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Fish for Health: Role of Fish in Global Food and Animal Protein Supply

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ABSTRACT

Aquatic foods (includes farmed or wild-caught fish, molluscs, crustaceans, miscellaneous aquatic invertebrates, and aquatic plants or seaweeds) represent a valuable source of essential dietary nutrients for the world population. Although at the global level, aquatic animal food products supplied over 3.4 billion people with over 20% of their total animal protein food supply in 2022, this was not the case for all regions. The composition of aquatic species consumed also varied between geographic regions. In the African region, aquatic animal foods were dominated by fish species (primarily captured pelagic and marine fish), whereas in the Asian region, aquatic animal foods were dominated by cultured freshwater fish species. In general, these differences generally reflect the seasonal availability and cost of aquatic foods, the level of consumer income, culinary traditions and preferences, and the existence of an organized productive sector; fish products generally being the cheapest source of animal protein and food available in most Asian and many African countries.

KEYWORDS

Aquatic food; protein; total global food supply; aquaculture; capture fisheries

Introduction

Fish and seafood represent a valuable source of essential dietary nutrients for most coastal, riverine, and urban communities (Tacon and Metian 2013; FAO 2024a). Aquatic foods include all farmed and captured fish, crustaceans, molluscs, aquatic invertebrates, and seaweeds or aquatic plants suitable for direct human consumption. Moreover, compared to terrestrial animal food products (such as poultry, pork, beef, egg, and dairy) and processed fast foods, aquatic food products offer a much healthier food alternative in the global fight against obesity, coronary heart disease, diabetes and associated ailments (FAO and WHO 2019; Tacon et al. 2020; Ahern et al. 2021; Golden et al. 2021).

This paper considers the contribution of fish and seafood products to global food supply and to the supply of animal protein from 2010 to 2022 on a regional and country basis according to the latest FAO Food Balance Sheets (FBS[1]; FAO 2024b). Although fish supply is currently sourced both from the aquaculture and the capture fisheries sectors (Figure 1, Table 1), no distinction is made within the FAO Food Balance Sheets concerning their origin (i.e., whether farmed or captured), with consumption data only being reported by species grouping as follows: freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, other aquatic animals, and aquatic plants (FAO 2024b).

Global aquaculture and capture fisheries production

According to the FAO, total global aquaculture production reached a new high of 130.92 million tonnes (Mt, live weight – including aquatic plants) in 2022, with production increasing at a Compound Annual Growth Rate (CAGR) of 5.19%/year since 2000 (FAO 2024c). By contrast, total landings from capture fisheries have remained relatively static since 2000, decreasing from 94.78 Mt in 2000 to 92.29 Mt in 2022; the total combined global production from aquaculture and capture fishery landings reaching a new high of 223.21 Mt in 2022 (Figure 1). Table 1 shows total aquaculture and capture fisheries by country, with the same top three Asian countries (China, Indonesia, India) producing over 76.6% and 28.35% of total

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[1]The FBS is a FAO statistical database which estimates food available for consumption or apparent consumption; apparent aquatic food consumption being aquatic food production plus imports less exports and non-food uses (FAO 2024c).

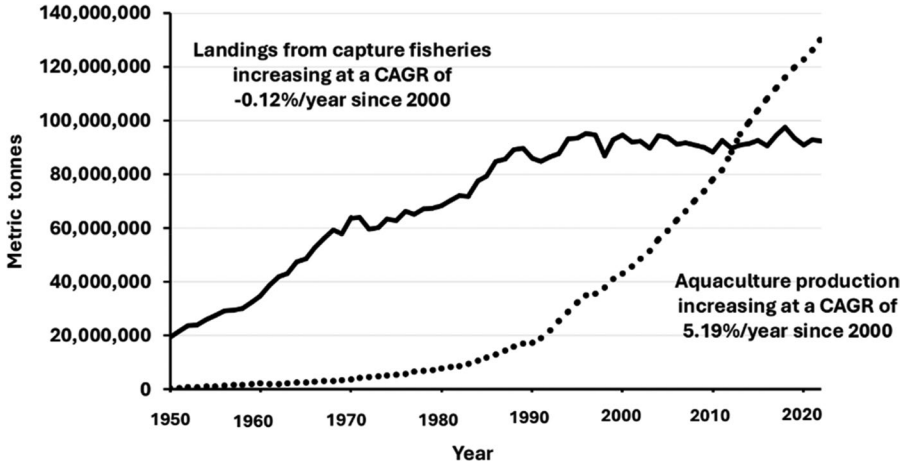

Figure 1. Total global aquaculture and capture fisheries production 1950 to 2022. (Source: FishStatJ release 4.03.06: FAO 2024c).

Table 1. Total global aquaculture production and capture fisheries landings in 2022 (quantities expressed in live weight equivalents in tonnes; FAO 2024c).

Rank	Country	Aquaculture	%	Rank	Country	Captured	%
1	China mainland	75,388,639	57.6	1	China mainland	13,179,077	14.3
2	Indonesia	14,633,869	11.2	2	Indonesia	7,398,555	8.0
3	India	10,235,300	7.8	3	India	5,539,025	6.0
4	Viet Nam	5,170,374	3.9	4	Peru*	5,368,101	5.8
5	Bangladesh	2,731,070	2.1	5	Russian Fed*	4,991,530	5.4
6	Philippines	2,349,252	1.8	6	USA*	4,262,836	4.6
7	Korea Republic	2,307,638	1.8	7	Viet Nam	3,590,003	3.9
8	Norway	1,648,469	1.3	8	Japan*	2,967,756	3.2
9	Egypt	1,552,430	1.2	9	Chile*	2,690,091	2.9
10	Chile	1,524,149	1.2	10	Norway*	2,613,634	2.8
11	Myanmar	1,197,078	0.91	11	Bangladesh	2,027,661	2.2
12	Ecuador	1,123,048	0.86	12	Myanmar*	1,864,730	2.0
13	Thailand	1,001,181	0.76	13	Philippines	1,771,247	1.9
14	Japan	942,560	0.72	14	Mexico*	1,683,376	1.8
15	Brazil	738,881	0.56	15	Morocco*	1,590,644	1.7
16	Korea DPR	680,700	0.52	16	Iceland*	1,434,724	1.5
17	Malaysia	574,182	0.44	17	Thailand*	1,385,491	1.5
18	Turkey	514,823	0.39	18	Malaysia*	1,318,358	1.4
19	Iran	480,624	0.37	19	Korea Rep	1,259,440	1.4
20	USA	478,824	0.37	20	Argentina*	847,753	0.92
21	Russian Fed	348,187	0.27	21	Iran*	811,552	0.88
22	Cambodia	330,600	0.25	22	Spain*	809,094	0.88
23	Mexico	289,618	0.22	23	Nigeria*	784,124	0.85
24	Spain	276,071	0.21	24	Mauritania*	780,383	0.84
25	Taiwan	264,252	0.20	25	Brazil*	758,512	0.82
26	Nigeria	259,106	0.20	26	Oman*	748,355	0.82
27	Colombia	204,942	0.16	27	Canada*	704,177	0.76
28	UK	203,112	0.15	28	Ecuador	688,326	0.75
29	France	200,490	0.15	29	UK*	617,388	0.67
30	Canada	166,463	0.13	30	Taiwan*	614,595	0.66
Total world		130,920,760		Total world		92,289,568	

*Countries currently having a higher capture fisheries production than their domestic aquaculture sector.

global aquaculture and capture fisheries production in 2022, respectively (FAO 2024c).

Notwithstanding the above total aquaculture production and catch data, only 160.85 Mt of aquatic animal food products and 23.95 Mt of aquatic plants were available for human consumption as food in 2022 (live weight equivalent, and excludes aquatic products destined for use as feed, seed, or shells of molluscs); total global available supply increasing from 127.69 Mt in 2010 to 160.85 Mt in 2022 (CAGR 1.94%/year), and from 13.63 Mt in 2010 to 23.95 Mt in 2022 (CAGR 4.81%/year), respectively (FAO 2024b). By comparison, annual global population growth over the same period was 1.17% (Table 2). The major aquatic products available for consumption as food in 2022 were freshwater fish (40.61%), pelagic fish (14.63%), other molluscs (12.66%), demersal fish (12.44%), crustaceans (11.25%), other marine fish (5.05%), cephalopods (2.34%), and other aquatic invertebrates (1.02%; FAO 2024b).

Regional supply of fish and animal food products

Marked differences exist between the different geographical regions in terms of the apparent supply and availability of aquatic food products to animal protein food supply; of the 160.85 Mt of aquatic animal foods available for human consumption in 2022 over 72.11% (115.99 Mt) was in Asia, 10.08% (16.22 Mt) in Europe, 9.34% (15.02 Mt) in Americas, 7.87% (12.66 Mt) in Africa, and 0.59% (0.955 Mt) in Oceania. Moreover, the highest annual growth in aquatic animal food availability and supply was in the Asian region (available production increasing from 87.27 Mt in 2010 to 115.99 Mt in 2022), with production available for food use increasing with a CAGR of 2.40%/year), followed by African region (10.11 Mt to 12.66 Mt, CAGR 1.89%/year), the Americas (13.03 Mt to 15.02 Mt, CAGR 1.19%/year), Oceania (0.942 Mt to 0.955 Mt, CAGR 0.11%/year), and Europe (16.32 Mt to 16.22 Mt, CAGR −0.05%/year; Table 2).

Notwithstanding the above, the observed increased growth in the availability of aquatic animal food products was above the population growth rate (period 2010-2022) in Asia and the Americas, but was below the population growth rate in the African region, Europe and Oceania (Table 2); apparent per capita supply (kg/capita/year) of aquatic animal food products only increasing in Asia from 20.74 kg to 24.63 kg/capita in 2022, and in the Americas from 14.01 kg to 14.56 kg/capita, and decreasing in Africa from 10.05 kg to 8.92 kg/capita, decreasing in Europe from 22.26 kg to 21.90 kg/capita, and decreasing in Oceania from 25.83 kg to 21.35 kg/capita (Table 2). By contrast, terrestrial meat food supply increased in all geographical regions over the same time-period (2010-2022), except for Oceania where it decreased from 99.97 kg/capita/year in 2010 to 93.23 kg/capita/year in 2022. Moreover, the contribution of sugars and sweeteners to total food supply (expressed as kcal/capita/day) ranged from a low of 5.76% and 6.49% in Africa and Asia, to a high of 11.19% and 15.12% in Oceania and Northern America, respectively, and consequent increased risk of diabetes (Tamayo et al. 2014; Yisahak et al. 2014; Table 2).

Despite the high apparent per capita consumption of aquatic animal food products in the Americas (and in particular within Northern America at 22.08 kg/capita/year in 2022), the higher consumption of

Table 2. Aquatic animal food production and availability by geographical region (data calculated from FAO 2024b; Mt – million tonnes).

Region	Population growth rate 2010-2022 %/year	Aquatic food production 2010-2022 Mt	Aquatic food production growth CAGR %	Aquatic food supply 2010-2022 kg/cap/yr	Total meat food supply 2010-2022 kg/cap/yr	Total food supply calories 2010-2022 kcal/cap/day	Total sugars & sweeteners as 2010-2022 % total calories
Africa	2.91	10.11-12.66	1.89	10.05-8.92	17.29-17.66	2560-2567	5.74-5.76
Americas	0.86	13.03-15.02	1.19	14.01-14.56	86.91-93.20	3271-3392	14.98-13.47
Asia	0.94	87.27-115.99	2.40	20.74-24.63	30.59-36.29	2703-2944	6.40-6.49
Europe	0.08	16.33-16.22	− 0.05	22.26-21.90	77.27-77.73	3371-3471	11.66-10.86
Oceania	1.71	0.94-0.95	0.11	25.83-21.35	99.97-93.23	3137-3101	13.13-11.19
Caribbean	0.75	0.32-0.37	1.25	8.72-9.25	42.81-49.46	2708-2828	14.81-13.19
Central America	1.15	1.67-2.12	2.02	10.68-11.83	58.26-68.67	3008-3173	16.46-12.98
Northern America	0.73	7.45-8.32	0.92	21.60-22.08	116.5-119.6	3713-3881	15.38-15.12
South America	0.88	3.60-4.22	1.34	9.15-9.67	76.37-84.44	3040-3111	13.98-11.96
World	1.17	127.7-160.9	1.94	18.47-20.24	41.55-44.54	2832-2985	8.37-7.91

Region	Total animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
Africa	15.48	7.83	3.53	0.70	0.85	2.57	16.60
Americas	63.86	39.27	15.13	4.46	1.41	3.59	5.62
Asia	34.29	15.30	7.15	3.65	1.41	6.78	19.77
Europe	68.07	32.54	23.02	4.25	2.16	6.10	8.96
Oceania	62.16	39.29	12.46	1.81	2.98	5.62	9.04
Caribbean	34.22	21.35	6.26	2.46	1.65	2.50	7.31
Central America	50.86	29.65	10.25	5.57	1.88	3.51	6.90
Northern America	81.92	49.28	22.42	4.96	0.49	4.77	5.82
South America	56.31	36.21	11.64	3.74	2.03	2.69	4.78
World	38.08	18.82	9.05	3.27	1.40	5.54	14.55

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

terrestrial meat products (119.6 kg/capita/year in 2022, includes meat, milk, eggs) within the region was such that aquatic food products represented less than 5.82% of their total supply of animal protein. In marked contrast, despite the lower animal protein consumption within the African (15.48 g/capita/day) and Asian region (34.29 g/capita/day), aquatic proteins supplied over 16.6% and 19.77% of total animal protein available within these regions for consumption, respectively. Of particular concern was the decrease in total animal protein food supply and aquatic animal protein food supply within the African region; the contribution of aquatic animal proteins to total animal protein food supply decreasing from 18.27% in 2010 to 16.60% in 2022 (Table 2). A similar, but smaller, decrease was observed in all other geographical regions and globally (Table 2).

Interestingly, the species composition of the aquatic species consumed also varied with the different geographical regions (Table 3). Aquatic food supply in the African region was dominated fish species (97% total aquatic food supply in 2022), with pelagic and other marine fish species dominating supply (60% total fish; mainly sourced from wild capture fisheries). By contrast, fish supply within the Asian region was dominated by freshwater fish species (65% total fish; primarily sourced from aquaculture). Moreover, in contrast to the African region, other aquatic food sources also significantly contributed to aquatic food supply within the other regions, including crustaceans (8.7-19.4% total supply), other molluscs (8.5-15.0%), and cephalopods (2.0-4.4%; Table 3).

Although at the global level aquatic animal food products supplied over 3.4 billion people with over 20% of their total animal protein food supply in 2022, this was not the case within all regions; the Asian and African region supplying 2.47 and 0.93 billion people with over 20% of their total animal protein supply, respectively (Africa - Table 4, Americas -Table 5, Asia - Table 6, Europe - Table 7, Oceania – Table 8).

African region and countries

Table 4 shows total apparent animal protein supply, including the main dietary sources (terrestrial meat, milk, eggs & aquatic meat) in 51 African countries in 2022 (data compiled from FAO 2024b) and Figure 2 shows the reported per capita supply (kg/capita/year) of aquatic animal food products within the countries of the region in 2022. Of particular significance was the important contribution of aquatic meat products to total animal protein supply within the African region (mean 16.60%), and in particular within Sierra Leone (55.17% total animal protein supply), Mozambique (42.49%), Ghana (42.24%), Sao Tome & Principe (39.89%), Cote d'Ivoire (39.33%), Uganda (37.59%), Cameroon (35.79%), and Benin (31.01%); the contribution of animal proteins derived from aquatic meat products surpassing that derived from terrestrial meats in Sierra Leone, Cote d'Ivoire, and Uganda (Table 4).

Notwithstanding the above, the per capita supply of aquatic animal food products decreased within 30 countries in the region, and only increased within 21 countries from 2010 to 2022 (FAO 2024b); the decrease in supply being due in part to the rapid population growth within the region (Table 2). Countries which showed a decrease in aquatic food supply included: Algeria (3.93 to 2.83 kg/capita/year; population growth 1.89%/year since 2010), Angola (15.73 to 12.88 kg/capita/year; population growth 3.57%/year), Botswana (3.58 to 2.09 kg/capita/year; population growth 1.93%/year), Cameroon (21.14 to 17.81 kg/capita/year; population growth 2.87%/year), Cabo Verde (13.20 to 9.40 kg/capita/year; population growth 1.08%/year), Central African Republic (8.89 to 6.44 kg/capita/year; population growth 1.51%/year), Chad (7.71 to 5.84 kg/capita/year; population growth 3.38%/year), Comoros (18.39 to 17.03 kg/capita/year; population growth 2.05%/year), DPR Congo (5.04 to 3.51 kg/capita/year; population growth 3.39%/year), Gabon (28.14 to 28.11 kg/capita/year; population growth 2.82%/year), Gambia (25.14 to 20.11 kg/capita/year; population growth 2.82%/year), Kenya (3.34 to 2.93 kg/capita/year;

Table 3. Aquatic animal food supply by major species group and geographical region in 2022 (values expressed as percent of total aquatic food supply in that region, Data calculated from FAO (2024b).

Region	Africa	Americas	Asia	Europe	Oceania
Freshwater fish	39.86	27.06	45.71	19.40	15.10
Demersal fish	15.44	17.80	8.43	33.24	21.17
Pelagic fish	34.97	20.73	10.22	23.71	30.31
Other marine fish	6.85	3.28	5.52	1.76	7.64
Total fish	97.13	68.87	69.88	78.11	74.22
Crustaceans	1.94	19.38	11.56	8.69	12.31
Cephalopods	0.54	2.04	2.26	4.44	4.17
Other molluscs	0.37	9.30	15.04	8.61	8.85
Other invertebrates	0.01	0.40	1.34	0.13	0.45

Table 4. Apparent animal protein food supply and availability in the African region (data compiled and calculated from FAO 2024b).

Africa	Animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
Seychelles	62.76	32.98	8.35	3.62	1.03	16.78	26.74
Mauritius	49.68	26.80	11.08	2.62	0.64	8.54	17.19
Libya	43.69	20.44	11.17	2.92	3.54	5.62	12.86
Gabon	42.87	30.06	2.17	0.25	2.34	8.05	18.78
South Africa	40.06	28.48	4.45	2.23	3.12	1.78	4.44
Tunisia	32.54	13.93	11.24	2.14	0.77	4.46	13.71
Congo	31.63	21.66	0.64	0.07	2.80	6.46	20.42
Mauritania	31.42	15.28	11.72	0.41	1.68	2.33	7.41
Zimbabwe	30.63	24.25	2.46	0.35	2.87	0.70	2.28
Cabo Verde	29.56	16.88	7.94	1.44	0.88	2.42	8.19
Chad	28.89	21.46	2.34	0.07	3.48	1.54	5.33
Morocco	28.46	14.23	5.13	2.53	1.16	5.41	19.01
Egypt	28.41	14.56	5.64	1.28	0.84	6.09	21.44
Algeria	26.57	8.02	15.04	1.96	0.67	0.88	3.31
Botswana	25.38	14.14	8.93	0.44	1.33	0.54	2.13
Namibia	23.76	12.71	5.74	0.35	1.66	3.30	13.89
Comoros	21.14	13.49	1.72	0.38	0.37	5.18	24.50
Sudan	19.70	8.66	9.05	0.39	1.32	0.28	1.42
Gambia	19.68	10.59	1.99	0.93	0.29	5.88	29.88
Central African Rep.	19.33	15.90	1.22	0.21	0.33	1.67	8.64
Sao Tome & Principe	18.80	9.18	1.72	0.22	0.18	7.50	39.89
Eswatini	18.33	10.96	4.49	0.52	1.21	1.15	6.27
Ghana	17.85	8.16	0.74	0.33	1.08	7.54	42.24
Malawi	17.34	12.88	1.01	0.29	0.85	2.31	13.32
Senegal	17.30	9.43	1.66	1.14	1.07	4.00	23.12
Somalia	17.06	5.15	10.56	0.10	0.76	0.49	2.87
Burkina Faso	17.01	10.50	2.10	0.33	1.07	3.01	17.69
Angola	16.10	9.84	0.91	0.56	0.89	3.90	24.22
Cote d'Ivoire	15.66	5.45	0.61	0.66	2.78	6.16	39.33
Lesotho	14.95	4.79	7.69	0.18	1.78	0.51	3.41
Benin	14.38	8.13	1.00	0.30	0.49	4.46	31.01
Kenya	14.32	4.89	7.68	0.35	0.65	0.75	5.24
Cameroon	13.97	6.73	1.21	0.52	0.51	5.00	35.79
Liberia	13.58	9.02	0.25	0.67	2.29	1.35	9.94
Zambia	13.57	7.96	0.58	0.88	0.72	3.43	25.28
Tanzania	13.41	5.08	5.01	0.80	0.72	1.80	13.42
Sierra Leone	13.34	4.27	0.62	0.44	0.65	7.36	55.17
Djibouti	12.84	6.53	3.78	0.57	0.84	1.12	8.72
Guinea	12.24	5.73	1.79	0.62	0.70	3.40	27.78
Uganda	12.13	4.10	2.72	0.25	0.50	4.56	37.59
Mali	9.81	3.48	3.96	0.15	0.27	1.95	19.88
Guinea-Bissau	9.10	5.69	1.70	0.39	0.67	0.65	7.14
Mozambique	9.06	4.68	0.22	0.15	0.16	3.85	42.49
Niger	8.98	3.53	4.55	0.07	0.38	0.45	5.01
Togo	8.66	4.70	0.55	0.70	0.25	2.46	28.41
Nigeria	6.99	3.38	0.47	0.85	0.28	2.01	28.75
Ethiopia	6.85	3.38	0.47	0.85	0.28	2.01	28.75
Rwanda	6.26	2.81	1.65	0.09	0.33	1.38	22.04
Madagascar	5.23	2.40	1.49	0.16	0.12	1.06	20.27
Dem Rep Congo	4.00	1.88	0.51	0.02	0.54	1.05	26.25
Burundi	3.13	1.59	0.55	0.04	0.19	0.76	24.28
Region							
Africa	15.48	7.83	3.53	0.70	0.85	2.57	16.60

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

population growth 2.22%/year), Libya (20.61 to 19.96 kg/capita/year; population growth 0.40%/year), Madagascar (5.54 to 3.70 kg/capita/year; population growth 2.61%/year), Mauritania (8.70 to 8.06 kg/capita/year; population growth 2.75%/year), Namibia (12.73 to 11.16 kg/capita/year; population growth 1.69%/year), Niger (2.59 to 1.85 kg/capita/year; population growth 3.85%/year), Nigeria (13.88 to 7.20 kg/capita/year; population growth 2.58%/year), Senegal (24.77 to 14.36 kg/capita/year; population growth 2.73%/year), Sao Tome & Principe (26.84 to 26.04 kg/capita/year; population growth 1.87%/year), Seychelles (59.46 to 51.24 kg/capita/year; population

Table 5. Apparent animal protein food supply and availability in the Americas (data compiled and calculated from FAO 2024b).

Americas	Animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
USA	83.48	50.54	22.90	4.96	0.32	4.76	5.70
Argentina	73.83	48.59	14.05	4.99	4.26	1.94	2.63
Canada	68.17	38.20	18.19	4.97	1.92	4.89	7.17
Antigua & Barbuda	66.20	40.67	7.53	3.16	1.37	13.47	20.35
Brazil	63.89	42.31	13.24	3.99	2.14	2.21	3.46
Uruguay	61.18	26.78	25.02	4.36	1.83	3.19	5.21
Grenada	58.77	33.56	15.50	5.93	1.84	9.09	15.47
Mexico	57.63	33.43	11.03	6.72	2.36	4.09	7.10
Chile	56.15	39.23	10.14	2.93	0.52	3.33	5.93
Guyana	54.36	34.30	11.30	0.45	0.33	7.98	14.68
Costa Rica	52.92	25.20	17.22	4.25	0.94	5.31	10.03
Panama	52.79	34.72	9.62	2.40	1.48	4.57	8.65
Jamaica	48.16	28.78	9.29	1.10	1.67	7.32	15.20
Colombia	45.51	27.05	10.84	3.79	1.24	2.59	5.69
Dominican Rep.	44.20	24.43	10.73	5.09	1.85	2.10	4.75
Trinidad & Tobago	43.60	27.45	8.79	1.22	1.29	4.85	11.12
Peru	43.01	24.09	6.81	3.44	1.29	7.38	17.16
Bolivia	41.92	33.86	3.75	2.07	1.60	0.64	1.53
Cuba	39.18	26.42	6.15	2.67	2.23	1.71	4.36
Ecuador	38.76	22.52	10.06	2.44	1.79	1.95	5.03
Suriname	36.26	25.62	3.56	1.85	0.31	4.92	13.57
Belize	34.86	22.29	7.11	1.41	0.42	3.63	10.41
El Salvador	34.66	18.46	10.78	2.71	0.47	2.24	6.46
Venezuela	30.07	15.74	8.22	1.87	1.22	3.02	10.04
Guatemala	30.06	20.17	4.46	3.81	0.56	1.06	3.53
Nicaragua	29.79	13.88	11.85	1.43	1.02	1.61	5.40
Paraguay	29.31	13.48	6.21	5.53	2.46	1.63	5.56
Honduras	26.38	17.17	6.18	1.25	0.45	1.33	5.04
Haiti	11.51	8.52	0.64	0.12	0.82	1.41	12.25
Region							
Caribbean	34.22	21.35	6.26	2.46	1.65	2.50	7.31
Central America	50.86	29.65	10.25	5.57	1.88	3.51	6.90
Northern America	81.92	49.28	22.42	4.96	0.49	4.77	5.82
South America	56.31	36.21	11.64	3.74	2.03	2.69	4.78

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

growth 1.24%/year), Sierra Leone (30.58 to 24.04 kg/capita/year; population growth 2.45%/year), Somalia (2.5 to 1.70 kg/capita/year; population growth 3.22%/year), Sudan (1.32 to 0.84 kg/capita/year; population growth 2.92%/year), Togo (11.15 to 8.74 kg/capita/year; population growth 2.51%/year), Zimbabwe (2.80 to 2.64 kg/capita/year; population growth 2.02%/year; FAO 2024b).

By contrast, countries which showed significant increases in aquatic animal food supply included: Benin (13.49 to 15.27 kg/capita/year; population growth 2.93%/year), Burundi (2.02 to 2.48 kg/capita/year; population growth 2.92%/year), Burkina-Faso (5.14 to 10.65 kg/capita/year; population growth 2.88%/year), Congo (18.95 to 24.01 kg/capita/year; 2.50%/year), Cote d'Ivoire (14.20 to 20.95 kg/year; population growth 2.43%/year), Djibouti (2.37 to 3.80 kg/capita/year; population growth 1.67%/year), Egypt (20.08 to 21.15 kg/capita/year; 2.02%/year), Ethiopia (0.19 to 0.52 kg/capita/year; 2.74%/year), Eswatini (1.61 to 3.88 kg/capita/year; 0.74%/year), Ghana (22.03 to 23.84 kg/capita/year; 2.27%/year), Guinea (10.47 to 11.07 kg/capita/year; population growth 2.53%/year), Guinea-Bissau (0.99 to 2.40 kg/capita/year; population growth 2.49%/year), Lesotho (0.87 to 1.93 kg/capita/year; population growth 1.10%/year), Liberia (4.84 to 4.92 kg/capita/year; population growth 2.33%/year), Malawi (7.15 to 9.07 kg/capita/year; 2.75%/year), Mali (7.60 to 8.82 kg/capita/year; 3.17%/year), Mauritius (20.99 to 28.81 kg/capita/year; population growth 0.10%/year), Morocco (14.31 to 16.82 kg/capita/year; population growth 1.20%/year), Mozambique (7.46 to 13.13 kg/capita/year; 3.02%/year), Rwanda (2.76 to 5.21 kg/capita/year; 2.45%/year), South Africa (5.83 to 6.39 kg/capita/year; population growth 1.22%/year), Tanzania (6.35 to 6.51 kg/capita/year; population growth 3.15%/year), Tunisia (12.08 to 15.68 kg/capita/year; 1.05%/year), Uganda (14.18 to 15.87 kg/capita/year; 3.21%/year), and Zambia (6.65 to 13.13 kg/capita/year; population growth 3.15%/year; FAO 2024b).

Notwithstanding the above decreases and low apparent consumption of aquatic food products within

Table 6. Apparent animal protein food supply and availability in the Asian region (data compiled and calculated from FAO 2024b).

Asia	Animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
Mongolia	99.85	60.76	21.42	2.04	15.33	0.30	0.30
Israel	81.94	49.87	20.34	3.89	1.70	6.14	7.49
Kazakhstan	63.64	30.35	26.91	2.43	2.85	1.10	1.73
Korea Republic	62.45	33.56	3.78	3.90	5.09	16.12	25.81
Qatar	60.35	39.10	8.67	5.85	0.55	6.18	10.24
Bahrain	59.79	39.20	8.87	3.85	2.40	5.47	9.15
Kuwait	59.68	37.36	10.95	5.56	1.57	4.24	7.10
United Arab Emirates	57.50	37.10	8.66	3.66	1.15	6.93	12.05
Cyprus	57.24	30.15	19.30	1.98	0.69	5.12	8.94
Armenia	56.03	25.20	21.38	4.50	3.38	1.57	2.80
Maldives	55.98	16.63	8.03	6.43	0.15	24.74	44.19
Taiwan	55.71	37.36	4.90	5.01	0.84	7.60	13.64
Malaysia	54.41	30.72	3.10	5.01	0.39	15.19	27.92
Japan	53.80	25.79	7.12	6.22	1.10	13.57	25.22
China, mainland	51.85	28.67	3.03	6.85	2.92	10.38	20.02
Oman	50.99	20.50	16.85	3.65	1.64	8.35	16.37
Uzbekistan	49.49	17.84	24.54	3.85	2.08	1.18	2.38
Turkey	47.25	20.43	21.17	3.12	1.05	1.48	3.13
Turkmenistan	46.05	25.89	12.08	4.00	3.25	0.83	1.80
Saudi Arabia	41.61	26.44	7.94	2.87	0.98	3.38	8.12
Kyrgyzstan	41.01	16.80	19.26	1.83	2.66	0.46	1.12
Georgia	40.53	16.61	15.73	3.46	1.63	3.10	7.65
Viet Nam	39.29	22.02	2.51	1.19	2.20	11.37	28.94
Azerbaijan	38.67	17.69	15.10	3.09	2.17	0.62	1.60
Lebanon	31.23	17.55	9.41	2.36	0.60	1.31	4.19
Pakistan	30.28	9.80	17.79	1.20	1.03	0.46	1.52
Indonesia	29.70	8.47	1.59	6.10	0.31	13.23	44.54
Philippines	29.27	14.64	2.26	1.75	2.58	8.04	27.47
Tajikistan	28.61	15.31	8.98	1.26	2.81	0.25	0.89
Thailand	27.70	10.71	2.69	3.72	0.96	9.62	34.73
Jordan	27.63	16.76	7.57	1.36	0.71	1.23	4.45
Iran	25.83	14.27	4.86	2.79	0.59	3.32	12.85
Lao	23.88	12.90	0.71	0.68	1.68	7.91	33.12
Timor-Leste	23.41	13.57	1.16	0.74	5.75	2.19	9.35
Myanmar	22.69	8.66	1.23	0.62	0.38	11.80	52.00
Cambodia	20.79	5.08	0.63	0.35	0.90	13.83	66.52
Syria	18.82	7.38	8.55	1.21	1.19	0.49	2.60
Sri Lanka	18.81	5.37	4.28	1.19	0.14	7.83	41.63
India	18.46	3.17	10.92	1.45	0.21	2.71	14.68
Bhutan	18.05	6.90	7.00	1.62	0.64	1.89	10.47
Bangladesh	17.32	1.99	6.44	1.13	0.24	7.52	43.42
Nepal	16.87	8.09	6.11	0.60	1.05	1.02	6.05
Iraq	14.13	10.07	2.15	0.86	0.26	0.79	5.59
Yemen	11.96	7.29	2.76	0.53	0.59	0.79	6.60
Afghanistan	9.00	3.04	5.13	0.22	0.49	0.12	1.33
Region							
Asia	34.29	15.30	7.15	3.65	1.41	6.78	19.77

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

the region, aquatic foods supplied over 20% of total animal protein supply within 25 countries in the region with a combined population of 928,000 million people or about 65.37% of the total African population in 2022 (Table 4; FAO 2024b).

Although terrestrial meats were the main source of animal protein in most African countries, in some countries milk proteins dominated supply, including Algeria, Sudan, Somalia, Lesotho, Kenya, Mali, and Niger. Moreover, although on a regional basis sugars and sweeteners contributed less than 5.67% of total energy supply within the region, some countries reported high consumption levels; including Somalia (30.55% total food calories), Gambia (21.45%), Mauritania (14.33%), Sudan (12.76%), Namibia (12.49%), Libya (10.98%), South Africa (10.58%), and Kenya/Mauritius (10.48%), Botswana (9.92%), Tunisia (9.91%), and Morocco (9.85%; FAO 2024b), with consequent increase risk of the incidence of diabetes (Majeed et al. 2014; Mapa-Tassou et al. 2019)

Table 7. Apparent animal protein food supply and availability in the European region (data compiled and calculated from FAO 2024b).

Europe	Animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
Iceland	105.56	40.80	33.67	2.77	2.86	25.46	24.12
Ireland	97.64	44.74	38.87	3.29	5.57	5.17	5.29
Lithuania	85.39	37.52	32.71	4.70	1.60	8.86	10.37
Portugal	81.39	40.78	20.68	3.55	2.33	14.05	17.26
Netherlands	80.72	29.99	31.99	10.25	3.18	5.31	6.58
Montenegro	78.78	35.51	34.23	4.54	1.19	3.31	4.20
France	78.32	35.28	27.81	4.27	2.98	7.98	10.19
Finland	78.23	30.27	35.06	3.12	1.94	7.84	10.02
Spain	78.18	42.12	18.13	4.54	1.84	11.55	14.77
Belgium	77.04	25.62	31.67	6.19	7.93	5.63	7.31
Estonia	76.62	25.95	40.69	4.00	2.69	3.29	4.29
Luxembourg	75.47	35.99	24.56	6.32	1.42	7.18	9.51
Germany	71.82	29.21	32.60	4.46	1.62	3.93	5.47
Sweden	71.49	29.69	26.69	4.18	3.27	7.66	10.71
Latvia	71.49	33.06	24.18	3.39	2.28	8.58	12.00
Croatia	70.30	36.55	22.52	2.63	2.89	5.71	8.12
Italy	69.96	29.77	26.71	3.91	1.60	7.97	11.39
Belarus	69.77	40.44	18.03	4.02	4.10	3.18	4.56
Poland	69.67	37.56	25.66	1.67	1.14	3.64	5.22
Norway	69.50	29.37	20.88	3.87	1.30	14.08	20.26
Austria	67.50	32.65	23.79	4.65	2.68	3.73	5.53
Greece	66.29	31.17	24.91	2.96	1.81	5.44	8.21
Albania	65.81	23.39	32.79	4.53	2.62	2.48	3.77
Russian Fed	65.68	34.42	16.52	5.23	2.55	6.96	10.60
Switzerland	65.58	26.96	29.26	3.35	1.90	4.11	6.27
UK	64.45	36.07	19.30	2.89	1.10	5.09	7.90
Czechia	62.60	32.96	22.25	2.67	2.00	2.72	4.34
Romania	59.86	27.33	24.70	4.07	1.69	2.07	3.46
Serbia	59.63	29.32	18.86	3.58	5.53	2.34	3.92
Malta	57.14	27.00	17.45	3.65	0.57	8.47	14.82
Slovenia	54.78	25.46	21.35	2.30	2.14	3.53	6.44
Hungary	52.85	30.33	15.85	4.19	0.79	1.69	3.20
Bulgaria	50.86	24.78	19.26	1.59	3.03	2.20	4.32
Slovakia	47.17	23.57	14.88	2.36	3.89	2.47	5.24
Ukraine	44.72	20.72	13.47	5.02	1.15	4.36	9.75
Bosnea & Herzegovina	41.38	20.67	16.13	1.86	1.00	1.72	4.15
North Macedonia	39.09	18.24	16.02	1.44	1.48	1.91	4.89
Moldova Republic	38.50	16.33	12.76	3.46	1.32	4.63	12.02
Region							
Europe	68.07	32.54	23.02	4.25	2.16	6.10	8.96

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

Table 8. Apparent animal protein food supply and availability in Oceania (data compiled and calculated from FAO 2024b).

Oceania	Animal protein supply g/capita/day	Total meat[a] protein supply g/capita/day	Total milk[b] protein supply g/capita/day	Total egg[c] protein supply g/capita/day	Total other[d] protein supply g/capita/day	Total aquatic[e] protein supply g/capita/day	Aquatic protein as % total animal protein
Tonga	79.20	64.03	4.90	1.03	1.13	8.11	10.24
Australia	76.54	46.04	18.56	2.22	3.55	6.17	8.06
French Polynesia	68.64	41.18	8.99	3.60	2.08	12.79	18.63
Samoa	62.96	45.88	3.42	0.50	1.20	11.96	18.99
New Zealand	61.08	34.92	10.48	3.16	6.03	6.49	10.62
New Caledonia	58.02	35.69	11.65	2.89	1.30	6.49	11.18
Kiribati	44.61	18.74	1.84	0.92	0.27	22.84	51.20
Micronesia	43.93	27.23	0.79	1.62	0.69	13.60	30.96
Fiji	39.21	22.87	5.56	1.81	1.46	7.51	19.15
Papua New Guinea	31.99	28.69	0.28	0.14	0.57	2.31	7.22
Vanuatu	26.93	15.02	1.85	0.77	0.73	8.56	31.79
Solomon Islands	19.60	7.05	0.82	0.28	0.31	11.14	56.84
Region							
Oceania	62.16	39.29	12.46	1.81	2.98	5.62	9.04

[a]Total meat protein supply includes bovine meat, mutton & goat meat, pigmeat, poultry meat, and other meats.
[b]Total milk protein supply excluding butter.
[c]Total eggs protein supply.
[d]Includes offals.
[e]Includes farmed and wild-caught freshwater fish, demersal fish, pelagic fish, other marine fish, crustaceans, cephalopods, other molluscs, and miscellaneous aquatic invertebrates.

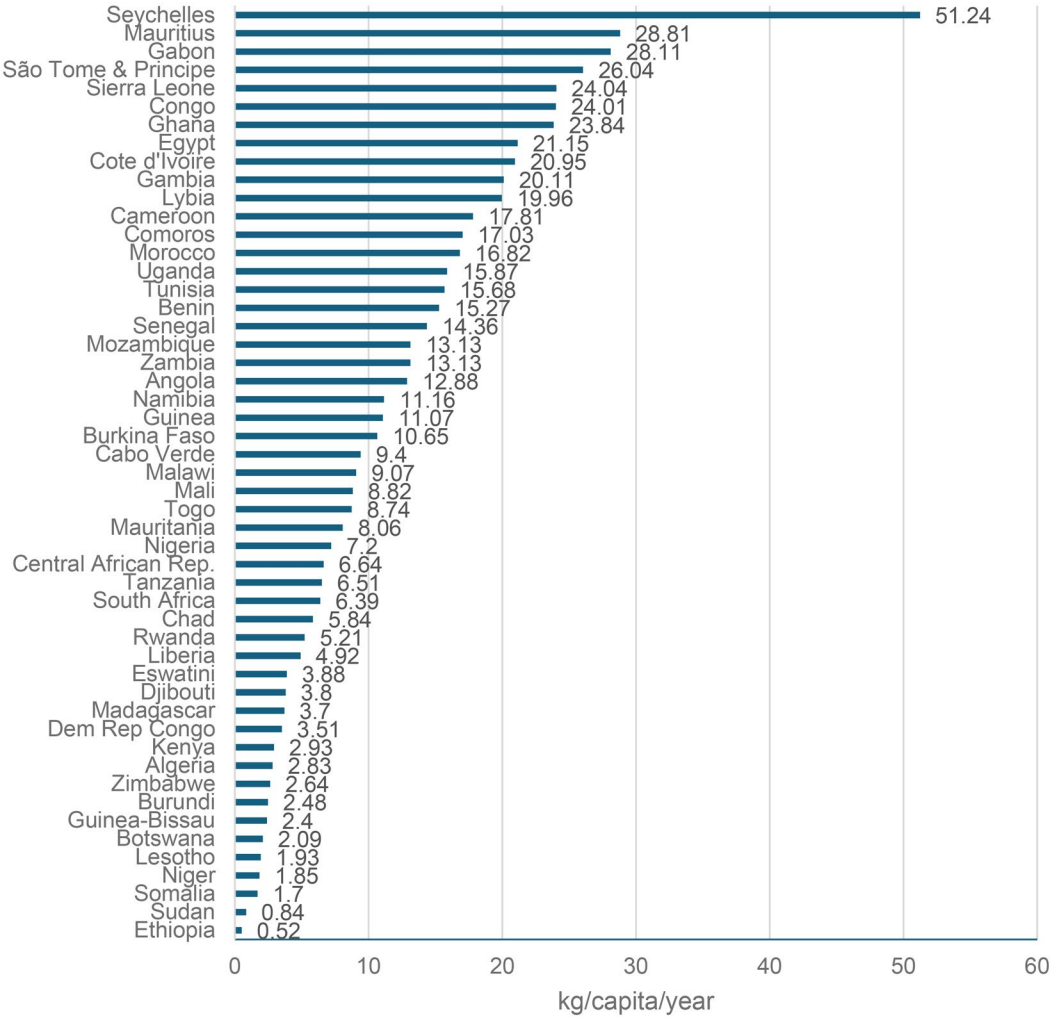

Figure 2. Apparent per capita aquatic animal food supply within the African region (values given in kg/capita/year on a live weight equivalent basis; FAO 2024b).

Americas

Table 5 shows total apparent animal protein supply in 29 countries within the Americas in 2022 (FAO 2024b) and Figure 3 shows the reported per capita supply (kg/capita/year) of aquatic animal food products within the countries of the region in 2022. In stark contrast to other regions (except for small Island States), aquatic food products contributed little to animal protein supply (4.7-6.9% total animal protein supply), with the highest levels being reported for Peru (17.16%) and Guyana (14.68%), and the lowest levels for Bolivia (1.53%), Argentina (2.63%), Brazil (3.46%), and Guatemala (3.53%; Table 5).

In contrast to the African region, the per capita supply of aquatic animal food products in the Americas only decreased within 7 countries within the region from 2010 to 2022. They include Brazil (8.59 to 8.02 kg/capita/year; population growth 0.77%/year), Canada (22.80 to 20.36 kg/capita/year; population growth 1.04%/year), Ecuador (8.57 to 6.44 kg/capita/year; population growth 1.54%/year), Guyana (31.82 to 25.30 kg/capita/year; population growth 0.65%/year), Nicaragua (6.40 to 6.37 kg/capita/year; population growth 1.44%/year), Trinidad & Tobago (18.84 to 18.33 kg/capita/year; population growth 0.69%/year), and Venezuela (10.49 to 10.25 kg/capita/year; population growth −0.12%/year; FAO 2024b).

By contrast, 22 countries showed a notable increase in aquatic animal food supply from 2010 to 2022, and these included Antigua & Balboa (54.01 to 54.26 kg/capita/year; population growth 0.65%/year), Argentina (5.75 to 7.12 kg/capita/year; 0.85%/year), Belize (15.24 to 17.19 kg/capita/year; population growth 1.93%/year), Bolivia (1.77 to 2.13 kg/capita/year; population growth 1.50%/year), Chile (14.2 to 14.4 kg/capita/year; population growth 1.19%/year), Colombia (5.75 to 8.72 kg/capita/year; population growth1.23%/year), Costa Rica (10.32 to 17.57 kg/capita/year; population growth 0.95%/year), Cuba (5.75 to 6.13 kg/capita/year; population growth −0.06%/year), Dominican Republic (7.73 to 8.20 kg/capita/

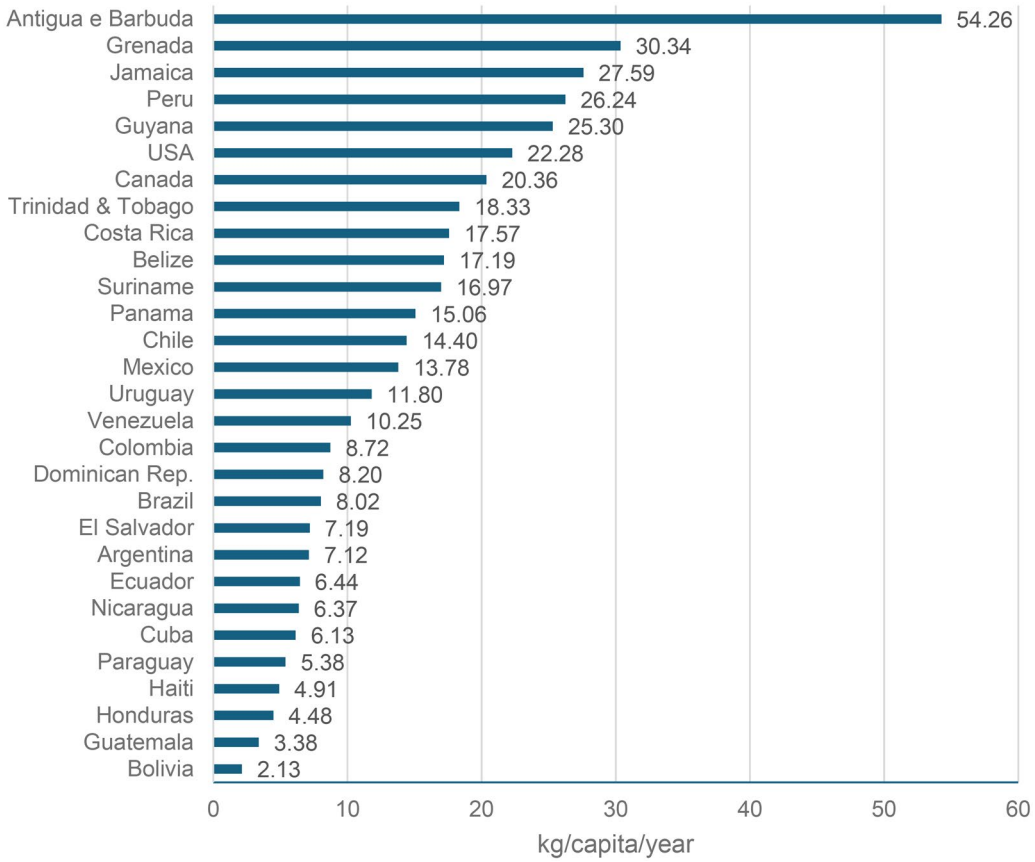

Figure 3. Apparent per capita aquatic animal food supply within the Americas (values given in kg/capita/year on a live weight equivalent basis; FAO 2024b).

year; population growth 1.16%/year), El Salvador (7.16 to 7.19 kg/capita/year; population growth 0.30%/year), Grenada (26.30 to 30.34 kg/capita/year; population growth 0.73%/year), Guatemala (1.65 to 3.38 kg/capita/year; population growth 1.72%/year), Haiti (3.91 to 4.91 kg/capita/year; population growth 1.37%/year), Honduras (3.07 to 4.48 kg/capita/year; population growth 1.77%/year), Jamaica (24.19 to 27.59 kg/capita/year; population growth 0.28%/year), Mexico (12.71 to 13.78 kg/capita/year; population growth 1.05%/year), Panama (14.26 to 15.06 kg/capita/year; population growth 1.65%/year), Paraguay (4.17 to 5.38 kg/capita/year; population growth 1.35%/year), Peru (22.29 to 26.24 kg/capita/year; population growth 1.28%/year), Suriname (16.81 to 16.97 kg/capita/year; population growth 1.04%/year), Uruguay (5.42 to 11.80 kg/capita/year; population growth 0.17%/year), and the USA (21.46 to 22.28 kg/capita/year; 0.70%/year; FAO 2024b). In the case of the USA, the high consumption of aquatic food products was achieved through the importation of over 5.61 Mt of aquatic food products in 2022; about 80% of estimated aquatic food consumption within the US being imported (Davis and Rexroad 2024).

As expected, animal protein supply and availability within the region was dominated by terrestrial meat (USA, Argentina, Brazil, Canada) and milk (Uruguay, USA, Canada, Argentina, Brazil) products, with highest consumption of sugars and sweeteners reported in Guatemala (20.24% total food calories), Colombia (18.99%), Suriname (18.25%), USA (15.54%), Honduras (15.45%), Costa Rica (15.19%), Chile (14.81%), Cuba (14.49%), and Nicaragua (13.66%; Yisahak et al. 2014; FAO 2024b).

Asia

Table 6 shows total apparent animal protein supply in 44 countries within the Asian region in 2022 (FAO 2024b) and Figure 4 shows the reported per capita supply (kg/capita/year) of aquatic animal food products within the countries of the region in 2022. As expected within the region that produces and consumes the bulk of global aquatic food production, aquatic food products play a very important role in animal protein supply within the region (mean 19.77%), and in particular in Cambodia (66.52% total animal protein supply), Myanmar (52.0%), Indonesia (44.54%), Maldives (44.19%), Bangladesh (43.42%), Sri Lanka (41.63%), Thailand (34.73%), Lao (33.12%), Viet Nam (28.94%), Malaysia (27.92%), Philippines

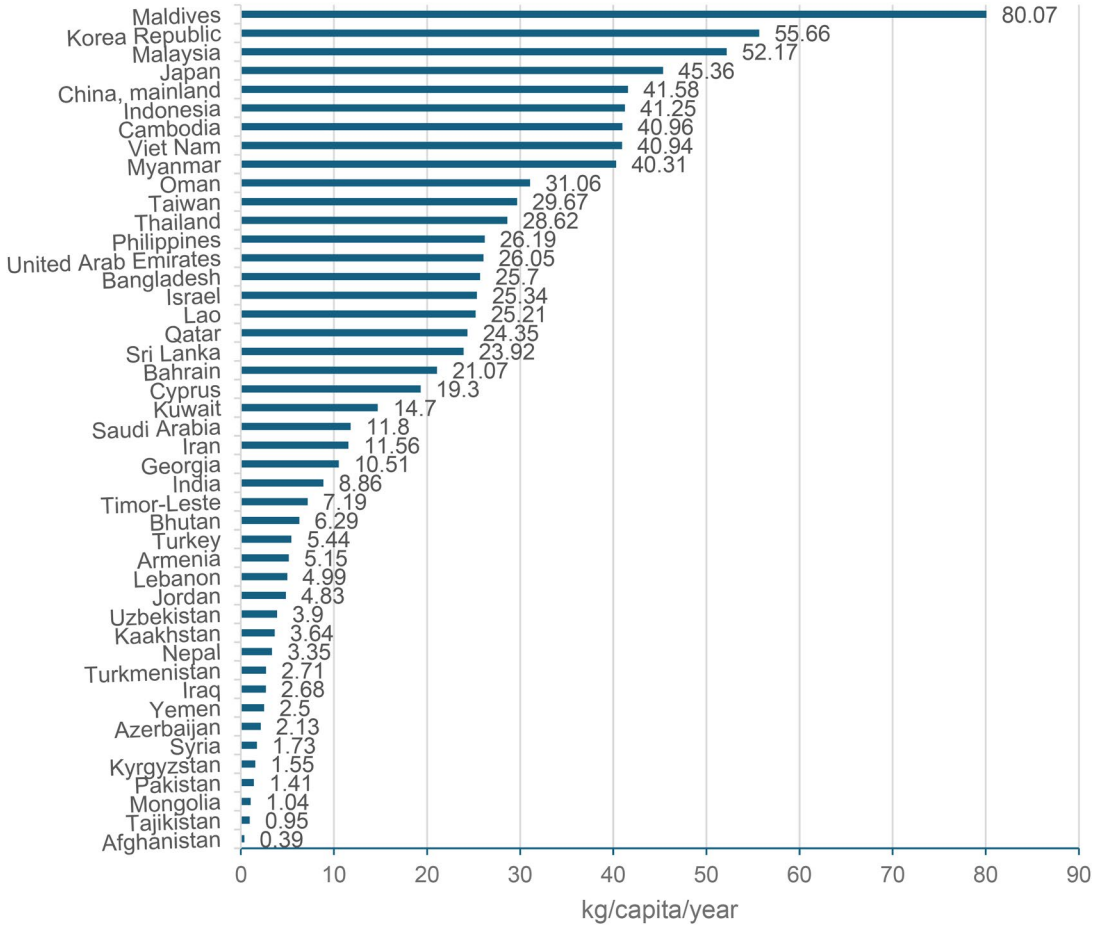

Figure 4. Apparent per capita aquatic animal food supply within the Asian region (values given in kg/capita/year on a live weight equivalent basis; FAO 2024b).

(27.47%), Korea Republic (25.81%), Japan (25.22%), and China (mainland, 20.02%); the contribution of animal proteins derived from aquatic meat products surpassing that derived from terrestrial meats in the Indonesia, Myanmar, Cambodia, Sri Lanka, Bangladesh, and the Maldives (Table 6).

The supply of aquatic animal foods increased significantly within 23 countries in the region from 2010 to 2020, including Afghanistan (0.12 top 0.39 kg/capita/year; population growth 3.20%/year), Armenia (2.62 to 5.15 kg/capita/year; population growth −0.48%/year), Bahrain (20.76 to 21.07 kg/capita/year; population growth −0.37%/year), Bangladesh (19.88 to 25.70 kg/capita/year; population growth 1.20%/year), Cambodia (36.14 to 40.96 kg/capita/year; population growth 1.30%/year), China (mainland, 32.46 to 41.58 kg/capita/year; population growth 0.47%/year), Georgia (9.89 to 10.51 kg/capita/year; population growth −0.20%/year), India (5.56 to 8.86 kg/capita/year; population growth 1.11%/year), Indonesia (27.70 to 41.25 kg/capita/year; population growth 1.02%/year), Iran (8.50 to 11.56 kg/capita/year; population growth 1.35%/year), Israel (22.34 to 25.34 kg/capita/year; population growth 1.76%/year), Lao (17.97 to 25.21 kg/capita/year; population growth 1.46%/year), Mongolia (0.62 to 1.04 kg/capita/year; population growth 1.93%/year), Nepal (1.99 to 3.35 kg/capita/year; population growth 0.98%/year), Oman (28.94 to 31.06 kg/capita/year; population growth 3.93%/year), Qatar (23.37 to 24.35 kg/capita/year; population growth - no data), Saudi Arabia (10.50 to 11.80 kg/capita/year; population growth 1.79%/year), Tajikistan (0.37 to 0.95 kg/capita/year; population growth 2.25%/year), Thailand (24.30 to 28.62 kg/capita/year; population growth 0.41%/year), Timor-Leste (5.16 to 7.19 kg/capita/year; population growth 1.75%/year), United Arab Emirates (24.75 to 26.05 kg/capita/year; population growth 0.90%/year), Uzbekistan (0.52 to 3.90 kg/capita/year; population growth 1.60%/year), and Viet Nam (33.84 to 40.94 kg/capita/year; population growth 0.97%/year; FAO 2024b).

By contrast, aquatic animal food supply decreased in 21 countries with the region, including Azerbaijan (2.20 to 2.13 kg/capita/year; population growth 0.96%/year), Bhutan (6.38 to 6.29 kg/capita/year; population growth

0.48%/year), Cyprus (22.11 to 19.30 kg/capita/year; population growth 0.86%/year), Iraq (3.08 to 2.68 kg/capita/year; population growth 2.98%/year), Japan (52.89 to 45.36 kg/capita/year; population growth −0.27%/year), Jordan (6.26 to 4.83 kg/capita/year; population growth 4.15%/year), Kazakhstan (5.07 to 3.64 kg/capita/year; population growth 1.29%/year), Korea Republic (57.54 to 55.66 kg/capita/year; population growth 0.50%/year), Kuwait (14.92 to 14.70 kg/capita/year; population growth 3.15%/year), Kyrgyzstan (2.06 to 1.55 kg/capita/year; population growth 1.59%/year), Lebanon (10.52 to 4.99 kg/capita/year; population growth 0.79%/year), Malaysia (59.88 to 52.17 kg/capita/year; population growth 1.40%/year), Maldives (172.95 to 80.07 kg/capita/year; population growth 3.14%/year), Myanmar (45.31 to 40.31 kg/capita/year; population growth 0.77%/year), Pakistan (1.74 to 1.41 kg/capita/year; population growth 1.62%/year), Philippines (33.30 to 26.19 kg/capita/year; population growth 1.68%/year), Sri Lanka (25.45 to 23.92 kg/capita/year; population growth 0.46%/year), Syria (3.05 to 1.73 kg/capita/year; population growth −0.08%/year), Taiwan (30.59 to 29.67 kg/capita/year; population growth 0.29%/year), Turkey (6.77 to 5.44 kg/capita/year; population growth 1.29%/year), Turkmenistan (3.72 to 2.71 kg/capita/year; population growth 1.68%/year), and Yemen (2.78 to 2.50 kg/capita/year; population growth 2.61%/year; FAO 2024b).

Aquatic animal foods supplied over 20% of total animal protein supply within 14 countries in the region, with a combined population of 2.47 billion people or about 52.41% of the total Asian population in 2022 (Table 6; FAO 2024b); aquatic animal food products such as dried small fish being one of the cheapest sources of animal protein in the Asian region (Belton et al. 2022). Interestingly, whilst terrestrial meats were the main source of animal protein in most Asian countries, in some countries milk proteins dominated animal protein supply, including India, Bhutan, Bangladesh, Uzbekistan, Turkey, Kyrgyzstan, Pakistan, Syria, and Afghanistan (Table 6). Moreover, although on a regional basis sugars and sweeteners contributed less than 6.49% of total energy supply within the region (Table 2), several countries reported high consumption levels; including Lebanon (16.10% total food calories), Thailand (15.04%), Jordan (14.63%), Bahrain (13.72%), Pakistan (13.63%), Korea Republic (13.80%), Malaysia (13.39%), Georgia (12.39%), Yemen (11.90%), Sri Lanka (11.60%), Indonesia (10.81%), Iran (10.45%), Japan (10.32%; FAO 2024b).

Europe

Table 7 shows total apparent animal protein supply in 38 countries within the European region in 2022 (FAO 2024b) and Figure 5 shows the reported per capita supply (kg/capita/year) of aquatic animal food products within the countries of the region in 2022. In contrast to the Asian region, aquatic meat products contributed modestly to total animal protein supply (mean 8.96%), with the highest level reported in Iceland (24.12%), followed by Norway (20.26%), Portugal (17.26%), Malta (14.82%), Spain (14.77%), Moldova Republic (12.02%), Sweden (12.00%), and Italy (11.39%).

Aquatic animal food supply within the region was mixed, with 18 major countries showing a decrease in supply and 20 showing an increase in supply between 2010 and 2022. Countries which showed a decrease in supply included Belarus (16.43 to 11.91 kg/capita/year; population growth −0.17%/year), Belgium (25.56 to 24.04 kg/capita/year; population growth 0.58%/year), Finland (35.01 to 31.84 kg/capita/year; population growth 0.27%/year), France (35.33 to 33.56 kg/capita/year; population growth 0.29%/year), Germany (14.51 to 13.16 kg/capita/year; population growth 0.21%/year), Iceland (90.22 to 87.10 kg/capita/year; population growth 1.33%/year), Ireland (22.66 to 19.93 kg/capita/year; population growth 0.87%/year), Latvia (27.81 to 24.91 kg/capita/year; population growth −1.05%/year), Lithuania (33.55 to 29.59 kg/capita/year; population growth −1.10%/year), Malta (31.71 to 30.37 kg/capita/year; population growth 2.03%/year), Netherlands (24.44 to 19.66 kg/capita/year; population growth 0.46%/year), Norway (54.18 to 49.87 kg/capita/year; population growth 0.88%/year), Poland (11.69 to 10.84 kg/capita/year; population growth 0.27%/year), Portugal (57.16 to 54.33 kg/capita/year; −0.25%/year), Spain (42.89 to 40.05 kg/capita/year; population growth 0.17%/year),Sweden (31.16 to 30.63 kg/capita/year; population growth 0.98%/year), Switzerland (18.13 to 16.71 kg/capita/year; population growth 0.93%/year), and the UK (19.59 to 18.01 kg/capita/year; 0.61%/year; FAO 2024b).

In contrast, countries which showed an increase in aquatic animal food supply from 2010 to 2022 included Albania (6.19 to 8.51 kg/capita/year; population growth −0.21%/year), Austria (13.61 to 14.43 kg/capita/year; population growth 0.56%/Year), Bosnia & Herzegovina (5.42 to 5.77 kg/capita/year; population growth −1.36%/year), Bulgaria (6.31 to 7.32 kg/capita/year; population growth −0.94%/year), Croatia (17.87 to 20.34 kg/capita/year; population growth −0.67%/year), Czechia (9.73 to 10.68 kg/capita/year; population growth 0.02%/year), Estonia (12.05 to 13.10 kg/capita/year; −0.03%/year), Greece (18.92 to 19.36 kg/capita/year; −0.05%/year), Hungary (5.31 to 6.17 kg/capita/year; −0.016%/year), Italy (27.24 to 29.62 kg/capita/year; −0.11%/year), Luxembourg (29.44 to 31.11 kg/capita/year; 2.06%/year), Moldova Republic (13.98 to

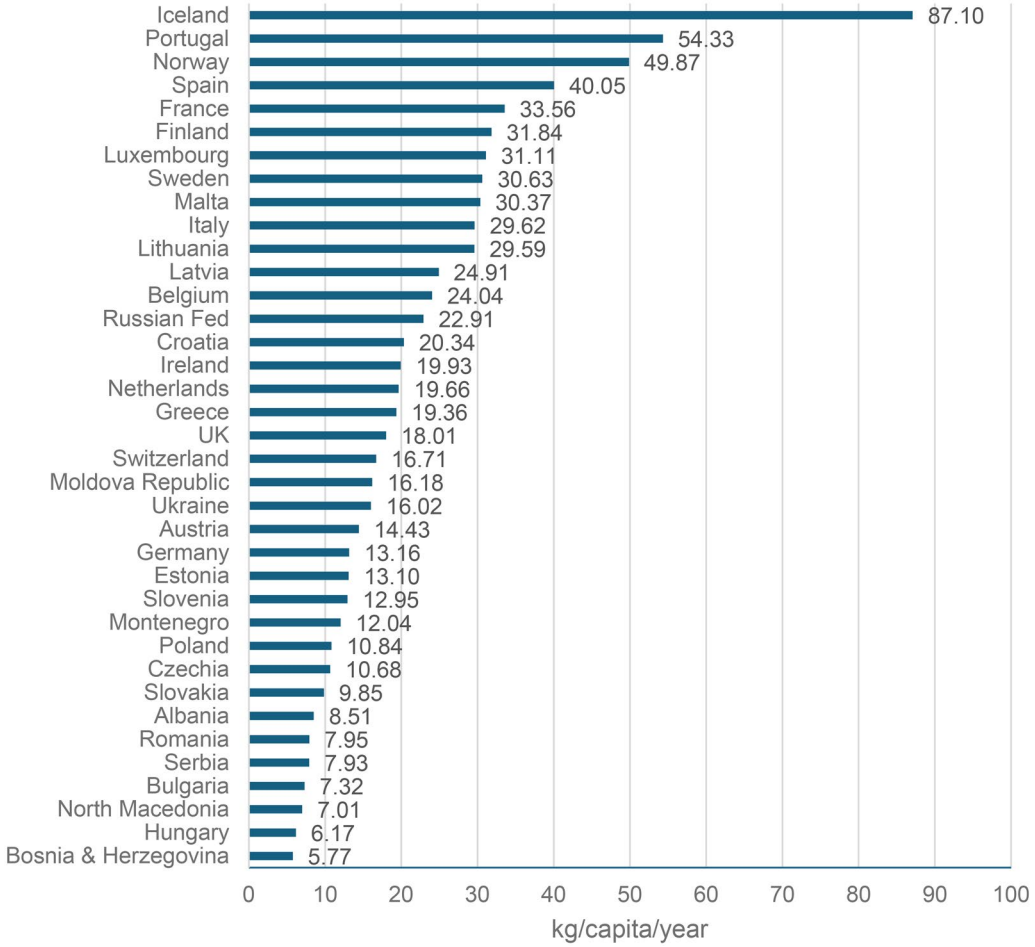

Figure 5. Apparent per capita aquatic animal food supply within the European region (values given in kg/capita/year on a live weight equivalent basis; FAO 2024b).

16.18 kg/capita/year; population growth −1.13%/year), Montenegro (10.49 to 12.04 kg/capita/year; population growth −0.05%/year), North Macedonia (5.58 to 7.01 kg/capita/year; population growth < −0.01%/year), Romania (6.82 to 7.95 kg/capita/year; population growth −0.28%/year), Russian Federation (22.62 to 22.91 kg/capita/year; population growth 0.085%/year), Serbia (7.21 to 7.93 kg/capita/year; −0.48%/year), Slovakia (8.00 to 9.85 kg/capita/year; population growth 0.37%/year), Slovenia (11.14 to 12.95 kg/capita/year; population growth 0.25%/year), and the Ukraine (13.64 to 16.02 kg/capita/year; population growth −1.16%/year; FAO 2024b).

Within Europe, Iceland (24.12%) and Norway (20.26%) were the only two countries where aquatic animal foods supplied more than 20% of animal protein supply (Table 7; FAO 2024b). Moreover, whilst terrestrial meat products constituted the main source of animal protein within most European countries, milk proteins (includes bacterial fermented milk products such as yogurts) served as the main source of animal protein in Albania, Belgium, Estonia, Finland, Germany, Netherlands, Switzerland. Moreover, the consumption of sugars and sweeteners was generally high (mean 10.86% of total energy supply), with elevated levels reported in the Republic of Moldova (14.05%), Malta (13.77%), Poland (13.49%), Croatia (12.90%), Hungary (12.86%), Belgium (12.76%), Germany (12.68%), and the Netherlands (12.58%; FAO 2024b).

Oceania

Table 8 shows total apparent animal protein supply in 12 countries within Oceania in 2022 and Figure 6 shows the reported per capita supply (kg/capita/year) of aquatic animal food products within the countries of the region in 2022. The contribution of aquatic animal food products to total animal protein supply varied widely in the region, with highest levels reported in the Soloman Islands (56.84%), Kiribati (51.20%), Vanuatu (31.79%), Micronesia (30.96%), and Fiji (19.15%), and the lowest values reported in Papua New Guinea (7.22%), Australia (8.06%), and New Zealand (10.62%; FAO 2024b).

In marked contrast to all other geographical regions, aquatic animal food supply decreased on a

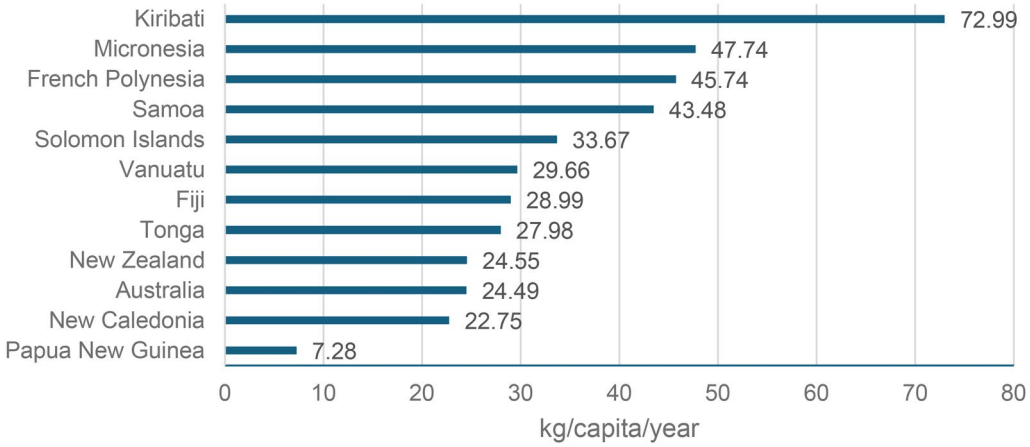

Figure 6. Apparent per capita aquatic animal food supply within Oceania (values given in kg/capita/year on a live weight equivalent basis; FAO 2024b).

per capita basis from 2010 to 2022 within all countries in Oceania, including Australia (27.98 to 24.49 kg/capita/year; population growth 1.45%/year), Fiji (31.60 to 28.99 kg/capita/year; population growth 0.22%/year), French Polynesia (48.08 to 45.74 kg/capita/year; population growth 0.64%/year), Kiribati (73.21 to 72.99 kg/capita/year; population growth 1.64%/year), Micronesia (48.93 to 47.74 kg/capita/year; population growth 0.62%/year), New Caledonia (25.71 to 22.75 kg/capita/year; population growth 0.87%/year), New Zealand (26.27 to 24.55 kg/capita/year; population growth 1.48%/year), Papua New Guinea (15.63 to 7.28 kg/capita/year; population growth 2.45%/year), Samoa (46.41 to 43.48 kg/capita/year; population growth 1.11%/year), Solomon Islands (36.90 to 33.67 kg/capita/year; population growth 2.47%/year), Tonga (28.48 to 27.98 kg/capita/year; population growth 0.45%/year), and Vanuatu (32.80 to 29.46 kg/capita/year; population growth 2.41%/year; FAO 2024b).

Notwithstanding the above decrease, aquatic animal foods supplied over 20% of total animal protein supply within half the countries in the region, including Kiribati (51.2% total animal protein supply), Micronesia (30.96%), Solomon Islands (56.84%), and Vanuatu (31.79%; Table 8; FAO 2024b). Moreover, the consumption of sugars and sweeteners in Oceania was relatively high (mean 11.19% of total energy supply), with higher levels reported in the New Zealand (15.22%), Fiji (14.41%), Kiribati (14.21%), Australia (12.19%), and Samoa (11.39%; FAO 2024b).

Concluding remarks

Although the apparent availability of aquatic animal food products has increased globally from 18.47 kg/capita/year in 2010 to 20.24 kg/capita/year in 2022, this increase was not universal. In Africa it decreased from 10.05 to 8.92 kg/capita/year and in Oceania decreased from 25.83 to 21.35 kg/capita/year (Table 3). Moreover, very large differences also existed between individual countries in their consumption of aquatic food products; in general, these differences usually reflecting in-country aquatic food seasonal availability and cost, consumer income level, culinary traditions and preferences, existence of a domestic capture fisheries and/or aquaculture sector, and the existence or not of marketing campaigns aimed at promoting the consumption of aquatic food products from a nutritional and/or health perspective (Samoggia and Castellini 2018; Golden et al. 2021; Cai and Leung 2022; FAO 2024a). Moreover, what is particularly worrisome is the overall decline in the relative contribution of aquatic food products to total animal protein supply both regionally and globally for over a decade (Table 2), and the fact that global production and consumption needs to be both stimulated and encouraged (Tacon and Shumway 2024).

Although small-sized dried fish usually represent one of the least expensive sources of animal protein and essential nutrients in most Asian and African communities (Belton et al. 2022; Jayasekara et al. 2022), the aquaculture and fisheries sectors have usually been fragmented and divided in their approach to encourage the increased domestic consumption of aquatic food products. Clearly it is time for the aquaculture and capture fisheries sector to combine resources and work together and better promote their aquatic food products from a nutritional and health perspective for all consumers (Thilsted et al. 2016; Golden et al. 2021; Koehn et al. 2022).

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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