

Variations in Length and Weight of *Oreochromis mossambicus* in Malir River, Karachi, Pakistan

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Abstract: Aquatic pollution results in physical, chemical and biological deterioration of water bodies causing destruction of fish and other biota. Fishes are now considered as the best indicators of pollution. The present study was conducted to see the extent of pollution in Malir River by studying the growth of *Oreochromis mossambicus*, the common fish of this river. During the study, analysis of length and weight has been done primarily to describe their relationship and to measure the variations in growth of an individual or population. The data showed that the growth was higher at spot 3 (Drigh road) and lower at spot 4 (Quyumabad). It appeared that the good water condition at Spot 3 was supporting the higher fish growth at this spot whereas the polluted water at Spot 4 results in the poor growth of the fish.

Keyword: *Oreochromis mossambicus*, Length, Weight, Malir River.

INTRODUCTION

Pollutants were reported to alter the normal environment of fish and other organisms [1-4] and their effects may be long-term or of short duration [5]. The Exposure for short duration may result in changes that are not lethal but affect the physiological aspects of fish related to the feeding, growth and reproduction while the long-term exposure may result in the death of fishes [5].

Tolerance to environmental disturbances may vary from animal to animal and from species to species [6]. In addition, these scientists have also recorded inter-specific differences in environmental tolerance which depend on the ability of individuals to tolerate various levels of environmental factors [7, 8]. The process, resulting in these changes, is usually termed resistance acclimation which may be against single factor or an interaction between several variables [9]. Fishes are now considered as the best indicators of pollution. Considerable efforts have been made to study the sub lethal effects of pollution on the fish and the water quality [7, 8, 10-13]. The environmental disturbances may affect fish production both directly or indirectly by affecting the growth of any other component of food chain. In evaluating the effects of pollution on fish, some growth variables as length, weight and condition factors are generally used [14]. In this paper the growth (as indicated through Length and weight data) of *Oreochromis mossambicus* in Malir River is investigated.

MATERIAL AND METHODS

A preliminary survey of the fish fauna of Malir River was conducted, to select the most suitable species. The most common species should be less affected species in the polluted environment. *Oreochromis mossambicus*, which is the most common fish of this river, was selected as a sample species to see the effects of pollution on fish fauna. Groups of 20 fishes, as recommended by Novotny and Beeman [15] and Biswas [16] were captured monthly by hand net from four spots in upper (Spots 1 & 2) and lower (Spots 3 & 4) Malir River. Spot 1 (Murad Memon Goth) is located 3.5 Km away from Malir City, Spot 2 (Malir City) located near Malir city; Spot 3 (Drigh road) is dominated by agricultural lands and Spot 4 (Quyumabad) which receives industrial and domestic waste in lower Malir river. Spots 1, 2 and 3 appeared to be less polluted with industrial and municipal waste and spot 4 is highly polluted as reported by Bano *et al.*, [17]. Length and weight of specimens in each group were measured by the procedures given by Bagenal [18]. Length and weight captured from each spot were recorded upto a period of three years from May 1993 to April 1996.

The data was compared with the recent data obtained during the survey in 2009. The recent data reflects little variation in length and weight of *O. mossambicus* at spot 1, 2 and 3 and therefore, not further evaluated. The data of Spot 4 is used to compare the growth of *O. mossambicus* in Lower Malir River which is subjected to high pollution levels.

RESULTS

During this study, the variation in length and weight data of *Oreochromis mossambicus* was observed during the study period. The length was found

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Table 1: Minimum and Maximum Length and Weight of *O. mossambicus* at Studied Spots During 1993-1996 in Malir River

| | LENGTH (cm) | | WEIGHT (gm) | |
|---------------|-------------|---------|--------------|---------|
| | Minimum | Maximum | Minimum | Maximum |
| SPOT 1 | 20.1 | 36.11 | 160 | 642.5 |
| SPOT 2 | 19.27 | 30.8 | 117.5 | 300 |
| SPOT 3 | 20.25 | 38.88 | 242.5 | 842.5 |
| SPOT 4 | 18.92 | 32.75 | 74.5 | 128 |

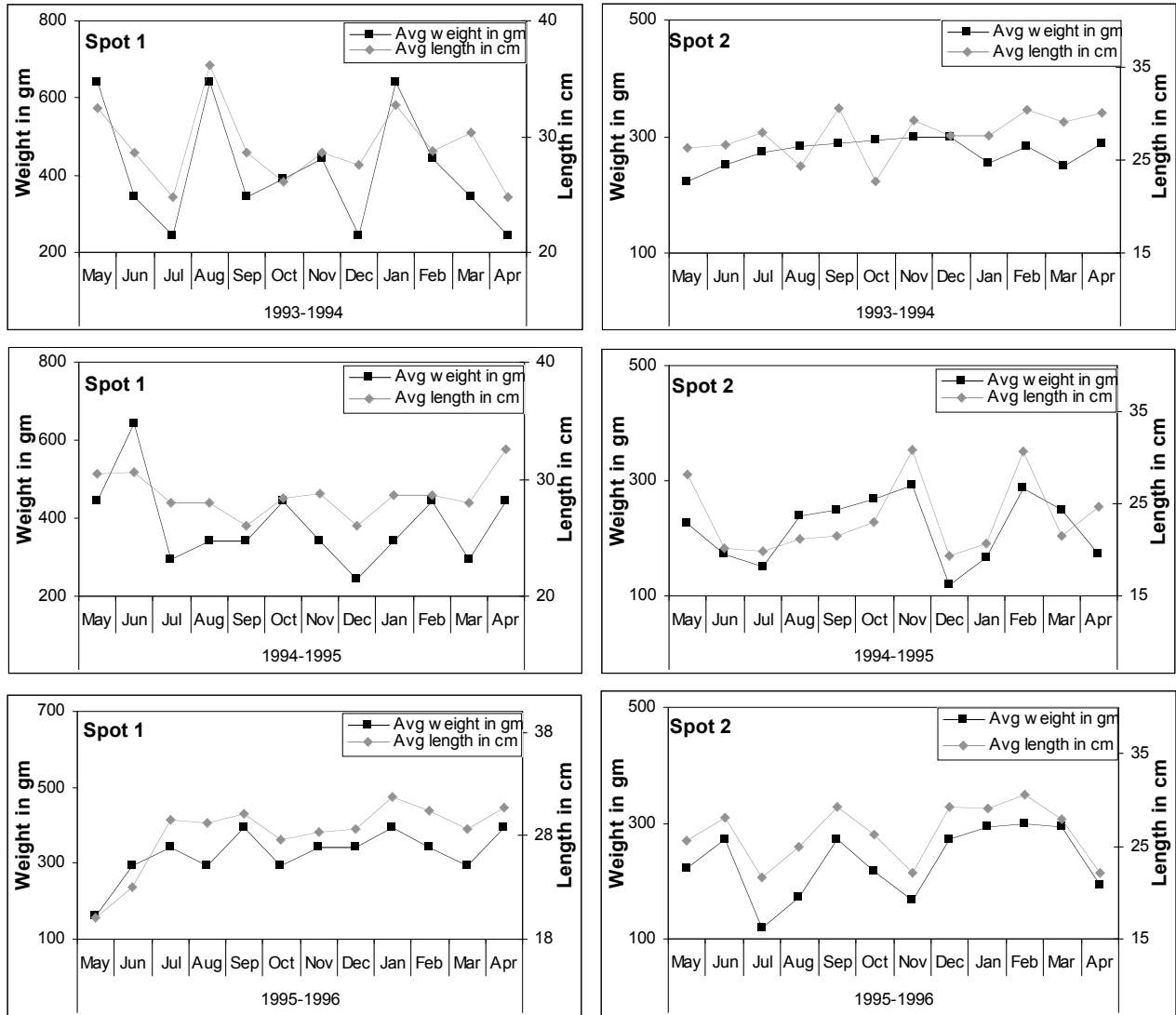


Figure 1: Variation in length and weight relationship at Spot 1 (Goth Murad Memon) and Spot 2 (Malir city) in Malir River.

generally to vary between 20.1 - 36.11cm at spot 1 while at Spot 2 the maximum length of 30.80cm was observed (Table 1). The average length at Spot 1 and 2 ranged between 28.13-29.1cm and 23.45-27.69 cm respectively. The length of *Oreochromis mossambicus* varied between 20.25 - 38.88 cm at spot 3 while at

Spot 4 it showed a variation of 18.92 – 32.75 cm (Table 1). The weight of *O. mossambicus* varies between 160-642.5 gm and 117.5-300 gm at spot 1 and 2 respectively. At Spots 3 and 4 in lower Malir River the maximum weight of 842.5 gm (Spot 3) and 128 gm (Spot 4) were recorded (Table 1).

The length and weight of *O. mossambicus* shows fluctuation throughout different seasons during which study was conducted (Figures 1 and 2). Average length and weight generally decline during June-July and in November-December at Spot 1 and 2 in lower Malir River (Figure 1). The data obtained from Spot 1 and Spot 2 during 1995-1996 and 1993-1994 respectively shows little variation in length and weight of the fish (Figure 1). At Spot 3 the length and weight data shows sharp decline in March and November except during the first year of study, whereas little variation in the length and weight of *O. mossambicus* was observed at spot 4 especially during 1994-1996 (Figure 2).

Figure 3 showed the comparison of average length and weight at studied spots. Lengthwise better

specimens were observed at Spot 3 as compare to other studied spots in upper and lower Malir River (Figure 3). Minimum average length was measured in the specimens of Spot 4. Similarly average weight of fishes was higher at Sopt 3 and lowest at Spot 4 (Figure 3).

Table 2 shows the average length and weight data which was obtained from Spot 4 during the recent study in 2009. The total length and weight ranges between 13.5-22 cm and 28-60.5 gm respectively (Table 2). The length-weight data obtained in 2009 shows decline in the growth of *O. mossambicus* as compare to the length-weight data of 1994-96 (Figure 4).

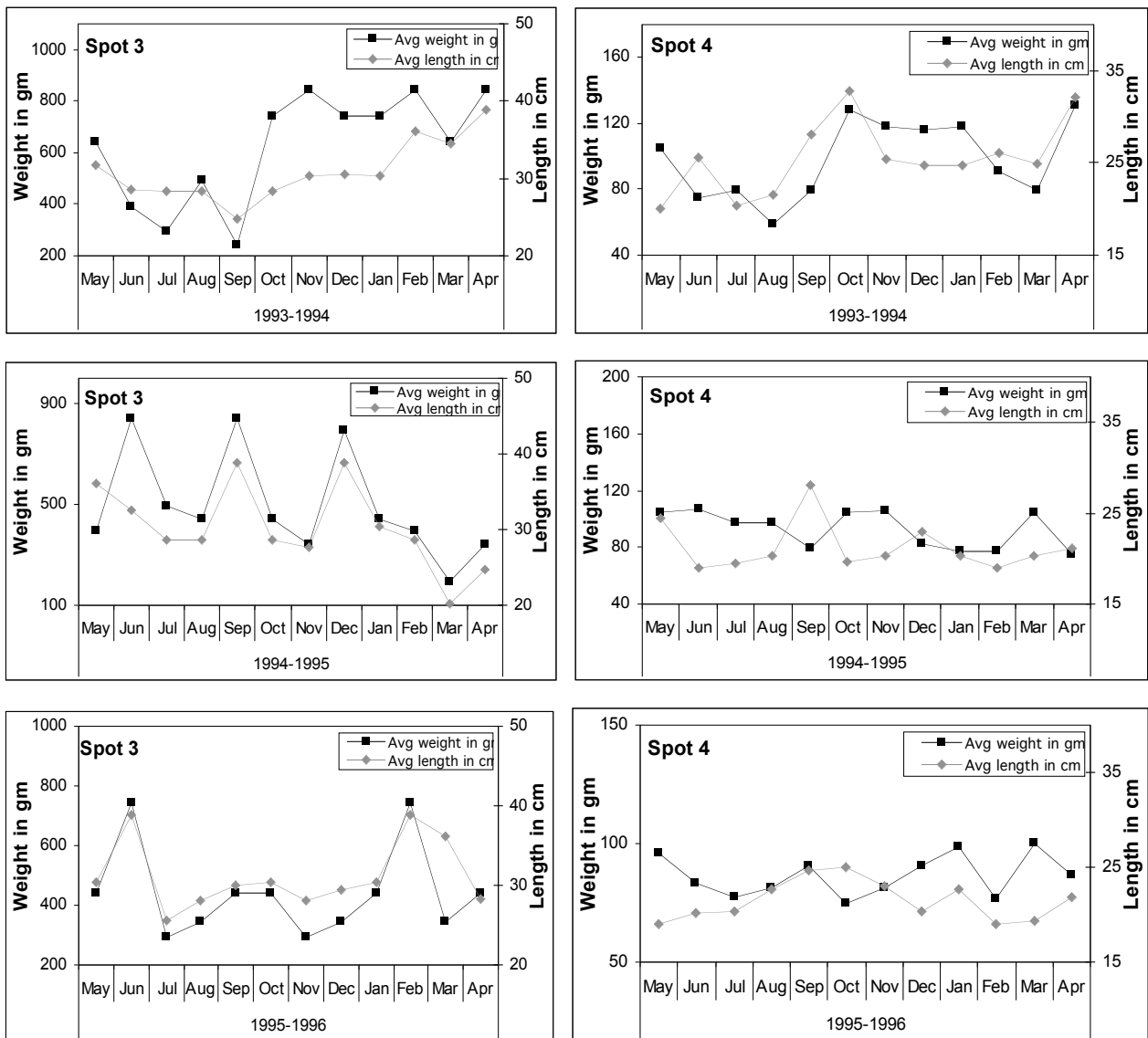


Figure 2: Variation in length and weight relationship at Spot 3 (Drigh Road) and Spot 4 (Quyumabad) in Malir River.

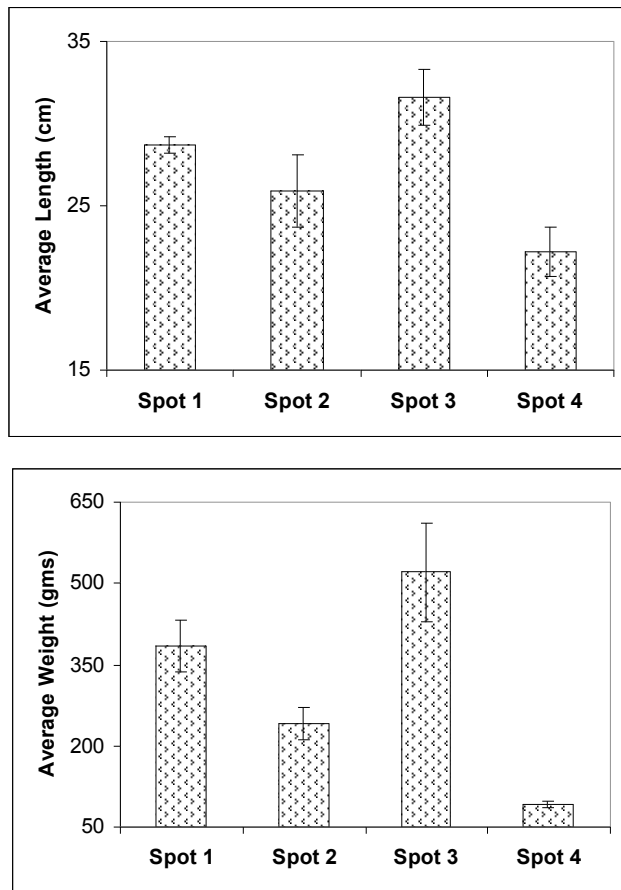


Figure 3: Comparison of annual average length and weight of *O. mossambicus* at spots 1, 2, 3 and 4.

Table 2: Minimum, Maximum and Average Length and Weight of *O. mossambicus* at Spot 4 During 2009 in Malir River

| | LENGTH (cm) | WEIGHT (gm) |
|---------|--------------|--------------|
| Minimum | 13.5 | 28 |
| Maximum | 22 | 60.5 |
| Average | 15.66 ± 2.32 | 49.8 ± 11.35 |

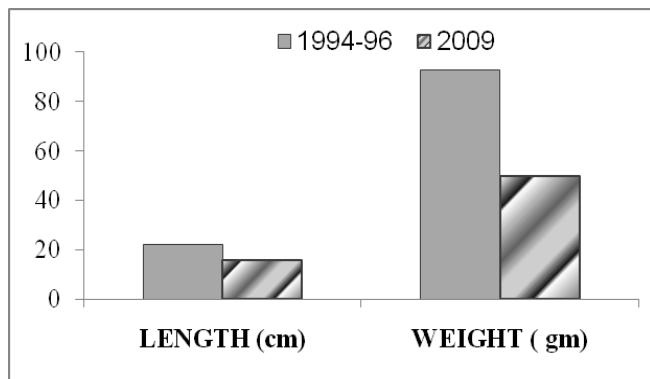


Figure 4: Comparison of average length and weight of *O. mossambicus* at Spot 4 in 1994-96 and 2009.

DISCUSSION

Fishes are now considered as the best indicators of the environment quality criteria [19]. Fishery scientists also use condition factor of fish as a simple indication to test the suitability of an environment [20]. The present study was also conducted to estimate the water quality in Malir River by studying length and weight of *Oreochromis mossambicus* at various spots in upper and lower Malir River.

During the study, analysis of length and weight has been done primarily to describe their relationship and secondarily to measure the variation from the expected weight of an individual or population as described by Parkar and Larkin [21]; Ricker [22].

The variation and irregular pattern of length and weight data of *Oreochromis mossambicus* shows that the growth of this fish may be affected by the variations in the physico-chemical conditions in Malir River. The data showed that the spot 3 (Drigh Road) in Malir River has higher growth rate of *O. mossambicus* as compared to other studied spots specially spot 4 in lower Malir River where the growth of fish is very poor. This spot is located near the major industrial area and was reported to be more polluted as compared to spot 3 [17]. This spot is also reported to have high levels of ammonium [17] which has a toxic effect to aquatic life [23]. It appeared that the good water quality at Spot 3 was supporting the higher fish growth at this spot.

The recent study data shows decline in the growth of *O. mossambicus* at Spot 4 in the lower Malir River. This indicates the deteriorating water condition at this spot which requires immediate attention. The data reflects the condition of aquatic life in lower Malir River & hence can be used in the management of pollution in this important river in future.

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Received on 23-11-2011

Accepted on 25-12-2011

Published on 28-02-2012

DOI: <http://dx.doi.org/10.6000/1927-5129.2012.08.01.26>© 2012 Bano *et al.*; Licensee Lifescience Global.

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