

Bridging the Gap between Environmental Research and Action

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Earth, our only home, is in peril. Unless each one of us steps up and does our bit we are looking at a future in which the quality of our lives will be severely compromised. The report released by the Intergovernmental Panel on Climate Change (IPCC) earlier this year, in March, lays special emphasis on the interdependence between human societies, biodiversity, ecosystems, and climate in today's world. The report categorically states that while we have enough scientific data to back the pervasive impact human beings have had on the planet, it is now more than ever critical to act immediately to address the ongoing climate crisis. As a species, we humans have wrought irreversible and widespread damage to biodiversity and ecosystems with cascading impacts on our health and well-being. The IPCC report draws special attention to the extreme vulnerability of cities in the coming decades, especially those located in climate-vulnerable areas. Faced with this gloomy future, a question we all need to ask is: How can we, as individuals or communities, contribute to addressing the climate change and sustainability challenges we face?

For our part, as researchers, we are, of course, looking at knowledge creation in the areas of climate change and sustainability and, more importantly, we are committed to contributing to knowledge that is context specific. For example, most academic understanding of urban sustainability, and its many challenges, comes from research centred around countries in the Global North (United States of America, Canada, countries in Europe, Asian countries like Japan, South Korea and Singapore, and the island countries of Australia and New Zealand). However, it is in the Global South (regions of Africa, Latin America, Asia and Oceania) where rapid and large-scale urbanisation, with its many implications for environmental sustainability and social equity, is underway. Thus, to address the complexity of urbanisation in the Global South, we require contextualised local knowledge. This is especially true in the case of India which is both urbanising rapidly and facing climate change-

related challenges. According to the Global Climate Risk Index (2021), India ranked seventh in the ten most affected countries in 2019, first in terms of the number of fatalities, having faced a series of extreme weather incidents leading to devastating floods across the country.

Future scenario

Over the next few decades, Indian cities will be home to more than 50 percent of the population of the country. Cities will also expand spatially, impacting green cover and water bodies that are critical for determining the quality of life of urban residents. Given this imperative, our academic research in recent years has focused on the impacts of India's urbanisation on urban ecosystems. We have tried to highlight the role of nature in Indian cities in addressing sustainability and climate change issues. In our research, we have used the frameworks of social-ecological systems and urban commons to examine how ecosystems, be it lakes, wetlands, avenue trees, wooded groves, cemeteries and so on, have historically been used, and continue to be used, managed, and conserved by local communities for livelihoods and subsistence. We have also highlighted the importance of these urban commons, which provide nature-based solutions to address urban floods, reduce air pollution, improve physical and mental health, ameliorate urban heat-island effects that cause cities to heat up, and combat drought and water scarcity. We often think of cities as devoid of biodiversity—only comprising built infrastructure for human use. The discipline of urban ecology, which studies biodiversity in an urban environment, is still in its nascent stage in India. To address this knowledge gap, we have studied different kinds of biodiversity from insects to birds to trees, in a variety of urban spaces, such as home gardens, parks, cemeteries, and even slums, to understand how nature thrives in cities. These studies also highlight why nature is important for cities and their residents.

By looking at cities as interlinked social-ecological systems, we also focussed attention on issues of environmental justice and equity in relation to access to nature. The right to nature in the cities is especially critical for the urban poor, impacting their livelihoods and subsistence, whereas the urban rich depend on nature largely for recreational uses. A street vendor, who can access a spot of shade under a tree, can keep perishable goods, such as vegetables and fruits fresh; a grazer who can reach a lake gets water and fodder for her cattle; and a slum dweller, who has access to a drumstick tree, is able to add an important source of nutrition to food. Our research on these aspects of environmental justice has helped us highlight how technocratic urban planning approaches, such as smart cities, compromise the sustainability of cities from the ecological and equity angle. We have also documented the urban foraging practices of women in cities, especially in urban slums. These women, struggling to make ends meet in the city, possess incredible knowledge about green leafy vegetables growing wild in unused plots, pavements, parks and so on – knowledge which we have collated in a booklet to share with other urban residents.

Over the years, our research has been disseminated through diverse popular outlets, such as newspapers both print and online, blogs such as *The Nature of Cities*, and very importantly, vernacular media, including Kannada, Hindi and Odia. Through focused talks and webinars, we further engage with different audiences across various cities, that include government officials, school children, undergraduate and post-graduate students, advocacy groups and NGOs. In this, we have found that environmental history and heritage can be used as effective communication hooks that help many city residents to engage with sustainability. City residents are often unaware of local histories, of the long evolution and heritage aspects of urban ecosystems, such as a lake, or a wooded grove, in their neighbourhood. But once they know about the historical significance, coupled with continuing ecological, social and cultural linkages, they are more enthused in advocating for their protection.

Photographic documentation is another very effective approach to communication. Photo exhibitions of environmental urban research, including that done by university students and visiting scholars, have helped to present the untold stories of communities living around the margins of Bengaluru's lakes. Significantly, the presence of residents from the lakes, individuals who were themselves the subjects of the photographs displayed at the venue, is very important because they help the residents of the city to understand the idea of nature from the perspective of low-income groups who are often systematically excluded, and almost never consulted in city planning.

At Azim Premji University, our students have been an important part of our research in different stages—from the conception of ideas to outreach. For example, in the MA Development programme, we have converted our research on urban commons into a case study for teaching and taken students to our field sites in and around Bengaluru for mapping land use with the help of GIS tools and biodiversity assessments. Undergraduate students are introduced to examining sustainability challenges from an interdisciplinary perspective, using field-work not only to gain understanding but also to act for change. For example, students undertake a tree census and carbon-mapping assignment where they identify and select species of trees, conduct research to summarise the social, ecological, economic, and cultural uses of these species, measure tree girth and height, understand the effect of trees in reducing temperatures, and calculate the carbon sequestered by these trees. In doing so, they learn spatial mapping and GIS, and also connect the climate mitigation measures they learn about in class with skill development for future action research.

Students at the university are partners in our research, contributing their ideas, creativity and perspectives. One example is the illustrated story 'Where have all our *Gunda thopes* gone?' Based on scientific publications, field notes, and photographs, undergraduate students, along with a researcher at the university, wrote a multi-lingual illustrated story based on the foundation of our research. The story features the transformation of a wooded grove, locally known as a *gunda thope*, into a landscaped park. While the characters are fictionalised, the setting of the story, the descriptions, and the

transformation of the wooded grove are events from a peri-urban field site, visited as part of our long-term research on urban commons. This bilingual illustrated booklet has been printed and distributed in rural libraries across the state of Karnataka—in villages and peri-urban settings where urban commons still exist and have the potential to be protected by the community. The story draws attention to the impact of urbanisation on the city's green cover and ends with the hope that adults and children will reflect on what the loss of these urban commons means for the city and act to protect and restore wooded groves.

Connecting with children

Climate change and sustainability can be very dismal topics for children. Thus, we do not want our narratives to be only about loss. We especially wanted children, who will bear the brunt of climate change, to appreciate nature and have fun with trees. Illustrated books are a great way to help rebuild connections with nature, especially in these times when children are increasingly drawn to gadgets. We worked with Pratham Books to bring out *So Many Leaves* aimed at young children. Beautifully illustrated by Barkha Lohia, the book has been translated into eight languages using a creative-commons approach, where translators contribute to the languages that they can on a voluntary basis. Currently, the book is available on the free, open-access *Story Weaver* platform in Hindi, Kannada, Marathi, Odia, Urdu – as well as Italian, French and Bahasa-Indonesia! The book describes common leaves that we find around us in different shapes, colours, sizes and textures, and draws attention to the many uses of the leaves in our lives. By reading about leaves and doing the fun activities mentioned in the book, we hope that children interested in nature are encouraged to touch, smell and engage with leaves. For any child to become a warrior for nature, it is important for them to not just read about, but also experience and appreciate nature, not in a distant forest, but in their immediate neighbourhood.

Citizen participation

In addition to education, action research is critical for change. For example, developmental projects in Bengaluru have led to the large-scale felling of trees. Several citizen groups and advocacy organisations that approach the court for environmental protection seek empirical data

that could strengthen their efforts. By conducting rapid environmental impact assessments along with citizen groups, we collate information on the number of trees impacted, ecosystems affected, carbon sequestration services that are compromised, and threatened biodiversity. Such action research has been especially effective, as in the *#steelflyoverbeda* campaign in Bengaluru.

What we are trying to do in terms of creating environmental awareness is the proverbial drop in the ocean. But what is heartening is that we are not alone. There are many ongoing efforts with wide participation from different sections of society. Scientific data collection is no longer the bastion of scientists. When limited to the scientific community, data that can provide important information for environmental policies and decision-making, also remains restricted. This is where citizen science initiatives have stepped in to bridge the gap, with the public collaborating with scientists and institutions to collect ecological data in a systematic manner. This enables the collection of data at a scale that was not possible earlier. For example, one of the most popular citizen science projects, *eBird India*, a portal for bird count in India, has more than 10 million data points that help scientists study the distribution, abundance and population of Indian birds, as well as to study the impact of urbanisation and climate change. *SeasonWatch*, another remarkable project of the Nature Conservation Foundation that monitors the phenological patterns of trees, such as flowering and fruiting, has collated invaluable information about the impact of the earth's changing climate on seasons and plant responses. The contribution of citizen science projects has been wide-ranging, providing new information about species, like tigers, addressing poaching, collating information on roadkill, providing insights about snake bites, and even contributing to the discovery of new species of spiders and frogs. Citizen science is perceived as a game changer when it comes to both, the collection of data and making it available to anyone.

There is also a diverse range of citizen movements across the country involved in protecting the environment—from reviving a lake, to protecting a forest and saving a species. Over the last few years, we have been speaking to many of these environmental warriors to understand their motivations for protecting the environment. Some

have been passionate about the environment from childhood, others as adults who became concerned about a specific environmental issue in their neighbourhood. For parents, many of these environmental issues were linked to the future of their children. The work these individuals and communities have been involved in has led to changes in the ground, reviving hope that they will spread wider into other areas.

When environmental issues such as these become a topic of concern and discourse in homes, communities and classrooms, children imbibe not just awareness of these issues but also learn that governments cannot ignore the voice of citizens. This is an important lesson for their lives.

Working with children to bring about change

Schools play a critical role in creating awareness about the importance of protecting the environment and provide the perfect setting to enable children to become environmental warriors of the future. Working with teachers, students can visit the green, blue and open spaces in their neighbourhood, be it a ward in a city or a village. They can work with natural elements, like mud, leaves, and stones to create models of, say, a lake in their village or a park in the city that they have visited. Children can observe and draw the biodiversity in these natural spaces, such as birds, ants, spiders, butterflies, bats, and other small mammals. They can carefully observe the interactions of these creatures with the environment. Students can adopt a tree and observe the changes happening across seasons, such as that of flowering, fruiting and leaf fall. These observations can even be uploaded by the teachers on citizen science portals, such as *SeasonWatch*, thereby, contributing to knowledge creation.

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Every neighbourhood has a history, and every space can have a story. Children can record these by talking to their parents and others in the village or neighbourhood. A good storyteller among their grandparents can get the children interested instantly. There could be interesting plays or skits that young children could perform around these stories. Understanding how these natural spaces are used by their parents and others in the local community could be another way of connecting with the environment. Creating a historical timeline with oral narratives, biodiversity observation and mapping will provide invaluable micro-level information about the environment complementing what students are learning in class. At the same time, this creates a repository of local knowledge and builds lasting concern for the environment among children.

A final word

Even as we are all faced with an uncertain future there is much each of us can do. We can learn about our local ecological histories that will help us and others to establish a connect with the place. We can contribute to scientific data by being a part of citizen science projects. When there are developmental projects that threaten nature, we can use our skills and contribute to meaningful action research. When the environment is threatened, and there are others fighting to save it, sometimes all we need to do is the bare minimum – to show up and stand with them. And where this awareness to contribute and care for the environment can begin is with teachers and children in our schools.



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