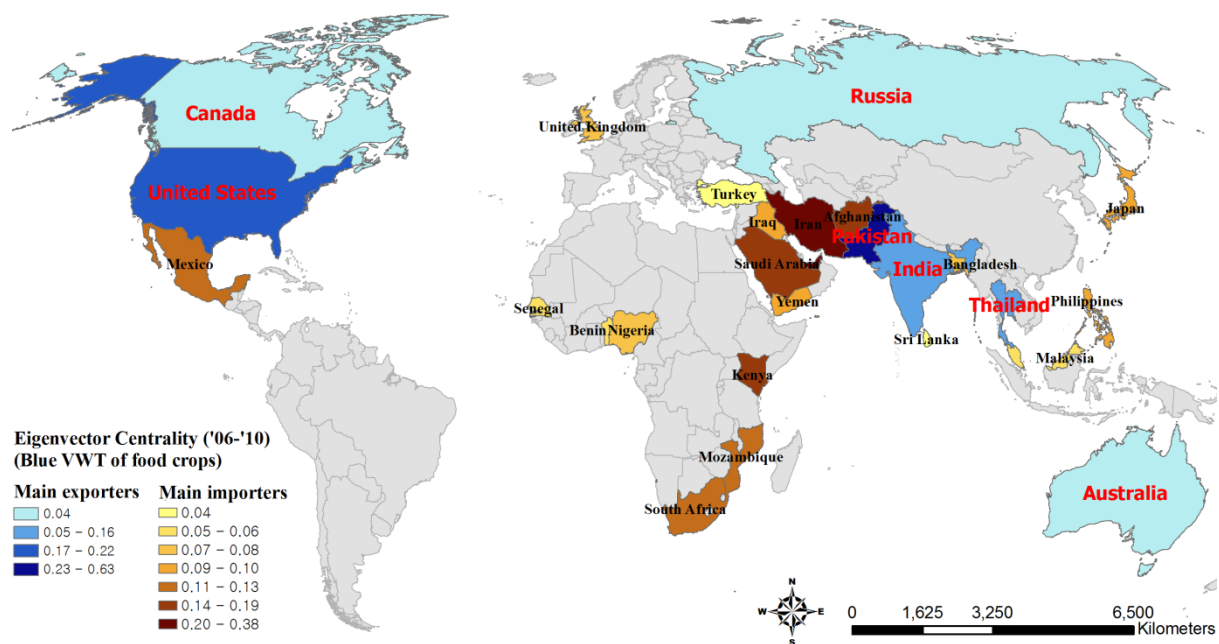
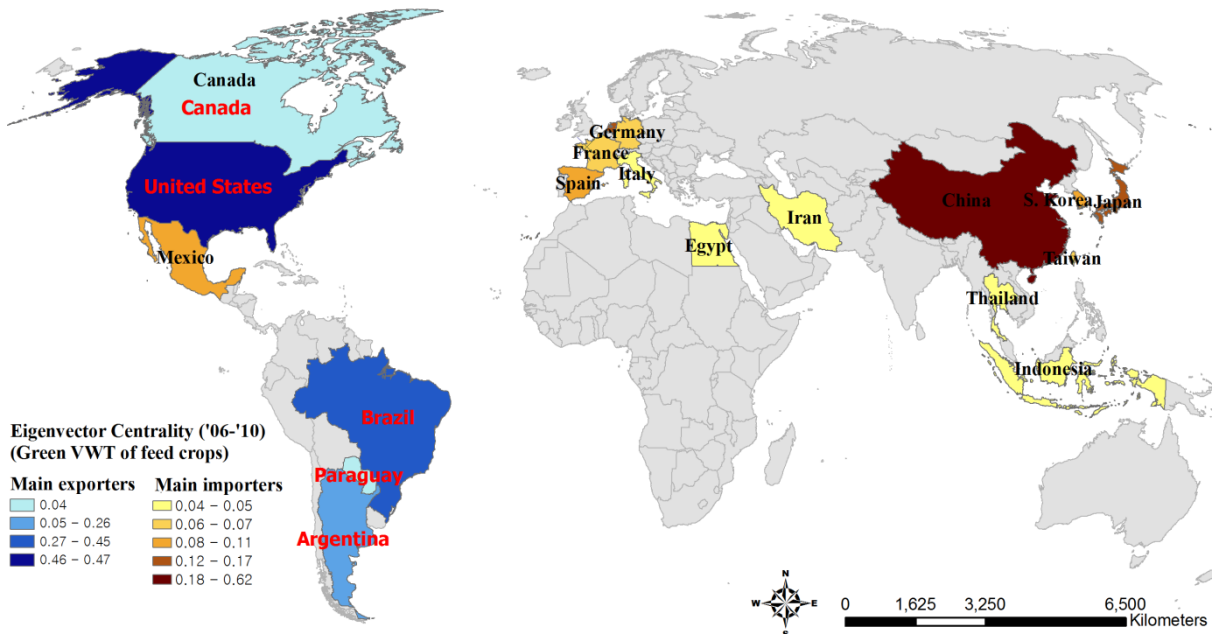


(a) Green virtual water trade in GVWT

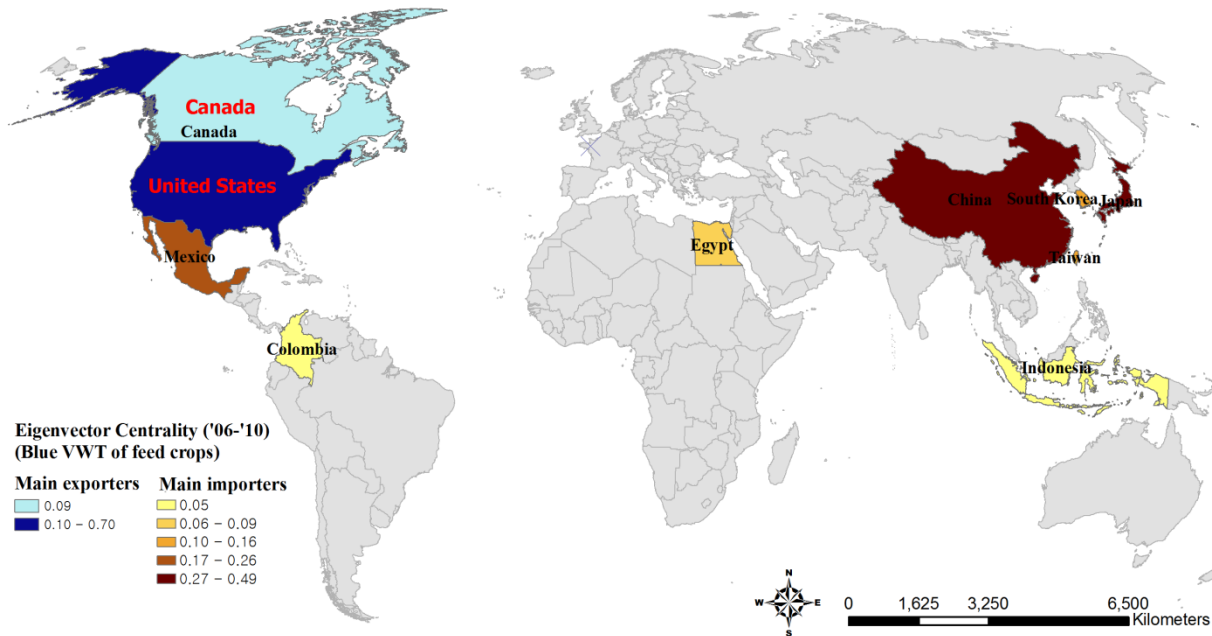


(b) Blue virtual water trade in GVWT

Figure A-1: Eigenvector centrality of the main exporters and importers in GVWT during period 2006-2010 (Food crops) (Above-average amount virtual water imported or exported).



(a) Green virtual water trade in GVWT



(b) Blue virtual water trade in GVWT

Figure A-2: Eigenvector centrality of the main exporters and importers in GVWT during period 2006-2010 (Feed crops) (Above-average amount virtual water imported or exported).

Table A-1: Total exports of crops and virtual water during the period 2006-2010.

Crops		Main Exporters	Export (Mton)	Virtual water export (Gm³)		
				Green water	Blue water	Total water
Food crops	Wheat	USA	152.0	284.2	14.0	298.2
		CANADA	101.0	135.0	0.5	135.5
		FRANCE	85.2	49.5	0.1	49.7
		RUSSIAN FED	64.5	148.3	2.0	150.3
		ARGENTINA	37.3	66.0	0.4	66.4
		GERMANY	36.6	21.9	0.0	21.9
		Total	674.9	1023.8	34.0	1057.8
	Rice	THAILAND	44.4	117.1	24.1	141.2
		USA	19.9	10.5	21.0	31.5
		VIET NAM	19.9	29.4	4.6	34.0
		INDIA	18.8	37.8	12.3	50.1
		PAKISTAN	16.7	16.1	53.0	69.1
		CHINA	4.9	3.8	1.7	5.5
		Total	148.8	246.9	136.7	383.5
	Barley	FRANCE	24.9	13.2	0.1	13.3
		UKRAINE	22.7	31.9	0.4	32.3
		AUSTRALIA	13.9	22.8	1.1	23.9
		RUSSIAN FED	9.7	21.3	0.5	21.8
		GERMANY	9.4	4.7	0.7	5.5
		CANADA	9.4	8.4	0.1	8.4
		Total	124.9	136.1	5.3	141.3
	Others (Rye and Sorghum)	USA	18.3	19.7	1.3	21.1
		ARGENTINA	5.2	5.4	0.1	5.5
		GERMANY	3.9	3.4	0.2	3.5
		POLAND	1.7	2.3	0.0	2.3
		Total	37.0	46.3	2.1	48.4
Feed crops	Maize	USA	284.5	148.7	18.0	166.7
		ARGENTINA	66.8	69.9	0.9	70.8
		BRAZIL	39.9	64.7	0.0	64.7
		FRANCE	30.3	12.9	2.8	15.7
		HUNGARY	18.9	12.0	0.0	12.0
		UKRAINE	16.7	17.7	1.4	19.1
		Total	531.2	423.0	28.5	451.5
	Beans crops	USA	230.2	348.6	20.7	369.3
		BRAZIL	193.8	399.4	0.2	399.6
		ARGENTINA	169.0	311.2	0.8	312.0
		INDIA	23.8	83.7	0.5	84.2
		NETHERLANDS	23.3	41.1	1.4	42.6
		PARAGUAY	21.8	51.8	0.0	51.8
		Total	712.6	1329.6	30.8	1360.4

Table A-2: Total imports of crops and virtual water during the period 2006-2010.

Crops		Main Importers	Import (Mton)	Virtual water import (Gm ³)		
				Green water	Blue water	Total water
Food crops	Wheat	EGYPT	43.9	82.7	2.0	84.7
		ITALY	33.8	37.4	1.7	39.1
		BRAZIL	30.2	53.7	1.3	55.0
		JAPAN	28.3	49.5	1.9	51.4
		ALGERIA	28.2	23.9	1.4	25.3
		SPAIN	24.7	27.0	0.7	27.7
		Total	674.9	1023.8	34.0	1057.8
	Rice	PHILIPPINES	8.8	14.7	3.9	18.7
		COTE DIVOIRE	6.1	11.6	5.3	16.8
		SAUDI ARABIA	5.4	9.5	5.6	15.1
		NIGERIA	5.4	12.8	3.2	16.0
		UNITED ARAB EM.	5.1	8.2	8.4	16.6
		IRAN ISLAM. REP	5.0	8.8	6.5	15.4
		Total	148.8	246.9	136.7	383.5
	Barley	SAUDI ARABIA	35.8	50.0	1.8	51.8
		NETHERLANDS	9.6	5.1	0.3	5.4
		GERMANY	8.6	4.9	0.2	5.1
		BELGIUM	7.0	3.8	0.1	3.8
		CHINA	6.7	8.2	0.3	8.5
		JAPAN	6.2	8.0	0.5	8.6
		Total	124.9	136.1	5.3	141.3
	Others (Rye and Sorghum)	MEXICO	9.2	9.8	0.6	10.4
		JAPAN	5.9	6.5	0.3	6.8
		SPAIN	4.3	4.1	0.2	4.3
		NETHERLANDS	2.4	3.8	0.1	4.0
		Total	37.0	46.3	2.1	48.4
Feed crops	Maize	JAPAN	86.7	48.0	5.4	53.4
		KOREA REP.	45.1	29.6	2.7	32.3
		MEXICO	43.4	22.8	2.7	25.5
		EGYPT	25.7	18.3	1.8	20.1
		SPAIN	23.9	22.0	1.3	23.3
		TAIWAN (POC)	23.2	16.4	1.4	17.8
		Total	531.2	423.0	28.5	451.5
	Beans crops	CHINA	203.2	383.3	9.0	392.3
		NETHERLANDS	49.5	92.3	0.7	93.1
		GERMANY	31.8	57.2	1.5	58.7
		SPAIN	31.4	59.1	0.5	59.6
		JAPAN	29.5	55.6	2.5	58.2
		MEXICO	26.0	39.1	2.3	41.4
		Total	712.6	1329.6	30.8	1360.4

Table A-3: Out-degree centrality of GVWT during the period 2006-2010.

Crops	Countries	Weighted network by volume of GVWT		Connection network of GVWT	
		Out-degree centrality	Rank*	Out-degree centrality	Rank*
Food crops	USA	1.64	1	0.74	1
	RUSSIAN FEDERATION	0.81	2	0.41	11
	CANADA	0.68	3	0.41	8
	THAILAND	0.66	4	0.65	2
	AUSTRALIA	0.44	5	0.28	15
	KAZAKHSTAN	0.41	6	0.27	17
	UKRAINE	0.41	7	0.42	7
	ARGENTINA	0.38	8	0.41	10
	PAKISTAN	0.33	9	0.56	3
	FRANCE	0.30	10	0.41	9
	INDIA	0.24	11	0.47	5
	VIET NAM	0.16	12	0.50	4
	GERMANY	0.15	13	0.42	6
	ROMANIA	0.07	14	0.25	18
	BRAZIL	0.06	15	0.34	13
Feed crops	USA	2.49	1	0.60	1
	BRAZIL	2.16	2	0.42	3
	ARGENTINA	1.78	3	0.52	2
	INDIA	0.51	4	0.34	4
	PARAGUAY	0.33	5	0.24	7
	NETHERLANDS	0.20	6	0.20	10
	UKRAINE	0.11	7	0.27	6
	CHINA	0.10	8	0.17	14
	CANADA	0.09	9	0.30	5
	FRANCE	0.08	10	0.24	8
	BOLIVIA	0.06	11	0.03	52
	GERMANY	0.06	12	0.16	15
	HUNGARY	0.06	13	0.18	13
	BELGIUM	0.05	14	0.18	12
	SOUTH AFRICA	0.04	15	0.21	9

* The higher rank (1) indicated the larger degree centrality

Table A-4: In-degree centrality of GVWT during the period 2006-2010.

Crops	Countries	Weighted network by volume of GVWT		Connection network of GVWT	
		In-degree centrality	Rank*	In-degree centrality	Rank
Food crops	EGYPT	0.40	1	0.14	21
	JAPAN	0.34	2	0.11	33
	SAUDI ARABIA	0.34	3	0.20	5
	BRAZIL	0.30	4	0.08	68
	NIGERIA	0.23	5	0.12	32
	MEXICO	0.23	6	0.03	144
	IRAN	0.22	7	0.10	47
	PHILIPPINES	0.21	8	0.09	56
	ITALY	0.20	9	0.22	1
	INDONESIA	0.19	10	0.09	55
	IRAQ	0.17	11	0.10	46
	SPAIN	0.17	12	0.19	7
	BANGLADESH	0.16	13	0.11	42
	TURKEY	0.16	14	0.20	6
	KOREA REP.	0.15	15	0.09	60
Feed crops	CHINA	1.83	1	0.08	27
	JAPAN	0.52	2	0.11	9
	NETHERLANDS	0.48	3	0.17	1
	SPAIN	0.39	4	0.14	5
	MEXICO	0.31	5	0.04	80
	GERMANY	0.30	6	0.14	4
	KOREA REP.	0.30	7	0.10	14
	ITALY	0.22	8	0.16	3
	INDONESIA	0.21	9	0.09	22
	FRANCE	0.20	10	0.16	2
	TAIWAN	0.19	11	0.07	39
	IRAN	0.19	12	0.08	30
	THAILAND	0.18	13	0.08	34
	VIET NAM	0.18	14	0.08	28
	EGYPT	0.17	15	0.08	29

* The higher rank (1) indicated the larger degree centrality