Appendix

Methodological approaches to mangrove valuation: Where do we stand?

Amber Himes-Cornell[1,2,*], Susan O. Grose[1] and Linwood Pendleton[1,3]

[1] University of Brest, Ifremer, CNRS, UMR 6308, AMURE, IUEM, 29280, Plouzane, France
[2] UN Food and Agriculture Organization, Fisheries and Aquaculture Division, Rome, Italy
[3] World Wildlife Fund, Global Science, Washington, D.C., USA

Table A1. Ecosystem service values in US$ per ha per year for mangrove ecosystems.

Ecosystem service	Example values (per ha per year)
Food	Benefit transfer: US$5.75 (Witt, 2016), US$ 90 (Khaleel, 2012; Khaleel et al., 2009), US$212 (Ayanlade and Proske, 2015), US$418.07-776.40 (Clark et al., 2012), US$450 (Ullah et al., 2010), US$577-980.18 (Burgess et al., 2015) US$797 (Gunawardena, 2009), US$1,225 (Mendoza-Gonzalez et al., 2012), US$8,700 (Souza and Silva, 2011), US$23,613 (Mubarak Bin Daina et al., 2015) Production function: US$52-105 (Islam and Ikejima, 2010), US$18,849 (Vazquez-Gonzalez et al., 2015), US$126,444 (Pascal and Bulu, 2013) Market price: US$37 (Malik et al., 2015a), US$48.8 (Hoberg, 2011), $US49 (Giri et al., 2011; Samonte-Tan et al., 2007), US$97.90 (Janekarnkij, 2010), US$113.09 (Kairo et al., 2009), US$238 (Huxham et al., 2015), US$385-419 (Kuenzer and Tuan, 2013), US$560.55 (Otieno, 2015)
Water	Benefit transfer: US$212 (Ayanlade and Proske, 2015), US$1,385-6,716 (Mubarak Bin Daina et al., 2015)
Raw material	Benefit transfer: US$1.45 (Mendoza-Gonzalez et al., 2012), US$45.30 (Emerton and Aung, 2013), US$50 (Khaleel, 2012; Khaleel et al., 2009), US$79.50 (Interwies and Gorlitz, 2013), US$101 (Barbier, 2012b), US$110 (Ullah et al., 2010), US$212 (Ayanlade and Proske, 2015) Production function: US$151 (Witt, 2016), US$5,100 (Christensen et al., 2008), US$1,336-9201 (Kallesoe et al., 2008), US$39,233 (Pascal and Bulu, 2013) Market price: US$12 (Malik et al., 2015b), US$30.50 (Janekarnkij, 2010), US$35.70 (Hoberg, 2011), US$41.54 (Otieno, 2015), US$206 (Huxham et al., 2015), US$2,040 (Vo, 2013)
Waste treatment	Benefit transfer: US$30.80 (Interwies and Gorlitz, 2013), US$569 (Mendoza-González et al., 2012), US$660 (Khaleel, 2012)US$760 (Ullah et al., 2010), US$6,696 (Gunawardena, 2009), US$11,000 (Korovulavula et al., 2008) Replacement cost: US$72 (Souza and Silva, 2011)
Climate regulation	Benefit transfer: US$2.20 (Janekarnkij, 2010), US$186 (Ayanlade and Proske, 2015), US$219 (Quoc Vo et al., 2015), US$59-6,538 (Kuenzer and Tuan, 2013), US$1,100 (Ullah et al., 2010) Market price: US$30.50 (Barbier et al., 2011), US$44.42 (Kairo et al., 2009), US$126 (Hoberg, 2011), US$251 (Huxham et al., 2015), US$550-

Ecosystem service	Example values (per ha per year)
	1,100 (Malik et al., 2015b) Production function: US$414,411 (Pascal and Bulu, 2013) Social cost of carbon: No per ha per year estimates published.
Erosion prevention	Benefit transfer: US$38.25 (Janekarnkij, 2010), US$186 (Ayanlade and Proske, 2015), US$672 (Samonte-Tan et al., 2007), US$800 (Khaleel, 2012), US$973.95 (Emerton and Aung, 2013) US$1200 (Ullah et al., 2010), US$1,340.60 (Interwies and Gorlitz, 2013) Market price: US$395 (Huxham et al., 2015), US$660 (Quoc Vo et al., 2015), US$3,896 (Kuenzer and Tuan, 2013)
Moderation of extreme events	Benefit transfer: US$16 (Janekarnkij, 2010), US$40 (Ullah et al., 2010), US$639.35 (Emerton and Aung, 2013), US$1,340 (Interwies and Gorlitz, 2013), US$1,356.66-1,631 (Burgess et al., 2015)US$1,500 (Khaleel, 2012), US$1,839 (Gunawardena, 2009), US$2,000 (Ullah et al., 2010), US$3,116 (Mubarak Bin Daina et al., 2015) Replacement cost: US$35 (Huxham et al., 2015), US$660 (Quoc Vo et al., 2015), US$694-3,767 (Malik et al., 2015b), US$1,879 (Barbier, 2012b) Avoided cost: US$91.70 (Hoberg, 2011)
Maintenance of soil fertility and nutrient cycling	Benefit transfer: US$640 (Khaleel, 2012; Ullah et al., 2010)
Regulation of water flows	Benefit transfer: US$540 (Ullah et al., 2010), US$660 (Khaleel, 2012)
Maintenance of genetic diversity	Benefit transfer: US$2.43 (Witt, 2016), US$5 (Hoberg, 2011), US$19 (Samonte-Tan et al., 2007), US$100 (Ullah et al., 2010), US$168 (Ayanlade and Proske, 2015), US$200 (Khaleel, 2012; Khaleel et al., 2009)
Maintenance of life cycles of migratory species	Benefit transfer: US$117.14 (Janekarnkij, 2010), US$243 (Samonte-Tan et al., 2007)US$249 (Barbier, 2012b), US$425.60 (Interwies and Gorlitz, 2013), US$3,500 (Ullah et al., 2010), US$4,200 (Khaleel, 2012; Khaleel et al., 2009) Production function: US$995-4,887 (Kallesoe et al., 2008), US$2,124 (Kuenzer and Tuan, 2013) Market price: No per ha per year estimates published.

Ecosystem service	Example values (per ha per year)
Aesthetic information	Benefit transfer: US$500 (Khaleel, 2012; Khaleel et al., 2009)
Information for cognitive development	Benefit transfer: US$50 (Ullah et al., 2010), US$100 (Khaleel, 2012) Market price: US$184.40 (Hoberg, 2011), US$770.23 (Kairo et al., 2009)
Opportunities for recreation and tourism	Benefit transfer: US$20 (Ayanlade and Proske, 2015), US$155 (Mendoza-González et al., 2012) US$500 (Khaleel, 2012; Ullah et al., 2010), US$658 (Gunawardena, 2009), US$37,927 (Mubarak Bin Daina et al., 2015) Market price: US$9.30 (Kairo et al., 2009), US$453.20 (Janekarnkij, 2010), US$ 2,352.15 (Souza and Silva, 2011) Contingent valuation: US$97 (Dehghani et al., 2010) Travel cost method: US$2,960.44-4,597.71 (Kuenzer and Tuan, 2013)

Table A2. Summary of ecosystem service values published for mangroves.

Year values were calculated for	Unknown	1996	1998	1999	2001	2002	2003	2004	2005	2006
Total ES value	US$11,850/ha/yr (Ullah et al. 2010), VND146,700/household/year (Tuan et al. 2014); US$10,960/ha/yr (Khaleel et al. 2009; 2012)	US$18,978/ha (Barbier 2012)					US$757.55/ha/yr (Janekarnkij 2010)			1852.60 million PhP/ha (Padilla 2008)
Provisioning services	US$4800/ha/yr (Korovulavula et al. 2008)									
Food	Aquatic production: US$300/ha/yr, Fishing: US$150/ha/yr (Ullah et al. 2010); Fisheries productivity: US$25,149(+-1,395 SE)/km (Aburto-Oropeza et al. 2008), Drinking water, food and raw materials: US$212/ha/yr (Ayanlade et al. 2015), Fisheries: $23,613/ha/yr (Mubarak Bin Daina et al. 2015), Fisheries: RM432.75 /household/month (Mojiol et al. 2016); Mud-crab fishing: US$5.75/ha/yr (Witt 2016); Fisheries: 0.02 million €/km^2/year (Failler et al. 2015); Fisheries: US$37/ha/yr (Malik et al. 2015); Aquaculture: US$ 8,700 / ha / year (Souza and Silva 2015); Fisheries: US$44.62-				Fish: US$200,000 /yr, Crab: US$20,000 /yr, Honey and wax: US$15,000 /yr (2001-2010 average, Uddin et al. 2013)		Fisheries: US$97.9/ha/year (Janekarnkij 2010); Commercial, recreational, and subsistence fisheries harvest: $418.07 to $776.40 per ha (Clark et al. 2012)	Fisheries: US$52-105/ha/yr (Islam and Ikejima 2010); Fisheries: US$16/ha/yr, Mollusks/ Echinoderms: US$33/ha/yr (Samonte-Tan et al. 2007)		Fisheries: 68,436.15 PhP/km2/yr (Padilla 2008), Commercial and subsistence fisheries: US$7119.51/household/yr (O'Garra 2012); Fin fish: US$113.09/ha/yr (Kairo et al. 2009); Food production: US$1225/ha/yr (Mendoza-González et al. 2012)

	68.6/household/year, Honey: US$3.6/household/year (Hussain and Badola 2010); Fishing: US$ 90/ha/yr (Khaleel et al. 2009; 2012); Food production/biological control: US$797/ha/yr (Gunawardena 2009); Mudcrabs: IDR 81,811,800/yr, Fish: IDR 440,000/yr (Susilo et al. 2016)									
Water	Drinking water, food and raw materials: US$212/ha/yr (Ayanlade et al. 2015), Water purification: US$ 1385-$6716 ha/yr (Mubarak Bin Daina et al. 2015)									
Ornamental resources										
Genetic resources										
Medicinal resources	Spiritual, medical and recreational benefits: US$20/ha/yr (Ayanlade et al. 2015)						Raw material (incl. medicinal plants): US$30.5/ha/year (Janekarnkij 2010)			
Raw material	Livestock grazing: US$60/ha/yr, Fertilizer industry: US$50/ha/yr (Ullah et al. 2010), Drinking water, food and raw materials: US$212/ha/yr (Ayanlade et al. 2015), Timber products: RM40.85 /household/month	Wood and non-wood products: US$101/ha/yr (Barbier 2012)	Forestry products: US$5,100/ha/yr (1998-2001 average, Christensen et al. 2008)		Timber: US$400,000/yr, Thatching materials: US$60,000/yr, Fuel wood: US$60,000/yr (2001-		Raw material (incl. medicinal plants): US$30.5/ha/year (Janekarnkij 2010); Timber			Timber: 279,770.44 PhP/km2/yr (Padilla 2008); Poles: US$4,328.27/ha of the plantation, Fuelwood:

	(Mojiol et al. 2016); Beekeeping: US$0.88/ha/yr, Sustainable timber harvesting: US$0.50/ha/yr, Charcoal production: US$150/ha/yr (Witt 2016); Firewood: US$2/ha/yr, Charcoal: US$5/ha/yr, Nypa palm crafting valule: US$5/ha/yr (Malik et al. 2015); Fuelwood: US$88.34, Timber: US$20.1/household/year, Thatching material: US$2.5/household/year (Hussain and Badola 2010); Fertilizer industry: US$50/ha/yr (Khaleel et al. 2009; 2012); Total gross mangrove product (Sri Lanka): US$1,771/household/yr and US$9,201/ha/yr, Total gross mangrove product (Thailand): US$9443-14428/household/yr and US$1336-3306/ha/yr (Kallesoe et al. 2008)				2010 average, Uddin et al. 2013)		and building material provisions: $89.59 to $101.42 per ha (Clark et al. 2012)			US$222.07/ ha of the plantation (Kairo et al. 2009); Raw materials: US$1.45/ha /yr (Mendoza-González et al. 2012)
Regulating services										
Waste treatment	Pollution filtration: US$260/ha/yr Heavy metal removal: US$150/ha/yr, Chemical pollution absorption: US$350/ha/yr (Ullah et al. 2010); Water and waste treatment: 0.17 M €/km^2/year (Failler et al.									53.83 million PhP/yr (Padilla 2008); $569/ha/yr (Mendoza-González et al. 2012)

	2015); Wastewater treatment: US$ 72.00/ha/year (Souza and Silva 2011); Pollution filtration: US$260/ha/yr, Heavy metal removal: US$100/ha/yr, Chemical pollution absorption: US$300/ha/yr (Khaleel et al. 2009; 2012); US$66,960/km /yr (in 1994 US$) or US$11,000/ha/yr (Korovulavula et al. 2008); US$6696/ha/yr (Gunawardena 2009)									
Moderation of extreme events	Protection against cyclone and wave damage: US$2000/ha/yr (Ullah et al. 2010), Coastal protection: $3,116/ha/yr (Mubarak Bin Daina et al. 2015); Coastal protection: 0.06 million €/km^2/year (Failler et al. 2015); Coastline protection: US$694-3767/ha/yr (Malik et al. 2015); Protection against Tsunami and wave damage: US$1500/ha/yr (Khaleel et al. 2009; 2012); Coastal protection: US$1839/ha/yr (Gunawardena 2009); Wave breakers: IDR 93,699,170/yr; Abrasion breakers: IDR 26,364,2000/yr (Susilo et al. 2016)	Storm protection: US$134,801 /ha (Barbier 2007), Coastal protection: US$1879/ha/year (Barbier 2012)		Wind protection: US$177/ha (Das and Crepin 2013)			Storm protection: US$16/ha /yr (Janekarnkij 2010)		Erosion control and Storm protection: 23,210.74 PhP/ha/yr (Defiesta 2007)	Coastal protection: 40,000PhP/ha/yr (Padilla 2008); Coastal protection: US$95686.63/km/yr (O'Garra 2012)
Regulation of water flows	Flood control: US$500/ha/yr, Groundwater and									

	recharge supply: US$40/ha/yr (Ullah et al. 2010); Seawater intrusion prevention: US$277/ha/yr (Malik et al. 2015), Flood control: US$600/ha/yr; Groundwater and recharge supply: US$60/ha/yr (Khaleel et al. 2009; 2012)									
Erosion prevention	US$1200/ha/yr (Ullah et al. 2010), Erosion and climate control: US$186/ha/yr (Ayanlade et al. 2015); US$800/ha/yr (Khaleel et al. 2009; 2012); Shoreline protection: 1) US$170,100 per km of shoreline per yr (in 1994 US$) or 2) F$105 million total protection value (Korovulavula et al. 2008)						US$38.25 /ha/yr (Janekarnkij 2010); $597.24 to $1,791.71 per ha (Clark et al. 2010)	US$672/ha/yr (Samonte-Tan et al. 2007)	Erosion control and Storm protection: 23,210.74 PhP/ha/yr (Defiesta 2007)	
Climate regulation	Microclimate regulation: US$1000/ha/yr World climate regulation: US$100/ha/yr (Ullah et al. 2010), Erosion and climate control: US$186/ha/yr (Ayanlade et al. 2015); Carbon sequestration: 0.01 M €/km^2/year (Failler et al. 2015); Carbon sequestration:US$550-1100/ha/yr (Malik et al. 2015); Microclimate regulation: US$800/ha/yr, World climate regulation:					Forestation cost (C fixation): 16,963,200 CNY/year; Carbon tax: 80,723,300 CNY/year (Zhiyun et al. 2011)	Carbon sequestration: US$2.2/ha/yr (Janekarnkij 2010)			Carbon sequestration: US$10.7/ton (Padilla 2008) ; US$44.42/ha/yr (Kairo et al. 2009)

	US$100/ha/yr (Khaleel et al. 2009; 2012)									
Maintenance of soil fertility	Ecosystem function in terms of dry matter: US$150 /ha/yr, Oxygen production (20 kg/ha): US$ 40/ha/yr, Nutrient production and recycling: US$450/ha/yr (Ullah et al. 2010), Protection of biodiversity, genetic resources, nutrient cycling: US$168/ha/yr (Ayanlade et al. 2015); Nutrient cycling: US$854.68/ha (Hussain and Badola 2008); Ecosystem function in terms of dry matter: US$150/ha/yr, Oxygen production (20 kg/ha/yr): US$40/ha/yr, Nutrient production and recycling: US$450/ha/yr (Khaleel et al. 2009; 2012; 2012)								Litterfall function: 13,515.47 PhP/ha/yr (Defiesta 2007)	
Pollination										
Biological control	Food production/biological control: US$797/ha/yr (Gunawardena 2009)									
Supporting services										
Maintenance of life cycles of migratory species	Fish and shellfish habitat: US$2500/ha/yr, Waterfowl and other birds' habitat: US$1000/ha/yr (Ullah et al. 2010), Nursery	Habitat-fishery linkanges: US$249/ha/yr					Nursery function: US$117.14 /ha/year (Janekarnkij 2010);	Nursery function: US$243/ha/yr (Samonte-	Nursery function: 36,955.16 PhP/ha/yr	

	habitat: NPV: US$0.47 and 0.57 million (3.44-18 km2 ha range) (Barbier 2007); Fisheries biomass production (nursery ground): 0.07 M /km^2/year (Failler et al. 2015); Provision of nursery grounds: US$2292/ha/yr (Malik et al. 2015); Fish and shellfish habitat: US$2000/ha/yr; Waterfowl and other birds' habitat: US$1200/ha/yr, Wildlife habitat: US$1000/ha/yr (Khaleel et al. 2009; 2012); Nursery value (Thailand): US$995-4,887/ha/yr (Kallesoe et al. 2008); Nursery ground: IDR 116,065,005 (Susilo et al. 2016)	(Barbier 2012)					Habitat function: $331 per ha (Clark et al. 2012)	Tan et al. 2007)	(Defiesta 2007)	
Maintenance of genetic diversity	Preservation of gene pool: US$100/ha/yr (Ullah et al. 2010), Protection of biodiversity, genetic resources, nutrient cycling: US$168/ha/yr (Ayanlade et al. 2015); Biodiversity: US$2.43/ha/yr (Witt 2016); Preservation of gene pool: US$200/ha/yr (Khaleel et al. 2009; 2012)							US$19/ha /yr (Samonte-Tan et al. 2007)		
Cultural services										

Aesthetic information	Recreation and aesthetics: US$500/ha/yr (Khaleel et al. 2009; 2012)									
Spiritual experience	US$20/ha/yr (Ayanlade et al. 2015)									
Opportunities for recreation and tourism	Recreation and aesthetics: US$500/ha/yr (Ullah et al. 2010), Recreation: RM41.18 per visit (Ahmad 2009), Spiritual, medical and recreational benefits: US$20/ha/yr (Ayanlade et al. 2015), Recreation and tourism: $37,927/ha/yr (Mubarak Bin Daina et al. 2015); Ecotourism: 0.27 million €/km^2/year, Touring activities: 0.13 million €/km^2/year, Consumer surplus for recreational activities: 0.98 million €/km^2/year (Failler et al. 2015); Tourism (including education and research): US$2352.15/ha/yr (Souza and Silva 2011); Recreation and aesthetics: US$500/ha/yr (Khaleel et al. 2009; 2012); Recreation: US$658/ha/yr (Gunawardena 2009); Tourism: Rs 25,000 in consumer surplus/person/year (Amarnath and Mouna 2016)				Tourism: US$42,000 /yr (2001-2010 average, Uddin et al. 2013)		Ecotourism and recreation: US$453.2/ ha/yr (Janekarnkij 2010); Recreation: $358.34 per ha (Clark et al. 2012)			Recreation value: US$97 ha/yr (Dehghani et al. 2010); Ecotourism: US$9.30/ha /yr (Kairo et al. 2009); Recreation: US$155/ha /yr (Mendoza-González et al. 2012)

Inspiration for culture, art and design	Spiritual, medical and recreational benefits: US$20/ha/yr (Ayanlade et al. 2015)									
Information for cognitive development	Scientific research: US$50/ha/yr (Ullah et al. 2010); Research and education: 0.01 M €/km^2/year (Failler et al. 2015); Scientific research: US$100/ha/yr (Khaleel et al. 2009; 2012)									Education and research: 7.5 million PhP/yr (Padilla 2008); US$770.23/ ha/yr (Kairo et al. 2009)
Existence/ option/ bequest value	Existence value: US$1.65/ha/yr (Witt 2016); Bequest and existence value: 0.15 M €/km^2/year (Failler et al. 2015); Option value for future medicinal use: US$157/ha/yr (Malik et al. 2015)						Non-use value: US$2.40/ha/yr (Janekarnkij 2010)			Bequest value: US$106.92/ household/ year (O'Garra 2012)

Year values were calculated for	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Total ES value	US$2,870 /ha/yr (Pernetta et al. 2013) ; $US4,684.20/ha/ yr lost value of mangroves (all services) across the region (Eppink et al. 2014); Total ecosystem service value:		US$797/ha/ yr (Pandey 2015)	US$3000/ha/ yr (Quoc Vo et al. 2015)		$2,692/ha/y r (2012 international $) (Clavelle and Jylkka 2013)	US$17,426 /ac/year (Brown and Shi 2014)		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
	US$1258/ha/year (Camacho Valdez et al. 2014); All ecosystem services combined all of SE Asia: US$1,037.46/ha/yr, Brunei: US$4000.00ha/yr, Cambodia: US$500.00ha/yr, Indonesia: US$1043.48ha/yr, Malaysia: US$1268.18ha/yr, Myanmar: US$625.00ha/yr, Philippines: US$1833.33ha/yr, Thailand: US$1440.00ha/yr, Vietnam: US$533.33ha/yr, (Brander et al. 2012)								
Provisioning services						Extractive value: Tk 2,300/ha/yr (Chow 2015)			
Food	Fruit: US$1/ha/yr, Fisheries: US$514/ha/yr, Worms: US$41/ha/yr, Wildlife: US$18/ha/yr (Pernetta et al. 2013);	Mangrove and coral reef fisheries: SBD$ 5500-12 100/household/yr (Warren-		Fisheries: US$44/ha/yr, Aquaculture: US$ 4.8/ha/yr (Hoberg 2011); Commercial fisheries: 70kMGA:	Fisheries catch inside mangrove area: US$385.97-419.11/ha/yr (Kuenzer and Tuan 2013)	Subsistence fishery: US$ 79161/ha/yr; Int$US1311, Commercial fishery: US$ 47283/ha/yr; Int$US783	Fish: US$ 559 /Ha/year, Honey: US$ 1.55 /ha/year (Otieno 2015), Food: 40.58 million Indian rupees/yr: 719.5 Indian	Capture fisheries - finfish: US$109/ha/yr, crustaceans: US$129/ha/yr (Huxham et al. 2015);	Fisheries: 10-year NPV per hectare ranging from $0-$3,839 /ha (Atkinson et al. 2016)

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Commercial fisheries: US$18,849/ha/year (Vazquez-Gonzalez et al. 2015); Fisheries: US$1,287/ha/yr (Adhikari 2010)	Rhodes et al. 2011)		6180 MGA/individual; 80k MGA: 14050 MGA/individual (Oleson et al. 2015); Fisheries: Range US$990.96 (less than 30% mangrove cover)-US$3248.14 (over 70% mangrove cover) (Quoc Vo et al. 2015); Fisheries: US$577-960.18ha/yr (Burgess et al. 2015); Fisheries: US$3404/household/year (Adekola et al. 2015)		(Pascal and Bulu 2013)	rupees/ha/yr (Everard et al. 2014)	Willingness to accept mangrove conservation with a decrease in fishing from 15 kg/day to 5-15 kg/day or less than 5 kg/day: 123260-184400IRR/household/day or US$4.47-6.68/household/day (Mashayekhi et al. 2016); Fishing: US$2,793.13 - 5,504.22/household/yr Snails: US$72.28/household/yr (Sopheak and Hoeurn 2016)	
Water							Fresh drinking water: 2.72 million Indian rupees/yr: 482 Indian rupees/ha/yr (Everard et al. 2014)		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
Ornamental resources									
Genetic resources									
Medicinal resources	Medicine: US$173/ha/yr (Pernetta et al. 2013)								
Raw material	Timber: US$73/ha/yr, Firewood: US$2/ha/yr (Pernetta et al. 2013)	SBD$ 2500-10 /household/ yr (Warren-Rhodes et al. 2011)		US$3714/household/year (Adekola et al. 2015); US$ 4.2/ha/yr for timber, US$16.8/ha/yr for fuelwood, Apiculture: US$14.7/ha/yr (Hoberg 2011); Timber products: US$2040/ha/yr (Quoc Vo et al. 2015)	Wood raw material: US$2,765/ha/yr (Ajonina et al. 2014)	Raw materials: Non-timber, non-fish (NTNF) mangrove products: MMK44,000 /ha/yr: US$45.30 /ha/yr (Emerton and Aung 2013); timber forestry product: U$12/ha/year; non-timber forestry product: US$67.5/ha/year (Interweis and Gorlitz 2013); Wood extraction: US$ 39233/ha/yr; Int$US650 (Pascal and Bulu 2013)	Firewood: US$26.60 /ha/year, Building materials: US$14.94 /ha/year (Otieno 2015), Timber and fuel wood collection: 3,544.74 Baht/Household/Year Plan and herb collection: 4,704.62 Baht/Household/Year (Wiwatthanapornachai et al. 2014)	Natural regeneration after clear felling - profitability: $US369.91/ha (Aziz et al. 2015); Timber, fuelwood, honey: US$206/ha/yr (Huxham et al. 2015); Willingness to accept mangrove conservation with a decrease in mangrove wood collection from 10 bundles/trip to 5 bundles or 3 bundles/trip: 103924-116602 IRR/household/day or US$3.77-	

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
								4.23/household/day (Mashayekhi et al. 2016); Fuelwood: US$54.81-98.02/household/yr, Poles for construction materials: US$615.37/household/yr (Sopheak and Hoeurn 2016)	
Regulating services									
Waste treatment						US$30.80/ha/year (Interweis and Gorlitz 2013)	8,819.89 Baht/Household/Year (Wiwatthanapornachai et al. 2014); Industrial and domestic wastewater treatment value: 119.57 million Indian rupees/yr: 21,200.35 Indian rupees/ha/yr (Everard et al. 2014)		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
Moderation of extreme events	Coastal protection: US$444/ha/yr, Windbreak: US$7/ha/yr (Pernetta et al. 2013)			Shoreline protection: US$91.7/ha/yr (Hoberg 2011); 1x4 yrs: 4130 MGA/individual; 1x/5 yrs: 14990 MGA/individual (Oleson et al. 2015); Storm protection/erosion: US$660/ha/yr (Quoc Vo et al. 2015); Coastal protection: US$1,356.66-1,631ha/yr (Burgess et al. 2015)		Disturbance regulation: NZ$4,909.81/ha/yr (Patterson and Cole 2013); Coastal protection: MMK 621,000/ha/yr: US$639.35/ha/yr (Emerton and Aung 2013); Moderation of extreme events and Erosion prevention: US$1340.60/ha/year (Interweis and Gorlitz 2013); Coastal protection against floods: US$ 5644/ha/yr; Int$US93 (Pascal and Bulu 2013)	Coastal protection: 11,490.39 Baht/Household/Year (Wiwatthanapornachai et al. 2014), flood control: 348.40 million Indian rupees/yr: 61,773.05 Indian rupees/ha/yr (Everard et al. 2014)	Protection from storm surges: US$35/ha/yr (Huxham et al. 2015)	Coastal protection: $88-$6.1M/ha over 10 years (Atkinson et al. 2016)
Regulation of water flows									
Erosion prevention	Sediment retention: US$66/ha/yr			Storm protection/erosion:	US$3896/ha/yr (Kuenzer	MMK 946,000/ha/yr:		Protection from coastal erosion:	

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
	(Pernetta et al. 2013)			US$660/ha/yr (Quoc Vo et al. 2015)	and Tuan 2013)	US$973.95 /ha/yr (Emerton and Aung 2013); Moderation of extreme events and Erosion prevention: US$1340.60/ ha/year (Interweis and Gorlitz 2013)		US$395/ha/ yr (Huxham et al. 2015)	
Climate regulation	Carbon sequestration: US$89/ha/yr (Pernetta et al. 2013)		Permanent carbon sequestratio n by global mangroves: $30.50/ha/y r (Barbier et al. 2011)	Carbon sequestration : mean estimate: social cost of carbon US$464,000/ ha, marginal abatement cost US$950,000/ ha, market price US$252/ha (Jerath 2012); US$ 126/ha/yr (Hoberg 2011); US$219/ha/y r (Quoc Vo et al. 2015)	Carbon sequestration : US$59.55-6538.79/ha/y r (Kuenzer and Tuan 2013)	US$335.50/h a/year (Interweis and Gorlitz 2013); Carbon sequestratio n: US$ 414411/ha/ yr; Int$US6864 (Pascal and Bulu 2013)	Purify air pollution: 6,093.90 Baht/Househ old/Year, Carbon storage: 5,773.76 Baht/Househ old/Year (Wiwatthana pornachai et al. 2014); Carbon sequestration : 0.56 million Indian rupees/yr: 99.29 Indian rupees/ha/yr (Everard et al. 2014)	Carbon sequestratio n: US$251/ha/ yr (Huxham et al. 2015)	Social cost of carbon: $56,045/ha, Regional Greenhouse Gas Initiative market: $6041/ha, International voluntary market price: $4819/ha, Marginal abatement cost of carbon: $18793.60/h a (Jerath et al. 2016)
Maintenance of soil fertility	Oxygen production: US$3/ha/yr						Nutrient storage: 7,510.48		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
	(Pernetta et al. 2013)						Baht/Household/Year (Wiwatthanapornachai et al. 2014)		
Pollination									
Biological control									
Supporting services									
Maintenance of life cycles of migratory species	Nursery function: US$573/ha/yr (Pernetta et al. 2013)				Nursery value: US$2124/ha/yr (Kuenzer and Tuan 2013)	Refugia: NZ$413.46/ha/yr (Patterson and Cole 2013); Fisheries nursery and breeding habitat: MMK 1097574/ha/yr: US$1,130/ha/yr (Emerton and Aung 2013); nursery grounds for fish: US$ 425.60/ha/year (Interweis and Gorlitz 2013)	Nursery and food habitat of aquatic animals: 7,294.07 Baht/Household/Year Benthos, habitat: 10,844.13 Baht/Household/Year (Wiwatthanapornachai et al. 2014)	Nursery habitat: US$44.82/household/yr (Sopheak and Hoeurn 2016)	
Maintenance of genetic diversity				US$5/ha/yr (Hoberg 2011)			Genetic diversity/Biodiversity		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
							source: 7,539.21 Baht/Household/Year (Wiwatthanapornachai et al. 2014)		
Cultural services								Cultural services (tourism, education, research): US$41/ha/yr (Huxham et al. 2015)	
Aesthetic information	Aesthetic value: US$11/ha/yr (Pernetta et al. 2013)								
Spiritual experience									
Opportunities for recreation and tourism	Ecotourism: US$43/ha/yr (Pernetta et al. 2013)			Recreation: US$-133ha/yr (Burgess et al. 2015)	Tourism: US$2960.44-4597.71/ha/yr (Kuenzer and Tuan 2013); 24,000 Ghanian cedis (US$16,000)/yr: US$160/ha/yr (Ajonina et al. 2014)		Recreation: 4,512.39 Baht/Household/Year Bird watching: 5,714.11 Baht/Household/Year (Wiwatthanapornachai et al. 2014); Recreation: 3.79 million Indian rupees/yr: 671.96	Willingness to accept mangrove conservation with no recreational boating: 234375 IRR/household/day or US$8.50/household/day (Mashayekhi et al. 2016)	

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
							Indian rupees/ha/yr (Everard et al. 2014)		
Spiritual experience									
Inspiration for culture, art and design				Social cohesion: 4 people/village: 3070 MGA/individual; 6 people/village: 14990 MGA/individual (Oleson et al. 2015)					
Information for cognitive development				Research and education: US$ 184.4 /ha/yr (Hoberg 2011)			Natural education: 8,843.15 Baht/Household/Year (Wiwatthanapornachai et al. 2014)		
Existence/ option/ bequest value	Option value: US$51/ha/yr (Pernetta et al. 2013)			Existence value: US$ 70.2 /ha/yr (Hoberg 2011); Bequest value: 2 generations: 24420 MGA/individu			National heritage: 11,317.94 Baht/Household/Year (Wiwatthanapornachai et al. 2014)		

Year values were calculated for	2007	2008	2009	2010	2011	2012	2013	2014	2015
				al; 5 generations: 56780 MGA/individual (Oleson et al. 2015)					

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