TABLE 14

Freshwater fish farming comparative advantage (Caribbean)

Country	Species	Production quantity (tonnes)				RCA		RCAV		
		1985–89	1990–94	1995–99	2000–03	1985–89	2000–03	Sub-period I[1]	Sub-period II	Sub-period III
Bahamas	Carp	0	0	0	0	0.00	--	0%	--	--
	Catfish	0	0	0	0	0.00	--	0%	--	--
	Tilapia	35	10	0	0	3.15	--	0%	--	--
	Others	0	0	0	0	0.00	--	0%	--	--
Cuba	Carp	958	4 464	20 240	14 474	1.00	1.97	25%	-2%	3%
	Catfish	102	80	92	451	1.48	0.83	-1%	-1%	2%
	Tilapia	2 982	3 034	1 600	590	2.27	0.06	-47%	-19%	-3%
	Others	94	2 609	10 656	9 383	0.05	1.27	23%	21%	-1%
Dominica	Carp	0	0	0	0	--	0.00	--	0%	0%
	Catfish	0	0	0	0	--	0.00	--	0%	0%
	Tilapia	0	1	2	3	--	2.59	--	0%	0%
	Others	0	0	0	0	--	0.00	--	0%	0%
Dominican Republic	Carp	1	169	238	500	0.38	0.77	4%	3%	1%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	8	481	479	1 707	2.88	2.00	-63%	17%	20%
	Others	0	932	177	0	0.00	0.00	59%	-20%	-21%
Grenada	Carp	0	0	0	0	--	0.00	--	--	--
	Catfish	0	0	0	0	--	0.00	--	--	--
	Tilapia	0	0	0	1	--	2.59	--	--	--
	Others	0	0	0	0	--	0.00	--	--	--
Guadeloupe	Carp	0	0	0	0	--	0.00	--	--	--
	Catfish	0	0	0	0	--	0.00	--	--	--
	Tilapia	0	0	0	2	--	2.59	--	--	--
	Others	0	0	0	0	--	0.00	--	--	--
Jamaica	Carp	2	2	2	1	0.00	0.00	0%	0%	0%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	2 050	3 273	3 562	4 378	3.14	2.59	0%	0%	0%
	Others	3	3	3	0	0.00	0.00	0%	0%	0%
Martinique	Carp	0	0	0	0	0.00	0.00	0%	0%	0%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	5	50	15	8	3.15	2.59	0%	0%	0%
	Others	0	0	0	0	0.00	0.00	0%	0%	0%
Puerto Rico	Carp	0	0	0	2	0.00	0.04	0%	0%	1%
	Catfish	0	0	0	7	0.00	2.30	0%	0%	5%
	Tilapia	9	69	17	122	3.15	2.39	0%	0%	-8%
	Others	0	0	0	2	0.00	0.05	0%	0%	2%
Saint Lucia	Carp	0	0	0	0	--	0.00	--	--	0%
	Catfish	0	0	0	0	--	0.00	--	--	0%
	Tilapia	0	0	1	2	--	2.59	--	--	0%
	Others	0	0	0	0	--	0.00	--	--	0%
Trinidad and Tobago	Carp	0	0	0	0	0.00	0.00	0%	0%	0%
	Catfish	0	0	0	1	0.00	4.25	0%	1%	8%
	Tilapia	2	3	14	10	3.15	2.35	0%	-1%	-8%
	Others	0	0	0	0	0.00	0.00	0%	0%	0%
US Virgin Islands	Carp	0	0	0	0	0.00	--	--	--	--
	Catfish	0	0	0	0	0.00	--	--	--	--
	Tilapia	4	0	0	0	3.15	--	--	--	--
	Others	0	0	0	0	0.00	--	--	--	--

[1] Sub-period I goes from the second half of the 1980s (1985–89) to the first half of the 1990s (1990–1994); sub-period II goes from the first half of the 1990s (1990–94) to the second half of the 1990s; and sub-period III goes from the second half of the 1990s (1995–99) to the early 2000s (2000–03).

Dominican Republic also increased its comparative advantage in carp farming during the study period. However, its carp RCA index of 0.77 in the early 2000s was still below the LAC's average. Jamaica and other smaller fish farming countries in the region maintained its strong comparative advantage in tilapia farming for the entire study period.

Central America

Table 15 lists eight Central American countries that engaged in freshwater fish farming during the study period. Carp was the most important species in Central America's freshwater fish farming during the 1980s but it was gradually displaced by tilapia

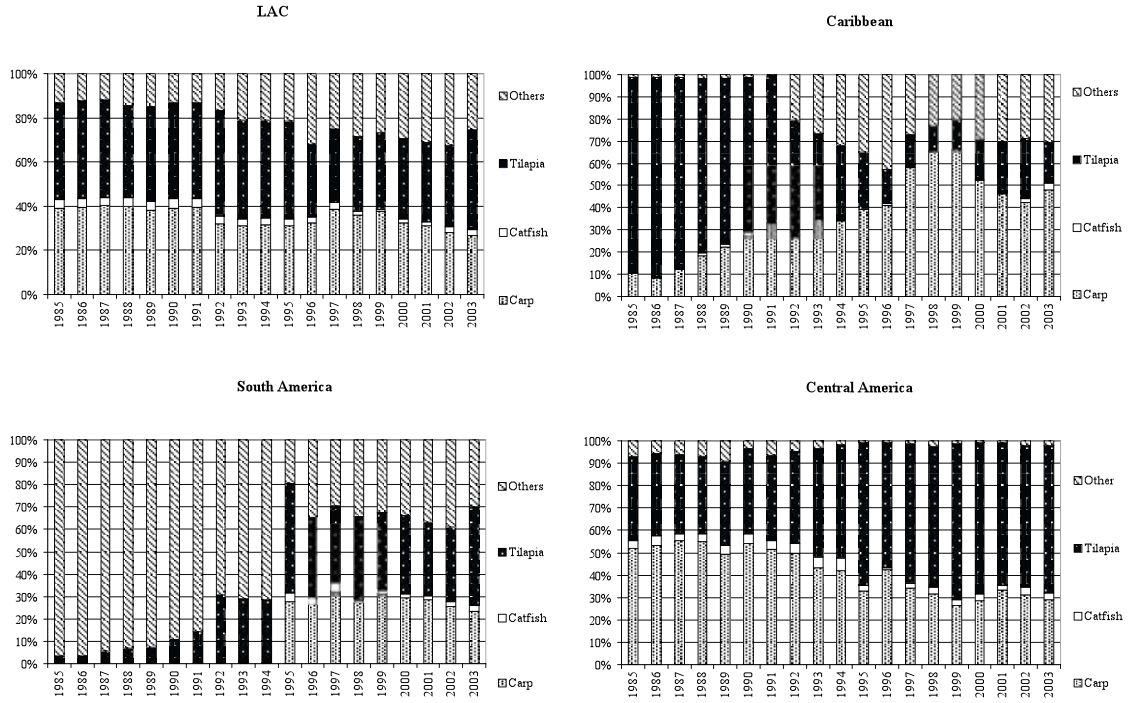
TABLE 15

Freshwater fish farming comparative advantage (Central America)

Country	Species	Production quantity (tonnes)				RCA		RCAV		
		1985–89	1990–94	1995–99	2000–03	1985–89	2000–03	Sub-period I[1]	Sub-period II	Sub-period III
Belize	Carp	0	0	0	0	--	--	--	0%	--
	Catfish	0	0	0	0	--	--	--	0%	--
	Tilapia	0	0	146	0	--	--	--	100%	--
	Others	0	1	0	0	--	--	--	-100%	--
Costa Rica	Carp	7	1	0	0	0.29	0.00	-5%	0%	0%
	Catfish	0	0	0	50	0.00	0.20	0%	0%	0%
	Tilapia	102	1 586	4 797	11 170	2.94	2.58	5%	0%	0%
	Others	0	7	15	0	0.00	0.00	0%	0%	0%
El Salvador	Carp	0	4	1	0	0.00	0.00	6%	-10%	-1%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	14	63	169	286	3.15	2.56	-6%	9%	1%
	Others	0	0	3	4	0.00	0.04	0%	1%	0%
Guatemala	Carp	4	24	91	15	0.15	0.02	3%	-6%	-3%
	Catfish	0	1	6	9	0.00	0.16	0%	0%	0%
	Tilapia	105	405	1 920	2 466	3.04	2.56	-3%	5%	3%
	Others	0	0	2	7	0.00	0.01	0%	0%	0%
Honduras	Carp	53	10	11	0	0.94	0.00	-11%	-9%	-2%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	97	140	378	1 920	1.26	2.59	41%	8%	9%
	Others	94	18	30	0	0.88	0.00	-30%	1%	-7%
Mexico	Carp	6 300	7 628	6 654	11 315	2.35	1.87	7%	-17%	10%
	Catfish	440	760	452	1 020	2.28	2.28	2%	-3%	1%
	Tilapia	4 100	4 868	5 404	7 528	1.11	0.95	-6%	19%	-12%
	Others	776	627	298	596	0.15	0.10	-3%	1%	0%
Nicaragua	Carp	1	0	0	0	1.10	0.00	-15%	-9%	0%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	2	4	27	44	2.35	2.59	15%	9%	0%
	Others	0	0	0	0	0.00	0.00	0%	0%	0%
Panama	Carp	188	120	53	6	1.89	0.03	16%	-51%	-14%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	121	77	218	669	0.89	2.56	2%	54%	17%
	Others	121	30	7	3	0.65	0.01	-18%	-3%	-2%

[1] Sub-period I goes from the second half of the 1980s (1985–89) to the first half of the 1990s (1990–1994); sub-period II goes from the first half of the 1990s (1990–94) to the second half of the 1990s; and sub-period III goes from the second half of the 1990s (1995–99) to the early 2000s (2000–03).

FIGURE 9
Freshwater fish farming specialization patterns in Latin America and the Caribbean



since the mid-1990s (Figure 9). Central America's carp farming has been concentrated primarily in Mexico. In fact, Mexico was the only Central American country with a strong comparative advantage in carp farming by the early 2000s. On the other hand, Mexico reduced its tilapia RCA index below unity in the early 2000s and hence it became the only Central American country with weak comparative advantage in tilapia farming.

Costa Rica, Guatemala and other relatively small countries in the region had strong comparative advantage in tilapia farming exclusively (Table 15 and Figure 10). Catfish is not a popular species in Central America. Mexico is the only Central American country with non-trivial production. Its catfish RCA index of 2.28 indicates that its specialization ratio in catfish farming is more than two times higher than the LAC's average.

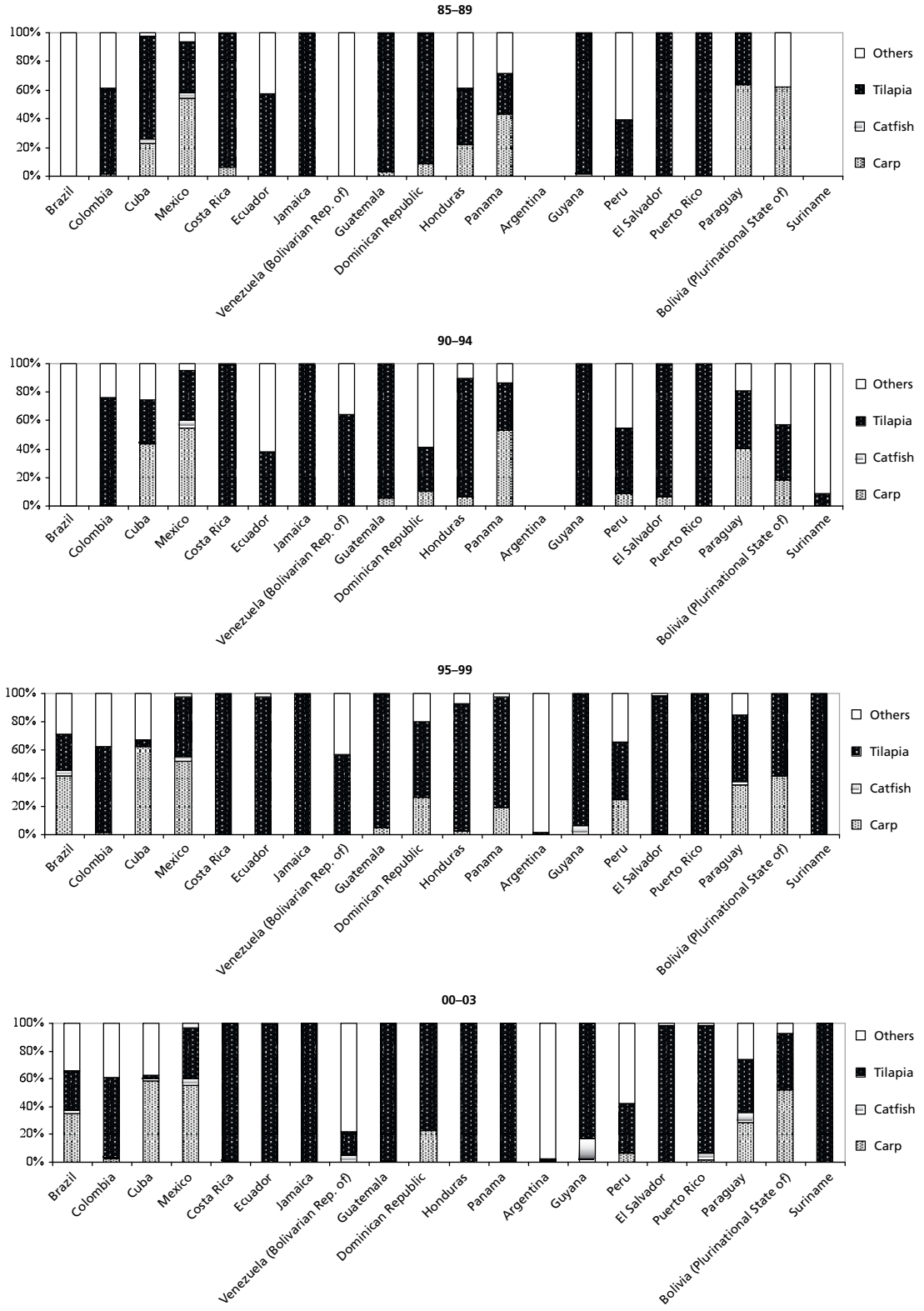
South America

Table 16 lists 12 South American countries that engaged in freshwater fish farming during the study period. Brazil is the largest freshwater fish farming country in the region. By the early 2000s it had strong comparative advantage in carp and catfish farming yet weak advantage in tilapia farming.[26] Colombia, the second largest freshwater fish farming country in the region, maintained its strong comparative advantage in tilapia aquaculture during the study period. However, this advantage declined during sub-periods II and III while comparative advantage gains were recorded for carp and miscellaneous other species (Table 16 and Figure 10).

Tilapia is also the main freshwater farming species in Bolivia (Plurinational State of), Ecuador, Guyana, Paraguay, Peru and Venezuela (Bolivarian Republic of).

[26] Brazil's freshwater fish farming production data in FishStat were reported in aggregate in the category of "miscellaneous others" until 1995.

FIGURE 10
Freshwater fish farming specialization patterns of Latin America and the Caribbean countries



Countries are placed in descending order from left to right according to their levels of freshwater fish farming production during 2000–2003.

TABLE 16
Freshwater fish farming comparative advantage (South America)

Country	Species	Production quantity (tonnes)				RCA		RCAV		
		1985–89	1990–94	1995–99	2000–03	1985–89	2000–03	Sub-period I[1]	Sub-period II	Sub-period III
Argentina	Carp	0	0	0	5	--	0.04	--	--	1%
	Catfish	0	0	0	0	--	0.00	--	--	0%
	Tilapia	0	0	7	6	--	0.03	--	--	0%
	Others	0	0	390	438	--	3.28	--	--	-1%
Bolivia (Plurinational State of)	Carp	13	31	32	43	2.71	1.77	-38%	7%	17%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	0	66	45	34	0.00	1.05	39%	18%	-25%
	Others	8	72	0	6	0.86	0.24	-1%	-25%	7%
Brazil	Carp	0	0	31 810	53 549	0.00	1.19	0%	42%	0%
	Catfish	0	0	2 997	4 140	0.00	1.24	0%	4%	-1%
	Tilapia	0	0	19 145	43 213	0.00	0.73	0%	25%	0%
	Others	12 400	23 500	22 241	51 965	2.30	1.15	0%	-71%	2%
Colombia	Carp	14	68	393	1 118	0.06	0.10	0%	0%	2%
	Catfish	0	0	26	35	0.00	0.04	0%	0%	0%
	Tilapia	581	7 652	16 740	22 943	1.89	1.50	15%	-22%	-4%
	Others	373	2 385	10 173	15 490	0.89	1.32	-15%	22%	2%
Ecuador	Carp	0	0	0	0	0.00	0.00	0%	0%	0%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	34	382	1 572	7 748	1.81	2.57	-20%	46%	1%
	Others	25	625	33	43	0.97	0.02	20%	-46%	-1%
French Guiana	Carp	0	0	0	9	--	1.44	--	--	42%
	Catfish	0	0	0	2	--	3.22	--	--	7%
	Tilapia	0	0	0	0	--	0.00	--	--	0%
	Others	0	0	6	11	--	1.70	--	--	-49%
Guyana	Carp	0	0	0	0	0.00	0.00	0%	0%	0%
	Catfish	0	0	15	76	0.87	7.77	-1%	6%	11%
	Tilapia	17	83	208	370	3.10	2.15	1%	-6%	-11%
	Others	0	0	0	0	0.00	0.00	0%	0%	0%
Paraguay	Carp	26	30	77	30	2.75	0.95	-16%	-24%	-1%
	Catfish	0	0	6	9	0.00	3.65	0%	3%	5%
	Tilapia	15	30	103	40	1.15	0.97	-3%	15%	-14%
	Others	0	14	34	28	0.00	0.89	19%	7%	10%
Peru	Carp	0	38	30	22	0.00	0.21	8%	7%	-14%
	Catfish	0	0	0	0	0.00	0.00	0%	0%	0%
	Tilapia	128	204	48	126	1.24	0.93	7%	-12%	-7%
	Others	199	201	42	205	1.40	1.96	-15%	5%	21%
Suriname	Carp	0	0	0	0	--	0.00	--	0%	0%
	Catfish	0	0	0	0	--	0.00	--	0%	0%
	Tilapia	0	0	11	79	--	2.59	--	85%	0%
	Others	0	2	0	0	--	0.00	--	-85%	0%
Uruguay	Carp	0	1	1	2	0.00	0.73	31%	-10%	2%
	Catfish	3	3	4	4	60.16	22.84	-31%	10%	-30%
	Tilapia	0	0	0	0	0.00	0.00	0%	0%	0%
	Others	0	0	0	2	0.00	0.96	0%	0%	29%
Venezuela (Bolivarian Republic of)	Carp	0	0	0	0	0.00	0.00	0%	0%	0%
	Catfish	0	0	0	215	0.00	2.27	0%	0%	5%
	Tilapia	0	467	1 923	722	0.00	0.43	65%	-19%	-40%
	Others	176	255	1 463	3 399	2.30	2.64	-65%	19%	36%

[1] Sub-period I goes from the second half of the 1980s (1985–89) to the first half of the 1990s (1990–1994); sub-period II goes from the first half of the 1990s (1990–94) to the second half of the 1990s; and sub-period III goes from the second half of the 1990s (1995–99) to the early 2000s (2000–03).

However, RCAV indices reveal that all these countries (except Ecuador) have reduced their comparative advantage in tilapia aquaculture in favour of either carp farming (e.g. Bolivia [Plurinational State of] and Colombia) or catfish farming (e.g. Guyana, Paraguay and Venezuela [Bolivarian Republic of]).

4.4.3 Freshwater fish farming comparative advantage in sub-Saharan Africa

As compared to Asia and LAC, sub-Saharan Africa has a much smaller freshwater fish farming industry. The region cultured only 60 000 mt of freshwater fish in 2003. Tilapia is the primary species in SSA accounting for more than 60 percent of production during 1985–89, yet the specialization ratio had declined to 39 percent by the early 2000s (Figure 6). Catfish is also an important species, accounting for more than 20 percent of the region's total freshwater fish farming production in the early 2000s (Figure 6). The specialization ratio for carp farming in the region was only 5 percent in the early 2000s, lower than the ratios in Asia and LAC.

Eastern SSA

Table 17 lists 13 countries in eastern SSA that engaged in freshwater fish farming during the study period. Tilapia is the main freshwater fish farming species. The region increased its specialization in carp farming during the mid 1990s but this trend was reversed since 1997. The importance of catfish in the region has become more significant during the early 2000s (Figure 11).

Madagascar and Ethiopia were the only eastern SSA countries that had no ongoing tilapia farming by the early 2000s (Table 17 and Figure 12). In fact, Madagascar completely specialized in carp farming since the 1990s. Kenya and Uganda also exhibited strong comparative advantage in carp farming by the early 2000s, yet this advantage had declined in both countries over the period of study. Kenya and Uganda also had a strong comparative advantage in catfish farming in the early 2000s, which increased consistently over the study period.

FIGURE 11
Freshwater fish farming specialization patterns in sub-Saharan Africa