

Can water conservation save agriculture?

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Introduction

Urban and agricultural conservation provide semi-arid regions under water scarcity with solutions to sustain agriculture and mitigate the effects of population growth and urbanization on rural water transfers.

Our study investigates the effects of conservation on the economic vitality of the South Platte River Basin and our goal is to sustain agricultural production for future generations.

Methods

Conservation bundles are created with the following strategies:



A- SITXF

B- SITXC

C- SIT

D- SIX

E- STX

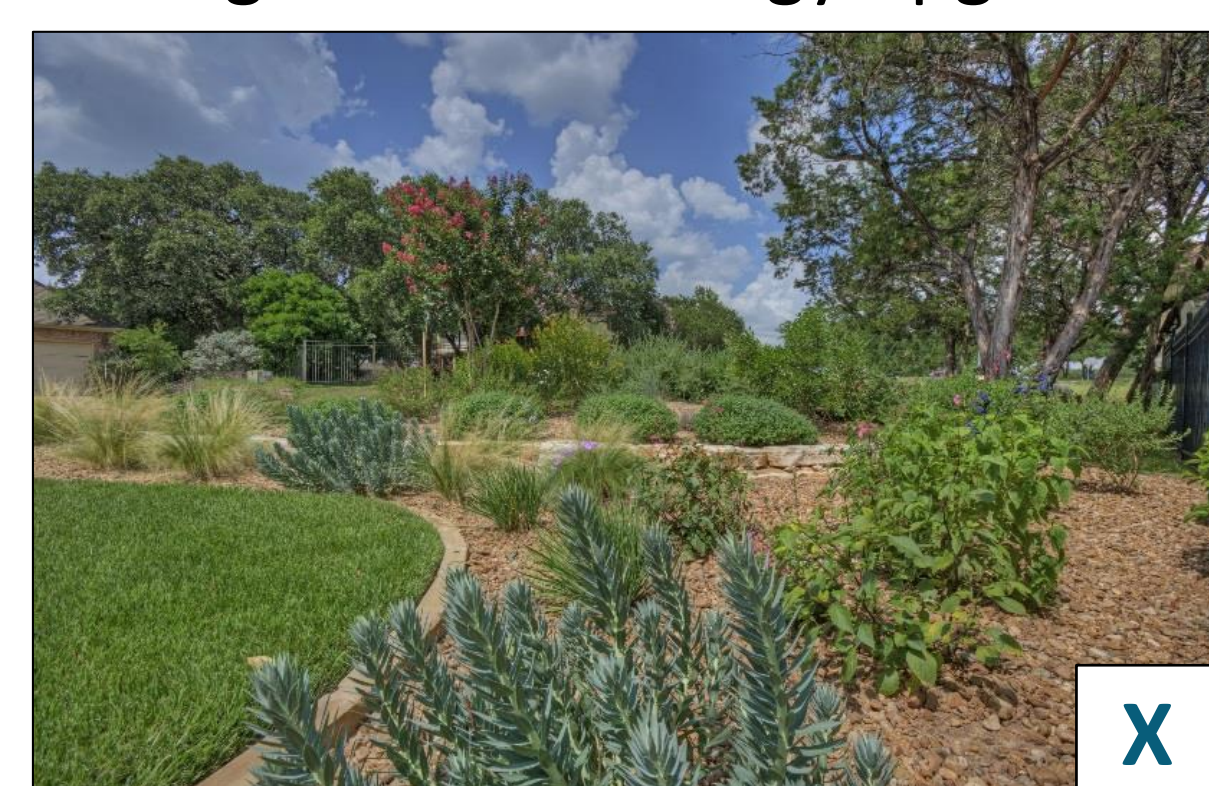
F- TIX



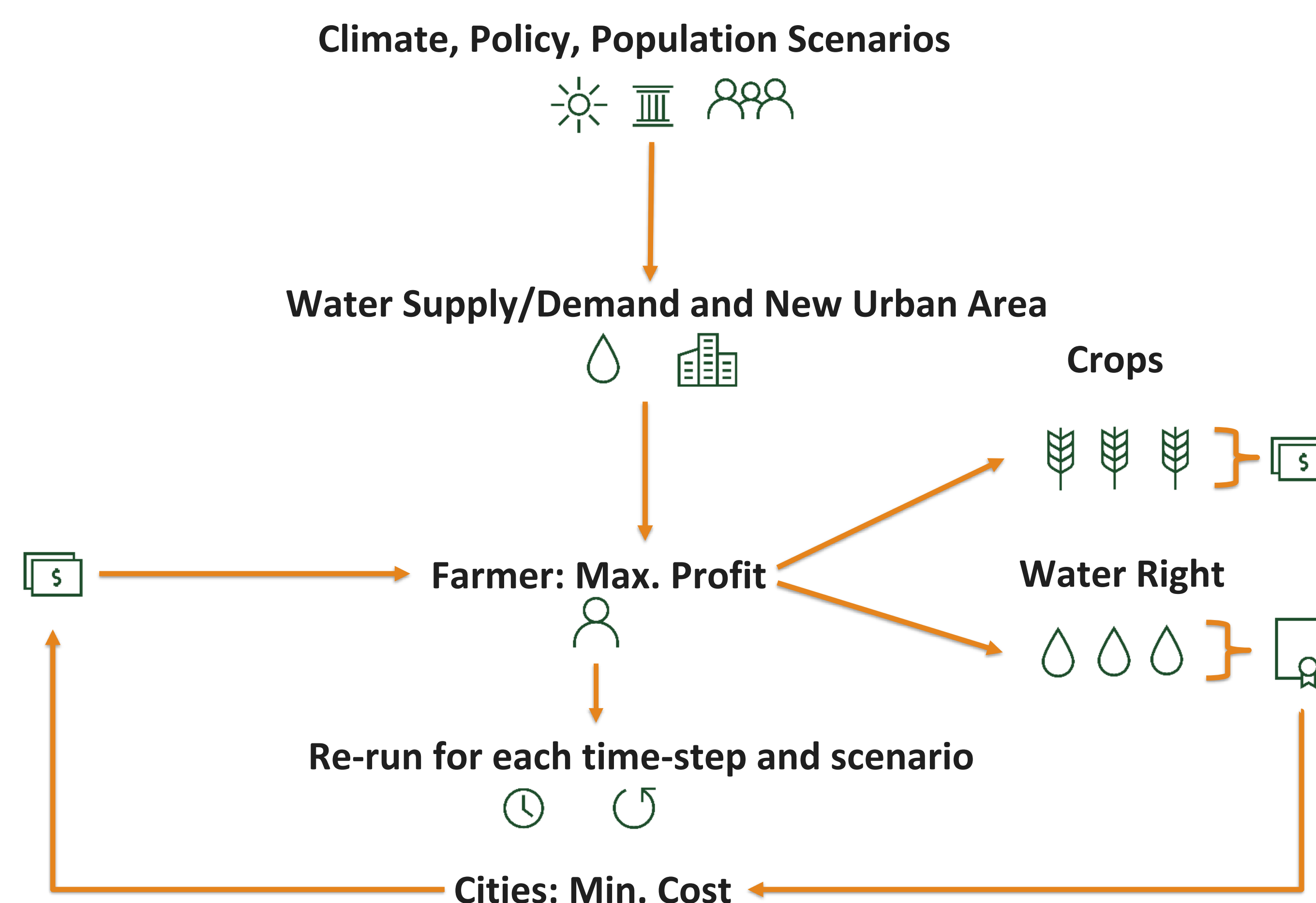
Toilet efficiency renovations³



Irrigation technology upgrades²



Xeriscaping lawn conversions⁴



Results

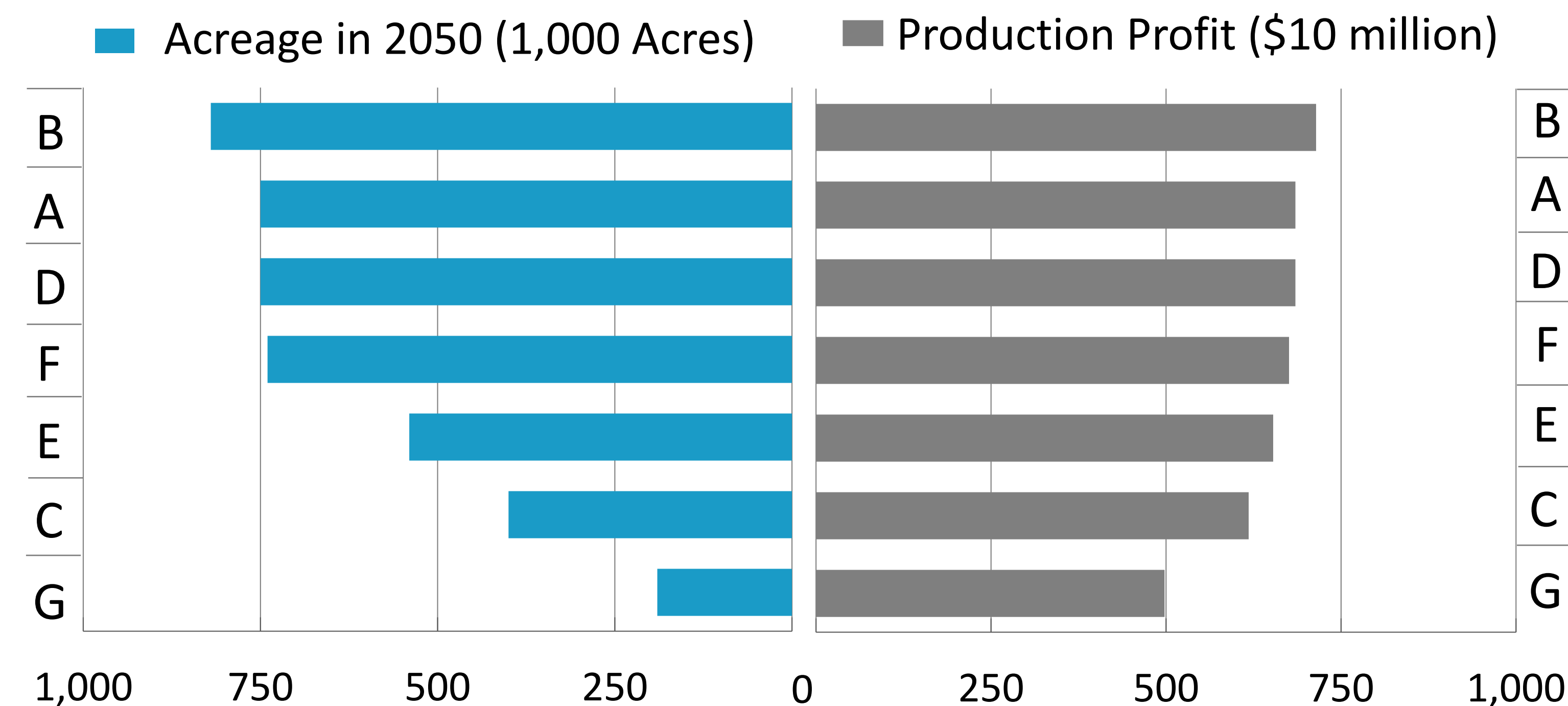


Figure 1: Scenario results of acreage (2050) and profit from production (2050).

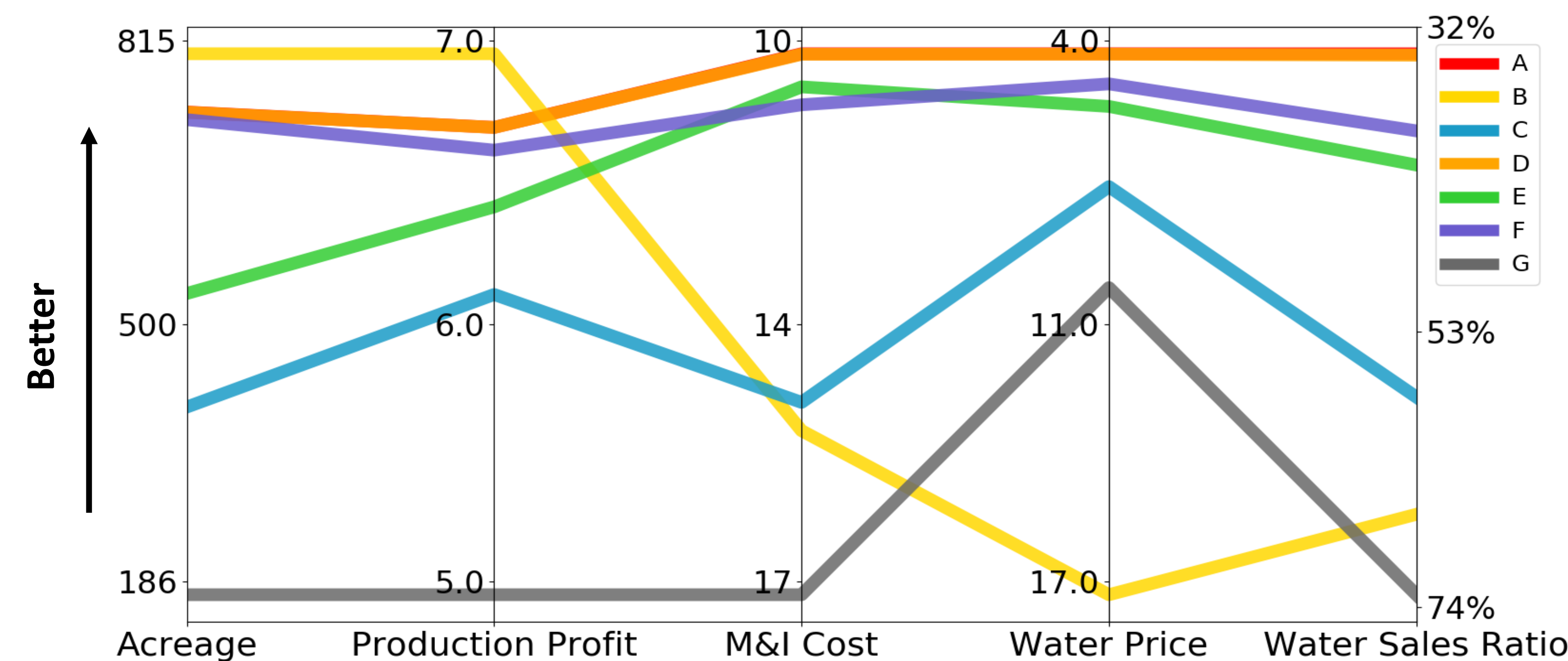


Figure 2: Conservation scenario tradeoffs and opportunities. Direction of favorability is upwards.

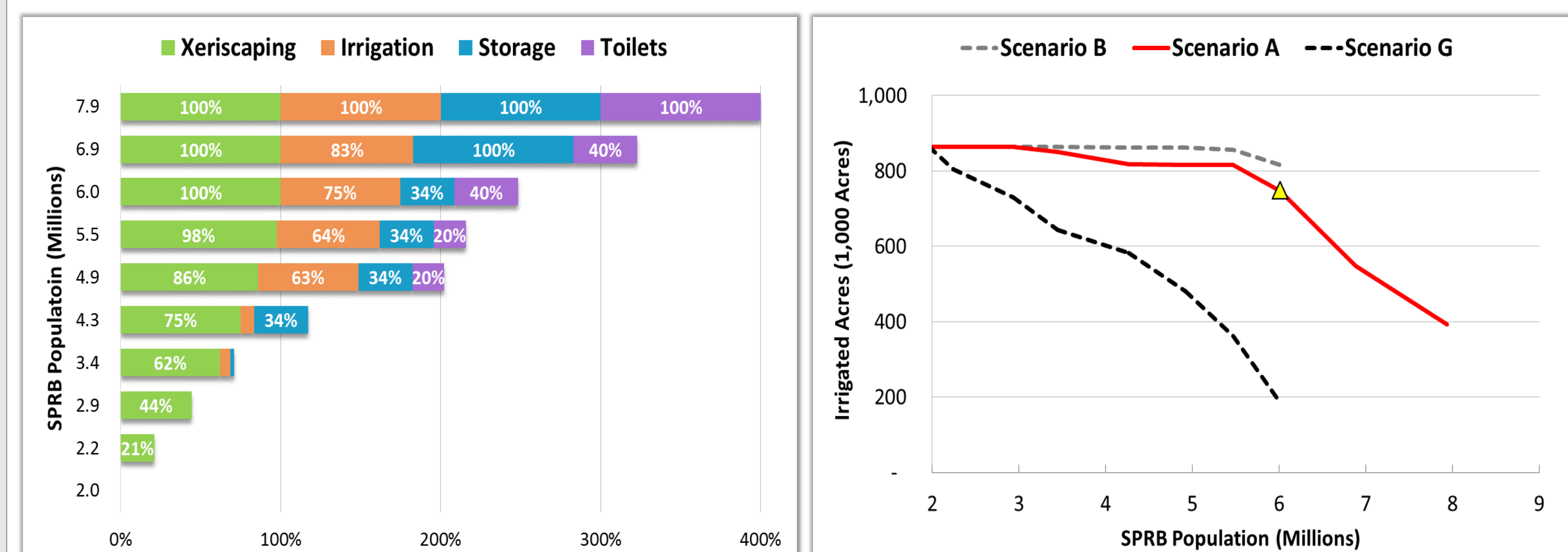


Figure 3: Trends in adoption in 2050 (left) and irrigated acreage (right).

Highlights

- **Agriculture** can be sustained through the adoption of conservation strategies.
- **Profit** and acreage are significantly increased in conservation outcomes.
- **Free-market solutions** (A) perform at near-optimal levels compared to the best scenario for producers (B).
- **M&I costs** of conservation are cheaper than acquiring water rights.
- **Xeriscaping** is the most effective strategy at reducing urban water demand and water transfers.
- **Irrigated acreage** declines rapidly after 2050 for each scenario, showing the limits of conservation.
- **Future work** includes research in alternative transfer methods, policy and economic interactions, refining spatial scale, and global sensitivity analysis of important parameters.

Acknowledgements

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¹ Dozier, A. Q., M. Arabi, B. Wostoupal, C. G. Goemans, Y. Zhang, and K. Paustian (2017), Declining agricultural production in rapidly urbanizing semi-arid regions: Policy tradeoffs and sustainability indicators, *Environ. Research Letters*

² www.northernwater.org/MediaAndNews/PhotoGallery.aspx

³ www.totousa.com/people-firstinnovation/peopleplanetwater/watersense

⁴ www.pearsonlandscape.com/index.html