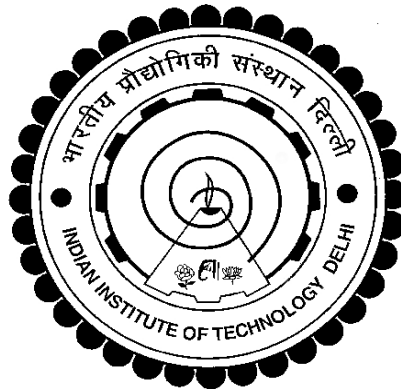


**DEVELOPMENT OF A
DISASTER RESILIENT RURAL HOUSING
FRAMEWORK**

MONA CHHABRA ANAND



**CENTRE FOR RURAL DEVELOPMENT &
TECHNOLOGY
INDIAN INSTITUTE OF TECHNOLOGY DELHI**

NOVEMBER 2017

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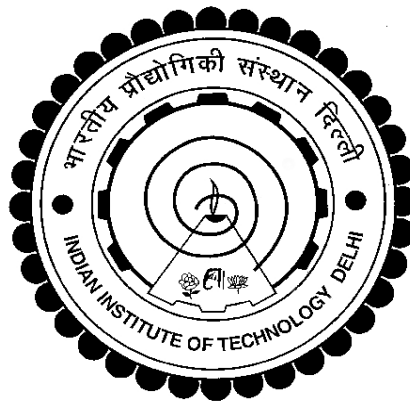
DEVELOPMENT OF A DISASTER RESILIENT RURAL HOUSING FRAMEWORK

by

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CENTRE FOR RURAL DEVELOPMENT & TECHNOLOGY

Submitted
in fulfillment of the requirements of the degree of Doctor of Philosophy

to the



INDIAN INSTITUTE OF TECHNOLOGY DELHI

NOVEMBER 2017

CERTIFICATE

This is to certify that “**Development of a Disaster Resilient Rural Housing Framework**” being submitted by **Mona Chhabra Anand** to the Indian Institute of Technology Delhi for the award of **Doctor of Philosophy** is a record of original bonafide research work carried out by her under my guidance and supervision. In my opinion, the thesis has reached the standard of fulfilling the requirements of all the regulations related to the degree. The research report and results presented in this thesis have not been submitted, in part or in full, to any other university or institution for the award of any degree or diploma. I certify that she has pursued the prescribed course of research.

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Mona Chhabra Anand

*For my father who could not see me complete this
journey, and to the rest of my family who saw to it!*

Abstract

Housing is one of the most fundamental essentials of a dignified life. Housing as a component of the living environment influences the attainment of human potential by individuals and their families besides impacting their health, efficiency, social behavior, and general well-being. The constitution of India lays down access to housing as one of the primary responsibilities of the State towards the citizens

Especially in rural areas that have traditionally been identified as 'underdeveloped' areas, housing has been a critical area of investment by the government(National Housing Bank, 2012). Policies and funding schemes have been instrumental in addressing this need for the poorest in rural India, most visibly through Indira AwaasYojana (IAY), the flagship scheme of the government of India. However, this effort is limited by disaster losses, estimated at an annual loss of 1 million houses each year. (The Hindu Business Line, 2015)

Given the multi-hazard prone context of several states in India, this is a real challenge. The Vulnerability Atlas of India estimates that about 57% of the country is prone to earthquakes, about 12% of these being prone to severe earthquakes. About 12% of the land is prone to floods and 10% land is prone to cyclones.(BMTPC, 2006)

A large part of these losses is preventable and can be minimized through a combination of measures that include judicious habitat planning, adoption of disaster resilient techniques and correct practice of construction and post-construction maintenance of houses.

This Research explores and examines the multiple layers of causality which are responsible for the poor performance of IAY houses in rural India. An important finding of the study has been that there is a lack of constructive inter-linkages within and between stakeholder groups engaged in Rural Housing. This has manifested in several conditions such as, lack of coherence

in the overall policy framework as it guides on-ground action, indiscriminate and incorrect use of 'conventional' high energy construction materials that put homeowners at risk, unaffordable cost of construction and an endless journey towards a safe shelter by the poorest, to name a few.

These trends have been documented in through field surveys in four most disaster prone states of India - Gujarat, Odisha, Tamil Nadu and Uttar Pradesh. Case studies have reinforced these findings. The characteristics and contours of Resilient Rural Housing - both as a product and process have been articulated to develop the 'Resilient Rural Housing Framework'.

As one of the key outcomes of the research, the framework serves as a guide to enhancing disaster performance of rural housing, especially that funded through public money in the form of state sponsored schemes. With regard to state supported housing interventions, the study is limited to Indira AwaasYojana that has been the flagship programme of the Government of India for rural housing. The study postulates that the overall performance of the 'housing ecosystem' is contingent on the quality of inter-linkages between different actors in the ecosystem. With the homeowner at the centre, upstream and downstream processes - institutional as well as markets, need to work in tandem so that disaster resilient houses can be created. The process of housing works as a 'system'. The interaction between the parts of the system is a critical factor that influences the quality of the final output of the system. It argues that the overall approach towards housing needs to change in favor of a more awareness oriented and performance focused culture encompassing the various roles performed by stakeholders in the Rural Housing arena. Additionally, policy actors need to establish performance standards, above and beyond the traditional focus on numbers. More importantly, they need to provide lead, facilitate and continuously invest in building capacity of all the other stakeholders so that resilience building becomes a shared priority. This would be a critical step towards strengthening the 'process' aspect of Resilient Rural Housing development.

The Resilient Rural Housing Framework has been tested in Sikkim. Although impacts of such socio-technical interventions manifest in longer time frames and are an outcome of multiple inputs, initial evidence of the usefulness of the actions undertaken within the framework has been encouraging. The same has been reported in third party evaluations by Sikkim University and the National Level Monitors appointed by the Ministry of Rural Development.

सामान्य सारांश

आवास जीवन के सबसे मूलभूत अनिवार्यताओं में से एक है। समुचित आवास मानव क्षमता की प्राप्ति को प्रभावित करता है; व्यक्तियों और उनके परिवारों, उनके स्वास्थ्य, दक्षता, सामाजिक व्यवहार, और सामान्य कल्याण के लिये अनिवार्य है। भारत के संविधान में नागरिकों की ओर सरकार की प्राथमिक जिम्मेदारियां, विशेष रूप से ग्रामीण क्षेत्रों में जिन्हें परंपरागत रूप से 'अविकसित' के रूप में पहचाना गया है, आवास सरकार द्वारा निवेश का एक महत्वपूर्ण क्षेत्र रहा है (राष्ट्रीय हाउसिंग बैंक, 2012).

ग्रामीण भारत में सबसे गरीबों के लिए इस आवश्यकता को संबोधित करते हुए, नीतियां और योजनाओं में इंदिरा आवास योजना ने महत्वपूर्ण भूमिका निभाई गई है; हालांकि, आपदा के वजह से, हर साल 10 लाख घरों की सालाना हानि का अनुमान है। (द हिंदू बिजनेस लाइन, 2015) भारत में कई राज्यों के बहु-खतरे के प्रकोप के संदर्भ को देखते हुए यह एक असली चुनौती है। भारत की भेद्यता एटलस का अनुमान है कि देश का लगभग 57% हिस्सा भूकंप प्रवण है, इनमें से लगभग 12% गंभीर भूकंप से; 12% भूमि बाढ़ से ग्रस्त है और 10% जमीन चक्रवातों से ग्रस्त है। (बीएमटीपीसी, 2006). इस घाटे का एक बड़ा हिस्सा रोका जा सकता है; तथा संयोजन के माध्यम से कम किया जा सकता है .

न्यायपूर्ण आवास नियोजन के उपायों में, आपदा प्रतिरोधी तकनीकों और निर्माण के सही अभ्यास, और निर्माण के बाद मकानों क रखरखाव शामिल है . यह शोध उन कारकों की कई परतों की पड़ताल करता है और जांचता है जो हैं ग्रामीण भारत में इंदिरा आवास योजना घरों के खराब प्रदर्शन के लिए जिम्मेदार है. इस शोध कि एक महत्वपूर्ण खोज है कि ग्रामीण आवास में लगे हुए हितधारक समूहों के बीच भीतर और रचनात्मक अंतर-संबंध का अभाव है. यह कमी कई रूपों में प्रकट हुई हुआ है जैसी, समग्र नीतिगत ढांचे में एकजुटता की कमी जिसे के बावजूद जमीन की कार्रवाई, 'पारंपरिक' उच्च ऊर्जा के निर्माण सामग्री का अंधाधुंध और गलत इस्तेमाल जो कि घर के मालिकों को खतरे में डालते हैं, निर्माण की अप्रतीम लागत, और गरीबों द्वारा एक सुरक्षित आश्रय की ओर एक अंतहीन यात्रा.

इन प्रवृत्तियों को देश के चार सबसे अधिक आपदा प्रभावित प्रदेशों में फील्ड सर्वे के माध्यम से प्रलेखित किया गया है - गुजरात, ओडिशा, तमिलनाडु और उत्तर प्रदेश। केस तथा अनुभवों के आधार पर इन निष्कर्षों को मजबूत बनाया गया है. लचीले ग्रामीण आवास की विशेषताओं और आकृतियों - उत्पाद और प्रक्रिया दोनों के रूप में, समझ कर, 'लचीले ग्रामीण आवास ढांचे तथा रूपरेखा' की संरचना की गयी है.

अनुसंधान के प्रमुख परिणामों में से एक के रूप में, यह रूपरेखा एक गाइड के रूप में कार्य करता है। ग्रामीण आवासों के आपदा झेलने की क्षमता को बढ़ाने के लिए, विशेष रूप से वे जोकि सार्वजनिक रूप से वित्त पोषित तथा राज्य प्रायोजित योजनाओं के द्वारा प्रदान की जाती है। राज्य समर्थित आवास के सन्दर्भ में, यह अध्ययन इंदिरा आवास योजना तक सीमित है जो कि ग्रामीण आवास के लिए भारत सरकार का प्रमुख कार्यक्रम है।

अध्ययन के मुताबिक, 'आवास पारिस्थितिकी तंत्र' का समग्र प्रदर्शन हितधारकों के इंटरलिंकेज अथवा काम करने के रिश्ते की गुणवत्ता पर आधारित है। पारिस्थितिकी तंत्र के केंद्र में घर के मालिक के साथ, अपस्ट्रीम और डाउनस्ट्रीम प्रक्रियाएं - संस्थागत और साथ ही बाजार, में अधिक गुणवत्ता लाने की जरूरत है ताकि आपदा प्रतिरोधी घरों को बनाया जा सके। आवास कार्य की प्रक्रिया एक 'प्रणाली' के रूप में काम करती है। प्रणाली के हिस्सों के बीच बातचीत तथा समन्वय इसकी गुणवत्ता को प्रभावित करता है। शोध यह दर्शाता है कि आवास की जरूरत के प्रति दृष्टिकोण बदलने की जरूरत है ताकि अधिक जागरूकता उन्मुख और उपलब्धियों पर आधारित प्रक्रियाओं द्वारा आवास कार्य हो।

इसके अतिरिक्त, नीति कलाकारों को संख्याओं पर पारम्परिक ध्यान से ऊपर और परे प्रदर्शन मानकों स्थापित करने की आवश्यकता है। अधिक महत्वपूर्ण बात, उन्हें सभी हितधारकों की क्षमता वर्धन में लगातार निवेश करने की आवश्यकता है अन्य ताकि आपदा प्रतिरोधी घरों को बनाया जा सके। आवास कार्य की प्रक्रिया एक 'प्रणाली' के रूप में काम करती है। प्रणाली के हिस्सों के बीच बातचीत तथा समन्वय इसकी गुणवत्ता को प्रभावित करता है। शोध यह दर्शाता है कि आवास की जरूरत के प्रति दृष्टिकोण बदलने की जरूरत है ताकि अधिक जागरूकता उन्मुख और उपलब्धियों पर आधारित प्रक्रियाओं द्वारा आवास कार्य हो। इसके अतिरिक्त, नीति कलाकारों को संख्याओं पर पारम्परिक ध्यान से ऊपर और परे प्रदर्शन मानकों स्थापित करने की आवश्यकता है। अधिक महत्वपूर्ण बात, उन्हें सभी हितधारकों की क्षमता वर्धन में लगातार निवेश करने की आवश्यकता है अन्य ताकि आपदा प्रतिरोधी घरों को बनाया जा सके।

यह 'आवास प्रक्रिया' को मजबूत बनाने की दिशा में एक महत्वपूर्ण कदम होगा। 'लचीला ग्रामीण आवास ढांचा' का परीक्षण सिक्किम में किया गया है। यद्यपि ऐसे सामाजिक-तकनीकी हस्तक्षेप के प्रभाव लंबे समय तक ही प्रकट होते हैं और तत्कालीन परिणाम तथा सिक्किम विश्वविद्यालय द्वारा मूल्यांकन और राष्ट्रीय स्तर पर ग्रामीण विकास मंत्रालय की निगरानी द्वारा किए गए इसकी उपयोगिता के प्रारंभिक साक्ष्य प्रोत्साहित करते हैं।

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LIST OF ABBREVIATIONS

AHP	Analytic Hierarchic Process
ATC	Appropriate Technology Centre
AVS	Awasth Vikas Sansthan
BC	Building Centers
BMP	Building Materials Programme (of SDC)
BMSB	Building Materials and Services Bank
BMTPC	Building Materials And Technology Promotion Council (of GoI)
BPL	Below Poverty Line
CCA	Climate Change Adaptation
CEEF	Cost Effective and Environment Friendly (Technologies)
CGI	Corrugated Galvanised Iron
CLD	Causal Loop Diagrams
CMRHM	Chief Minister Rural Housing Mission
DA	Development Alternatives
DDMA	District Disaster Management Authority
DFID	(UK Government) Department of International Development
DM	Disaster Management
DMKS	Darshna Mahila Kalyan Samiti
DRDA	District Rural Development Agencies
DRI	Differential Rate of Interest
DRR	Disaster Risk Reduction
DVA	Detailed Vulnerability Assessment

EMDAT	Emergency Events Database (initiative of Centre for Research on the Epidemiology for Disasters)
FGD	Focus Group Discussion
GOI	Government Of India
HUDCO	Housing And Urban Development Corporation Limited (of Government of India)
IAY	Indira Awaas Yojana
IPCC	Intergovernmental Panel on Climate Change
IRDP	Integrated Rural Development Program
JEEWOMS	JeevaPoorna Women Masons Society
JRY	Jawahar Rozgar Yojana
KESNIK	Kerala State Nirmithi Kendra
KfW	Kreditanstalt fur Wiederaufbau (of Germany)
MACTS	Mutually Aided Cooperative Thrift Societies
MG-NREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MMAY	Mukhya Mantri Awas Yojna
MoHUPA	Ministry of Housing and Urban Poverty Alleviation
MHA	Ministry of Home Affairs (of GoI)
MORD	Ministry of Rural Development
NDMA	National Disaster Management Authority (of GoI)
NGO	Non-Government Organisation
NLM	National Level Monitor
NREGA	National Rural Employment Guarantee Act
NREGP	National Rural Employment Guarantee Program
NSSO	National Sample Survey Organization

PMGAY	Pradhan Mantri Gramin Awaas Yojana
R&D	Research and Development
RBC	Reinforced Brick Concrete
RBI	Reserve Bank of India
RCC	Reinforced Concrete Cement
REDRH	Reconstruction Of Earthquake Damaged Rural Houses
RH	Rural Housing
RHP	Rural Housing Program (of Swiss Agency for Development Cooperation)
RHKN	Rural Housing Knowledge Network
RLEGP	Rural Landless Employment Guarantee Programme
RMDD	Rural Management And Development Department(Government Of Sikkim)
RRHF	Resilient Rural Housing Framework
RTI	Right to Information
RVS	Rapid Visual Screening
SCC	Supreme Court Case
SDC	Swiss Agency For Development And Cooperation
SDMA	State Disaster Management Authority
SEWA	Self Employed Women's Association
TKM	Tara Karigar Mandal
TMM	Tilothu Mahila Mandal
TSC	Total Sanitation Campaign (of Government of India)
UNDP	United Nations Development Programme
UNISDR	United Nations International Strategy for Disaster Reduction

UP	Uttar Pradesh (state of India)
SVA	Simplified Vulnerability Assessment

“Human beings with their tampering do something wrong, leave the damage unrepaired, and when the adverse results accumulate, work with all their might to correct them. When the corrective actions appear to be successful, they come to view these measures as splendid accomplishments. People do this over and over again. It is as if a fool were to stomp on and break the tiles of his roof. Then when it starts to rain and the ceilings to rot away, he hastily climbs up to mend the damage, rejoicing in the end that he has accomplished a miraculous solution.

It is the same with the scientist. He pores over books night and day, straining his eyes and becoming nearsighted, and if wonder why on earth he has been working on all that time - it is to become the inventor of eyeglasses to correct nearsightedness.”(Fukuoka, 1978)