System of Environmental Economic Accounting

Defining and valuing carbon related services in the SEEA-EEA

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Point of departure

- We want to ensure that accounts are policy relevant (and provide right incentives)
- Be comprehensive (i.e. also thinking about carbon emissions and degradation)
- Have to have a certain logic

Recording issues – situation 1

- Simple economy, one product X produced; value added of 200
- Situation 1: 10 tC sequestration + 20 tC emissions; NECB (forest) = 10

Situation 1: SNA	IC				
		Isic A	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration					0
Product X		200			200
Use					
Sequestration		0			0
Product X				200	200
Value added (gross)		200			**200**
degradation (CNC)					
Value added (net)		200		**200**	

Recording issues – situation 1

- Simple economy, one product X produced; value added of 200
- Situation 1: 10 tC sequestration + 20 tC emissions; NECB (forest) = 10

Situation 1: CS	Gov. consumption				
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	10				10
Product X		200			200
Use					
Sequestration				10	10
Product X				200	200
Value added (gross)	10	200			**210**
degradation (CNC)					
Value added (net)	10	200		**210**	

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Recording issues – situation 1

- What to do with the air emissions / degradation of the atmosphere?
- We could price the externality (orange)

Situation 1:	air emissions		gross recording		
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	10				10
Product X		200			200
Use					
Sequestration				10	0
Product X				200	200
Value added (gross)	10	200			210
degradation (CNC)		20			
Value added (net)	10	180		**190**	

Recording issues – situation 1

- What to do with the air emissions / degradation of the atmosphere?
- Record as CS as intermediate consumption + price degradation of asset

Situation 1:	air emissions		net		
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	10				10
Product X		200			200
Use					
Sequestration		10			10
Product X				200	200
Value added (gross)	10	190			200
degradation (CNC)		10			
Value added (net)	10	180		**190**	

Recording issues – situation 1

- What to do with the air emissions / degradation of the atmosphere?
- Alternative: introduce a sink service ? Major drawbacks

Situation 1:	air emissions		sink service		
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	10				10
Sink service	20				
Product X		200			200
Use					
Sequestration				10	0
Sink service		20			
Product X				200	200
Value added (gross)	30	180			210
degradation (CNC)					
Value added (net)	30	180		**210**	

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Recording issues – situation 2 (short-lived biomass)

- Situation 1: 10 tC NEP + 10 tC timber logging; 10 tC emissions; NECB = 0

Situation 2	timber logging for energy of 10 (interaction with ecc				
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	0				0
Product X		200			200
Use					
Sequestration				0	0
Product X				200	200
Value added (gross)	0	200			200
degradation (CNC)					
Value added (net)	0	200		**200**	

Recording issues – situation 2 (short-lived biomass)

- Situation 1: 10 tC NEP + 10 tC timber logging; 10 tC emissions; NECB = 0

		Ecosystem	Isic A	Inv.	Hh cons.	Total
Supply						
Sequestration		10				10
Product X			200			200
Use						
Sequestration					10	10
Product X					200	200
Value added (gross)		10	200			210
degradation (CNC)		10				
Value added (net)		0	200		**200**	

Recording issues – situation 3 (logging for wood products)

- Situation 1: 10 tC NEP + 20 tC timber logging; **no** emissions; NECB = -10

Situation: 3 logging	(no emissions, but 20 logging)				
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
Sequestration	0				0
Product X		200			200
Use					
Sequestration				0	0
Product X				200	200
Value added (gross)	0	200			200
degradation (CNC)		10			
Value added (net)	0	190		**190**	

Recording issues – situation 3 (logging for energy)

- Situation 1: 10 tC NEP + 20 tC timber logging; 20 emissions; NECB = -10

Situation: 3 logging	(20 logging + 20 emissions)					
	Ecosystem	**Isic A**	**Isic B**	**Inv.**	**Hh cons.**	**Total**
Supply						
Sequestration	0					0
Product X		100	100			200
Use						
Sequestration					0	0
Product X					200	200
Value added (gross)	0	100	100			200
degradation (CNC)		10	10			
Value added (net)	0	90	90		**180**	

Recording issues – situation 4 (export)

- Situation 4: (exports) 20 tC CS, 10 tC emissions NECB = +10

Situation: 4 logging	(CS > emissions)					
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Exports**	**Total**
Supply						
Sequestration	10					10
Product X		200				200
Use						
Sequestration		10			10	10
Product X				200		200
Value added (gross)	10	190				200
degradation (CNC)						
Value added (net)	10	190		**200**	**10**	

Supply and use of carbon sequestration and carbon storage

PHYSICAL SUPPLY	Economic unit									Environment unit												
										Biosphere												
	Agriculture, Forestry & Fisheries	Wood and paper products manufacturing	Waste management	Energy	Other Industries	Government*	Households	Accumulation	Imports	Artificial Surfaces	Crops and orchards	Plantation forest - hardwood	Plantation forest - softwood	Natural forest	Other vegetation cover	Peatlands	Mangroves	Inland Water Bodies	Geosphere	Oceans	Atmosphere	TOTAL SUPPLY
Ecosystem Services																						
Carbon sequestration																						
- forest available for harvest												*12*	*13*	*14*								*39*
- forest unavailable for harvest														*15*								*15*
- all other biosphere										*11*	*1*				*16*	*17*	*18*	*1*				*64*
Subtotal biosphere carbon sequestration										11	1	12	13	29	16	17	18	1				*118*
Subtotal non-biosphere carbon sequestration																			2	20	300	*322*
Total carbon sequestration										**11**	**1**	**12**	**13**	**29**	**16**	**17**	**18**	**1**	**2**	**20**	**300**	**440**
Carbon storage																						
- forest available for harvest												*120*	*130*	*140*								*390*
- forest unavailable for harvest														*150*								*150*
- all other biosphere										*50*	*3*				*200*	*300*	*400*	*5*				*958*
Subtotal biosphere carbon storage										50	3	120	130	290	200	300	400	5				1498
Subtotal non-biosphere carbon storage																			600	700	800	2606
Total carbon storage										**50**	**3**	**120**	**130**	**290**	**200**	**300**	**400**	**5**	**600**	**700**	**800**	**4104**

PHYSICAL USE	Economic Unit									Ecosystem Unit												
										Biosphere												
	Agriculture, Forestry & Fisheries	Wood and paper products manufacturing	Waste amangement	Energy	Other Industries	Government*	Households	Accumulation	Exports	Artificial Surfaces	Crops and orchard	Plantation forest - hardwood	Plantation forest - softwood	Natural forest	Other vegetation cover	Peatlands	Mangroves	Inland Water Bodies	Geosphere	Oceans	Atmosphere	TOTAL USE
Ecosystem Services																						
Carbon sequestration																						
- forest available for harvest	*39*																					*39*
- forest unavailable for harvest						*15*																*15*
- all other biosphere						*64*																*64*
Subtotal biosphere carbon sequestration	39	-	-	-	-	79	-	-	-													118
Subtotal non-biosphere carbon sequestration						322																322
Total carbon sequestration	**39**	-	-	-	-	**401**	-	-	-													**440**
Carbon storage																						
- forest available for harvest	390																					*390*
- forest unavailable for harvest						150																*150*
- all other biosphere						958																*958*
Subtotal biosphere carbon storage	390	-	-	-	-	1,108	-	-	-													1,498
Subtotal non-biosphere carbon storage						2,606																2,606
Total carbon storage	**390**	-	-	-	-	**3,714**	-	-	-													**4104**

Source: Keith and Vardon

Issue 1: REDD+

- NECB -5 (no emissions – logging)
- REDD -8 (based on historic land use change / deforestation)
  - > Therefore +3 REDD+ credit

Situation: 6 REDD+ sc	(no emissions, but 20 logging)				
	Ecosystem	**Isic A**	**Inv.**	**Hh cons.**	**Total**
Supply					
REDD	3				3
Product X		200			200
Use					
REDD				3	3
Product X				200	200
Value added (gross)	3	200			203
degradation (CNC)					
Value added (net)	3	200		**203**	

Issue 2: capacity

- A rainforest has a higher capacity to sequester carbon (i.e. its long-term average carbon density per hectare is high;
- Can we / should we recognize different qualities of carbon stocks ?
- In part -> will be picked up by other services
- Perhaps, if linked to "capacity"
  - > Estimate the change in capacity between a rainforest and a plantation over lifetime

	Stock	Flows								
bamboo	5	2	2	1	0					**5**
rainforest	30	1	1	1	1	1	1	1	1	**8**

  - > Direct loss (of 30) + indirect loss (delta NPV 3)

Conclusions

- It is possible to find satisfactory accounting treatments that provide a consistent recording of carbon in SUTs based on 2 principle
  - CS = NECB
  - Degradation costs recorded iff an underlying asset's condition worsens
- It seems to have the proper incentives
  - Timber logging (loss of storage services) is recognized as a cost
  - Polluter pays principle
  - Additional output for countries with NECB > 0
- Carbon stock accounts will always be useful (for Tier 3 countries)