Relocation, relocation, relocation: Math could address climate change population concerns

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As sea levels rise in the wake of climate change and semi-arid regions turn to desert, people living in those parts of the world are likely to be displaced. A mathematical approach to planned relocation reported in the *International Journal of Mathematics and Operational Research*.

Decision scientist Sajjad Zahir at the University of Lethbridge, Alberta, Canada, and colleagues Ruhul Sarker of the University of New South Wales, Canberra, Australia and Ziaul Al-Mahmud of Lethbridge Community Network, have devised a mathematical algorithm to address the problem of population relocation.

The team's multi-objective optimization approach will help governments decide what fraction of a population would need to be relocated and how many people could stay behind for effective adaptation to climate change.

The "multi-objective" nature of the calculation takes into account people's preferences, various costs, and planning priorities with the ultimate aim of ensuring that the issue of relocation is addressed fairly and is economically viable.

Although mitigation measures are vitally important for controlling greenhouse gas emissions, there are limitations to such efforts novel approaches to allow us to adapt successfully to the effects of climate

change are now needed, the researchers say. They point out that large-scale cross-border migrations may not be a feasible solution to land loss because of the societal costs and the effects on labor. An influx of environmental refugees from the worst affected parts of the developing world is also likely to face opposition from the developed world, they add.

The team's decision analysis factors in the "value" of new opportunities, lost opportunities, transportation costs, adaptation costs and other variables. This allows them to balance the books in terms of how migration would affect a population.

"To make adaptation a success, part of the population must be prepared to adapt to new or different work opportunities and living conditions and others may have to be relocated in a planned way to new locations that require accepting different working and environmental conditions," the researchers conclude, "Our methodology lets us find the fraction of people who would be relocated and who would stay in an optimal manner."

More information: "An interactive decision support system for implementing sustainable relocation strategies for adaptation to climate change: a multi-objective optimization approach" by Sajjad Zahir, Ruhul Sarker, and Ziaul Al-Mahmud in Int. J. Mathematics in Operational Research, 2009, 1, 329-350

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