

The potential for urban household vegetable gardens to reduce greenhouse gas emissions (GHGE)

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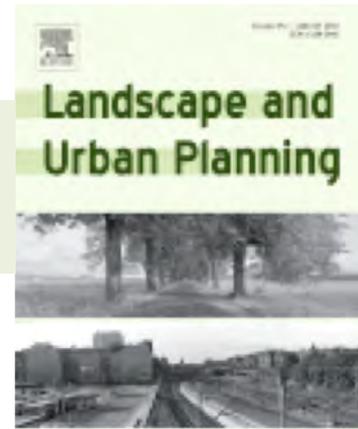
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Summary

Can household vegetable gardens help fight climate change?

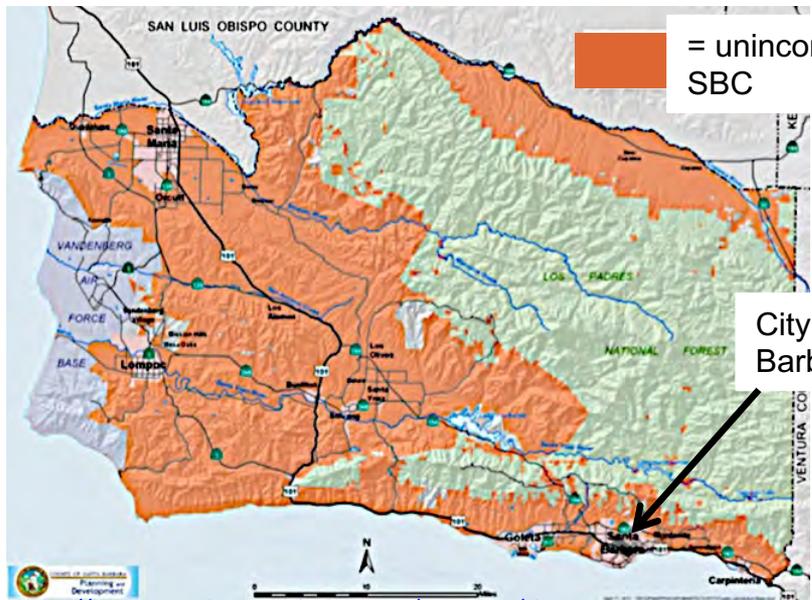
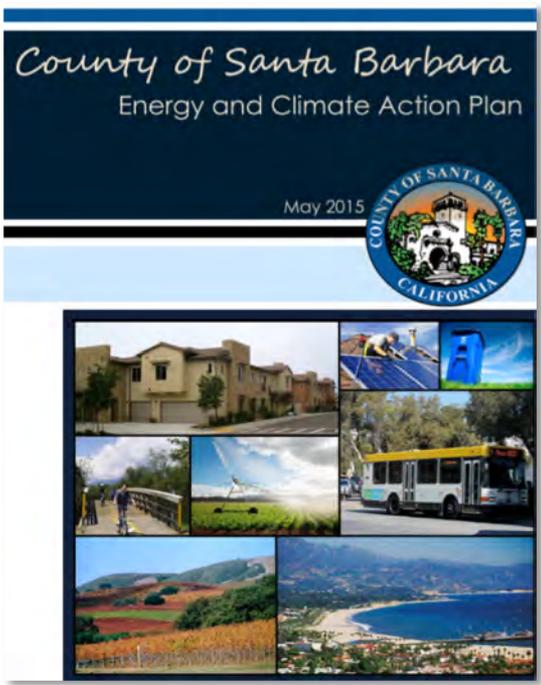
- We modeled household vegetable gardens to reduce greenhouse gas emissions (GHGE)
- They did reduce emissions per kg of vegetable, and contributed to official climate change mitigation targets in Santa Barbara County and California
- Our results can help to motivate households, communities, and policy makers to support vegetable gardens to fight climate change



Vegetable garden plot, SBC

Background: Santa Barbara County

- California's 2006 Global Warming Act (AB 32) includes targets for reducing GHGE
- Santa Barbara County (SBC) unincorporated area and the City of Santa Barbara have official targets
- But the food system, including gardens, gets only a mention
- In part this is due to lack of data, which our research contributes to



Orange box = unincorporated SBC

City of Santa Barbara



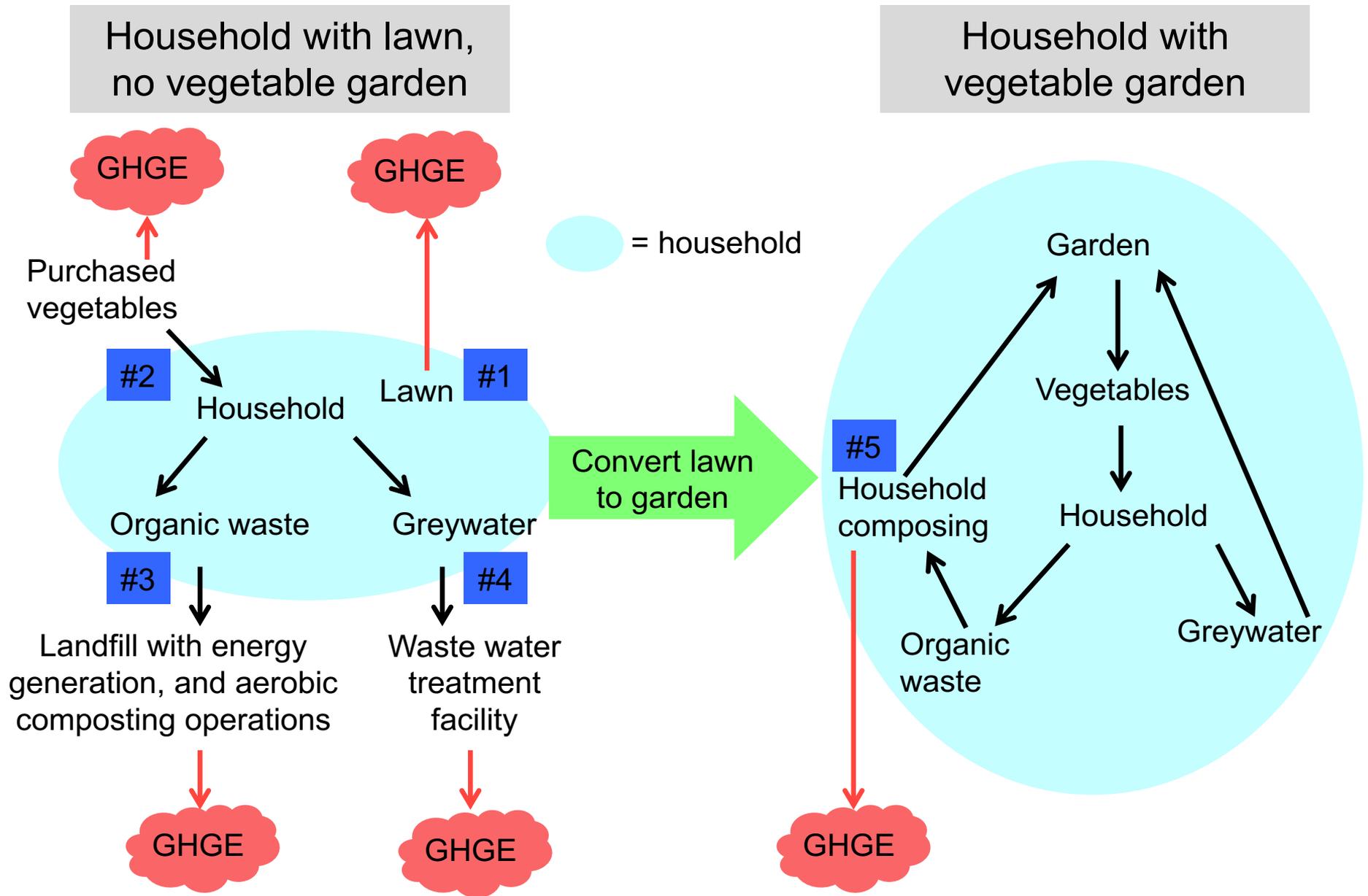
California

Santa Barbara County

http://longrange.sbcountyplanning.org/programs/climateactionstrategy/docs/BOS051915/Attachment%20B_ECAP.pdf

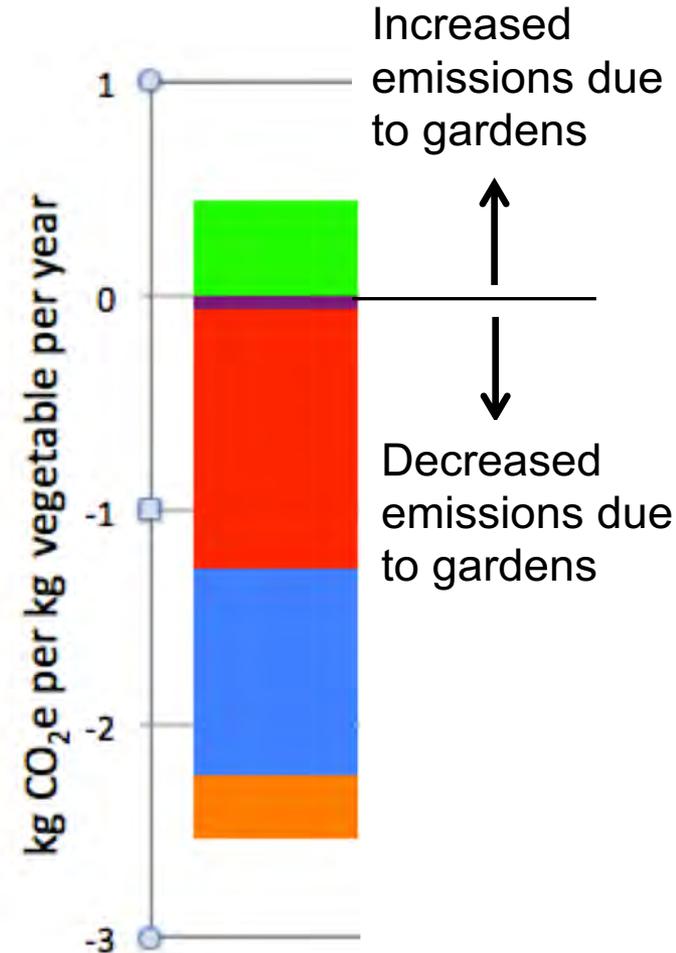
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Methods: Model design



Results: GHGE per kg of vegetable

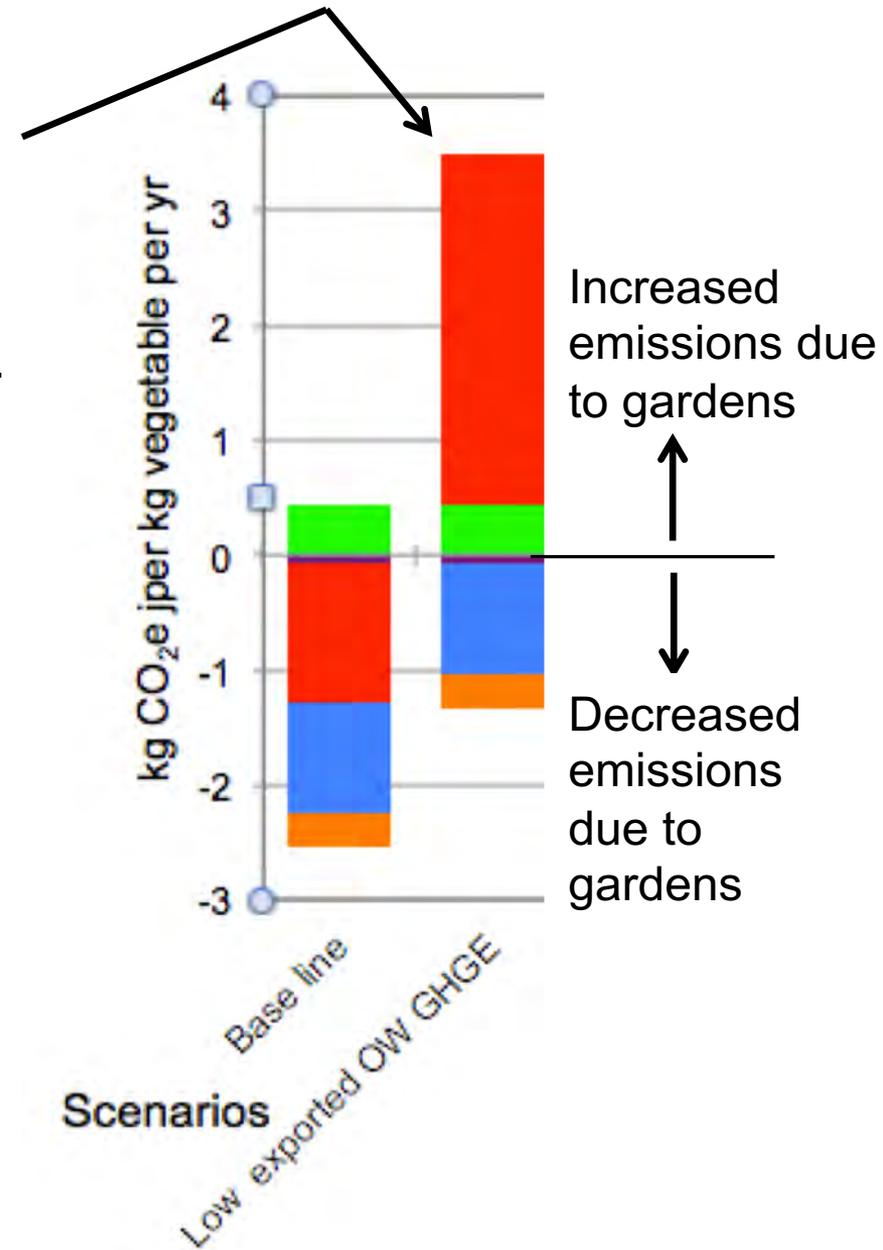
- In the base line scenario, gardens reduced greenhouse gas emissions per kg of vegetable by 2.1 kg CO₂e (carbon dioxide equivalents) compared to households with no gardens and purchasing all vegetables
- Diverting greywater from treatment plants to gardens contributed the least emissions reductions █
- Organic waste diverted from landfills and from aerobic composting operations, to household composting for gardens contributed the most emissions reductions █
- Replacing purchased vegetables █ and replacing lawn █ also reduced emissions
- But, the gardens also produced some emissions from composting, which offset overall reductions █



Results: Sensitivity analysis

We then created alternative scenarios

- In one scenario, the alternative to home composting was sending organic waste to landfills that efficiently captured and burned methane for energy, and to efficient aerobic composting operations--both had net negative emissions
- In other words, in this scenario, by not exporting organic waste, gardeners missed an opportunity to increase emission reductions
- This suggests that if there were efficient organic waste management options to home composting, gardening households could maximize emission reductions by exporting their waste, and importing compost



Results: Gardens' contribution to mitigation targets

We also calculated total net emissions for all gardening households, assuming 50% of single-family housing units had an 18.7 m² garden

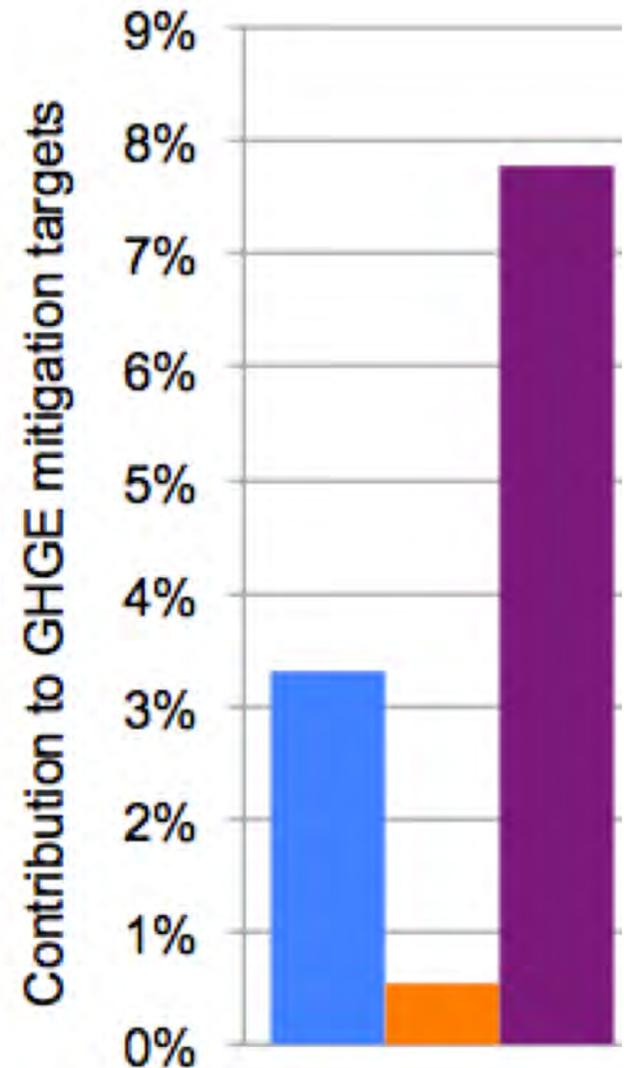
- In the base line scenario, gardens contributed to official GHGE reduction targets

3.3% of unincorporated Santa Barbara County's target 

0.5% of the City of Santa Barbara's target 

7.8% of the State of California's target 

- Contributions varied by how ambitious the target was



Conclusions

- In our baseline scenario, gardens made a positive contribution to GHGE mitigation targets
- Emissions from organic waste management were large and highly variable, so how the processing of organic waste is done, both at the household, and in landfills and aerobic composting operations, has a large influence
- The yield gardeners achieve, and how much of the harvest the household eats also affected emissions
- Our results provide data to support incorporating household food gardens into climate change mitigation plans in California



Backyard compost piles, SBC



<http://www.lessismore.org/materials/161-waste-hauler-contacts>

Santa Barbara County's Tajiguas landfill

What next?

- However, motivating households, communities, and policy makers is not easy
- But the challenge of fighting climate change is similar to the challenge of WW II that motivated many Victory Gardens
- Our results could help to motivate gardening for fighting climate change
- Also, coming soon, a new book to support climate friendly gardens that promote social justice, *Food Gardening for a Changing World*, by Daniela Soleri, David Cleveland, and Steven Smith



War gardens for victory—Grow vitamins at your kitchen door / lithographed by the Stecher-Traung Lithograph Corporation, Rochester, New York. [between and 1945, 1939] Image. Retrieved from the Library of Congress, <https://www.loc.gov/item/96507418/>. (Accessed August 07, 2016.)