



System of  
Environmental  
Economic  
Accounting

# Exercises - answers

Handout ecosystem accounts

2019



United Nations

# Exercise 1

## EA Table

EA	ha
EA01 = Herbaceous crops	80
EA02 = Tree covered areas	42
EA03 = Inland water bodies	11
EA04 = Herbaceous crops	45
EA05 = Tree covered areas	<b>12</b>
EA06 = Artificial surfaces (urban)	9
EA07 = Artificial surfaces (urban)	11
EA08 = Shrubs..regularly flooded (wetland)	6
EA09 = Inland water bodies	8
EA10 = Tree covered areas	36
EA11 = Herbaceous crops	28
<b>Total</b>	<b>288</b>



# Exercise 1

<b>ET (ecosystem type)</b>	<b>ha</b>
Artificial surfaces (urban)	20
Herbaceous crops	153
Tree covered areas	90
Inland water bodies	19
Shrubs..regularly flooded (wetland)	6
<b>Total</b>	<b>288</b>

# Exercise 2

		Closing Extent						
		Artificial surfaces (urban)	Herbaceous crops	Tree covered areas	Inland water bodies	Shrubs..regularly flooded (wetland)	Other	Opening
Opening Extent	Code							
Artificial surfaces (urban)		20	0	0	0	0	0	20
Herbaceous crops		3	142	8	0	0	0	153
Tree covered areas		0	2	88	0	0	0	90
Inland water bodies		0	0	0	19	0	0	19
Shrubs..regularly flooded (wetland)		0	1	0	0	5	0	6
Other		0	0	0	0	0	0	0
<b>Closing</b>		<b>23</b>	<b>145</b>	<b>96</b>	<b>19</b>	<b>5</b>	<b>0</b>	<b>288</b>

# Exercise 3

**Table 2: Ecosystem extent account**

	Artificial surfaces (urban)	Herbaceous crops	Tree covered areas	Inland water bodies	Shrubs..regularly flooded (w	Other	Total
Opening Stock	20	153	90	19	6	0	288
Additions to Stock	3	3	8	0	0	0	14
Reductions in Stock	0	11	2	0	1	0	14
Closing Stock	23	145	96	19	5	0	288

# Exercise 4

Condition Table

EA	Extent (ha)	(V) Vegetation (e.g. SOC)	(B) Biodiversity (species richness)	(W) Water (e.g. BOD)	Index
EA01 = Herbaceous crops	80	4.00	3.00	5.00	4.00
EA02 = Tree covered areas	42	6.00	7.00	6.00	6.33
EA03 = Inland water bodies	11	5.00	6.00	6.00	5.67
EA04 = Herbaceous crops	45	3.00	2.00	4.00	3.00
EA05 = Tree covered areas	12	6.00	7.00	5.00	6.00
EA06 = Artificial surfaces (urban)	9	2.00	2.00	4.00	2.67
EA07 = Artificial surfaces (urban)	11	2.00	1.00	3.00	2.00
EA08 = Shrubs..regularly flooded (wetland)	6	5.00	7.00	5.00	5.67
EA09 = Inland water bodies	8	3.00	3.00	4.00	3.33
EA10 = Tree covered areas	36	4.00	6.00	4.00	4.67
EA11 = Herbaceous crops	28	3.00	2.00	3.00	2.67
	<b>288</b>				

EA Type	Extent (BSU)	Vegetation	Biodiversity	Water	Index
Artificial surfaces (urban)	20	2.00	1.45	3.45	2.30
Herbaceous crops	153	3.52	2.52	4.34	3.46
Tree covered areas	90	5.20	6.60	5.07	5.62
Inland water bodies	19	4.16	4.74	5.16	4.68
Shrubs..regularly flooded (wetland)	6	5.00	7.00	5.00	5.67
<b>Total</b>	<b>288</b>	<b>4.01</b>	<b>3.96</b>	<b>4.57</b>	<b>4.18</b>

# Exercise 5

## Condition Account

	Extent (BSU)	Artificial surfaces (urban)	Herbaceous crops	Tree covered areas	Inland water bodies	Shrubs..regularly flooded (wetland)
Opening Conditions	288	2.30	3.46	5.62	4.68	5.67
Improvements in condition			0.49		0.33	0.33
Reductions in condition				0.09		
Closing Conditions	288	2.30	3.95	5.53	5.02	6.00

# Exercise 6

Opening carbon stock																
		40	40	40	40	40	40	40	40	200	200	200	200	200	200	200
		40	40	40	40	40	40	40	40	200	200	200	200	200	200	200
40	40		40	40	40	40	40	40	40	200	200	200	200	200	200	200
40	40	40		40	40	40	40	40	40	200	200	200	200	200	200	200
40	40	40	40		40	40	40	40	40	200	200	200	200	200	200	200
40	40	40	40	40		40	40	40	40	200	200	200	200	200	200	200
40	40	40	40	40	40		40	40	40	40	40	40	40	40	40	40
40	40	40	40	200	200	200		40	40	40	40	40	40	40	40	40
40	40	40	40	200	200	200		40	40	40	40	40	40	40	40	40
40	40	40	40	200	200	200		40	40	40	40	40	40	40	40	40
40	40	40	40	200	200	200		5	5	5	40	40	40	40	40	40
40	40	40	5	5	5	5		5	5	5	40	40	40	40	40	40
40	40	40	5	5	5	5		5	5	5	40	40	40	40	40	40
40	40	40	5	5	5	300	300									
200	200	200	200	200	200	300	300	40	40	40	40	40	40	40	40	40
200	200	200	200	200	200	300	300	40	40	40	40	40	40	40	40	40
200	200	200	200	200	200	200	200	40	40	40	40					
200	200	200	200	200	200	200	200	40	40	40	40					
200	200	200	200	200	200	200	200	40	40	40	40					
1480	1480	1520	1415	2055	2055	2550	1780	615	1575	1575	1680	1560	1560	1560	1560	<b>26020</b>



# Exercise 6

Closing carbon stock ??																
		40	40	40	40	40	40	40	215	215	215	215	215	25	25	
		40	40	40	40	40	40	40	215	215	215	215	215	25	25	
40	40		40	40	40	40	40	40	215	215	215	215	215	215	215	
40	40	40		40	40	40	?	?	215	215	215	215	215	215	215	
40	40	40	40		40	40	40	40	215	215	215	215	215	215	215	
40	40	40	40	40		40	40	40	215	215	215	215	215	215	215	
40	40	40	40	40	40		40	40	40	40	40	40	40	40	40	
40	40	?	?		215	215	215		40	40	40	40	40	40	40	
40	40	?	?		215	215	215		40	40	40	40	40	40	40	
40	40	?	?		215	215	215		40	40	?	?		40	40	
40	40	40	40		215	215	215		6	6	6	?		40	40	
40	40	40	6	6	6	6			6	6	6	40	40	40	40	
40	40	40	6	6	6	6			6	6	6	40	40	40	40	
40	40	40	6	6	6	<b>324</b>	<b>324</b>									
215	215	215	215	215	215	<b>324</b>	<b>324</b>	40	40	40	40	40	40	40	40	
215	215	215	215	215	215	<b>324</b>	?	40	40	40	40	40	40	40	40	
215	215	215	215	215	215	215	?	40	40	40	40					
215	215	215	215	215	215	215	?	40	40	40	40					
215	215	215	215	215	215	215	215	40	40	40	40					
1555	1555	1475	1373	2193	2193	2729	1103	578	1668	1628	1690	1650	1650	1270	1270	<b>25580</b>

# Exercise 6

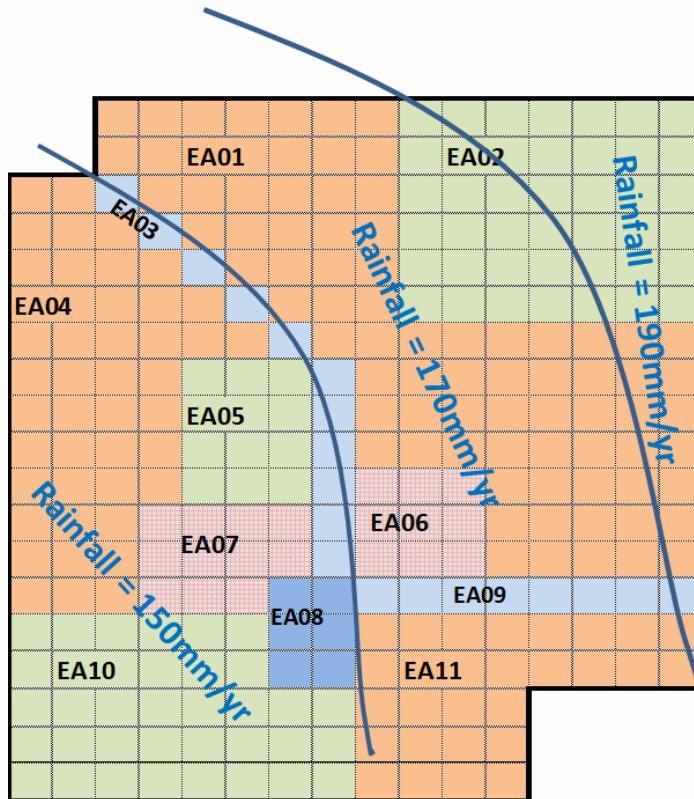
Closing carbon stock																	
		44	44	44	44	44	44	44	44	215	215	215	215	215	25	25	
		44	44	44	44	44	44	44	44	215	215	215	215	215	25	25	
44	44		44	44	44	44	44	44	44	215	215	215	215	215	215	215	
44	44	44		44	44	44	200	200	215	215	215	215	215	215	215	215	
44	44	44	44		44	44	44	44	215	215	215	215	215	215	215	215	
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44	44	44	44	44	44		44	44	44	44	44	44	44	44	44	44	
44	44	200	200	215	215	215		44	44	44	44	44	44	44	44	44	
44	44	200	200	215	215	215		44	44	44	44	44	44	44	44	44	
44	44	200	200	215	215	215		44	44	5	5	44	44	44	44	44	
44	44	44	44	215	215	215		6	6	6	5	44	44	44	44	44	
44	44	44	6	6	6	6		6	6	6	44	44	44	44	44	44	
44	44	44	6	6	6	6		6	6	6	44	44	44	44	44	44	
44	44	44	6	6	6	324	324										
215	215	215	215	215	215	324	324	44	44	44	44	44	44	44	44	44	
215	215	215	215	215	215	324	40	44	44	44	44	44	44	44	44	44	
215	215	215	215	215	215	215	40	44	44	44	44						
215	215	215	215	215	215	215	40	44	44	44	44						
215	215	215	215	215	215	215	215	44	44	44	44						
1603	1603	2115	2001	2217	2217	2753	1447	834	1704	1665	1740	1686	1686	1306	1306		<b>27883</b>

# Exercise 6

Table 2: Simplified Carbon Stock Account

	Artificial surfaces (urban)	Herbaceous crops	Tree covered areas	Inland water bodies	Shrubs..regularly flooded (wetland)	Other	Total
	20	153	90	19	6	0	288
	23	145	96	19	5	0	288
<b>Opening</b>	<b>100</b>	<b>6,120</b>	<b>18,000</b>	<b>0</b>	<b>1,800</b>	<b>0</b>	<b>26,020</b>
Addition - carbon uptake by biomass	20	568	1,320	0	120	0	2,028
Addition - conversion	15	120	1,600	0	0	0	1,735
Reduction - forest fire	0	0	760	0	0	0	760
Reduction - conversion	0	440	400	0	300	0	1,140
<i>Net Ecosystem Carbon Balance (NECB)</i>	35	248	1,760	0	-180	0	1,863
<b>Closing</b>	<b>135</b>	<b>6,368</b>	<b>19,760</b>	<b>0</b>	<b>1,620</b>	<b>0</b>	<b>27,883</b>

# Exercise 7



Rainfall EA01	170	190
ha	70	10
Average EA01 (rainfall/ha)	173	
Rainfall EA02	150	
Ratio rainfall	0.87	
Yield EA01	18,700	
EA01: Yield/ha	234	
EA02: Yield/ha	203	
Yield EA02	9,147	

# Exercise 8

## Services Supply Database

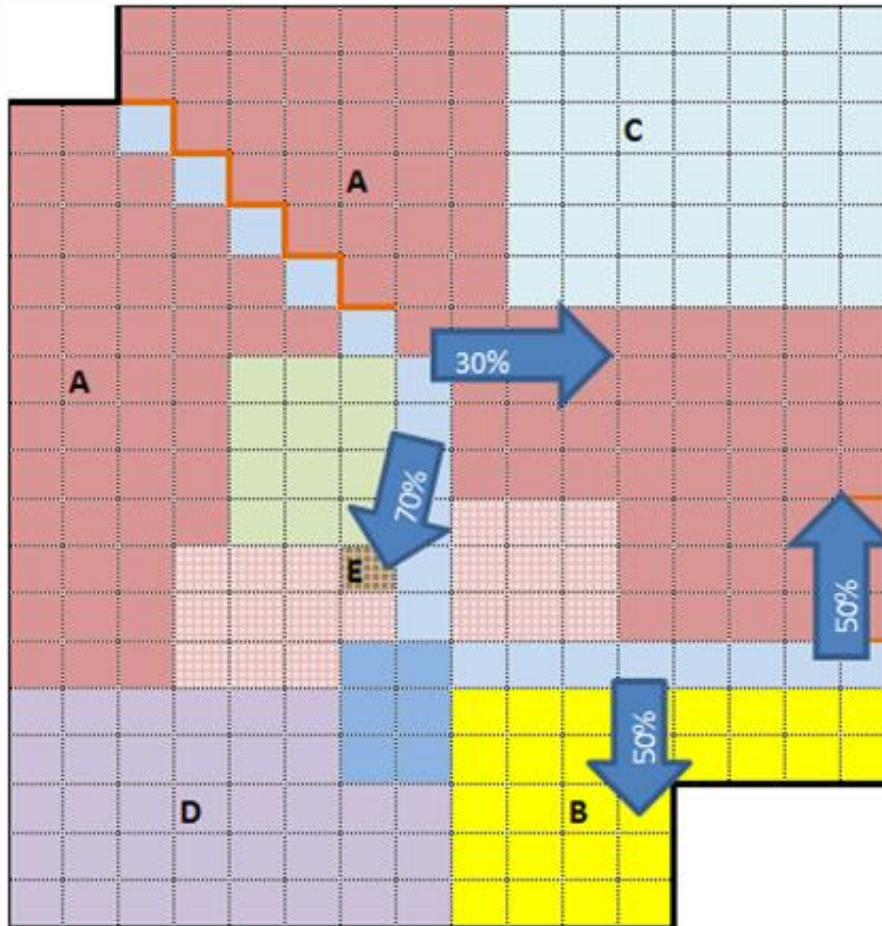
EU	Extent (ha)	(C) Crop	(R) Recreation	(W) Water	(S) Carbon Sequestration
		tonnes/year	trips/year	m <sup>3</sup> /year	tonnes /year
EA01 = Herbaceous crops	500.0	18,700	500	0	0
EA02 = Tree covered areas	262.5	0	1,500	0	270
EA03 = Inland water bodies	68.8	0	1,600	15,000	0
EA04 = Herbaceous crops	281.3	9,147	281	0	0
EA05 = Tree covered areas	75.0	0	429	0	1,380
EA06 = Artificial surfaces (urban)	56.3	0	500	0	0
EA07 = Artificial surfaces (urban)	68.8	0	700	0	0
EA08 = Shrubs..regularly flooded (wetland)	37.5	700	5,000	0	0
EA09 = Inland water bodies	50.0	0	1,164	10,909	0
EA10 = Tree covered areas	225.0	0	1,286	0	110
EA11 = Herbaceous crops	175.0	6,545	175	0	0
<b>Total</b>	<b>1,800.0</b>	<b>35,092</b>	<b>13,134</b>	<b>25,909</b>	<b>1,760</b>

# Exercise 8

## Services Supply Account

EU Type	(C) Crop	(R) Recreation	(W) Water	(S) Carbon Sequestration
	Tonnes	Trips	m <sup>3</sup>	tonnes
Artificial surfaces (urban)	-	1,200	-	-
Herbaceous crops	<b>34,392</b>	956	-	-
Tree covered areas	-	<b>3,214</b>	-	1,760
Inland water bodies	-	2,764	<b>25,909</b>	-
Shrubs..regularly flooded (wetland)	700	5,000	-	-
<b>Total</b>	<b>35,092</b>	<b>13,134</b>	<b>25,909</b>	<b>1,760</b>

# Exercise 9



## Economic units

A  
B  
C  
D  
E  
F  
G

## ISIC - Classification of economic activities

0111 - Growing of cereals (except rice), leguminous crops and oil seeds  
 Other agriculture  
 0113 - Growing of vegetables and melons, roots and tubers  
 5520 - Camping grounds, recreational vehicle parks and trailer parks  
 36 - Water collection, treatment and supply  
 Households  
 Government

# Exercise 9

## Services Supply Account

EU Type	(C) Crop	(R) Recreation	(W) Water	(S) Carbon Sequestration
	Tonnes	Trips	m <sup>3</sup>	tonnes
Artificial surfaces (urban)	-	1,200	-	-
Herbaceous crops	<b>34,392</b>	956	-	-
Tree covered areas	-	<b>3,214</b>	-	1,760
Inland water bodies	-	2,764	<b>25,909</b>	-
Shrubs..regularly flooded (wetland)	700	5,000	-	-
<b>Total</b>	<b>35,092</b>	<b>13,134</b>	<b>25,909</b>	<b>1,760</b>

## Services Use Account

Beneficiaries (based on survey)	(C) Crop	(R) Recreation	(W) Water	(S) Carbon Sequestration
	Tonnes	Trips	m <sup>3</sup>	tonnes
Agriculture - cereals	27,847		9,955	
Agriculture - other	6,545		5,455	
Water supply sector			10,500	
Recreation		1,286		
Households	700	11,848	-	-
Government	-	-	-	1,760
<b>Total</b>	<b>35,092</b>	<b>13,134</b>	<b>25,909</b>	<b>1,760</b>



# Exercise 10

**Resource rent = 188**

Step 1: estimate the gross operating surplus (in basic prices)

$$500 - 40 - 200 = 260$$

Step 2: deduct the return to produced capital

*depreciation: 10% of 400 = 40*

*rate of return = 8% 400 = 32*

$$260 - 72 = \mathbf{188}$$

*Ecosystem service = contribution by ecosystem to benefit*

# Exercise 11

## Services Supply Account (monetary)

EU Type	Extent (ha)	(C) Crop	(R) Recreation	(W) Water	(S) Carbon Sequestrati	Total	per ha \$/ha
		\$	\$	\$	\$		
Artificial surfaces (urban)	20	-	9,600	-	-	9,600	480
Herbaceous crops	153	<b>188,000</b>	7,650	-	-	195,650	1,279
Tree covered areas	90	-	25,714	-	176,000	201,714	2,241
Inland water bodies	19	-	22,109	<b>259,091</b>	-	281,200	14,800
Shrubs..regularly flooded (we	6	<b>3,827</b>	40,000	-	-	43,827	7,304
<b>Total</b>	<b>288</b>	<b>191,827</b>	<b>105,073</b>	<b>259,091</b>	<b>176,000</b>	731,991	2,542