Foreword

By Ace McArleton

We walk in a moment of great crisis and opportunity. This book you hold in your hands, or read on a screen, is a pathway into that opportunity.

The crisis is clear: climate crisis, fascism, dehumanization, loss, hopelessness, and death; they roar to us and attempt to surround us with fear and proclaimed dominance. The opportunities are clear as well: tender hope, courage, love, and vision, but most importantly, tangible daily practices towards a healed world.

The United Nations 2023 report *Buildings and Climate: Constructing a New Future,* was a clarion call to all of us. Lead authors Anna Dyson, Naomi Keena, Mae-ling Lokko, and Barbara K. Reck stated that building materials are responsible for a staggering 37% of global carbon emissions annually. The building industry needs to clean up its act. The report, after setting the stage with the steep challenges we face, lays out a roadmap:

AVOID the extraction and production of raw materials by galvanizing a circular economy, which requires building with less materials through better data-driven design, while reusing buildings and recycled materials wherever feasible.

SHIFT to regenerative material practices wherever possible by using ethically produced, low-carbon earth- and bio-based building materials (such as sustainably sourced bricks, timber, bamboo, agricultural and forest detritus) whenever possible.

IMPROVE methods to radically decarbonize conventional materials such as concrete, steel, and aluminium, and only use these non-renewable, carbon-intensive, extractive materials when absolutely necessary.

What does one little earthen floor how-to book bring to this very serious-sounding party?

To answer that question, we need to look back to look forward. The

1960s, 70s, 80s, and 90s in the United States saw the first burgeoning attempt to integrate indigenous, traditional, and alternative building practices that worked with earth- and bio-based materials into modern day life and architecture. Timber framing, straw-bale construction, adobe and cob, clay and lime paints and plasters, and earthen floors all experienced a resurgence and became real options for homes and buildings. Small but significant forays into the mainstream were made: structural engineers did research and wrote articles; colorful coffee table books that highlighted case studies and showed the beauty and possibility of these methods were published; and many workshops, colloquia, and gatherings came to life. Too many people to list worked on this resurgence, and devoted their love, vision, and practice to working with regenerative methods. We owe them immense gratitude. Yet, it remained mostly an alternative, fringe movement when I entered it in the early 2000s.

Around that time, a new generation was looking for a way to bridge mainstream trades work and tech-oriented green building with regenerative materials. These folks—myself, Sukita, and James amongst them—felt the reconnection to land and self these materials created. We also saw how those important and transformative methods, while fascinating and enjoyable, weren't scalable, and that they were only accessible to a relative few. As the climate crisis has accelerated alongside deepening wealth inequality over the past 30 years, many in our generation have sought to make these more boutique experiences and techniques accessible and scalable within mainstream design and construction practices.

This is humanity's task within the building trades and associated spheres: to change codes; find experts in regenerative building practices and document their knowledge; set up trades education for building techniques that work with earth- and bio-based materials; change market perceptions; swap out toxic and high-embodied carbon materials; and change construction practices at scale.

Sukita Crimmel and James Thomson's practical, fun guide to making earthen floors is a vital contribution to this important task. This book includes case studies from other builders who have tried different ways of working with earthen floors, showing how the work of the early trail blazers is already spreading to a new generation. These second generation prac-

titioners are taking their hard-won experience and training apprentices, teaching workshops, starting trade schools, creating standardized products such as Claylin floors, Hempitecture hempwool batts, Earthaus lime plaster, Gold Hill Clay Plaster, and experimenting with scaling up through collaborative, decentralized business models like the Seed Program and Collaborative that my business New Frameworks started to spread the use of S-SIPs (straw structural insulated panels), and working on affordable housing solutions like Community Rebuilds.

Regional, national, and international groups in the U.S. and beyond, such as CASBA (California Straw Bale Alliance), the Natural Building Alliance, the Natural Plasterers Guild, the Bio-Based Materials Collective (BBMC), and the European Straw Bale Building Alliance (ESBBA), are growing in influence, connecting practitioners and promoting the use of earth and bio-based materials. Initiatives like the Healthy Materials Lab at Parsons School of Design curate a list of healthier materials for buildings and offer podcasts on the subject. As awareness continues to grow that buildings and the process of making them are a massive contributor to the climate crisis, so does the awareness that we have solutions right in front of us. The movement to build a better tomorrow is growing, and Sukita and James' work holds an important place in it.

In a 2020 piece in *The Guardian,* author James Yeh examines the impact of the work of Robin Wall Kimmerer, biologist, professor, researcher, and member of the Potowotomi nation. He quotes Kimmerer, from the bestselling book, *Braiding Sweetgrass*: "What's being revealed to me from readers is a really deep longing for connection with nature....It's as if people remember some kind of early, ancestral place within them. They're remembering what it might be like to live somewhere you felt companionship with the living world, not estrangement." This estrangement and disconnection from land is also disconnection from self, which allows our extractive industries to exist, which in turn has caused the climate crisis.

Sukita and James describe the "difference" people feel when they walk on an earthen floor as opposed to a concrete or other floor—a difference that could be described as companionship with the living world expressed as architecture, not estrangement; an ancestral place of sun-warmed earth brought into your living room.

It is transformative to alter our perspective on buildings in this way. Instead of viewing them as just technical tools to help us to survive, we can see them as fundamental expressions of being alive. They can be acts of integrating ourselves into the interconnectedness of life, acknowledging our position alongside all living beings.

This begins to point to another dimension of the opportunity before us: not only can we preserve the Earth so we can continue to live on it, but we can also rediscover what is inherently joyful about cultivating creative relationships with earth elements. At once joyful and practical, this second edition of *Earthen Floors* puts the tools in our hands to meet this moment. Part of what brings the fun in these pages is the intimacy that the authors feel with their materials and craft. It offers us a clear method to employ our mineral relatives–sand, clay, soil–in combination with our plant relatives—chopped straw, seed-based oils—to form beautiful, durable, and inspiring floors that are embedded with the relationships that created them, and marked with the hands that laid them. Imbued with these connections that are the truth of our existence, our buildings can become opportunities to practice and live with that healing connection.

So dive in, gather some friends or your architectural design practice, trade partners, and construction trades union members, and enter the beautiful world of *Earthen Floors*, and in turn, the movement for a better world—one trowel of sand and clay at a time.

Ace McArleton is Co-Founder, Co-CEO, and Director of Vision & Strategy at New Frameworks in Burlington, Vermont. Ace founded New Frameworks in 2006 to offer design/build services that blend natural materials and methods with high-performance design, to move the building industry toward climate regeneration and social justice. Ace is also co-founder and co-organizer of the Seed Program and Seed Collaborative, to democratically scale the use of structural straw panels in buildings; the Bio-Based Materials Collective, to advance the implementation of bio-based materials in the built environment; and of the NESEA Diversity Caucus and Anti-Racism Action Group, to place social justice at the heart of the building industry. Ace was a longtime instructor & board member at Yestermorrow Design/Build School; is co-author of *The Natural Building Companion*; and led New Frameworks's conversion to a worker cooperative in 2016. Ace is devoted to trades education for all, and is passionate about finding practical, regional solutions to build healthy, just communities now and into the future.

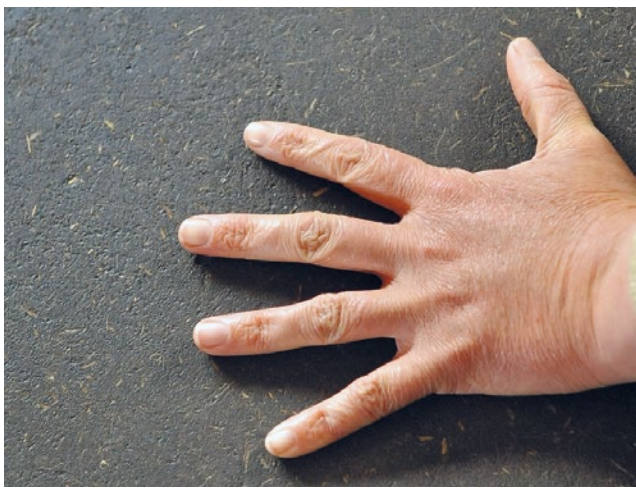
Introduction

"Wow!" is the most common exclamation heard when people set foot on an earthen floor for the first time. It's usually followed by "It's beautiful!" or, more often, "What is it?" There is something familiar and comforting about it; for people who are used to concrete, tile, hardwood, or carpet, taking a step onto an earthen floor is something special, something new.

Most people are unfamiliar with the idea of an earthen floor and are understandably skeptical. "Aren't they dusty?" they ask. When people imagine an earthen floor, they probably think of a dirt floor in a small home in a village in a faraway country, or maybe something from the past. While this type of simple floor can actually be quite comfortable if cared for properly, the earthen floors described in this book are a modern adaptation of these ancient techniques. Today's earthen floors are attractive, durable, and environmentally conscious options for modern homes.

The basic ingredients in earthen floors are simple: sand, clay, and some sort of fiber (usually chopped straw). Other additives may include pigments for color and manure for extra fiber. Finally,

A beautiful earthen floor in Crestone, CO. (Credit: James Thomson)



(Credit: Mike O'Brien)

once applied and fully dried, the floor is sealed with coats of drying oil and finish.

People love the unique look and feel of earthen floors. They come in a range of dark, rich earth tones, often flecked with lightly colored fibers. They feel different too: Walking barefoot over an earthen floor is a starkly different experience from walking on a concrete floor. The first obvious difference is temperature: Earthen floors feel warmer to the touch. Second, an earthen floor is softer than a concrete floor. The difference is subtle but important. Finally, the minor undulations and irregularities that are a result of the hand-troweling process more closely mimic textures and patterns that we might expect to find in nature and feel more natural to our feet, almost like walking on the earth.

This book will tell the story of earthen floors, give best practices for where and when to use them, and provide step-by-step instructions for installing a floor from scratch. It is intended to be a practical guide for DIYers, contractors, architects, and anyone with an interest in trying their hand at this amazing technique.

The authors (and others in the natural building field) have developed the installation methods described here over decades of work. This doesn't mean they're the only or even the best way; they're simply a way that has been shown to work over time and in a variety of circumstances.

Building is a creative practice. Builders develop their own methods that work well for them, and readers will likely modify and adapt the guidance in this book for their own purposes. Building with earth is like working with wood: There are regional and building site conditions that affect the materials, as well as seasonal differences; experience leads to better understanding. People who choose to make earthen floors should be prepared for surprises and challenges as they learn and gain experience.

No book can teach everything there is to know about any topic, and this one is no exception. The intention is to provide enough information to improve the odds for success and to prevent readers from making some of the many mistakes the authors have made. But mistakes will invariably happen anyway; hopefully they will be opportunities for further learning and development rather than causes for despair.

The Authors

Sukita Reay Crimmel

Sukita Reay Crimmel (Credit: Noel Adams)

I was born to world-traveling, meditating hippies. We lived in rural Australia and Northern California in my childhood. We gardened, we raised chickens, we raised goats. As I grew, we lived more urban lives; there was always a garden, and we recycled.

In 1994 I moved to Eugene and started my studies at the University of Oregon. The architecture program was known for its green building program. I was an Environmental Studies student with a minor in architecture, the best of both worlds. It was my involvement with HOPES (Holistic Options for Planet Earth Sustainability), a student group that hosted a green building design conference, that introduced me to natural building.

And at the end of my college studies, I was looking for work with utilities to help customers reduce their energy use with energy efficient appliances and weatherization practices. This work made ecological sense, and I enjoyed the number-crunching and problem-solving aspects of the work. And I had fallen in love with natural building. It was that young, "pivot and find any way to be a part of it," sort of love.

I volunteered for the Cob Cottage Company, the most well-known natural building education organization at the time, and then I worked for Robert Bolman, a builder in Eugene, Oregon. In 2002, with inspired gusto and a vision of natural building in the urban landscape, I moved to Portland, Oregon, where The City Repair Project was making functional mud art all over town.

I started my contracting business and called it From These Hands. The bulk of the work was installing earthen plasters and earthen floors in existing and new homes. In February 2007, the *New York Times* published an article on earthen floors. I was one of the professionals included in the story. After this article came out, I directed my attention toward understanding

earthen floors with more precision. I did more research and development, and in 2011, I started Claylin LLC, an earthen floor materials, consulting, and training company. In 2014, the first edition of this book was published.

As of this writing, I have retired from installing earthen floors as a contractor. With Claylin I sell materials and offer phone and in-person consultations and teach workshops. I enjoy helping others install earthen floors and sharing stories and experience. I am also a mother to my young daughter. We build sandcastles, fairy forts, and tree houses. Professionally, I have joined forces with longtime building colleague Josh Baeckel. Together we run the Traditional Natural Plaster Company.

It brings me great joy to collaborate again with my friend and colleague James Thomson in writing this second edition. We now live across the country from each other, but still we found the time to get together regularly. This second edition has new, helpful information on the care and repair of these floors. It has stories from colleagues around the world and more photos. It is because of the success of the first edition we are here again, sharing what we have learned about earthen floors since the last time.

James Thomson

I stumbled into the natural building world twenty years ago, as a wide-eyed and idealistic college grad, looking for a way to combine my interest in building with my beliefs about environmental conservation. It was a good fit, and I spent nearly ten years "covered in mud," building and teaching earth building techniques primarily in Southern Oregon. During that time I realized that true sustainability cannot be achieved simply by swapping industrial building materials for natural ones: It requires a willingness to change how we live, not just what materials we live with. Importantly, it's about changing our relationship to the structures that shelter us away from one that is mostly financial in nature to one that is more holistic, that values how we really want to live over how much our investment grows.

Building with earth is one way to help us deepen our connection with our homes. Its unique aesthetic reminds us of the larger Earth outside our door. It's also a technique that leaves a light footprint on the environment and doesn't bring a lot of toxic junk indoors. And best of all, earthen build-

ing techniques are accessible to novice builders. Like all things, they require practice to develop skill, but the materials are safe and forgiving and, perhaps more importantly, fun to work with. Maybe they remind us of making sandcastles on the beach or mud pies in the backyard. Or maybe it's just because these materials are all around us; They make up our world; they make up us.

I poured my first earthen floor in the summer of 2004. I couldn't believe that such simple materials could make such a sturdy floor; even after years of installing them, I'm still sometimes surprised that they work so well. Earthen floors are a great starter project for budding natural builders, and they can be installed in most pre-existing homes with minimal alterations to the existing structure.

James Thomson (Credit: Noel Adams)

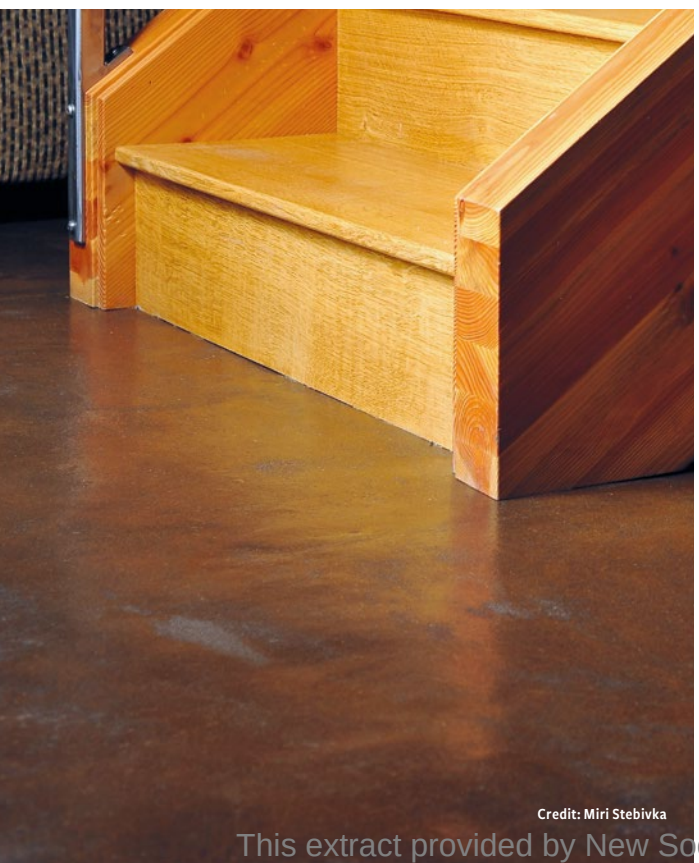
In recent years, my building work has been more focused on renovating and repairing old wood buildings, such as the 1890's era timber-frame barn on our family farm in Western Massachusetts. But my time in the natural building world continues to inspire my work: I'm always looking for ways to reuse materials, find locally available options, and figure out how to create spaces that will outlive me.

The writing of this second edition has been a welcome opportunity to dip my toes back into earth building, and I am pleased to find that the movement, though small, is still vital and thriving. And finally, I could not do this project without my good friend and colleague Sukita Reay Crimmel. Sukita and I met about twenty years ago in Portland, Oregon, and quickly became friends. Sukita asked me if I would cowrite an earthen floor book with her back in 2012; it was an easy thing to say yes to. Working together now, just as back then, is a delight. I am grateful that our lives and particular skills and experiences have combined in the ways that they have, and that together we are able to provide this text as our offering to future earthen floor builders. We hope that you have as much fun as we have!

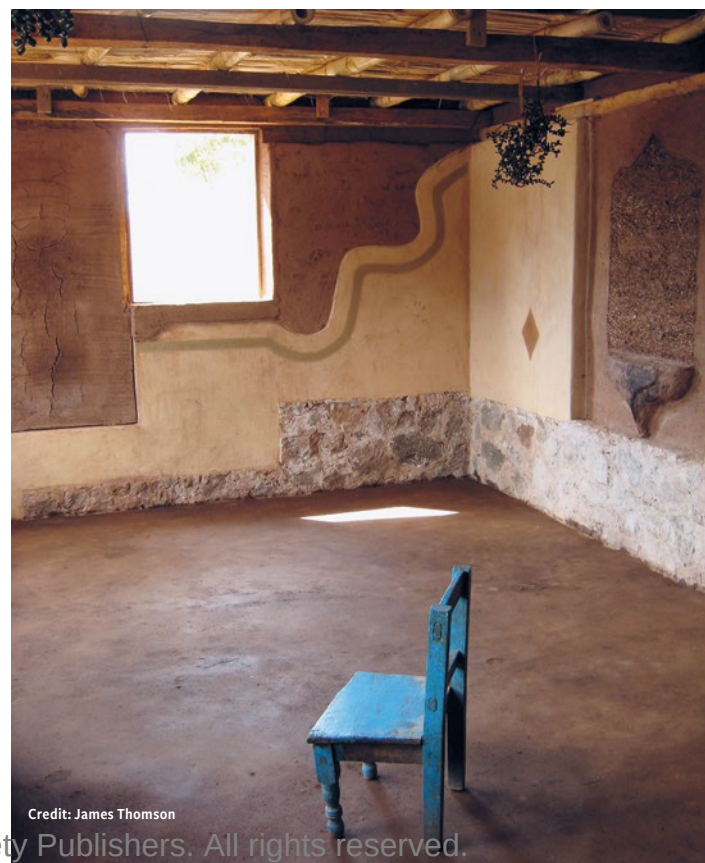
SECTION 1

About Earthen Floors

The idea of living on a floor made of earth is not new; humans have been doing that for centuries. What is new is the idea of bringing these ancient materials into our modern homes. It is valuable to understand where the techniques used today came from and how earthen floors are different from (and similar to) other flooring options, to make sure they are installed in appropriate settings.



Credit: Miri Stebivka



Credit: James Thomson

600-year-old "Hakka" communal earthen structure, China. (Credit: © Liumangtiger Dreamstime.com)

1

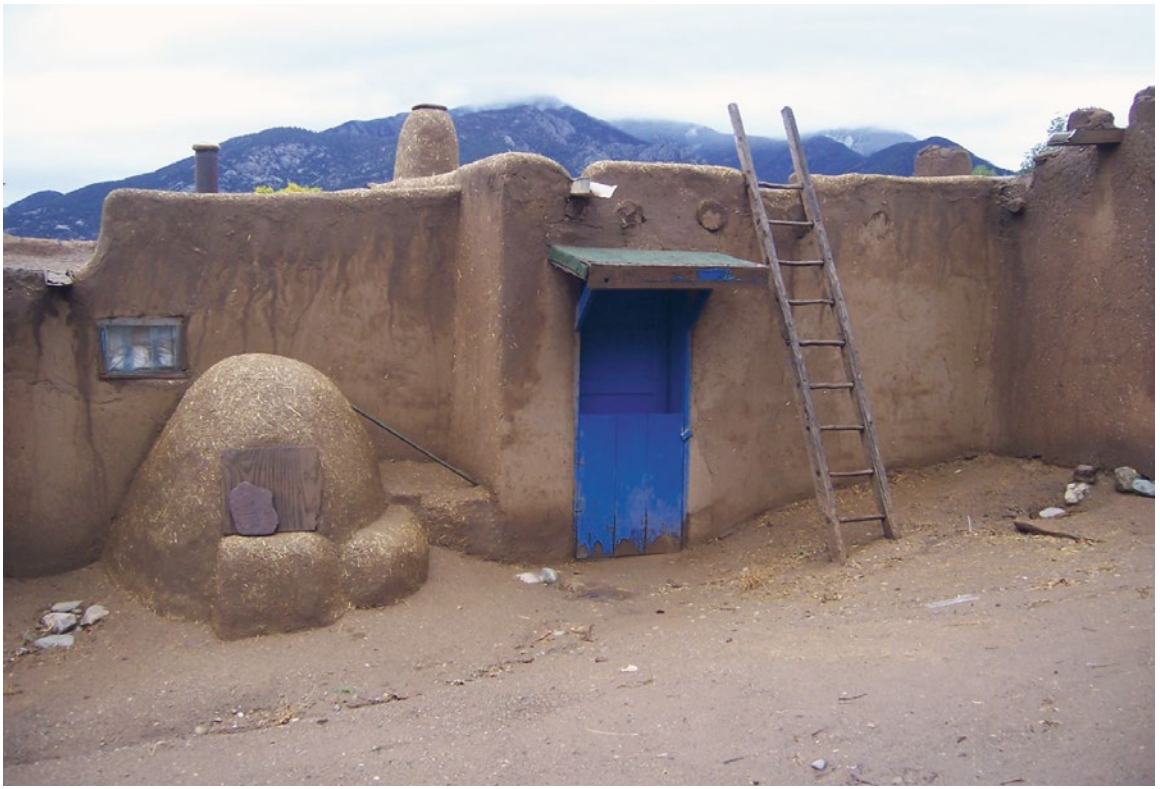
The Story of Earthen Floors

Building with earth has been a staple of human civilization for millennia. Confronted with the question of how to shelter themselves, our ancestors looked around and found an abundance of natural building materials right under their feet.

Using soil, sand, rocks, and plant fibers, they built durable and comfortable buildings that would stand for generations. They used these same materials to add smooth and attractive wall and floor finishes. For most of human history, people have lived in houses that they (or a family member) built from materials found close by. In many parts of the world, these ancient traditions are still in use today.

There are several earthen building techniques that readers may be familiar with. The most widely known is sunbaked clay bricks, often referred to as adobe. There is evidence that ancient Egyptians made mud bricks more than four thousand years ago (2000 BCE). Every continent on Earth (except Antarctica) has ancient structures built from mud or clay bricks. Here in the US, there are many examples of ancient adobe buildings, including the oldest continually occupied structure in North America: Taos Pueblo in New Mexico, about a thousand years old. Other common earthen building techniques are wattle and daub (mud plaster smeared over a matrix of woven sticks), cob (similar to adobe, but without the bricks) and sod (bricks of earth and roots cut from the earth). Human societies the world over have employed these techniques for thousands of years to create shelter.

Populations grew rapidly during the nineteenth and twentieth centuries, and the increased demand for housing spurred the growth of a building



Taos Pueblo, the oldest continuously occupied dwelling in North America, is built from earth.
(Credit: James Thomson)

Scars on the landscape left behind by logging operations.
(Credit: © Steve Estvanik Dreamstime.com)

products industry that promoted new materials, techniques, and designs that would allow buildings to be erected much more quickly. Building materials could be manufactured in a factory or mill and sent almost anywhere in the world, essentially outsourcing much of the labor required in home-building. As specialization of labor has increased and technology has advanced, this once-new paradigm has become the standard and ideal, allowing buildings to be completed in a fraction of the time it would have taken our ancestors just three or four generations ago.

Yet this time saving has a cost: not only a financial cost but also a cost to the health of our planet and our bodies. Using modern building products often means filling our homes with toxic chemicals and leaving vast swaths of clear-cut or strip-mined land in places often far away.

As the impacts of climate change become more apparent, the calls for change are growing louder. The built environment generates 42% of annual global CO2 emissions. Of those total emissions, building operations are responsible for 27% annually, while building and infrastructure materials and construction are responsible for an additional 15% annually.[1] As builders, we must work diligently to reduce the carbon emissions of the built environment.

This book is not intended to address all of these challenges, but it does offer an answer to the question "Is there a better way?" The Earth provides an incredible abundance of durable, low-carbon, nontoxic, and beautiful building materials that can be found almost anywhere. Our ancestors knew this; today, we have the opportunity to learn this again.

Wooden stud framing in progress.
(Credit: © Picstudio Dreamstime.com)

Natural building

"Natural building" is a relatively new term that describes a building philosophy that emphasizes sustainability through using minimally processed, locally available, plentiful, and renewable resources to create healthy living environments. Natural builders value handmade and site-processed materials over store-bought products and favor small, thoughtful buildings over large, extravagant ones. Natural building is a small fringe movement, but technical books on natural building processes continue to become available, and building codes are being rewritten to be more accepting of natural building practices.

Earth is a favorite building material of natural builders, in the form of adobe, cob, and earth-based finishes, and earth building has seen a small renaissance in the last few decades in North America and around the world. What started as a movement of homesteaders and off-the-grid DIYers has grown to where it is now possible to find earthen building projects in urban areas of the most developed countries. The 2021 version of the International Residential Code (commonly known as "the building code"), used in most places in the United States (though ironically not in any other country), now contains an appendix for cob construction and even includes a note about earthen floors, referred to as "cob floors" in the code.[2]

Laurie C., Franklinville, North Carolina: **We have loved the silkiness and comfortably cool surface of our new earthen floor. It's a small detached meditation/guest room, so it doesn't get full-time use, but it has a remarkably welcoming feel that always makes me want to take my shoes off. I particularly enjoy knowing that it is earth that I'm standing on, even if it is inside a structure.**

For most people, building a complete house out of earth is not practical or possible. But earthen floors are a great option for those who still want to bring some earth into their homes. The technique is relatively easy to learn, and the floors can be installed in all types of new and existing buildings. They sell themselves on their aesthetics alone, without even considering their unique feel, low toxicity, minimal environmental impact, and thermal benefits. They can be applied in a variety of situations and conditions and are suitable for most general-use rooms. These are modern earthen floors.

A remodeled bedroom in a 1926 Craftsman-style home, with earthen plaster walls and an earthen floor.
(Credit: James Thomson)

The history of earthen floors

The concept of an "earthen floor" is not new. Homes have been built directly on the earth for many millennia. As late as 1625, most European houses had a tamped earthen floor on the first level. The abundance of wood available brought about the plank wood flooring of the Colonial Era (1607–1780), and tamped earth floors fell out of favor.[3] Still, in many parts of the world, it is not hard to find people living on floors made of earth. Sometimes the residents use sealers to stabilize the earth; examples of simple, low-cost sealers include ox blood, ghee, and some vegetable oils. Often, traditional earthen floors are just the raw earth beneath the house, tamped down with human feet and moistened frequently with water to keep the dust down.

The modern earthen floor is distinctly different from these simple, rustic floors. A modern earthen floor is carefully planned, built, and sealed to provide the kind of performance that most people today have come to expect from a floor. The earliest examples of this type of earthen floor can be traced back to Bill and Athena Steen and Anita Rodriguez in the American southwest, where the traditions of building and living with earth go back a thousand years and continue to the present day.

Bill and Athena Steen

The Canelo Project, Arizona (caneloproject.com)

Bill and Athena Steen (Credit: Bill Steen)

Bill Steen:

My favorite floors were always those that were nothing more than plain dirt and were renewed with dampening and sweeping on a regular basis. Those were primarily in Mexico. My mother continued dampening and sweeping the yard around our home as I grew up, a practice common in the patios of many old homes in southern Arizona. It made the earth smell fabulous.

Bill writes:

> *We heard that someone had come up with a method for doing adobe floors that didn't crack. At that time, most adobe floors were poured 3 to 4 inches thick. At that thickness, they typically cracked, largely because adjustments to the site soil were rarely made. Those cracks were often patched before sealing the floor, giving a look like rustic flagstone. The woman with the crack-free adobe floors was Anita Rodriguez. We secured a job for ourselves doing an earthen floor and we wanted to use Anita's method. We compensated Anita for her formula from revenues earned on that job, and we were on our way. About the same time we wrote a very simple booklet on the technique, every now and then one finds a copy in some obscure location. The essence of Anita's method was applying two half-inch coats of the finish for the floor and then sealing them with four coats of heated and progressively thinned coats of linseed oil.*

The Steens developed the process further and started using insulation.

> *I think one of the major changes we adopted was to switch from using off-the-shelf boiled linseed oil, which is toxic and foul smelling, to using sun-thickened raw linseed oil that we produced ourselves. We also started adding insulation beneath the floors and separating them from the ground with adequate drainage where needed.*

And finally, they gave the floors the name we use today.

> *We coined the term "earthen floors" in order to make it clearer to a wider audience instead of how they were known in our part of the world, "adobe floors." From that point they seemed to really take off.*

In the late 1990s, a student of the Steens' named Robert Bolman worked with the building department of Eugene, Oregon, to install many earthen floors in buildings on his urban property. In the winter of 1999, a large floor was installed with the help of many, including the very excited Sukita Reay Crimmel. Sukita started installing earthen floors in 2002 in Portland, Oregon. She developed a recipe with less clay that allows for deeper oil penetration, and she figured out how to simplify the oil application process. Sukita also spearheaded the use of wood floats, stiff steel trowels, and laser

levels to create flatter floors, and began using floor sanding machines to create smoother surfaces. Sukita and Erik Hoffman, a hydronic plumber colleague, developed much of the information about hydronic and electric heated earthen floor systems that we share in this book. And in 2014, in partnership with James Thomson and New Society Publishers, the first edition of this book came out, bringing awareness of earthen floors to a much broader audience.

Today, modern earthen floors can be found on six continents, in buildings ranging from simple backyard cabins to high-end homes designed by well-known designers. There are contractors who will install earthen floors for clients, and earthen floor products are available for those who don't want to find or process their own materials.

Earthen floors are also playing an important role in creating more affordable and sustainable housing. Here in the US, there are examples of floors being used in affordable housing projects, such as those developed by Community Rebuilds in Moab, Utah, which put over twenty-five earthen floors in new homes between 2010 and 2020.

In Africa, an organization called EarthEnable has been building and promoting floors in Rwanda as part of their push to provide affordable, sanitary, low-carbon, and beautiful homes for the rural poor.

These organizations, along with other builders around the world, have used information gleaned from the first edition of this book and the practitioners that preceded it to take earthen floors in new and inspiring directions. We are excited to see what comes next!

EarthEnable: More than a Floor
Gayatri Datar, Rwanda (earthenable.org)

Founded in 2014, EarthEnable is an East Africa-based earthen construction company on a mission to make living conditions healthier and more dignified for the world's poor by providing healthy, sustainable, affordable housing products to rural families. EarthEnable's flagship product is an earthen alternative to bare dirt floors: locally sourced earthen floors that are 70 percent cheaper than concrete. EarthEnable's mission is based on the deep-seated belief that improved earthen construction is the solution to many economically developing countries' greatest challenges across the health, housing, employment, and environmental sectors.

The enterprise began as a class project through Stanford's School of Design in 2014. EarthEnable's founder, Gayatri Datar, and her team from Stanford visited Rwanda and saw vivid examples of serious health complications caused by dirt floors, which are ubiquitous in rural areas of many developing countries (especially Rwanda, where 75 percent of the population lived on dirt floors). According to a 2009 World Bank study conducted in Mexico, replacing a dirt floor with a concrete one causes a reduction in diarrheal disease by 49 percent and parasitic infection by 78 percent.[4] But further region-specific research conducted by the Stanford team showed that impoverished families were unable to afford concrete. In addition to being a significant financial investment, concrete causes major environmental problems, being responsible for 6 percent of global carbon emissions. After transport and energy generation, concrete production alone is the third-ranking producer of anthropogenic CO_2 in the world.

The Stanford team discovered that the solution to these issues was combining earthen construction techniques used for thousands of years with modern innovations. Although most of the necessary materials could be found in Rwandan villages, the linseed oil sealants and binders used in the United States were prohibitively expensive. Undetered, Datar and her team recruited biochemist Rick Zuzow, who set out to engineer an oil-based floor sealant that

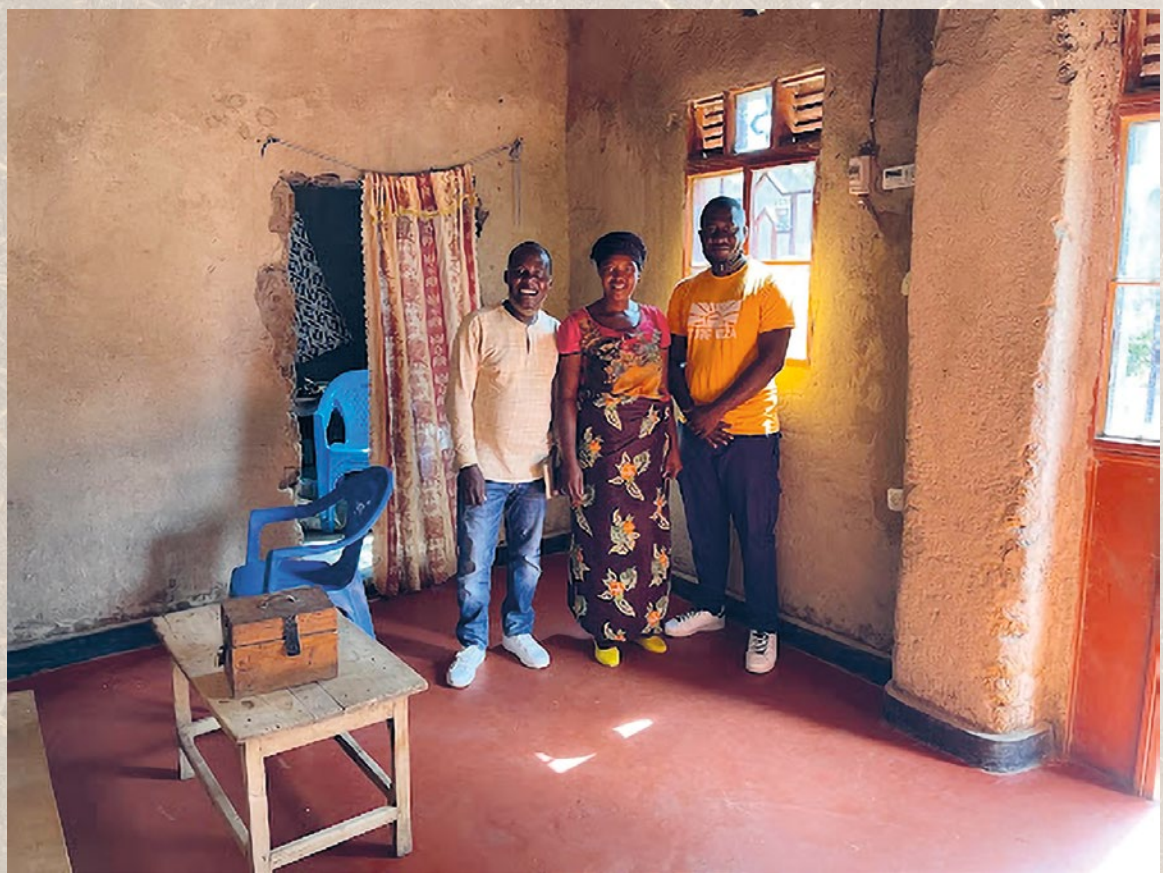
would be both environmentally friendly and more affordable. The result is EarthEnable's proprietary seed oil varnish, used by several hundred masons and floormen to finish earthen floors across Rwanda and Uganda.

With ongoing R&D, EarthEnable has developed durable, aesthetically pleasing floors, began offering an earthen plaster in 2019, and today is developing complete earthen houses to ensure that a range of earthen alternatives are available to address housing needs. EarthEnable has found that the main challenge for customers is maintenance knowledge: The earthen floor's unique requirements must be acknowledged and made clear. A well-made and maintained earthen floor can last a generation, but without proper knowledge, customers may treat it as they would a dirt or concrete floor. EarthEnable has instituted extensive measures to address and correct these misconceptions.

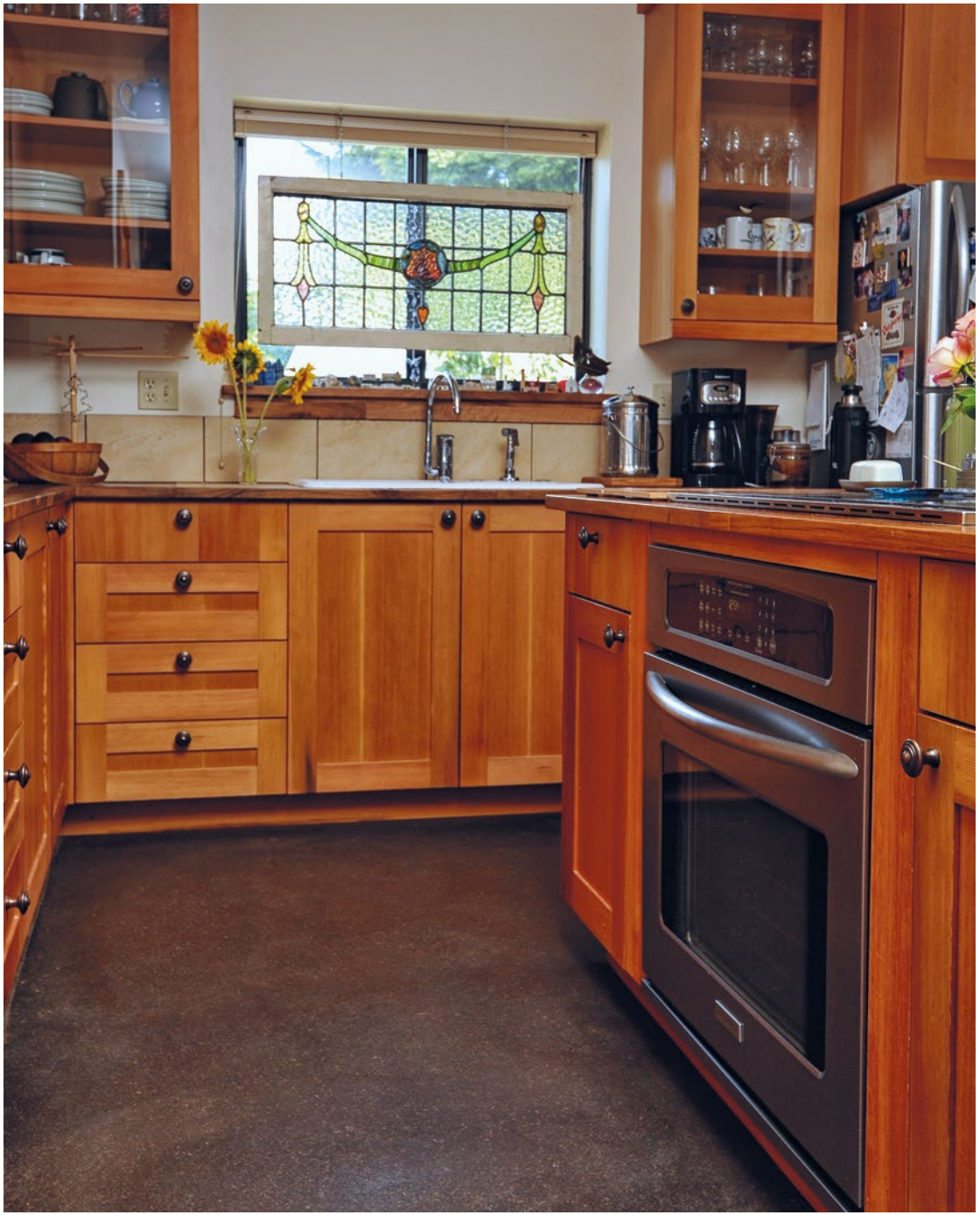
Today, EarthEnable can provide earthen floors that are 70 percent cheaper and 95 percent less carbon-intensive to produce than concrete, and they have provided flooring and other products to almost 170,000 people across Rwanda, Uganda, and Kenya. To deliver these products, EarthEnable has upskilled local masons across central Africa to become flooring entrepreneurs who independently sell and build earthen floors in their communities. By delivering EarthEnable products, these masons are able to double their previous income while serving their communities. In addition to providing training, EarthEnable supports these masons with a community-trained sales department and a robust quality assurance department to ensure that customers are satisfied. As a result of these efforts, EarthEnable has 95 percent of customers indicating on customer surveys that they would recommend EarthEnable's floor to a friend.

After ten years and more than 27,000 earthen installations, EarthEnable has developed insights about the growth and progression of the earthen floor industry and has worked alongside governments to demonstrate the benefits of earthen construction and encourage the development of engineering

standards to ensure that it is responsibly regulated. EarthEnable's efforts resulted in the creation of The Local Building Materials Think Tank in Rwanda in 2019 to develop legal standards for earthen construction that hopefully can be used as a legal standard for earthen construction across the world. Through these efforts, EarthEnable seeks to ensure that affordable, sustainable construction options will meet the growing demand for housing in Africa and across the world.



The floor is ready! (Credit: EarthEnable)



Credit: Miri Stebivka