.514691	0.493365	0.466803	0.491454	0.550818	0.596923
1. Energy Industries	0.085472	0.079854	0.080654	0.084450	0.080027	0.072190	0.080226	0.076750	0.074744	0.077078
2. Manufacturing Industries and Construction	0.134880	0.114057	0.101275	0.090922	0.083535	0.070161	0.061909	0.056256	0.062270	0.073432
3. Transport	0.120297	0.134453	0.141978	0.144043	0.150646	0.145920	0.136523	0.181664	0.223868	0.272044
4. Other Sectors	0.242696	0.232902	0.218436	0.210169	0.199594	0.204902	0.188108	0.176746	0.189897	0.174331
5. Other	0.001149	0.000888	0.000888	0.000888	0.000888	0.000192	0.000038	0.000038	0.000038	0.000038
B. Fugitive Emissions from Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
2. Oil and Natural Gas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Metal Production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	0.264204	0.233153	0.202102	0.171051	0.140000	0.120000	0.090000	0.063489	0.060758	0.055648
4. Agriculture	**3.451328**	**3.559366**	**3.428043**	**3.285504**	**3.252194**	**3.042044**	**3.435900**	**3.110658**	**3.136144**	**3.137193**
A. Enteric Fermentation										
B. Manure Management	0.890435	0.873146	0.866728	0.861854	0.838812	0.796757	0.759761	0.679393	0.661231	0.677548
C. Rice Cultivation										
D. Agricultural Soils	2.560893	2.686220	2.561315	2.423651	2.413382	2.245287	2.676140	2.431265	2.474912	2.459645
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land Use, Land-Use Change and Forestry	**NA,NE,NO**	**NA,NE,NO**	**0.000777**	**0.000513**	**0.002633**	**0.002672**	**0.001365**	**NA,NE,NO**	**NA,NE,NO**	**0.000636**
A. Forest Land	NA,NO	NA,NO	0.000777	0.000513	0.002633	0.002672	0.001365	NA,NO	NA,NO	0.000636
B. Cropland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
E. Settlements	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**0.189864**	**0.186658**	**0.184488**	**0.184676**	**0.192164**	**0.180508**	**0.143618**	**0.163821**	**0.171093**	**0.179307**
A. Solid Waste Disposal on Land										
B. Waste-water Handling	0.189864	0.186658	0.184488	0.184676	0.192164	0.180508	0.143618	0.163821	0.171093	0.179307
C. Waste Incineration	NO	NO	NO	NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total N_2O emissions including N_2O from LULUCF	**4.489890**	**4.541333**	**4.358641**	**4.172216**	**4.101681**	**3.838589**	**4.137687**	**3.829422**	**3.918813**	**3.969708**
Total N_2O emissions excluding N_2O from LULUCF	**4.489890**	**4.541333**	**4.357864**	**4.171703**	**4.099049**	**3.835917**	**4.136322**	**3.829422**	**3.918813**	**3.969071**
Memo Items:										
International Bunkers	**0.001597**	**0.001618**	**0.001481**	**0.001395**	**0.001344**	**0.000582**	**0.000921**	**0.001315**	**0.001469**	**0.001572**
Aviation	0.001597	0.001618	0.001481	0.001395	0.001344	0.000582	0.000921	0.001315	0.001469	0.001572
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Multilateral Operations	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CO_2 Emissions from Biomass										

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
N_2O
(Part 2 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)
1. Energy	**0.657154**	**0.669074**	**0.635364**	**0.599562**	**0.622215**	**0.619167**	**0.608821**	**0.603903**	**0.604710**	**0.616103**
A. Fuel Combustion (Sectoral Approach)	0.657154	0.669074	0.635364	0.599562	0.622215	0.619167	0.608821	0.603903	0.604710	0.616103
1. Energy Industries	0.070152	0.076822	0.081470	0.071845	0.074737	0.081602	0.086079	0.081688	0.083551	0.086025
2. Manufacturing Industries and Construction	0.075770	0.077535	0.083289	0.066361	0.075929	0.072934	0.069827	0.070072	0.087144	0.090376
3. Transport	0.336791	0.341243	0.295252	0.287311	0.299119	0.299035	0.288103	0.283927	0.270047	0.274972
4. Other Sectors	0.174402	0.173437	0.175278	0.173965	0.172345	0.165505	0.164721	0.168127	0.163873	0.164638
5. Other	0.000038	0.000038	0.000075	0.000080	0.000085	0.000091	0.000091	0.000091	0.000095	0.000092
B. Fugitive Emissions from Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
2. Oil and Natural Gas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
2. Industrial Processes	**NA,NO**	**0.000048**	**0.000061**	**0.000053**	**0.000090**	**0.000081**	**0.000073**	**0.000082**	**0.000066**	**0.000010**
A. Mineral Products	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B. Chemical Industry	NA,NO	0.000048	0.000061	0.000053	0.000090	0.000081	0.000073	0.000082	0.000066	0.000010
C. Metal Production	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
D. Other Production										
E. Production of Halocarbons and SF_6										
F. Consumption of Halocarbons and SF_6										
G. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3. Solvent and Other Product Use	0.060320	0.061120	0.090181	0.104527	0.137834	0.117316	0.117845	0.107523	0.126600	0.139743
4. Agriculture	**3.077110**	**3.157637**	**3.208793**	**3.205814**	**3.262828**	**3.213970**	**3.280803**	**3.136696**	**2.949604**	**2.948831**
A. Enteric Fermentation										
B. Manure Management	0.662212	0.655837	0.645233	0.642003	0.641854	0.619499	0.626853	0.569701	0.529677	0.531674
C. Rice Cultivation										
D. Agricultural Soils	2.414898	2.501801	2.563561	2.563811	2.620974	2.594471	2.653949	2.566995	2.419927	2.417158
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
G. Other	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
5. Land-Use Change and Forestry	**0.001042**	**0.001639**	**0.003100**	**0.001373**	**0.000531**	**0.001028**	**0.000331**	**0.006810**	**0.000329**	**0.000608**
A. Forest Land	0.001042	0.001639	0.003100	0.001373	0.000531	0.001028	0.000331	0.006810	0.000329	0.000608
B. Cropland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
E. Settlements	NE	NE	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO
F. Other Land	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
G. Other	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
6. Waste	**0.185868**	**0.181449**	**0.179598**	**0.193966**	**0.194194**	**0.186270**	**0.183191**	**0.185618**	**0.182378**	**0.187314**
A. Solid Waste Disposal on Land										
B. Waste-water Handling	0.185868	0.181449	0.179594	0.193966	0.194194	0.186270	0.183087	0.185524	0.182332	0.187197
C. Waste Incineration	NA,NO	NA,NO	0.000004	NA,NO	NA,NO	NA,NO	0.000104	0.000094	0.000046	0.000117
D. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7. Other ***(as specified in Summary 1.A)***	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total N_2O emissions including N_2O from LULUCF	**3.981495**	**4.070967**	**4.117096**	**4.105295**	**4.217692**	**4.137831**	**4.191064**	**4.040632**	**3.863687**	**3.892609**
Total N_2O emissions excluding N_2O from LULUCF	**3.980453**	**4.069328**	**4.113996**	**4.103922**	**4.217162**	**4.136804**	**4.190733**	**4.033822**	**3.863359**	**3.892001**
Memo Items:										
International Bunkers	**0.001453**	**0.001530**	**0.001367**	**0.001640**	**0.001891**	**0.002141**	**0.002207**	**0.002104**	**0.001574**	**0.028104**
Aviation	0.001453	0.001530	0.001367	0.001640	0.001891	0.002141	0.002207	0.002104	0.001574	0.001704
Marine	NA	NA	NA	NA	NA	NA	NA	NA	NA,NO	0.026400
Multilateral Operations	NA	0.000005	0.000007	0.000010	0.000014	0.000016	0.000016	0.000017	0.000017	0.000012
CO_2 Emissions from Biomass										

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
N_2O
(Part 3 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
1. Energy	**0.640673**	**0.624852**	**0.669353**	**0.596347**	**0.579062**	**0.487207**	**-16.644550**
A. Fuel Combustion (Sectoral Approach)	0.640673	0.624852	0.669353	0.596347	0.579062	0.487207	-16.644550
1. Energy Industries	0.087467	0.089612	0.094470	0.085289	0.086621	0.088564	3.618090
2. Manufacturing Industries and Construction	0.115927	0.091778	0.095125	0.077924	0.062987	0.056257	-58.291144
3. Transport	0.272350	0.281360	0.311215	0.269896	0.259369	0.185387	54.108239
4. Other Sectors	0.164836	0.162006	0.168444	0.163146	0.170005	0.156912	-35.346180
5. Other	0.000092	0.000097	0.000099	0.000093	0.000080	0.000087	-92.424242
B. Fugitive Emissions from Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
1. Solid Fuels	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
2. Oil and Natural Gas	NO	NO	NO	NO	NO	NO	0.000000
2. Industrial Processes	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**0.000000**
A. Mineral Products	NA	NA	NA	NA	NA	NA	0.000000
B. Chemical Industry	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
C. Metal Production	NO	NO	NO	NO	NO	NO	0.000000
D. Other Production							
E. Production of Halocarbons and SF_6							
F. Consumption of Halocarbons and SF_6							
G. Other	NA	NA	NA	NA	NA	NA	0.000000
3. Solvent and Other Product Use	0.142428	0.136000	0.089000	0.100000	0.098000		-100.000000
4. Agriculture	**2.969309**	**3.003993**	**2.781838**	**2.878668**	**2.794800**	**NA,NO**	**-100.000000**
A. Enteric Fermentation							
B. Manure Management	0.509102	0.529322	0.492144	0.485637	0.451441		-100.000000
C. Rice Cultivation							
D. Agricultural Soils	2.460207	2.474671	2.289694	2.393031	2.343358	NA,NO	-100.000000
E. Prescribed Burning of Savannas	NO	NO	NO	NO	NO	NO	0.000000
F. Field Burning of Agricultural Residues	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
G. Other	NO	NO	NO	NO	NO	NO	0.000000
5. Land Use, Land-Use Change and Forestry	**0.004373**	**0.000422**	**0.000200**	**0.000490**	**0.000223**	**0.000680**	**100.000000**
A. Forest Land	0.004373	0.000422	0.000200	0.000490	0.000223	0.000680	100.000000
B. Cropland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
C. Grassland	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
D. Wetlands	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0.000000
E. Settlements	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	NE,NO	0.000000
F. Other Land	NO	NO	NO	NO	NO	NO	0.000000
G. Other	NE	NE	NE	NE	NE	NE	0.000000
6. Waste	**0.186774**	**0.188661**	**0.189212**	**0.190607**	**0.190667**	**0.000144**	**-99.924055**
A. Solid Waste Disposal on Land							
B. Waste-water Handling	0.186635	0.188389	0.188993	0.190352	0.190651		-100.000000
C. Waste Incineration	0.000139	0.000272	0.000218	0.000255	0.000016	0.000144	100.000000
D. Other	NA	NA	NA	NA	NA	NA	0.000000
7. Other *(as specified in Summary 1.A)*	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**0.000000**
Total N_2O emissions including N_2O from LULUCF	**3.943556**	**3.953928**	**3.729602**	**3.766113**	**3.662751**	**0.488032**	**-89.130428**
Total N_2O emissions excluding N_2O from LULUCF	**3.939183**	**3.953506**	**3.729402**	**3.765622**	**3.662528**	**0.487352**	**-89.145576**
Memo Items:							

International Bunkers	**0.038122**	**0.063500**	**0.085018**	**0.042570**	**0.025089**	**0.042571**	**2,565.458597**
Aviation	0.001953	0.002612	0.002904	0.002175	0.002044	0.001941	21.537170
Marine	0.036169	0.060887	0.082114	0.040396	0.023046	0.040630	100.000000
Multilateral Operations	0.000012	0.000012	0.000013	0.000012	0.000010	0.000011	100.000000
CO_2 Emissions from Biomass							

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
HFCs, PFCs and SF_6
(Part 1 of 3)

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1986) (Gg)	1987 (Gg)	1988 (Gg)	1989 (Gg)	1990 (Gg)	1991 (Gg)	1992 (Gg)	1993 (Gg)	1994 (Gg)	1995 (Gg)
Emissions of HFCs[3] - (Gg CO_2 equivalent)	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**NA,NO**	**31.761477**
HFC-23	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-32	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-41	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-43-10mee	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-125	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-134	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-134a	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.024432
HFC-152a	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-143	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-143a	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-227ea	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-236fa	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-245ca	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed HFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Emissions of PFCs[3] - (Gg CO_2 equivalent)	**276.291120**	**317.872800**	**219.632000**	**249.831400**	**257.444320**	**302.580180**	**106.749786**	**105.873795**	**105.298263**	**106.484000**
CF_4	0.037236	0.042840	0.029600	0.033670	0.034696	0.040779	0.014195	0.014269	0.014191	0.014160
C_2F_6	0.003724	0.004284	0.002960	0.003367	0.003470	0.004078	0.001574	0.001427	0.001419	0.001570
C_3F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_4F_{10}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
c-C_4F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_5F_{12}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_6F_{14}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed PFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Emissions of SF6[3] - (Gg CO_2 equivalent)	**10.241150**	**10.241150**	**10.241150**	**11.464830**	**10.303290**	**10.109700**	**10.133600**	**11.048970**	**11.359670**	**12.717190**
SF_6	0.000429	0.000429	0.000429	0.000480	0.000431	0.000423	0.000424	0.000462	0.000475	0.000532

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
HFCs, PFCs and SF_6
(Part 2 of 3)

Inventory 2011
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1996 (Gg)	1997 (Gg)	1998 (Gg)	1999 (Gg)	2000 (Gg)	2001 (Gg)	2002 (Gg)	2003 (Gg)	2004 (Gg)	2005 (Gg)
Emissions of HFCs[3] - (Gg CO_2 equivalent)	**30.016592**	**35.160593**	**30.741921**	**29.462634**	**40.871007**	**51.528073**	**65.505014**	**92.695128**	**111.290305**	**133.018631**
HFC-23	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-32	NA,NO	NA,NO	0.000036	0.000053	0.000145	0.000206	0.000298	0.000630	0.000739	0.000844
HFC-41	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-43-10mee	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-125	NA,NO	NA,NO	0.000261	0.000616	0.001245	0.001777	0.002277	0.003322	0.003917	0.004720
HFC-134	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-134a	0.023090	0.026971	0.022184	0.019264	0.024746	0.030141	0.038354	0.054608	0.065524	0.077888
HFC-152a	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-143	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-143a	NA,NO	NA,NO	0.000261	0.000645	0.001279	0.001822	0.002292	0.003028	0.003599	0.004408
HFC-227ea	NA,NO	0.000034	0.000054	0.000072	0.000090	0.000108	0.000126	0.000168	0.000340	0.000430
HFC-236fa	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
HFC-245ca	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed HFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Emissions of PFCs[3] - (Gg CO_2 equivalent)	**101.745000**	**104.870000**	**102.032000**	**105.352000**	**105.612000**	**105.612000**	**116.444000**	**118.990000**	**120.008000**	**132.731353**
CF_4	0.013530	0.013940	0.013560	0.014000	0.014040	0.014040	0.015480	0.015900	0.016000	0.017768
C_2F_6	0.001500	0.001550	0.001510	0.001560	0.001560	0.001560	0.001720	0.001700	0.001740	0.001874
C_3F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_4F_{10}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
c-C_4F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_5F_{12}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
C_6F_{14}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Unspecified mix of listed PFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO
Emissions of SF6[3] - (Gg CO_2 equivalent)	**13.498720**	**13.893070**	**13.386390**	**16.106210**	**15.738150**	**16.108600**	**17.334670**	**17.915440**	**18.312180**	**18.864670**
SF_6	0.000565	0.000581	0.000560	0.000674	0.000659	0.000674	0.000725	0.000750	0.000766	0.000789

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS
HFCs, PFCs and SF_6
(Part 3 of 3)

Inventory 2011
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GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	(Gg)	%
Emissions of HFCs[3] - (Gg CO_2 equivalent)	**154.361093**	**177.392732**	**188.232098**	**196.256397**	**198.544379**	**NA,NO**	**0.000000**
HFC-23	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-32	0.001037	0.001208	0.001509	0.001711	0.001820	NA,NO	0.000000
HFC-41	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-43-10mee	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-125	0.005964	0.007464	0.009100	0.009843	0.010123	NA,NO	0.000000
HFC-134	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-134a	0.087997	0.097843	0.098014	0.100631	0.101200	NA,NO	0.000000
HFC-152a	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-143	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-143a	0.005628	0.007182	0.008716	0.009347	0.009525	NA,NO	0.000000
HFC-227ea	0.000416	0.000420	0.000425	0.000430	0.000435	NA,NO	0.000000
HFC-236fa	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
HFC-245ca	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
Unspecified mix of listed HFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
Emissions of PFCs[3] - (Gg CO_2 equivalent)	**124.700379**	**90.869790**	**20.914791**	**7.432549**	**13.682442**		**-100.000000**
CF_4	0.016700	0.012188	0.002722	0.000967	0.001781		-100.000000
C_2F_6	0.001755	0.001266	0.000350	0.000124	0.000229		-100.000000
C_3F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
C_4F_{10}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
c-C_4F_8	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
C_5F_{12}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
C_6F_{14}	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
Unspecified mix of listed PFCs[4] - (Gg CO_2 equivalent)	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	0.000000
Emissions of SF6[3] - (Gg CO_2 equivalent)	**18.262562**	**17.543413**	**16.678166**	**15.918869**	**16.542497**	**NA,NO**	**-100.000000**
SF_6	0.000764	0.000734	0.000698	0.000666	0.000692	NA,NO	-100.000000

Note: All footnotes for this table are given at the end of the table on sheet 5.

TABLE 10 EMISSION TRENDS SUMMARY (Part 1 of 3)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS EMISSIONS	Base year (1986)	1987	1988	1989	1990	1991	1992	1993	1994	1995
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
CO_2 emissions including net CO_2 from LULUCF	7,163.582903	6,623.445085	6,380.197786	6,340.460021	5,734.439242	4,748.183406	4,669.707210	5,040.311799	5,199.842756	6,055.354403
CO_2 emissions excluding net CO_2 from LULUCF	16,356.900505	15,793.216683	15,515.262515	15,455.770675	14,795.759756	13,785.397263	13,702.136981	14,068.807368	14,204.546654	15,027.369906
CH_4 emissions including CH_4 from LULUCF	2,187.111296	2,177.144082	2,161.040937	2,165.002201	2,136.344249	2,057.489141	2,134.267125	2,071.602093	2,063.926083	2,057.555103
CH_4 emissions excluding CH_4 from LULUCF	2,187.111296	2,177.144082	2,159.705872	2,164.120727	2,131.821040	2,052.898867	2,131.921157	2,071.602093	2,063.926083	2,056.461488
N_2O emissions including N_2O from LULUCF	1,391.865809	1,407.813144	1,351.178843	1,293.386950	1,271.521225	1,189.962512	1,282.682999	1,187.120917	1,214.831894	1,230.609378
N_2O emissions excluding N_2O from LULUCF	1,391.865809	1,407.813144	1,350.937966	1,293.227912	1,270.705133	1,189.134319	1,282.259731	1,187.120917	1,214.831894	1,230.412064
HFCs	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	NA,NO	31.761477
PFCs	276.291120	317.872800	219.632000	249.831400	257.444320	302.580180	106.749786	105.873795	105.298263	106.484000
SF_6	10.241150	10.241150	10.241150	11.464830	10.303290	10.109700	10.133600	11.048970	11.359670	12.717190
Total (including LULUCF)	**11,029.092278**	**10,536.516262**	**10,122.290716**	**10,060.145402**	**9,410.052326**	**8,308.324938**	**8,203.540720**	**8,415.957575**	**8,595.258666**	**9,494.481550**
Total (excluding LULUCF)	**20,222.409880**	**19,706.287859**	**19,255.779503**	**19,174.415544**	**18,466.033540**	**17,340.120329**	**17,233.201255**	**17,444.453144**	**17,599.962564**	**18,465.206125**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	Base year (1986)	1987	1988	1989	1990	1991	1992	1993	1994	1995
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
1. Energy	16,113.932273	15,539.499445	15,165.063784	15,139.326169	14,432.242356	13,565.413015	13,563.895663	14,046.471495	14,026.349563	14,849.784861
2. Industrial Processes	1,316.981531	1,341.980768	1,318.931343	1,312.741105	1,317.645798	1,198.060117	932.911984	795.639336	952.734386	1,001.681861
3. Solvent and Other Product Use	81.903240	72.277430	62.651620	53.025810	43.400000	37.200000	27.900000	19.681590	18.834980	17.250880
4. Agriculture	2,218.801338	2,250.926808	2,196.731629	2,142.964772	2,140.744386	2,008.173612	2,184.693227	2,045.143211	2,058.571087	2,047.212191
5. Land Use, Land-Use Change and Forestry[5]	-9,193.317602	-9,169.771597	-9,133.488786	-9,114.270142	-9,055.981214	-9,031.795390	-9,029.660535	-9,028.495569	-9,004.703898	-8,970.724574
6. Waste	490.791498	501.603408	512.401127	526.357689	532.000999	531.273585	523.800382	537.517512	543.472548	549.276331
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)[6]	**11,029.092278**	**10,536.516262**	**10,122.290716**	**10,060.145402**	**9,410.052326**	**8,308.324938**	**8,203.540720**	**8,415.957575**	**8,595.258666**	**9,494.481550**

[1] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[2] Fill in net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[3] Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO_2 equivalent emissions.

[4] In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is Gg of CO_2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

[5] Includes net CO_2, CH_4 and N_2O from LULUCF.

TABLE 10 EMISSION TRENDS SUMMARY (Part 2 of 3)

Inventory 2011
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GREENHOUSE GAS EMISSIONS	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
CO_2 emissions including net CO_2 from LULUCF	6,752.894535	7,096.100333	6,877.898372	6,249.328797	5,323.889890	6,270.427868	6,433.375171	6,305.994670	6,588.035110	6,913.835899
CO_2 emissions excluding net CO_2 from LULUCF	15,695.538277	16,006.626772	15,743.891470	15,116.584634	15,226.192362	16,140.135344	16,287.627176	16,041.732984	16,391.407592	16,687.736584
CH_4 emissions including CH_4 from LULUCF	2,020.160111	2,026.179265	2,061.980898	2,034.461680	2,128.345442	2,097.357842	2,185.267264	2,163.644617	2,155.400562	2,166.145234
CH_4 emissions excluding CH_4 from LULUCF	2,018.369617	2,023.363471	2,056.654594	2,032.103003	2,127.433557	2,095.592250	2,184.698200	2,151.944229	2,154.835904	2,165.100467
N_2O emissions including N_2O from LULUCF	1,234.263434	1,261.999815	1,276.299854	1,272.641425	1,307.484641	1,282.727739	1,299.229772	1,252.595873	1,197.743058	1,206.708884
N_2O emissions excluding N_2O from LULUCF	1,233.940387	1,261.491780	1,275.338864	1,272.215865	1,307.320116	1,282.409185	1,299.127099	1,250.484851	1,197.641181	1,206.520383
HFCs	30.016592	35.160593	30.741921	29.462634	40.871007	51.528073	65.505014	92.695128	111.290305	133.018631
PFCs	101.745000	104.870000	102.032000	105.352000	105.612000	105.612000	116.444000	118.990000	120.008000	132.731353
SF_6	13.498720	13.893070	13.386390	16.106210	15.738150	16.108600	17.334670	17.915440	18.312180	18.864670
Total (including LULUCF)	**10,152.578391**	**10,538.203075**	**10,362.339435**	**9,707.352746**	**8,921.941130**	**9,823.762123**	**10,117.155891**	**9,951.835729**	**10,190.789215**	**10,571.304671**
Total (excluding LULUCF)	**19,093.108593**	**19,445.405685**	**19,222.045239**	**18,571.824346**	**18,823.167192**	**19,691.385452**	**19,970.736158**	**19,673.762632**	**19,993.495162**	**20,343.972089**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)
1. Energy	15,522.375631	15,829.607124	15,549.334651	14,870.153688	14,957.581378	15,776.975689	15,959.805835	15,670.518287	15,990.551228	16,208.599767
2. Industrial Processes	997.970072	1,027.605105	1,011.573625	1,031.741298	1,062.819239	1,133.379254	1,147.960357	1,227.385366	1,271.006821	1,372.962532
3. Solvent and Other Product Use	18.699200	18.947200	27.956110	32.403370	42.728540	36.367960	36.531950	33.332130	39.246000	43.320330
4. Agriculture	1,999.153201	2,001.984999	2,049.746110	2,032.161131	2,137.298232	2,109.283596	2,179.010288	2,085.313916	1,991.532161	2,006.495320
5. Land Use, Land-Use Change and Forestry[5]	-8,940.530202	-8,907.202611	-8,859.705804	-8,864.471600	-9,901.226062	-9,867.623330	-9,853.580268	-9,721.926903	-9,802.705947	-9,772.667418
6. Waste	554.910489	567.261257	583.434742	605.364859	622.739803	635.378954	647.427729	657.212933	701.158953	712.594140
7. Other	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (including LULUCF)[6]	**10,152.578391**	**10,538.203075**	**10,362.339435**	**9,707.352746**	**8,921.941130**	**9,823.762123**	**10,117.155891**	**9,951.835729**	**10,190.789215**	**10,571.304671**

[1] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[2] Fill in net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[3] Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO_2 equivalent emissions.

[4] In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is Gg of CO_2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

[5] Includes net CO_2, CH_4 and N_2O from LULUCF.

TABLE 10 EMISSION TRENDS SUMMARY (Part 3 of 3)

Inventory 2011
Submission 2013 v1.1
SLOVENIA

GREENHOUSE GAS EMISSIONS	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
CO_2 emissions including net CO_2 from LULUCF	7,182.302288	7,281.850030	8,270.135791	6,373.408014	6,470.105212	5,818.047387	-18.782996
CO_2 emissions excluding net CO_2 from LULUCF	16,876.670326	17,007.512955	17,973.528824	16,047.164677	16,122.252117	15,438.164247	-5.616811
CH_4 emissions including CH_4 from LULUCF	2,195.477113	2,193.863698	2,075.533409	2,035.975103	2,036.104483	755.221200	-65.469466
CH_4 emissions excluding CH_4 from LULUCF	2,187.963945	2,193.139347	2,075.190442	2,035.132340	2,035.722070	754.052660	-65.522895
N_2O emissions including N_2O from LULUCF	1,222.502312	1,225.717655	1,156.176585	1,167.494898	1,135.452732	151.289854	-89.130428
N_2O emissions excluding N_2O from LULUCF	1,221.146761	1,225.586965	1,156.114706	1,167.342845	1,135.383736	151.079022	-89.145576
HFCs	154.361093	177.392732	188.232098	196.256397	198.544379	NA,NO	0.000000
PFCs	124.700379	90.869790	20.914791	7.432549	13.682442		-100.000000
SF_6	18.262562	17.543413	16.678166	15.918869	16.542497	NA,NO	-100.000000
Total (including LULUCF)	**10,897.605746**	**10,987.237318**	**11,727.670839**	**9,796.485829**	**9,870.431745**	**6,724.558441**	**-39.028904**
Total (excluding LULUCF)	**20,583.105066**	**20,712.045202**	**21,430.659026**	**19,469.247676**	**19,522.127241**	**16,343.295929**	**-19.182254**

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	2006	2007	2008	2009	2010	2011	Change from base to latest reported year
	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	CO_2 equivalent (Gg)	(%)
1. Energy	16,353.995765	16,452.767094	17,492.309218	15,894.673439	15,980.254639	15,987.167598	-0.786677
2. Industrial Processes	1,432.932389	1,446.559779	1,327.369899	972.607585	971.165610	NA,NO	-100.000000
3. Solvent and Other Product Use	44.152680	42.160000	27.590000	31.000000	30.380000		-100.000000
4. Agriculture	2,022.963284	2,078.356143	1,964.604615	1,995.960863	1,962.871433	NA,NO	-100.000000
5. Land Use, Land-Use Change and Forestry[5]	-9,685.499320	-9,724.807884	-9,702.988187	-9,672.761847	-9,651.695496	-9,618.737488	4.627490
6. Waste	729.060949	692.202185	618.785294	575.005789	577.455558	356.128331	-27.437958
7. Other	NA	NA	NA	NA	NA	NA	0.000000
Total (including LULUCF)[5]	**10,897.605746**	**10,987.237318**	**11,727.670839**	**9,796.485829**	**9,870.431745**	**6,724.558441**	**-39.028904**

[1] The column "Base year" should be filled in only by those Parties with economies in transition that use a base year different from 1990 in accordance with the relevant decisions of the COP. For these Parties, this different base year is used to calculate the percentage change in the final column of this table.

[2] Fill in net emissions/removals as reported in table Summary 1.A. For the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+).

[3] Enter actual emissions estimates. If only potential emissions estimates are available, these should be reported in this table and an indication for this be provided in the documentation box. Only in these rows are the emissions expressed as CO_2 equivalent emissions.

[4] In accordance with the UNFCCC reporting guidelines, HFC and PFC emissions should be reported for each relevant chemical. However, if it is not possible to report values for each chemical (i.e. mixtures, confidential data, lack of disaggregation), this row could be used for reporting aggregate figures for HFCs and PFCs, respectively. Note that the unit used for this row is Gg of CO_2 equivalent and that appropriate notation keys should be entered in the cells for the individual chemicals.

[5] Includes net CO_2, CH_4 and N_2O from LULUCF.

Documentation box:

- Parties should provide detailed explanations on emissions trends in Chapter 2: Trends in Greenhouse Gas Emissions and, as appropriate, in the corresponding Chapters 3 - 9 of the NIR. Use this documentation box to provide references to relevant sections of the NIR if any additional information and further details are needed to understand the content of this table.
- Use the documentation box to provide explanations if potential emissions are reported.

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TABLE NIR 1. SUMMARY TABLE
Activity coverage and other information relating to activities under Article 3.3 and elected activities under Article 3.4

Activity		Change in carbon pool reported[1]					Greenhouse gas sources reported[2]						
		Above-ground biomass	Below-ground biomass	Litter	Dead wood	Soil	Fertilization[3]	Drainage of soils under forest management	Disturbance associated with land-use conversion to croplands	Liming	Biomass burning[4]		
							N_2O	N_2O	N_2O	CO_2	CO_2	CH_4	N_2O
Article 3.3 activities	Afforestation and Reforestation	NO	NO	NO	NO	NO	NO			NO	NO	NO	NO
	Deforestation	R	R	R	R	R			R	NO	NO	NO	NO
Article 3.4 activities	Forest Management	R	R	R	R	R	NO	NO		NO	R	R	R
	Cropland Management	NA	NA	NA	NA	NA			NA	NA	NA	NA	NA
	Grazing Land Management	NA	NA	NA	NA	NA				NA	NA	NA	NA
	Revegetation	NA	NA	NA	NA	NA				NA	NA	NA	NA

(1) Indicate R (reported), NR (not reported), IE (included elsewhere) or NO (not occurring), for each relevant activity under Article 3.3 or elected activity under Article 3.4. If changes in a carbon pool are not reported, it must be demonstrated in the NIR that this pool is not a net source of greenhouse gases. Indicate NA (not applicable) for each activity that is not elected under Article 3.4. Explanation about the use of notation keys should be provided in the text.

(2) Indicate R (reported), NE (not estimated), IE (included elsewhere) or NO (not occurring) for greenhouse gas sources reported, for each relevant activity under Article 3.3 or elected activity under Article 3.4. Indicate NA (not applicable) for each activity that is not elected under Article 3.4. Explanation about the use of notation keys should be provided in the text.

(3) N_2O emissions from fertilization for Cropland Management, Grazing Land Management and Revegetation should be reported in the Agriculture sector. If a Party is not able to separate fertilizer applied to Forest Land from Agriculture, it may report all N_2O emissions from fertilization in the Agriculture sector.

(4) If CO_2 emissions from biomass burning are not already included under changes in carbon stocks, they should be reported under biomass burning; this also includes the carbon component of CH_4. Parties that include CO_2 emissions from biomass burning in their carbon stock change estimates should report IE (included elsewhere).

Table NIR 1.1 Additional information
Selection of parameters for defining "Forest"under the Kyoto Protocol

Parameter	Range	Selected value
Minimum land area	0.05 - 1 ha	0.250000
Minimum crown cover	10 - 30 %	30.000000

Minimum height	2 - 5 m	2.000000

Table NIR 2. LAND TRANSITION MATRIX

Areas and changes in areas between the previous and the current inventory year [(1), (2), (3)]

From previous inventory year \ To current inventory year		Article 3.3 activities		Article 3.4 activities				Other [(5)]	Total area at the beginning of the current inventory year[(6)]
		Afforestation and Reforestation	Deforestation	Forest Management (if elected)	Cropland Management (if elected)	Grazing Land Management (if elected)	Revegetation (if elected)		
		(kha)							
Article 3.3 activities	Afforestation and Reforestation	0.000000	0.000000						0.000000
	Deforestation		85.800000						85.800000
Article 3.4 activities	Forest Management (if elected)		3.900000	1,115.950000					1,119.850000
	Cropland Management[(4)] (if elected)	NA	NA		NA	NA	NA		NA
	Grazing Land Management[(4)] (if elected)	NA	NA		NA	NA	NA		NA
	Revegetation[(4)] (if elected)	NA			NA	NA	NA		NA
Other [(5)]		NA	NA	0.000000	NA	NA	NA	821.650000	821.650000
Total area at the end of the current inventory year		0.000000	89.700000	1,115.950000	NA	NA	NA	821.650000	2,027.300000

(1) This table should be used to report land area and changes in land area subject to the various activities in the inventory year. For each activity it should be used to report area change between the previous year and the current inventory year. For example, the total area of land subject to Forest Management in the year preceding the inventory year, and which was deforested in the inventory year, should be reported in the cell in column of Deforestation and in the row of Forest Management.

(2) Some of the transitions in the matrix are not possible and the cells concerned have been shaded.

(3) In accordance with section 4.2.3.2 of the IPCC good practice guidance for LULUCF, the value of the reported area subject to the various activities under Article 3.3 and 3.4 for the inventory year should be that on 31 December of that year.

(4) Lands subject to Cropland Management, Grazing Land Management or Revegetation which, after 2008, are subject to activities other than those under Article 3.3 and 3.4, should still be tracked and reported under Cropland Management, Grazing Land Management or Revegetation, respectively.

(5) "Other" includes the total area of the country that has not been reported under an Article 3.3 or an elected Article 3.4 activity.

(6) The value in the cell of row "Total area at the end of the current inventory year" corresponds to the total land area of a country and is constant for all years.

TABLE NIR 3. SUMMARY OVERVIEW FOR KEY CATEGORIES FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

KEY CATEGORIES OF EMISSIONS AND REMOVALS	GAS	CRITERIA USED FOR KEY CATEGORY IDENTIFICATION			COMMENTS [3]
		Associated category in UNFCCC inventory[1] is key (indicate which category)	Category contribution is greater than the smallest category considered key in the UNFCCC inventory [1], [4] (including LULUCF)	Other [2]	
Specify key categories according to the national level of disaggregation used[1]					
Forest Management	CO2	Forest land remaining forest land	Yes	No other criteria needed her	NO
Deforestation	CO2	Conversion to grassland	Yes	No other criteria.	NO

(1) See section 5.4 of the IPCC good practice guidance for LULUCF.

(2) This should include qualitative consideration as per section 5.4.3 of the IPCC good practice guidance for LULUCF or any other criteria.

(3) Describe the criteria identifying the category as key.

(4) If the emissions or removals of the category exceed the emissions of the smallest category identified as key in the UNFCCC inventory (including LULUCF), Parties should indicate YES. If not, Parties should indicate NO.

TABLE 5(KP). REPORT OF SUPPLEMENTARY INFORMATION FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL [1], [2]

SLOVENIA
Inventory 2011
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GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	Net CO_2 emissions/ removals [3], [4]	CH_4 [5]	N_2O [6]	Net CO_2 equivalent emissions/removals
	(Gg)			
A. Article 3.3 activities				**1,690.383136**
A.1. Afforestation and Reforestation [7]	NA,NO	NO	NO	NA,NO
A.1.1. Units of land not harvested since the beginning of the commitment period	NA,NO	NO	NO	NA,NO
A.1.2. Units of land harvested since the beginning of the commitment period	NO	NO	NO	NO
A.2. Deforestation	1,690.383136	NO	NA,NO	1,690.383136
B. Article 3.4 activities				**-11,576.428842**
B.1. Forest Management (if elected)	-11,577.808214	0.055645	0.000680	-11,576.428842
B.2. Cropland Management (if elected)	NA	NA	NA	NA
B.3. Grazing Land Management (if elected)	NA	NA	NA	NA
B.4. Revegetation (if elected)	NA	NA	NA	NA

Information item:				
A.1.2. Units of land harvested since the beginning of the commitment period	NO	NO	NO	NO
99-national	NO	NO	NO	NO

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) All estimates in this table include emissions and removals from projects under Article 6 hosted by the reporting Party.

(2) If Cropland Management, Grazing Land Management and/or Revegetation are elected, this table and all relevant CRF tables should also be reported for the base year for these activities.

(3) According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks

(4) CO_2 emissions from liming, biomass burning and drained organic soils, where applicable, are included in this column.

(5) CH_4 emissions reported here for Cropland Management, Grazing Land Management and Revegetation, if elected, include only emissions from biomass burning (with the exception of savannah burning and agricultural residue burning which are reported in the Agriculture sector). Any other CH_4 emissions from Agriculture should be reported in the Agriculture sector.

(6) N_2O emissions reported here for Cropland Management, if elected, include only emissions from biomass burning (with the exception of savannah burning and agricultural residue burning

(7) As both Afforestation and Reforestation under Article 3.3 are subject to the same provisions specified in the annex to decision 16/CMP.1, they can be reported together.

TABLE 5(KP-I)A.1.1. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Article 3.3 activities: Afforestation and Reforestation [1, 2]

Units of land not harvested since the beginning of the commitment period

SLOVENIA
Inventory 2011
Submission 2013 v1.1

GEOGRAPHICAL LOCATION [3]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [7]										Implied emission/ removal factor per area [9]	CHANGE IN CARBON STOCK [7]										Net CO_2 emissions/ removals [9]
Identification code	Subdivision [4]	Area subject to the activity	Area of organic soils [8]	Carbon stock change in above-ground biomass per area [5, 6]			Carbon stock change in below-ground biomass per area [5, 6]			Net carbon stock change in litter per area [5]	Net carbon stock change in dead wood per area [5]	Net carbon stock change in soils per area [5]			Carbon stock change in above-ground biomass [5, 6]			Carbon stock change in below-ground biomass [5, 6]			Net carbon stock change in litter [5]	Net carbon stock change in dead wood [5]	Net carbon stock change in soils [5]		
				Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils [10]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity A.1.1		NO	NO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
99-national		NO	NO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	land converted to forestland	NO	NO	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

KP.A.1.1 land converted to forestland/2011:AR activities in Slovenia are not human induced. Net increase of area under FM is a consequence of spontaneous afforestation on abandoned agricultural land.

[1] Report here information on anthropogenic change in carbon stock for the inventory year for all geographical locations that encompass units of land subject to Afforestation and Reforestation under Article 3.3 not harvested since the beginning of the commitment period.

[2] As both Afforestation and Reforestation under Article 3.3 are subject to the same provisions specified in the annex to decision 16/CMP.1, they can be reported together.

[3] Geographical location refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation.

[4] Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

[5] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[6] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be reported in the "Losses" column. The notation key IE should be filled in, in the other column.

[7] Note that net change corresponds to increase/decrease of carbon stock (see table 4.2.6a of the IPCC good practice guidance for LULUCF).

[8] This information is needed for the calculation of the net carbon stock changes in soils per area.

[9] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

[10] The value reported here is an emission and not a carbon stock change.

TABLE 5(KP-I)A.1.2. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Article 3.3 activities: Afforestation and Reforestation [1], [2]

Units of land harvested since the beginning of the commitment period

SLOVENIA
Inventory 2011
Submission 2013 v1.1

GEOGRAPHICAL LOCATION [3]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [7]										Implied emission/ removal factor per area [9]	CHANGE IN CARBON STOCK [7]										Net CO_2 emissions/ removals [9]
				Carbon stock change in above-ground biomass per area [5], [6]			Carbon stock change in below-ground biomass per area [5], [6]			Net carbon stock change in litter per area [5]	Net carbon stock change in dead wood per area [5]	Net carbon stock change in soils per area [5]			Carbon stock change in above-ground biomass [5], [6]			Carbon stock change in below-ground biomass [5], [6]			Net carbon stock change in litter [5]	Net carbon stock change in dead wood [5]	Net carbon stock change in soils [5]		
Identification code	Subdivision [4]	Area subject to the activity	Area of organic soils [8]	Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils [10]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity A.1.2		**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
99-national		NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	land converted to forestland	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

[1] Report here information on anthropogenic change in carbon stock for the inventory year for all geographical locations that encompass units of land subject to Afforestation and Reforestation under Article 3.3 harvested since the beginning of the commitment period.

[2] As both Afforestation and Reforestation under Article 3.3 are subject to the same provisions specified in the annex to draft decision 16/CMP.1, they can be reported together.

[3] Geographical location refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation.

[4] Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

[5] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[6] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be

[7] Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6a of the IPCC good practice guidance for LULUCF).

[8] This information is needed for the calculation of the net carbon stock changes in soils per area.

[9] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

[10] The value reported here is an emission and not a carbon stock change.

TABLE 5(KP-I)A.1.3. SUPPLEMENTARY BACKGROUND FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Article 3.3 activities: Afforestation and Reforestation [1], [2]

Units of land otherwise subject to elected activities under Article 3.4 (information item)

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GEOGRAPHICAL LOCATION[3]	ACTIVITY DATA	
Identification code	**Subdivision[4]**	**Area subject to the activity (kha)**
Total for activity A.1.3		**NO**
99-national		NO
	land converted to forestland	NO

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

[1] Units of land subject to Afforestation or Reforestation under Article 3.3 otherwise subject to elected activities under Article 3.4 are implicitly included under A.1.1 or A.1.2. They are reported here for transparency and to fulfil the requirement of paragraph 6 (b) (ii) of the annex to decision 15/CMP.1.

[2] As both Afforestation and Reforestation under Article 3.3 are subject to the same provisions specified in the annex to decision 16/CMP.1, they can be reported together.

[3] Geographical location refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation, which would otherwise be included in land subject to elected activities under Article 3.4.

[4] Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

TABLE 5(KP-I)A.2. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Article 3.3 activities: Deforestation [1]

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GEOGRAPHICAL LOCATION[2]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [6]										Implied emission/ removal factor per area[8]	CHANGE IN CARBON STOCK [6]										Net CO_2 emissions/ removals[8]
				Carbon stock change in above-ground biomass per area[4],[5]			Carbon stock change in below-ground biomass per area[4],[5]			Net carbon stock change in litter per area[4]	Net carbon stock change in dead wood per area[4]	Net carbon stock change in soils per area[4]			Carbon stock change in above-ground biomass[4],[5]			Carbon stock change in below-ground biomass[4],[5]			Net carbon stock change in litter[4]	Net carbon stock change in dead wood[4]	Net carbon stock change in soils[4]		
Identification code	Subdivision[3]	Area subject to the activity	Area of organic soils[7]	Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils [9]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity A.2.		**75.800000**	**NO**	**IE**	**-4.419757**	**-4.419757**	**IE**	**-0.292805**	**-0.292805**	**-0.521372**	**-0.224591**	**-0.623448**	**NO**	**22.300569**	**IE**	**-335.017612**	**-335.017612**	**IE**	**-22.194641**	**-22.194641**	**-39.520000**	**-17.024000**	**-47.257330**	**NO**	**1,690.383136**
99-national		75.800000	NO	IE	-4.419757	-4.419757	IE	-0.292805	-0.292805	-0.521372	-0.224591	-0.623448	NO	22.300569	IE	-335.017612	-335.017612	IE	-22.194641	-22.194641	-39.520000	-17.024000	-47.257330	NO	1,690.383136
	Forest land converted to	2.000000	NO	IE	-4.714732	-4.714732	IE	IE	IE	-0.520000	-0.224000	-0.000165	NO	20.015955	IE	-9.429463	-9.429463	IE	IE	IE	-1.040000	-0.448000	-0.000330	NO	40.031909
	Forest land converted to	3.800000	NO	IE	-3.015507	-3.015507	IE	-1.229402	-1.229402	-0.547368	0.235789	1.765000	NO	24.907913	IE	-11.458927	-11.458927	IE	-4.671728	-4.671728	-2.080000	-0.896000	-6.707000	NO	94.650068
	Forest land converted to	36.000000	NO	IE	-4.627232	-4.627232	IE	IE	IE	-0.520000	-0.224000	0.185000	NO	19.016183	IE	-166.580342	-166.580342	IE	IE	IE	-18.720000	-8.064000	6.660000	NO	684.582589
	Forest land converted to	18.000000	NO	IE	-3.930732	-3.930732	IE	IE	IE	-0.520000	-0.224000	0.185000	NO	16.462350	IE	-70.753171	-70.753171	IE	IE	IE	-9.360000	-4.032000	3.330000	NO	296.322295
	Forest land converted to	4.000000	NO	IE	-4.964732	-4.964732	IE	-1.167932	-1.167932	-0.520000	-0.224000	-5.165000	NO	44.152767	IE	-19.858927	-19.858927	IE	-4.671728	-4.671728	-2.080000	-0.896000	-20.660000	NO	176.611068
	Forest land converted to	12.000000	NO	IE	-4.744732	-4.744732	IE	-1.070932	-1.070932	-0.520000	-0.224000	-2.490000	NO	33.182100	IE	-56.936781	-56.936781	IE	-12.851184	-12.851184	-6.240000	-2.688000	-29.880000	NO	398.185205

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) Report here information on anthropogenic change in carbon stock for the inventory year for all geographical locations that encompass units of land subject to Deforestation under Article 3.3.

(2) Geographical location refers to the boundaries of the areas that encompass units of land subject to Deforestation.

(3) Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

(4) The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

(5) Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be reported in the "Losses" column. The notation key IE should be filled in, in the other

(6) Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6a of the IPCC good practice guidance for LULUCF).

(7) This information is needed for the calculation of the net carbon stock changes in soils per area.

(8) According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

(9) The value reported here is an emission and not a carbon stock change.

TABLE 5(KP-I)A.2.1. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Article 3.3 activities: Deforestation [1]

Units of land otherwise subject to elected activities under Article 3.4 (information item)

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GEOGRAPHICAL LOCATION[2]	ACTIVITY DATA	
Identification code	**Subdivision**[3]	**Area subject to the activity (kha)**
Total for activity A.2.1.		**NO**
99-national		NO
	Forest land converted to Cropland annual	NO
	Forest land converted to Cropland woody	NO
	Forest land converted to Grassland_woody	NO
	Forest land converted to other land	NO
	Forest land converted to Settlements	NO

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

[1] Units of lands subject to Deforestation under Article 3.3 otherwise subject to elected activities under Article 3.4 are implicitly included under A.2. They are reported here for transparency and to fulfil the requirement of paragraph 6 (b) (ii) of the annex to decision 15/CMP.1.

[2] Geographical location refers to the boundaries of the areas that encompass units of land subject to Deforestation which would otherwise be included in land subject to elected activities under Article 3.4.

[3] Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

TABLE 5(KP-I)B.1. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Elected Article 3.4 activities: Forest Management [1]

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GEOGRAPHICAL LOCATION[2]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [6]										Implied emission/ removal factor per area[8]	CHANGE IN CARBON STOCK [6]										Net CO_2 emissions/ removals[8]
				Carbon stock change in above-ground biomass per area [4], [5]			Carbon stock change in below-ground biomass per area [4], [5]			Net carbon stock change in litter per area[4]	Net carbon stock change in dead wood per area[4]	Net carbon stock change in soils per area[4]			Carbon stock change in above-ground biomass[4], [5]			Carbon stock change in below-ground biomass[4], [5]			Net carbon stock change in litter[4]	Net carbon stock change in dead wood[4]	Net carbon stock change in soils[4]		
Identification code	Subdivision[3]	Area subject to the activity	Area of organic soils[7]	Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils [9]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity B.1		**1,116.748207**	**NO**	**2.287120**	**IE**	**2.287120**	**0.437032**	**NO**	**0.437032**	**IE**	**0.105714**	**NO**	**NO**	**-10.376177**	**2,554.136800**	**IE**	**2,554.136800**	**488.055224**	**NO**	**488.055224**	**IE**	**118.056239**	**NO**	**NO**	**-11,587.576964**
99-national		1,116.748207	NO	2.287120	IE	2.287120	0.437032	NO	0.437032	IE	0.105714	NO	NO	-10.376177	2,554.136800	IE	2,554.136800	488.055224	NO	488.055224	IE	118.056239	NO	NO	-11,587.576964
	Forest Land remaining	1,116.748207	NO	2.287120	IE	2.287120	0.437032	NO	0.437032	IE	0.105714	NO	NO	-10.376177	2,554.136800	IE	2,554.136800	488.055224	NO	488.055224	IE	118.056239	NO	NO	-11,587.576964

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) If Forest Management has been elected, report here information on anthropogenic carbon stock change for the inventory year for all geographical locations that encompass land subject to Forest Manageme

(2) Geographical location refers to the boundaries of the areas that encompass land subject to Forest Management (if elected).

(3) Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

(4) The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

(5) Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be reported in the "Losses" column. The notation

(6) Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6a of the IPCC good practice guidance for LULUCF).

(7) This information is needed for the calculation of the net carbon stock changes in soils per area.

(8) According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

(9) The value reported here is an emission and not a carbon stock change.

TABLE 5(KP-I)B.2. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Elected Article 3.4 activities: Cropland Management [1], [2]

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GEOGRAPHICAL LOCATION[3]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [7]										Implied emission/ removal factor per area[10]	CHANGE IN CARBON STOCK [7]										Net CO_2 emissions/ removals[10]
Identification code	Subdivision[4]	Area subject to the activity	Area of organic soils[9]	Carbon stock change in above-ground biomass per area [5], [6]			Carbon stock change in below-ground biomass per area [5], [6]			Net carbon stock change in litter per area[5]	Net carbon stock change in dead wood per area[5]	Net carbon stock change in soils per area[5]			Carbon stock change in above-ground biomass[5], [6]			Carbon stock change in below-ground biomass [5], [6]			Net carbon stock change in litter[5]	Net carbon stock change in dead wood[5]	Net carbon stock change in soils[5]		
				Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils[8]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity B.2		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Documentation box
Parties should provide detailed explanation on the land use, land use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) If Cropland Management has been elected, report here information on anthropogenic carbon stock change for the inventory year for all geographical locations that encompass land subject to Cropland Management under Article 3.4.

(2) If Cropland Management has been elected, this table and all relevant CRF tables should also be reported for the base year for Cropland Management.

(3) Geographical location refers to the boundaries of the areas that encompass land subject to Cropland Management (if elected).

(4) Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

(5) The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

(6) Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be

(7) Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6b of the IPCC good practice guidance for LULUCF).

(8) The value reported here is an emission and not a carbon stock change.

(9) This information is needed for the calculation of the net carbon stock changes in soils per area.

(10) According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

TABLE 5(KP-I)B.3. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Elected Article 3.4 activities: Grazing Land Management [1], [2]

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GEOGRAPHICAL LOCATION[3]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS [7]										Implied emission/ removal factor per area[10]	CHANGE IN CARBON STOCK [7]										Net CO_2 emissions/ removals[10]
				Carbon stock change in above-ground biomass per area [5], [6]			Carbon stock change in below-ground biomass per area [5], [6]			Net carbon stock change in litter per area[5]	Net carbon stock change in dead wood per area[5]	Net carbon stock change in soils per area[5]			Carbon stock change in above-ground biomass[5], [6]			Carbon stock change in below-ground biomass [5], [6]			Net carbon stock change in litter[5]	Net carbon stock change in dead wood[5]	Net carbon stock change in soils[5]		
Identification code	Subdivision[4]	Area subject to the activity	Area of organic soils[9]	Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils[8]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity B.3		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

[1] If Grazing Land Management has been elected, report here information on anthropogenic carbon stock change for the inventory year for all geographical locations that encompass land subject to Grazing Land Management under Article 3.4.

[2] If Grazing Land Management has been elected, this table and all relevant CRF tables should also be reported for the base year for Grazing Land Management.

[3] Geographical location refers to the boundaries of the areas that encompass land subject to Grazing Land Management (if elected).

[4] Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

[5] The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

[6] Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be reported in the

[7] Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6b of the IPCC good practice guidance for LULUCF).

[8] The value reported here is an emission and not a carbon stock change.

[9] This information is needed for the calculation of the net carbon stock changes in soils per area.

[10] According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO2 removals to be negative (-) and for net CO2 emissions to be positive (+).

TABLE 5(KP-I)B.4. SUPPLEMENTARY BACKGROUND DATA ON CARBON STOCK CHANGES AND NET CO_2 EMISSIONS AND REMOVALS FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Elected Article 3.4 activities: Revegetation [1], [2]

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GEOGRAPHICAL LOCATION[3]	ACTIVITY DATA			IMPLIED CARBON STOCK CHANGE FACTORS[7]											CHANGE IN CARBON STOCK[7]										
				Carbon stock change in above-ground biomass per area [5], [6]			Carbon stock change in below-ground biomass per area [5], [6]			Net carbon stock change in litter per area[5]	Net carbon stock change in dead wood per area[5]	Net carbon stock change in soils per area[5]		Implied emission/ removal factor per area [10]	Carbon stock change in above-ground biomass[5], [6]			Carbon stock change in below-ground biomass [5], [6]			Net carbon stock change in litter[5]	Net carbon stock change in dead wood[5]	Net carbon stock change in soils[5]		Net CO_2 emissions/ removals[10]
Identification code	Subdivision[4]	Area subject to the activity	Area of organic soils [9]	Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils		Gains	Losses	Net change	Gains	Losses	Net change			Mineral soils	Organic soils[8]	
		(kha)	(kha)	(Mg C/ha)										(Mg CO_2/ha)	(Gg C)										(Gg CO_2)
Total for activity B.4		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) If Revegetation has been elected, report here information on anthropogenic carbon stock change for the inventory year for all geographical locations that encompass land subject to Revegetation under Article 3.4.

(2) If Revegetation has been elected, this table and all relevant CRF tables should also be reported for the base year for Revegetation.

(3) Geographical location refers to the boundaries of the areas that encompass land subject to Revegetation (if elected).

(4) Activity data may be further subdivided according to climate zone, management system, soil type, vegetation type, tree species, ecological zone, national land classification or other criteria. Complete one row for each subdivision.

(5) The signs for estimates of gains in carbon stocks are positive (+) and of losses in carbon stocks are negative (-).

(6) Carbon stock gains and losses should be listed separately except in cases where, due to the methods used, it is technically impossible to separate information on gains and losses. In that case, net gains should be reported in the "Gains" column and net losses should be reported in the "Losses"

(7) Note that net change corresponds to increase / decrease of carbon stock (see table 4.2.6b of the IPCC good practice guidance for LULUCF).

(8) The value reported here is an emission and not a carbon stock change.

(9) This information is needed for the calculation of the net carbon stock changes in soils per area.

(10) According to the Revised 1996 IPCC Guidelines, for the purposes of reporting, the signs for removals are always negative (-) and for emissions positive (+). Net changes in carbon stocks are converted to CO_2 by multiplying C by 44/12 and changing the sign for net CO_2 removals to be negative (-) and for net CO_2 emissions to be positive (+).

TABLE 5(KP-II)1. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

Direct N_2O emissions from N fertilization [1], [2]

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Identification code of geographical location	ACTIVITY DATA	IMPLIED EMISSION FACTOR	EMISSIONS
	Total amount of fertilizer applied (Gg N/year)	N_2O-N emissions per unit of fertilizer (kg N_2O-N/kg N)[3]	N_2O (Gg)
A.1.1. Afforestation/Reforestation: units of land not harvested since the beginning of the commitment period [4]	**NO**	**NO**	**NO**
99-national	NO	NO	NO
A.1.2. Afforestation/Reforestation: units of land harvested since the beginning of the commitment period [4]	**NO**	**NO**	**NO**
99-national	NO	NO	NO
B.1. Forest Management (if elected) [5]	**NO**	**NO**	**NO**
99-national	NO	NO	NO

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.
KP.A.1.1 99-national/2011:Fertilization of forests is not a common practice in Slovenia

(1) N_2O emissions from fertilization for Cropland Management, Grazing Land Management and Revegetation should be reported in the Agriculture sector. If a Party is not able to separate fertilizer applied to Forest Land from Agriculture, it may report all N_2O emissions from fertilization in the Agriculture sector. This should be explicitly indicated in the documentation box.

(2) Direct N_2O emissions from fertilization are estimated following section 3.2.1.4.1 of the IPCC good practice guidance for LULUCF based on the amount of fertilizer applied to land under Forest Management. The indirect N_2O emissions from Afforestation and Reforestation and land under Forest Management are estimated as part of the total indirect emissions in the Agriculture sector based on the total amount of fertilizer used in the country. Parties should show that double counting of N_2O emissions from fertilization with Agriculture sector estimates has been avoided.

(3) In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

(4) Geographical location refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation.

(5) Geographical location refers to the boundaries of the areas that encompass land subject to Forest Management (if elected).

TABLE 5(KP-II)2. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Elected Article 3.4 activities: Forest Management
N_2O emissions from drainage of soils [1], [2]

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Identification code of geographical location[3]	ACTIVITY DATA Area of drained soils (kha)	IMPLIED EMISSION FACTOR N_2O-N per area drained (kg N_2O-N/ha)[4]	EMISSIONS N_2O (Gg)
B.1. Forest Management (if elected)	**NO**	**NO**	**NO**
Total for organic soils	NO	NO	NO
Total for mineral soils	NO	NO	NO
99-national	NO	NO	NO
Organic soils	NO	NO	NO
Mineral soils	NO	NO	NO

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

[1] Methodologies for estimating N_2O emissions from drainage of soils are not addressed in the Revised 1996 IPCC Guidelines, but Appendix 3a.2 of the IPCC good practice guidance for LULUCF provides methodologies for consideration.

[2] N_2O emissions from drainage of soils include those resulting from Forest Management. N_2O emissions from drained Cropland and Grassland soils are covered in the
[3] Geographical location refers to the boundaries of the areas that encompass land subject to Forest Management (if elected).
[4] In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

TABLE 5(KP-II)3. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL

N_2O emissions from disturbance associated with land-use conversion to cropland [1], [2]

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Identification code of geographical location	ACTIVITY DATA Land area converted (kha)	IMPLIED EMISSION FACTOR N_2O-N per area converted [5] (kg N_2O-N/ha)	EMISSIONS N_2O (Gg)
A.2. Deforestation [3], [6]	**NA,NO**	**NA,NO**	**NA,NO**
Total organic soils	NO	NO	NO
Total mineral soils	NA	NA	NA
99-national	NA,NO	NA,NO	NA,NO
Organic soils [7], [10]	NO	NO	NO
Mineral soils [7]	NA	NA	NA
B.2. Cropland Management (if elected) [4], [8]	**NA**	**NA**	**NA**
Total organic soils	NA	NA	NA
Total mineral soils	NA	NA	NA
Information items [9]			
A.2.1. Deforestation: units of land otherwise subject	**NA**		
Total organic soils	NA		
Total mineral soils	NA		
99-national	NA		
Organic soils [7], [10]	NA		
Mineral soils [7]	NA		

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) Methodologies for N_2O emissions from disturbance associated with land-use conversion to Croplands are found in section 3.3.2.3.1.1 of the IPCC good practice guidance for LULUCF. N_2O emissions from fertilization in the preceding land use and new land use should not be reported here. Parties should avoid double counting with N2O emissions from drainage and from cultivation of organic soils reported in the Agriculture sector under Cultivation of Histosols.

(2) According to the IPCC good practice guidance for LULUCF N_2O emissions from disturbance of soils are only relevant for land conversions to Cropland. N_2O emissions from Cropland Management when Cropland is remaining Cropland are included in the Agriculture sector.

(3) Geographical location refers to the boundaries of the areas that encompass units of land subject to Deforestation.

(4) Geographical location refers to the boundaries of the areas that encompass land subject to Cropland Management, if elected.

(5) In the calculation of the implied emission factor, N_2O emissions are converted to N_2O-N by multiplying by 28/44.

(6) N_2O emissions associated with Deforestation followed by the establishment of Cropland should be reported under Deforestation even if Cropland Management is not

(7) Parties may separate data for organic and mineral soils, if they have data available.

(8) This includes N_2O emissions in land subject to Cropland Management from disturbance of soils due to the conversion to Cropland of lands other than Forest Lands.

(9) Units of land subject to Deforestation under Article 3.3 otherwise subject to elected activities under Article 3.4 are implicitly included under A.2. They are reported here for transparency and to fulfil the requirement of paragraph 5 (b) (ii) of the annex to decision 15/CMP.1.

(10) N_2O emissions from Cropland are included in the Agriculture sector.

TABLE 5(KP-II)4. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
Carbon emissions from lime application [1]

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Identification code of geographical location	ACTIVITY DATA	IMPLIED EMISSION FACTOR	EMISSIONS
	Total amount of lime applied (Mg/year)	Carbon emission per unit of lime (Mg C/Mg)	Carbon (Gg)
A.1.1. Afforestation/Reforestation: units of land not harvested since the beginning of the commitment period [2], [8], [9]	**NO**	**NO**	**NO**
Total for limestone	NO	NO	NO
Total for dolomite	NO	NO	NO
99-national	NO	NO	NO
Limestone ($CaCO_3$)	NO	NO	NO
Dolomite ($CaMg(CO_3)_2$)	NO	NO	NO
A.1.2. Afforestation/Reforestation: units of land harvested since the beginning of the commitment period [2], [8], [9]	**NO**	**NO**	**NO**
Total for limestone	NO	NO	NO
Total for dolomite	NO	NO	NO
99-national	NO	NO	NO
Limestone ($CaCO_3$)	NO	NO	NO
Dolomite ($CaMg(CO_3)_2$)	NO	NO	NO
A.2. Deforestation [3], [8], [9]	**NO**	**NO**	**NO**
Total for limestone	NO	NO	NO
Total for dolomite	NO	NO	NO
99-national	NO	NO	NO
Limestone ($CaCO_3$)	NO	NO	NO
Dolomite ($CaMg(CO_3)_2$)	NO	NO	NO
B.1. Forest Management (if elected) [4], [8], [9]	**NO**	**NO**	**NO**
Total for limestone	NO	NO	NO
Total for dolomite	NO	NO	NO
99-national	NO	NO	NO
Limestone ($CaCO_3$)	NO	NO	NO
Dolomite ($CaMg(CO_3)_2$)	NO	NO	NO
B.2. Cropland Management (if elected) [5], [8], [9]	**NA**	**NA**	**NA**
Total for limestone	NA	NA	NA
Total for dolomite	NA	NA	NA
B.3. Grazing Land Management (if elected) [6], [8], [9]	**NA**	**NA**	**NA**
Total for limestone	NA	NA	NA
Total for dolomite	NA	NA	NA
B.4. Revegetation (if elected) [7], [8], [9]	**NA**	**NA**	**NA**
Total for limestone	NA	NA	NA
Total for dolomite	NA	NA	NA

Documentation box

Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) Carbon emissions from agricultural lime application are addressed in sections 3.3.1.2.1.1 and 3.3.2.2.1.1 of the IPCC good practice guidance for LULUCF.
(2) Geographical location refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation.
(3) Geographical location refers to the boundaries of the areas that encompass units of land subject to Deforestation.
(4) Geographical location refers to the boundaries of the areas that encompass land subject to Forest Management, if elected.
(5) Geographical location refers to the boundaries of the areas that encompass land subject to Cropland Management, if elected.
(6) Geographical location refers to the boundaries of the areas that encompass land subject to Grazing Land Management, if elected.
(7) Geographical location refers to the boundaries of the areas that encompass land subject to Revegetation, if elected.
(8) If Parties are not able to separate lime application for different geographical locations, they should include liming for all geographical locations in the total.
(9) A Party may report aggregate estimates for total lime applications when data are not available for limestone and dolomite.

TABLE 5(KP-II)5. SUPPLEMENTARY BACKGROUND DATA FOR LAND USE, LAND-USE CHANGE AND FORESTRY ACTIVITIES UNDER THE KYOTO PROTOCOL
GHG emissions from biomass burning

Identification code of geographical location	ACTIVITY DATA			IMPLIED EMISSION FACTOR			EMISSIONS		
	Description[7]	Unit	Values	CO_2	CH_4	N_2O	CO_2 [8]	CH_4 [8]	N_2O
	Area (AB) or biomass burned (BB)	ha or kg dm		(Mg/activity data unit)			(Gg)		
A.1.1. Afforestation/Reforestation: units of land not harvested since	**ab**	**ha**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Total for controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Total for wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
99-national	ab	ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
A.1.2. Afforestation/Reforestation: units of land harvested since the	**ab**	**ha**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Total for controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Total for wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
99-national	ab	ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
A.2. Deforestation[2], [9]	**ab**	**ha**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
Total for controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Total for wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
99-national	ab	ha	NO	NO	NO	NO	NO	NO	NO
Controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Wildfires	ab	ha	NO	NO	NO	NO	NO	NO	NO
B.1. Forest Management (if elected) [3], [9]	**ab**	**ha**	**159.080000**	**61.407780**	**0.349791**	**0.004275**	**9.768750**	**0.055645**	**0.000680**
Total for controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Total for wildfires	ab	ha	159.080000	61.407780	0.349791	0.004275	9.768750	0.055645	0.000680
99-national	ab	ha	159.080000	61.407780	0.349791	0.004275	9.768750	0.055645	0.000680
Controlled burning	ab	ha	NO	NO	NO	NO	NO	NO	NO
Wildfires	ab	ha	159.080000	61.407780	0.349791	0.004275	9.768750	0.055645	0.000680
B.2. Cropland Management (if elected) [4], [9], [10]	**(specify)**		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total for controlled burning	(specify)		NA	NA	NA	NA	NA	NA	NA
Total for wildfires	(specify)		NA	NA	NA	NA	NA	NA	NA
B.3. Grazing Land Management (if elected) [5], [9], [11]	**(specify)**		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total for controlled burning	(specify)		NA	NA	NA	NA	NA	NA	NA
Total for wildfires	(specify)		NA	NA	NA	NA	NA	NA	NA
B.4. Revegetation (if elected) [6], [9]	**(specify)**		**NA**	**NA**	**NA**	**NA**	**NA**	**NA**	**NA**
Total for controlled burning	(specify)		NA	NA	NA	NA	NA	NA	NA
Total for wildfires	(specify)		NA	NA	NA	NA	NA	NA	NA

Documentation box
Parties should provide detailed explanation on the land use, land-use change and forestry sector in the relevant annex of the NIR: Supplementary information on LULUCF activities under the Kyoto Protocol. Use this documentation box to provide references to relevant sections of the NIR if any additional details are needed to understand the content of this table.

(1) Geographical locations refers to the boundaries of the areas that encompass units of land subject to Afforestation and Reforestation.
(2) Geographical location refers to the boundaries of the areas that encompass units of land subject to Deforestation.
(3) Geographical location refers to the boundaries of the areas that encompass land subject to Forest Management, if elected
(4) Geographical location refers to the boundaries of the areas that encompass land subject to Cropland Management, if elected
(5) Geographical location refers to the boundaries of the areas that encompass land subject to Grazing Land Management, if elected
(6) Geographical location refers to the boundaries of the areas that encompass land subject to Revegetation, if elected
(7) For each activity, activity data should be selected between area burned (AB) or biomass burned (BB). Units will be ha for area burned, and kg dm for biomass burned. The implied emission
(8) If CO_2 emissions from biomass burning are not already included in Tables 5(KP-I)A.1.1 to 5(KP-I)B.4, they should be reported here. This also includes the carbon component of CH_4. This should be clearly documented in the documentation box and in the NIR. Parties that include all carbon stock changes in the carbon stock tables (5(KP-I)A.1.1 to 5(KP-I)B.4) should report IE (included elsewhere) in the CO_2 column.
(9) Parties should report controlled/prescribed burning and wildfires emissions separately, where appropriate.
(10) Burning of agricultural residues is included in the Agriculture sector.
(11) Greenhouse gas emissions from prescribed savannah burning are reported in the Agriculture sector.

INFORMATION TABLE ON ACCOUNTING FOR ACTIVITIES UNDER ARTICLES 3.3 AND 3.4 OF THE KYOTO PROTOCOL

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Commitment period accounting: YES
Annual accounting: NO

Number of the reported year in the commitment period: 4

GREENHOUSE GAS SOURCE AND SINK ACTIVITIES	BY(5)	Net emissions/removals(1)					Accounting Parameters[7]	Accounting Quantity [8]
		2008	2009	2010	2011	Total[6]		
	($Gg\ CO_2$ equivalent)							
A. Article 3.3 activities								
A.1. Afforestation and Reforestation								NA,NO
A.1.1. Units of land not harvested since the beginning of the commitment period[2]		NA,NO	NA,NO	NA,NO	NA,NO	NA,NO		NA,NO
A.1.2. Units of land harvested since the beginning of the commitment period[2]								NO
99-national		NO	NO	NO	NO	NO		NO
A.2. Deforestation		1,608.242133	1,635.622467	1,663.002801	1,690.383136	6,597.250537		6,597.250537
B. Article 3.4 activities								
B.1. Forest Management (if elected)		-11,559.359380	-11,562.906427	-11,575.613463	-11,576.428842	-46,274.308113		-13,197.250537
3.3 offset[3]							6,597.250537	-6,597.250537
FM cap[4]							6,600.000000	-6,600.000000
B.2. Cropland Management (if elected)	0.000000	NA	NA	NA	NA	NA	0.000000	0.000000
B.3. Grazing Land Management (if elected)	0.000000	NA	NA	NA	NA	NA	0.000000	0.000000
B.4. Revegetation (if elected)	0.000000	NA	NA	NA	NA	NA	0.000000	0.000000

(1) All values are reported in table 5(KP) of the CRF for the relevant inventory year as reported in the current submission and are automatically entered in this table.

(2) In accordance with paragraph 4 of the annex to decision 16/CMP.1, debits resulting from harvesting during the first commitment period following Afforestation and Reforestation since 1990 shall not be greater than credits accounted for on that unit of land.

(3) In accordance with paragraph 10 of the annex to decision 16/CMP.1, for the first commitment period, a Party included in Annex I that incurs a net source of emissions under the provisions of Article 3.3 may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under Forest Management under Article 3.4, up to a level that is equal to the net source of emissions under the provisions of Article 3.3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3.3.

(4) In accordance with paragraph 11 of the annex to decision 16/CMP.1, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from Forest Management under Article 3.4, after the application of paragraph 10 of the annex to decision 16/CMP.1 and resulting from Forest Management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

(5) Net emissions and removals in the Party's base year, as established by decision 9/CP.2.

(6) Cumulative net emissions and removals for all years of the commitment period reported in the current submission.

(7) The values in the cells "3.3 offset" and "FM cap" are absolute values.

(8) The accounting quantity is the total quantity of units to be added to or subtracted from a Party's assigned amount for a particular activitity in accordance with the provisions of Article 7.4 of the Kyoto Protocol.