


Plastic fantastic?

- 1 At 73, Dr Rajagopalan Vasudevan is roughly as old as the mass production of plastic. But that is not the reason why the chemistry professor has a soft spot for the much-maligned material. "Plastic isn't the problem," the venerable scientist says in his office in the southern Indian city of Madurai, "we are. Plastic wouldn't clog our oceans or our landfills if we didn't throw it there in the first place. And there is so much we can do with it instead."
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- 2 He should know. In January this year, Dr Vasudevan was honoured with one of India's highest civilian awards, the Padma Shri, for his groundbreaking research on re-using waste plastic – in a very unusual way. The idea emerged from his workshop at the Thiagarajar College of Engineering in Madurai as far back as 2001. Disturbed by calls to ban plastic, a material which he believed was crucial to poor people, he wanted to find a solution to the growing environmental challenges it raised. "Ban plastic and it can severely affect the quality of life for a low-income family," he says. "But if you burn it or bury it, it's bound to affect the environment."
 - 3 **25**, he began a series of experiments in his workshop to discover effective disposal techniques. In a molten condition, he found that plastic had the property of an excellent binder. Acting on the principle that like attracts like, Dr Vasudevan looked at another chemical of similar nature: bitumen, a black tarry substance that was being combined with gravel to lay roads. When molten plastic was added to stone and bitumen mix, he found that, true to its nature, plastic stuck fast and bound both materials together.
 - 4 The bitumen-modified plastic improved the strength of the road by making it more durable and flexible. Plastic also prevented pothole formation. When the layer of molten plastic filled the space between the gravel and bitumen it thwarted rain water from seeping in and causing structural defects. Dr Vasudevan received a patent for the process in 2006. Since then, almost 10,000km of Indian roads have been paved using his technique.
 - 5 "Our planet is drowning in snack-food packaging that is non-recyclable," says Almitra Patel, a member of India's supreme court committee for solid waste management. "If (this technology is) seriously adopted in all cities for all multi-film laminates, it has the potential to achieve near-zero

landfill, leaving almost nothing for final disposal." The real challenge lies, she says, in collecting all of the voluminous post-consumer packaging.

- 6 Dr Noreen Thomas, a polymer science expert at Loughborough University, said the process appeared to be an imaginative solution, but cautioned that plastic waste is often a complex mix of materials not all of which would work well with Dr Vasudevan's operations. Some might burn up in the heat, and others, she said, might prove unsatisfactorily soft as a road surface. "There is always a risk when heating or burning mixed plastic waste in an open environment when the composition of the plastic waste is unknown," she said. "It is important to find more applications for mixed plastic waste but even more important to ensure that more environmental pollution is not created in doing so."
- 7 Today, self-help groups from various states across India, local citizens and schools are engaged in helping Dr Vasudevan collect waste plastic. "It's time to stop seeing plastic as the enemy and turn it into our biggest resource," says Dr Vasudevan.

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