

Maximum ponds occurred with 43 meters width. The minimum width found about 18 meters and maximum found nearly 186 meters. And the count of ponds is 6680 because of the reason as stated in length section. A Bar diagram showing the frequency of ponds according to their width is given below:

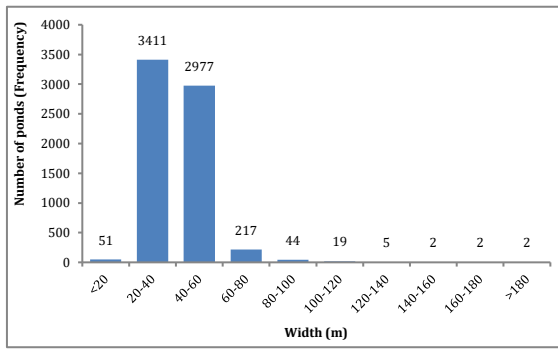


Figure 13: Frequency of large ponds according to their width

Here (Figure 13), most of the large ponds (6388) have width in between 20 to 60 meters and the lowest number of ponds (2) having width in between 160 to 180 meters.

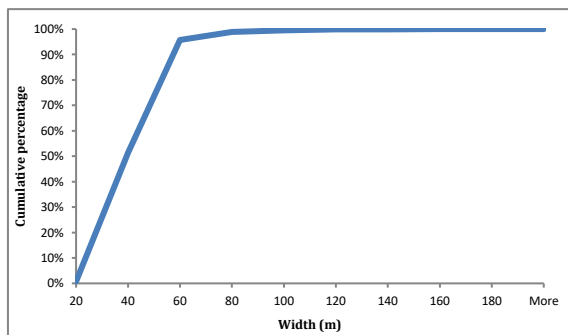


Figure 14: Cumulative percentage of large ponds according to their width

The line diagram (Figure 14) is showing that, 95% large ponds have length less than 60 meters and the median width is about 39 meters.

3.8 Elevation statistics of large ponds

By generating descriptive statistics on elevation data of large ponds, the average elevation of these ponds is found 11.75 meters. The minimum and maximum elevation is 1 and 40 meters respectively. The highest number of large pond is found at 7 meters elevation. But in case of elevation range, the highest number of pond is found in the range of 10-15 meters. Another Range of elevation with 2nd highest number of ponds is 5-10 meters. Combining this two elevation ranges, it can be said that, most of the ponds are in between 5 to 15 meters of elevation from the sea surface. And if we see the pond map, we can see that almost all of the ponds are in the valley of the Halda River watershed. Here is a bar diagram (Figure 15) showing the number of large ponds according to their elevation.

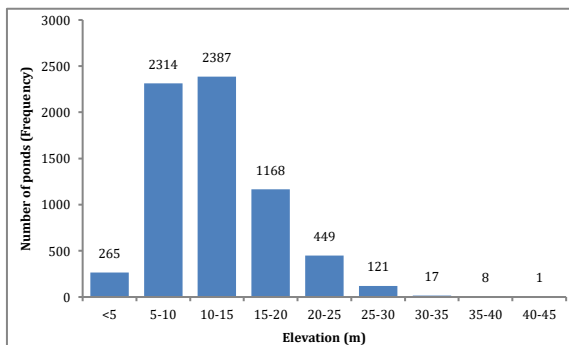


Figure 15: Frequency of large ponds according to their elevation.

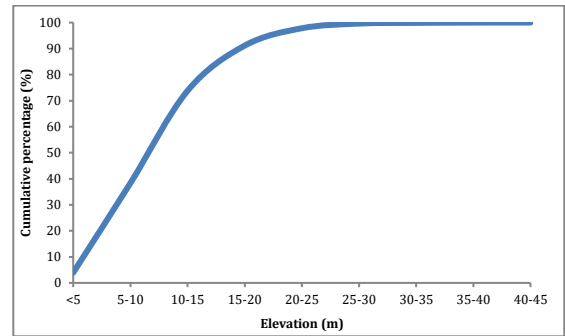


Figure 16: Cumulative percentage of large ponds according to their elevation

From the cumulative percentage graph (Figure 16) it can be said that, 90% of large ponds are below 20 meters elevation and the median elevation is 11 meters.

3.9 Result of small pond analysis and combined estimation

Six areas were intentionally selected in the watershed area and digitized all ponds existing in those sample areas. Here small ponds means, ponds having less than 1000 m² area.

Table 2: Result of small pond analysis	
Total sample area	6
Total ponds found in the sample areas	26
Total number of small pond found in the sample areas	22
Total number of large ponds found in the sample areas	4
Large ponds: Small ponds	1: 5.5
Total area of small ponds in the sample area (m ²)	8367.07
Total area of large ponds in the sample areas (m ²)	5722.65
Small pond (area): Large pond (area)	1: 1.46
Estimated total number of small ponds in the whole watershed	37015
Estimated total area occupied by small ponds (m ²)	26229607.66

Result in table 2 showing that the number of small ponds approximately 5.5 times than large ponds (as large ponds found 6730), That is 5.5 small ponds for one large pond. The estimated total area occupied by the small ponds 26.23 km² which is 1.46 times than large pond's area, where the total area of large ponds is 17.97 km². The area of small pond is about 1.56% of the whole watershed and 4.38% of the valley area (area <20 m elevation and relatively plain, which is 598.85 km² in total), where the area of large pond is about 1.07% of the whole watershed and 3% of the valley area. Collectively, these ponds occupy 44.19 km² and that is 2.63% of the whole watershed and 7.38% of the valley area, where the whole watershed is 1683 km². The total number of ponds (both small and large) was then estimated 43745.

4. CONCLUSION

Through this research work an informative GIS analysis has been done on the ponds in the Halda River watershed. This research revealed important Geometric and geographic characteristics of ponds in the Halda River watershed. Some of the parameters are excluded from the analysis like Vertices of pond's polygon, perimeter of ponds etc., because these are less important characteristics to be considered. The information generated through this research can raise other questions like the effect of this ponds and their density on local economy and ecology. How they are changing over the years and it can be a database for future comparison in case of land use changing trend. It can also be a good helping hand for generating an effective management plan.

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