

## Citizen Science: Air Quality Monitoring Training Workshops Report

### Introduction

The UCRSEA project has decided to use an environmental measurement device called the Airbeam. It is based on the open-source AirCasting platform for collecting, displaying and sharing environmental data using a mobile device. The Airbeam device allows users to measure four variables: humidity, sound level, particulate matter (PM2.5), and temperature, and share the data with others online.

The device is useful as a teaching tool in a number of ways. First, by making measurements, interpreting the data, and comparing data from different regions, students can learn about methods of scientific investigation. Second, the findings on the distribution of pollution and the varying levels of pollution from the different regions will increase the students' awareness of environmental and public policy issues. Third, collecting a complete data set may require students to measure several different regions daily and maintain this routine for an extended period of time. Students may divide into several groups and each group will take charge of each region. This will teach students how to assume different roles and take responsibilities as part of a team.

The device is also useful as a research and advocacy tool to encourage community engagement in dealing with urban environmental issues. By being able to accurately gauge urban temperature and pollution, citizens can use these findings to engage in shared learning dialogues with municipal officials and other actors about how their cities should address these issues.

Consequently, UCRSEA organized five air quality monitoring workshops in five cities in four Southeast Asian countries: Ninh Binh, Khon Kaen, Phnom Penh, Battambang, and Yangon.

### Purposes of the workshops

- 1) A main purpose of the workshop was to teach UCRSEA partners and other participants how to use the Airbeam device, how to upload the data to the AirCasting website, and how to use the website.
- 2) Another important purpose of the workshop was to teach participants about what PM 2.5 is, what the sources of PM 2.5 are, and why it is harmful to health. This information showed participants why it is important to monitor PM 2.5.
- 3) A final objective of the workshop was to help participants start thinking about how they can use the Airbeam device for their teaching, research, and advocacy.

### Activities and approaches in conducting the training workshops

Below is the agenda of each workshop:

First day	9:00-9:30	Introduction
	9:30-10:15	Participants introduce themselves and their goals for the workshop
	10:15-10:30	Coffee break

	10:30-12:00	Discuss what PM 2.5. is, its sources, and give overview of air quality in Asia. Then introduce the Airbeam and how to use it
	12:00-1:30	Lunch
	1:30-3:00	Each group learns how to use devices. Then each group uses the device to measure the air quality and temperature around the building and outside.
	3:00-3:30	Coffee break
	3:30-4:00	Upload the data to the website and look at the data together; Hand out the devices
	4:00-5:00	Q&A and wrap up
Second day	9:00-11:30	Each group goes somewhere in the city and uses the device to measure the data for their goals and then uploads the data
	11:30-1:30	Lunch
	1:30-3:00	The groups present the data and discuss what they found
	3:00-3:30	Coffee break
	3:30-4:30	Q & A and wrap up

Each workshop began by having the participants introduce themselves and share what they seek to learn during the workshop. Then the trainers described PM 2.5, its sources, and the risks it poses to human health, and gave an overview of the levels of PM 2.5. They then introduced the Airbeam device, which costs around US\$ 250. They presented data which showed that it is 80-90 percent as accurate as a US\$ 5,000 device and stated that while the device should not be used for scientific research (such as to be published in academic journals), it is useful to learn and raise awareness about air pollution.

The trainers then divided participants into groups and distributed Airbeam devices to each group. Participants were then taught of how to find the AirCasting App, set it up, and connect the Airbeam to a user’s phone or tablet. After the device was paired to a phone or tablet, groups were then taught how to collect data and upload it to the AirCasting website.

In the afternoon, each group walked around the vicinity of where the workshop was hosted and collected air quality data in this area. After they returned and uploaded their data, the trainers showed them the AirCasting website and how to use the website.

On the morning of the second day, each group took long trips around the city to collect air quality data. These trips were useful because participants could discover which areas had better and worse air quality. After they returned, the trainers showed them the data from their trips on the website and compared this data to that of the other groups. All of the participants then discussed the levels of air quality in the cities where the workshops were hosted.

The workshop concluded with each participant discussing what they had learned and how they plan to use the device in the future. After the workshop finished, UCRSEA handed out two devices per country to local partners.

The overall approach used in the workshop was very hands-on. Participants were able to learn about air quality monitoring by experimenting with the Airbeam devices and using the devices themselves. Consequently, many participants expressed that they enjoyed the workshop and found it different to many other workshops where they sat through many lectures.

### **Results and key lessons from the workshops**

- 1) This was the first time air quality had been monitored by citizens in Southeast Asia. Participants' knowledge of air pollution was greatly enhanced, particularly in countries where air quality had never been monitored.
- 2) This is the first time air quality data is available in all five of the workshop cities. This data can be accessed on the AirCasting website.
- 3) The Airbeam device is easy to use and consequently it is easy for people to teach others how to use it. A high school in Ninh Binh borrowed one of the devices and was able to teach his students how to use the device in only thirty minutes.
- 4) There is significant interest in air quality in the region. Citizens are interested in learning the air quality in their cities and therefore found the Airbeam device very useful.
- 5) A number of partners have concrete plans to use the devices to enhance their research, teaching, and advocacy.

### **Challenges, gaps and follow-up actions**

- 1) One of the devices meant for Myanmar has been malfunctioning. The PM 2.5 level is higher by 10 than it should be. Consequently, results are skewed and higher than they should be. This device needs to be fixed before it is given to the Myanmar partners.
- 2) The number of devices available for partners was less than the demand. Consequently, UCRSEA is purchasing three more devices: one for the high school in Ninh Binh and two for universities in Myanmar. RUPP requested that UCRSEA purchase a device for each provincial office of the Ministry of Environment, totaling 24 devices. However, this amount is beyond UCRSEA's budget for this project. Lisa suggested that UCRSEA write a proposal to the Canadian Embassy to fund this project.
- 3) A local government official in Ninh Binh is impressed with the Airbeam devices. However, during the workshop, he raised a concern that the national Vietnamese government would not accept these results unless the device has been accredited by a national-level scientific agency. This concern shows that there is a politics of knowledge in Vietnam and the national government seeks to maintain a monopoly over knowledge production.
- 4) As mentioned in the previous section, some partners have clear plans of how they will use the device. But the plans of other partners are unclear and undeveloped. Therefore, we need to follow up with these partners and help them develop their plans.
- 5) While it is clear how the device will be used by partners for research and education, none have yet mentioned how they will be used for advocacy efforts. This is something that needs to be followed up on after they have collected air quality data. UCRSEA could help the partners with these plans.
- 6) Also, this is strong potential to publish research article(s) based on the lessons learned and challenges encountered by partners after they have used the devices for research, advocacy, and community development. UCRSEA should follow up on this after these actions have been done.