

# Some Thoughts on Hilsa Exports and Management in Bangladesh

KAZI ALI TOUFIQUE\*

Hilsa is the largest single species fishery in Bangladesh. The Department of Fisheries (DoF) publishes estimate of annual Hilsa catch and has been the single source of information. In the absence of information from alternative sources, the reliability of catch figures could not be tested. This notes uses the Household Income and Expenditure Survey (HIES) data to estimate Hilsa catch for the last three survey years (2000, 2005 and 2010) and finds that Hilsa catch figures reported by the DoF is overestimated for all these years. BBS data is very reliable because it is nationally representative, consumption is recorded by making home visits over a period of 14 days and data collection is spread over a year so that seasonal variation in fish consumption is adjusted. Thus Bangladesh may not have enough Hilsa for exports, particularly to India. It is also argued that Hilsa population is already in stress and the fishery is overexploited and fish habitat is severely degraded. Rather than promoting exports the government should improve Hilsa management, control overfishing of Hilsa, halt degrading conditions of Hilsa fishing ground, intensify effort to reduce smuggling of Hilsa and improve the quality of data.

**Keywords:** Bangladesh, Fish, Hilsa

**JEL Classification:** Q2

## I. INTRODUCTION

Hilsa (*Tenualosa ilisha*), besides being our national fish, is also the largest single species fishery in Bangladesh. It receives an unrivalled cultural importance from Bengalis from both sides of the border. While Bangladesh has been lucky to catch most of the Hilsa fish,<sup>1</sup> the Bengalis from West Bengal have to live with a dwindling catch of Hilsa and satisfy their appetite with whatever amount of Hilsa they could import from Bangladesh. Those who love to eat Hilsa believe that the

---

\* The author is a Research Director at the Bangladesh Institute of Development Studies. He is grateful to Ben Belton, Md. Yunus and an anonymous referee for helpful comments and suggestions. Research assistance provided by Ehsanur Rauf and Sami Farook is gratefully acknowledged. However, the author alone is responsible for any error that may remain in this paper.

<sup>1</sup> Bangladesh accounts for about 60 per cent of global Hilsa catch (Rahman 2010).

Hilsa caught in Bangladesh taste the best. Unfortunately, Hilsa catch in West Bengal declined from 60,000 MT in 2011 to 18,000 MT in 2012<sup>2</sup> and the future is perceived as bleak. In Bangladesh, as reported by the Department of Fisheries (DoF), Hilsa catch increased from 3,13,753 MT to 3,39,845 MT between 2010 and 2011.<sup>3</sup> Thus, as the production statistics shows, not only are we blessed with more Hilsa but its catch is also increasing recently. This rather optimistic scenario has prompted the Government to allow export of Hilsa to India. It also raised many unresolved issues and controversies. Bangladeshis have argued that large-sized Hilsa is now less available in the market as they are mostly exported to India. Prices of Hilsa have also gone up, as they thought, due to exports to India. The Government has reacted to these views expressed in the national dailies by becoming more ambivalent towards exporting Hilsa to India. Finally, an export ban to India was imposed by Bangladesh in 2012 and, as expected, it resulted in a threat to stop all exports of fish from India and search for alternative source of Hilsa from Myanmar.

Such controversies aside, the crucial question is, does Bangladesh actually catch as much Hilsa as reported by the DoF? Or, in other words, does Bangladesh actually have enough Hilsa to justify exports? Is there any way to test the accuracy of the data collected by DoF on Hilsa catch? One important check would be the total amount of consumption of Hilsa in Bangladesh and compare it with the catch figures reported by DoF. Hilsa consumption data is available from Household Income and Expenditure Surveys (HIES) undertaken by the Bangladesh Bureau of Statistics (BBS).<sup>4</sup> Since Bangladesh is an exporter of Hilsa, total consumption of Hilsa plus the amount of exports (legal and illegal) should be comparable to total catch of Hilsa reported by DoF. This note estimates total Hilsa catch in Bangladesh from BBS consumption data and found that the actual level of Hilsa production as inferred from consumption data is much lower than that reported by DoF. This implies that we may not have enough Hilsa to export to India. We have also analysed the findings from several studies on Hilsa stock assessment to emphasize that Hilsa stock is under serious threat due to increasing fishing pressure and environmental factors. Exports of fish from an overexploited fishery may also not be a good policy choice as it adds up pressure

---

<sup>2</sup> [http://www.thefinancialexpress-bd.com/more.php?news\\_id=139561&date=2012-08-09](http://www.thefinancialexpress-bd.com/more.php?news_id=139561&date=2012-08-09).

<sup>3</sup> The Telegraph commented that “If Calcuttans have been lamenting the drought of hilsas, people across the border seem to be blessed with a bounty.” ([http://www.telegraphindia.com/1120724/jsp/calcutta/story\\_15763062.jsp#.URzoW2ckquI](http://www.telegraphindia.com/1120724/jsp/calcutta/story_15763062.jsp#.URzoW2ckquI)).

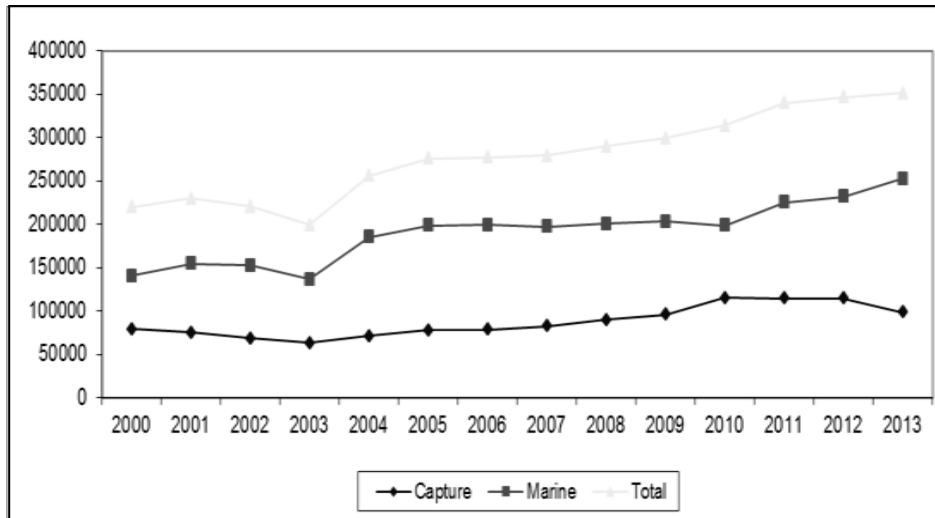
<sup>4</sup> Hereafter this data will be referred to as BBS data.

to existing stock of fish. Thus a lower level of Hilsa production, as estimated from more reliable consumption data and unencouraging findings from several Hilsa stock assessment surveys, suggests that government policy should be rather more inward looking and concentrate more on Hilsa management rather than on exports.

## II. HILSA PRODUCTION: DEPARTMENT OF FISHERIES DATA

Hilsa is an anadromous fish. It lives mainly in the seas but travels upstream to the freshwaters to spawn eggs and then migrate back to the seas. It can be caught at any stage of its life cycle at different sizes and from different types of fishing grounds. Hilsa is therefore caught in the seas (marine fisheries) as well as in the fresh waters (inland capture fisheries) and also in the estuaries and coastal areas. Hilsa is available almost throughout the year in various amounts. June to March is the peak fishing season, a major peak season is between September and October and a minor between February and March. A wide range of fishing gears is used for catching Hilsa. There are about half a million Hilsa fishers in Bangladesh and about 92 per cent of them are concentrated in the divisions of Barisal and Chittagong (Rahman 2010).

**Figure 1:** Hilsa Catch from Capture and Marine Fisheries of Bangladesh



**Source:** Various issues of *Fisheries Statistical Yearbook of Bangladesh* published by the DoF.

According to the statistics reported by the DoF, Hilsa catch has steadily increased during the period 2000-2013 (Figure 1). Total Hilsa catch increased from 2.2 lakh MT in 2000 to 3.51 lakh MT in 2013 (an increase by almost 60 per cent). But note that more catches are increasingly coming from the marine sector. Over this period, almost 70 per cent of Hilsa fishes were caught in the seas. This was not the case in the early 1980s when most of the Hilsa came from the inland fisheries (Rahman 2010). The major source of Hilsa has changed from inland to marine from the 1980s. While Hilsa catches from the marine sector increased by 4.6 per cent per annum during 2000-13, catches from the capture fisheries lagged behind and grew at a rate of 1.7 per cent. There is a decrease in fishing effort in the upstream Hilsa fisheries and increase in the downstream (Rahman 2010). Increase in Hilsa catch has therefore been made possible from increase in marine and estuarine catch. This might have initially come from expansion of fishing area but later more likely from increase in fishing effort (Mome 2007).

### III. HILSA PRODUCTION: BANGLADESH BUREAU OF STATISTICS DATA

BBS data collects information on fish consumption from the surveyed households. Fishes are classified into 15 groups including Hilsa. It is possible to estimate Hilsa consumption per person per year from these data because Hilsa is not grouped with other species of fish.<sup>5</sup> National consumption of Hilsa can then be obtained by multiplying per capita consumption by the population of Bangladesh for the survey years. National population figures are obtained from the *World Development Report* (World Bank 2012). We have used unit record BBS data for the last three survey years, 2000, 2005 and 2010, to estimate Hilsa production in Bangladesh.

Table I presents estimates of Hilsa consumption derived from BBS data. We observe that consumption of Hilsa has fallen from 1.17 kg/person/year in 2000 to about 1 kg/person/year in 2005. In the next five years consumption of Hilsa increased to 1.27 kg/person/year. Hilsa consumption has also fallen between 2000 and 2005 in terms of its contribution to total fish consumption. While Hilsa accounted for 8.5 per cent of total fish consumption in 2000, this came down to about 6.4 per cent in 2005 (Toufique 2015). Hilsa's contribution to total fish consumption increased slightly to 7 per cent in 2010 but it is still lower than that of 2000 (Toufique 2015). Since average consumption of Hilsa increased between 2000 and 2010 and share of Hilsa in total consumption declined, it implies that

---

<sup>5</sup>Some fishes such as Indian Major Carps or Exotic Carps are lumped together and consumption of individual species of carp cannot be directly separated out.

households have substituted Hilsa consumption by other fishes. The relative availability of Hilsa has declined during the decade 2000-2010. This has happened mainly due to the rapid growth of aquaculture during this period. Aquaculture has been compensating for declining inland capture fisheries during this period (Toufique and Belton 2014). Inland capture fisheries contributed to 63 per cent of total catch in 1984 but this came down to 34 per cent in 2011. At the same time, the contribution of the culture fisheries increased from a mere 16 per cent to 48 per cent. Households are now increasingly consuming farmed carps and cat fishes and substituting them for their dwindling counterparts in the capture fisheries (Thompson *et al.* 2002, Thompson 2007, Belton *et al.* 2013).

TABLE I  
CONSUMPTION OF HILSA IN BANGLADESH IN 2000, 2005 AND 2010

	2000	2005	2010
Hilsa consumption (Kg/person/year)	1.17	0.99	1.27
Hilsa consumption as a % of total fish consumption	8.53	6.44	7.04
Total Hilsa consumption (Lac MT)	1.52	1.39	1.89

**Source:** Unit record data of BBS for 2000, 2005 and 2010.

We have estimated total consumption of Hilsa for 2000, 2005 and 2010 by extrapolating per capita consumption (Table I).

To arrive at the figure for Hilsa production from DoF data, the amount of legal and illegal exports of Hilsa has to be estimated and added to the consumption figures (Table II).

TABLE II  
ESTIMATES OF HILSA PRODUCTION IN BANGLADESH IN 2000, 2005 AND 2010 FROM BBS DATA (Lakh MT)

	2000	2005	2010
A. Frozen exports	0.01	0.02	0.03
B. Chilled exports	0.01	0.04	0.04
C. Exports (A+B)	0.02	0.06	0.07
D. Illegal exports (2*C)	0.04	0.12	0.14
E. Total exports (legal and illegal) (C+D)	0.06	0.18	0.21
F. Total production from BBS data	1.58	1.57	2.10

**Source:** Fisheries Statistical Yearbook of Bangladesh (several issues).

Hilsa is exported either frozen or chilled. Chilled Hilsa is mostly exported to India, while frozen Hilsa is mostly exported to the expatriate Bangladeshis living abroad. Hilsa export figures are collected from the Export Promotion Bureau (EPB) by DoF since 2003. However, only the amount of chilled Hilsa exports is separately reported, while frozen Hilsa exports are merged with aggregate frozen fish exports figures. It is only from 2010 Hilsa exports in both frozen and chilled forms are separately reported by DoF. We have to therefore find a way to estimate the amount of frozen Hilsa exports for the years 2000 and 2005. On the average, frozen Hilsa represented 69 per cent of chilled Hilsa exports in 2010 and 2011. We have used this information to obtain frozen Hilsa exports for the years 2000 and 2005. Unfortunately, chilled Hilsa export figure is also not available for 2000 and we have assumed that the amount of chilled Hilsa export in that year was equal to chilled Hilsa exports in 2003. Thus if there is any bias in this estimate, the direction of that bias is upward because Hilsa exports in chilled form was increasing every year around this time.

As already mentioned, a large amount of Hilsa is smuggled out of the country. The actual quantity of Hilsa smuggled out of the country is anybody's guess. It is often suggested that an amount equal to the volume of legal (recorded) exports of Hilsa is smuggled out of the country.<sup>6</sup> We have multiplied legal exports of chilled Hilsa by 2 to obtain the amount of illegal exports of Hilsa.<sup>7</sup> This helped us to get total production of Hilsa, which includes legal and illegal exports either in chilled or in frozen forms, *and* total consumption of Hilsa as estimated from BBS data (Row F in Table II).

#### IV. HILSA CATCH IN BANGLADESH: DoF AND BBS DATA COMPARED

Hilsa catch according to DoF is presented in Table III along with the catch estimated from BBS data. Although Hilsa catch is reported every year by DoF (see Figure 1), we only report catch for 2000, 2005 and 2010 because these are the years for which consumption data is available from the BBS.

We observe that 43 per cent of total catch reported by DoF is over-reported in 2005. This amounts to 1.19 lakh MT. The extent of over-reporting was less in 2000 (28 per cent) but it stood at 33 per cent in 2010. Interestingly, when BBS figures showed a drop in Hilsa production between 2000 and 2005 by 0.63 per cent, DoF figures showed an increase by 25 per cent. On the other hand, when BBS figures showed an increase in Hilsa production by 34 per cent between 2005

<sup>6</sup><http://ezinearticles.com/?Smuggling-of-3.5-Billion-Hilsa-Per-Annum-to-India!&id=7293514>.

<sup>7</sup>As we will see later, a much higher extent of illegal Hilsa exports will not change the extent of overestimation of Hilsa production by DoF much.

and 2010, DoF figures showed an increase of only 14 per cent. Thus there seems to be no systematic pattern in the mismatch between DoF and BBS data on estimated Hilsa production.

TABLE III  
**PRODUCTION OF HILSA IN BANGLADESH IN 2000, 2005 AND 2010**

	2000	2005	2010
BBS (Lakh MT)	1.58	1.57	2.10
DoF (Lakh MT)	2.20	2.76	3.14
Gap between BBS and DoF production estimates (Lakh MT)	0.62	1.19	1.04
Gap as a % of total production reported by DoF	28.20	43.02	33.12

The difference between DoF and BBS figures is very large and cannot be explained only by massive informal exports of Hilsa to India. An assumption of smuggling of 33.5 times than the legal exports in 2000 would have made Hilsa production figures reported by DoF coincide with that estimated from BBS data. The corresponding multipliers for 2005 and 2010 are 11 and 17 respectively. These are absurd numbers as they result in Hilsa catch several times higher than the amount of Hilsa produced in Bangladesh.

BBS data is generally believed to be more reliable than that produced by DoF. The households surveyed by the BBS are nationally representative. Consumption data is collected from home visits made by the enumerators over a period of 14 days. Seven visits are made in total and information on food consumption is collected for previous two days. Female enumerators are particularly hired for interviewing housewives who are directly involved in cooking and can better report on various items of household food consumption. The data collection is also carried out over a period of one year to capture seasonal variations in food consumption, including fish consumption which is highly seasonal. Over time, the BBS has also improved the quality of BBS data.

On the other hand, reliability of DoF data has already been questioned. Belton and Azad (2012) question the increase in the amount of fish available from capture fisheries as reported by DoF. On the other hand, DoF calculation of catch from the culture fisheries is generally believed to be seriously underreported. This is partly due to the unchanging sampling procedure adopted by DoF since 1989. Anwar (2011) points out that the production of Tilapia is seriously underreported in DoF statistics. Edwards and Hossain (2010) and Belton *et al.* (2011) have also shown that Pangas production in Bangladesh has been seriously underreported by DoF. However, over time, DoF has improved the quality of the data they generate.

## V. HILSA EXPLOITATION IN BANGLADESH

It has to be understood that Hilsa is not farmed. Production of farmed species can be increased by bringing in, say, more ponds into production or by changing the technology as was done in the case of shrimp farming in the coastal districts of Bangladesh which expanded in leaps and bounds when export opportunities were identified. On the contrary, we can get more Hilsa only by increasing the stock of Hilsa and this requires spending human and financial resources on Hilsa management and maintaining the quality of the habitat of Hilsa fishery. Increase in Hilsa catch has therefore a biological limit and a sacrifice from the fishers (who would have to follow certain rules such as not catching jatka or juveniles of Hilsa, following a seasonal ban, etc.) is required for preserving and enhancing the stock.

The factors that have severely affected the inland capture fisheries sector of Bangladesh have also affected Hilsa fishery (Toufique and Ahmed 2013). The Flood Control Drainage and Irrigation Projects (FCDI) have created havoc to open water fisheries of Bangladesh. The breeding run of Hilsa has been severely hindered by construction of a number of dams, anicuts and barrages and also by over-fishing (Puvanendran 2013). Low water discharge from the Ganges at the Farraka barrage and associated heavy siltation, indiscriminate exploitation of juveniles (*jatka*), disruption of their migration routes, loss of spawning, feeding and nursery grounds and increased fishing pressure have all contributed to a decline in the catch per unit effort in both the marine and river Hilsa fishery (Mome 2007). During the last 10-30 years, Hilsa fishery has been completely lost from about 35 rivers and in another 8-10 rivers Hilsa are rarely caught. The estimated production loss from these rivers is about 20,000-25,000 MT (Rahman 2010). Thus, over time, Hilsa fishery has shifted from the upstream to further down towards the estuaries, coastal and to the seas. Fishing effort in the riverine Hilsa fisheries has declined whereas that in the marine sector has increased (Mome 2007).

There are other reasons to believe that we should not be complacent with our current levels of Hilsa catch irrespective of the source of information. Several studies have found that Hilsa is heavily overfished in Bangladesh (Mome 2007, Milton 2010, Amin *et al.* 2002, Amin *et al.* 2004, Amin *et al.* 2008). These studies suggest that fishing mortality has to be reduced by around 10 per cent. Studies undertaken in the 1980s either did not find overexploitation of Hilsa (BoBP 1987) or some limited overexploitation (Melvin 1984). Momo (2007) has found that fishing fleet has to be cut by 30 per cent from existing level to maintain the stock of Hilsa. This is difficult to implement because it requires fishing fleet and fishers remain idle for a long period of time or leaving the



fishery altogether. The government distributes rice to the fishers and generates alternative source of livelihoods for them but these are neither adequate nor properly implemented. Hilsa stock is also strained by *current jal* which is widely used to catch Hilsa, including *jatka* (juvenile Hilsa).

When an overexploited fishery de facto characterised by open access and severely strained by environmental factors is exposed to exports, more fishes are caught and exported. This creates additional pressure on an almost unregulated fishery such as Hilsa because the fishers would be less inclined to follow the rules related to the management of Hilsa. Since 2003, the Government has been implementing the *Hilsa Fisheries Management Action Plan 2003*. Under this management plan, several sanctuaries are established, berried Hilsa catches are protected by declaring a 10-day closed season, etc.<sup>8</sup> When exports are allowed, it would be more difficult for the government to refrain the fishers from either catching *jatka* or catching fish from the sanctuaries or following the closed season. These rules are nevertheless poorly followed. As already mentioned, well above two-thirds of total Hilsa catches now come from the marine sector which is mostly unregulated.

## VI. PROJECTION OF HILSA EXPORTS

This paper shows that whether Bangladesh has an exportable Hilsa surplus or not depends on whether one is using DoF data or the BBS data. If we consider DoF data, Bangladesh may be considered to have more exportable surplus as Hilsa catch is much higher than the amount of consumption of Hilsa reported in BBS data. On the other hand, if we consider the BBS data as a better estimation on availability of Hilsa, then Bangladesh has very limited export potential.

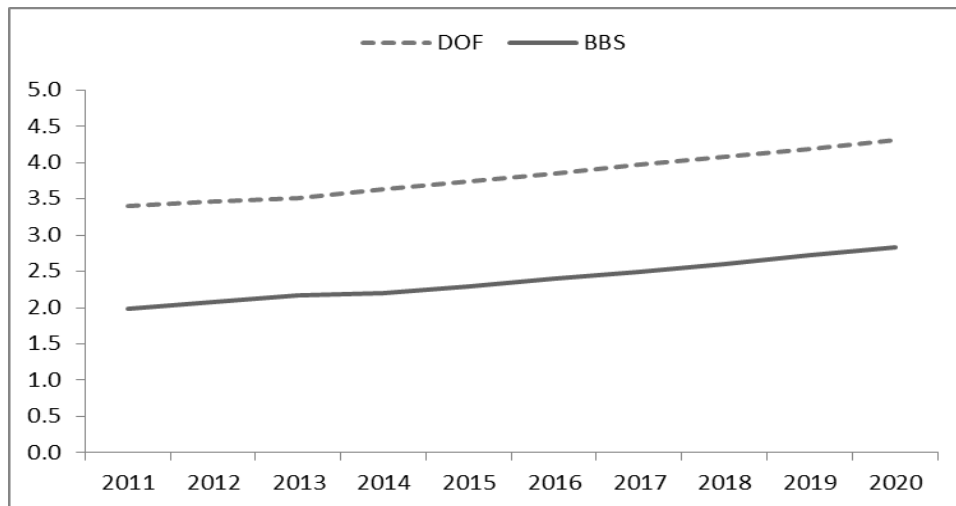
In Figure 2 we have projected Hilsa production on the basis of DoF data and consumption by BBS data. DoF production data is calculated by using a trend growth rate. Fish consumption prediction is based on population growth (World Bank 2012) and income elasticity of Hilsa consumption (Dey 2000). This analysis does not provide a precise estimation of exportable Hilsa because we have questioned the reliability of DoF data. Our position is that the BBS data is more reliable and therefore we hardly have any exportable surplus of Hilsa. This

---

<sup>8</sup>Sanctuaries are declared in Shatnol of Chandpur to Char Alexander of Laxmipur, Char Ilisha to Char Pial of Bhola, Bheduria of Bhola to Char Rustam of Patuakhali and a 20-km stretch of Padma River between Shariatpur and Chandpur. Fishing in these sanctuaries is banned from March to April. Fishing in another sanctuary in Andharmanik River in Kalapara upazila of Patukhali is banned from November to January.

analysis makes three important points. *First*, the DoF should try to understand and revise (if necessary) its estimates so that a more reliable estimate of Hilsa catches can be made. This would help to accurately derive exportable surplus of Hilsa fish. *Second*, a downward estimation of exportable surplus will be more resource conserving than an upward estimation as the latter will not attract more resources to the fishery. In this context BBS data would serve as a better indicator of actual production of Hilsa. *Third*, we have found that per capita Hilsa consumption by the extreme poor in Bangladesh has fallen by 64 per cent (from 0.56 kg/person/year in 2000 to 0.2 kg/person/year in 2010). Only the non-poor households could marginally (by 2.4 per cent) increase Hilsa consumption (from 1.64 to 1.68 kg/person/year) during this period. This low consumption of Hilsa, even by the non-poor households should also be taken into consideration while deciding on Hilsa exports (Toufique 2015). Finally, it should be remembered that an increasing catch does not mean fish stock is not depleting. As Figure 1 shows, Hilsa catches from the rivers have gradually plateaued and increasing catch is now coming from the marine sector. From 2010 onwards Hilsa catch from capture fisheries has been steadily falling. This may be the result of more fishing effort in the seas or discovering new fishing areas or any other factor we do not know. The DoF should make an attempt to estimate Hilsa stock periodically to check any symptom of collapse of the fishery.

**Figure 2:** Future Availability of Hilsa for Exports from Bangladesh



## VII. CONCLUSIONS

Hilsa is a pride fish of Bangladesh and the country should aim at maintaining a stock justified by existing knowledge and resources available to the government. Bangladesh has at times exported Hilsa to India on the assumption that we have enough Hilsa to export. Hilsa catch figures reported by DoF have generated some kind of national complacency. So far it was not possible to compare production of Hilsa in Bangladesh with data from sources other than the DoF. In this note we have estimated production of Hilsa in Bangladesh from data generated by the BBS. BBS conducted data are arguably more reliable than the data collected by DoF. We have found that DoF data significantly over-reports Hilsa catch in Bangladesh. For example, in 2005, an excess of 1.19 lakh MT of Hilsa catch was reported by DoF! We have also argued that Hilsa population is already in stress and the fishery is overexploited in a situation where it is severely degraded by external (such as siltation, Flood Control Projects) and internal factors (catching of *jatka*). Exports increase fishing pressure on an already overexploited and poorly regulated fishery. The issue of Hilsa exports should not be tied to any other deal such as water sharing because Hilsa catch should aim at maintaining a healthy stock of fish and optimal allocation of resources. Thus rather than promoting exports the government should extend Hilsa management to the seas, improve it in inland waters and intensify effort to reduce smuggling of Hilsa. Regional co-operation is justified because the stock is held in common along with India and Myanmar. The government can also help develop growing of Hilsa in fish farms (Puvanendran 2013). The apparent over-reporting of Hilsa catch should caution the resource managers of the alleged success of the existing Hilsa management policies and persuade them to improve the quality of Hilsa management. For this reliable data is required.

## REFERENCES

- Amin, S. M. N., M. Rahman, G. Haldar, M. Mazid and D. Milton. 2002. "Population Dynamics and Stock Assessment of Hilsa Shad, *Tenualosa ilisha* in Bangladesh." *Asian Fisheries Science*, 15:123-128
- 2008. "Catch Per Unit Effort, Exploitation Level and Production of Hilsa Shad in Bangladesh Waters." *Asian Fisheries Science*, 21:175-187.
- Amin, S. M. N., M. Rahman, G. Haldar, M. Mazid, D. Milton and S. Blaber. 2004. "Stock Assessment and Management of *Tenualosa ilisha* in Bangladesh." *Asian Fisheries Science*, 17: 51-59.

- Anwar, J. 2011. *Market Study on Some Freshwater Farmed Fish: Tilapia and Pangas (Mekong River Catfish)*. Report prepared for the USAID-funded PRICE.
- BBS (Bangladesh Bureau of Statistics). *Household Income and Expenditure Surveys of 2000, 2005, 2010*.
- BoBP. 1987. *Hilsa Investigations in Bangladesh, Bay of Bengal Programme*. FAO/UNDP Report 36, Colombo.
- Belton, B., Imke van Asseldonk and Shakuntala Haraksingh Thilsted. 2013. "Faltering Fisheries and Ascendant Aquaculture: Implications for Food and Nutrition Security in Bangladesh" (unpublished manuscript).
- Belton, B. and A. Azad. 2012. "The Characteristics and Status of Pond Aquaculture in Bangladesh." *Aquaculture*, 358–359:196–204.
- DoF (Department of Fisheries). various issues. *Fisheries Statistical Yearbook of Bangladesh*. Dhaka: Bangladesh Ministry of Fisheries and Livestock.
- Belton, B., M. Karim, S. Thilsted, K. M. Jahan, W. Collis and M. Phillips. 2011. *Review of Aquaculture and Fish Consumption in Bangladesh. Studies and Reviews 2011-53*. The WorldFish Center.
- Dey, M. 2000. "Analysis of Demand for Fish in Bangladesh." *Aquaculture Economics and Management*, 4 (1/2):65-83.
- Edwards P. and M. Hossain. 2010. "Bangladesh Seeks Export Markets for Striped Catfish." *Global Aquaculture Advocate*, May/June: 59–60.
- Melvin, G. 1984. *Investigation on the Hilsa Fishery of Bangladesh*. Report prepared for the Fishery Advisory Service, Food and Agriculture Organization, Rome.
- Mome, M. A. 2007. *The Potential of the Artisanal Hilsa Fishery in Bangladesh: An Economically Efficient Fisheries Policy*. Fisheries Training Programme Final Project Report, United Nations University, Iceland. 57 pp.
- Milton, D. 2010. *Status of Hilsa (Tenulosa Ilisha) Management in the Bay of Bengal: An Assessment of Population Risk and Data Gaps for More Effective Regional Management*. Report to FAO Bay of Bengal Large Marine Ecosystem Project, BoBLME-2010-Ecology-01.
- Puvanendran, V. 2013. *Norway-India-Bangladesh Consortium for Hilsa Aquaculture in South Asia*. Report 2, Norway.
- Rahman, M. A. 2010. "Status of Hilsa Fisheries in Bangladesh." BOBP-IGO/ RC-HF2/5 February.
- Thompson, P. 2007. "Trends in Fish Consumption in Community Restored Wetlands." MACH Technical Paper 8, June.
- Thompson, P., N. Roos, P. Sultana and S. H. Thilsted. 2002. "Changing Significance of Inland Fisheries for Livelihoods and Nutrition in Bangladesh." *Journal of Crop Production*, 6:1-2, 249-317.

- Toufique, K. A. 2015. Analysis of Fish Consumption and Poverty in Bangladesh. BIDS-REF Study Series No. 15-01. Bangladesh Institute of Development Studies, Dhaka.
- Toufique K. A. and B. Belton. 2014. "Is Aquaculture Pro-Poor? Empirical Evidence of Impacts on Fish Consumption in Bangladesh." *World Development*, 64:, 609–620.
- Toufique, K. A. and N. Ahmed. 2013. *Barriers to Development of the Fisheries Sub-sector*. Report prepared for International Food Policy Research Institute (IFPRI).
- World Bank. 2012. *World Development Indicators 2012*. The World Bank.