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Angaben zur Veröffentlichung / Publication details:

Keck, Markus. 2015. "Contributions and challenges of Dhaka's food system: the case of fish provision." In *Urban development challenges, risks and resilience in Asian mega cities*, edited by R. B. Singh, 469–88. Tokyo: Springer.
https://doi.org/10.1007/978-4-431-55043-3_24.

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Contributions and Challenges of Dhaka's Food System: The Case of Fish Provision

Markus Keck

Abstract The food system of Bangladesh is currently producing a wide range of contradictions: Domestic food production was increased at unprecedented rates, but not without ecologically damaging side effects. Supply chains work efficient insofar as enough food is transported to the consumers. Nevertheless, stark discrepancies can be detected between the involved actors, from single dominant market makers to the masses of day labourers who can hardly make a living. And even though enough amounts of food are supplied to consumer markets, food security is far from being attained. This chapter sheds light on the extent of dysfunctionalities of Bangladesh's food system from a sustainability perspective by focussing on the capital city of Dhaka. The case of fish provision is taken to discuss present day challenges of the mega city in terms of food production, supply and food security. In the first part, I will discuss recent developments in national fish production and outline the structure of the supply and value chain for fresh fish. In the second part, I focus on the local food market of Dhaka and debate available amounts and seasonally fluctuating prices. In the last part, I will bring together the national and the local perspective to provide proposals for necessary future re-adjustments.

Keywords Bangladesh • Dhaka • Fish consumption • Food security • Mega city • Value chain

24.1 Global Urbanisation and Food Security

Despite a steady growth of agricultural production around the world, and despite a tremendous increase in the international trade of edibles, global food security is far from being attained. Today, 15 % of the population in the Global South are still undernourished (FAO 2011). Moreover, decades of deregulation and privatization policies together with innovations in the financial sector have led to an unprecedented volatilization of capital to which food prices are particularly

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sensitive (Altvater 2005; Ruel et al. 2010). In addition to that, global environmental change has unforeseeable impacts on food systems worldwide (Ingram et al. 2010). There is mounting evidence that with ongoing urbanisation hunger shifts from rural to urban areas (Ravallion et al. 2007; Ruel et al. 2010). In some countries of the Global South, the incidence of chronic food insecurity is already higher in cities than in rural areas (Cohen and Garrett 2010). This is due to the fact that urban households primarily rely on their income for access to food (Sen 1981; Watts and Bohle 1993). In times of economic, political or ecological crises poor urban households suffer from decreasing purchasing power, as prices of food commodities increase while their income does not (Bohle and Adhikari 2002; Pryer 2003). Urban food security, in turn, is largely a matter of sufficient production and undisturbed food supply chains on one side and societies' class structure and people's access to the labour market on the other.

Drawing on recent research in Dhaka, Bangladesh, in this contribution, the present-day challenges of the urban food system are discussed. National food production figures are presented, the functioning of rural–urban supply chains is explained, and the current situation of food insecurity in the mega city is depicted. Three major findings are drawn from the empirical data: First, it is the resource and technology intensive inland water fisheries in ponds and ditches that are today's major source of fish supply in Dhaka. The overall situation in terms of availability of fish has never been better, albeit with all negative consequences for ground water, soils and biodiversity. Second, as the value chain analysis will show, it is large-scale rural intermediaries who possess power to dominate price building mechanisms. In harsh contrast to their dominant position, the labourers who literally carry the food for the entire city on their shoulders have to face a heavy burden that is constituted by demanding work, extremely low earnings, irregular time slots for taking rest, and miserable living conditions. Third, the mega city of Dhaka is well supplied with fish. Nevertheless, food security is far from being guaranteed, because the majority of fish is out of reach for the urban poor. At that, fish price dynamics indicate that a season of chronic food insecurity (*monga*) is not a phenomenon of rural areas in Bangladesh alone. An urban *monga* in Dhaka can be identified that arises from an increase in food prices by simultaneously invariable earnings and income that most severely threatens the low income groups and the urban poor. These findings call for a reform of urban food security schemes in the capital city of Bangladesh.

24.2 The Mega City of Dhaka

Without doubt, the city of Dhaka has seen ups and downs in her more than 400 years history. The French traveler and trade pioneer Jean-Baptiste Tavernier (1676 [2004]), who visited Dhaka in 1666, described a burgeoning city that was provincial capital in the Mughal empire, accommodated a prospering muslin industry and extended to a length of two leagues (almost 10 km) along the bank of Buriganga

river. At that time, the city was said to comprise approximately 200,000 people (Islam 2005).¹ Approximately 200 years later, after the East India Company had taken the city over, the commercial resident James Taylor (1840 [2011]) described Dhaka as being largely decayed with most of the former city area overgrown with jungle and swamps. In 1872, the first census was conducted that recorded for Dhaka a total population of 69,212 people (Siddiqui et al. 2000).

From 1901 to 1911 Dhaka's population size increased from 104,000 to 154,000 people at an average annual growth rate of 4.0 % due to Dhaka's new status as provincial capital of Eastern Bengal and Assam. After the annulation of the partition of Bengal in 1911, however, Dhaka's growth rate decelerated. Massive migration inflows came along with the partition of the subcontinent and led to a regaining growth rate of 3.5 % in between 1941 and 1951 (Islam 2005) and to a rate of 5.2 % from 1951 to 1961. After independence, Dhaka² became one of the fastest growing cities worldwide. Her population growth reached a peak from 1961 to 1974 with an average annual rate of 8.9 %. At that time, the city's population jumped from 557,000 to 1.680 million people, mainly due to the political violence in the aftermath of Bangladesh's declared independence in 1971. Afterwards, the city's growth rate slowly decelerated from 5.6 % (1974–1981) to 4.5 % (1981–1991). Within this time period, Dhaka City reached a population size of 3.839 million and the metropolitan area even grew to 6.844 million people (Khatun 2003; Islam 2005). The census of 2001 estimated the population of Dhaka City to be 5.334 million and that of the Metropolitan Area of Dhaka to be 9.673 million (BBS 2007). The average annual growth rate of Dhaka City from 1991 to 2001 was 3.5 %. For the year 2010, Islam (2010) estimates Dhaka to accommodate a total population of 14.230 million people (Fig. 24.1).

Like other megacities Dhaka is today marked by extreme contrasts in close proximity. Dhaka is the seat of government, the centre of political power, and—with most of the garment industry concentrated in and around the metropolis—the workshop of Bangladesh's export-oriented economy. With its vast university

¹ Some historians even speak of a population figure of 900,000 for Dhaka of the 1700s. However, in this regard, I follow other well-known urban scientists who criticize this figure to be unrealistic (Islam 2005, p. 7).

² From 1974 onwards, it is distinguished between the population of "Dhaka City" and the population of the "Metropolitan Area of Dhaka". Dhaka City refers to the area of the Dhaka City Corporation (DCC) that comprises 145 km² and extends from Buriganga river in the south, to Mirpur in the north-west, and Tongi in the north (Islam 2005, p. 8). The Metropolitan Area of Dhaka changes over time. In 1974, it refers to the Dhaka Metropolitan Area (DMA) that covers a territory of 306 km² including DCC (ibid). From 1981 onwards it refers to Dhaka Statistical Metropolitan Area (DSMA) which covers an area of 797 km² in 1981 and an area of 1,353 km² in the following years. The DSMA includes the DMA, the DCC, and the municipalities of Narayanganj and Munshiganj in the south east, Savar in the west, as well as Tongi and Gazipur in the north (ibid). For 2010, "Megacity of Dhaka" is introduced as additional territorial reference category which is congruent with the Dhaka Metropolitan Development Plan (DMDP) and equals an area of 1,528 km² (Islam 2010). In order to avoid misunderstandings, all figures on growth rates refer to the DCC area only.

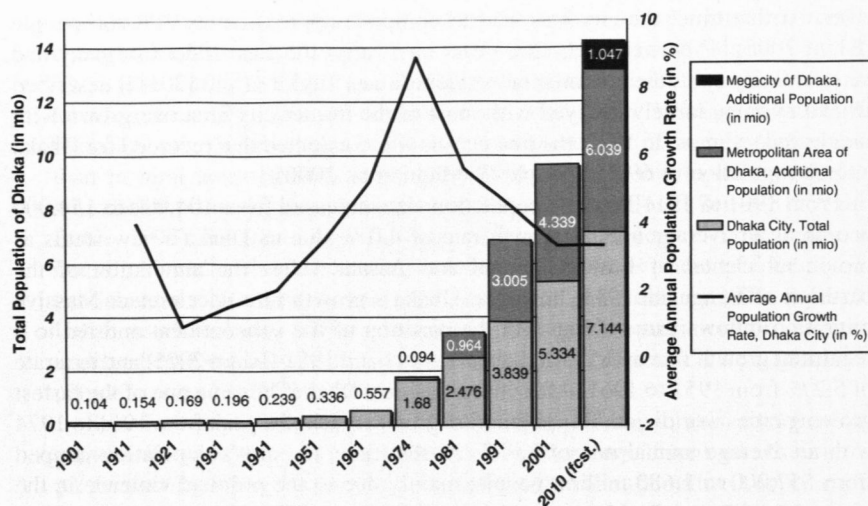


Fig. 24.1 The Population Growth of Dhaka (1901–2010). *Source:* Khatun (2003), Islam (2005), BBS (2007), Islam (2010). *Notes:* (1) Population figures of “Dhaka City, Total Population (in mio)” refer to Dhaka Municipal resp. Dhaka City Corporation (DCC) area. (2) Population figures of “Metropolitan Area of Dhaka, Additional Population (in mio)” are calculated by taking a specific reference area and subtracting the resp. Figures that refer to the DCC area. The 1974 figure refers to Dhaka Metropolitan Area (DMA). The 1981, 1991 and 2001 figures as well as the 2010 forecast refer to Dhaka Statistical Metropolitan Area (DSMA) in the size of the respective year. (3) The 2010 population forecast of “Megacity of Dhaka, Additional Population (in mio)” refers to the Dhaka Metropolitan Development Plan (DMDP) area

campus and a number of private universities, with its museums, exhibitions and art performances Dhaka is also the cultural heart of the country. Despite this centrality, however, 30–40 % of the population of the city live in marginal, partly illegal settlements under conditions of extreme poverty (World Bank 2007). Providing basic amenities like drinking water and sewerage systems for all inhabitants is beyond the capacities and will of the city’s administration (Siddiqui et al. 2010). How much food is necessary to meet the daily demand of a megacity like Dhaka? Where do all the food supplies come from? What does the supply chain look like? Who is profiteering from the current system? And who bears the costs?

In this chapter the case of fish provision is taken to discuss present day challenges of mega cities in terms of food supply and food security. In the first part, I will discuss recent developments in national fish production and outline the structure of the value chain for fresh fish. In the second part, I focus on the local food market of Dhaka to debate available amounts and seasonally fluctuating prices. In the last part, I will bring together the national and the local perspective to provide recommendations for necessary future re-adjustments.

This study was guided by the triangulation of qualitative and quantitative research methods. Qualitative methods used were observations, semi-structured interviews and participatory techniques. Repeated interviews were conducted

with 20 fish wholesalers; 18 actors at various positions along the supply chain, such as pond owners, intermediaries and retailers; and 28 experts from various governmental, non-governmental and academic backgrounds. The major quantitative methods employed were a survey of all food wholesale markets in Dhaka in 2009 ($n=87$) and a standardized survey with 242 fish wholesalers in 9 out of 13 wholesale markets within the area of Dhaka City Corporation³ (DCC), which was conducted between November 2009 and January 2010 (see Keck 2012 for more details).

24.3 Fisheries in Bangladesh

According to official data, 1.5 million people are involved in fisheries in Bangladesh, today. As compared to agriculture, fisheries is a much less significant economic sector contributing (in 2006) 4.2 % to the national GDP (MoA 2007) and providing (in 1999) employment to 3.6 % of economically active persons in agriculture (FAO 1999). Nevertheless, fishing plays a significant role in Bangladesh's food system by contributing 62.4 % of the nation's animal and 13.6 % of the total protein intake (BBS 2007).

The vast and diverse inland waters of Bangladesh are inhabited by 260 species of finfish belonging to 55 families, and by 25 species of prawn. Another 475 species of finfish and 38 shrimp species occur in the marine and brackish waters of the Bay of Bengal (Rahman 1997). The total inland water area is estimated to be roughly 4.6 million ha. This area comprises, on the one hand, man-made formations of ponds and ditches with a total area of 305,025 ha, coastal shrimp, prawn and fish farms with a total size of 217,877 ha, and Kaptai Lake, a reservoir that was dammed up for hydropower purposes in the Hill Tracts in Khagrachari with a size of 68,800 ha. On the other hand, it comprises natural formations such as the Sundarbans, a huge mangrove forest with an area of 177,700 ha, ox-bow lakes (*baors*) with a total area of 5,488 ha, depressions which retain water throughout the year (*beels*) with a total area of 114,161 ha, innumerable rivers and estuaries with a total area of 853,863 ha, and flood lands (flood plains and seasonally flooded depressions (*haors*)) in a total size of 2,832,792 ha (Kabir and Amin 2007; DoF 2009). Additionally, Bangladesh commands offshore an Exclusive Economic Zone of 7,853,800 ha (SAU 2011).

Over the last 20 years, Bangladesh's total production of fish shows a significant increase (Fig. 24.2). In the early 1990s (1990–1991 to 1994–1995), the average total annual production amounted to 1.0 million mt (DoF 1993, 2002; Rahman 1997). Until the late 2000s (2004–2005 to 2008–2009) this figure had increased to an amount of roughly 2.5 million mt. For the year 2008–2009, a total production of 2.7 million mt is estimated (DoF 2007, 2009). Over this whole period of time,

³ On 29 November 2011 the government of Bangladesh split the Dhaka City Corporation into two corporations, North and South. This study was finalized before this dissociation.

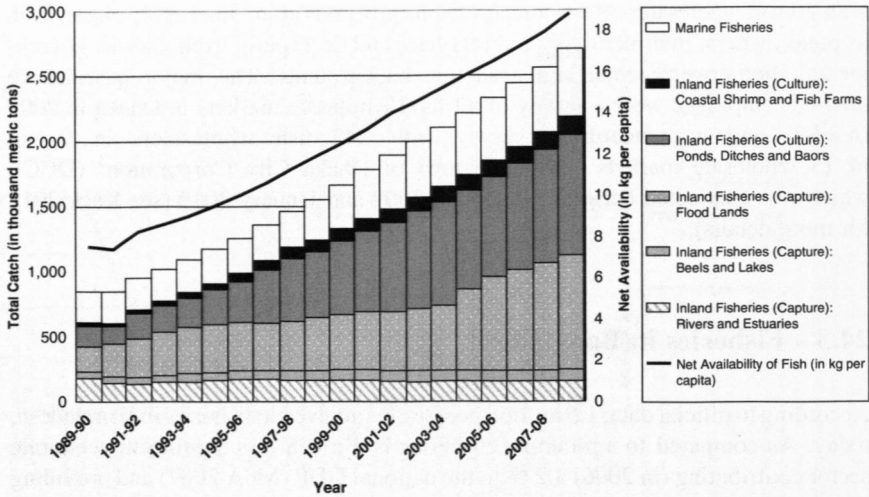


Fig. 24.2 Total Catch and Net Availability of Fish in Bangladesh (1989–2009). *Source:* DoF (1993, 2002, 2007, 2009), MoA (2007), BBS (2011a)

Bangladesh exported fish that amounted to a more or less constant portion of 2.9 %. In real terms, though, this meant an increase from an average amount of 29,700 mt (early 1990s) to an average of 70,800 mt/year (late 2000s). At that, the net availability of fish (total production minus exports) almost doubled within the same period from an average of 8.5 kg to an average of 17.3 kg per person and year. Due to additional import of frozen fish, mainly from Myanmar and India, the factual availability of fish is even higher.

In the early 1990s, the largest proportion of Bangladesh's annual production stemmed with 31.5 % from captures in flood lands, followed by captures in the Bay of Bengal with 24.7 %, and from aquaculture in ponds, ditches and *baors* with 20.2 %. A significant share of 14.4 % came from capture fisheries in rivers and estuaries (incl. Sundarbans), while the share of coastal shrimp and fish farms was with a portion of 3.5 % ranked last, even behind captures in *beels* and Lake Kaptai that made 5.7 %. Within 20 years, all types of capture fisheries showed a downward trend in respect to their individual shares of the total production. Rivers and estuaries (incl. Sundarbans) lost significance most remarkably, falling from 14.4 to 6.3 % until the late 2000s. At the same time, the role of inland and coastal aquaculture increased significantly. The proportion of fish that stems from ponds, ditches and *baors* increased from 20.2 to 33.7 % and that of coastal shrimp and fish farms from 3.5 to 5.4 % (cf. Fig. 24.2).

The dominant share of fish that is consumed in Bangladesh today stems from inland aquaculture in ponds and ditches (without *baors*). In absolute terms, the annual production more than quadruplicated from an average of 203,600 mt in the early 1990s to an average of 821,400 mt in the late 2000s. The increase in the total production resulted in part from an expansion of the total water area from

Table 24.1 Distribution of arising costs, net margin and consumers' expenditure for domestically raised Rui carp by value chain actors

Actors	Activities	Arising costs (in BDT/fish)	Net margin (in BDT/fish)	Consumers' expenditure (in BDT/fish)
Hatchery owner	Production	4.90 (7.4 %)	2.10 (3.4 %)	7.00 (5.4 %)
Fish farmer	Production	39.90 (59.9 %)	20.10 (32.2 %)	60.00 (46.5 %)
<i>Dalal</i>	Marketing	2.50 (3.8 %)	2.50 (4.0 %)	5.00 (3.9 %)
<i>Bepari</i>	Transportation	7.20 (10.8 %)	25.60 (41.0 %)	32.80 (25.4 %)
<i>Arotadar</i>	Marketing	4.60 (6.9 %)	4.60 (7.4 %)	9.20 (7.1 %)
Retailer	Marketing	7.50 (11.3 %)	7.50 (12.0 %)	15.00 (11.6 %)
Total		66.60 (100.0 %)	62.40 (100.0 %)	129.00 (100.0 %)

Source: Estimation based on own survey 2009

Note:

1. Arising costs: Hatchery and fish farmers' costs comprise expenses for land lease, fertilizer, insecticides, lime, post-larvae/fry, water, permanent staff, and seasonal labour, and costs that accrue to fish loss. *Bepari*'s transportation costs comprise expenses for up- and downloading of trucks, fees for toll collection points (Jamuna Bridge, Faricha Ferry Ghat, etc.), labour and fuel, and costs that accrue to fish loss. The marketing costs of *dalal* and *arotadar* comprise business lease and labour, while the marketing costs of retailers comprise stall fees and transportation
2. The net margin is calculated as the difference between purchase and sales price of respective actors less arising costs. The consumers' expenditure is the sum of arising costs and net margins

146,890 ha in 1992–1993 to 305,025 ha in 2008–2009, but also from an intensification of production that increased from an average of 1.4 mt/ha in 1992–1993 to an average of 3.0 mt/ha in 2008–2009 (DoF 1993, cited after Rahman 1997, p. 101; DoF 2009: Table 24.1). The second largest share of Bangladesh's fish consumption stems from inland capture fisheries in flood plains that comprise the largest water area of all sectors. Its average annual catch more than doubled in the same time from 320,400 to 761,500 mt, or from 113 to 269 kg/ha. Today, catch from marine waters are ranked third with an annual amount of 514,600 mt in 2008–2009. Given the vast water area of the Bay of Bengal, its increase in productivity from 32 to 62 kg/ha must be seen to be remarkable. Until today, the bulk of marine catch (456,200 mt or 92.9 %) stems from artisanal fisheries while trawler fisheries are almost negligible. Even though the share of coastal shrimp and fish farms in total production is still small, its production increase from 35,800 mt in the early 1990s to 131,600 mt in the late 2000s is striking. Similar to the case of ponds and ditches, this increase was the result of an expansion of the water area from 108,280 ha in 1992–1993 (DoF 1993; Rahman 1997) to 217,877 ha in 2008–2009 (DoF 2009) and an intensification from an annual catch of 312 kg/ha in 1992–1993 to 668 kg/ha in 2008–2009. With a quantity of 145,600 mt in 2008–2009, it overtook already the amount provided by rivers and estuaries (138,200 mt), that is the only sector that shows a decline of productivity from the mid-1990s onwards (Fig. 24.2). However, the setback in 2002–2003 and 2003–2004 might be an early indication of the limits of coastal shrimp and fish farming that has to be seen. Today, fish from *beels*

amount to at least 79,200 mt, while the Sundabans (18,500 mt), Kaptai Lake (8,600 mt) and *boars* (5,000 mt) are minor fishing grounds (Department of Fisheries DoF 2009), even though fishing was intensified.

From these figures, it becomes clear that fishery in Bangladesh underwent a substantial change in the last 20 years and must be seen as a success story. Without the increase in productivity, the 142 million people of Bangladesh (BBS 2011a) could not be fed. Nonetheless, fishery has its dark side as well. Especially the downward trend in capture fisheries in rivers and estuaries is alarming. This negative development is attributed to many factors, such as pollution through the use of fertilizer and pesticides in agriculture, through industrial effluents especially in large cities, to flood control measures, the erection of large-scale drainage and irrigation systems, and the encroachment of wetlands (Belton et al. 2011; Sultana 2012). All these features led to the destruction of sanctuaries and hinder migration of fish to their breeding grounds. At the same time, fishery itself contributes to this list of negative factors, as the conversion of wetlands into agricultural land (most notably in the Sundarbans) led to a reduction of biodiversity. The growing use of fertilizer, pesticides and antibiotics in pond fisheries led to residues of heavy metals in the soil and groundwater and that has given reason for public health concerns (World Bank 2006).

24.4 The Value Chain for Fish

The major share of fish that is consumed in Bangladesh is carps that are cultivated in ponds and ditches. Thus, the focus of this part is on aquaculture fisheries. Within the value chain⁴ for cultivated carps (mainly Rui, Catla, and Mrigal, but also Silver Carp, Grass Carp, Japanese Carp) hatcheries constitute the primary link. Hatchery owners usually command a number of ponds for keeping brood fish, facilities for fish spawning, egg incubation and the rearing of hatchlings to post-larva stage, ponds for nursing post-larvae to fry, and ponds for rearing fry to fingerlings. In hatcheries, fish reproduction is organized in a controlled environment (Lewis et al. 1996): Female carps are transferred to “mother ponds”, where they get hormonal treatment by which the fish is brought about to spawn (Jhingran and Pullin 1985). The fertilized fish eggs are moved into special incubators where they are hatched under the constant addition of oxygenated water. For rearing post-larvae to fry and fry to fingerlings ponds are limed (that acts as a general pond disinfectant, effectively stops fluctuations of pH, and promotes mineralization), unwanted fish, predatory insects and harmful vegetation is eradicated, and fertilizer (mainly nitrogen, phosphorus, and potassium that enables the suitable production of zooplankton which forms the main food of post-larvae, fry and hatchlings) is added (Jhingran and Pullin 1985).

⁴ Value chains are defined as a “network of organizations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer” (Christopher 1998, p. 15).

The pond culture for raising fingerlings is similarly organized. It relies on natural feed but is supplemented with feed and fertilizer.

Aqua culturists – mostly small scale operators who produce some fish as a supplement to farming or other activities – raise most of their fish until an age of 9 month to 1 year when one exemplar weighs approximately 1 kg.⁵ Then they are sold to the *dalal*. *Dalal* are independent players who do their business on commission on behalf of a *bepari*. The *bepari*, who is also called the “collector” or “agent”, collects the fish and organizes the transportation to Dhaka. Sometimes, local money lender (*mohajan*) provide credit to the *bepari*, who then supplies credit to the *dalal*. Air breathing species like Pangas, Koi or Magur are transported alive in water-filled drums, while the majority of fish is brought in chilled in ice-filled metal boxes or baskets. Most fish reaches Dhaka by truck, where it arrives after a journey of maximally 12 h. At these markets, the fresh fish is sold via commission agents (*arotdars*) in the early morning hours at auction, and is transported by rickshaws or motorized tricycles to the customers, i.e. hawkers who perform door-to-door sale, retailers at kitchen markets, or operators of restaurants and canteens. The major supply chain for fish involves thus the following agents: hatchery owner → fish farmer → *dalal* → *bepari* → *arotdar* → retailer → consumer.

The value chain analysis is performed by taking the example of Rui carp, which is the fish type that is mostly consumed in Dhaka. It is found that 67.3 % of all arising costs are generated at the producers' level, i.e. 7.4 % for nurturing fish in hatcheries and 59.9 % for raising fish in ponds. Due to the small sales amounts of retailers and their comparably high expenses for the rent of their stalls (*venders* at kitchen markets) and bribes (*hawkers*), the marketing costs of retailers are second amounting to 11.3 % of the total arising costs. The costs of commission agents are comparably high, with 6.9 and 3.8 % that accrue to *arotdars* and *dalals* respectively. With 10.8 %, transportation costs of *beparis* are considerable as well. The reason is large quantities of water and ice that are needed in transport in order to keep the fish fresh. It is estimated that drums—used for the transportation of fish—are filled with water to an amount of 75–80 %. Likewise, about one third of the total weight of baskets stems from the ice. It was further found that 41.0 % of the total net margin goes into the *beparis*' pocket that makes them the players who gain most of the current system. Nevertheless, in case of successful management, also aqua culturists are in a position to make considerable net margins that amount to 32.2 %. The retailers follow with 12.0 % of the total net margin (Table 24.1).

Figure 24.3 shows how the customers' expenditure is composed. It can be seen that 51.9 % of the consumers' expenditure accrues until the fish farm's gate, of which 33.2 % are costs for cultivation and 18.8 % are the net margin of hatchery owners and fish farmers. By leaving involved costs aside, the greatest share of the consumers' price arises in the hands of the *bepari* with 23.9 %, followed by the pond owner with

⁵ Nonetheless, also bigger fishes are available in the market. These are usually older fishes that were used for reproduction purposes. Carps become sexually mature not before the age of 3–4 years. These examples are usually larger and more expensive.

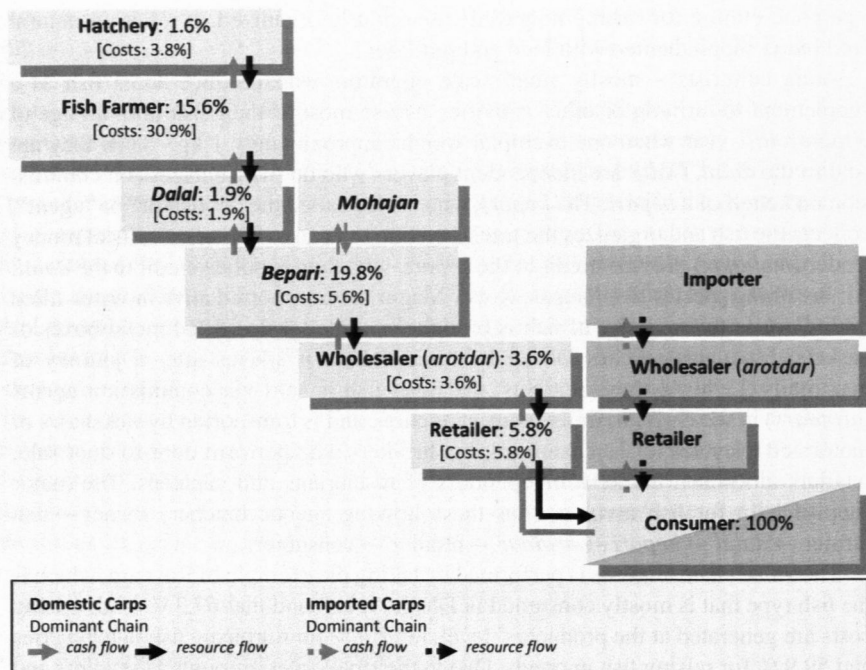


Fig. 24.3 The Value Chain for Domestic Carps to Dhaka. *Source:* Own survey 2009

17.1 % and the retailer with 5.8 %. In some distance follow the *arotdars* with 3.6 %, the *dalals* with 1.9 % and the hatchery owners with 1.6 %. Thus, it is the *beparis* and the fish farmer who are the dominant players in the fish chain. However, for the case of fish farmers it must be added that they bear a higher risk of making loss as compared to *beparis* who are embedded in multiple networks to various supply regions by which they can assure a constant business despite local or regional supply bottlenecks.

Beside the market makers mentioned above there are countless day- and night labourers involved in Dhaka's fish provision system. In contrast to *beparis'* extensive options for profit making, the labourers have to bear the hardest part—whether in rural areas, on trucks or at urban markets. In Dhaka's wholesale markets e.g. the labourers' work day starts around 1 a.m. when the first trucks approach the city to disembark their perishable freight. Night labourers, who are responsible for the unloading of the metal boxes, drums and baskets with frozen and fresh fish, usually sleep and live on the markets—often under miserable conditions. In the absence of motorized vehicles or conveyor belts, they use rickshaw vans and muscle power to transport the fish from the trucks to the merchants' vending sites. Huge ice blocks are delivered from nearby factories and the workers crush them manually to put them on the piled fish. Until the merchants arrive around 4 a.m., it is the night labourers' responsibility to guard the loads. When the market opens

(usually fish wholesaling takes place between 4:30 and 8:30 a.m.), some lucky ones are asked to give a hand to the merchants and their sales teams.

Usually the night workers organize themselves, with a leader (*sordar*) who gives instructions. He also collects the service charges from the wholesalers when the market is closed and distributes the earnings among the workers. They are paid per weight and earn on average about 100 BDT (that equals about 1.00 EUR) per night. As such they have to face not only a highly demanding work, but also extremely low earnings and irregular time slots for taking rest. All these factors add to their overstrained physical condition and are reflected in the generally poor shape of the workers' bodies which makes them easily distinguishable from the merchants and their staff.

24.5 Dhaka's Fish Market

According to own survey data, today there are approximately 4,400 traders running businesses in the 87 food wholesale markets located in Dhaka's centre, i.e. the area of DCC. Taken together they supply more than 9,000 tons of food every single day. By taking the total amount of 707 mt of fresh fish that is sold in Dhaka City every day and by dividing this amount by the city's estimated total population of 7,144 million people in 2010, it turns out that there are 99 g of fish available per capita and day. According to official data, the average quantity of fish intake per person and day for urban areas in Bangladesh in 2010 is 59.9 g (BBS 2011b). Accordingly, the availability of fish in Dhaka equals 165.3 % of the national urban average. By taking the percentage share of different food types into consideration (Fig. 24.4), it can be seen that in Dhaka the consumption of expensive food items (fish, meat, fruits and edible oil) play a more prominent role as compared to other cities in Bangladesh. Similarly, the consumption of rice is lower in Dhaka than in other urban areas. These figures are a clear indicator for the existence of numerous middle

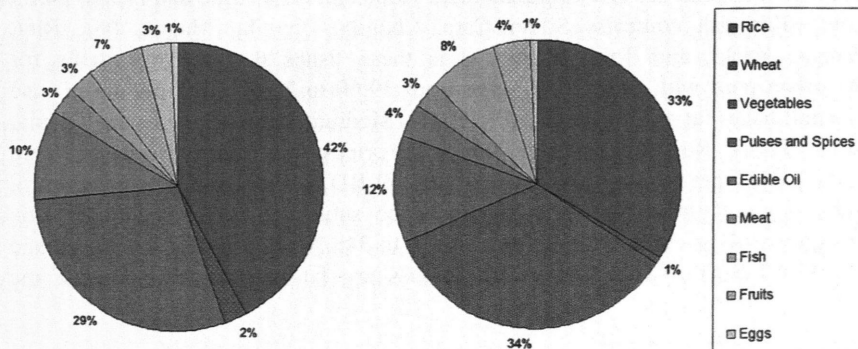


Fig. 24.4 Food Consumption in Urban Areas and in Dhaka (from left to right). Source: Calculation for 2010, based on BBS (2007): p. 45. Source: Own survey 2009–2010

Table 24.2 Average annual fish wholesale prices in Dhaka (2009–2010)

Low value fish	Average wholesale price for small fishes (in BDT per kg)	Medium value fish	Average wholesale price for small fishes (in BDT per kg)	High and special value fish	Average wholesale price for small fishes (in BDT per kg)
Silver carp	39.60	Tilapia	84.90	Chingri	149.70
Chanda	45.00	Mola	84.90	Shol	165.00
Chapila	45.00	Punti	90.00	Koral	182.50
Magur	52.50	Rui	110.0	Hilsha	201.30
Poa	58.70	Tengra	113.80	Boal	236.70
Rita	63.30	Koi	130.20	Shing	346.70
Pangas	67.10				
Kaski	68.90				
Taki	70.00				

Source: Own survey 2009–2010

Note:

1. Average annual prices are taken to even the price variability of the individual fish types throughout the year in order to get more general figures. The average annual wholesale price is calculated by the formula: $P\bar{O} = [P(th)*th] + [P(tl)*tl]/12$. $P(th)$ is the price during high season, that is multiplied by the number of months in which this season is prevalent (th). $P(tl)$ is the price during low season, that is similarly multiplied by the number of months in which this season lasts (tl). The result is then divided by 12 month

2. In the course of the survey, the currency rate for 100 BDT changed from 0.973 EUR (15.12.2009) to 1.011 EUR (01.01.2010) to 0.984 EUR (15.01.2010) (cf. <http://www.bankenverband.de/service/waehrungsrechner>). By taking the mean of these three, the average rate in the time of the survey was 0.989 EUR

and upper class people in Dhaka whose higher incomes allow them to substitute staples like rice by superior and more expensive food.

Fish can be categorized according to price in order to reveal a more detailed picture on the present situation of food consumption of different socio-economic sections in Dhaka. Going by their price levels, three categories of fish are distinguished, that are low value, medium value and high value fish (Table 24.2). Low value fish comprise Silver Carp, Chanda, Chapila, Magur, Poa, Rita, Pangas, Kaski, and Taki. If any, it is these fishes that are affordable for the urban poor with prices that range from 39.60 to 70.00 BDT per kg in case of small fishes (at an average of 56.70 BDT). Medium value fish types are Tilapia, Mola, Punti, Rui, Tengra and Koi with prices that range from 84.90 to 130.20 BDT per kg (at an average of 102.40 BDT). Finally, Chingri (shrimp), Shol, Koral, Hilsha, Boal and Shing can be subsumed under the high value category with prices that range from 149.70 to 346.70 BDT per kg (at an average of 213.60 BDT).⁶ These latter fish species are far beyond the scope of the

⁶ For this study, it was consciously decided to take the native fish names as they are prevalent in Bangladesh. Anyone who is interested in the scientific names of these fishes, is referred to information that is available online under: http://en.wikipedia.org/wiki/List_of_fishes_in_Bangladesh.

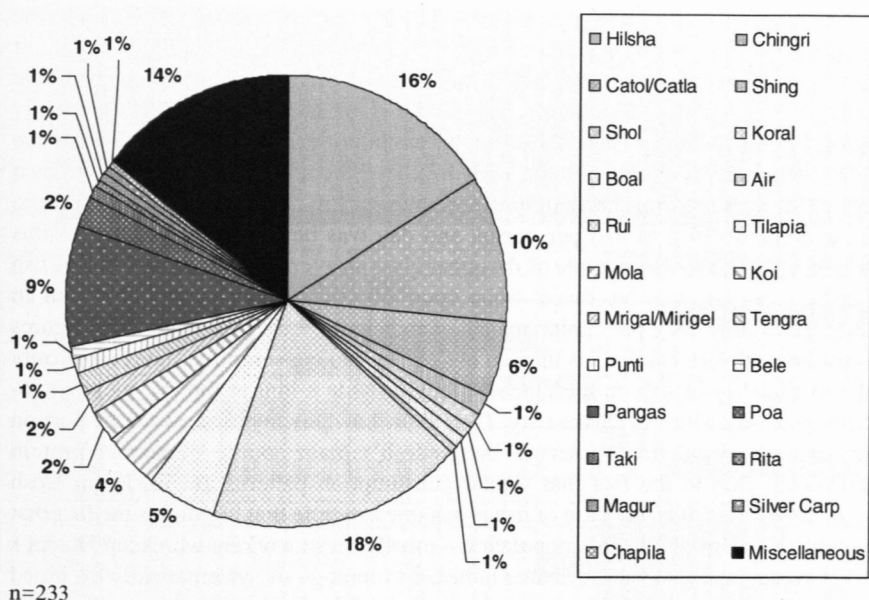


Fig. 24.5 Fish Consumption in Dhaka. *Source:* Own survey 2009–2010

urban poor. This becomes obvious by recalling the fact that night labourers or rickshaw pullers—one of the main jobs of urban poor male workers in Dhaka (World Bank 2007)—usually earn not more than 100 BDT per day. This situation applies not only to jobs in the so-called informal sector, but also to formal jobs in export-oriented industries like the garment industry in which the majority of urban poor female workers is employed. From 2007 until 2009, when the field-work was conducted, the minimum wage of a female garment worker was officially fixed to the amount of 1,662 BDT per month. These few examples show that the majority of fish is too costly for the urban poor.

As it can be seen in Fig. 24.5, those types of fish that are mostly consumed⁷ in Dhaka are Rui (18.5 %), Hilsha (15.9 %) and Chingri (10.5 %). Also Pangas (8.7 %), Catla (5.7 %), Tilapia (5.2 %) and Mola (4.0 %) take considerable proportions. Fish types with individual shares of above one percent are further Koi (2.3 %), Poa (2.1 %), Mrigal (1.6 %), Tengra (1.4 %), Shing (1.3 %), Shol (1.2 %) and Punti (1.1 %). By leaving the 14.4 % of miscellaneous fish aside for which no price data is available, it can be seen that the bulk of Dhaka's fish supplies (42.9 %) belongs to the high value category. 40.8 % have to be addressed as medium value fish, while the share of low value fish amounts to only 16.4 %.

⁷ These figures are based on the volume of sales in the markets of Dhaka.

By taking the different types of fish and their respective prices, one gets into the position to get a sort of negative image of Dhaka's society. Generally speaking, it can be assumed that low value fish is mainly consumed by the urban poor, middle value fish is mainly consumed by the middle class, and high value fish is mainly consumed by the upper class. Based on this assumption it is possible to calculate the fish availability individually for each of these income groups: Based on own calculations it is estimated that upon a number of 2.9 million middle class people an average of 99 g of fish per person and day was bestowed. In contrast to this figure, upon 2.2 million people of the upper class an average amount of 135 g of fish per head per day was bestowed, while upon 2.0 million poor people in Dhaka an average of only 58 g per capita and day was bestowed. Even though these figures must be read with caution, as they do not reflect real consumption figures, but only the availability of fish on the markets, they provide a hint at the prevalent socio-economic disparities in Dhaka City. They show how poverty hinders a large portion of Dhaka's population to access Bangladesh's main source of animal protein provision. Due to the fact that similar consumption patterns are likely for fresh vegetables and fruits, the case of fish is just one example that highlights the fact that almost one third of Dhaka's population—mostly those workers who keep Dhaka's food system and its export oriented industries running—is systematically excluded from affording socially valued and physically healthy food. As such, poverty is not just an abstract idea that comes about by categorizing people. It is real conditions that factually pierce down to the very bodies of individual human beings.

24.6 Urban *Monga*

Bangladesh's fish supply basically follows the country's annual flood cycle. The main season of capture fisheries in the floodlands starts shortly before the monsoon rainfalls in Jyaistha (May/June) and lasts until the beginning of the post-monsoon phase in Asvin (September/October). Marine capture fisheries have their high season mostly in between Asarh (June/July) and Kartik (October/November). The main season for harvesting fish from ponds, ditches and baors begins later and lasts from Kartik until the end of the dry season in Falgun (February/March). The dry winter time is also the main season for capture fisheries in perennial rivers, beels and in Lake Kaptai that is most intensely done from Magh (January/February) to Baisakh (April/May). From the main fish varieties that are sold at Dhaka's markets, seven have their high season in the first half of the (Bangladeshi) year (s. Fig. 24.6). The remaining 14 varieties have their high season in the second half of the (Bangladehsi) year.

Figure 24.6 shows that two temporal bottlenecks of fish supply can be identified, one from Caitra to Baisakh, and one during Asvin. These supply bottlenecks are translated in the market as seasonal price changes, shown in Table 24.3. Pangas, a low value fish that is consumed a lot, has an average wholesale price of 58.20 BDT per kg for small fishes during high season that lasts for 3 months from Jyaistha

Fish Type	Baisakh (April/May)	Jyaistha (May/June)	Asarh (June/July)	Sraban (July/August)	Bhadra (August/September)	Asvin (September/October)	Kartik (October/November)	Agrahayan (November/December)	Paus (December/January)	Magh (January/February)	Falgun (February/March)	Chaitra (March/April)
Low Value Fish												
Silver												
Chanda												
Chapila												
Magur												
Poa												
Rita												
Pangas												
Kaski												
Taki												
Medium Value Fish												
Tilapia												
Mola												
Punti												
Rui												
Tengra												
Koi												
High Value Fish												
Chingri												
Shol												
Koral												
Hilsha												
Boal												
Shing												

Fig. 24.6 Seasonal Changes in Supply at Dhaka's Fish Markets. *Source:* Own survey 2009–2010.
Note: Squares in dark gray colour indicate high season, squares in light gray colour indicate mid-season, and squares in white colour indicate low season (n = 241)

to Sraban. During the rest of the year, its price rises to an average of 72.50 BDT per kg, which means an increase by 24.6 %. The seasonal price variation of other fish that is consumed in Dhaka ranges from 7.50 BDT in case of Chapila to 106.70 BDT in case of Shing or from 18.8 % (Chapila) to 150.0 % (Chanda). As such, Pangas is an example of medium seasonal price changes. By calculating the mean figures, it turns out that prices for low value fish during off-season are on average 54.0 % higher than during high season. Prices for high value fish vary from low to high seasons only by 47.7 %, and those of medium value fish by 42.6 %. Accordingly, low value fish shows the most extreme seasonal price changes.

In regard to capture fisheries in rivers, the temporal bottlenecks stem from the natural fish behaviour and their cycles of migration, breeding and growing. In regard to fisheries in floodplains, they are the outcome of high precipitation during summer that let the rivers, ditches and canals overflow their banks onto low-lying areas. The lean season of aquaculture is related to the lack of fry and fingerlings to

Table 24.3 Seasonal Price Changes of Major Fish Types at Dhaka's Wholesale Markets

Fish species	Average price, past high season (in BDT per kg)	Standard deviation (in BDT per kg)	Average price, past low season (in BDT per kg)	Standard deviation (in BDT per kg)
Silver carp	25.00	–	50.00	–
Chanda	20.00	–	50.00	–
Chapila	40.00	14.10	47.50	10.60
Magur	45.00	–	60.00	–
Poa	44.70	15.40	65.00	30.20
Rita	50.00	–	70.00	–
Pangas	58.20	25.60	72.50	30.60
Kaski	56.70	11.50	70.00	17.30
Taki	53.30	16.10	80.00	0.00
Tilapia	66.70	16.80	91.00	19.80
Mola	68.50	17.70	90.60	23.10
Punti	60.00	–	100.00	–
Rui	93.30	24.30	118.50	28.90
Tengra	83.80	35.40	128.80	54.50
Koi	106.70	23.30	148.90	45.90
Chingri	122.90	86.80	163.40	105.90
Shol	130.00	65.60	190.00	55.70
Koral	130.00	–	200.00	–
Hilsha	140.30	74.50	233.80	136.70
Boal	170.00	–	250.00	–
Shing	270.00	166.40	376.70	92.90

Source: Own survey 2009–2010

stock early in the year, the lack of water due to ponds drying up during this period, and the low productivity during the winter due to low temperatures.

In North-Western parts of rural Bangladesh, the notion of *monga* addresses the season of food scarcity and prevalent hunger. *Monga* arises from an employment and income deficit that is most severe before *aman* rice is harvested (mainly in the months of Asvin and Kartik), but also occurs in the time before *boro* rice is harvested (mainly in the month of Caitra) (Zug 2006). It is said to mainly affect the peasants and sharecroppers of rural Bangladesh whose income is directly or indirectly based on agriculture, as the stocks that stem from the previous harvest become depleted while, at the same time, it takes at least two further months for the next harvest to come. However, the argument that I want to make at this point is that *monga* is not a rural phenomenon alone. As poverty is currently shifting from rural to urban areas, it is necessary and urgent to understand the effects of this seasonal scarcity in Bangladesh's cities as well.

The most obvious effect is that prices rise as the general supply decreases. In Dhaka, though, this effect is aggravated due to the seasonal in-migration of rural poor who come to the city to find a job, to be fed by governmental safety net

programs, or simply to beg in order to secure at least a minimum of food and income. Besides the general lack of income opportunities during that time, it is river erosion and floods that destroy the belongings and livelihoods of people who are then forced to follow the general flows of migrants to the cities. From 2007 to 2011, an additional factor had to be added, that was Ramadan which took place in the very time of *monga*. Thus, in the particular years of this research, the seasonal price variability in Dhaka was influenced by the general decline in supplies at that time, the increase in demand due to temporal in-migration of people from rural areas, and rising prices due to Ramadan.

24.7 Future Challenges of Dhaka's Food System

This study has shown that contradictions and dysfunctionalities of Dhaka's food system are found in respect to all three dimensions of the sustainability notion: In regard to ecological sustainability it was shown that Bangladesh is a natural habitat for fish production due to its location in the world's largest river delta with its thousands of ponds, canals, rivers, *haors* and *beels*, and its vicinity to the ocean. This fact, however, should not hide that with the breeding and rearing of carps, it is the resource and technology intensive inland water fisheries in ponds and ditches that are today's major source of fish in Bangladesh. The technologisation of fisheries makes Bangladesh to meet its fish demand in the first place. The South Asian situation in terms of availability of fish has never been better—not least due to the impressive increases in productivity with all negative consequences for ground water, soils and biodiversity.

In terms to economic sustainability the value chain analysis made clear that the *beparis* dominate the price determination along the fish chain. Furthermore, stark discrepancies were found to exist between the involved actors. In harsh contrast to the extensive options of market makers for profit making, the labourers who literally carry the food for the entire city on their shoulders have to face a heavy burden that is constituted by demanding work, extremely low earnings, irregular time slots for taking rest, and miserable living conditions. As such, the bitter irony of Dhaka's fish provision system is that those people, who carry the food for the mega city on their shoulders, are themselves most vulnerable to food insecurity and related health risks.

In regard to social sustainability it was shown that the mega city of Dhaka is currently well supplied with fish. Nevertheless, food security in Dhaka is far from being attained. Still more than a quarter (28 %) of Dhaka's population (World Bank 2007) lives in a situation of severe poverty and undernourishment while, at the same time, considerable wealth and opulence exists. The consumption figures reflect these socio-economic disparities in Bangladesh's capital: The average amount of fish that bestows to the urban poor makes up less than half (58 g per person and day) the amount that bestows to upper class people (135 g per person and day). The majority of fish is simply out of reach for the urban poor. Furthermore, a claim was

made for conceiving the annual *monga* season to be not a phenomenon of rural areas in Bangladesh alone. The urban *monga* in Dhaka can be understood as a seasonally re-occurring period of food insecurity that arises from an increase in food prices by simultaneously invariable earnings and income that most severely threatens the low income groups. The case study showed that prices for low value fish do change most intensely in between high and low season. Thus, of all people who live in Dhaka, it is the urban poor who are not only threatened by high prices, but also by comparatively high temporal price variability.

In order to transform Dhaka's food system in a more sustainable way, three future challenges must be met: First, awareness among urban consumers must be raised of the ecological impact of the present fish provision system. Environmentally damaging side effects are not a phenomenon of the export-oriented shrimp industry alone, but are serious for domestic consumption as well. More knowledge is needed to understand the potentials of alternative ways of urban food consumption and their impacts on rural production areas. Second, the ongoing reproduction of stark socio-economic disparities by means of exploitative practices in the urban labour market must be pushed onto the centre of public attention. Governmental and non-governmental organisations are requested to campaign against neo-feudalistic attitudes among Bangladesh's burgeoning middle and upper class. Support must be given to grass root level workers organizations throughout the country. Third, food insecurity in Bangladesh must be understood to be an urgent urban challenge as well. Accordingly, main governmental and non-governmental emphasis must be given to craft effective food aid schemes for the country's cities—especially for the time of *monga*. So far, respective programmes do not probably help the urban poor to overcome the burden of rising food prices. Consequently, the mega city's most vulnerable are left alone in the very situation in which support would be needed the most.

Acknowledgements I would like to acknowledge the financial support of the German Research Foundation (DFG), who funded the project "The mega-urban food system of Dhaka/Bangladesh" (Grant No. BO 680/35-1/-2) within the research program "Megacities—Megachallenge: Informal Dynamics of Global Change". Special thanks go to Hans-Georg Bohle (University of Bonn) and to Wolfgang-Peter Zingel (University of Heidelberg) who led the research project, to Shafique uz-Zaman (Dhaka University) for continuous support, to Benjamin Etzold (University of Bonn) for collaboration and synergetic effects and to Shahidul Haque (Dhaka University) for his efforts in facilitating my research in the field.

References

- Altwater E (2005) Globalization and the informalization of the urban space. Research Center on Development and International Relations, Aalborg University. Development Research Series, Working Paper No.131, Aalborg
- Bangladesh Bureau of Statistics (BBS) (2007) Statistical pocket book Bangladesh 2006. BBS, Dhaka
- Bangladesh Bureau of Statistics (BBS) (2011a) Population and housing census 2011. Preliminary Results. BBS, Dhaka

- Bangladesh Bureau of Statistics (BBS) (2011b) Report of the household income and expenditure survey 2010. BBS, Dhaka
- Belton, B, Karim, M, Thilsted, S, Jahan, KM, Collis, W, Phillips, M (2011) Review of aquaculture and fish consumption in Bangladesh. Studies and Reviews 2011–53. The World Fish Center. Dhaka
- Bohle HG, Adhikari J (2002) The metropolitan food system of Kathmandu – conceptual considerations and empirical evidence. *Die Erde* 133(4):401–421
- Christopher M (1998) Logistics and supply chain management. Strategies for reducing cost and improving service. Financial Times & Prentice Hall, London
- Cohen M, Garrett JL (2010) The food price crisis and urban food (in)security. *Environ Urban* 22 (2):467–482. doi:10.1177/0956247810380375
- Department of Fisheries (DoF) (1993) Fishery statistical yearbook of Bangladesh 1992–1993, Dhaka (cited after Rahman A (1997) Fish marketing in Bangladesh: status and issues. In: Tsai C, Ali Y (eds) Openwater fisheries of Bangladesh. DoF, Dhaka, pp 99–114
- Department of Fisheries (DoF) (2002) Fishery statistical yearbook of Bangladesh 2001–2002. DoF, Dhaka
- Department of Fisheries (DoF) (2007) Fishery statistical yearbook of Bangladesh 2006–2007. DoF, Dhaka
- Department of Fisheries (DoF) (2009) Fishery statistical yearbook of Bangladesh 2008–2009. DoF, Dhaka
- Food and Agriculture Organization of the United Nations (FAO) (1999) Numbers of fishers 1970–1997. FAO Fisheries Circular No. 929, Revision 2
- Food and Agriculture Organization of the United Nations (FAO) (2011) The state of food insecurity in the world 2011. How does international price volatility affect domestic economics and food security? FAO, Rome
- Ingram J, Erickson P, Liverman D (2010) Food security and the global environmental change. Earthscan, London/Washington DC
- Islam N (2005) Dhaka now. Contemporary Urban Development, Dhaka
- Islam N (2010) Dhaka in 2050. *CUS Bull Urban Dev* (58/59):5–10
- Jhingran V, Pullin R (1985) A hatchery manual for the common, Chinese, and Indian major carps. Asian Development Bank, Manila
- Kabir H, Amin S (2007) Tanguar Haor. A diversified freshwater wetland. Academic Press & Publishers Library, Dhaka
- Keck M (2012) Market governance and social resilience. The organization of food wholesaling in Dhaka, Bangladesh. Dissertation, University of Bonn
- Khatun H (2003) Dhakaiyas on the move. Academic Press & Publishers Library, Dhaka
- Lewis D, Wood G, Gregory R (1996) Trading the silver seed. Local knowledge and market moralities in aquacultural development. University Press, Dhaka
- Ministry of Agriculture (MoA) (2007) Handbook of agricultural statistics. MoA, Dhaka
- Pryer JA (2003) Poverty and vulnerability in Dhaka slums: the urban livelihood study. Ashgate, Burlington
- Rahman A (1997) Fish marketing in Bangladesh: status and issues. In: Tsai C, Ali Y (eds) Openwater fisheries of Bangladesh. University Press, Dhaka, pp 99–114
- Ravallion M, Chen S, Sangraul P (2007) New evidence on the urbanization of global poverty. *Popul Dev Rev* 33(4):667–701. doi:10.1111/j.1728-4457.2007.00193.x
- Ruel MT, Garrett JL, Hawkes C, Cohen M (2010) The food, fuel and financial crises affect the urban and rural poor disproportionately: a review of the evidence. *J Nutr* 140(1):170–176. doi:10.3945/jn.109.110791
- Sea Around Us Project (SAU) (2011) EEZ waters of Bangladesh
- Sen A (1981) Poverty and famines: an essay on entitlement and deprivation. Oxford University Press, New Delhi
- Siddiqui K, Ahmed J, Awal A, Ahmed M (2000) Overcoming the governance crisis in Dhaka City. University Press, Dhaka

- Siddiqui K, Ahmed J, Siddiqui K, Huq S (2010) Social formation in Dhaka, 1985–2005. A longitudinal study of society in a third world megacity. Ashgate, Surrey
- Sultana, P (2012) Implications of floodplain aquaculture enclosure. *J Environ Plann Man* 55(9):1159–1174
- Tavernier JB (1676 [2004]) Tavernier's travels in India, New Delhi
- Taylor J (1840 [2011]) A sketch of the topography and statistics of Dacca, Calcutta
- Watts M, Bohle HG (1993) The space of vulnerability: the causal structure of hunger and famine. *Prog Hum Geogr* 17(1):43–67. doi:10.1177/030913259301700103
- World Bank (2006) Bangladesh country environmental analysis. Bangladesh Development Series, Paper No. 12, Dhaka
- World Bank (2007) Dhaka: improving living conditions of the urban poor. The World Bank Office, Dhaka
- Zug S (2006) Monga – seasonal food insecurity in Bangladesh. Bringing the information together. *J Social Stud* (111):21–39