

Supplemental Information

Ecological Suitability of Island Development Based on Ecosystem Service Values, Biocapacity and Ecological Footprint: A Case Study of Pingtan Island, Fujian, China

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The supplemental information includes 2 parts.

Part 1: the original government data which is used in the calculation of EF

Part 2: data sources, including remote sensing data download URLs, the data sources and some calculation methods of data in Part 1.

Part 1: Data

Table S1. Population and industrial output value of Fuzhou and Pingtan.

	Fuzhou		Pingtan	
	2014	2016	2014	2016
Population	6749436	6870648	427938	437812
Industrial output value (billion CNY)	749.53	841.96	3.38	2.98

Table S2. Yield, import and convert coefficient

Items	Yield (Pingtan) (unit: t)		Import (Fuzhou) (unit: t)		Convert Coefficient
	2014	2016	2014	2016	
Rice	84	82	30337.729	950702.699	2.744
Sweet potato	19265	20084			12.607
Potato	1353	1541			12.607
Coarse grain	99	109	4761.514	192128.419	2.744
Wheat	0	0	5016.647	159480.736	2.744
Soybean	117	138			1.856
Beans	267	297			1.856
Vegetable	62033	66448			18

Oil crops (peanut)	8168	8277	9899.637	740141.546	1.856
Pork	13593	14557	31289.634	24071.755	0.74
Poultry	390	715	2998.615	54323.744	0.606
Dairy*	0	0	5854.19184		0.502
Beef	36	40	741.635	1034.481	0.074
Mutton	348	321	275.463	778.538	0.074
Rabbit meat	82	82			0.074
Eggs	5990	9292	6966.767	6744.685	0.48
Wood*	3960.6	3610.08	10233.965	59196.165	7.8
Fruits*	3659	3442	17909.2053	19889.79916	3.5

*Calculation measures of wood and fruit import are different from others (please see data sources below), and the results are put in this table.

Table S3. Aquatic products yield (unit: t) and convert coefficient

Items	Freshwater-Cultured		Convert Coefficient	Mariculture		Convert Coefficient	Marine Capture		Convert Coefficient
	2014	2016		2014	2016		2014	2016	
Fish	135	132	3.264	12504	16865	7.477	210400	133462	0.748
Shell	0	0	3.264	158786	181102	7.477	158866	70	0.748
Shrimps and crabs	55	57	3.264	480	1492	7.477	16453	14533	0.748
Alga	0	0	3.264	37090	46809	7.477	37090	46809	0.748

Table S4. Consumption of energy sources*

Items	2014 (unit: t)	2016 (unit: t)	Average Global Energy Footprint (unit: GJ/hm2)***	Convert Coefficient (unit: GJ/t)
Electricity**	608.39	794.27	1000	
Gasoline	4722.612836	7912.575024	93	43.12
Coal	101170.5398	53188.09181	55	20.93
Diesel	35406.08395	40393.46207	93	42.71
Gas	11268.63947	11594.60491	71	52.2
Kerosene	0.762180836	2.402319434	93	43.12
Biomass fuel	91.02232925	120.0869348	55	20.93
Fuel oil	97.72796946	18.44923605	71	50.2

* Calculation measures please see data sources below, and the results are put in this table.

** The unit of Electricity consumption is million kwh.

*** Wackernagel, M, Ree W E. (1996). Our ecological footprint: Reducing human impact on earth. Gabriela Island, B. C. Canada: New Society Publishers.

Part 2: Data Sources

1. Remote sensing data download URLs

The image of 2004:

http://bjdl.gscloud.cn/download?sid=uwfm2yomKVyjeNYPSo2BunEdGsgFhaXTo7x_cz9yzcDBKVobXkxyw8EcRB6-mG79CYhKSWWF2m5o8W4FDqb5QOVbjlMBB9A3xct3W0eP1JOqDaeUD5MFXP_naQh5BrEmp8

The image of 2014:

http://bjdl.gcloud.cn/download?sid=e1xOsDGt_tepxM1FKMTZeXCgNYIyaW9cLqBjctcMxk99xOTzAHhV7C1qdWRFWsq1USRmtytA-15cDpntPmm91RV1umUcyp1mUrIbmU1aJrG7NWY4n5KM89yBMTDTFafX4s

The image of 2017:

http://bjdl.gcloud.cn/download?sid=OF8MSmgmoifog5nk2YgaRFBBDhDgO72ipN80Ek1v-yZ9qpb41o3QYLOPALYvEPmT7eh0jroEJPCaO5Le8dJ4cnICBqnHJaaGRmPjp2uLnxEbtudAQr4_1YkqW5HrR6Y

2. Data sources and calculation methods of data in Part 1

Table S5. Data sources and calculation methods

Items	Data Sources	
Population	Pingtang Statistical Yearbook	
Pork	Pingtang Statistical Yearbook	
Poultry	Pingtang Statistical Yearbook	
Beef	Pingtang Statistical Yearbook	
Mutton	Pingtang Statistical Yearbook	
Rabbit meat	Pingtang Statistical Yearbook	
Dairy	Fujian Statistical Yearbook	
Aquatic products	Pingtang Statistical Yearbook	
Fruit import	Fujian Statistical Yearbook	
Wood usage	Wood usage = Area × density Area comes from Pingtang Statistical Yearbook, and density is 920kg/m ³ .	
Wood import	Wood import = construction usage × area Construction usage = 0.035m ³ /m ² (http://www.zlaqw.com/), area comes from Pingtang Statistical Yearbook	
Agricultural products and meat import	Agricultural products and meat import = import of Fuzhou × (Pingtang population / Fuzhou Population) Import of Fuzhou and Fuzhou population comes from Fuzhou Statistical Yearbook, and Pingtang population comes from Pingtang Statistical Yearbook.	
Rate of industrial output value	Rate of industrial output value = industrial output value of Pingtang / industrial output value of Fuzhou Industrial output value of Pingtang comes from Pingtang Statistical Yearbook, and industrial output value of Fuzhou comes from Fuzhou Statistical Yearbook	
Electricity consumption	Pingtang Statistical Yearbook	
Gasoline consumption	Gasoline consumption = Car consumption + industrial gasoline consumption Car consumption = (Number of car + Number of motorcycle) × Annual consumption Industrial gasoline consumption = industrial gasoline consumption of Fuzhou × Rate of industrial output value Industrial gasoline consumption of Fuzhou comes from Fuzhou Statistical Yearbook. Number of car, number of motorcycle and annual consumption were calculated from data of 2013 and 2018 via interpolation method.*	
Diesel consumption	Diesel consumption = Farm machinery consumption + industrial diesel consumption Industrial diesel consumption = industrial diesel consumption of Fuzhou × Rate of industrial output value	
Other energy consumption	Other energy consumption = energy consumption of Fuzhou × Rate of industrial output value	
Convert coefficient	Cultivated land	Global average yield (Shoufeng Qiu, 2009)**
	Forest land	Global average yield (Shoufeng Qiu, 2009)**
	grassland	Global average yield (Shoufeng Qiu, 2009)**
	Water area and sea area	Convert coefficient of Marine capture yield = 10% × Convert coefficient of mariculture yield Convert coefficient of freshwater-cultured yield and mariculture yield comes from Hongyu Xie and Huishan Ye (2008)***

Constructi
on land Global average yield (Shoufeng Qiu, 2009)**

* Data of 2018: http://www.pingtan.gov.cn/jhtml/ct/ct_2971_80481

Data of 2013: http://www.pingtan.gov.cn/jhtml/ct/ct_2971_38275

** Shoufeng Qiu (2009). "Ecological footprint and ecological carrying capacity of Fujian Province in 2008" Development Research, (12): 80-83. (in Chinese)

***Hongyu Xie, Huishan Ye (2008) "Struggling with social-ecological mismatches in marine management and conservation at Easter Island." Journal of Guangzhou University (Natural Science Edition), 7(1):76-80. (in Chinese)

Some screenshots of yearbook:

2-2-2 各类粮食产量(9)

单位:吨

项 目	2012 年	2013 年	2014 年	2015 年	2016 年
总 计	20781	20056	21185	21384	22251
按收获季节分					
春收粮食	1477	1476	1440	1555	1679
夏收粮食	422	480	480	504	406
秋收粮食	18882	18100	19265	19325	20166
按品种分					
稻 谷	91	87	84	83	82
早 稻	91	87	84	83	82
晚 稻	-	-	-	-	-
大小麦	6	-	-	-	-
#小 麦	6	-	-	-	-
甘 薯	18829	18100	19265	19414	20084
马铃薯	1450	1374	1353	1470	1541
杂 粮	55	117	99	88	109
大 豆	119	122	117	117	138
杂 豆	231	256	267	212	297

Figure S1 Grain yield in 2014 and 2016.

The red parts are grain yield in 2014 and 2016 (unit: t).

The numbers from top to bottom are yield of total, grain harvested in spring, grain harvested in summer, grain harvested in autumn, rice, early season rice, late rice, barley and wheat, wheat, sweet potato, potato, coarse grain, soybean, and beans.

2-2-2 经济作物与其他作物产量(10)

项 目	单位:吨				
	2012 年	2013 年	2014 年	2015 年	2016 年
1. 油料作物	8741	8245	8168	8149	8277
#花生	8741	8245	8168	8149	8277
2. 其他农作物	64098	61901	61379	62794	65610
蔬菜	1654	1788	2069	2024	2297
瓜果类	1297	1365	1415	1195	1459
#西瓜	57	57	57	57	60
3. 花卉	25	42	43	43	50
#水仙花					

2-2-2 水果产量(11)

项 目	单位:吨				
	2012 年	2013 年	2014 年	2015 年	2016 年
合 计	2162	2382	2244	2324	1983
柑 桔	590	590	30	27	27
橙 子	637	637	59	62	157
龙 眼		1082	1828	1883	1600
枇 杷		37	50	55	55
菠 萝	-	-	6	5	33
杨 梅	-	-	-	2	1
其 他	-	-	-	117	106
荔 枝	-	-	-	-	-
葡 萄	-	-	-	-	-
其 他	-	-	-	-	-

Figure S2. Yield of crop and fruits in 2014 and 2016.

The red parts in Table 2-2-2 (10) are crop yield in 2014 and 2016 (unit: t).

The numbers from top to bottom are yield of oil crops, peanut, vegetable, amphisarca, watermelon, flowers, and narcissus.

The red parts in Table 2-2-2 (11) are yield of fruits in 2014 and 2016 (unit: t).

The numbers from top to bottom are yield of total, citrus reticulata, tangerine, citrus junos, longan, loquat, pineapple, waxberry, other, litchi, and grape.