

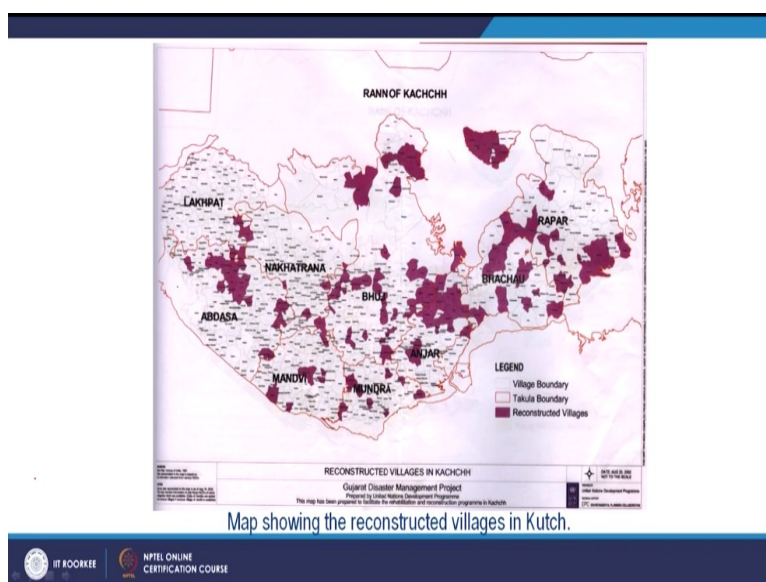
Disaster Recovery and Build Back Better
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Lecture - 21
Temporary Shelter Construction in India

Welcome to the course disaster recovery and build back better. My name is Ram Sateesh. I am an assistant professor in Department of Architecture and Planning, IIT Roorkee. Today, I am going to talk about temporary shelter construction in India. So, in this lecture, I am going to cover a wide variety of examples and my own personal interaction with all these 3 case studies which I am going to discuss about the Gujarat earthquake starting in 2002 and to this one, two.

And then the Tsunami recovery programs in 2004 Tsunami and as well as 2005 earthquake in Kashmir in the Pewaukee Pakistan Occupied Kashmir. So, these are all my, some of my personal interactions with these or various other various aspects of my work and as well as my study.

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And in the early 2000 like 2002 when the whole disaster has been struck in Gujarat earthquake. So Kutch is the district which has been majorly affected and that is one of the major 7.5 major earthquake and it has a huge vast devastation both at an urban level as well as the rural level and this is one of the you know the layout of reconstructed villages, the map

of the reconstructed villages in the Kutch district, which has been developed by the Gujarat disaster management project we call GSDMP.

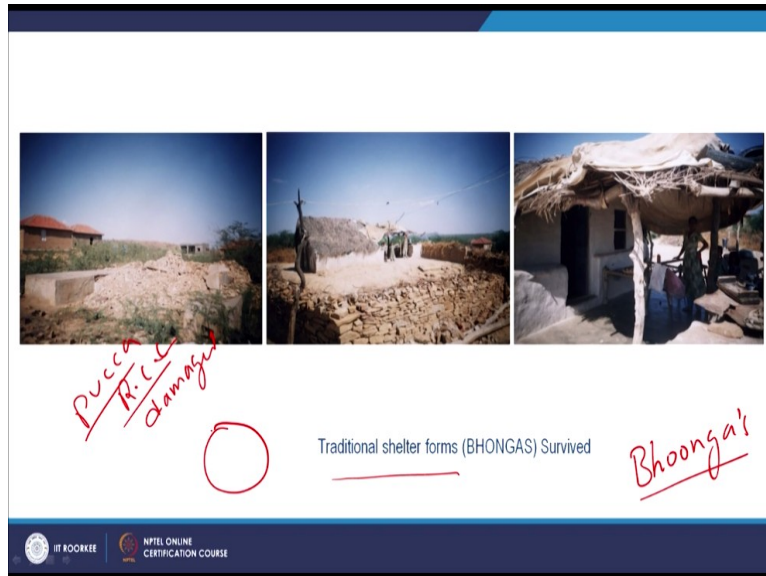
And this is a time Gujarat state has actually taken a very active initiative of the community participation and as well as developing certain guidelines. The GSDMA regulatory aspects, the retrofitting process, so it has looked at providing them guidance in how to reconstruct and how to retrofit these buildings. So, that is where the technical aspects also come into the picture and many NGOs have shown interest in looking at the participatory approaches advocacy.

For example, Hunnarshala an NGO and Catholic Relief Services. So, there are many NGOs who have actually advocated participatory approaches in Gujarat earthquake. So, today what I am going to discuss with you is it is about the immediately after a disaster before coming into the permanent reconstruction stage and just immediately after relief stage, this is where the transition shelter.

You know there is a temporary shelter which they have been provided for them and how they gradually shaped into or progressed into a permanent shelter process. So, this is the stage which I will be talking about it and from this map you can see the amount of damage which has occurred in the Kutch and the amount of reconstruction activities from many NGOs, Catholic Relief Services, Hunnarshala, Caritas.

It was many NGOs which came to Gujarat to give their helping hand. So, these are all some of my primary case study you know evidences.

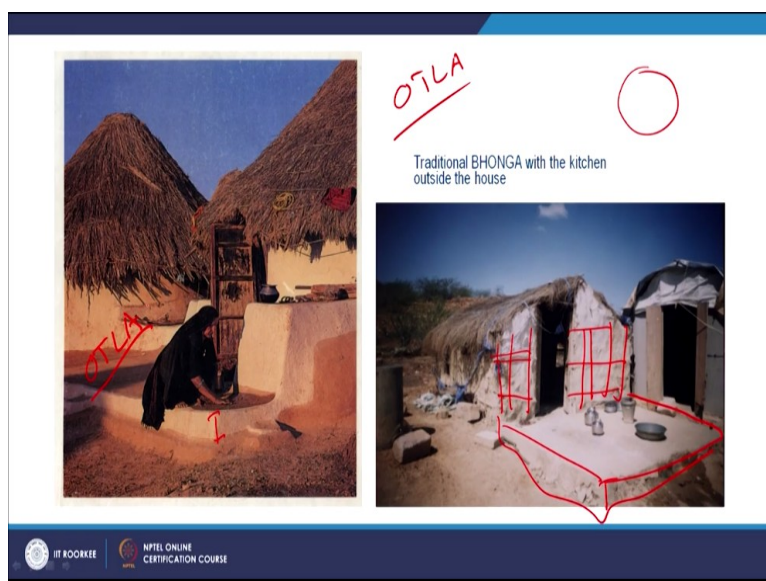
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Like in this what you can see is the modern house which has RCC construction and which is a brick and concrete construction has completely damaged and this is a pucca house and which has completely damaged. Whereas, you can see these traditional shelter forms in local language they call also the Bhongas which is normally there in circular shape and in some cases they are in a kind of rectangular shape.

So, here what you see, these have resisted, these are some of immediate I am talking about within a span of one year, the evidences which you are seeing is that these houses with traditional shelter forms have resisted the earthquakes and why they have resisted because that is where the structural form within.

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You can see that there is a wattle and daub constructions, it has you can see that these weeds the wattle has been embedded like a mesh, it acts like a reinforcement, is a binding element and then the cover with the mud and this is a circular shape because they believe that the circular shape is the best earthquake resisted form because all the forces are not coming at the corner because most of the damages which we see is at the corners of a house you know that is where the load aspects also play an important role.

But and also this is how when the moment from the circular form, they believe that this is smaller circular shapes, they resist earthquakes and this wattle and daub which acts as the vertical and the horizontal bands and which can protect the houses from the severe earthquakes and this Kutch zone, Kutch area this falls in the fifth zone, zone 5 in the earthquake zoning.

And what you can see here this is called opla in Gujarati language, so, here you can see that there is a small just exposed platform which is informally has been raised. So, this defines some a kind of semi-living space because, for them, they can cook, some people have some outdoor kitchens to it, some people can have a washing area, some people and if it is and they also believe in kind of family clusters you know like 2, 3 people live in a cluster.

And they raise the whole platform as the opla has been raised and that demarcates that family belonging from the ground and this is how the traditional patterns and in many of the Bhongas we have the low eaves you know because of the desert climate and also the windy aspects of it, so it can protect from the wind as well.

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And you can see this kind of veranda and where they have the kitchen has been made a small partition and there is a stone wall you can see and how the inside of the Bhongas you know it has all, it has a very low height wall and then what they do is if it is a conical shape, so, in some of the Bhongas it will have also the central post. You know to support this kind of low eaved roof which can protect from the harsh climatic aspect.

And here, this obviously forms as a kind of racks which they can display, they can keep their functional aspects like you can see that the storage boxes are embedded within it and then they can I mean the indigenous ideas of how a small space could be functional enough for the family, you know for everyday activities. So, even a small wall makeup itself frames everything that their whole products can fit within it.

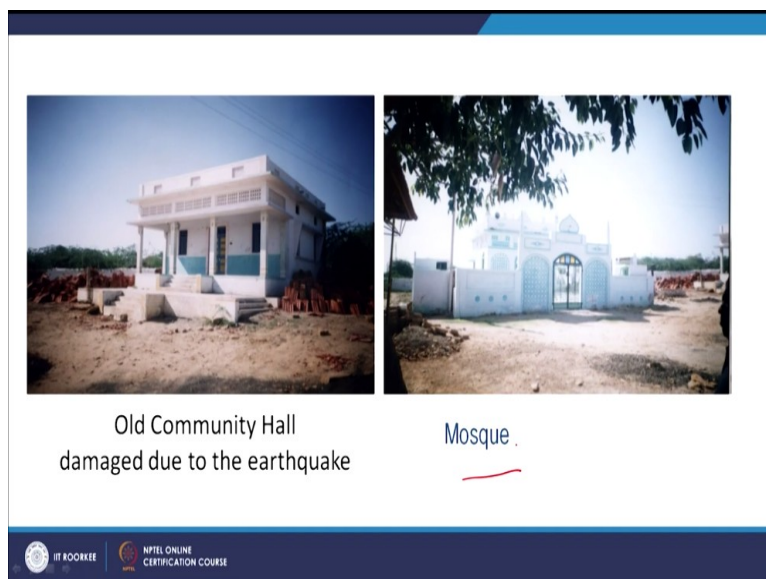
You can see that the clothes, their utensils you know and this everything has been managed within that small space.

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Also, the typical bath, they have a kind of outdoor bathing areas like we have a semi-open bath spaces and also this is in Pakai village near Bhuj and this is a kind of again a raised platform about one foot six inches and then there is a wooden construction which has been made for a small commercial entity which is scattered to the local needs of that village or nearby villages.

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That is how the pattern looks like and in this particular disaster many of the communal buildings also have been damaged, not only the communal buildings, the historic buildings have been damaged, public buildings have been damaged. So, this is one example it has been partly damaged to the old community hall of the village. So, it is very unsafe to live and the mosque which has been repaired.

Because that is the religious entity where they feel so that is how they immediately retrofitted this and they immediately made a mosque here and in Bhuj, I visited to many places of these damaged areas. I will just show you a glimpse of what all things have happened immediately after an earthquake and how what are the destructions and what kind of property has been damaged, what kind of built environment has been damaged.

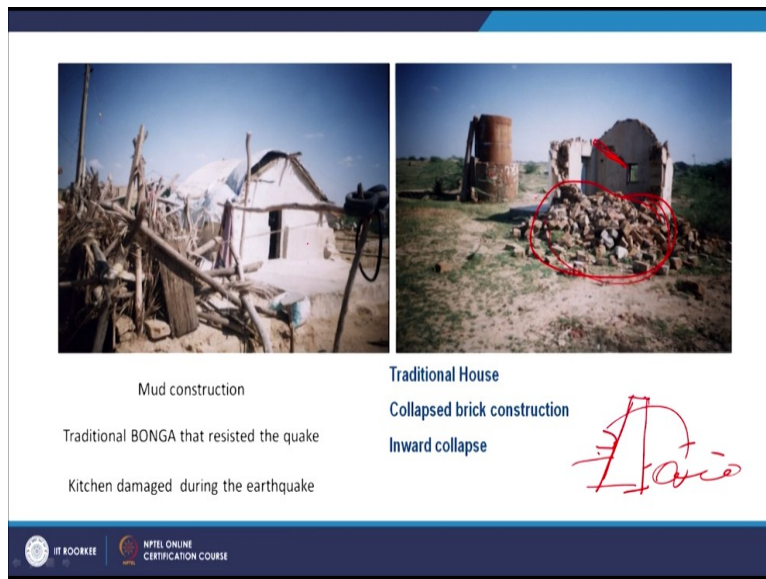
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So, now this is a kind of industrial godown which has been damaged. So, when we talk about the industrial godowns and which has to do with the livelihood of certain sector of the people, obviously they will lose their employment for some months, maybe years. So, it has not only the godown or not only the built form which has been collapsed or damaged but it will indirectly affect the livelihoods of the poor people who are working in that godown, so all the industrial segment.

There is also the historic building which has been damaged and the brackets have been fallen down and the railing have fallen down. So, it has become very unsafe, you know it has to talk with the heritage and we also discuss about heritage in disaster context and many aspects like Ayutthaya 9:45 will be discussing on and we also discussed on Kiruna aspect.

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And as I said to you if you see this was a traditional house with a brick and concrete house. The wall has actually collapsed inside, the inward collapse, so that actually talks about you know the wall makeup and bonding and even how we can actually make a slant. Imagine if you are making a roof like if you are making a wall like this, obviously the pressure acts this way and as things might tend to fall down here.

But if it is and also the corners most of the corners during the openings, at the walls, the junctions these are the most crucial places, you know where the damage occurs and also the water tanks which has because this is where they used to store the water and obviously it got damaged. So, because these are some basic needs one a community relies upon, so these are and whereas brick and concrete house has fallen but as the Bonga have resisted. This is one of the important example, surviving examples.

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And similarly in Bhuj, where a large infrastructure has been damaged like roads also, some of the bridges, some of the hospitals, some of the schools which has been and now some in the urban areas, huge house, many houses have been damaged, some apartments have been damaged and this is one good example of how it has partially been damaged.

So, being a hospital do you think now how it will affect the whole health sector and which is serving the community. When we say hospital has been obvious, it is very difficult to carry on the regular activities and how it has to serve the local community's health conditions and what about the employment of those people who are working. For Government Hospital, if it is servants were working, government servants who are working, for them at least they have some benefit that they will be supported.

But what about the temporary workers, who are depending on their daily labor or daily wages, so for them if there is no work what happens to the livelihood, these are some of the important questions and due to the hot summers you can see the whole lake in Bhuj has been dried, many rivers have been dried out. So, it has become even the water scarcity is the issue in that particular region.

This is a house nearby a village where they have different class societies. There is a mukhiyas, there is chauhans and there is a Muslim community. So, different caste hierarchies existed in the Kutch area and this is one of the rich class and which has been destructed during the earthquake. Now there is one single house which is having like two or three families together they made one single house having different partitions.