

## Ep. 6 Bangalore Urban Metabolism Project

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### SUMMARY KEYWORDS

Bangalore, water, groundwater, model, India, metabolism, people, water supply

### SPEAKERS

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JC

0:21

Water is fundamental to human development, from drinking water and sanitation to agriculture and more. You're listening to Water Stories, a podcast series where you will learn everything about securing water, energy and food security for all of us.

Hello everyone, I am Juan Carlos Giraldo and welcome to Water Stories episode number six. Today, we will talk and discuss with my guest about an exciting project developed in India called the Bangalore Urban Metabolism Project (BUMP). Well, to get more in the context, Bangalore is the capital and the largest city of the Indian state of Karnataka, making it the fifth-most populous city and the fifth-most populous urban agglomeration in India and is located in the south of the country.

Today, to discuss this interesting topic about Bangalore Urban Metabolism Project (BUMP), my guest is Vishal Mehta. Vishal is an environmental scientist with more than 15 years of experience in water resources research, forest conservation and sustainable development. He is based in Davis, California, and he works with Stockholm Environment Institute.

Hello, Vishal. How are you?

Vishal

1:39

I'm good, JC. Thanks very much.

JC

1:41

Happy to have you, Vishal. I would like to start this conversation, what is Bangalore Urban Metabolism Project? And how are you involved in this exciting project?

Vishal

1:50

Thanks, JC. This is very dear to me, because I grew up in Bangalore. So it's my hometown. And it has grown very rapidly since I was a child there. It's close to 13 million people now. When I was in high school, it was four-and-a-half million. When I was born, it was like 2 million. So this is a city that I've seen rapidly changing, me and my old friends, my family, and with those changes, as you know, come many, many challenges: increased traffic, reduced quality of services.

So my friends and project partners and I came up with the idea of the Bangalore or Bengaluru Urban Metabolism Project. Basically, the idea is that when we talk about urban sustainability, you know how, JC, the word "sustainability" is such a loose word. And so what are some approaches we can use to concretize this idea of sustainability? And we came up with the idea of using this lens or framework of urban metabolism, that is, treating cities as living entities. All living beings use and need energy, water resources, to maintain themselves to grow. And in the process, they also generate waste. So it's a very comprehensive framework that acknowledges the interconnectedness of water, energy, all kinds of other resources, and we came together to try to understand these various flows and stocks in the city.

JC

3:13

Wow, that's very interesting. Uh, you know, in fact, I did a little bit of research about this area and have almost 14 million of people living there. As I mentioned, before, Vishal, urban agglomeration population is growing in India and you were one of the witness of that in this region, which also represent a challenge in Bangalore, because it affects the scarcity of water and natural resources. What is your opinion, what did Bangalore Urban Metabolism Project (BUMP) find during the process?

Vishal

3:43

Thanks, JC. We've been working since 2011, in three different cycles.

In 2011, and '12, we began to focus on water. In that time, we developed various tools to help us in this research, and one of the tools is that we treat cities as tightly coupled social-ecological systems. By that, I mean that we build computer models that, you know, are not just about natural systems, are not just about human systems, but they show the interplay and feedback between how people use water, where the water comes from, what happens to groundwater resources, what happens to surface water, wastewater, and so on.

So that's one of the tools. Then we also put together datasets from publicly available datasets, from the municipality and so on. And we created a geoportal, like a website where you can look at different types of data. In that time, we also did a household survey with my project partners, Indian Institute of Management. We also built online models where you can change certain levers and see how we are increasing population, how much of surface water we'll use, how much groundwater we will use.

And we also did participatory planning workshops with some of the main stakeholders in the city. The last round was funded by Cities Alliance. We worked with my friends at Indian Institute of Science and the Indian Institute of Management, and we did a pretty seminal study, the first of its kind in any Indian city. We mapped out the groundwater levels across the city for two years, focused on groundwater basically, and learned many, many interesting things which are published, and published online.

JC

5:16

And now the groundwater is, you know, it's so important. We'll talk later about that.

Vishal, you mentioned the words, "cities are living entities," which is kind of constantly changing, adapting to new environments. Since it has caught my attention on BUMP, can you elaborate a little bit? What exactly means, "Cities are like living entities"?

Vishal

5:37

Yes, it's just an idea that tries to emphasize that we humans and nature are not separate. Both philosophically, as well as really realistically speaking, we impact nature and nature impacts us every day, every single moment. And this should not be forgotten. Because I think most of the problems we have in the world today are, are by

thinking that we can do whatever we want, and that, you know, growth is limitless, and so on.

So basically, that's the idea. I don't know. I mean, I didn't specifically answer to your question earlier about what are some of the learnings, there are so many, but you know, on the demand side, for example, we learnt that because no Indian city gets 24/7 water supply. Bangalore uses as many as 18 different ways in which households secure water across the city. That is just, that is just astonishing, if you think about it, JC, because like, I am not sure, where are you based?

JC

6:36

I am in Boston. So...

Vishal

6:37

In Boston, right. So you get water, probably, from a single utility. In Davis here, we get water 24/7 from a single utility. So, you know, many things, you know, different households, different neighborhoods, how much water is consumed, how much you pay for water, you know a whole lot.

But imagine when you don't have that, and you use 18 different ways to secure water across the city.

JC

7:02

It's a challenge.

Vishal

7:03

Yeah. And on the other hand, on the supply side, and the resource side, until we did our groundwater-level work and the groundwater modeling that followed, we had no idea exactly across the city, where the groundwater was, like how deep it was, and why. We have shown how in droughts, water levels go down in different parts of the city. And I'll share a URL that people can go to where you can access all of this in maps and animations, you know.

But there was a very wet year that followed towards the end of our sampling and water levels actually recovered. So, what we are doing is providing evidence base, you know, providing the evidence to inform policy, which did not exist before. People just say that groundwater levels are falling all over, but that's not true. It is falling in many places. But in some places, it's rising. And we described why that's happening.

JC

7:54

Vishal, for example, to get this information, the technology plays an essential role, right? In this planning in BUMP, what tools are you using? Like for example, Stockholm Environment Institute is very well-known for WEAP, that we talked in the last episode.

Vishal

8:09

Yes.

JC

8:10

What is the technology? I did a little bit of research and you have, for example, geoportal, social science tools, online scenarios, you know. Can you elaborate a little bit about what tools help to develop this project?

Vishal

8:26

Definitely, like you said, we put up data in a transparent manner using maps that anybody can access on the net. We also, actually, when it came to the computer modeling part, you know, a model is only as good as the information that goes into it. So we had to do this two years of groundwater-level monitoring and rainfall monitoring, and all kinds of other land use monitoring, collect together databases on population, population density, et cetera. And then, we only then could we build a credible model. And we didn't use WEAP for this particular aspect of it, we used, we actually developed our own model with other project partners. Sat Kumar, who had headed it, he was with the Indian Institute of Science at the time, we built it using open source software. We have a hope of converting this also into an online application some day with, you know, some support. So we used a very wide variety of tools in trying to achieve our objective.

JC

9:24

Yeah, that's interesting, because it allowed, for example, in online scenario, shows us the water demand, water supply, private groundwater supply, and so on. So it seems like a very, very important tool.

Vishal

9:38

Right. And so that actually is actually two tools. That one is the online scenario explorer, which uses a very simple, very, very simple WEAP model of the city. And the

other one I mentioned, the open source groundwater model, is very detailed, and that was built using an open source software called R. And if you go into the presentations tab or publications tab of the website, recreated for this BUMP, there's a link to the paper that describes the, that computer model.

JC

10:09

Oh, that's great. Vishal, you know, I am involved in in ESG you know, (for) our listeners, ESG, and you know, as you know, is Environmental, Social and Governance. And one of the main goals in these metrics is to focus in long-term programs, you know, and work hand-in-hand with government agencies. What agencies are involved in the Bangalore Urban Metabolism Project?

Vishal

10:33

That's a very good question. Our connection to government agencies, first of all, the utility that supplies water is the BWSSB, the Bangalore Water Supply and Sewerage Board. And then there's the BBMP, which is the municipality.

And our connections there since we are, you know, based internationally, our connections to the government are through our project partners, so namely Indian Institute of Science, Indian Institute of Management. At the Indian Institute of Science, I should mention Dr. Muddu Sekhar, who's a well-respected, phenomenal groundwater hydrologist, at the Indian Institute of Science. Dr. Deepak Malghan is PI from the Indian Institute of Management side, and I am the overall PI of BUMP, principal investigator that is. So it was through their connections to government that we were able to make that connection.

But I have to say that on the ESG side, you ask a very good question, because there are two limitations of working this way. One is that, you know, the funding determines how much continuity we can maintain in doing this research. And there needs to be a better funding model for bringing about these alliances that are international and long-term that would support this project and actually turn it from Bengaluru Urban Metabolism Project to Bengaluru Urban Metabolism Program, you know, a long-term program. The other issue is that there is no real framework for – established framework – for bringing together civil society and government. It mostly happens fairly ad hoc, and there really needs to be a governance framework that could bring this about

JC

12:12

I hope this multi-institution task, you know, can bring together, you know, important to have these projects, you know, evolve every day.

Vishal, is there anything that you would like to add? It's very, very exciting, you know, I am not either hydrologist, I'm no scientist, but I did my research about the webpage. It's very, very interesting, you know, India is facing problems as climate change and, you know, groundwater, et cetera. Anything that you would like to add?

Vishal

12:38

Yes, sure. I mean, just a little bit, I guess. One is that you can, and you've done this JC, is go to [bangalore.urbanmetabolism.asia](http://bangalore.urbanmetabolism.asia) online, you can access all of the information that we've talked about and much more.

The second is to just realize some important facts, is that India is the largest user of groundwater, surface water, total water in the entire world. And its cities have been growing fast for a very long time and continue to do so. So, we are going to see more and more and more of these problems, unless we can find some systematic solution to land use change and development, and start treating exurban areas as attractive places and make them attractive places to live and work, and not have to come into far-flung cities, increasing the density there.

JC

13:32

That is true. Well, Vishal I would like to say thank you for your time. I hope the listeners enjoy this conversation. And I want to say that the Bangalore Urban Metabolism Project is very interesting and very challenging. I'm you know, I'm learning a lot about that. Vishal, thank you so much for your time.

Vishal

13:48

You're welcome, JC. It was my pleasure, like I said, since I grew up there, and you know, it's still my home.

JC

13:53

Thank you so much, Vishal, and thank you so much, everyone. Don't forget to follow us on Spotify, Apple Podcasts and Google Podcasts. Stay tuned for our next episode.