



Manual for Operation of Mini Secchi Disc and the Mobile App TurbAqua Developed as Part of Revival Project

ICAR-Central Marine Fisheries Research Institute
(Department of Agricultural Research and Education, Government of India)
P.B. No. 1603, Ernakulam North P.O., Kochi - 682 018



Department of
Science and
Technology,
Government of
India



PML | Plymouth Marine
Laboratory





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About Secchi disc

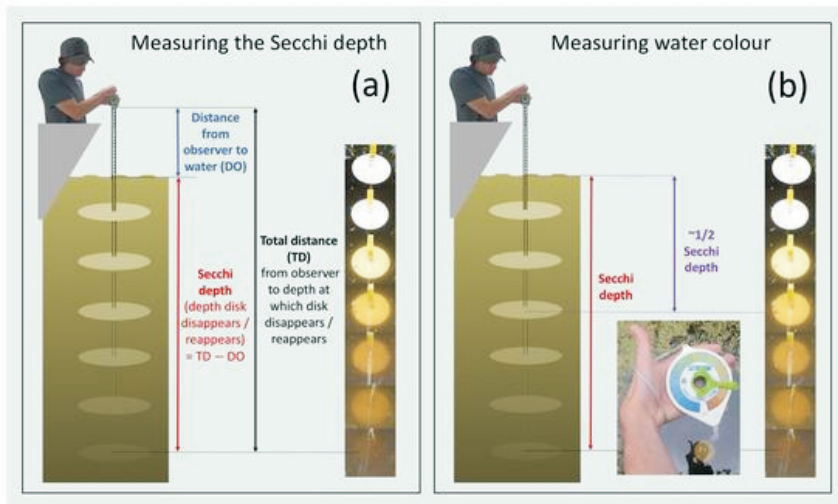
The Secchi disc measures transparency of water bodies in a fast, easy and precise way. The Secchi disc is a white disc that is lowered into the water and the depth at which this disc disappears from sight is logged as Secchi depth in the App. Transparency is the depth at which disc reappears, i.e., or how deep the sunlight can penetrate into a lake. The mini Secchi disc is basically a manually-operated tape measure with a white Secchi 10 cm disk and a brass weight of 100g attached to the tape end. The weight is manufactured using a metal lathe and the disc is made of white polypropylene sheet. The measuring tape is approximately 8m long wrapped around a 3D printed bobbin. For the easy handling of the device a polypropylene finger strap and nylon lanyard are attached to the casing. For prediction of colour of the water body, a vinyl-laminated Forel Ule colour scale sticker (with colour ranging from Indigo blue to Cola brown) is placed on the outside of the casing and the entire device is held together using stainless steel or brass fixings. In addition to this, an i-Button housed in a Thermochron water proof capsule ((DS9107) is attached to one of the weights, designed for measuring the water temperature.

How to use Secchi disc

During normal observations taken using the Secchi disc, the white Secchi disc is lowered into the water and the depth at which it disappears and reappears are recorded (Figure 5a). For accurate Secchi depth readings, the observers should avoid sun glint regions and shadows, ideal is to conduct the measurements closer to mid-day. Allow the eyes to adapt to areas nearer to the Secchi depth and write down sky conditions, and repeat measurements to improve precision. The disc must sink vertically though the water for accurate Secchi depth readings. Initially you need to take the distance from the hand-held device (casing) to the water surface (D0) (**In the mobile app, this is the 'Boat level to water surface (m)'**). Next you need to take the total distance (TO) from the device to the depth at which the disc disappears and reappears (**In mobile app, this is the 'Boat level to secchi disc visible level (m)'**). The colour of the water is measured



by looking at the colour of the Secchi disc at roughly half the Secchi depth, and matching it with the closest colour on the colour scale. Submit the corresponding number in the App.



Measuring Secchi depth and water colour with the mini-Secchi disk. (a) Measuring the Secchi depth. (b) Measuring water colour at half the Secchi depth.

Idea behind TurbAqua mobile App

Laymen are the building blocks of a society. Realizing the importance of societal involvement in scientific research, the team DST-REVIVAL is providing a platform to those who want to volunteer in developing better science for the society. The citizen science programme mainly targets increasing scientific understanding through public participation in data collection and monitoring programmes. The quality of water determines its suitability for human consumption and the ecological status of the water body. Here, we are attempting to build a database on the clarity of water of Vembanad Lake involving people from the surroundings of the lake. The information collected using a hand held pocket sized 3D printed Secchi disc will be fed into a mobile app developed for the purpose, namely TurbAqua. The same can be accessed from google play store <https://play.google.com/store/apps/details?id=com.meridian.cmfi.survey&hl=en>.



This information will be used for mapping the water quality of the lake as well as for validation of satellite data which give us synoptic view of the situation. Here our team is trying to involve local community to generate a scientific solution for turbidity in the Lake.

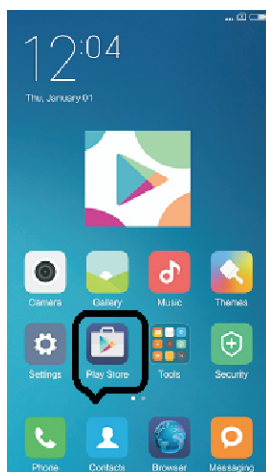
About TurbAqua

TURBAQUA is a mobile application developed by ICAR-CMFRI to transmit the data generated during mini Secchi disc operation in Vembanad Lake. The app works in conjunction with hand held, pocket sized 3D printed Mini Secchi disc designed and fabricated by Plymouth Marine Laboratory, UK. The Secchi disc is used to measure the clarity of water. It also has a colour scale attached on top of it. This colour scale consists of 21 colours ranging from blue to green to yellow to brown, the colour range of natural waters, and is used by the observer to record the colour of a submerged Secchi disc as viewed by him/her from above. Many Secchi discs are provided with a miniature temperature sensor (i button). After operating the Secchi disc, the operator can submit a photo of the water colour and Secchi depth values onto the app, which will be transmitted to ICAR-CMFRI server with geo-reference co-ordinates of the sampling sites. The application is of immense potential in aquaculture as well as in water quality related studies as it gives almost accurate information based on the colour changes observed in the water body.

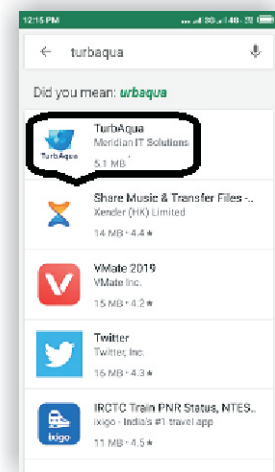
How to operate TurbAqua

To begin with the application installation, the mobile App TurbAqua can be easily installed from google play store.

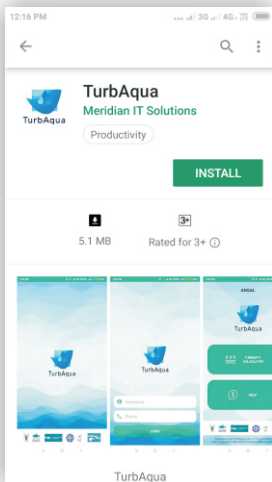
<https://play.google.com/store/apps/details?id=com.meridian.cmfri.survey&hl=en>



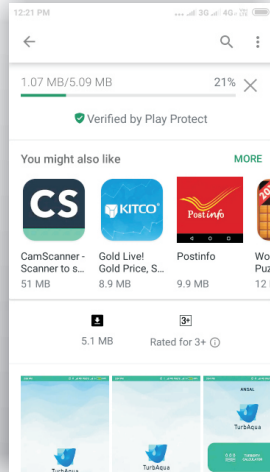
To find out the App manually, navigate to the “Google Play store”.



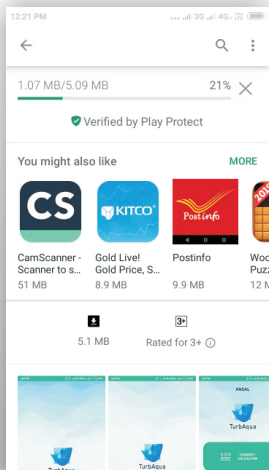
Search the app “TurbAqua”. You will now see the results for your search.



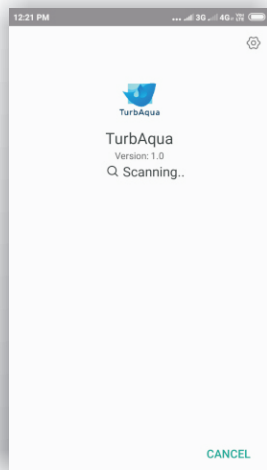
Click on the icon of the application “TurbAqua” to install.
Press the **“Install”** button to download the application.



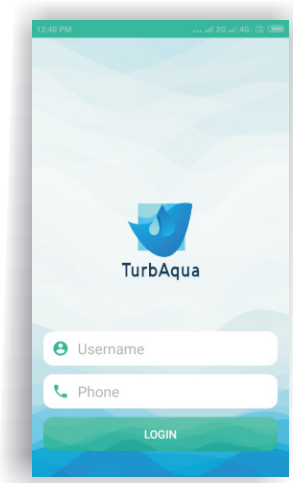
Please wait while the “TurbAqua” Mobile app is being downloaded and installed.



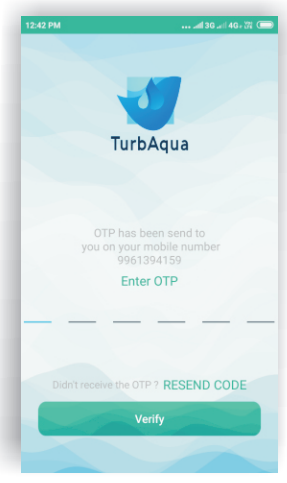
Select **“open”** to start using “TurboAqua” mobile app.



Select **“done”** to proceed for the registration of “TurboAqua” mobile app.

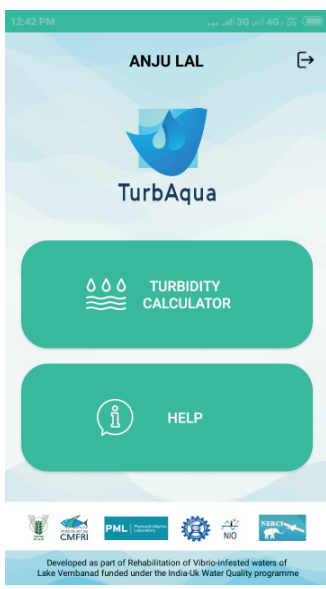


Input your **name** and **mobile number** and click login.(no register icon?)



A six digit OTP number will be sent automatically to your registered mobile number. Enter the OTP and click **“Verify”**.

This icon provides the main window for entry of details of the water body.This icon provides the main window for entry of details of the water body.



This icon helps to sign out from the app

Here you have to fill the DO value, i.e., distance from the hand-held device to the water surface.

Here you need to fill the Total distance (TO).

Here you need to fill the colour of the water body by comparing with the colour scale provided in the pocket sized 3D printed Secchi disc.

Here you need to fill the temperature of the water. A temperature sensor is already inserted in the secchi disc. If you are using normal secchi disc, by manually using a thermometer you can note the temperature, or you can ignore

By this icon you can upload images of the water body with preference to the colour of the surface

12:43 PM

TURBIDITY CALCULATOR

TurbAqua

Boat level to water surface (Mtr) *

Boat level to secchi disc visible level(Mtr) *

Water color in secchi disc *

Temperature

Upload Photo (optional)

SUBMIT

Finally filling all information you can click "submit" to upload all data.

Login To Dashboard

TurbAqua

Username

Password

Login

This is the main server where the data entered by the people are received.

TurbAqua Admin

Dashboard / Overview

35 Users! [View Users](#)

99 Turbidity! [View Turbidity](#)

Turbidity

#	User Name	Boat Level	Sea Level	Water Color	Temperature	Latitude	Longitude	Date	Image
1	jithin	1	3	16		9.9872015	76.2723138	30-07-2019 12:56	
2	jithin	1	3	16		9.9871948	76.2723474	30-07-2019 12:55	
3	ansal	1	1	1	1	11.2587087	75.7761582	23-07-2019 15:41	

TurbAqua Admin

Dashboard / Turbidity Data

Turbidity

From date: To date: [Filter](#) [Reset](#)

[CSV](#) [Images](#)

Show 10 entries Search:

#	User Name	Boat Level	Sea Level	Water Color	Temperature	Latitude	Longitude	Date	Image
1	jithin	1	3	16		9.9872015	76.2723138	30 July 2019 12:56	
2	jithin	1	3	16		9.9871948	76.2723474	30 July 2019 12:55	

The entered data will be generated in this server and it will be transferred into excel sheet and used for scientific studies in order to find out the nature and status of the water body.

