# RESULTS

## I- Physico-chemical parameters:

### 1-Water temperature:

The lowest average value of water temperature was recorded during PFS (21.5 ˚C), while the highest average value was recorded during FS (23.2 ˚C). At all the collected stations, the highest value of water temperature was recorded at Station IN of Gurf Hussein during PFS, while the lowest was represented at Station IIN of Gurf Hussein during PFS (Table, 2 and Figure, 3).

### 2-Transparency:

Transparency decreased considerably from the northern part to the southern one of Lake Nasser (Table, 3 and Figure, 4). The highest average value of transparency (2.60 m) has been recorded at Khor El-Ramla, while the lowest average value (1.11 m) was recorded at Tushka West.

The lowest average value was recorded during FS (1.95 m) and the highest one (2.19 m) was recorded during PFS. The values of transparency varied from khor to other. At Khor El-Ramla, the highest average value (2.63 m) was measured during FS whereas the lowest (2.57 m) during PFS. At all stations of Khor El-Ramla, transparency ranged between 1.2-1.4 m and 1.70-3.00 m at sectors III & II in the northern side and sectors III & I in the southern side during PFS, respectively. During FS, transparency ranged between 2.50-2.75 and 2.35-2.77 m at sectors I & III in the northern side and sectors I & III in the southern sides, respectively.

At Khor Kalabsha, the average value of transparency being 2.32 m with the highest value during FS (2.4 m) and the lowest (2.25 m) during PFS. At all stations of the khor, the values ranged between 1.75-2.75 m and 2.00-2.75 m at sectors I & II and III in the northern side and sectors II & I in the southern one during PFS, respectively. During FS, it fluctuated between 2.25-2.76 m and 1.90-2.50 m at Stations IIIN & IN and Stations IIIS & IS of the khor, respectively.

At Khor Gurf Hussein, the total average value of transparency being 2.53 m with the highest value (3.13 m) during PFS and the lowest one (1.93 m) during FS. The highest values that recorded during PFS

(3.5 m) was found at Station IN, while it decreased to 3 m at the other stations. Transparency decreased sharply in the flood season, ranging between 1.85-2.00 m and 1.89-1.99 m at Stations IN & IIN and Stations IIS & IS, respectively.

At Khor Kurusku, the total average value of transparency was 2.38 m with the lowest average (1.97 m) during PFS and the highest (2.80 m) during FS. The values of transparency in the khor stations fluctuated between 1.80 m at Station IIIS while it increased to 2 m at all the other stations during PFS, whoever, during FS, it was relatively high, ranging between 3-3.04 m and 2.05-3.05 m at Stations IN & IIN and Stations IIS & IS, respectively.

At Khor Tushka East, average value being 1.48 m with the highest average (2.00 m) during PFS and the lowest (0.96 m) during FS. At all the stations sampled, transparency showed the same value (2.00 m) at the two sectors during PFS. These values decreased in the flood season and ranged between 0.90-0.94 m and 0.95-1.04 m at Stations IIN & IN and IIS & IS, respectively.

At Khor Tushka West, the values of transparency reached to its minimum values with average value of 1.11 m. During PFS, it appeared the highest average value (1.23 m) while the lowest value (1.00 m) was recorded during FS. At all the selected stations, it fluctuated in a narrow range being 1-1.5 m and 0.92-1.07 m at southern and northern sides of sector I during PFS and northern side of sector I & southern side of sector III during FS, respectively.

**3-Electrical Conductivity (EC):**

The average values of electrical conductivity in Lake Nasser khors (225 µmhos $cm^{-1}$) were recorded with the highest average value during FS (231 µmhos $cm^{-1}$) and the lowest during PFS (218 µmhos $cm^{-1}$). The highest values of conductivity was recorded in the northern part of the lake at Khor El Ramla (241 µmhos $cm^{-1}$) while the lowest one was recorded in the southern part at Khor Tushka East (213 µmhos $cm^{-1}$). At the remaining khors, it was recorded with high values in the northern khors; Kalabsha (230 µmhos $cm^{-1}$) and Gurf Hussein (243 µmhos $cm^{-1}$), than these in the southern side at Kurusku (215 µmhos $cm^{-1}$) and Tushka West (217 µmhos $cm^{-1}$), as in Table 4 and Figure 5.

At Khor El-Ramla, the highest average value of EC was recorded (241 µmhos $cm^{-1}$) with the highest average value during FS (248 µmhos $cm^{-1}$) and the lowest during PFS (233 µmhos $cm^{-1}$). During PFS, the northern side of the khor recorded the lowest values at Stations II, III and I; while the southern side recorded the highest values at Stations II, I and III. During FS, the lowest value was recorded at Station IIN and the highest value was recorded at Station IIIN.

At Khor Kalabsha, the average value of EC was recorded (230 µmhos $cm^{-1}$) with the highest value during FS (237 µmhos $cm^{-1}$) and the lowest during PFS (223 µmhos $cm^{-1}$). During PFS, the highest values of EC was recorded at Stations IIIN and IN, it decreased at the southern side at Station I and reached to the lowest value at Stations IIS and IIIS. During FS, it was increased and recorded the same value at all stations.

At Khor Gurf Hussein, the average value of EC was recorded (230 µmhos $cm^{-1}$) with similar average during FS (235 µmhos $cm^{-1}$) and PFS (234 µmhos $cm^{-1}$). During PFS, the lowest value was recorded at Station IIS, while the highest value was recorded at all the remaining stations. During FS, the values of EC ranged between 230 µmhos $cm^{-1}$ at Stations IN & IIN and 240 µmhos $cm^{-1}$ at Station IS and IIS.

The average value of EC decreased at Khor Kurusku (215 µmhos $cm^{-1}$) with the highest average value during FS (228 µmhos $cm^{-1}$) and the lowest during PFS (202 µmhos $cm^{-1}$). During PFS, the lowest value was recorded at Station IN, then increased at all the remaining stations. It increased during PFS, the lowest value was recorded at Station IS, then increased to 230 µmhos $cm^{-1}$ at all the remaining stations.

At Khor Tushka East, the highest average value was measured during FS (218 µmhos $cm^{-1}$) whereas the lowest was during PFS (208 µmhos $cm^{-1}$). During PFS, the highest values were recorded at Stations IS & IIS and the lowest one was recorded at Station IN. During FS, the lowest value was recorded at Station IIS and the highest one was recorded at all the remaining stations.

At Khor Tushka West, the average value of EC showed a low average value of 217 µmhos $cm^{-1}$, with the highest value during FS (222 µmhos $cm^{-1}$) and the lowest during PFS (212 µmhos $cm^{-1}$). During PFS, the highest value of EC was recorded at Stations IIN and IS while the lowest one was recorded at all the remaining stations. During FS, the

lowest value was recorded at Station IN, and increased at Stations IS , IIS and IIN, then reached to the highest value at Stations IIN and IIS.

Table (2): Variations of water temperature (˚C) in different localities of Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

| Khor Location | Sector | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 20.3 | 21.2 | 23.2 | 22.6 | 21.8 | 21.9 |
| | II | 21.6 | 20.9 | 22.7 | 22.7 | 22.2 | 21.8 |
| | III | 20.4 | 21.5 | 22.7 | 22.7 | 21.6 | 22.1 |
| Kalabsha | I | 20.1 | 22.7 | 21.8 | 23.0 | 21.0 | 22.9 |
| | II | 22.7 | 21.3 | 22.0 | 23.0 | 22.4 | 22.2 |
| | III | 20.1 | 20.6 | 22.6 | 22.9 | 21.4 | 21.8 |
| Gurf Hussein | I | 26.7 | 20.5 | 22.5 | 23.5 | 24.6 | 22.0 |
| | II | 18.5 | 19.5 | 22.9 | 22.7 | 20.7 | 21.1 |
| Kurusku | I | 21.0 | 21.1 | 22.9 | 24.5 | 22.0 | 22.8 |
| | II | 21.3 | 21.6 | 23.4 | 24.4 | 22.4 | 23.0 |
| | III | 23.4 | 23.6 | 24.3 | 24.3 | 23.9 | 24.0 |
| Tushka East | I | 21.1 | 22.9 | 23.0 | 24.7 | 22.1 | 23.8 |
| | II | 22.4 | 23.9 | 22.8 | 24.0 | 22.6 | 24.0 |
| Tushka West | I | 21.2 | 22.5 | 23.2 | 23.6 | 22.2 | 23.1 |
| | II | 19.8 | 21.5 | 24.3 | 23.0 | 22.1 | 22.3 |
| | III | 19.5 | 20.9 | 22.2 | 22.4 | 20.9 | 21.7 |

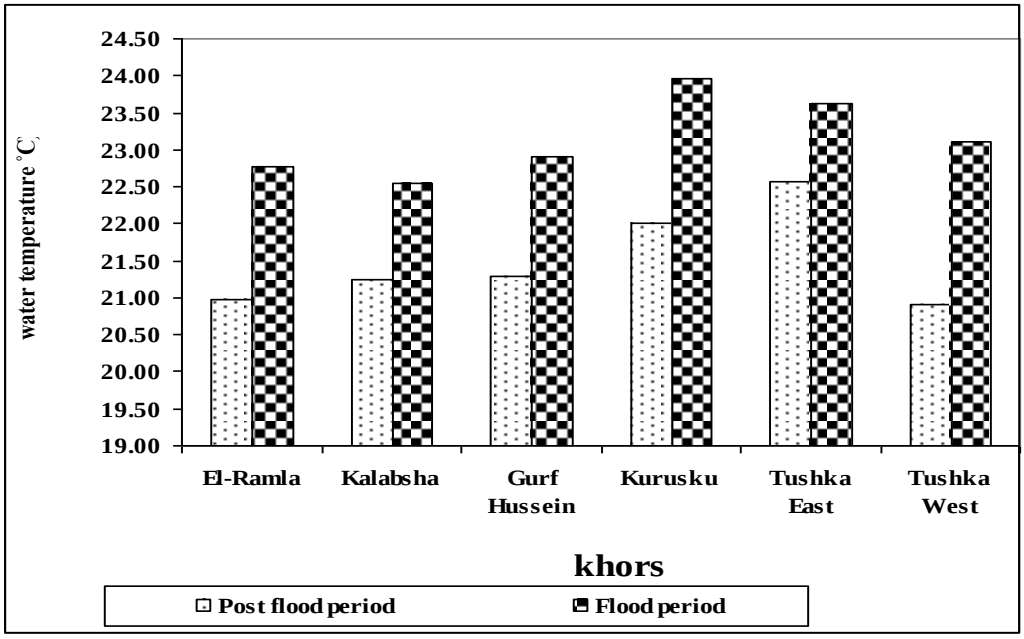


Figure (3): Average values of water temperature in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (3): Variations of transparency (m) in different localities of Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

| Khor Location | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 3.00 | 3.00 | 2.50 | 2.35 | 2.75 | 2.68 |
| | II | 4.00 | 2.50 | 2.66 | 2.74 | 3.33 | 2.62 |
| | III | 1.20 | 1.70 | 2.75 | 2.77 | 1.98 | 2.24 |
| Kalabsha | I | 1.75 | 2.75 | 2.76 | 2.50 | 2.26 | 2.63 |
| | II | 1.75 | 2.00 | 2.68 | 2.30 | 2.22 | 2.15 |
| | III | 2.75 | 2.50 | 2.25 | 1.90 | 2.50 | 2.20 |
| Gurf Hussein | I | 3.50 | 3.00 | 1.85 | 1.99 | 2.68 | 2.50 |
| | II | 3.00 | 3.00 | 2.00 | 1.89 | 2.50 | 2.45 |
| Kurusku | I | 2.00 | 2.00 | 3.00 | 3.05 | 2.50 | 2.53 |
| | II | 2.00 | 2.00 | 3.04 | 2.05 | 2.52 | 2.03 |
| | III | 2.00 | 1.80 | 3.03 | 2.63 | 2.52 | 2.22 |
| Tushka East | I | 2.00 | 2.00 | 0.94 | 1.04 | 1.47 | 1.52 |
| | II | 2.00 | 2.00 | 0.90 | 0.95 | 1.45 | 1.48 |
| Tushka West | I | 1.50 | 1.00 | 0.92 | 0.93 | 1.21 | 0.97 |
| | II | 1.20 | 1.25 | 1.05 | 1.00 | 1.13 | 1.13 |
| | III | 1.25 | 1.20 | 1.00 | 1.07 | 1.13 | 1.14 |

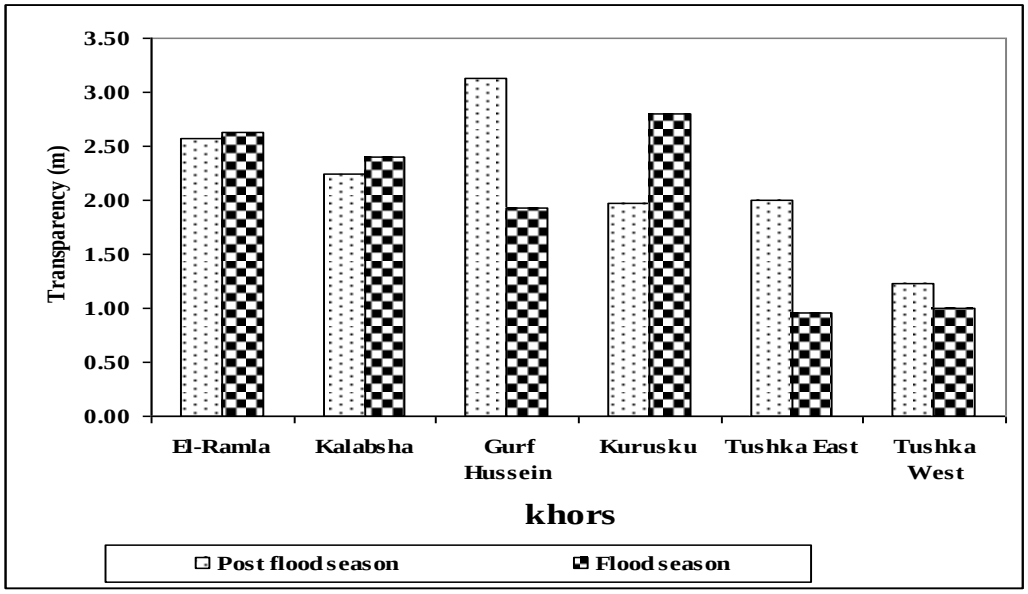


Figure (4): Average values of transparency (m) in Lake Nasser khors during post flood (March, 2006) and flood season (Nov., 2006).

Table (4): Variations of electrical conductivity (µmhos $cm^{-1}$) in different localities of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Khor Location | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 230 | 250 | 240 | 240 | 235 | 245 |
| | II | 215 | 221 | 230 | 240 | 223 | 231 |
| | III | 221 | 260 | 300 | 240 | 261 | 250 |
| Kalabsha | I | 230 | 221 | 220 | 240 | 225 | 231 |
| | II | 215 | 221 | 240 | 240 | 228 | 231 |
| | III | 235 | 215 | 240 | 240 | 238 | 228 |
| Gurf Hussein | I | 235 | 235 | 230 | 240 | 233 | 238 |
| | II | 235 | 230 | 230 | 240 | 233 | 235 |
| Kurusku | I | 210 | 200 | 230 | 220 | 220 | 210 |
| | II | 200 | 200 | 230 | 230 | 215 | 215 |
| | III | 200 | 200 | 230 | 230 | 215 | 215 |
| Tushka East | I | 200 | 215 | 220 | 220 | 210 | 218 |
| | II | 215 | 200 | 220 | 210 | 218 | 205 |
| Tushka West | I | 210 | 215 | 210 | 220 | 210 | 223 |
| | II | 215 | 210 | 220 | 220 | 218 | 215 |
| | III | 210 | 210 | 230 | 230 | 220 | 220 |

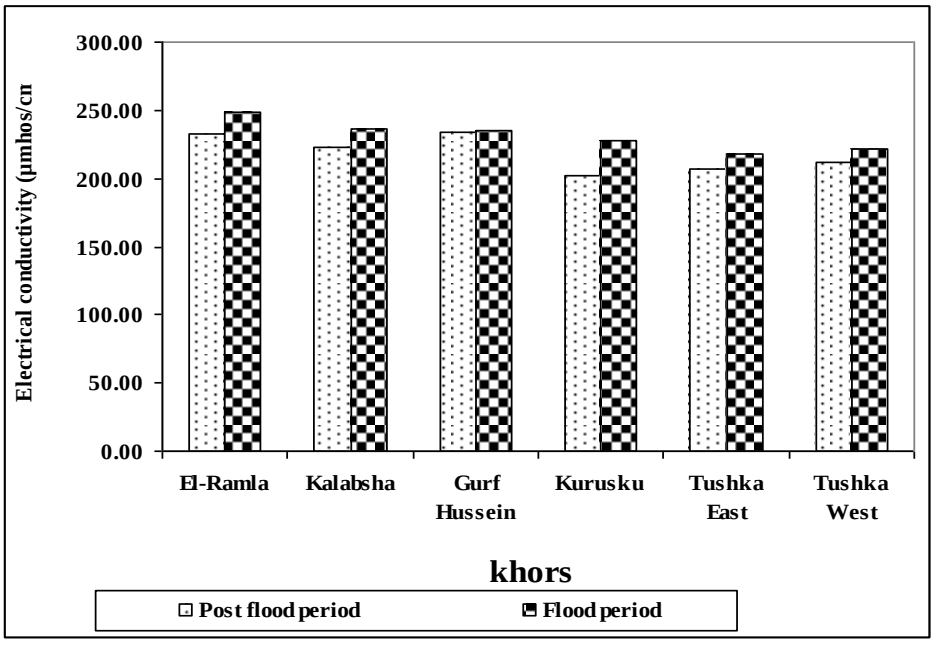


Figure (5): Average values of electrical conductivity (µmhos $cm^{-1}$) in Lake Nasser khors during post flood season (March, 2006) an flood season (Nov., 2006).

## 4-Total Solids (TS):

The average value of TS in Lake Nasser was 159 mg $1^{-1}$, with the highest average value during FS (165 mg $1^{-1}$) and the lowest one during PFS (152 mg $1^{-1}$). The values of TS varied from khor to other.

At Khor El-Ramla, it was 165 mg $1^{-1}$, with the highest average during FS (166 mg $1^{-1}$) and the lowest during post flood (163 mg $1^{-1}$). At all stations sampled, the maximum value was measured during PFS at IIIS while the lowest was measured at IIN. At the remaining stations, it fluctuated between 155-160 mg $1^{-1}$ and 155-175 mg $1^{-1}$; while during FS, the highest values was recorded at sectors I & III of the southern side (Table 5 & Figure 6).

The highest value was recorded at Khor Gurf Hussein (168 mg $1^{-1}$) with the maximum value (171 mg $1^{-1}$) during FS and the minimum (164 mg $1^{-1}$) during PFS. During PFS, Station IIS sustained the lowest value while the highest value was measured at all the remaining stations. During flood season, TS ranged between 170-180 and 160-175 mg $1^{-1}$ at sectors II & I of the northern side and sectors I & II of the southern one, respectively.

At Khor Kalabsha, the average values of TS showed slightly decrease (158 mg $1^{-1}$) with the highest average value during FS (160 mg $1^{-1}$) and the lowest during PFS (156 mg $1^{-1}$). At all the recorded stations, the values of TS decreased gradually from the entrance to the end of the khor.

At Khor Kurusku, the average value of TS (157 mg $1^{-1}$) was recorded with the lowest average during PFS (138 mg $1^{-1}$) and the highest during FS (176 mg $1^{-1}$). During PFS, the values of TS decreased gradually toward the end of the khor, while during FS it recorded the highest values at the southern side of the khor.

At Khor Tushka East, the average value of TS decreased to 155 mg $1^{-1}$, with the minimum average value (146 mg $1^{-1}$) during PFS and the maximum (146 mg $1^{-1}$) during FS. During PFS, it ranged between 145-150 mg $1^{-1}$ and 140-150 mg $1^{-1}$. During FS, TS increased and fluctuated between 160-163 mg $1^{-1}$ and 152-180 mg $1^{-1}$.

At Khor Tushka West, the values of TS reached its minimum average values of the lake (150 mg $1^{-1}$) with the highest average value during FS (153 mg $1^{-1}$) and the lowest one (147 mg $1^{-1}$) during PFS.

Table (5): Variations of total dissolved solids (mg $1^{-1}$) in different localities of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Khor Location | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 160 | 175 | 152 | 180 | 156 | 178 |
| | II | 150 | 155 | 160 | 160 | 155 | 158 |
| | III | 155 | 185 | 166 | 180 | 161 | 183 |
| Kalabsha | I | 160 | 155 | 170 | 160 | 165 | 158 |
| | II | 150 | 155 | 165 | 160 | 158 | 158 |
| | III | 165 | 150 | 148 | 158 | 157 | 154 |
| Gurf Hussein | I | 165 | 165 | 180 | 160 | 173 | 163 |
| | II | 165 | 160 | 170 | 175 | 168 | 168 |
| Kurusku | I | 145 | 140 | 180 | 180 | 163 | 160 |
| | II | 140 | 135 | 168 | 180 | 154 | 158 |
| | III | 135 | 135 | 162 | 185 | 149 | 160 |
| Tushka East | I | 145 | 150 | 160 | 152 | 153 | 151 |
| | II | 150 | 140 | 163 | 180 | 157 | 160 |
| Tushka West | I | 145 | 150 | 180 | 135 | 163 | 143 |
| | II | 150 | 145 | 153 | 130 | 152 | 138 |
| | III | 145 | 145 | 172 | 150 | 159 | 148 |

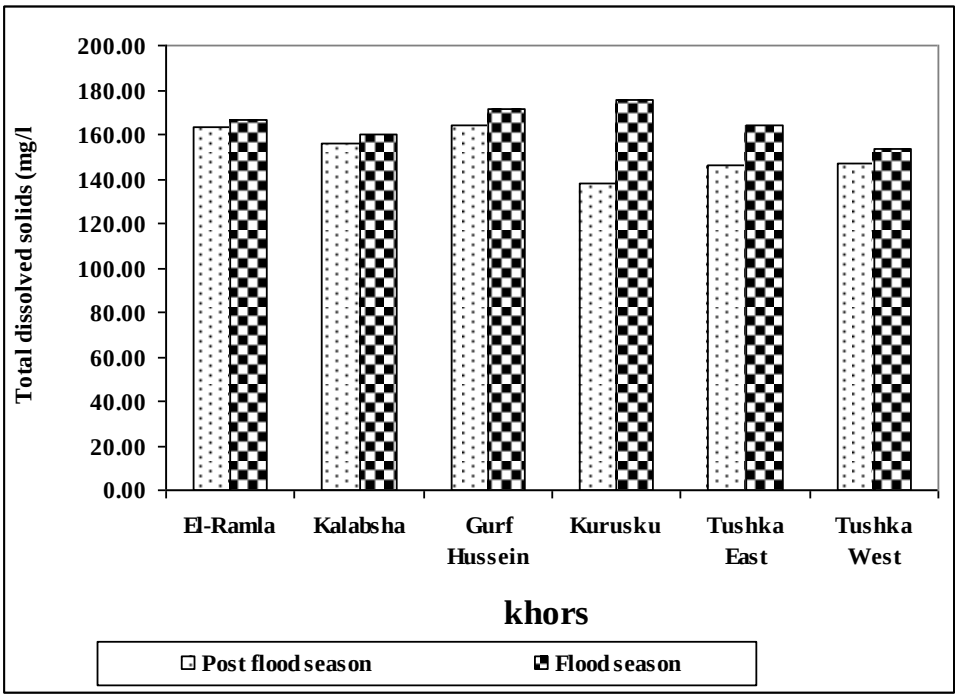


Figure (6): Average values of total dissolved solids (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

## 5-Hydrogen Ion Concentration (pH):

pH in Lake Nasser ranged between 7.82 and 9.50. The average value was 8.78, with the highest average during PFS (8.80) and the lowest during FS (8.75). The average values of pH varied from khor to another. The highest value was measured at Khor Gurf Hussein while the lowest one was measured at Khor Kurusku (Table 6 and Figure 7).

At Khor El-Ramla, the average value of pH was 8.78 with the highest average value during PFS (8.82) and the lowest during FS (8.74). During PFS at the northern side of the khor, the values increased gradually from beginning to end of the khor. In vice versa, at the southern side the values decreased gradually to end of the khor. During FS, the highest values were recorded at sector I and the lowest at sector II.

At Khor Kalabsha, the average value of pH was 8.77 with the highest average value during PFS (8.79) and the lowest during FS (8.74). During FS, the values at the northern side increased gradually from beginning to end of the khor, while at the southern side the values decreased from Station I to the lowest at Station II then it increased again at Station III. During FS, the lowest value of the northern side was recorded at Station II and increased to the highest at Station III, while at the southern side the values decreased gradually from beginning to end of the khor.

The highest average value of pH was recorded at Khor Gurf Hussein with the lowest value was measured during PFS (8.53), while the highest average was during FS (9.16).

The lowest average value of pH was recorded at Khor Kurusku with the highest value during PFS (8.92) and the lowest during FS (8.51). During PFS, the lowest value at the northern side was measured at sector III, then increased at sectors I & II; while these values increased at the southern side at sectors II, I and III. During FS, the values increased gradually at the northern side from beginning to end while at the southern side its values was 8.52 at sector I, then decreased at sector II and increased again to its highest value.

At Khor Tushka West, the average value of pH was 8.78 with more or less similar average values during PFS (8.79) and FS (8.78). During PFS, the highest and lowest values of pH was found at Stations IN and IIN; in vice versa, at the southern side the highest value was recorded at

Station IIS and the lowest at Station IS. During FS the values increased gradually from beginning to end of the khor.

Table (6): Variations of pH in the studied area of Lake Nasser khors during the post flood season (March, 2006) and flood season (Nov., 2006).

| Khor Location | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 8.70 | 8.97 | 8.81 | 8.69 | 8.76 | 8.83 |
| | II | 8.75 | 8.88 | 8.72 | 8.71 | 8.74 | 8.80 |
| | III | 8.77 | 8.84 | 8.75 | 8.74 | 8.76 | 8.79 |
| Kalabsha | I | 8.77 | 8.83 | 8.69 | 8.80 | 8.73 | 8.82 |
| | II | 8.78 | 8.71 | 8.64 | 8.78 | 8.71 | 8.75 |
| | III | 8.91 | 8.76 | 8.81 | 8.73 | 8.86 | 8.75 |
| Gurf Hussein | I | 8.82 | 8.73 | 8.92 | 8.90 | 8.87 | 8.82 |
| | II | 7.82 | 8.73 | 9.50 | 9.30 | 8.66 | 9.02 |
| Kurusku | I | 8.89 | 9.00 | 8.40 | 8.52 | 8.65 | 8.76 |
| | II | 8.89 | 8.93 | 8.46 | 8.46 | 8.68 | 8.70 |
| | III | 8.81 | 9.02 | 8.61 | 8.63 | 8.71 | 8.83 |
| Tushka East | I | 8.84 | 8.82 | 8.50 | 8.61 | 8.67 | 8.72 |
| | II | 8.91 | 9.14 | 8.59 | 8.73 | 8.75 | 8.94 |
| Tushka West | I | 8.89 | 8.70 | 8.60 | 8.64 | 8.75 | 8.67 |
| | II | 8.62 | 8.92 | 8.81 | 8.77 | 8.72 | 8.85 |
| | III | 8.73 | 8.85 | 8.90 | 8.93 | 8.82 | 8.89 |

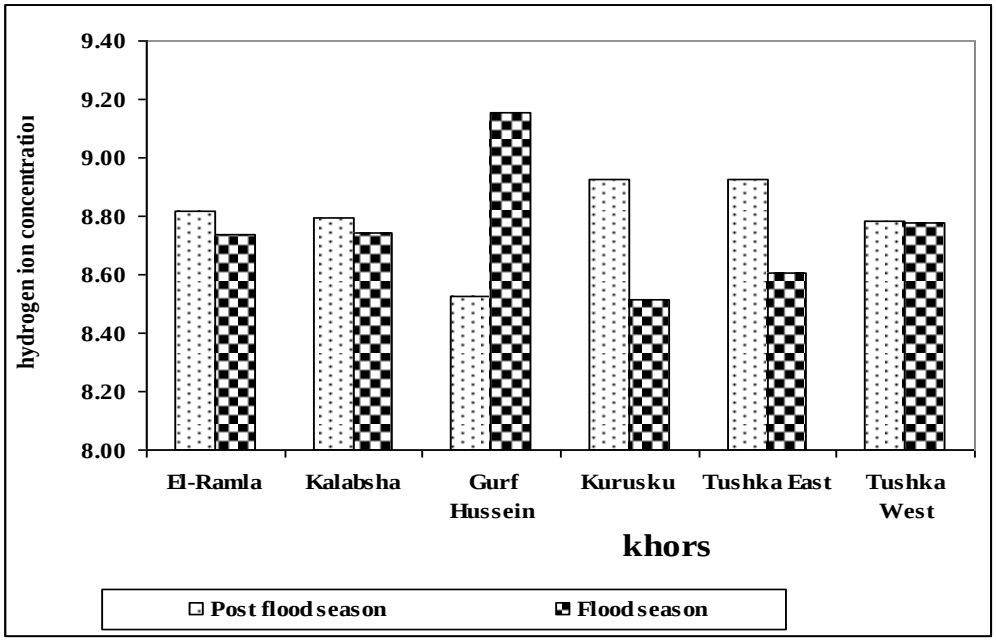


Figure (7): Average values of hydrogen ion concentration in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

**6-Dissolved Oxygen (DO):**

Dissolved oxygen in Lake Nasser showed relatively increasing during FS compared to PFS. The highest and the lowest average values being 10.60 and 8.27 mg $1^{-1}$ at the northern sides of Gurf Hussein and Kurusku khors, respectively (Table 7 and Figure 8).

At Khor El-Ramla, the average value of DO (9.15 mg $1^{-1}$) was measured with the lowest average (7.80 mg $1^{-1}$) during PFS and the highest one (10.49 mg $1^{-1}$) during FS. During PFS, DO appeared with maximum peak in sectors I & III. During FS, DO showed a relatively increase at the northern side.

The average value of the DO at Khor Kalabsha (9.75 mg $1^{-1}$) reached its highest average value during FS (10.91 mg $1^{-1}$) and lowest (8.60 mg $1^{-1}$) during PFS. Sector I of the khor recoded the highest value. The lowest value was recorded at Stations IIN & IIIN. During FS, the values of DO fluctuated between 9.96 mg $1^{-1}$ at Station IIN and 11.73 mg $1^{-1}$ at Station IIS.

At Khor Gurf Hussein, the average value of DO recorded a relatively increase (10.13 mg $1^{-1}$) with the highest average during FS (11.47 mg $1^{-1}$) and the lowest average during PFS (8.80 mg $1^{-1}$). During PFS, sector I encountered the lowest values, while sector II recorded the highest one. In vice versa, during FS the highest value was recorded in sector I whereas the lowest one was recorded in sector II.

At Khor Kurusku, the average value of DO was 9.07 mg $1^{-1}$. This khor recorded its highest average value during PFS (9.60 mg $1^{-1}$) and lowest during FS (8.53 mg $1^{-1}$). During PFS, the highest value was found at Stations IIN and the lowest values were recorded at IIIN. During FS, DO decreased from beginning to end of the khor.

The highest average value of the studied khors appeared at Khor Tushka East (10.21 mg $1^{-1}$) with the highest average value during FS (10.22 mg $1^{-1}$). During PFS, DO fluctuated between 9.60 and 10.8 mg $1^{-1}$ while it increased during FS reaching to 10.67-11.38 mg $1^{-1}$.

At Khor Tushka West, the average value of DO was 9.60 mg $1^{-1}$. The highest average was measured during FS (10.87 mg $1^{-1}$) and the lowest during PFS (8.33 mg $1^{-1}$). During PFS, the lowest value of DO was 7.60 mg $1^{-1}$ it fluctuated between 10.67 mg $1^{-1}$ and 11.73 mg $1^{-1}$.

## 7-Chemical Oxygen Demand (COD):

The average value of COD in Lake Nasser khors was 5.35 mg $1^{-1}$. It showed remarkable decrease during FS compared to PFS.

The highest average concentration of COD was recorded at Khor El-Ramla (5.71 mg $1^{-1}$) with maximum average during PFS (6.91 mg $1^{-1}$) and minimum (4.51 mg $1^{-1}$) during FS. During PFS, the values of COD fluctuated between 6.30 and 7.83 mg $1^{-1}$. The values decreased during FS recording its minimum value of the khor at Station IN.

Khor Kalabsha recorded high average value of COD (5.70 mg $1^{-1}$) with the maximum value during PFS (7.60 mg $1^{-1}$) and the minimum during FS (3.81 mg $1^{-1}$). At all stations selected from the this khor, the values of COD decreased gradually at the northern side from beginning to end of the khor, while at the southern side it increased from Station IS to Station IIS then decreased at Station IIIS. During FS, the values showed a remarkable decrease, being the lowest value at Station IIIN, whereas at the southern side the highest value was recorded at Station IS (Table 8 & Figure 9).

At Khor Gurf Hussein, the average value of COD concentration was 5.38 mg $1^{-1}$ with the highest average value during PFS (7.4 mg $1^{-1}$) and the lowest (3.63 mg $1^{-1}$) during FS. During PFS, the values of COD increased from Station IN to Station IIN at the northern side. On the vice verse it decreased from Station IS to Station IIS at the southern side. During FS, the values decreased from Station IN to Station IIN at the northern side but at southern side it increased from Station IN to Station IIN.

At Khor Kurusku, the average value of COD was 5.47 mg $1^{-1}$ with the highest average value during PFS (7.57 mg $1^{-1}$) and the lowest (3.37 mg $1^{-1}$) during FS. At all the selected stations, during PFS, the highest values were recorded at Sector II, while the lowest values were recorded at sector I. During FS, the values at the northern side decreased gradually from begging to end of the khor.

At Khor Tushka East, the average value of COD was 5.15 mg $1^{-1}$ with maximum average (9.35 mg $1^{-1}$) during PFS and the minimum one (0.96 mg $1^{-1}$) during FS. During PFS, the highest value was recorded at Station IN and decreased by about two folds at Station IIN, but at the other side, the highest value was recorded at Station IIS. It decreased by

about two folds at Station IS. During FS, the lowest value was recorded at Station IN and Station IS then increased at Station IIN & IIS.

Khor Tushka West had the lowest average value of COD (4.70 mg $1^{-1}$) with the highest value (7.46 mg $1^{-1}$) during PFS and the lowest (3.25 mg $1^{-1}$) during FS. At all the selected station, during PFS, the lowest values were recorded at Stations IIN & IIS. During FS, the highest value was found at Stations IIN and IS while the lowest one were recoded at Stations IIIN & IIIS.

Table (7): Variations of dissolved oxygen (mg $1^{-1}$) in the studied area at Lake Nasser during post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 7.60 | 8.80 | 11.02 | 9.60 | 9.31 | 9.2 |
| | II | 6.80 | 7.20 | 11.38 | 10.31 | 9.09 | 8.755 |
| | III | 8.40 | 8.00 | 9.96 | 10.67 | 9.18 | 9.335 |
| Kalabsha | I | 8.40 | 9.20 | 10.31 | 11.38 | 9.355 | 10.29 |
| | II | 8.00 | 8.80 | 9.96 | 11.73 | 8.98 | 10.265 |
| | III | 8.00 | 9.20 | 11.38 | 10.67 | 9.69 | 9.935 |
| Gurf Hussein | I | 8.40 | 8.80 | 12.80 | 11.73 | 10.6 | 10.265 |
| | II | 8.80 | 9.20 | 10.31 | 11.02 | 9.555 | 10.11 |
| Kurusku | I | 8.80 | 10.80 | 9.60 | 8.18 | 9.2 | 9.49 |
| | II | 10.40 | 10.00 | 8.89 | 8.18 | 9.645 | 9.09 |
| | III | 8.00 | 9.60 | 8.53 | 7.82 | 8.265 | 8.71 |
| Tushka East | I | 10.00 | 10.40 | 10.67 | 9.60 | 10.335 | 10 |
| | II | 9.60 | 10.80 | 11.38 | 9.24 | 10.49 | 10.02 |
| Tushka West | I | 8.80 | 7.60 | 10.67 | 10.31 | 9.735 | 8.955 |
| | II | 8.00 | 8.80 | 11.73 | 10.45 | 9.865 | 9.625 |
| | III | 8.40 | 8.40 | 10.67 | 11.38 | 9.535 | 9.89 |

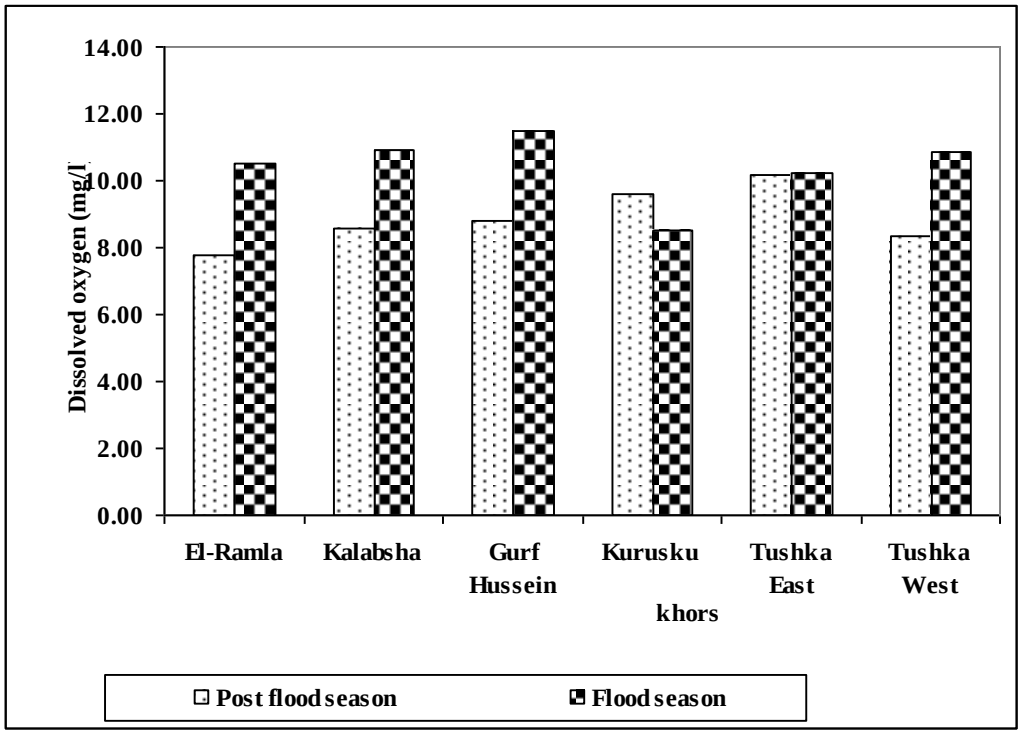


Figure (8): Average values of dissolved oxygen (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (8): Variations of chemical oxygen demand (mg $1^{-1}$) in the studied area of Lake Nasser khors during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Sector | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 7.83 | 6.52 | 3.60 | 5.60 | 5.715 | 6.06 |
| | II | 6.30 | 5.44 | 5.44 | 5.20 | 5.87 | 5.32 |
| | III | 7.20 | 8.15 | 5.20 | 2.00 | 6.2 | 5.075 |
| Kalabsha | I | 5.03 | 7.50 | 3.88 | 4.20 | 4.455 | 5.85 |
| | II | 9.20 | 7.63 | 4.00 | 3.55 | 6.6 | 5.59 |
| | III | 9.43 | 6.82 | 3.20 | 4.00 | 6.315 | 5.41 |
| Gurf Hussein | I | 7.86 | 7.03 | 3.20 | 4.20 | 5.53 | 5.615 |
| | II | 8.98 | 4.70 | 2.80 | 4.30 | 5.89 | 4.5 |
| Kurusku | I | 5.86 | 6.41 | 4.40 | 3.60 | 5.13 | 5.005 |
| | II | 9.78 | 7.90 | 3.00 | 2.00 | 6.39 | 4.95 |
| | III | 8.66 | 6.83 | 2.40 | 4.80 | 5.53 | 5.815 |
| Tushka East | I | 14.23 | 5.12 | 0.80 | 0.80 | 7.515 | 2.96 |
| | II | 7.08 | 10.95 | 1.20 | 1.05 | 4.14 | 6 |
| Tushka West | I | 5.82 | 5.58 | 3.60 | 4.00 | 4.71 | 4.79 |
| | II | 3.90 | 3.75 | 4.00 | 3.40 | 3.95 | 3.575 |
| | III | 10.65 | 7.31 | 1.20 | 3.20 | 5.925 | 5.255 |

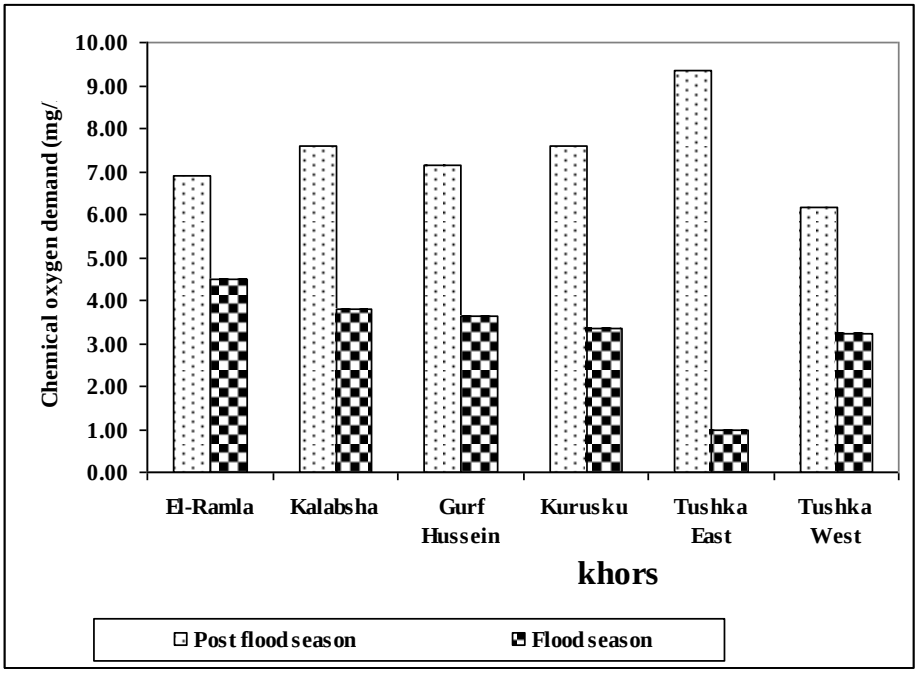


Figure (9): Average values of chemical oxygen demand (mg $1^{-1}$) in Lake Nasser khors during post flood (March, 2006) and flood season (Nov., 2006).

## 8-Alkalinity:

### A-Carbonate Alkalinity:

The average value of carbonate was 11.45 mg $1^{-1}$, with highest value during FS (13.24 mg $1^{-1}$) and lowest during PFS (9.67 mg $1^{-1}$).

During FS, it showed a remarkable increase of carbonate concentrations with the highest value at Tushka East and Tushka West, while the lowest value was recorded during PFS at Khor El-Ramla and Khor Tushka West (Table 9 and Figure 10).

During PFS, carbonate disappeared from many stations at middle and southern khors; Gurf Hussein (IN) and Tushka West (IIN & IIIN and all stations of the southern side). Also during FS, it disappeared from Kurusku (IN, IIN, IS & IIS) and Tushka West (IIN, IIIN, IS & IIS).

### B-Bicarbonate Alkalinity

At all the selected stations during both PFS and FS, bicarbonate concentration fluctuated between 84 and 264 mg $1^{-1}$ (Table10and Figure 11). The average of bicarbonate in Lake Nasser khors was 145.92 mg $1^{-1}$ with the highest values during FS and the lowest during PFS.

The highest average value of bicarbonate (168.52 mg $1^{-1}$) was recorded at Khor El Ramla with the highest value during FS (215.37 mg $1^{-1}$) and the lowest during PFS (109.67 mg $1^{-1}$). During PFS, at the north, the values decreased gradually from beginning to end of the khor while at the southern side, the values reversed. During FS, the values of bicarbonate increased with the highest values at Stations IN and IIIN, while the lowest one was recorded at Station IIN. In vice versa, at the southern side, the lowest values were recorded at Stations IS and IIIS while the highest value was recorded at Station IIS.

At Khor Kalabsha, the average value of bicarbonate was 162.25 mg $1^{-1}$ with the highest average during FS (215.37 mg $1^{-1}$) and the lowest during PFS (97 mg $1^{-1}$). During PFS, the lowest values were recorded at Station IIS, while the highest values were recorded at sector III. During FS, the lowest values were recorded at Stations IN & IIIN and the highest at Station IIN. In vice versa, at the southern side, the lowest value was recorded at Station IIS and the highest value was recorded at Stations IS and IIIS.

The average value of bicarbonate at Khor Gurf Hussein was 147.83 mg $1^{-1}$) with the highest during FS (189.15 mg $1^{-1}$) and the lowest during

PFS (106 mg $1^{-1}$). During PFS, the highest value was recorded in sector I while the lowest was recorded at the end of the khor. During FS, the values of bicarbonate showed a relatively increase and recorded the highest values at Stations IN and IS and the lowest at Stations IIN & IIS.

At Khor Kurusku, the average value decreased (135.45 mg $1^{-1}$) with the highest average value during FS (173.91 mg $1^{-1}$) and the lowest during PFS (97 mg $1^{-1}$). During PFS, the lowest values were recorded at Stations IIN & IIS while the highest were recorded at Stations IIIN & IIIS. Stations IN & IS recorded a moderate values. During FS, the lowest value of the northern side was recorded at Stations IN & IIN and the highest was recorded at Station IIIN. On the other side, the lowest values were recorded at Stations IS & IIS and the highest at Station IIIS.

The lowest average value of bicarbonate (126.71 mg $1^{-1}$) was recorded at Khor Tushka East with the highest average value during FS (161.42 mg $1^{-1}$) and the lowest during PFS (92 mg $1^{-1}$). During PFS, the values decreased from beginning to end of the khor. During FS, the lowest value was recorded at the northern side in Stations IN and IIN. It increased at the southern side at Station I reaching to the highest value at Station II.

At Khor Tushka West, the average value of bicarbonate was 140.78 mg $1^{-1}$ with the highest average during FS (161.9 mg $1^{-1}$) and the lowest during PFS (119.67 mg $1^{-1}$). During the two seasons, the values of bicarbonate increased gradually from begging to end of the khor.

**9-Sulphate**:

The average value of sulphate in Lake Nasser was 15.55 mg $1^{-1}$. The highest average value (15.81 mg $1^{-1}$) was found during FS and the lowest (15.29 mg $1^{-1}$) during PFS. Sulphate concentrations increased gradually from the northern to the southern khors as in Table 11 & Figure 12.

At Khor El-Ramla, the average value of sulphate was 14.35 mg $1^{-1}$, with the highest average value during FS (15.27 mg $1^{-1}$) and the lowest during PFS (13.43 mg $1^{-1}$). During PFS, it decreased gradually from beginning to end of the khor at the north. At the southern side, it decreased from Station IS to Station IIS and increased again at Station IIIS. During FS, it increased from beginning to end at the northern side and vice versa at the southern side.

At Khor Kalabsha, the average value of sulphate was 14.7 mg $1^{-1}$, with the highest average (15.21 mg $1^{-1}$) during FS and the lowest (14.21 mg $1^{-1}$) during PFS. During PFS, it decreased from Station IN to Station IIN and increased again at Station IIIN in the north; while at the southern side, it increased from beginning to end of the khor. During FS, it decreased from beginning to end of the khor.

At Khor Gurf Hussein, the lowest average value of sulphate was 13.86 mg $1^{-1}$, with the highest average (13.91 mg $1^{-1}$) during PFS and the lowest (13.18 mg $1^{-1}$) during FS. During PFS, sulphate values were 13.77 and 14.04 mg $1^{-1}$ at the northern and southern sides with the same value at all stations; while during FS, it fluctuated between 13.23 and 15.22 mg $1^{-1}$ at Stations IS and IIS, respectively.

At Khor Kurusku, the average value of sulphate increased compared to the other khors (16.41 mg $1^{-1}$) with the minimum average value during PFS (14.81 mg $1^{-1}$) and the maximum average during FS (18.02 mg $1^{-1}$). During PFS, the values of the northern side increased from beginning to the end; while at the southern side the highest values were recorded at Stations IS & IIIS and the lowest at Station IIS. During FS, the values of sulphate showed a relatively increase, the values increased gradually from beginning to the end at the northern side while at the southern side.

A glance to Khor Tushka East, the highest average value of sulphate was measured (17.16 mg $1^{-1}$), with the highest value during PFS (17.64 mg $1^{-1}$) and the lowest during FS (16.67 mg $1^{-1}$). During PFS, the highest values were recorded at the northern side. During FS, the highest value of sulphate was recorded at Station IS.

Tushka West recorded the average value of sulphate being 16.79 mg $1^{-1}$. It showed a relatively increase during PFS (17.72 mg $1^{-1}$) than during FS (15.87 mg $1^{-1}$). During PFS, the values of sulphate showed similar values and varied in a narrow range at the south. Whereas at the northern side, the lowest value was recorded at Station IIN and increased at Stations IN & IIIN. During FS, the values decreased with the highest value at Station IIN and the lowest at Stations IN & IIIN, these values decreased at the southern side with highest value at Station IS and the lowest at Stations IIS and IIIS.

Table (9): Variations of carbonate (mg $1^{-1}$) in the studied area of Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 4.00 | 12.00 | 8.67 | 8.67 | 6.34 | 10.34 |
| | II | 8.00 | 4.00 | 17.33 | 8.67 | 12.67 | 6.34 |
| | III | 12.00 | 4.00 | 8.67 | 8.67 | 10.34 | 6.34 |
| Kalabsha | I | 12.00 | 12.00 | 8.67 | 8.60 | 10.34 | 10.30 |
| | II | 14.00 | 16.00 | 17.33 | 17.33 | 15.67 | 16.67 |
| | III | 10.00 | 10.00 | 17.33 | 8.67 | 13.67 | 9.34 |
| Gurf Hussein | I | 0.00 | 16.00 | 8.67 | 8.67 | 4.34 | 12.34 |
| | II | 10.00 | 18.00 | 8.67 | 17.33 | 9.34 | 17.67 |
| Kurusku | I | 10.00 | 8.00 | 0.00 | 0.00 | 5.00 | 4.00 |
| | II | 10.00 | 12.00 | 0.00 | 43.33 | 5.00 | 27.67 |
| | III | 14.00 | 16.00 | 8.67 | 0.00 | 11.34 | 8.00 |
| Tushka East | I | 12.00 | 16.00 | 43.33 | 8.67 | 27.67 | 12.34 |
| | II | 14.00 | 18.00 | 43.33 | 17.33 | 28.67 | 17.67 |
| Tushka West | I | 4.00 | 0.00 | 43.33 | 0.00 | 23.67 | 0.00 |
| | II | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | III | 0.00 | 0.00 | 0.00 | 8.67 | 0.00 | 4.34 |

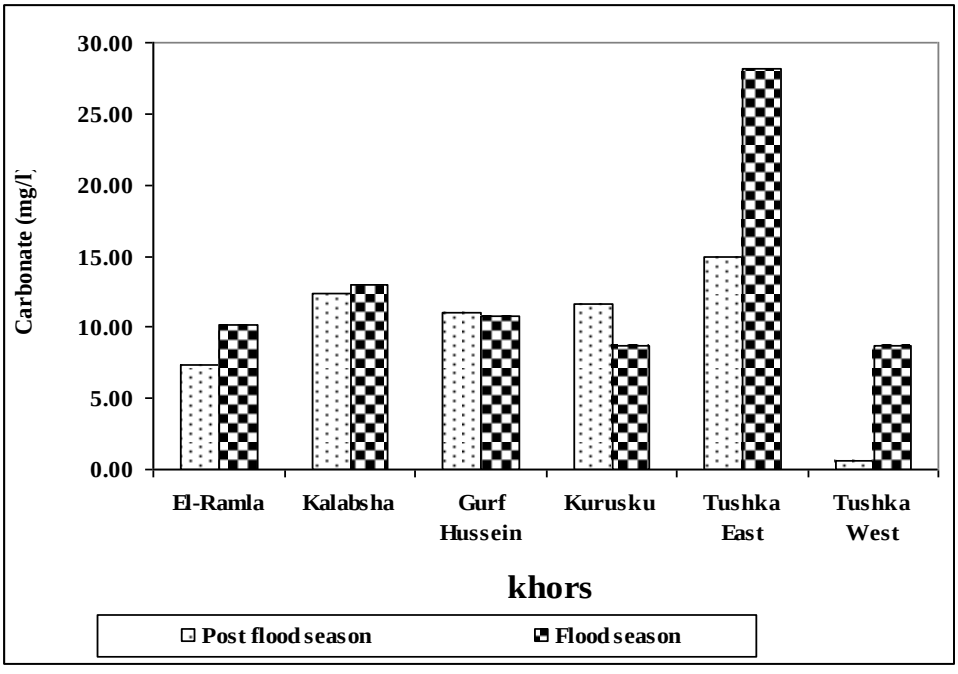


Figure (10): Average values of carbonate alkalinity (mg $1^{-1}$) in Lake Nasser khors during post flood (March, 2006) and flood season (Nov., 2006).

Table (10): Variations of bicarbonate in the studied area of Lake Nasser khors during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 122.00 | 98.00 | 215.80 | 181.13 | 168.90 | 139.57 |
| | II | 108.00 | 116.00 | 187.20 | 267.80 | 147.60 | 191.90 |
| | III | 102.00 | 112.00 | 259.13 | 181.13 | 180.57 | 146.57 |
| Kalabsha | I | 98.00 | 96.00 | 189.80 | 267.80 | 143.90 | 181.90 |
| | II | 98.00 | 84.00 | 265.20 | 187.20 | 181.60 | 135.60 |
| | III | 102.00 | 104.00 | 187.20 | 267.80 | 144.60 | 185.90 |
| Gurf Hussein | I | 130.00 | 100.00 | 198.47 | 189.80 | 164.24 | 144.90 |
| | II | 112.00 | 84.00 | 189.80 | 178.53 | 150.90 | 131.27 |
| Kurusku | I | 94.00 | 102.00 | 173.33 | 164.67 | 133.67 | 133.34 |
| | II | 92.00 | 86.00 | 173.33 | 160.33 | 132.67 | 123.17 |
| | III | 108.00 | 100.00 | 181.13 | 190.66 | 144.57 | 145.33 |
| Tushka East | I | 102.00 | 88.00 | 143.00 | 172.47 | 122.50 | 130.24 |
| | II | 92.00 | 86.00 | 143.00 | 187.20 | 117.50 | 136.60 |
| Tushka West | I | 116.00 | 118.00 | 151.67 | 156.00 | 133.84 | 137.00 |
| | II | 120.00 | 120.00 | 164.67 | 161.90 | 142.34 | 140.95 |
| | III | 124.00 | 120.00 | 164.67 | 172.47 | 144.34 | 146.24 |

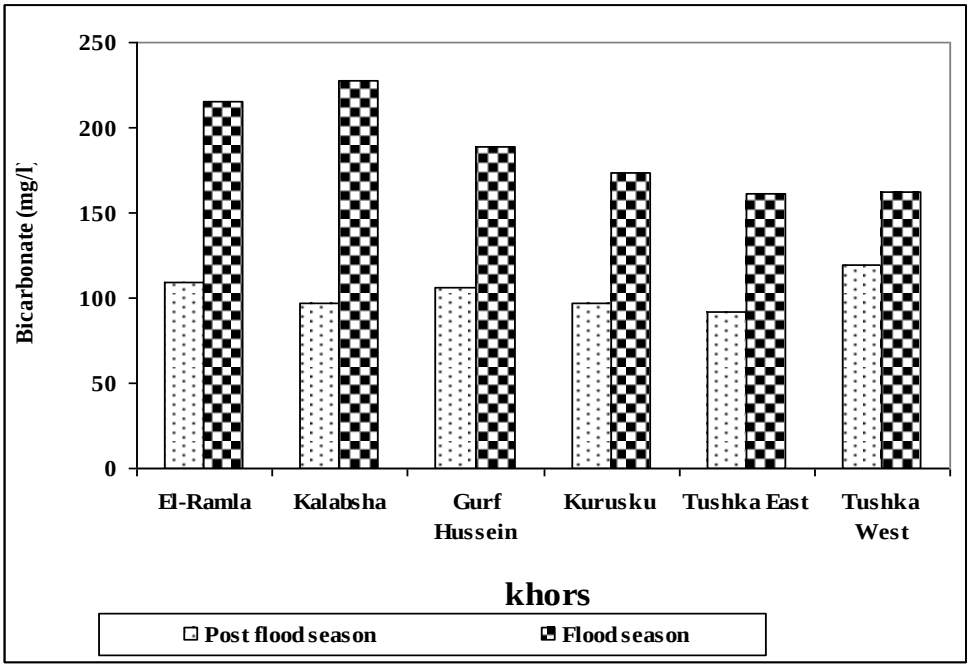


Figure (11): Average values of bicarbonate alkalinity (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (11): Variations of sulphate in the studied area of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 13.52 | 13.78 | 15.22 | 15.35 | 14.37 | 14.57 |
| | II | 13.26 | 13.26 | 15.28 | 15.28 | 14.27 | 14.27 |
| | III | 13.26 | 13.52 | 15.28 | 15.22 | 14.27 | 14.37 |
| Kalabsha | I | 14.19 | 14.19 | 17.29 | 14.84 | 15.74 | 14.52 |
| | II | 13.93 | 14.19 | 16.23 | 14.00 | 15.08 | 14.10 |
| | III | 14.32 | 14.45 | 15.22 | 13.67 | 14.77 | 14.06 |
| Gurf Hussein | I | 13.77 | 14.04 | 13.50 | 13.23 | 13.64 | 13.64 |
| | II | 13.77 | 14.04 | 13.29 | 15.22 | 13.53 | 14.63 |
| Kurusku | I | 14.58 | 15.12 | 16.77 | 19.74 | 15.68 | 17.43 |
| | II | 14.58 | 14.58 | 17.29 | 18.00 | 15.94 | 16.29 |
| | III | 14.85 | 15.12 | 18.00 | 18.29 | 16.43 | 16.71 |
| Tushka East | I | 18.43 | 16.55 | 16.13 | 17.93 | 17.28 | 17.24 |
| | II | 18.15 | 17.45 | 16.35 | 16.26 | 17.25 | 16.86 |
| Tushka West | I | 17.42 | 17.94 | 16.23 | 16.00 | 16.83 | 16.97 |
| | II | 17.68 | 17.68 | 16.38 | 15.09 | 17.03 | 16.39 |
| | III | 17.68 | 17.94 | 16.23 | 15.26 | 16.96 | 16.60 |

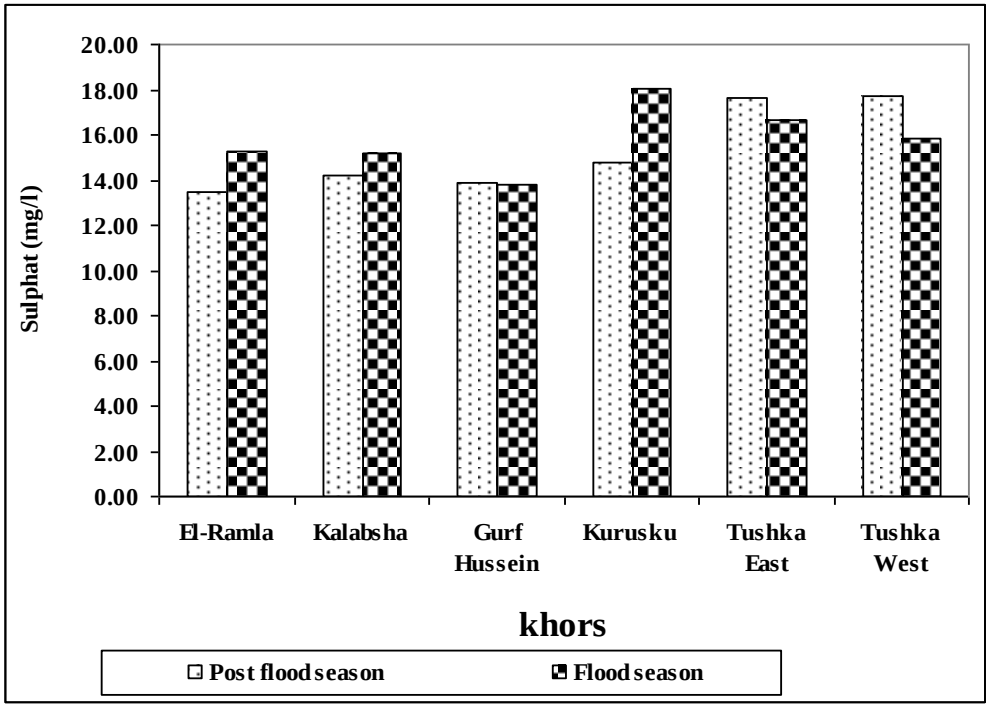


Figure (12): Average values of sulphate (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

**10-Calcium:**

The average value of calcium in Lake Nasser khors was 23.92 mg $1^{-1}$, with the highest average value (26.24 mg $1^{-1}$) during FS and the lowest (21.42 mg $1^{-1}$) during PFS. The values of calcium showed a gradually decrease from the northern to southern khors as in Table 12 & Figure 13.

At Khor El-Ramla the average was 25.01 mg $1^{-1}$, with the highest value during FS (25.7 mg $1^{-1}$) and the lowest during PFS (24.32 mg $1^{-1}$). During PFS, the northern side had high value at Station IIN reaching to the lowest at Station IIIN; while at the southern one, the highest values were recorded at Stations IS and IIIS, while the lowest one was found at Station IIS. During FS, the highest values were recorded at middle of the khor and the lowest value at Station IIIS.

At Khor Kalabsha, the average value was 22.05 mg $1^{-1}$, with the highest during FS (24.34 mg $1^{-1}$) and the lowest during PFS (19.77 mg $1^{-1}$). During PFS, sector II recorded the highest values. During FS, it showed a relatively increase, with high values at the northern side from beginning to end of the khor. While at the southern side, it decreased from Station I to Station II and increased again at Station III.

At Khor Gurf Hussein, the average value was 23.50 mg $1^{-1}$, with the lowest value (22.04 mg $1^{-1}$) during PFS and the highest (24.95 mg $1^{-1}$) during FS. During PFS, the highest value was found at Station IIS and the lowest at IS in the southern side. During FS, the highest value was at Station IIS while the lowest was recorded at all the remaining stations.

At Khor Kurusku, the average was 23.73 mg $1^{-1}$, with the lowest during PFS (21.64 mg $1^{-1}$) and the highest during FS (25.83 mg $1^{-1}$). During PFS, at the northern side, the lowest value was recorded at sector II and the highest at sectors I & III; while the values at the southern one increased gradually from sector I to III. During FS, it ranged between 26.72 and 24.93 mg $1^{-1}$.

At Tushka East, the average value was 24.74 mg $1^{-1}$, with the lowest average during PFS (19.64 mg $1^{-1}$) and the highest during FS (29.83 mg $1^{-1}$). During PFS, the northern side recorded high concentration than the southern side. During FS, the lowest value was found at Station IN and increased at the remaining stations.

At Tushka West, the average value of calcium was 24.51 mg $1^{-1}$, with the highest average value during FS (27.90 mg $1^{-1}$) and the lowest during PFS (21.1 mg $1^{-1}$). During PFS, the values increased from beginning to end of the khor. Whereas, the values increased during FS at the northern side from Station IN to the highest value of the lake at Station IIN then decreased

again at Station IIIN but decreased at the southern side from beginning to end of the khor.

Table (12): Variations of calcium (mg $1^{-1}$) in the studied area of Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 27.25 | 24.05 | 24.93 | 24.93 | 26.09 | 24.49 |
| | II | 28.86 | 20.84 | 28.49 | 26.72 | 28.67 | 23.78 |
| | III | 20.84 | 24.05 | 26.00 | 23.15 | 23.42 | 23.60 |
| Kalabsha | I | 17.64 | 20.84 | 21.37 | 24.93 | 19.50 | 22.89 |
| | II | 20.84 | 22.44 | 23.15 | 23.15 | 22.00 | 22.80 |
| | III | 17.64 | 19.24 | 24.93 | 28.49 | 21.28 | 23.86 |
| Gurf Hussein | I | 22.44 | 19.24 | 24.93 | 24.93 | 23.69 | 22.08 |
| | II | 22.44 | 24.05 | 24.93 | 25.00 | 23.69 | 24.52 |
| Kurusku | I | 20.84 | 20.84 | 26.72 | 24.93 | 23.78 | 22.89 |
| | II | 19.24 | 22.44 | 24.93 | 26.72 | 22.08 | 24.58 |
| | III | 20.84 | 25.65 | 24.93 | 26.72 | 22.89 | 26.19 |
| Tushka East | I | 22.44 | 17.64 | 28.49 | 30.28 | 25.47 | 23.96 |
| | II | 20.84 | 17.64 | 30.28 | 30.28 | 25.56 | 23.96 |
| Tushka West | I | 16.03 | 22.44 | 28.49 | 28.49 | 22.26 | 25.47 |
| | II | 17.64 | 22.44 | 32.06 | 26.72 | 24.85 | 24.58 |
| | III | 19.24 | 28.86 | 26.72 | 24.93 | 22.98 | 26.89 |

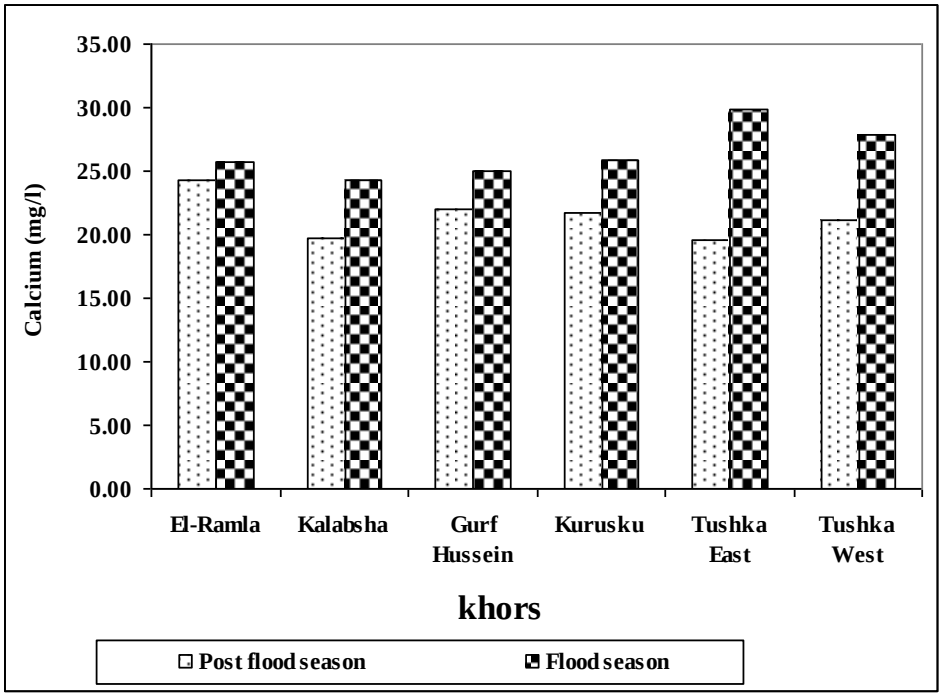


Figure (13): Average values of calcium (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

**11-Magnesium**:

The average value of magnesium concentration was 11.48 mg $1^{-1}$, with the highest average value during PFS (15.14 mg $1^{-1}$) and the lowest during FS (7.82 mg $1^{-1}$) as in Table 13 & Figure 14.

At Khor El Ramla, the average value was 11.60 mg $1^{-1}$, with the highest value during PFS (15.73 mg $1^{-1}$) and the lowest during FS (7.48 mg $1^{-1}$). The highest values were recorded during PFS at Stations IIS and IIIN, while the lowest was recorded at Stations IIN and IIIS. During FS, the values decreased by about two folds.

At Khor Kalabsha, the lowest average value was 16.06 mg $1^{-1}$, with the highest average during PFS (11.64 mg $1^{-1}$) and the lowest during FS (8.47 mg $1^{-1}$). During PFS, the highest value was recorded at Station IN and the lowest at Station IIS. The values decreased during FS. The highest value was measured at Station IN and reached to the lowest value at Stations IIN, IIIN and IIIS.

Khor Gurf Hussein recorded high average concentration of magnesium (12.46 mg $1^{-1}$) with the highest average during PFS (16.98 mg $1^{-1}$) and the lowest during FS (7.95 mg $1^{-1}$). During PFS, it decreased from beginning to end of the khor. During FS, magnesium showed a highly decrease with the highest value at Station IN then decreased at Station IIS and reached to the lowest value at Stations IIN and IS.

The average value of magnesium decreased at Khor Kurusku (10.47 mg $1^{-1}$) with the highest average value during PFS (12.29 mg $1^{-1}$) and the lowest during FS (8.65 mg $1^{-1}$). During PFS, the highest value was recorded at Stations IN, IIN and IS; while the lowest was recorded at Station IIS. During FS, the values at the northern one increased gradually from beginning to end of the khor. In vice versa, it decreased gradually at the same stations of the southern one.

At Tushka East, the average value was 11.48 mg $1^{-1}$, with the highest average value (16.74 mg $1^{-1}$) during PFS and the lowest (6.22 mg $1^{-1}$) during FS. During PFS, the highest values were recorded at sector I while the lowest was recorded at sector II. During FS, the highest value was recorded at Station IN while the lowest was measured at Stations IIN and IS.

Table (13): Variations of magnesium in the studied area of Lake Nasser khors during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 15.56 | 15.56 | 8.65 | 7.57 | 12.11 | 11.57 |
| | II | 14.59 | 17.51 | 6.49 | 7.58 | 10.54 | 12.55 |
| | III | 16.54 | 14.59 | 7.00 | 7.58 | 11.77 | 11.09 |
| Kalabsha | I | 12.62 | 11.64 | 10.81 | 8.65 | 11.71 | 10.15 |
| | II | 11.64 | 10.67 | 7.57 | 8.65 | 9.61 | 9.66 |
| | III | 11.64 | 11.64 | 7.57 | 7.57 | 9.61 | 9.61 |
| Gurf Hussein | I | 17.47 | 18.44 | 8.65 | 7.57 | 13.06 | 13.00 |
| | II | 15.53 | 16.50 | 7.57 | 8.00 | 11.55 | 12.25 |
| Kurusku | I | 13.59 | 13.59 | 7.57 | 9.73 | 10.58 | 11.66 |
| | II | 13.59 | 9.70 | 8.65 | 8.65 | 11.12 | 9.18 |
| | III | 12.62 | 10.67 | 9.73 | 7.58 | 11.17 | 9.13 |
| Tushka East | I | 16.50 | 15.53 | 7.57 | 5.41 | 12.03 | 10.47 |
| | II | 17.47 | 17.47 | 5.41 | 6.49 | 11.44 | 11.98 |
| Tushka West | I | 20.38 | 15.53 | 7.57 | 7.57 | 13.97 | 11.55 |
| | II | 19.41 | 17.47 | 5.41 | 9.00 | 12.41 | 13.23 |
| | III | 17.47 | 14.56 | 9.73 | 9.73 | 13.60 | 12.14 |

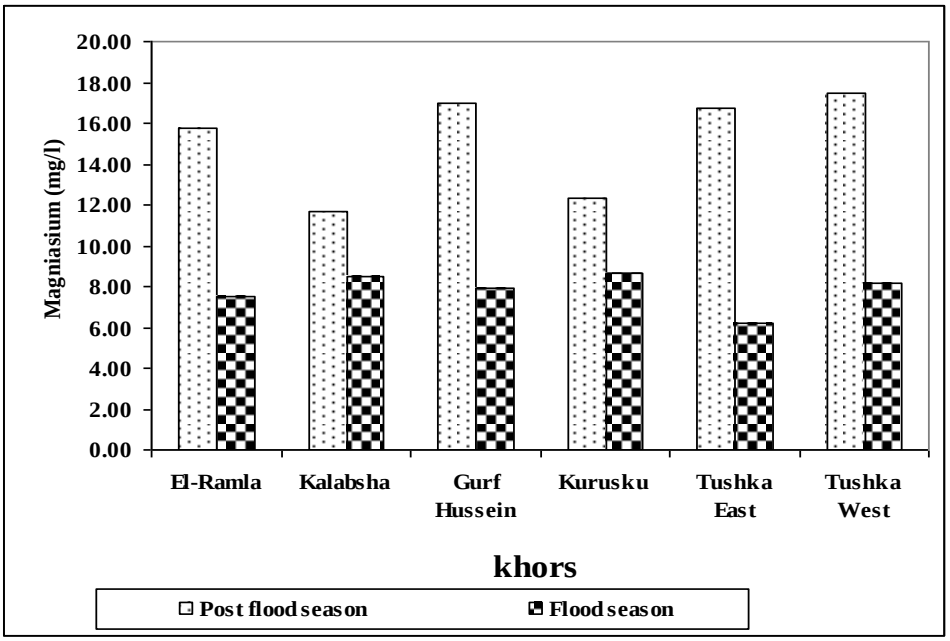


Figure (14): Average values of magnesium (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

The highest average value of magnesium in Lake Nasser khors was recorded at Khor Tushka West (12.82 mg $1^{-1}$), with the highest average value during PFS (17.47 mg $1^{-1}$) and the lowest (8.17 mg $1^{-1}$) during FS. During PFS, the values decreased gradually at the northern side from beginning to end of the khor; while at the southern side the values increased from Station I to Station II then decreased to the lowest at Station III. During FS, the value decreased with the highest values at sector III, it decreased at sector I and reached to the lowest value at Station IIN.

**12-Nitrite:**

The average value of nitrite in Lake Nasser khors was 5.88 µg $l^{-1}$, with the highest average value during PFS (8.14 µg $l^{-1}$) and the lowest during FS (3.61 µg $l^{-1}$) as in Table 14 & Figure 15.

The values of nitrite varied from khor to other. At Khor El-Ramla, the average value of nitrite was 4.68 µg $l^{-1}$, with the highest value during PFS (5.86 µg $l^{-1}$) and the lowest during FS (3.50 µg $l^{-1}$). During PFS, the highest values were recorded at Stations IIIN and IS. It decreased at Stations IN and IIIS reaching to the lowest values at sector II. During FS, the values of nitrite decreased gradually from beginning to end of the khor at the northern side, while at the southern one it decreased from Station IS to Station IIS and increased again at Station IIIS.

At Khor Kalabsha, the average value of nitrite was 5.90 µg $l^{-1}$, with the highest average value during PFS (7.93 µg $l^{-1}$) and the lowest during FS (3.92 µg $l^{-1}$). During PFS, the lowest values were found at the northern side and the highest values were recorded at southern one of sector II. During FS, the northern side recorded the lowest values at Stations II, III and I. It increased at the southern side at Stations IS & IIS then reached to the highest value at Station IIIS.

At Khor Gurf Hussein the lowest average value of the lake was recorded (4.60 µg $l^{-1}$) with the highest average value during PFS (5.47 µg $l^{-1}$) and the lowest during FS (3.73 µg $l^{-1}$). During PFS, the lowest value was recorded at Station IN. It increased at Station IIN. It increased at the southern side at Station IIS and reached to the highest value of the khor (8.12 µg $l^{-1}$) at Station IS. During FS, the value increased from beginning to end of the khor.

At Khor Kurusku, the average value was 6.04 µg $l^{-1}$, with the highest average value (7.06 µg $l^{-1}$) during PFS and the lowest (2.33 µg $l^{-1}$) during FS. During PFS, the values decreased from Station IN to Station IIN then increased to the highest value at Station IIIN; while at the other side, it decreased gradually from beginning to end the khor. During FS, the northern side recorded the highest value at Stations IN and IIIN then decreased at the middle, while at the southern one the values were 3.24, 3.33 and 3.50 µg $l^{-1}$ at Stations IIS, IS and IIIS, respectively.

At Khor Tushka East, the average value of nitrite was 4.69 µg $l^{-1}$, with the highest average during PFS (7.06 µg $l^{-1}$) and the lowest during FS (2.33 µg $l^{-1}$). During PFS, it decreased from beginning to end of the khor. During FS, the values decreased more than two folds.

The highest average value of the nitrite in Lake Nasser was recorded at Khor Tushka West (9.32 µg $l^{-1}$) with the highest average value during PFS (14.57 µg $l^{-1}$) and the lowest during FS (4.08 µg $l^{-1}$). During PFS, the highest value of nitrite was recorded at Station IN and decreased by about two folds at Stations IIN and IIIN; while it decreased gradually from beginning to end of the khor at the southern side. During FS, it decreased by about two folds, the highest value was recorded at sector II and the lowest at sector.

**13-Orthophosphate:**

The average value of orthophosphate in Lake Nasser khors was 88.25 µg $l^{-1}$, with the highest average value during FS (134.66 µg $l^{-1}$) and the lowest during PFS (41.85 µg $l^{-1}$).

The values of orthophosphate varied from khor to other. At khor El-Ramla, the average value of orthophosphate was 85.40 µg $l^{-1}$, with the lowest average value during PFS (58.86 µg $l^{-1}$) and the highest during FS (111.94 µg $l^{-1}$). During PFS, the highest values of the northern side were recorded at Station IN and decreased to the lowest at Station IIN then increased at Station IIIN; while at the southern side, it decreased from Station IS to Station IIS and reached to the highest at Station IIIS. During FS, the highest values were recorded at sector I at Stations IN and IS. It decreased to the lowest at sector II at Stations IIN and IIS.

At Khor Kalabsha, the average value of orthophosphate was 85.72 µg $l^{-1}$, with the highest average value during FS (127.3 µg $l^{-1}$) and the

lowest during PFS (44.15 µg $l^{-1}$). During PFS, the values at the north decreased from Station IN to Station IIN and reached to the highest at Station IIIN; while at the southern side it increased gradually from beginning to end of the khor. During FS, at the northern side, it increased gradually from beginning to end of the khor; while at the southern side, the highest value was recorded at IS and the lowest at Station IIS.

The lowest average value of the lake was recorded at Khor Gurf Hussein (80.72 µg $l^{-1}$), with the highest average value during FS (123.84 µg $l^{-1}$) and the lowest during PFS (37.61 µg $l^{-1}$). During PFS, the highest value was recorded at Stations IN and IIS, while the lowest one was observed at Stations IIN and IS. During FS, the lowest values were recorded at the northern side, while the highest numbers were observed at the southern side as in Table 15 & Figure 16.

At Khor Kurusku, the average value was 82.23 µg $l^{-1}$, with the highest average value during FS (140.76 µg $l^{-1}$) and the lowest (23.71 µg $l^{-1}$) during PFS. During PFS, the values increased gradually from beginning to end of the khor at the northern side; while at the south, it decreased from Station IS to Station IIS then increased to the highest value at Station IIIS. During FS, the lowest number was recorded at sector II, while the highest numbers were recorded at sector III.

At Khor Tushka East, the average value of orthophosphate was 88.81 µg $l^{-1}$, with the highest average during FS (146.14 µg $l^{-1}$) and the lowest during PFS (31.47 µg $l^{-1}$). During PFS, the lowest values were recorded at the northern side at Stations IN and IIN. While the highest one was observed at the southern side at Stations IS and IIS. During FS, the northern side recorded the highest values at Stations IN and IIN while the lowest ones were observed at the southern side at Stations IS and IIS.

The highest average value was recorded at Khor Tushka West (106.64 µg $l^{-1}$), with the highest average value during FS (157.96 µg $l^{-1}$) and the lowest during PFS (55.32 µg $l^{-1}$). During PFS, the lowest value was recorded at Stations IN and IIN. It increased at Station IIIN for the north, while it increased gradually from beginning to end of the khor at the southern side. During FS, it recorded the highest value at Station IN and decreased at Station IIN then increased again at Station IIIN; while at the southern side, it increased from Station IS to the highest at Station IIS, then decreased again to the lowest at Station IIIS.

## 14-Total Phosphorus:

The average value of total phosphorus in Lake Nasser khors was 222.87 µg $l^{-1}$, with the highest average value during FS (359.47 µg $l^{-1}$) and the lowest during PFS (86.27 µg $l^{-1}$) as in Table 16 & Figure 17.

The values of total phosphorus varied from khor to other. At Khor El Ramla, the average value was 170.09 µg $l^{-1}$, with the lowest average value during PFS (112.17 µg $l^{-1}$) and the highest during FS (228.02 µg $l^{-1}$). During PFS, the highest value was recorded at Station IN and decreased to the lowest at Station IIN, then increased again at Station IIIN; while at the southern side, it decreased from Station IS to Station IIS, then increased at Station IIIS. During FS, the values increased gradually from beginning to end of the khor at the northern side; while at the southern the maximum was at station IN.

At Khor Kalabsha, the average value was 223.6 µg $l^{-1}$, with the lowest average during PFS (99.83 µg $l^{-1}$) and the highest during FS (347.36 µg $l^{-1}$). During PFS, the lowest value at the northern was recorded at Stations IN & IIN and decreased at Station IIIN; while at the southern sides, the lowest values were recorded at Station IS & IIS. During FS, at the northern side, it recorded the highest values at Stations IN and IIN and the lowest was observed at Station IIN At the southern side, the lowest value was recorded at Station IS and reached to the highest at Station IIS.

At Khor Gurf Hussein, the lowest average value of the lake was 119.53 µg $l^{-1}$, with the lowest average value during PFS (79.44 µg $l^{-1}$) and the highest during FS (159.62 µg $l^{-1}$).

At Khor Kurusku, the average value was 169.50 µg $l^{-1}$, with the lowest average value (52.67 µg $l^{-1}$) during PFS and the highest (286.32 µg $l^{-1}$) during FS. During PFS, the values decreased gradually from beginning to end the khor at the northern side; while at the southern side, it decreased from Station IS to Station IIS and reached to the highest at Station IIIS. During FS, the northern side record the highest value of total phosphorus at Station IIN and the lowest at Stations IN and IIIN; in vice versa at the southern side.

At Khor Tushka East, the average value of total phosphorus was 139.73 µg $l^{-1}$, with the lowest average during PFS (48.50 µg $l^{-1}$) and the highest during FS (230.95 µg $l^{-1}$). During PFS, the lowest values were recorded at the northern side at Station IN and IIN while the highest ones

were observed at the southern side at Stations IS and IIS. During FS, the highest values were recorded at sector I at Stations IS and IIS, while the lowest ones were observed at Stations IIN and IIS.

The highest average value of the total phosphorus in Lake Nasser was recorded at Khor Tushka West (514.79 µg $l^{-1}$) with the highest average value during FS (904.55 µg $l^{-1}$) and the lowest during PFS (125.03 µg $l^{-1}$). During the two seasons, the value of total phosphorus increased gradually from beginning to end of the khor.

**15-Silicate:**

The average value of silicate in Lake Nasser khors was 1.74 mg $l^{-1}$, with the highest average value during PFS (1.81 mg $l^{-1}$) and the lowest during FS (1.67 mg $l^{-1}$). The highest average value was recorded at the northern part of the lake in khor El-Ramla and the lowest at the southern part in Khor Tushka West (Table 17 & Figure 18).

At Khor El-Ramla, the average value of silicate was 2.16 mg $l^{-1}$, with the highest average value during FS (2.75 mg $l^{-1}$) and the lowest during PFS (1.57 mg $l^{-1}$). During PFS, the values at the northern side decreased gradually from beginning to end of the khor. In vice versa, at the southern side, the values increased at the same sites. The values increased during flood at the northern side, while it decreased at the southern side and fluctuated in a narrow range.

At Khor Kalabsha, the average value of silicate was 1.61 mg $l^{-1}$, with the highest average value during PFS (1.81 mg $l^{-1}$) and the lowest during FS (1.40 mg $l^{-1}$). During PFS, at the northern side, the values decreased from Station I to Station II, then increased to its highest value at Station III. In vice versa, at the southern side, the values decreased gradually from the beginning to end of the khor. During FS, the highest values were recorded at end of the khor while the lowest were recorded at the middle of the khor.

Khor Gurf Hussein recorded the same average value during FS & PFS, being 1.49 mg $l^{-1}$. During PFS, it decreased from the beginning to end of the khor. During FS, the values reached to its lowest values at the northern side.

At Khor Kurusku, the average value was 1.79 mg $l^{-1}$, with highest average during PFS (1.95 mg $l^{-1}$) and lowest during FS (1.62 mg $l^{-1}$). During PFS, the values at the northern side increased from Station I to II

and then decreased at Station III; while at the southern side it increased gradually from the beginning to end of the khor. During FS, the values at the northern side showed high values than the southern one.

At Khor Tushka East, average value was 1.9 mg $l^{-1}$, with the highest average value during PFS (1.99 mg $l^{-1}$) and the lowest during FS (1.84 mg $l^{-1}$). During PFS, the highest values of silicate was recorded at the beginning of the khor, while the lowest value was recorded at the end of sector II. During FS, it decreased at the northern side from the beginning to end of the khor.

At Tushka West, the lowest average value of silicate was 1.47 mg $l^{-1}$, with the highest average value during PFS (2.03 mg $l^{-1}$) and the lowest during FS (0.91 mg $l^{-1}$). During PFS, the values decreased gradually from beginning to end of the khor at the northern side while at the southern side it increased from Station I to Station II then decreased again to the lowest value at Station III. During FS, silicate reached to the lowest values during the study at sector III. It increased at sector I and reached to the highest values at sector II.

Table (14): Variations of nitrite in the studied area of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 5.80 | 6.43 | 5.00 | 2.50 | 5.40 | 4.47 |
| | II | 5.12 | 5.60 | 4.59 | 2.43 | 4.86 | 4.02 |
| | III | 6.58 | 5.64 | 3.00 | 3.50 | 4.79 | 4.57 |
| Kalabsha | I | 7.41 | 6.47 | 4.00 | 4.32 | 5.71 | 5.40 |
| | II | 5.99 | 14.87 | 1.35 | 4.32 | 3.67 | 9.60 |
| | III | 6.66 | 6.19 | 3.50 | 6.00 | 5.08 | 6.10 |
| Gurf Hussein | I | 3.98 | 8.12 | 2.16 | 2.97 | 3.07 | 5.55 |
| | II | 4.85 | 4.93 | 5.50 | 4.30 | 5.18 | 4.62 |
| Kurusku | I | 8.20 | 8.68 | 5.00 | 3.33 | 6.60 | 6.01 |
| | II | 6.66 | 8.28 | 4.59 | 3.24 | 5.63 | 5.76 |
| | III | 10.14 | 5.83 | 5.00 | 3.50 | 7.57 | 4.67 |
| Tushka East | I | 7.37 | 6.62 | 3.00 | 1.99 | 5.19 | 4.31 |
| | II | 7.26 | 6.98 | 2.43 | 1.89 | 4.85 | 4.44 |
| Tushka West | I | 25.46 | 13.22 | 4.00 | 5.00 | 14.73 | 9.11 |
| | II | 13.69 | 11.32 | 4.22 | 5.33 | 8.96 | 8.33 |
| | III | 14.91 | 8.80 | 3.78 | 2.16 | 9.35 | 5.48 |

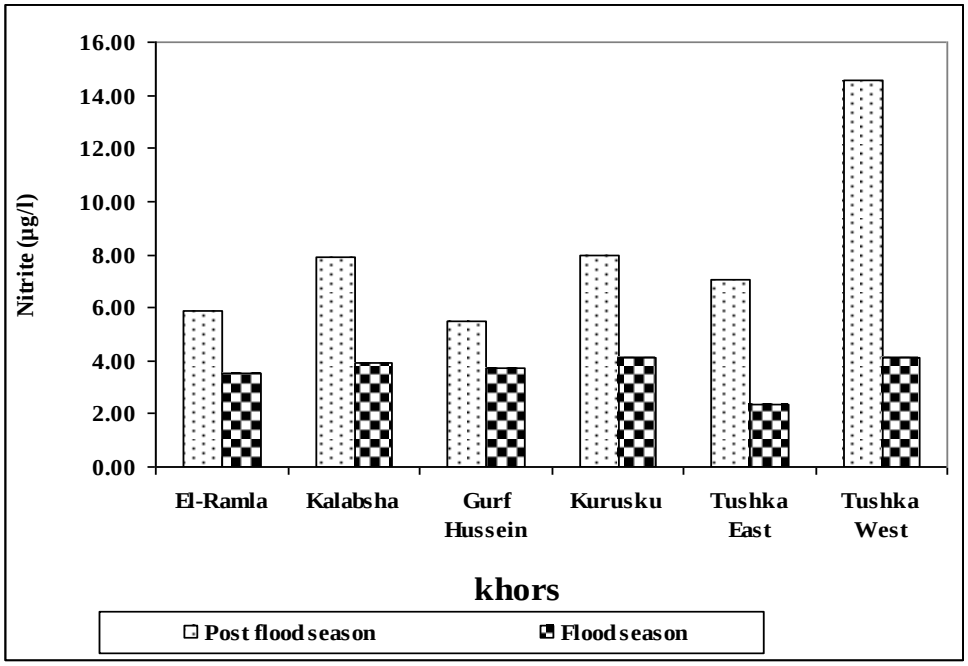


Figure (15): Average values of nitrite (µg $l^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (15): Variations of orthophosphate (µg $l^{-1}$) in the studied area of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 63.77 | 52.32 | 105.30 | 150.00 | 84.53 | 101.16 |
| | II | 55.59 | 47.42 | 90.75 | 105.60 | 73.17 | 76.51 |
| | III | 58.86 | 75.21 | 113.00 | 107.00 | 85.93 | 91.11 |
| Kalabsha | I | 44.15 | 52.32 | 109.73 | 170.00 | 76.94 | 111.16 |
| | II | 39.24 | 44.15 | 112.20 | 113.85 | 75.72 | 79.00 |
| | III | 47.42 | 37.61 | 118.00 | 140.00 | 82.71 | 88.80 |
| Gurf Hussein | I | 39.24 | 35.97 | 113.85 | 115.50 | 76.55 | 75.74 |
| | II | 35.97 | 39.24 | 106.00 | 160.00 | 70.99 | 99.62 |
| Kurusku | I | 17.99 | 22.89 | 150.00 | 128.90 | 83.99 | 75.90 |
| | II | 22.89 | 21.26 | 141.90 | 123.75 | 82.40 | 72.50 |
| | III | 27.80 | 29.43 | 172.00 | 127.99 | 99.90 | 78.71 |
| Tushka East | I | 21.26 | 34.32 | 170.33 | 118.88 | 95.79 | 76.60 |
| | II | 29.43 | 40.88 | 163.35 | 132.00 | 96.39 | 86.44 |
| Tushka West | I | 37.61 | 58.86 | 177.40 | 190.90 | 107.50 | 124.88 |
| | II | 37.61 | 68.67 | 123.80 | 199.90 | 80.70 | 134.29 |
| | III | 49.05 | 80.12 | 138.60 | 117.15 | 93.83 | 98.63 |

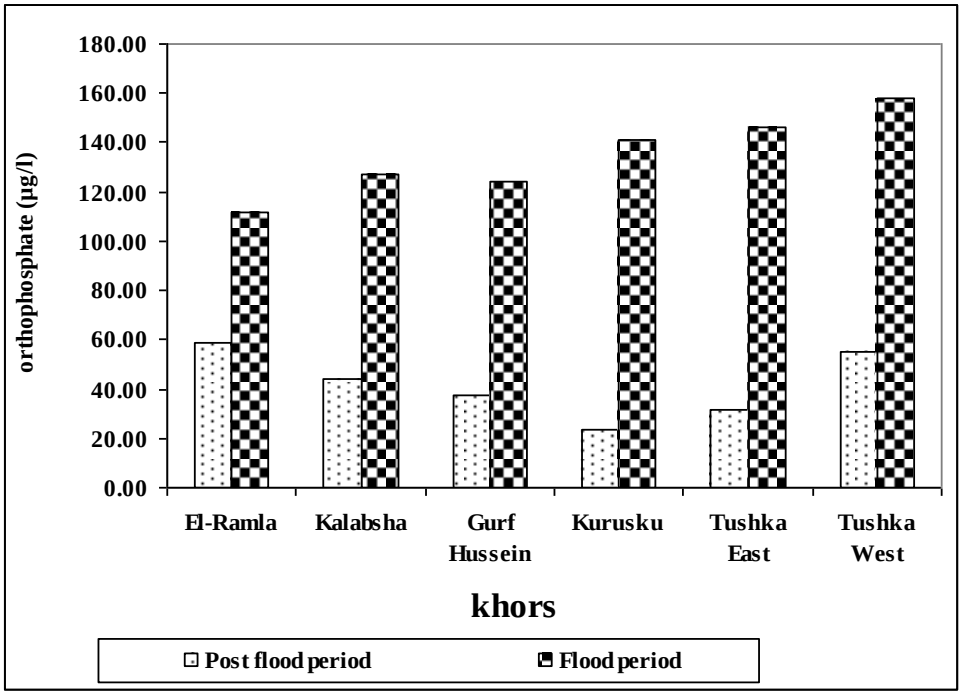


Figure (16): Average values of orthophosphate (µg $l^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (16): Variations of total phosphorus (µg $l^{-1}$) in the studied area of Lake Nasser during the post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 124.00 | 99.00 | 204.36 | 195.00 | 164.18 | 147.00 |
| | II | 105.00 | 92.80 | 223.08 | 182.52 | 164.04 | 137.66 |
| | III | 111.00 | 141.20 | 375.96 | 187.20 | 243.48 | 164.20 |
| Kalabsha | I | 92.00 | 101.00 | 482.04 | 151.32 | 287.02 | 126.16 |
| | II | 92.00 | 102.00 | 196.56 | 478.92 | 144.28 | 290.46 |
| | III | 95.00 | 117.00 | 570.96 | 204.36 | 332.98 | 160.68 |
| Gurf Hussein | I | 70.76 | 76.15 | 366.60 | 108.08 | 218.68 | 92.12 |
| | II | 94.54 | 76.31 | 129.48 | 34.32 | 112.01 | 55.31 |
| Kurusku | I | 65.00 | 43.00 | 202.80 | 205.92 | 133.90 | 124.46 |
| | II | 57.00 | 41.00 | 536.64 | 195.30 | 296.82 | 118.15 |
| | III | 55.00 | 55.00 | 347.88 | 229.40 | 201.44 | 142.20 |
| Tushka East | I | 41.00 | 51.00 | 232.50 | 235.60 | 136.75 | 143.30 |
| | II | 46.00 | 56.00 | 224.75 | 230.95 | 135.38 | 143.48 |
| Tushka West | I | 115.00 | 111.38 | 527.00 | 890.90 | 321.00 | 501.14 |
| | II | 119.00 | 134.40 | 256.05 | 1444.98 | 187.53 | 789.69 |
| | III | 120.00 | 150.41 | 308.40 | 1999.95 | 214.20 | 1075.18 |

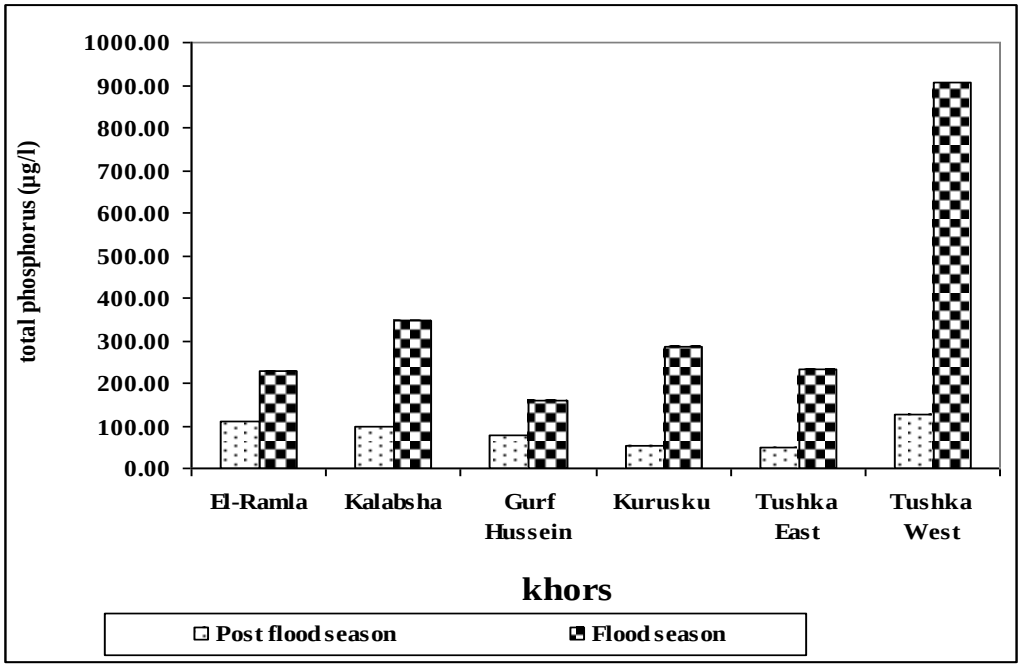


Figure (17): Average values of total phosphorus (µg $l^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).

Table (17): Variations of silicate in the studied area of Lake Nasser during post flood season (March, 2006) and flood season (Nov., 2006).

| Location Khor | Site | Post Flood Season (PFS) | | Flood Season (FS) | | Average | |
|---|---|---|---|---|---|---|---|
| | | N | S | N | S | N | S |
| El-Ramla | I | 1.56 | 1.60 | 2.87 | 2.40 | 2.21 | 2.00 |
| | II | 1.52 | 1.60 | 3.63 | 2.10 | 2.58 | 1.85 |
| | III | 1.44 | 1.68 | 3.00 | 2.50 | 2.22 | 2.09 |
| Kalabsha | I | 1.64 | 2.03 | 1.30 | 1.77 | 1.47 | 1.90 |
| | II | 1.60 | 1.76 | 0.81 | 1.05 | 1.20 | 1.40 |
| | III | 2.30 | 1.52 | 1.50 | 1.99 | 1.90 | 1.76 |
| Gurf Hussein | I | 1.60 | 1.48 | 0.75 | 1.98 | 1.17 | 1.73 |
| | II | 1.48 | 1.40 | 1.37 | 1.87 | 1.43 | 1.64 |
| Kurusku | I | 1.87 | 1.25 | 2.00 | 1.50 | 1.94 | 1.37 |
| | II | 2.15 | 2.18 | 1.44 | 1.35 | 1.79 | 1.77 |
| | III | 2.03 | 2.22 | 2.01 | 1.44 | 2.02 | 1.83 |
| Tushka East | I | 2.22 | 2.07 | 2.00 | 1.70 | 2.11 | 1.88 |
| | II | 1.83 | 1.83 | 1.56 | 2.10 | 1.70 | 1.97 |
| Tushka West | I | 2.46 | 1.87 | 0.99 | 1.00 | 1.72 | 1.44 |
| | II | 2.22 | 1.99 | 1.04 | 1.05 | 1.63 | 1.52 |
| | III | 2.07 | 1.56 | 0.87 | 0.51 | 1.47 | 1.04 |

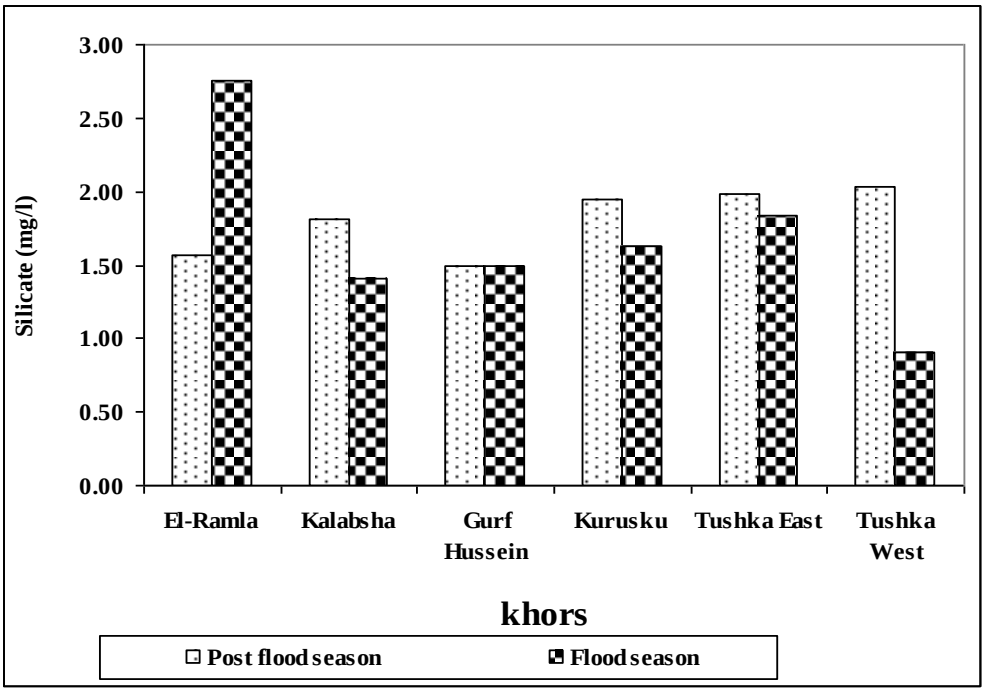


Figure (18): Average values of silicate (mg $1^{-1}$) in Lake Nasser khors during post flood season (March, 2006) and flood season (Nov., 2006).