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## From Buildings to Cities

**An Interview with Ar. Minni Sastry**

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Ar. Minni Sastry is a Green Building Professional with over 18 years of experience in designing climate responsive built environments, certifying buildings, applied research, and developing policy framework for cities to mainstream Sustainable Development.

As a Consultant to IFC, she worked with the Global team, to develop high level low carbon growth initiatives for targeted cities in India. Managed projects with Government of India, State Governments, US Department of State, Multilateral organizations, UNEP, IFC, Educational Institutions, Department of Science & Technology, Corporates & PSUs in India. She is currently pursuing a part time Ph.D. Her Research topic is "Development of Evaluation Tool for Green Built Environment to Control Increase of City Temperatures and Climate Change". She teaches Sustainable Building Design at R V College of Architecture, Bengaluru.

She Co-authored, with Ms. Mili Majumdar, the book "Green Homes and Workplaces", published by TERI Alumni Association, 2022.



### Could you tell us a little bit about your education and your interests in the field of architecture?

I completed my B.Arch in 2002, where I think I was one of the few people at that time who had a questioning mind about 'What is right, What is wrong and What is the truth behind building science?' At that time there were a lot of curtain-glazed buildings, and my dissertation was on glass buildings and their energy efficiency. I had the question of whether glass buildings are good for us and what is the kind of right architecture. I did my master's in AA School of Architecture in London because at that time I can't remember any master's program in India which was giving a master's in Sustainable Building design.

Also, I was looking at tools which could equip me to analyse buildings, which was also not so common here back then. So, I did my master's, which was on Environment and Energy studies and that is when I started analysing buildings for thermal comfort and visual comfort and doing energy simulations.

### You used to work at The Energy and Resources Institute TERI, could you tell us a little bit about TERI and your experiences there?

I came back to India in 2003, after which I joined TERI, and I was with them for 15 years. I had initially joined TERI, Delhi for 2 years. In those days, TERI was involved in certification of New Buildings under the US Green Building Council, LEED. However, after a few buildings the team in TERI, then known as, Centre for Research on Sustainable Building Science, developed a green building certification for Indian

construction industry, climate zones and lifestyle. I was a part of this team. We developed GRIHA (Green Rating for Integrated Habitat Assessment) to address the environment issues related to the built environment of our country. GRIHA is now the National Rating System of India.

### Your work on a green home solution for sericulture farmers was very inspiring. Could you tell us about it and about any other innovations and ideas you have worked towards?

In 2007, I got married and that's when I took the transfer to Bangalore. I started a group for building science here. In the initial years, I worked with Bangalore Development Authority and BBMP, and I used to write proposals which were single handedly done. Now there's a team but initially, I was the only one. So, I used to work with these development authorities and try to see if we can change the building bylaws or create some policies so that Energy Efficient assistant ability becomes a part and parcel of construction. Those were the initial projects at the grassroots level.

In TERI, we got some funding from the central government, and we had to look at the rural areas, because of climate change and the impact it had on various sectors of agriculture. Building science also plays a role there, because sericulture or silkworm rearing happens in a silkworm-rearing house now. Due to the changing climate, the homes are becoming hotter, and the yield had reduced. As you know, South India, along with Bengal, is one of the highest producers of silk in the country because of comfortable climate conditions. But with the change in climate, increasing temperatures, humidity, and everything else, there has been a drop in the yield. So, the whole project was to design a passive house for

silkworm rearing for the farmers in South India, so that those comfortable temperatures could be achieved inside through passive features.

We had partnered with Sanjay Mohe's office for the construction. In TERI, we had designed the passive house and simulated it for various passive features which had all those basics, the true north-south, very few windows, along with several natural ventilation techniques which we had integrated. For example, stack effect, shading, and insulation. It was good because we had simulated beforehand. That's the tool which I want to say that all architects should have. You should be able to analyze the design before it is constructed, to understand what the indoor environmental conditions are, whether they are comfortable or not. Due to the tools that I knew at that time, I was able to model, so I designed the house and of course, Mohe's team got it constructed, but I also modelled it to understand, and it was nice to see that when the house had gotten constructed and was monitored, the results were very similar to what we had predicted using simulations at the design stage. That's one of the advantages of being well-equipped with simulation tools.

**What are the living conditions of the people in the places you worked in? How do you think your work can help with their living conditions? Can you also tell us about your experiences with the local people in the places you have worked in?**

We used to work at the grassroot level with farmers and then with GRIHA we also started working in the affordable housing sector in TERI. That is when the team also grew, and we expanded. We got several projects from the World Bank and from the United Nations where we were also designing and providing spaces to local people for climate-independent housing. There were projects that we did in the Uttarakhand area which is known for earthquakes and some other projects that we had done in Bangladesh that come under this.

We also developed a prototype for cyclones, and we had done a prototype in Nepal, along with a housing module. In the affordable housing sector, we started doing a lot of surveys where we would go and understand the condition of people living in the rural segment of the population. If you do surveys in these communities which are already constructed by our development authorities, there would be severe issues of indoor air quality because of the lack of right openings and daylight along with storm water. Three very basic issues. We started developing our affordable housing sector through sustainable measures.

**After TERI, you worked with the World Bank. Could you tell us about the project you worked on with them?**

During COVID times, it was tough for me to travel to TERI. So I resigned because I got an opportunity to work at the city level with the World Bank. The World Bank has developed some similar tools for cities, like what we already have for buildings. It's not like a certification system, but it's a tool which can tell how sustainable a city is and in the years down the line till 2030 or 2050, how city-level GHG Emission reductions can happen. They were looking for a consultant who can work in India for 14 cities for which I helped them in their tool analysis

by collecting the data from local consultants for 14 cities, and we analysed 'how are the current trends, how GHG emissions will further increase in the current scenario' and so on.

The four sectors that we looked at were the built environment and energy, transport, water, and solid waste. But all the 4 sectors are looked at on a city level. For example, more than 90% of the solid waste which may be segregated but not scientifically treated in the country yet becomes a part of GHG emissions in the city. We had looked at more than 20-25 measures across these four sectors and what would happen if these were implemented. For example, if public transport goes EV, then what is the GHG emission reduction? So, this took me from the building level to the city level and based upon that work, I was already given an idea as to what more needs to be done at the city level. That is when I started my Ph.D. work and that is where I stand now.

**Could you tell us a little bit about the topic you are researching for your Ph.D.?**

I'm going to develop a tool where we can analyse some of the green measures and the impact of green measures to further decrease the city's air temperature. We have the two degrees Celsius Thumb rule or Benchmark that has been given. I have taken Bhopal as a composite climate and Bangalore as a moderate climate, and I have narrowed down my Ph.D. research to 4/5 elements which would include transport, for example.

Basically, in transport, I would be looking at how to reduce anthropogenic heat so that my city's temperatures don't increase. That's the algorithm or tool that I'm going to develop at the city scale. Or for example, if 50% or 70% of the roofs, and roofscapes turn into cool roofs, then what impact would it have on further reducing the increase of the temperatures? The temperatures have been increasing, which is the cause for more energy consumption and it's a vicious cycle. To break that, I'm developing this tool.

**Can you tell us about your work with the World Bank and if it influenced your decision to take up this as your Ph.D. topic?**

Before I worked with the World Bank, it had not been there on my mind. But when I was working for them, I saw that all major companies, whether it is C40 or whether it is the World Bank Sustainable Cities program were not just looking at GHG Emissions. GHG emissions are important, but ultimately for climate change, we must also look at how we reduce this increase in temperatures. But ultimately, of course, that conclusion is not happening.

I want to fill that gap by developing this tool and see that there's enough from various of these measures. How do you translate it into reducing climate change in terms of city temperatures? That's the gap which I felt is there currently. That's what motivated me to get into this tool.

**You have spoken about working with the government on a few projects. Have you also worked with the private sector or private clients?**

In the private sector, the interactions that we've had is because they are developing campuses and new buildings. There are two ways to deal with the public sector. One is on a policy level, but the other is through their campuses and buildings. For example, Power Grid Corporation of India which is a PSU, or HAL, has developed residential campuses as well as headquarters and office buildings, and these were developed as super-efficient buildings and are highly certified in terms of five-star or Platinum in LEED. That is where we used to work with the PSU as well as for the corporate sector.

ITC is another company, where they wish all their buildings to be sustainable and green certified. We used to do all their simulations as green building consultants and used to optimize their water demand, waste management, architectural design, and so on. From the green perspective, energy efficiency also facilitates the certifications as to whether it is IGBC or GRIHA. So we used to work with the corporate world, and give them green building consultancy. That's the most important part. TERI was different from any other green building consultancy because it's not for profit which I've always liked. It's a research institute, so the green building consultancy also was very research-based and because we were a Research Institute and an NGO, we were never biased. We would give them an unbiased solution.

Our measures and our recommendations were always research-based, and we used to give green building consultancy and then it depended on the client whether they would go for certification or not. If not, we would just do a green building consultancy where we would deal with all those sectors. We would optimize the landscape plans, and site development so that everything from outside to inside, all the services were optimized for sustainability, and everything would be taken into consideration. Then we would ask them if they wanted to go for certification, and we would go forward and facilitate those documents as well. That is a role that as green building consultants or researchers we play.

**How do you think the design of a space can help make it more inclusive for the community?**

I think firstly, designing right can always make it inclusive, I would say. If it's at a city or a neighbourhood level, I think it's very important that the designers do what is ethically right and truthful justice to what they're designing for. So, if it is a campus on a neighbourhood level, it is important that from both a health as well as an environmental perspective, it has to be approachable for people to walk and reach everywhere. When you see the word holistic, I think it's very important that it is for the people for whom you are designing.

People must be kept in mind. If walking helps, if air quality helps, if water quality helps then how do you design these systems around them so that you're taking into consideration their better health and the better environment? Safety will also go hand in hand with that and ultimately one tries to see that they have minimum or least impact on the

environment with respect to whatever development they are doing, whether it is for a city or a satellite town, or a small institutional campus.

It's very important that we also understand that when we have a parcel of land, what is the capacity of this land in terms of the number of people it can have, and whether it can sustain them. That depends a lot on the air, the water availability, and the green cover. Ultimately, we're talking about for whom we are building, their health, environment, safety, and overall sustainability.

**How would you describe an ideal city?**

An ideal city for me would be one that has zero GHG emissions. That is an ideal city and if I was an artist, if I have to paint it, then it would be a city which does not pollute any of the natural resources, whether it is water or soil. Where it has no pollution and is completely sustainable so it can manage its energy on its own without burning fossil fuels. Where wastewater gets treated right and rainwater is harvested fully so that we become fully self-sustainable in terms of water, energy, and even materials, along with food and clothing, and where everything can be harvested and created sustainably. This is the picture I would like to paint if you ask me.

**Where do you think we are at this point with respect to your vision of an ideal city?**

A lot of work has to be done but I am very optimistic about our current central government because if the right changes can happen, then we are on the right path. But it has to be implemented because we do have the right technology. There's no drought of technology and policies, along with people who can make the right ones. But I would still say that there is a lot of work to be done.

According to the World Bank, there's huge development growth which is going to happen in the next three decades till 2050, and most of it is going to happen in the emerging economies. But in the current scenario, we have a long way to go. Everybody should be working and be on their toes in order to get things implemented.

**How do you think cities can be moulded better to perform in times of need or distress?**

I think that's what the policy people have to do so that the cities have the right policies with them so that there are no research crunches. We need water and energy security which is not there right now. Another way is to have partnerships with the private sector. The PPP (Public-Private Partnerships) word has to come into place, otherwise, it's very tough because that's when the implementation can happen. The government also has to join hands with institutions so that they have the right technology on board, and they become aware of the right technology and can start implementing it.

**How do you think cities can create sensitivity and safe spaces for historically marginalized communities?**

I have a very straightforward answer for this. One very important thing is that we should understand their backgrounds. There has been a decline in the kind of handicrafts that we were developing earlier and what we develop now as a country. It's important that the government or the right organizations support the art or craft in which they were involved so that we don't lose it in the future. I think our cities can use that platform and help those craftsmen to take forward their roots or what their ancestors were involved in and give them that space.

I somehow do not go with the idea of only cities as mentioned in the question. It could also be in rural India. Wherever they are, the government should support and make sure that their craftsmanship is retained and enhanced. They need to be supported so that they can continue their traditional work along with the right kind of housing. They should be given those basic services with enough financial support so that they don't have to travel to newer cities or leave behind their roots or what their ancestors were doing, what was happening traditionally, and just change their occupation. It's very important that culturally as a country, the government should support them financially, and technically enhance their living quality overall so that they have all the basic things with them. They need to be given that support, along with a platform where it can reach out to other global markets.