



LASER EGG

NEPAL STUDY CENTER

LUMBINI SUSTAINABILITY CIRCLE

Citizen Science Danda River Monitoring Program (DEMP)

- The Laser egg is an air quality monitor that measures and displays Air Quality Index (AQI) for US EPA and Chinese Conversions.
- The sensor measures particle count for $>0.3 \mu\text{m}$ & $2.5 \mu\text{m}$ with PM2.5 concentration ($\mu\text{m}/\text{m}^3$)
- The Egg has Wi-Fi internet connection so that all data recorded while connected to the internet is stored in cloud based database.
- The Egg has an IOS and android app called "Breathing Space" that will display and record the data for exportation and collection



PRATIMAN-NEEMA
MEMORIAL FOUNDATION

**Air Quality
Monitoring**

**YOGDAN Study
Abroad Program**

December 2017

**Eco-adventure
Hands-on
Service-learning
Experiential -
learning**

**Community
Learning
Environment**

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Mexico**

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DECEMBER 2018 ACTION LAB STUDY ABROAD DEPLOYMENT

STANDARD OPERATING PROCEDURE (SOP)

LASER EGG AND KAITERRA APP- SETUP AND DATA EXPORT

By Corinne Fox

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DECEMBER 2018 ACTION LAB SUMMARY:



Figure 1: Nepal Study Center in the Sustainability action lab room at PNMHI installing the Laser Egg

Laser Eggs are sensors that monitor particulate matter in the air in real-time (Kaiterra, n.d.). This particulate matter concentration is measured against the Air Quality Index (AQI). AQI is a number used by government agencies to communicate the level of air quality to the public (USEPA, 2016). The higher the number, the more likely a community is to experience negative health effects. In this project, the Laser Egg was used to monitor indoor air quality.

The Laser Egg by the company Kaiterra was selected for this project because of its affordability, user-friendly interface, and real-time data display on the Laser Egg sensor, and because it has a built-in application that can be accessed easily through a download on a smart device.

The sensor is programmed to take a measurement every 0.1 seconds through a small fan built into the shell which sucks in the ambient air through the back of the sensor. A laser beam streams across the air current and the refracted light measures the partial size count and diameter (Kaiterra, n.d.).

OPERATIONAL CHECK LIST

- First, read the instructions that come with the laser Egg (inside the box or refer to *Additional Resources C* in this Standard Operational Procedure)
- Open the Laser Egg box and make sure all the materials are in the box.
 - a. Laser Egg
 - b. Charging cord
 - c. Instructions



(Charging Cord)



(All material in the box: <http://www.kaiterra.com/support/knowledge-base/in-the-box-2/>)

- Purchase the following additional materials: an adapter with a USB inlet and a wall converter to plug the Laser Egg into the wall for charging for the item does not come with a converter or adapter.



(Charging converter)



(Charging adapter)

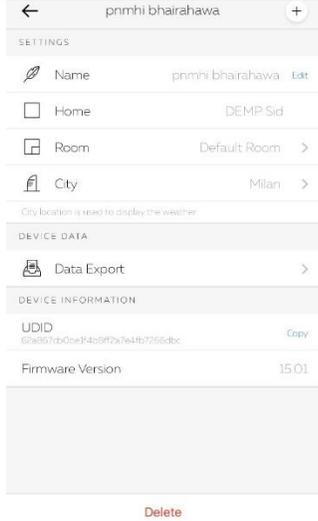
- Download the Kaiterra phone or tablet application (GooglePlay or Apple store) onto a smart device.

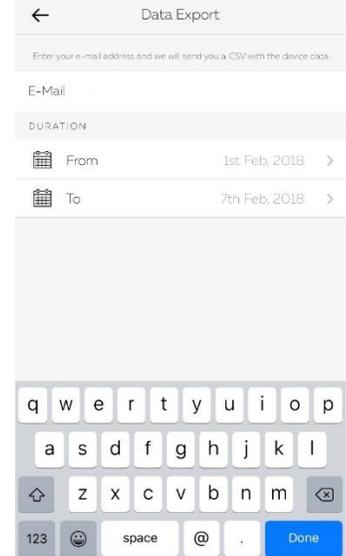
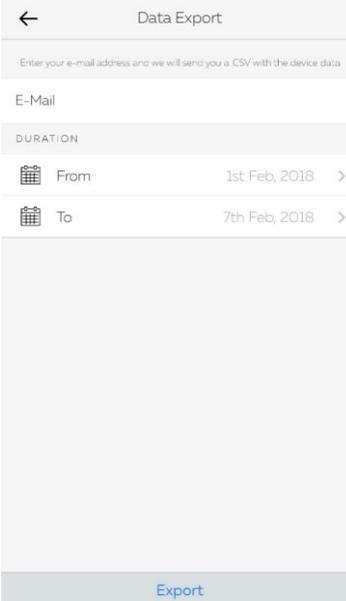
Important Notes: (1) Before the deployment and application process, it is critical to have access to Wifi and Wifi passwords. (2) If the Laser Egg is not plugged in to power and the battery is not fully charged, it will run out of battery and not collect data. (3) The application needs to be downloaded onto a smartphone or other smart device before the pairing process.

- Follow the Laser Egg and Kaiterra application pairing instructions (located inside box or in *Additional Resources C.*)
- Once the Laser Egg is paired with the Kaiterra application, place the Laser Egg in a desired location and make sure it is plugged in. Although the Laser Egg has a battery, it will only stay charged for short a period of time (less than 8 hours) if it is not connected to an external power source. A desired location would therefore be considered somewhere safe, without external air pollution flow, and a clear and dust-free indoor location, for example of a bookshelf or desk, which has a power outlet nearby.
- Additionally, if one wants to access the Laser Egg data on a different smart device, one must follow the pairing process (located inside Laser Egg box or *Additional Resources C.*)

DOWNLOADING DATA

<p>The picture to the right is the screen when the Kaiterra application first opens. Select “Default Room”: here you will see PNMHI and Mayor because these two Laser Eggs are already set up.</p>	
--	--

<p>Select either PNMHI or DEMP Sidd Mayor depending on what data you want to download. Do this by selecting the gear to the right of the Laser Egg name.</p>	
<p>Now select “Data Export” under DEVICE DATA.</p>	

<p>Enter in the email address to which the data should be sent, and under DURATION, select a FROM and TO date (6-day increments) Send email to : bohara@unm.edu</p>	
<p>Select Export at the bottom of the screen. Check the email account that was entered earlier; the data should have arrived as a csv. File and can be opened in Microsoft Excel.</p>	

ADDITIONAL RESOURCES:

- A. This website is helpful for questions and troubleshooting:
<http://www.kaiterra.com/support/>
- B. For additional technical questions email: SUPPORT@KAITERRA.COM

C. The Document below is the step-by-step process to pair the Laser Egg and the Kaiterra application

MODE BUTTON

By pressing the mode button, you can cycle through the different displays on the Laser Egg, and understand more details about the air quality around you.

AQI CN MODE

The Air Quality Index is a representation of air quality on a 0-500 scale, calculated here using the Chinese conversion method.

AQI US MODE

The Air Quality Index is a representation of air quality on a 0-500 scale, calculated here using the United States EPA method.

CONCENTRATION MODE

The concentration of PM2.5 in micrograms per cubic metre is a standard measure of particulate air pollution, commonly used by governmental institutions. AQI calculations are based on this number.

PARTICLE COUNT MODE

This mode displays the number of particles in 0.1L of air. Both the number of particles larger than 0.3 microns and larger than 2.5 microns in size are displayed. Particles 0.3 microns in size include bacteria and smog, while those 2.5 microns in size include large dust particles.

NIGHT MODE

This mode turns down the brightness of the LCD screen, perfect if you want to get some sleep while the Laser Egg continues to record data. You can still receive alerts of changes in air quality on your phone.

DATA TRANSFER

Data will be uploaded every 30 seconds when the Laser Egg is connected to Wi-Fi (Wi-Fi icon). If left untouched for 15 minutes, the Wi-Fi icon will appear and data will be uploaded every 5 minutes. This helps extend the lifespan of the Laser Egg.

TECH SPECS

Battery type: Lithium
 Battery capacity: 2300mAh
 Input voltage: DC5.0V
 Input current: 1A
 Screen size: 2.6"
 Connection: Wi-Fi (2.4GHz)
 Supported platforms: Android, iOS
 Compliance standard: Q/CYDSH 002-2015
 Manufacturer: Origins Technology Limited

CE Made with ♻️ in China

CONTACT



www.origins-china.com
 400-863-0600

Visit us at the Origins Breathing Space
 Beixinqiao Touting No. 2, Dongcheng, Beijing
 北京市东城区北新桥头条二号

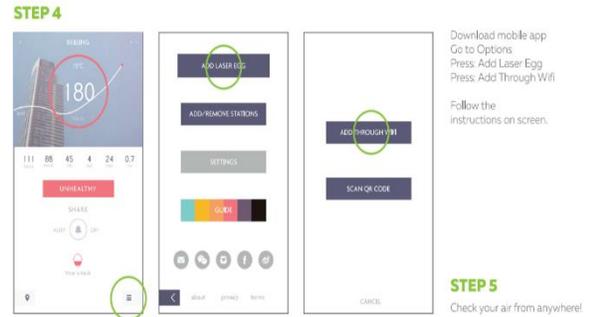
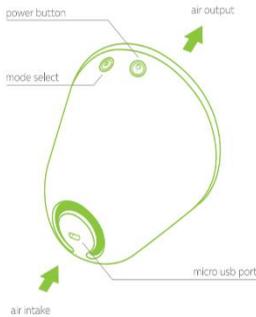
LASER EGG
 by origins

**TAKE CHARGE
 OF YOUR ENVIRONMENT**

ACCURACY
 Laser particle counter and cloud calibration provide top-level accuracy.

CONNECTIVITY
 Wi-Fi enabled for real-time data and wireless monitoring.

MOBILITY
 Small enough to fit in the palm of your hand. Monitor the air in your home, or wherever you choose to go.





5-IN-1 WEATHER STATION NEPAL STUDY CENTER ENVIRONMENTAL ACTION LAB

Citizen Science Danda River Monitoring Program (DEMP)

- The Weather Station measures:

1. Temperature
2. Humidity
3. rain
4. wind speed
5. wind direction



- The Dual digital display allows one to observe weather data in multiple rooms via monitor and phone application called ACURITE



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WEATHER STATION, ACURITE APP SETUP AND DATA EXPORT

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The materials and directions are directly referenced from the Acurite website and manual:
<https://www.acurite.com/learn/weather-stations/acurite-5-in-1-sensor>

DECEMBER 2018 ACTION LAB SUMMARY:



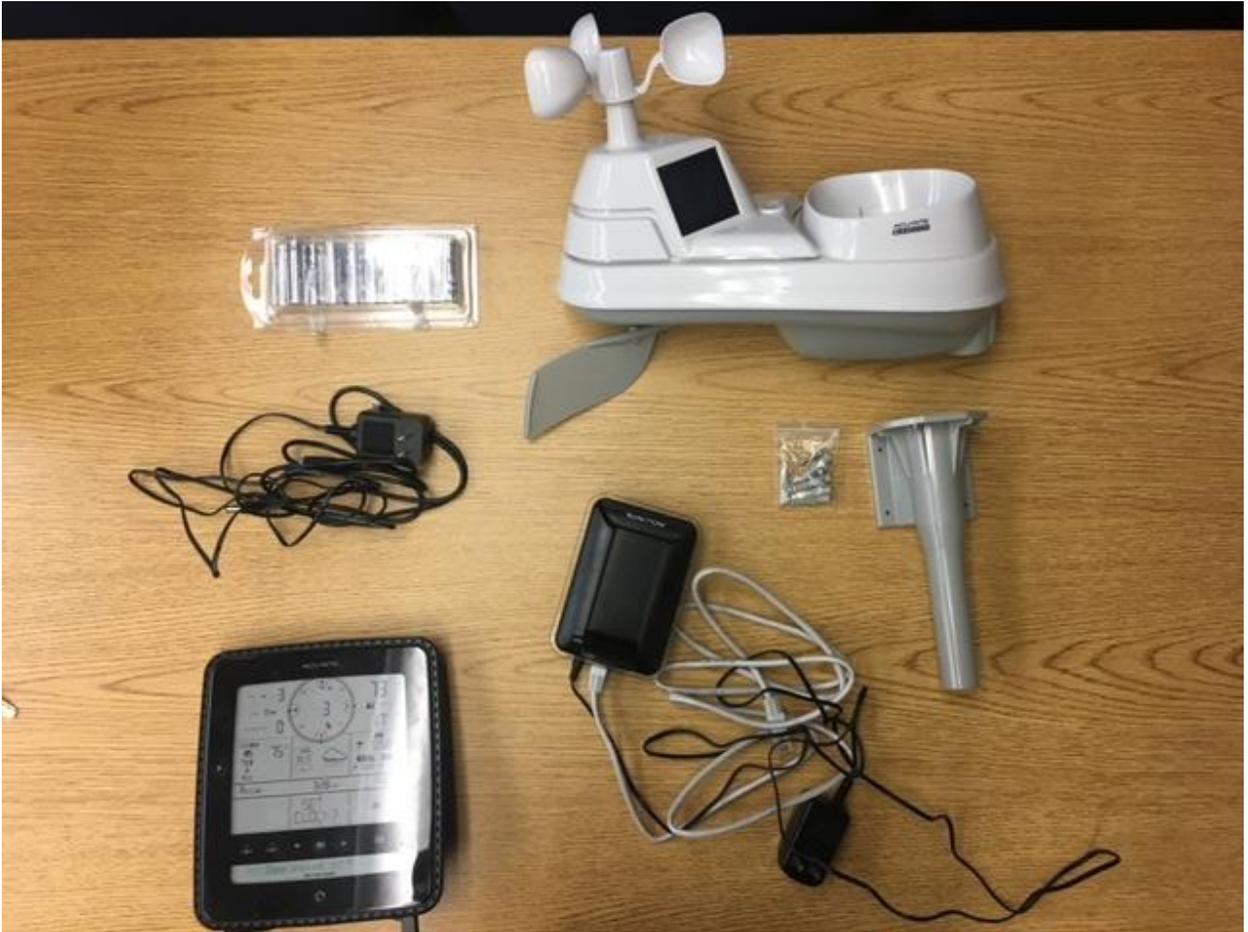
Figure 1: Nepal Study Center participants installing the Weather Station.

Weather stations are used to measure outdoor weather-related variables. The Pro 5-in-1 Weather Station Sensor by the company Acurite measure five different outdoor conditions: temperature, humidity, wind speed, wind direction, and rainfall (Acurite, 2018). The Weather Station was selected because of its affordability, user-friendliness, durability, wireless network abilities, and smart device application capabilities (Acurite, 2018). The sensor has a monitor that displays the weather parameters in real-time, an application that displays the readings, and an online network for communities to access the weather measurements on the web from anywhere.

The Weather Station must be set up in a safe location where the data can be wirelessly transmitted to the monitor that displays the weather data and uses weather prediction algorithms to generate and display a most accurate forecast available for the exact location (Acurite, 2018). For example, the Nepal Study Center installed the station on the roof of the PNMHI building where no one can get to the device and where it cannot be damaged by harsh weather.

TOOLS AND MATERIALS

1. 5-in-1 Pro Weather Station



2. AAA batteries for monitor



3. Additional tools needed to install the station include: drill, drill bit, extension cord, computer with internet access, and a smart device for the application download.

SETTING UP THE WEATHER STATION

For installation, the Acurite website has very helpful resources. Before installation read the manual and watch the videos:

- Manual: <https://www.acurite.com/learn/installation/5in1>
- Station: <https://www.acurite.com/media/manuals/06014RM-instructions.pdf>
- Station Monitor: <https://www.acurite.com/media/manuals/01036-instructions-PC-Connect.pdf>
- Troubleshooting: <https://www.acurite.com/media/manuals/01512-01531-instructions.pdf>
- Rain Gauge Video: https://www.youtube.com/watch?time_continue=6&v=sB9xFI7HYPg
- Maintenance Video: https://www.youtube.com/watch?time_continue=14&v=IQouEzdPqDw
- Installation Video: https://www.youtube.com/watch?time_continue=4&v=Lx7GP_Vrggs

After the weather station is installed, it should be ready to start collecting data. The data is displayed on the Acurite website and the monitor, and can be accessed via phone application.

Downloading Data

The Nepal Study Center environmental coordinator is in charge of downloading the weather data from the monitor by plugging it into the desktop computer and downloading it into a CSV document. This is the current system for downloading the data.

After the data is downloaded, it is emailed to Dr. Bohara (bohara@unm.edu) and then cleaned up for further analysis.

- 1) Before the equipment is synced with your personal computer, be sure that your Weather Station (both indoor and outdoor components) is functioning and recording real-time weather data. You will know if it is functioning if you see the data on the monitor and on the application.
- 2) In order to transfer data from the station to your computer, you will need some software that allows the two to connect to each other. Go to:

http://www.acurite.com/kbase/downloads/ and download the version which is suitable for your operating system. The download should be relatively short.

Knowledge Base, Manuals & Downloads

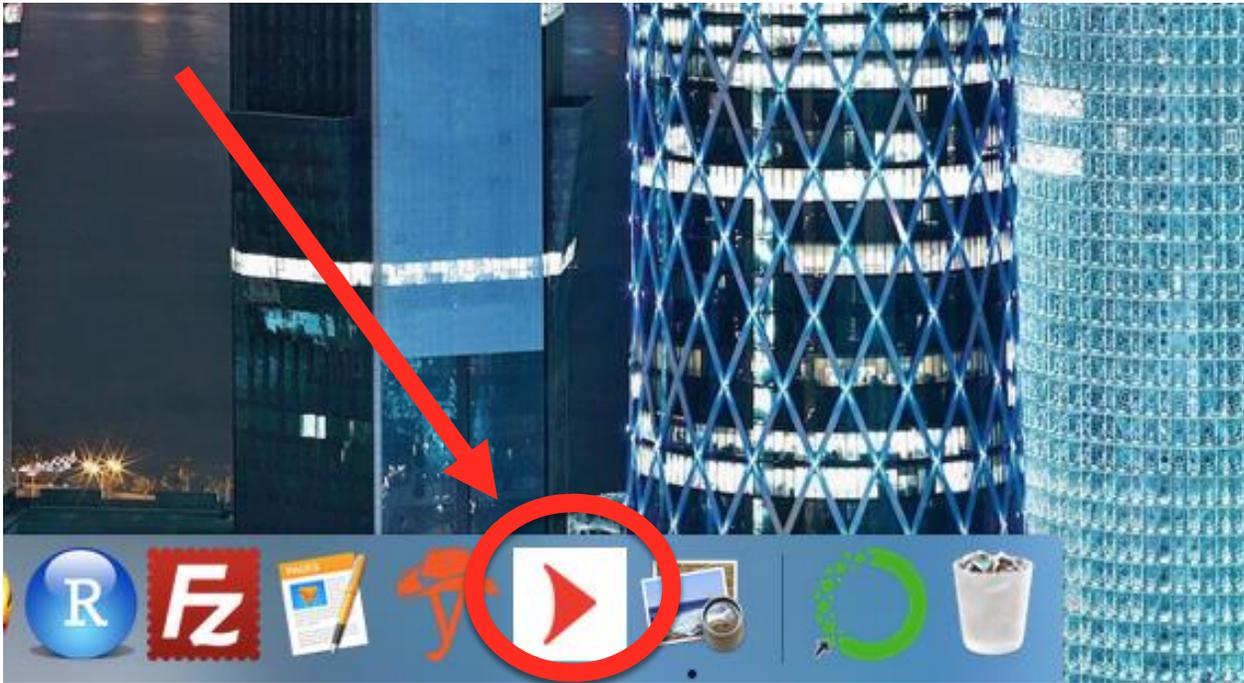
Enter Model Number:

Articles of "Downloads"

Sort by Date  

ARTICLE	DATE
My AcuRite - PC Connect Download	Apr 4, 2017

Show per page



- 3) Open up the newly-downloaded program. The icon on your computer will be displayed as a white square with a right-pointing red arrow in the center of it.
- 4) If you search within the box that your weather station came with, you will find a small USB cable that connects to your computer and the indoor component of your station. (In our case, this piece of equipment was black in color and displayed the real-time weather reports on a blue screen.) Connect the indoor component of your weather station into a free USB port on your computer.
- 5) Return to the opened program.
- 6) On the software window, you will see bolded text at the top that reads *Data Transfer*. This area, along with the drop-down menu slightly below it, is what we are interested in.

ACURITE PC Connect

Data Transfer

Transfer historical data from Indoor Display to my computer [Transfer Now](#)

Schedule automatic data transfers

Weather Sharing

Send current data to the My AcuRite and Weather Underground communities.

Share my weather data

My AcuRite ⓘ Enter the 12-digit Device ID

[Share Now](#)

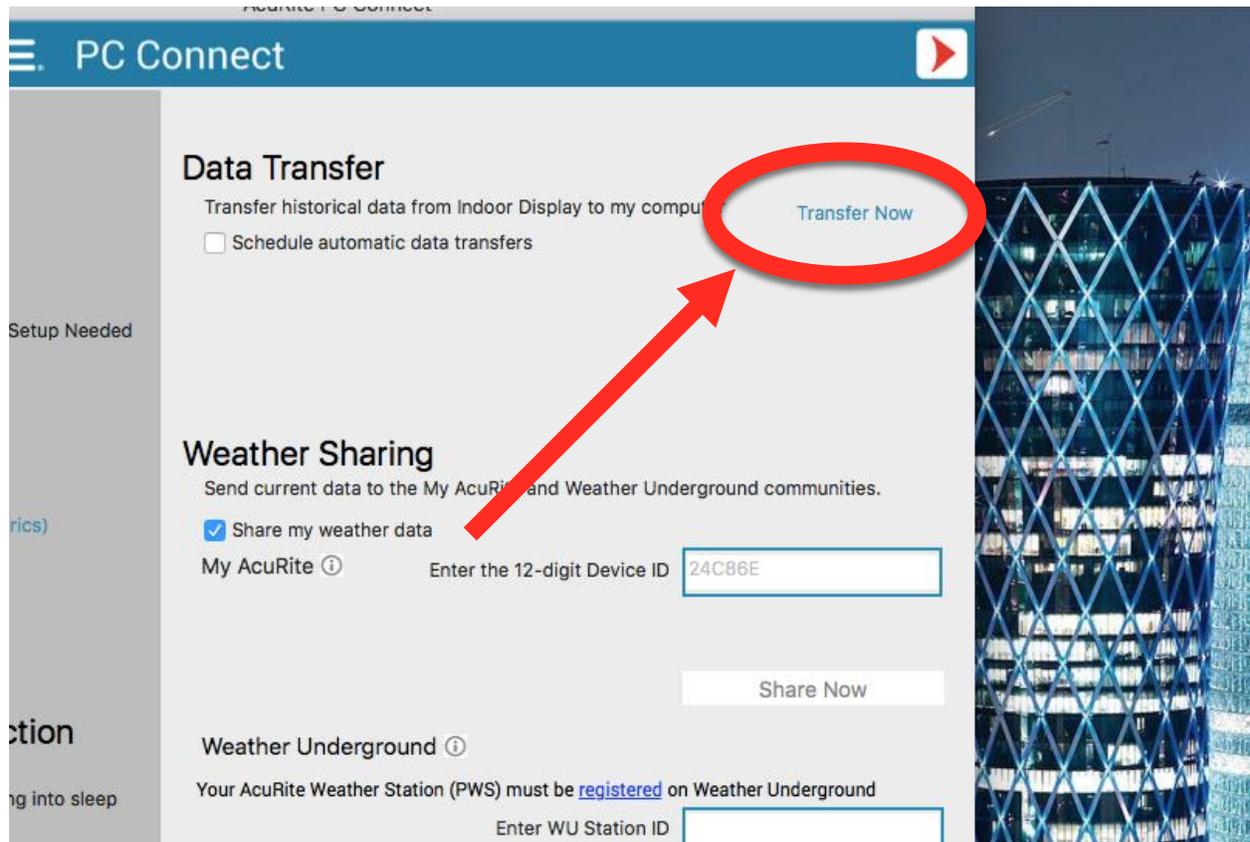
Weather Underground ⓘ

Your AcuRite Weather Station (PWS) must be [registered](#) on Weather Underground

Enter WU Station ID



- 7) To the right of this area, you will see blue text that reads *Transfer Now*. Click this text. The software will upload the real-time data being displayed on your weather station into a .csv file.



- 8) After you click, a new window will pop up; you will be prompted to input where on your personal computer you want all of your data to be saved. Enter a safe location that you will remember into the text area. You will now have a .csv file that contains all of the weather data at that particular point in time.

ADDITIONAL RESOURCES

A. Display for 5-in-1 Weather Sensor



Package Contents

1. Display unit with tabletop stand
2. Power adapter
3. Instruction Manual

This product requires an AcuRite 5-in-1 Weather Sensor (sold separately) to be operational.

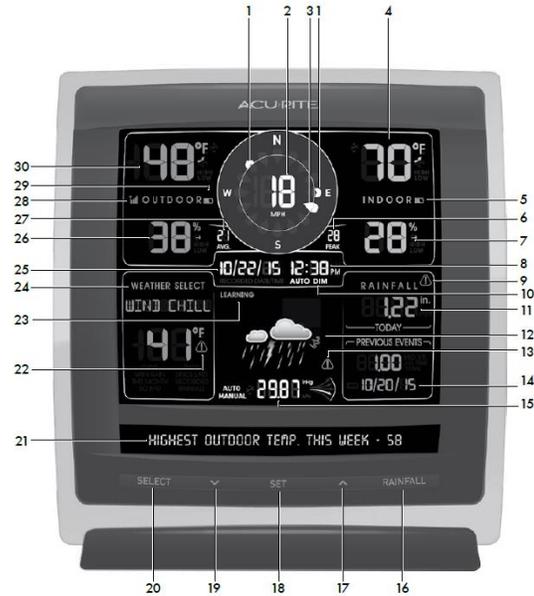
IMPORTANT		PRODUCT MUST BE REGISTERED TO RECEIVE WARRANTY SERVICE
PRODUCT REGISTRATION		
Register online to receive 1 year warranty protection		
www.AcuRite.com		
REGISTER NOW Support Forum Archived Products Register a Product	SUPPORT Support Forum Archived Products Register a Product	

Questions? Contact Customer Support at (877) 221-1252 or visit www.AcuRite.com.

SAVE THIS MANUAL FOR FUTURE REFERENCE.

Features & Benefits

Display Unit



1. **Previous 2 Wind Directions**
2. **Current Wind Speed**
3. **Current Wind Direction**
4. **Current Indoor Temperature**
Arrow icon indicates direction temperature is trending.
5. **Display Low Battery Indicator**
6. **Peak Wind Speed**
Highest speed from the last 60 minutes.
7. **Current Indoor Humidity**
Arrow icon indicates direction humidity is trending.
8. **Clock**
9. **Rainfall Alert Indicator**
Indicates rainfall of more than 1" of rain in 2 hours or less.
10. **AUTO DIM Indicator**
11. **Current Rainfall**
Accumulates data during rainfall.
12. **12 to 24 Hour Weather Forecast**
Self-Calibrating Forecasting pulls data from your 5-in-1 sensor to generate your personal forecast.
13. **Storm Alert Indicator**
14. **Month/Year/All-Time Rainfall**
15. **Current Barometric Pressure**
Arrow icon indicates direction pressure is trending.
16. **RAINFALL Button**
Press to change the RAINFALL data being displayed (Month, Year, All-Time).
17. **^ Button**
for setup preferences.
18. **SET Button**
for setup preferences.
19. **v Button**
for setup preferences.
20. **SELECT Button**
Press to change the WEATHER SELECT category data being displayed.
21. **Weather Ticker™**
22. **Heat Index/ Wind Chill Alert Indicator**
23. **Learning Mode Icon**
Disappears after weather forecast self-calibration is complete.
24. **WEATHER SELECT**
Displays: heat index, dew point, wind chill, feels like, days with rain this month, and days since last recorded rainfall.
25. **Date**
26. **Current Outdoor Humidity**
Arrow icon indicates direction humidity is trending.
27. **Average Wind Speed**
of all speeds from past 2 minutes.
28. **5-in-1 Sensor Signal Strength**
29. **Sensor Low Battery Indicator**
30. **Current Outdoor Temperature**
Arrow icon indicates direction temperature is trending.

3

Display Unit Setup

AcuRite recommends high quality alkaline batteries for the best product performance. Heavy duty or rechargeable batteries are not recommended.

1. **Set the A-B-C Switch**
The A-B-C switch is located inside the battery compartment. It can be set to A, B or C. However, you must select the same letter choices for both the sensor and the display unit in order for the units to synchronize.
 2. **Plug Power Adapter into Electrical Outlet**
 3. **Install or Replace Batteries (optional)**
Insert 6 x AA alkaline batteries into the battery compartment, as shown. Follow the polarity (+/-) diagram in the battery compartment.
-

IMPORTANT: Batteries are a backup power source to preserve records in the event of a power outage. Power adapter is the recommended primary power source to enjoy the full functionality of this product.

PLEASE DISPOSE OF OLD OR DEFECTIVE BATTERIES IN AN ENVIRONMENTALLY SAFE WAY AND IN ACCORDANCE WITH YOUR LOCAL LAWS AND REGULATIONS.
BATTERY SAFETY: Clean the battery contacts, and also those of the device prior to battery installation. Remove batteries from equipment which is not to be used for an extended period of time. Follow the polarity (+/-) diagram in the battery compartment. Promptly remove dead batteries from the device. Dispose of used batteries properly. Only batteries of the same or equivalent type are recommended to be used. DO NOT incinerate used batteries. DO NOT dispose of batteries in fire, as batteries may explode or leak. DO NOT mix old and new batteries or types of batteries (alkaline/standard). DO NOT use rechargeable batteries. DO NOT recharge non-rechargeable batteries. DO NOT short-circuit the supply terminals.

5



BACK OF DISPLAY UNIT

1. **Integrated Hang Hole**
for easy wall mounting.
2. **Backlight Button**
Dimmer control while using power adapter. Activates momentary backlight while on battery power.
3. **Plug-in for Power Adapter**
4. **Removable Tabletop Stand**
5. **CLEAR ALL/RESET Button**
Press and HOLD for 10 seconds for full reset to factory defaults.
6. **A-B-C Switch**
ID code that must match 5-in-1 sensor's A-B-C switch to ensure units synchronize.
7. **Power Adapter**
8. **Battery Compartment Cover**
(not shown)

4

Set the Time, Date & Units

Press the "SET" button, located on the front of the display unit, to enter SET MODE. Once in set mode, the preference you are currently setting will blink on the display.

To adjust the currently selected (flashing) item, press and release the "^" or "v" buttons (press and HOLD to fast adjust).

To save your adjustments, press and release the "SET" button again to adjust the next preference. The preference set order is as follows:

- TOP DISPLAY:**
CLOCK HOUR
CLOCK MINUTE
CALENDAR MONTH
CALENDAR DATE
CALENDAR YEAR
TEMPERATURE UNITS (°F or °C)
WIND SPEED UNITS (MPH, km/h, Knots)
RAINFALL UNITS (in or mm)
PRESSURE UNITS (inHg or hPa)
- TICKER DISPLAY:**
LANGUAGE (English, French, Spanish)
WEATHER TICKER SPEED (SLOW, MEDIUM, FAST)

You will automatically exit SET MODE if no buttons are pressed for 20 seconds. Enter SET MODE at any time by pressing the "SET" button.

Display Backlight Settings

This weather station's color display features three different lighting settings: High (100%) brightness, Medium (60%) brightness and Low (30%) brightness. Using battery power alone, the backlight is available momentarily for 10 seconds by pressing the "BACKLIGHT" button.

When display is powered with the power adapter, backlight remains on at 100% brightness. Press "BACKLIGHT" button once to dim to 60% brightness; press again to dim to 30%; press a 3rd time to enter "AUTO DIM" mode. "AUTO DIM" will appear below the time.

AUTO DIM MODE: Automatically adjusts display brightness based on time of day & year.	
MARCH 11-NOVEMBER 4	6:00 a.m. - 9:00 p.m. = 100% brightness 9:01 p.m. - 5:59 a.m. = 30% brightness
NOVEMBER 5 - MARCH 10	7:30 a.m. - 7:00 p.m. = 100% brightness 7:01 p.m. - 7:29 a.m. = 30% brightness

6

OPERATION

Placement for Maximum Accuracy

AcuRite sensors are sensitive to surrounding environmental conditions. Proper placement of both the display unit and the sensor are critical to the accuracy and performance of this product.



Display Unit Placement

Place the display unit in a dry area free of dirt and dust. To ensure accurate temperature measurement, place out of direct sunlight and away from heat sources or vents. Display unit stands upright for tabletop use or is wall-mountable.

Using the Professional Weather Center

Learning Mode

Self-Calibrating Forecasting use a unique algorithm to analyze changes in pressure over a time period (called Learning Mode) to determine your altitude. After 14 days, the Learning Mode icon disappears from the display screen. At this point, the self-calibrated pressure is tuned in to your location and the unit is ready for superior weather prediction.

Weather Forecast

AcuRite's patented Self-Calibrating Forecasting provides your personal forecast of weather conditions for the next 12 to 24 hours by collecting data from the sensor in your backyard. It generates a forecast with pinpoint accuracy - personalized for your exact location.



View the complete list of icons at www.AcuRite.com/acurite-icons

Weather Select

Weather Select displays data including wind chill, dew point, heat index, feels like, days with rain this month, and days since last recorded rainfall. To change the "Weather Select" category shown, press the "SELECT" button on the front of the display.

Barometric Pressure

Subtle variations in barometric pressure greatly affect the weather. This weather center displays the current pressure with an arrow icon to indicate the direction the pressure is trending (FALLING, STEADY, or RISING).

7

Weather Ticker™

The Weather Ticker automatically flashes your real-time weather information and alerts as text in the lower part of the display unit screen.

The possible WEATHER TICKER messages are as follows:

- HEAT INDEX XX
- WINDCHILL XX
- DEW POINT XX
- IT FEELS LIKE XX OUTSIDE
- 7 DAY HIGH TEMP. XX- MM/DD
- 7 DAY LOW TEMP. XX- MM/DD
- 30 DAY HIGH TEMP. XX- MM/DD
- 30 DAY LOW TEMP. XX- MM/DD
- ALL TIME HIGH TEMP. XXX...RECORDED MM/DD/YY
- ALL TIME LOW TEMP. XXX...RECORDED MM/DD/YY
- 24 HOUR TEMP. CHANGE +XX
- ALL TIME HIGH WIND XX MPH...RECORDED MM/DD/YY
- 7 DAY AVERAGE WIND XX MPH
- TODAY'S AVERAGE WIND XX MPH
- MOON- NEW
- MOON- WAXING CRESCENT
- MOON- FIRST QUARTER
- MOON- WAXING GIBBOUS
- MOON- FULL
- MOON- WANING GIBBOUS
- MOON- LAST QUARTER
- MOON- WANING CRESCENT
- INDOOR HUMIDITY OK
- INDOOR HUMIDITY HIGH
- INDOOR HUMIDITY LOW
- NEW LOW TEMP. RECORD XX
- NEW HIGH TEMP. RECORD XX
- NEW WIND RECORD TODAY XX
- CURRENT RAINFALL X.XX/HR.
- RAIN EVENT STARTED XX HRS. AGO
- SENSOR BATTERIES LOW
- DISPLAY BATTERIES LOW
- SENSOR SIGNAL LOST...CHECK BATTERIES AND PLACEMENT
- CAUTION- HEAT INDEX IS XXX
- CAUTION- WIND CHILL IS XXX
- CALIBRATION

9

Rainfall Tracking

This weather station features enhanced tracking of historical rainfall data. Rain accumulation data is recorded for today, over all-time, by year, by month, and by rainfall event.

Press the "RAINFALL" button to review rainfall records. The icon is shown on the display while historical data is being viewed.

Records are shown in the following order:

- PREVIOUS RAINFALL #1*
- PREVIOUS RAINFALL #2*
- PREVIOUS RAINFALL #3*
- CURRENT MONTH TOTAL RAINFALL
- PREVIOUS MONTH TOTAL RAINFALL
- 2 MONTHS AGO TOTAL RAINFALL
- CURRENT YEAR TOTAL RAINFALL
- PREVIOUS YEAR TOTAL RAINFALL
- ALL-TIME TOTAL RAINFALL (date shown is start date of the all-time total; the date the display was powered on)



* Previous rainfall is the amount of rain recorded from 12:00am to 11:59pm on the date shown.

8

Troubleshooting

Problem	Possible Solution
Inaccurate temperature or humidity	<ul style="list-style-type: none"> • Make sure both the display unit and 5-in-1 sensor are placed away from any heat sources or vents (see page 7). • Make sure both units are positioned away from moisture sources. (see page 7). • Make sure 5-in-1 sensor is mounted at least 5 ft off of the ground. • Calibrate indoor and outdoor temperature and humidity (see page 11).
No rainfall	<ul style="list-style-type: none"> • Check to ensure the rain gauge stabilizer (plastic tab) has been removed from the bottom of the sensor. • Clear debris, such as leaves, out of the rain collector funnel and debris screen. • Calibrate the Rain Gauge.
Inaccurate wind readings	<ul style="list-style-type: none"> • What is wind reading being compared to? Pro weather stations are typically mounted at 30 ft high or more. Make sure to compare data using a sensor positioned at the same mounting height. • Check location of the sensor. Ensure it's mounted a minimum of 5 ft in the air with no obstructions around it (within several feet). • Ensure wind cups are spinning freely. If they hesitate or stop try lubricating with graphite powder or spray lubricant.
Display screen not working	<ul style="list-style-type: none"> • Check that the batteries are installed correctly. Batteries may need to be replaced. • Reset the display by pressing and holding the CLEAR/ALL/RESET button for 10 seconds, located in the battery compartment of the display unit. Date and time will need to be entered after a reset.

If your AcuRite product does not operate properly after trying the troubleshooting steps, visit www.AcuRite.com or call (877) 221-1252 for assistance.

10

Care & Maintenance

Display Unit Care

Clean with a soft, damp cloth. Do not use caustic cleaners or abrasives. Keep away from dust, dirt and moisture. Clean ventilation ports regularly with a gentle puff of air.

Calibration

The indoor / outdoor temperature and humidity readings, and barometric pressure can be calibrated on the display unit to improve accuracy. Calibration can improve accuracy when sensor placement or environmental factors impact the data accuracy.

- To access calibration mode, press AND HOLD the “^”, “SET”, and “v” buttons simultaneously for at least 5 seconds.
- To adjust the currently selected (flashing) item, press and release the “^” or “v” buttons to calibrate the data value higher or lower from the actual reading.
- To save your adjustments, press and release the “SET” button to adjust the next preference. The “☑” icon will remain illuminated next to calibrated values.

The preference set order is as follows:

OUTDOOR TEMPERATURE
 OUTDOOR HUMIDITY
 INDOOR TEMPERATURE
 INDOOR HUMIDITY
 BAROMETRIC PRESSURE (must be set to MANUAL mode to calibrate)*

*To change from AUTO to MANUAL pressure mode and vice versa, press AND HOLD the “SET” button for at least 10 seconds. The display indicates the current pressure mode selected, “AUTO” or “MANUAL”.

After 10 seconds of inactivity, the display will save the adjustments and exit calibration mode. Note: Calibrations will be erased if the display is reset or if batteries are removed and the power adapter is unplugged.

Specifications

TEMPERATURE RANGE	Outdoor: -40°F to 158°F, -40°C to 70°C Indoor: 32°F to 122°F, 0°C to 50°C
HUMIDITY RANGE	Outdoor: 1% to 99% RH Indoor: 1% to 99% RH
WIND SPEED	0 to 99 mph; 0 to 159 kph
WIND DIRECTION INDICATORS	16 points
RAINFALL	0 to 393 in; 0 to 9999mm
WIRELESS RANGE	330ft / 100m depending on home construction materials
OPERATING FREQUENCY	433 MHz
POWER	Display: 4.5V, 250mA AC adapter 6 x AA alkaline batteries (optional) Sensor: 4 x AA alkaline or lithium batteries
DATA REPORTING	Wind Speed: 18 second updates; Direction: 30 seconds Outdoor temperature & humidity: 36 second updates Indoor temperature & humidity: 60 second updates

FCC Information

This device complies with part 15 of FCC rules. Operation is subject to the following two conditions:

- This device may NOT cause harmful interference, and
 - This device must accept any interference received, including interference that may cause undesired operation.
- WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
- NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and the receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.
- NOTE:** The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user authority to operate the equipment.
- This device complies with Industry Canada licence-exempt RSS standard(s).
- Operation is subject to the following two conditions:
- This device may not cause interference, and
 - This device must accept any interference received, including interference that may cause undesired operation of the device.

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Customer Support

AcuRite customer support is committed to providing you with best-in-class service. For assistance, please have the model number of this product available and contact us in any of the following ways:

 (877) 221-1252  info@chaney-inst.com

24/7 support at www.AcuRite.com

- ▶ Installation Videos
- ▶ Register your Product
- ▶ Instruction Manuals
- ▶ Support User Forum
- ▶ Replacement Parts
- ▶ Submit Feedback & Ideas

IMPORTANT PRODUCT MUST BE REGISTERED TO RECEIVE WARRANTY SERVICE

PRODUCT REGISTRATION
 Register online NOW to receive 1 year warranty protection
www.AcuRite.com

SUPPORT

Support Forum
 Archived Products
 Register a Product

Limited One Year Warranty

At AcuRite, we proudly uphold our commitment to quality technology. Chaney Instrument Co. warrants that all products it manufactures to be of good material and workmanship, and to be free of defects when properly installed and operated for a period of one year from the date of purchase.

We recommend that you visit us at www.AcuRite.com for the fastest way to register your product. However, product registration does not eliminate the need to retain your original proof of purchase in order to obtain warranty benefits.

Chaney Instrument Co. warrants that all products it manufactures to be of good material and workmanship, and to be free of defects when properly installed and operated for a period of one year from the date of purchase. Remedies for breach of this warranty is limited to repair or replacement of the defective item(s). Any product which, under normal use and service, is proven to breach the warranty contained herein within ONE YEAR from date of sale will, upon examination by Chaney, and at its sole option, be repaired or replaced by Chaney. Transportation costs and charges for returned goods shall be paid for by the purchaser. Chaney hereby disclaims all responsibility for such transportation costs and charges. This warranty will

not be breached, and Chaney will give no credit for products it manufactures which have received normal wear and tear, been damaged (including by acts of nature), tampered, abused, improperly installed, damaged in shipping, or repaired or altered by others than authorized representatives of Chaney.

The above-described warranty is expressly in lieu of all other warranties, express or implied, and all other warranties are hereby expressly disclaimed, including without limitation the implied warranty of merchantability and the implied warranty of fitness for a particular purpose. Chaney expressly disclaims all liability for special, consequential or incidental damages, whether arising in tort or by contract from any breach of this warranty. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. Chaney further disclaims all liability from personal injury relating to its products to the extent permitted by law. By acceptance of any of Chaney's products, the purchaser assumes all liability for the consequences arising from their use or misuse. No person, firm or corporation is authorized to assume for Chaney any other liability in connection with the sale of its products. Furthermore, no person, firm or corporation is authorized to modify or waive the terms of this paragraph, and the preceding paragraph, unless done in writing and signed by a duly authorized agent of Chaney. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

For in-warranty claims:
 Chaney Instrument Co., 1 945 Wells St., 1 Lake Geneva, WI 53147

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SOLINST LEVELOGGER® EDGE

NEPAL STUDY CENTER

LUMBINI SUSTAINABILITY CIRCLE

Citizen Science Danda River Monitoring Program (DEMP)

- The Levelogger is a self-contained water level datalogger that monitors the depth of the river.
- It has a memory capacity of 40,000 temperature and water level data points
- The Levelogger has a long lasting lithium battery that can last up to 10 years.
- The Levelogger has wireless capabilities and uploads real-time data to an application interface



PRATIMAN-NEEMA
MEMORIAL FOUNDATION

**River Stage
Monitoring**

**YOGDAN Study
Abroad Program**

December 2017

**Eco-adventure
Hands-on
Service-learning
Experiential -
learning**

**Community
Learning
Environment**

**University of New
Mexico**
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com

ACTION LAB STUDY ABROAD DEPLOYMENT

STANDARD OPERATING PROCEDURE

LEVELLOGGER PRESSURE TRANSDUCER- RIVER STAGE

By Corinne Fox

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DECEMBER 2018 ACTION LAB SUMMARY:



Figure 1 and 2: Action Lab team teaching the students how to deploy the Levellogger into the pipe well connected to the gabion wall

A pressure transducer can measure the level and temperature of water for various applications such as long-term groundwater monitoring; river, lake, and stream gauging; aquifer testing; wetlands and stormwater runoff monitoring; agricultural stormwater runoff monitoring; and more for water resource management (Solinst, n.d.). A Solinst Levellogger Edge water level and temperature logger was used in this case study to begin to measure the river dynamics (river stage) of the Danda River. River stage is the depth of the river at the time of measurement. Two sensors were donated by the UNM Civil Engineering Department Geographic Information System (GIS) Lab and were specifically selected because of their relative affordability, durability, long-lasting battery life, large data point memory, and potential blue tooth and smartphone application capabilities. This sensor was also used successfully in previous UNM international watershed research studies conducted by the Water Resource Engineering Department, for example in Mexico.

The Levellogger starts to measure data once it is programmed and deployed into the river (Solinst, n.d.). It measures the temperature and the pressure of the water in feet (Solinst, n.d.). The logger can be programmed using the Solinst software on a computer to fit the parameters of the project. To accurately measure the level of the water, the barometric pressure needs to be measured. The company Solinst provides a barometric sensor, but for this study, the 5-in-1 Pro Weather Station provides barometric data for this study.

SETUP DESIGN

During the preliminary stages of the research, the Levelloggers were tested by following the Solinst directions prior to deployment in Nepal. A design was created prior to the deployment to ensure the proper materials were purchased and ready for use on the ground during the day of the deployment in Nepal. The figure below was created to provide a general outline as to

how the well pipe would be installed and then how the levellogger would be disseminated down into the well to collect readings from the river flow.

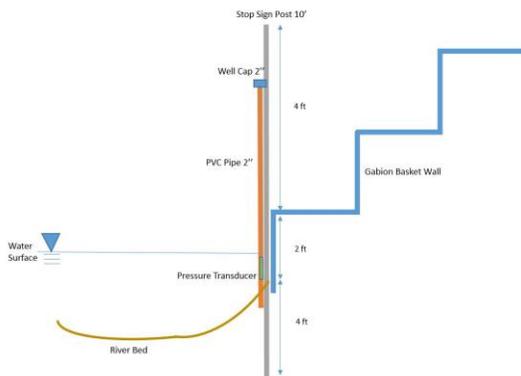


Figure 3 and 4: Initial well design and gabion wall along the PNMHI campus

MATERIALS AND TOOLS

Before starting, make sure to have internet access to access the website links provided in this SOP.

1. Begin by familiarizing yourself with the Solinst material:
<https://www.solinst.com/products/data/brochure-dataloggers-telemetry.pdf> and
<https://www.solinst.com/products/dataloggers-and-telemetry/precision.php> (read all tabs)
User guide: <https://www.solinst.com/products/dataloggers-and-telemetry/3001-levellogger-series/operating-instructions/user-guide/3001-user-guide.pdf>
Quick Start Guide: <https://www.solinst.com/products/dataloggers-and-telemetry/3001-levellogger-series/operating-instructions/quick-start-guide/3001-quick-start-guide.pdf>
2. Download the Solinst software onto the computer you intend to use by going to this link: <https://www.solinst.com/downloads/>



Figure 5: Levellogger materials

RESOURCES FOR OPERATIONAL AND INSTALLATION PROCESS

Before installation make sure you have all the proper materials listed in this brochure:

<https://www.solinst.com/products/data/brochure-dataloggers-telemetry.pdf>

A. Levellogger



(<https://www.solinst.com/products/dataloggers-and-telemetry/software.php>)

B. Levellogger cable

C. Solinst Levellogger Software (downloaded onto a desktop computer)

LEVELLOGGER

- Familiarize yourself with the material provided on this website:
<https://www.solinst.com/products/dataloggers-and-telemetry/precision.php>

SOFTWARE

- This resource is what will be needed to understand the Levellogger software:
<https://www.solinst.com/products/dataloggers-and-telemetry/software.php>

INSTALLATION AND PROGRAMING MATERIAL

- This website offers guidance for installation and programing:
<https://www.solinst.com/products/dataloggers-and-telemetry/programming-deployment.php>

ADDITIONAL RESOURCES:

- A. This website is helpful for questions and troubleshooting:
<https://www.solinst.com/products/dataloggers-and-telemetry/3001-levellogger-series/levellogger-edge/>
- B. This video is helpful for programing the Levellogger: <https://youtu.be/1bnFtonvwwA>
- C. This video is helpful for groundwater basics:
<https://www.youtube.com/watch?v=CpLpXx1Mkr8>

CITIZEN SCIENCE SURVEY

Himalayan Study Abroad Program: Urban Health and Environment

Sustainable Development Action Lab (SDAL)
Nepal Study Center, University of New Mexico
Department of Economics

In collaboration with the
Lumbini Center for Sustainability (LCS), PNMF
Siddharthanagar, Nepal

Namaste. Please help the University of New Mexico's SDAL Team understand how we can better collaborate with you in the future by answering the following questions. Please ask questions, if needed.

Name: _____

Gender: _____

Age: _____

Mention your grade level if you are a student: _____

Or mention your occupation and position if a professional: _____

How has your understanding of citizen science changed following this week's presentations and activities? Circle one option.

- 1—I understand much more about citizen science.
- 2—I understand a little more about citizen science
- 3—I have the same understanding about citizen science.

Was English a barrier to your understanding throughout the presentations and activities? Circle one option.

- 1—I understood everything.
- 2—I understood most of the information.
- 3—I partially understood the information.
- 4—I rarely understood the information.
- 5—I did not understand anything.

How has your awareness of the current environmental condition of the Danda River changed following this week's presentations and activities? Circle one option.

- 1—I am much more aware.
- 2—I am somewhat more aware.
- 3—I have the same awareness

To which of the following technological devices do you have access? Circle all that apply.

Feature Phone
Smart Phone
Landline
Personal Computer
School Computer
Other: _____

Which social media platforms do you use? Also, please indicate how often you use each one. Circle all that apply.

- 1—I use daily
- 2—I use sometimes
- 3—I rarely use.

Facebook (1 2 3)
Instagram (1 2 3)
Twitter (1 2 3)
Snapchat (1 2 3)
Tumblr (1 2 3)
YouTube (1 2 3)
Pinterest (1 2 3)
Reddit (1 2 3)
Other: _____

What computer programs do you know how to use? Circle all that apply.

Word (or other word processor)
Excel (or other spreadsheet software)
PowerPoint (or other presentation software)
Statistical Software (Such as SPSS or others)
Other: _____

What is the best way for the UNM SDAL to stay connected with you? Circle one option.

Email
Skype/Google Hangouts/FaceTime
Yogdan Website
Facebook
Other: _____

What resources and information could the UNM SDAL provide you to help you stay informed of our activities?

Do you have any suggestions/ideas that UNM SDAL can use in the future? Please explain.

What was your favorite and least favorite part of the activities and presentations? Please explain.

CITIZEN SCIENCE WORKSHEET

1. LASER EGG WORKSHEET

Air Quality Index (AQI) Assessment Data Sheet

Water quality index is important to know because it tells you how many particles are in the air. When pollution is heavy the air quality is not healthy for humans and animals. In Table 2, fill in the date and the air quality number you see on the Laser Egg. In Figure 1, you will see the different levels of AQI and why they are important to understand.

Table 2. Air quality index from laser egg.

Date	AQI Measurement	AQI Rating (see Figure 1)



Air Quality Rating	Steps to Protect Your Health and Our Environment
GOOD 0-50	Enjoy the great outdoors. - Rather than drive - bike or walk when possible. - Conserve energy. Replace incandescent bulbs with CFLs. - Plant a tree to improve health and air quality.
MODERATE 51-100	Some pollution. Even moderate levels pose risks to highly sensitive groups. - Bundle errands. Eliminate unnecessary trips. - Check AirAlerts to see if tomorrow's forecast is unhealthy. - Perform regular maintenance on your car.
UNHEALTHY For Sensitive Groups 101-150	Pollution levels are harmful to children, older adults and anyone with a respiratory or heart condition. Limit physical outdoor activity. - Don't drive alone. Carpool, take public transit. - Refuel your car in the evening. - Put off lawn care until air quality improves. - Use a gas or electric grill instead of charcoal.
UNHEALTHY 151-200	Everyone should limit strenuous outdoor activity when the air is unhealthy to breathe. - Telework and take public transit. - Turn off lights and electronics when not in use. - Avoid lawn mowing or use an electric mower. - Sign up for health alerts at cleanairpartners.net. - Don't use chemicals on your lawn and garden.
VERY UNHEALTHY 201-300	Pollution levels are very unhealthy for everyone. Avoid any physical outdoor activity. - Follow all of the action steps above.

Figure 1. Air quality rating based on index.

2. 5 IN 1 PRO WEATHER STATION WORKSHEET

Weather Station Assessment Data Sheet

Understanding weather helps us know different climatic patterns in the region. In this excursion one will look at the weather station screen and fill in the measurements that are being collected by the Pro 1 and 5 Weather Station.



Look at the weather station monitor screen or the Acurite app and write down the corresponding numbers for each measurement in Table 3.

Table 3. Current weather conditions.

Weather Measurement	Weather Data
Temperature (°C)	
Humidity (%)	
Wind Speed (Km/hr)	
Precipitation (in)	
Barometric Pressure (Hg)	

For more information on the projects, visit:

- **Nepal Study Center:**

<http://nepalstudycenter.unm.edu/SustainableResearchLab/UndergraduaterResearchInitiatives.html>

- **Nepal Study Center Blog:**

<https://foxc01.wixsite.com/yogdan/contact>

