Supplementary material

Trophic Models of Seagrass Ecosystems in Maqueda Channel, Caramoan Peninsula, Philippines

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Supplementary Material 1

Table 1 Sources of the P/B and Q/B values of invertebrates and seagrasses used in the Ecopath models

Groups	*P/B*	*Q/B*
P. nodosus	0.52 [27]	2.60 [27]
Crustaceans	8.40 [23]	28.00 [23]
Nematodes	10.00 [24]	50.00 [24]
Ophiuroids	8.63 [24]	34.52 [24]
Pelecypods	2.06 [27]	6.86 [27]
Polychaetes	1.63 [26]	12.46 [26]
S. maculata	4.45 [23]	22.25 [23]
Holothuria	4.45 [23]	22.25 [23]
Zooplankton	67.00 [24]	192.0 [24]
Herbivorous gastropods	2.80 [24]	5.60 [24]
T. gratilla	4.47 [28]	25.00 [23]
S. isoetifolium	8.43 [23]	--
H. pinifolia	8.43 [23]	--
H. uninervis	8.43 [23]	--
H. minor	8.43 [23]	--
C. serrulata	8.43 [23]	--
C. rotundata	8.43 [23]	--
T. hemprichii	8.43 [23]	--
E. acoroides	8.43 [23]	--
Phytoplankton	30.42 [23]	--
Detritus	19.80 [24]	--

Supplementary Material 2

Table 1 Diet composition matrix for all function groups of the Cagbanilad (coastal inlet of Tinago in Minalahos Island) seagrass system model, Maqueda Channel, Caramoan Peninsula, Philippines

	Prey \ predato	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	Syngnathidae		0.05			0.04		0.03								
2	Crustaceans	0.50	0.06	0.20	0.10	0.04	0.25	0.03								
3	Jellyfish		0.10			0.06		0.04								
4	*Proteroaster nodosus*		0.09			0.04		0.03								
5	Omnivorous fish		0.06			0.03		0.04								
6	Pelecypods		0.06		0.10				0.20	0.06		0.10				
7	Other benthic feeding fish		0.07	0.20												
8	Nematodes					0.05	0.25	0.03								
9	Other Holothuria		0.06		0.10	0.04		0.03		0.06						
10	Gastropods			0.20		0.07		0.07					0.20	0.10		
11	Ophiuroids		0.06		0.10	0.04		0.03		0.06						
12	*Synapta maculata*		0.08		0.10	0.05		0.04								
13	Zooplankton	0.20	0.07	0.20		0.09			0.20		0.30	0.10				
14	Polychaetes	0.30				0.04		0.04		0.11						
15	*Tripneustes gratilla*		0.04		0.24	0.06		0.05								
16	*Cymodocea serrulata*					0.05		0.08	0.20	0.10					0.20	0.18
17	*Cymodocea rotundata*					0.05		0.08	0.20	0.10					0.20	0.17
18	*Halophila ovalis*					0.06		0.08		0.10					0.20	0.10
19	*Halodule univervis*					0.06		0.09	0.20	0.100						0.10
20	*Thalassia hemprichii*					0.08		0.09		0.10						0.15
21	Phytoplankton		0.10	0.20	0.13		0.25			0.10	0.30	0.30	0.20	0.70		0.15
22	Detritus		0.10		0.13	0.05	0.25	0.12		0.11	0.40	0.50	0.60	0.20	0.20	0.15
Sum		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 2 Diet composition matrix for all function groups of the Sabitang-Laya seagrass system model, Maqueda Channel, Caramoan Peninsula, Philippines

	Prey \ predato	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	Syngnathidae		0.05			0.04		0.03								
2	Crustaceans	0.5	0.06	0.2	0.1	0.04	0.25	0.03								
3	Jellyfish		0.1			0.06		0.04								
4	*Proteroaster nodosus*		0.09			0.04		0.03								
5	Omnivorous fish		0.06			0.03		0.04								
6	Pelecypods		0.06		0.1				0.2		0.05	0.1				
7	Other benthic feeding fish		0.07	0.2												
8	Nematodes					0.05	0.25	0.03								
9	Other Holothuria			0.2		0.07		0.07					0.2	0.1		
10	Gastropods		0.06		0.1	0.04		0.03			0.05					
11	Ophiuroids		0.06		0.1	0.04		0.03			0.05					
12	*Synapta maculata*		0.08		0.1	0.05		0.03								
13	Zooplankton	0.2	0.07	0.2		0.09			0.2	0.3		0.1				
14	Polychaetes	0.3				0.04		0.03			0.1					
15	*Tripneustes gratilla*		0.04		0.24	0.06		0.04								
16	*Cymodocea serrulata*					0.05		0.07	0.2		0.09				0.2	0.15
17	*Cymodocea rotundata*					0.05		0.07	0.2		0.09				0.2	0.15
18	*Halophila ovalis*					0.05		0.07			0.09				0.2	0.1
19	*Halodule univervis*					0.05		0.08	0.2		0.09					0.1
20	*Syringodium isoetifolium*					0.05		0.08			0.09					0.1
21	*Thalassia hemprichii*					0.05		0.08			0.09					0.1
22	Phytoplankton		0.1	0.2	0.13		0.25			0.3	0.1	0.3	0.2	0.7		0.15
23	Detritus		0.1		0.13	0.05	0.25	0.12		0.4	0.11	0.5	0.6	0.2	0.2	0.15
Sum		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 3 Diet composition matrix for all function groups of the Nipa seagrass system model, Maqueda Channel, Caramoan Peninsula, Philippines

	Prey \ predato	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
1	Syngnathidae		0.05			0.04		0.03								
2	Crustaceans	0.5	0.06	0.2	0.1	0.04	0.25	0.03								
3	Jellyfish		0.1			0.06		0.04								
4	*Proteroaster nodosus*		0.09			0.04		0.03								
5	Omnivorous fish		0.06			0.03		0.04								
6	Pelecypods		0.06		0.1				0.2		0.05	0.1				
7	Other benthic feeding fish		0.07	0.2												
8	Nematodes					0.05	0.25	0.03								
9	Other Holothuria			0.2		0.07		0.07					0.2	0.1		
10	Gastropods		0.06		0.1	0.04		0.03			0.05					
11	Ophiuroids		0.06		0.1	0.04		0.03			0.05					
12	*Synapta maculata*		0.08		0.1	0.05		0.03								
13	Zooplankton	0.2	0.07	0.2		0.09			0.2	0.3		0.1				
14	Polychaetes	0.3				0.04		0.03			0.1					
15	*Tripneustes gratilla*		0.04		0.24	0.06		0.04								
16	*Cymodocea serrulata*					0.05		0.07	0.2		0.09				0.2	0.15
17	*Cymodocea rotundata*					0.05		0.07	0.2		0.09				0.2	0.15
18	*Halophila ovalis*					0.05		0.07			0.09				0.2	0.1
19	*Halodule univervis*					0.05		0.08	0.2		0.09					0.1
20	*Syringodium isoetifolium*					0.05		0.08			0.09					0.1
21	*Thalassia hemprichii*					0.05		0.08			0.09					0.1
22	*Enhalus acoorides*															
23	Phytoplankton		0.1	0.2	0.13		0.25			0.3	0.1	0.3	0.2	0.7		0.15
24	Detritus		0.1		0.13	0.05	0.25	0.12		0.4	0.11	0.5	0.6	0.2	0.2	0.15
Sum		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Supplementary Material 3

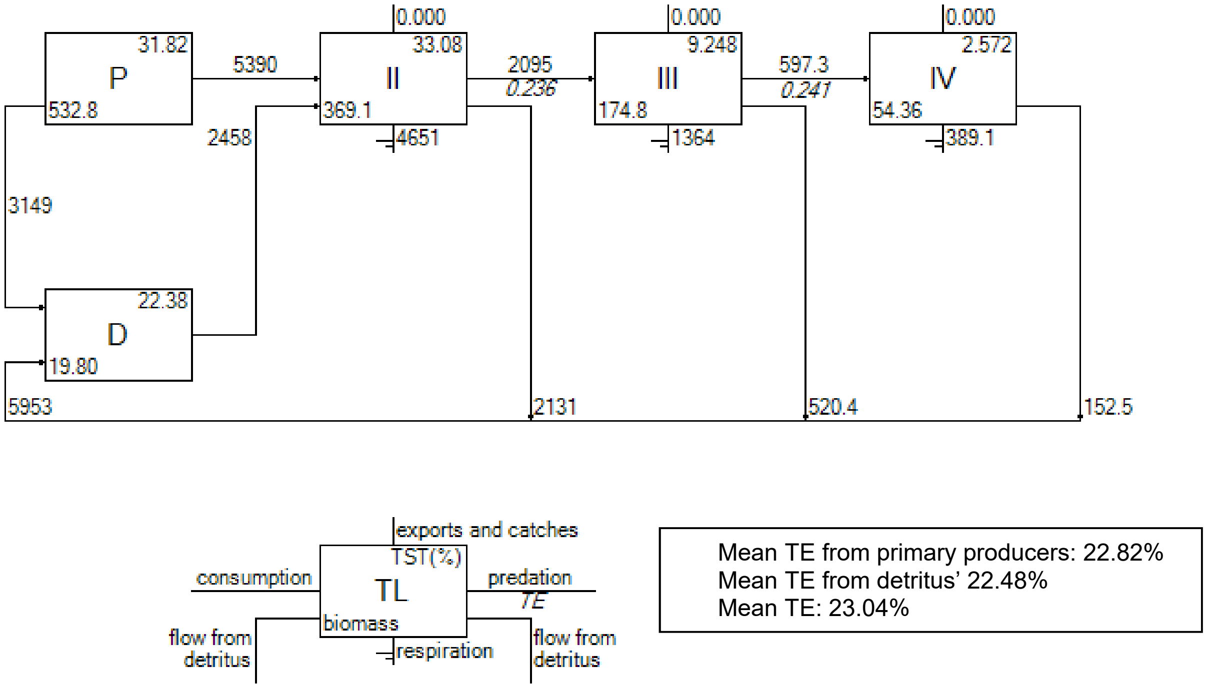

Figure 1 Flow network of organic matter and trophic efficiencies (%) in Cagbanilad (coastal inlet of Tinago in Minalahos Island) Seagrass System. The flow (g wet weight (WW) km^{-2} a^{-1}) web is aggregated into a concatenated chain of transfers through three integral trophic levels. Flows from primary producers (P), from detritus (D), and out of the tops of boxes represent export, while flows out of the bottoms represent respiration.

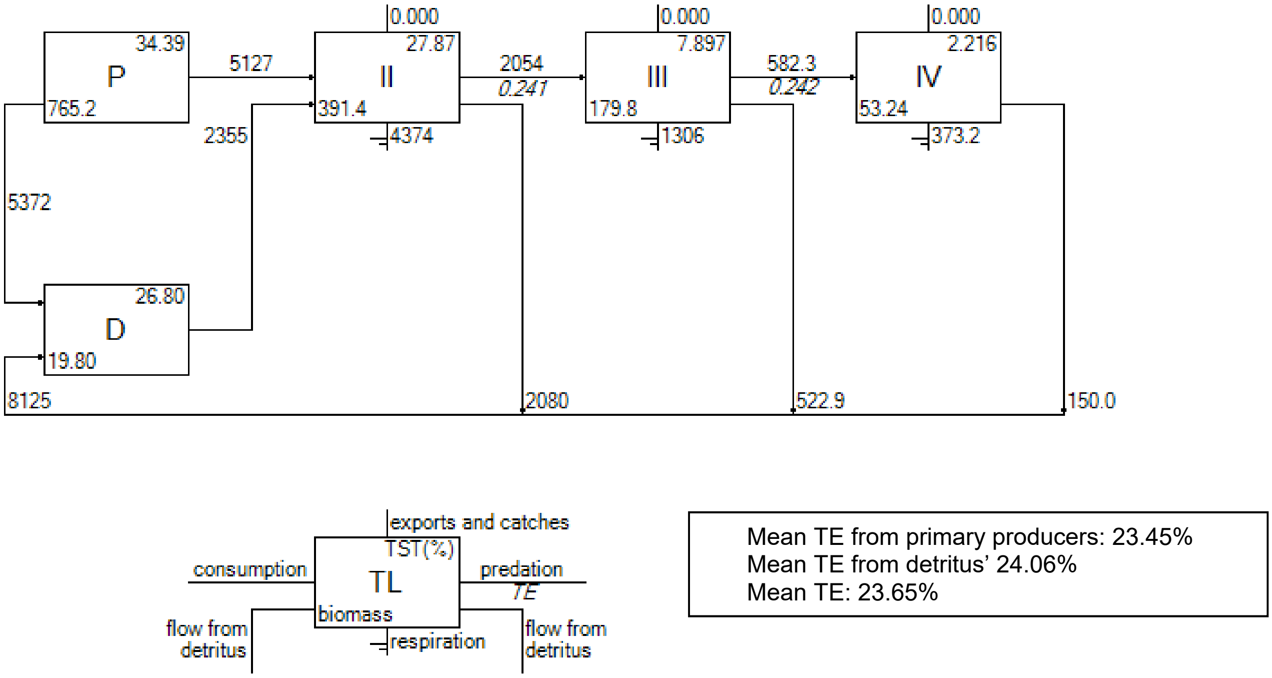

Figure 2 Flow network of organic matter and trophic efficiencies (%) in Sabitang-Laya Seagrass System. The flow (g wet weight (WW) km^{-2} a^{-1}) web is aggregated into a concatenated chain of transfers through three integral trophic levels. Flows from primary producers (P), from detritus (D), and out of the tops of boxes represent export, while flows out of the bottoms represent respiration.

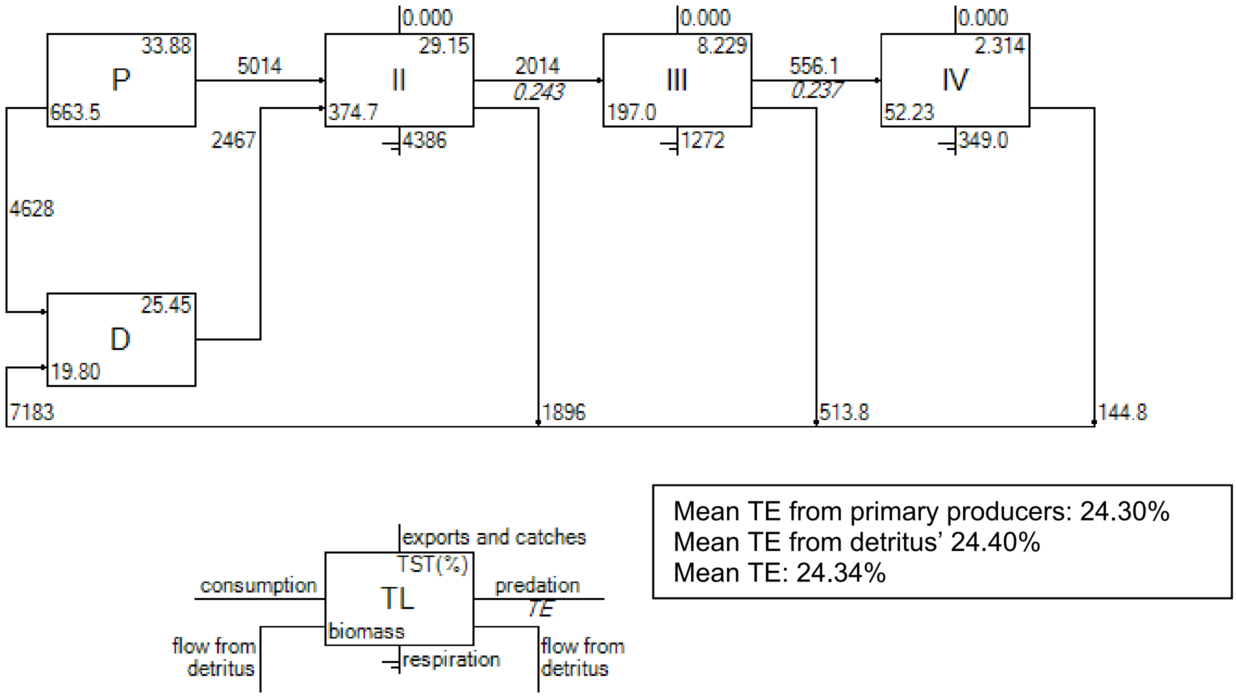

Figure 3 Flow network of organic matter and trophic efficiencies (%) in Nipa Seagrass System. The flow (g wet weight (WW) km^{-2} a^{-1}) web is aggregated into a concatenated chain of transfers through three integral trophic levels. Flows from primary producers (P), from detritus (D), and out of the tops of boxes represent export, while flows out of the bottoms represent respiration.

Supplementary Material 4

Table 1 Summary statistics and network flow indices of the seagrass system model of Cagbanilad (coastal inlet of Tinago in Minalahos Island), Sabitang-Laya Island, and Nipa, Maqueda Channel, Caramoan Peninsula, Philippines

Parameter	**Value**		
	Cagbanilad Bay	Sabitang-Laya Island	Nipa Bay
Ecosystem theory indices			
Sum of all consumption (t km^{-2} a^{-1})	11906.37	11400.86	11227.34
Sum of all exports (t km^{-2} a^{-1})	3547.41	5825.43	4776.05
Sum of all respiratory flows (t km^{-2} a^{-1})	6537.32	6189.08	6153.66
Sum of all flows into detritus (t km^{-2} a^{-1})	6005.37	8180.34	7243.15
Total system throughput (TST, t km^{-2} a^{-1})	27996.48	31595.70	29400.20
Sum of all production (t km^{-2} a^{-1})	11527.64	13430.60	12469.88
Calculated total net primary production (t km^{-2} a^{-1})	8539.86	10499.00	9641.66
Total primary production/total respiration (TPP/TR)	1.31	1.70	1.57
Net system production (PP-TR, (t km^{-2} a^{-1})	2002.54	4309.92	3488.00
Total primary production/total biomass (PP/B, $year^{-1}$)	7.43	7.45	7.36
Total biomass/total system throughput (B-TST, $year^{-1}$)	0.04	0.05	0.04
Total biomass (excluding detritus) (t km^{-2})	1150.03	1409.97	1310.27
Connectance Index (CI)	0.252	0.238	0.217
System Omnivory Index (SOI)	0.469	0.453	0.449
Shannon diversity index	2.824	2.757	2.867
Cycling indices			
Throughput cycled excluding detritus (t km^{-2} a^{-1})	394.3	359.9	337.6
Predatory cycling index (PCI, % of throughput without detritus)	2.467	2.362	2.264
Throughput cycled (including detritus) (t km^{-2} a^{-1})	1323	1198	1204
Finn's cycling index (FCI, % of total throughput)	4.726	3.790	4.096
Finn's mean path length	2.776	2.630	2.690
Finn's straight-through path length (excluding detritus)	2.385	2.403	2.369
Finn's straight-through path length (including detritus)	2.645	2.530	2.580
Information indices			
Ascendancy (A, flowbits) [%]	35497 [21.82]	43043 [24.47]	39527 [23.80]
Overhead (Ø, flowbits) [%]	127202 [78.18]	132856 [75.53]	126573 [76.20]
Capacity (C, flowbits) [%]	162698 [100]	175900 [100]	166100 [100]
Information (I, bits)	1.268	1.362	1.344
A/C	0.2182	0.2447	0.2380
Throughput (t/km^2/a)	27996	31596	29400