Quake helps clear the blackened air over Nepal's brick kilns

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Hundreds of thousands of brick kiln workers endure back-breaking labour and suffocating heat working in South Asian brick kilns

Below skies darkened by thick black smoke, hundreds of thousands of brick kiln workers endure back-breaking labour and suffocating heat

working in almost medieval conditions across South Asia.

But in one corner of the region, the need to rebuild after Nepal's devastating 2015 earthquake has presented an unexpected opportunity.

While much work remains to be done in improving working conditions, an environmental initiative has already managed to reduce emissions from the kilns and efforts are now focusing on rolling out the programme across the region, with significant implications for tackling climate change.

There are more than 150,000 kilns in India, Bangladesh, Pakistan and Nepal belching out thousands of tonnes of soot—known as black carbon—a major air pollutant and the second largest contributor to global warming after carbon dioxide.

The factories are stuck in a bygone era. Workers toil away in furnace-like heat in a form of modern day slavery—bonded labourers trapped by landlords in ever-spiralling debt.

These labourers are sold between landlords and the debt starts with the sum they are sold for. It grows as the workers borrow money for food, medical care, even the bricks they use to build homes on the edge of the kilns.

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Along with much of Nepal, the industry was devastated by a 7.8-magnitude earthquake that hit in 2015, killing around 9,000 people and flattening about a third of the country's brick kilns.

But despite the scale of the human tragedy, the devastation presented environmentalists with a rare chance to clean up at least one part of the notoriously filthy industry.

The brick kiln owners remain resistant to interference from labour rights

groups, but they saw potential profit in working with environmental campaigners.

The Brick Kiln Initiative, launched by the International Centre for Integrated Mountain Development (ICIMOD), found a way to redesign the ovens and stack the bricks differently so that less toxic soot is produced.

"We wanted to do three things: decrease emissions, increase efficiency and make the kilns earthquake-resistant," said Bidya Banmali Pradhan, programme coordinator for the initiative.

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The problem is acute, with industrial soot emissions from the region having a worldwide impact.

South Asia has the highest such emissions in the world, according to a NASA study. The soot collects on the Arctic ice, decreasing the earth's ability to reflect the sun's rays and contributing to warming globally.

Higher temperatures are affecting global weather patterns and have disrupted South Asia's annual monsoon rains, with some areas left at risk of drought while others suffer deadly deluges.

In 2017, more than 1,200 people died across South Asia in the worst monsoon floods to hit the region in years.

Black carbon has also exacerbated the melting of glaciers in the Himalayas, which have shrunk by nearly a quarter between the late 1970s and 2010, according to a study.

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Zig-zag stacking

By stacking the bricks inside the kilns in a zig-zag pattern, the heat snakes through the gaps more efficiently, ensuring coal is completely burned so less soot is produced.

Emissions are cut by 60 percent. But more importantly for the kiln owners, it nearly halves coal consumption.

"The environmental factor does not necessarily motivate most kiln owners, but the zig-zag method has an economic benefit. We are using less coal and getting better bricks faster," said Mahendra Chitrakar, president of the Federation of Nepal Brick Industries.

But activists say while the environmental changes are positive, conditions for kiln workers have not improved

Most of the 100 brick kilns in the Kathmandu valley have already adopted the new technology, according to Chitrakar.

"We had to rebuild, so we thought why not build a more scientific, environmentally friendly structure," said brick kiln owner Raj Kumar Lakhemaru.

"Now there is no black smoke. The bricks are better and I am spending a lot less on coal."

The next step is to spread the technology. Brick manufacturers from Bangladesh, India, Nepal and Pakistan met in Kathmandu this year to discuss the new design.

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On the edge of Kathmandu, sweaty bare-footed workers hack away at the grey clay and haul heavy loads of bricks to the cavernous kilns.

Most live in shacks around the factories. As bonded labourers, the next generation of workers are literally born into the industry and many start work as children.

There are more than 200,000 kiln workers in Nepal and 16 percent of them are children, according to Better Brick Nepal, which is campaigning for better conditions.

"We have to clean the brick industry from not just an environmental perspective but also a human one," said the charity's head Homraj Acharya.

And on that issue, he added, the Nepal earthquake has not yet cracked the factory owners' hardline opposition to change.

Nepali worker shovels coal at a brick factory in Bhaktapur, on the outskirts of Kathmandu. There are more than 200,000 kiln workers in Nepal