Increasing environmental outcomes with conservation tenders: The participation challenge

JOHN ROLFE ; STEVEN SCHILIZZI ; MD SAYED IFTEKHAR

Received: 23 July 2021 | Revised: 7 November 2021 | Accepted: 26 November 2021

DOI: 10.1111/conl.12856

Conservation Letters
A journal of the Society for Conservation Biology
Open Access
WILEY

REVIEW

Increasing environmental outcomes with conservation tenders: The participation challenge

John Rolfe[1] | **Steven Schilizzi**[2] | **Md Sayed Iftekhar**[3]

[1] School of Business and Law, CQUniversity, Rockhampton, Queensland, Australia

[2] School of Agriculture and Environment, University of Western Australia, Perth, Western Australia, Australia

[3] Department of Accounting, Finance and Economics, Griffith University, Brisbane, Queensland, Australia

Correspondence
John Rolfe, CQUniversity, Rockhampton, Queensland, Australia.
Email: j.rolfe@cqu.edu.au

Funding information
This work was financially supported by the Australian Research Council, grants number DP150104219 and DE180101503.

Abstract

Incentive payments to landholders have become increasingly popular as mechanisms to achieve conservation goals. Within these mechanisms economists commonly recommend competitive tenders over fixed rate payment schemes because (a) specialist knowledge of landholders about their own enterprises and costs can be utilized, (b) auction prices are more likely to reflect the marginal value of the resources being used to produce the environmental outcome, and (c) the scope for rent seeking is reduced by competition between landholders. Yet there is very little uptake of conservation tenders as agrienvironmental schemes, potentially because of the difficulties in generating sufficient levels of landholder participation to make tenders effective. In this paper we summarize the efficiency benefits of using competitive tenders, analyze reasons why participation rates may be so low, and suggest potential mechanisms to address this.

KEYWORDS
auctions, conservation, landholders, participation, procurement, tenders

1 | INTRODUCTION

Much biodiversity exists on private lands. Because of private property rights, the difficulties of designing and enforcing regulatory mechanisms, and political issues with imposing restrictions, policy makers have considered voluntary approaches to generate improved environmental outcomes (Hanley et al., 2012). Several approaches are available to increase biodiversity conservation through voluntary provision: changing attitudes (e.g., education programs), improving landholder awareness of positive synergies between conservation and production (e.g., extension programs), improving technical efficiency (e.g., technology research programs), providing incentives to change behavior (e.g., payment for ecosystem services), and hybrids of economic and regulatory programs known as Market Based Instruments (e.g., taxes, subsidies, debt for nature swaps).

Payment for Ecosystem Services (PES) schemes are directly targeted at changing the financial incentives that landholders[1] face so that conservation becomes a viable land use option (Engel et al., 2008; Salzman et al., 2018; Wunder et al., 2008). They also engage landholders as agents to achieve conservation outcomes and are thus much more empowering than regulatory approaches. PES schemes have become increasingly popular as mechanisms to achieve conservation goals, and sit within a broader family of agrienvironmental schemes where farmers are paid to deliver environment benefits or other

[1] The term "landholders" includes farmers and managers of agricultural enterprises.

outcomes. There are many different types of PES schemes, as well as other direct incentive schemes that allocate funds to farmers for a variety of production, environmental, and social priorities.

Many economists have recommended that a competitive form of PES and other incentive schemes known as conservation tenders be adopted as mechanisms to improve the effectiveness of public spending (Ferraro et al., 2008; Hanley et al., 2012; Whitten et al., 2017). These differ from standard flat-rate grants in that each land manager is usually asked to specify the types of activities that they will undertake as well as a bid for the funding that they need to complete the work. Also known as conservation auctions or procurement auctions, conservation tenders involve a purchaser, typically a government agency or environmental organization, inviting local landholders or residents to put forward options for conservation improvements and the payments they would require (Windle & Rolfe, 2008). Proposals are then evaluated through application of some form of an environmental benefits index, ranked in order of cost-effectiveness, and progressively selected from lower cost options until available funds are exhausted or a target achievement is met. Successful landholders are then contracted to guide performance.

Despite the potential advantages of competitive tenders for allocating limited environmental funds, they have suffered not only from low usage when compared to broader agrienvironmental schemes (Rolfe et al., 2018a), but also from low rates of landholder participation (Palm-Forster et al., 2016). In this paper, we explore whether low rates of participation by farmers and landholders explain why policy makers tend not to use this mechanism, despite the potential gains in cost effectiveness. In the next two sections, we describe the opportunity available from adopting conservation tenders and then the participation problem that appears to limit outcomes. Reasons for low participation are canvassed in Section 4, followed by an overview of some solutions in Section 5. Final comments conclude.

2 | OPPORTUNITY

The key advantages of tender mechanisms are that they can generate more environmental outcomes for a given budget; that is, they should be more cost effective than alternative mechanisms (Latacz-Lohmann & van der Hamsvoort, 1998; Stoneham et al., 2003). This is because tender mechanisms are explicitly designed to deal with asymmetric information between landholders and agencies, helping to select the providers who can deliver greater value for money. Conservation tenders are commonly recommended by economists as they enable selection of more cost effective options and can encourage greater innovation by focusing on outcomes rather than inputs. In contrast, fixed rate grants tend to be expensive because rates have to be set at high levels to ensure sufficient participation, particularly for set actions that landholders may not wish to implement (Rolfe & Windle, 2011).

There are a wide number of applications of conservation tenders in developed and developing countries, including the Conservation Reserve Program in the United States, English Countryside Stewardship Scheme in the United Kingdom, and the BushTender program in Australia (Rolfe et al., 2017, 2018a; Whitten et al., 2017; Wünsher & Wunder, 2017). Rolfe and Windle (2011) found that a competitive tender mechanism generated 2.5 times more environmental benefits than a grant mechanism for the same funds, while Schilizzi and Latacz-Lohmann (2007) found from controlled lab experiments gains of about 25–60%. Yet despite the variety of applications, the extent to which conservation tenders are used is low (Rolfe et al., 2017, 2018a), and critics complain that the mechanism may not be effective or that competition is incompatible with other goals (Ferarro et al., 2008; Whitten et al., 2017).

3 | PROBLEM

Policy makers dealing with private land conservation typically want to maximize the environmental protection achieved for a given budget. There is evidence from various reviews (e.g., Pannell & Roberts, 2010) that much more could be achieved if available funds could either: (a) be better prioritized at the program and project level or (b) provide stronger incentives for change. As one example, researchers estimate that environmental outcomes for Australian Great Barrier Reef management could be doubled if existing funds could be allocated more efficiently (Rolfe et al., 2018b).

However, conservation tenders see very low rates of adoption despite recommendations by economists and high profile examples (Bingham et al., 2021). Australia has been a hotbed of development for conservation tenders, accounting for almost 50% of published studies on the topic (Rolfe et al., 2018a). Yet expenditures on conservation tenders between 2001 and 2012 was estimated by Rolfe et al. (2017) to be less than 2% of total environmental funding. Most countries have only dabbled with trials, preferring to stay with flat-rate grant programs, although the Conservation Reserve Program in the United States, which is a competitive tender for allocating conservation contracts to farmers, has been running since 1985.

There are several reasons for the low use of competitive tenders even though, for a given budget, they have the potential to more than double conservation outcomes (Ferarro et al., 2008; Whitten et al., 2017). First, tender

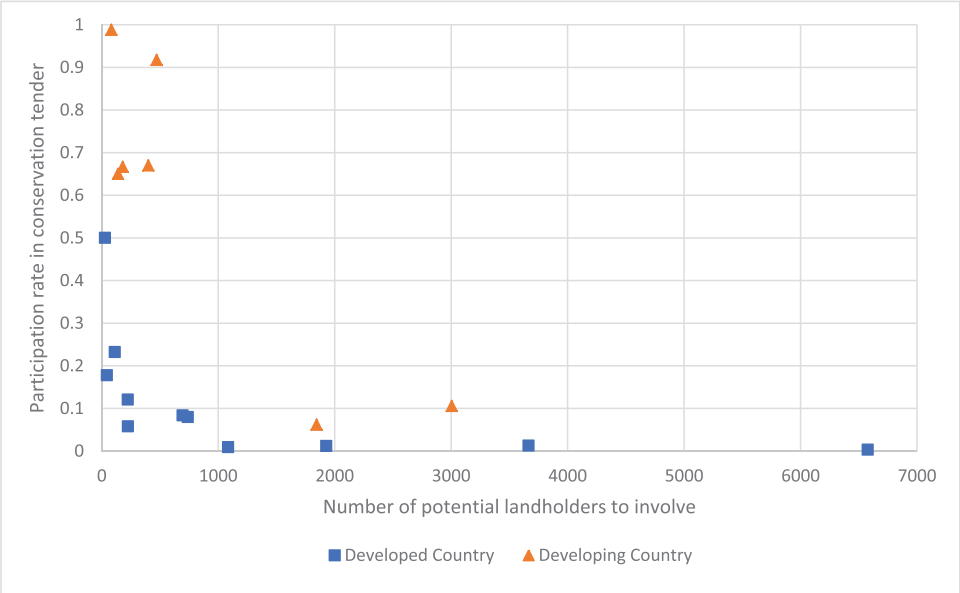

FIGURE 1 Participation rates in conservation auctions in developed and developing countries.

Source: Reproduced from Rolfe et al. (2018a)

mechanisms are more complex than grant programs, so there are more design requirements, and critically, requirements for agency staff to understand the process. Auctions and market designs can be complex, and governments often struggle to frame them to specific circumstances and communicate them to the target audience in ways that generate trust (Klemperer, 2002; Whitford, 2007). Second, there are often concerns that competitive mechanisms and varying payment levels to participants may not be seen as fair, or that it is inconsistent to have a competitive mechanism alongside other programs that focus on information, encouragement or extension frameworks. We also note that it is possible that governments and conservation agencies are not focused on achieving value for money, preferring programs that maximize other goals such as landholder involvement and engagement, even if environmental outcomes are limited.

However, the potential efficiency gains from using tender mechanisms, and the corresponding increase in environmental outcomes that can be generated, makes it worthwhile to consider refining the way in which tenders are applied to make them more broadly accepted for policy purposes.

4 | THE PARTICIPATION ISSUE

We focus here on a design and implementation issue that is a major limitation to tender effectiveness. Participation rates in tender mechanisms are often very low across both developed and developing countries, particularly for larger schemes (Rolfe et al., 2018a) (Figure 1). Tenders with low participation tend not to be as efficient because of thin markets and inadequate competition, nor effective because there is not enough involvement to generate desired outcomes. The implication is that while conservation tenders may be theoretically efficient in generating lower cost outcomes, low participation rates mean they are not effective in addressing conservation challenges.

The review by Rolfe et al. (2018a) indicates that, excluding some smaller trials, participation rates for larger-scale conservation tenders fall close to less than one percent in developed countries and around ten percent in developing countries. The Conservation Reserve Program (CRP) in the United States is an exception with approximately 11% participation, but this might be because it blends elements of grant and tender approaches as well as having multiple objectives. We also note that the national scope of the CRP means that it is largely the only scheme available for US farmers. It is challenging to identify the reasons for low participation when there are large variations in geography and targets, institutions, mechanism design, and the landholder groups being targeted across the variety of published studies. Here we canvass different reasons why participation might be so low.

4.1 | Types of conservation tenders and associated participation challenges

Rolfe et al. (2018a) characterize the targets of conservation programs into three groups:

TABLE 1 Relative importance of participation factors for different tender purposes

	Natural asset tenders (type N)	Supplementary asset tenders (type S)	Changes to farming systems (type F)
Adoption challenges	Low	Medium	High
Mechanism complexity	Low	High	Medium
Risk and uncertainty factors	Low	Medium	High
The peripheral nature of the amenity and small relative payment size	High	Medium	Low
Misalignment with landholder norms	Low	High	Medium

- Natural asset tenders (type N), which involve the reservation of existing natural areas or assets from farming operations, such as tenders to protect native bushland or reserve some areas from farming.
- Supplementary asset tenders (type S), which involve remediation of natural assets, such as tenders to stop farming wetlands and actively restore them back to natural conditions.
- Changes to farming systems (type F), such as tenders to reduce pollutants or losses of ecosystem services.

These three purposes of tenders, which apply more broadly to payment-for-ecosystem service schemes than just tender mechanisms, address very different market failure problems. Type N programs invite farmers to repurpose some land uses to generate public benefits in exchange for a payment. Type S programs are like Type N programs but they ask farmers to withdraw from farming to produce public goods, and have additional management actions. This invokes the principal-agent problems of ensuring that farmers generate additional environmental outcomes instead of farm outputs. In contrast, Type F programs aim to reduce the creation of negative externalities such as pollutants from pesticides or chemical fertilizers, typically by encouraging more sustainable farming practices.

These variations in the underlying environmental and resource targets being addressed may indicate that some level of ambiguity and confusion may exist around the goals for a tender, and suggest that the challenges of generating participation in tender processes may need to be more nuanced than is currently the case. Here we discuss five potential reasons why observed participation rates may be low, with relevance to the three program types summarized in Table 1.

- Adoption challenges
- Mechanism complexity
- Risk and uncertainty factors
- The peripheral nature of the amenity and small relative payment size
- Misalignment with landholder norms

4.2 | Adoption challenges

Rolfe et al. (2018a) advanced the challenge of changing farmer practices as one of two major hypotheses about why participation was so low in conservation tenders. The suggestion is that farmers may be reluctant to participate because they are slow to adapt to these types of mechanisms, similar to low rates of adopting more environmentally sustainable practices (e.g., Pannell et al., 2006), engaging in agrienvironmental schemes (e.g., Hanley et al., 2012), and participating in market-based instruments (Blackmore & Doole, 2013; Morrison et al., 2011; Whitten et al., 2013). This may be particularly the case for F-type programs where there is a risk that simply offering higher payments through conservation tenders fails to engage landholders compared to other agrienvironmental schemes that tend to package grant schemes together with encouragement and extension mechanisms.

Among the factors that explain participation in conservation tenders and agrienvironmental schemes more broadly are those relating to social, cultural, and personal factors and those relating to the practices themselves (Morrison et al., 2011; Pannell et al., 2006). Drawing on the literature about practice adoption would suggest that tender design would benefit from considering the importance of financial drivers to explain adoption (e.g., Sierbert et al., 2006), along with other factors that improve landholder adoption of new practices such as trialability (Pannell et al., 2006).

Yet the adoption hypothesis is generally that adoption will be initially slow but will then increase over time. Examination of some of the data underpinning Rolfe et al. (2018a) reveals little evidence that participation is ramping up over time as landholders become more familiar with the concepts,, noting that comparisons are limited to a very small number of repeated tenders. For example, the four rounds of the Wimmera CMA tenders that were run in Victoria Australia in 2006, 2007, 2010, and 2011 showed declining numbers of bids each year, from 83 in 2006 to 22 in 2011 (Whitten et al., 2012). It appears that adoption reluctance may not be the underlying issue for declining participation in these N-type tenders.

4.3 | Complexity of the tender mechanism

The second key hypothesis advanced by Rolfe et al. (2018a) was that participation rates are lower in tenders than in other schemes because they are more complex for landholders to engage with. This may be particularly relevant for S-type programs. From a landholder perspective, a tender can vary according to the way the auction is designed, the types of actions that are required, the process for submitting bids, and the conditions and obligations required in a contract once a bid is accepted. Potential reasons for limited involvement include the difficulty for landholders to construct bids, often because landholders find it difficult to estimate their future costs of supplying the required actions, and there are transaction and administrative costs in being involved in an auction process.

Rolfe et al. (2018a) establish the key steps that landholders have to undertake to participate in a Type-F tender process, including the decision about whether to change management practices, the decision to engage and contract with an external agency, and the estimation of opportunity, and transaction costs that underpin bid formation. Within these key stages, high transaction costs, contract conditions and contract length, and detailed pricing requirements may all create important barriers (Whitten et al., 2013, 2017; Greiner, 2015; Palm-Forster et al., 2016; Hellerstein, 2017).

Yet the complexity hypothesis has limitations in that auction mechanisms appear to perform well in other related fields such as fisheries, where the use of both procurement auctions (e.g., Schilizzi & Latacz-Lohmann, 2012) and individually transferable quotas (Iftekhar & Tisdell, 2012) are commonplace. While there is likely a relationship between complexity and participation, as suggested by Whitten et al. (2013) and Rolfe et al. (2018a,b), it appears that landholders should participate in well-designed tenders.

4.4 | Risk and uncertainty factors

A related argument to the complexity issue is that landholders may not participate because they perceive greater risks and uncertainties with the tender process and the contractual outcomes than they do with more conventional fixed rate grants, particularly for F-type programs where management practices have to change. Some landholders may not participate because of perceptions that bids may not be successful (Whitten et al., 2013), perhaps comparing the costs involved in preparing bids to the likelihood of success. Conversely, other landholders may not participate because of "winners curse" concerns that the net returns if successful and contracted turn out to be much lower than the bid submitted (Rolfe et al., 2018a,b). This may occur because of risks that revenues or costs have not been estimated accurately (Wichmann et al., 2017), that there is uncertainty about the outcomes of management changes (Schilizzi & Latacz-Lohmann, 2016), or that subsequent contracts and conditions are inflexible with variations in seasons and markets (Greiner, 2015).

Much of the discussion around risk and uncertainty factors in relation to conservation tenders has focused on the difficulties that landholders face in setting their bid price, where setting it too low constrains their profits, and setting it too high reduces the likelihood of success (Schilizzi & Latacz-Lohmann, 2012; 2016; Wichmann et al., 2017). DePiper (2015) notes that participation rates can be low and bids can be substantially above an individual's true valuation, which is consistent with risks impacting on bid and participation choices. Studies showing that participation rates will fall as the pool of potential bidders increases (e.g., Rolfe et al., 2011) confirm that landholders consider those trade-offs in deciding whether to participate. However, it is possible that it is the combination of selection chances and winner's curse fears mean that landholders who expect that their chances of success are low and that there are risks of lower-than-expected returns will not participate.

While it is feasible that concerns around bid setting and outcome risks limit participation, there has been limited empirical research on this topic. One relevant study by Star et al. (2019), where they asked landholders in catchments of the Great Barrier Reef in Australia about scenarios to reduce sediment emissions through Type-F tenders, found limited evidence that input risks were important. Instead landholders were more averse to output risks, perhaps because they considered the sunk costs of any in-kind labor and capital commitments (Schilizzi & Latacz-Lohmann, 2016).

4.5 | The peripheral nature of the amenity and small relative payment size

An alternative cause of low participation rates is that the issue may have limited relevance to landholders, perhaps because it is on the periphery of landholder interests or that payments comprise a small proportion of enterprise budgets (Whitten et al., 2013; Rolfe et al., 2018a). The three program types are about providing additional public goods or reducing environmental impacts, as distinct from the auction mechanisms applied in the fishing sector that were focused on rights or assets central to the business operations. Whitten et al. (2013) and Rolfe et al. (2018a) note that the conservation issues in focus may not be

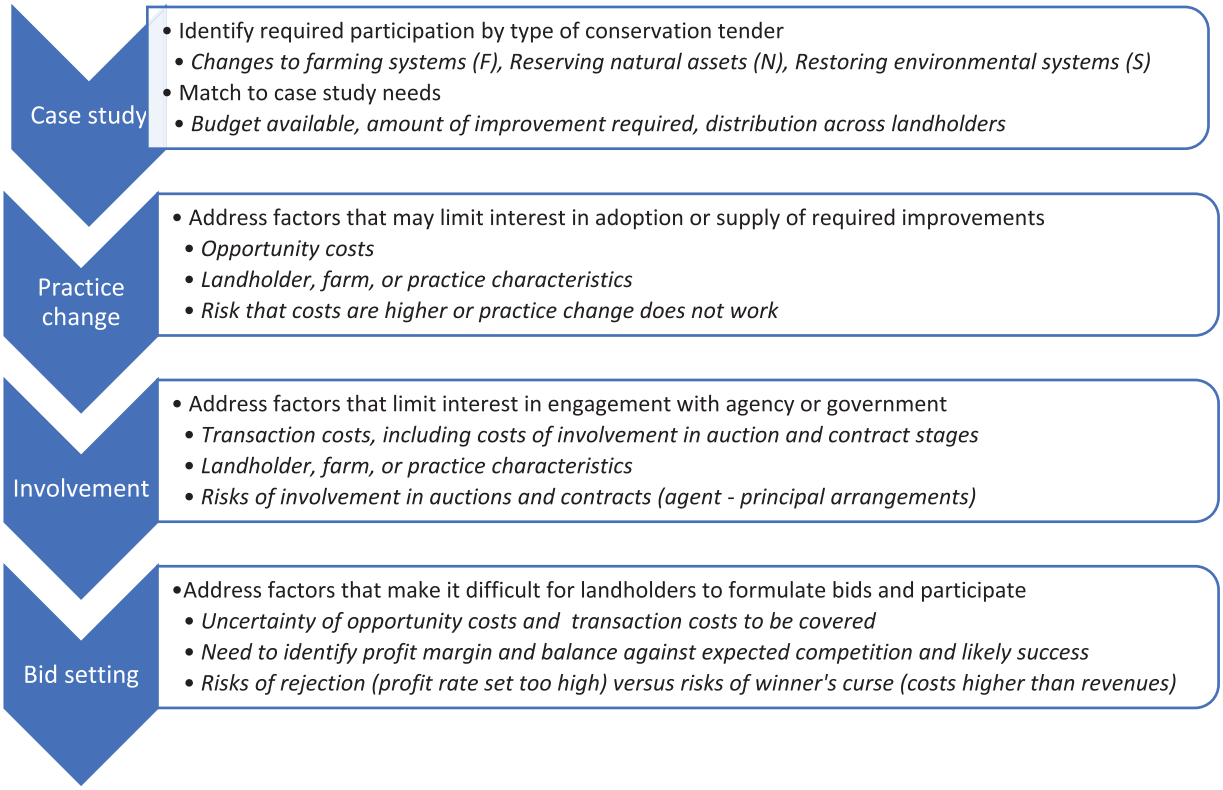

FIGURE 2 Drivers of participation in conservation tenders.

Source: Reproduced from Rolfe et al. (2018a)

central to landholder interests, particularly F-type and S-type programs.

An aligned issue is that the payment amounts or net returns are too small for it to be worthwhile for enterprises to engage. On the issue of costs, Palm-Forster et al. (2016) argue that perceptions of costs, including transaction costs, may limit participation. Bid payments to landholders are often small relative to enterprise turnover. To evaluate the relative size of bid payments we conducted additional analysis of 23 Australian tender mechanisms reported in Rolfe et al. (2018a) where data were available. The average payment allocation across a total of 710 successful bids between 2001 and 2011 was $33,650 in 2020 Australian dollar equivalents. Across an average agreement length of 10 years, this is slightly more than $3000 per annum, approximately 2% of annual revenue for the average Australian farm.[2] While it is difficult to calculate comparable rates from tenders in developing countries, it is likely that tender payments are a much higher proportion of agricultural incomes in developing countries, which may drive differences in participation rates.

4.6 | Misalignment with landholder norms

Tenders for S-type programs may be particularly problematic when landholders are asked to engage in actions that are outside of their professional identity norms. A number of researchers have found that tender participation rates are sensitive to nonfinancial drivers, such as sociodemographic, cultural, and human capital factors (e.g., Blackmore & Doole, 2013; Morrison et al., 2011), social capital (Morrison et al., 2011), and institutional factors that improve trust and positive attitudes (Mettepenningen et al., 2013; Taylor & Van Grieken, 2015). Activating social norms (e.g., normative interventions) has been recently promoted as an effective policy tool for conservation interventions (Farrow et al., 2017). The literature suggests that social norms should be incorporated with economic incentives for improving the efficiency with which conservation is achieved (e.g., Kuffuss et al., 2016). By implication then, actions that do not match with landholders' professional identity norms will be more difficult to generate engagement with landholders.

[2] See https://www.agriculture.gov.au/abares/research-topics/surveys/farm-performance#overview (Accessed 4/2/2021).

5 | SOLUTIONS

Given the potential for economic instruments such as conservation tenders to generate substantial improvements in the generation of environmental outputs, some attention has been paid to addressing participation issues. Strong relationship between landholders and auctioning agencies have been identified as important in limiting transaction costs and increasing participation (Blackmore & Doole, 2013; Blackmore et al., 2014; Doole et al., 2014). Conservation tenders which had a simple and clear application process, along with simple monitoring of outcomes, lowered the transaction costs and increased participation of landholders (Morrison et al., 2011). Another approach to reduce transaction costs and levels of uncertainty in bid formation involves holding multiple rounds within an auction, as this provides a price discovery process and limits concerns of winner's curse (Boxall et al., 2017; Rolfe et al., 2009).

Whitten et al. (2013) proposed a five-stage framework covering alignment, opportunity, engagement, contracting and postparticipation as factors to consider in design and implementation. Alignment refers to ensuring that a tender is framed in ways that suit current institutional, social and cultural factors; opportunity relates to the individual benefits that may be realized; engagement relates to the processes involved in running a tender; contracting to the rules that bind successful tenderers; and postparticipation to the ongoing engagement and follow-up. In contrast to studies identifying individual and social factors, Whitten et al. (2013) focused more on characteristics of the tender process to explain participation, identifying alignment of management priorities, opportunities for payment, effective engagement, and clear and uncomplicated bidding and contracting rules.

Rolfe et al. (2018a) also provide a framework summarizing the key issues to ensuring adequate participation, which is adapted here in Figure 2. This has a broader case study context, where the initial focus is on the scope of the problem to be addressed and then the focus is on addressing various factors that will impact on the level of participation that is required to achieve the desired level of environmental change, including the different issues discussed above. This framework makes it clearer that the type of conservation auction is important, that conservation auctions have to be tailored to the situation and participants of interest and that there are several important stages of design to consider in targeting participation.

6 | FINAL COMMENTS

Increasing the amount of conservation that can be achieved with limited public funding is an important goal for policy makers. While conservation auctions have demonstrated considerable promise in providing more cost-effective, empowering and dynamic approaches to engaging with landholders, existing challenges to generate high rates of participation are a limiting factor. This review reveals the diversity of factors that affect participation, as well as canvassing some of the solutions. It also suggests avenues for new conceptual effort and modeling that may help to better tailor conservation auctions to different contexts and case studies. The results show that there is scope for conservation auctions to be more widely applied and be more effective, but it will take careful design and implementation to address participation issues.

ACKNOWLEDGMENTS

An earlier version of the paper has been presented at the 2021 annual conference of the Australasian Agricultural and Resource Economics Society. Funding support from the Australian Research Council is acknowledged, grant numbers DE180101503 and DE180101503.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

All authors conceived of the manuscript. JR drafted the initial manuscript and all authors contributed to revisions.

DATA ACCESSIBILITY STATEMENT

No new data were collected for this synthesis.

REFERENCES

Bingham, L. R., Da Re, R., & Borges, J. G. (2021). Ecosystem services auctions: the last decade of research. *Forests*, *12*(5), 578; https://doi.org/10.3390/f12050578

Blackmore, L., Doole, G., & Schilizzi, S. (2014). Practitioner versus participant perspectives on conservation tenders. *Biodiversity and Conservation*, *23*, 2033–2052.

Blackmore, L., & Doole, G. J. (2013). Drivers of landholder participation in tender programs for Australian biodiversity conservation. *Environmental Science and Policy*, *33*, 143–153.

Boxall, P. C., Perger, O., Packman, K., & Weber, M. (2017). An experimental examination of target based conservation auctions. *Land Use Policy*, *63*, 592–600.

DePiper, G. S. (2015). To bid or not to bid: The role of participation rates in conservation auction outcomes. *American Journal of Agricultural Economics*, *97*, 1157–1174.

Doole, G. J., Blackmore, L., & Schilizzi, S. (2014). Determinants of cost-effectiveness in tender and offset programmes for Australian biodiversity conservation. *Land Use Policy*, *36*, 23–32.

Engel, S., Pagiola, S., & Wunder, S. (2008). Designing payments for environmental services in theory and practice: An overview of the issues. *Ecological Economics*, *65*, 663–674.

Farrow, K., Grolleau, G., & Ibanez, L. (2017). Social norms and pro-environmental behavior: A review of the evidence. *Ecological Economics*, *140*, 1–13.

Greiner, R. 2015. Motivations and attitudes influence farmers' willingness to participate in biodiversity conservation contracts. *Agricultural Systems 137*, 154–165.

Hanley, N., Banerjee, S., Lennox, G. D., & Armsworth, P. R. (2012). How should we incentivize private landowners to 'produce' more biodiversity? *Oxford Review of Economic Policy*, *28*, 93–113.

Hellerstein, D. M. (2017). The US Conservation Reserve Program: The evolution of an enrollment mechanism. *Land Use Policy*, *63*, 601–610.

Iftekhar, M. S., & Tisdell, J. G., (2012). Comparison of simultaneous and combinatorial auction designs in fisheries quota market. *Marine Policy*, *36*(2), 446–453.

Klemperer, P. (2002). What really matters in auction design. *Journal of Economic Perspectives*, *16*(1), 169–189.

Kuhfuss, L., Préget, R., Thoyer, S., Hanley, N., Le Coent, P., & Désolé, N. (2016). Nudges, social norms, and permanence in agri-environmental schemes. *Land Economics*, *92*(4), 641–655.

Latacz-Lohmann, U., & van der Hamsvoort, C. (1998). Auctions as a means of creating a market for public goods from agriculture. *Journal of Agricultural Economics*, *49*, 334–345.

Mettepenningen, E., Vandermuelen, V., Delaet, K., van Huyenbroeck, G., & Wailes, E. J. (2013). Investigating the influence of the institutional organisation of agri-environmental schemes on scheme adoption. *Land Use Policy*, *33*, 20–30.

Morrison, M., Oczkowski, E., & Greig, J. (2011). The primacy of human capital and social capital in influencing landholders' participation in programmes designed to improve environmental outcomes. *Australian Journal of Agricultural and Resource Economics*, *55*, 560–578.

Pannell, D., Marshall, G. R., Barr, N., Curtis, A., Vanclay, F., & Wilkinson, R. (2006). Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture*, *46*, 1407–1424.

Pannell, D. J., & Roberts, A. M. (2010). The National Action Plan for Salinity and Water Quality: A retrospective assessment. *Australian Journal of Agricultural and Resource Economics*, *54*, 437–456.

Palm-Forster, L. H., Swinton, S. M., Lupi, F., & Shupp, R. S. (2016). Too burdensome to bid: Transaction costs and pay-for-performance conservation. *American Journal of Agricultural Economics*, *98*, 1314–1333.

Rolfe, J., Greiner, R., Windle, J., & Hailu, A. (2011). Testing for allocation efficiencies in water quality tenders across catchments, industries and pollutants: A north Queensland case study. *Australian Journal of Agricultural and Resource Economics*, *55*, 518–536.

Rolfe, J., Whitten, S., & Windle, J. (2017). The Australian experience in using tenders for conservation. *Land Use Policy*, *63*, 611–620.

Rolfe, J., Windle, J., & McCosker, J. (2009). Testing and implementing the use of multiple bidding rounds in conservation auctions: A case study application. *Canadian Journal of Agricultural Economics/Revue Canadienne d'Agroeconomie*, *57*, 287–303.

Rolfe, J., Schilizzi, S., Boxall, P., Latacz-Lohmann, U., Iftekhar, S., Star, M., & O'Connor, P. (2018a). Identifying the causes of low participation rates in conservation tenders. *International Review of Environmental and Resource Economics*, *12*(1), 1–45.

Rolfe, J., & Windle, J. (2011). Comparing a best management practice scorecard with an auction metric to select proposals in a water quality tender. *Land Use Policy*, *28*, 175–184.

Rolfe, J., Windle, J., McCosker, K., & Northey, A. (2018b). Assessing cost effectiveness when environmental benefits are bundled: Agricultural water management in Great Barrier Reef catchments. *Australian Journal of Agricultural and Resource Economics*, *62*, 373–393.

Salzman, J., Bennett, G., Carroll, N., Goldstein, A., & Jenkins, M. (2018). The global status and trends of Payments for Ecosystem Services. *Nature Sustainability*, *1*, 136–144.

Schilizzi, S., & Latacz-Lohmann, U. (2007). Assessing the performance of conservation auctions: An experimental study. *Land Economics*, *83*, 497–515.

Schilizzi, S., & Latacz-Lohmann, U. (2012). Evaluating conservation auctions with unknown bidder costs: The Scottish Fishing Vessel Decommissioning Program. *Land Economics*, *88*, 658–673.

Schilizzi, S., & Latacz-Lohmann, U. (2016). Incentivizing and tendering conservation contracts: The trade-off between participation and effort provision. *Land Economics*, *92*, 273–291.

Siebert, R., Toogood, M., & Knierim, A. (2006). Factors affecting European farmers' participation in biodiversity policies. *Sociologia Ruralis*, *46*, 318–340.

Star, M., Rolfe, J., & Barbi, E. (2019). Do outcome or input risks limit adoption of environmental projects: Rehabilitating gullies in Great Barrier Reef catchments. *Ecological Economics*, *161*, 73–82.

Stoneham, G., Chaudhri, V., Ha, A., & Strappozzon, L. (2003). Auctions for conservation contracts: An empirical examination of Victoria's BushTender trial. *Australian Journal of Agricultural and Resource Economics*, *47*, 477–500.

Taylor, B. M., & van Grieken, M. (2015). Local institutions and farmer participation in agri-environmental schemes. *Journal of Rural Studies*, *37*, 10–19.

Whitford, A. B. (2007). Designing markets: Why competitive bidding and auctions in government often fail to deliver. *The Policy Studies Journal*, *35*, 61–85.

Whitten, S. M., Reeson, A., & Langridge, J. (2012). *Evaluation of Wimmera CMA programs: MBIs, incentives and group support*. Final report for The Wimmera Catchment Management Authority, CSIRO Ecosystem Sciences, Canberra Australia.

Whitten, S. M., Reeson, A., Windle, J., & Rolfe, J. (2013). Designing conservation tenders to support landholder participation: A framework and case study assessment. *Ecosystem Services*, *6*, 82–92.

Whitten, S. M., Wunsher, T., & Shogren, J. (2017). Conservation tenders in developed and developing countries—Status quo, challenges and prospects. *Land Use Policy*, *63*, 552–560.

Wichmann, B., Boxall, P. C., Wilson, S., & Perger, O. (2017). Auctioning risky conservation contracts. *Environmental and Resource Economics*, *68*, 1111–1144.

Windle, J., & Rolfe, J. (2008). Exploring the efficiencies of using competitive tenders over fixed price grants to protect biodiversity in Australian rangelands. *Land Use Policy*, *25*, 388–398.

Wunder, S., Engel, S., & Pagiola, S. (2008). Taking stock: A comparative analysis of payments for ecosystem services programs in developed and developing countries. *Ecological Economics*, *65*, 834–852.
Wunsher, T., & Wunder, S. (2017). Conservation tenders in low-income countries: Opportunities and challenges. *Land Use Policy*, *63*, 672–678.

How to cite this article: Rolfe J, Schilizzi S, Iftekhar Md. S. Increasing environmental outcomes with conservation tenders: The participation challenge. *Conservation Letters*. 2021;e12856. https://doi.org/10.1111/conl.12856