Conservation Tenders in Developed and Developing Countries - Status Quo, Challenges and Prospects

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Highlights:

- Conservation tender performance, potential, pitfalls, and challenges are explored
- Success relies on economic efficiency, institutions, social and behavioural factors
- Four key lessons for the future of conservation tenders are set out
- Conservation tenders are concluded to be a smart but underutilized tool

Abstract

Conservation tenders – or procurement auctions – are a competitive mechanism, in which payment for ecosystem service contracts are allocated to landholders based on their submitted bids. These encompass a price and sometimes a measure for the environmental services the landholder offers to provide. This special edition comprises a set of papers from a workshop on conservation tenders across developed and developing countries. These papers assess the status quo, and the challenges and prospects of tendering approaches. Four high level lessons emerge: 1) Conservation tender performance has been robust; 2) Developed – developing country conservation tender differences are modest; 3) Conservation tender prospects are dependent on political and institutional support; and 4) Optimal conservation tender design is circumstance specific.

1 Introduction

Protecting biodiversity on private lands remains a challenge. Policymakers want to protect the public good, landowners want to protect their investment in the land. Economists have promoted payments for ecosystem service (PES) schemes as a mechanism to help policymakers pay willing landholders to conserve land and thus secure the public good. A conservation tender (also referred to as conservation, procurement or reverse auctions) asks each private land manager to submit a bid with the payment they require to deliver land management or outcome. Landholders compete for conservation contracts to supply a specified good or service, enabling buyers to identify the most competitive sellers (adapted from Greenhalgh et al. 2007). Services are usually procured from multiple providers in a single tender, which may be repeated in the future. In a typical conservation tender, the buyer identifies a particular ecosystem service or commodity to buy (such as management of a particular habitat). The buyer selects the bids with the best value for money, usually in terms of the amount of commodity/service offered per dollar requested. Rousseau and Moons (2008) indicate auctions attain allocative efficiency when the selected bids offer the best value for money and the offered prices reflect the social value of the resources. Critics complain, however, that tender-style PESs might not be as effective in practice as in theory.

The primary efficiency-oriented argument for conservation tender approaches centers on determining payment levels. Landholders have an informational advantage (asymmetric information) about their own private lands (Ferraro 2008). Landholders' private information (too costly to observe) about their costs, and sometimes about the presence or absence of environmental good or service, can allow them to obtain informational rents, i.e. payments above their true costs of providing the agreed upon ecosystem service. Purchasers are presumed to hold information about the relative values of different packages of environmental goods or services. To reduce this informational rent economists have promoted the idea of using tenders (or reverse auctions) to facilitate a cost-effective conservation contract. The tendering approach is intended to reveal the 'real' cost to deliver the desired conservation goal (e.g. Stoneham *et al.* 2003; Engel and Palmer 2008). Both the public and the landowner gain – the public gains from competitive cost-effective conservation and the landowner gains payments from voluntarily selling their services or foregoing otherwise profitable activities.

Recently, conservation tender researchers have also focused on the broader institutional context, and on key behavioral/psychological and social factors that influence how participants use the instrument. These trends are reflected by the different foci of various PES special issues (BULTE *et al.* 2008; Engel *et al.* 2008; Farley and Costanza 2010; Muradian *et al.* 2010; Muradian and Gómez-Baggethun 2013), and the special issues focusing on aspects of market approaches to environmental management (Roth and Dressler 2012; Greiner 2013).

We structure this review to focus on these recent developments in thinking around conservation tenders. Figure 1 illustrates the spectrum of focus. The three circled groups represent the broad theoretical underpinnings of conservation tender design. While design architecture has focused on delivering economic efficiency (top left circle), the constraints and opportunities presented by institutional dimensions are also considered in design and evaluation of outcomes (top middle circle). Behavioral and social factors (top right circle) are important because economic theory does not predict the social outcomes of bidding behavior sufficiently well and because individual human behavior is influenced by factors such as bounded rationality and variance in risk and time preferences. Complementing theory, a body of field experience (middle circle) is emerging to test or challenge the predictions from theory.

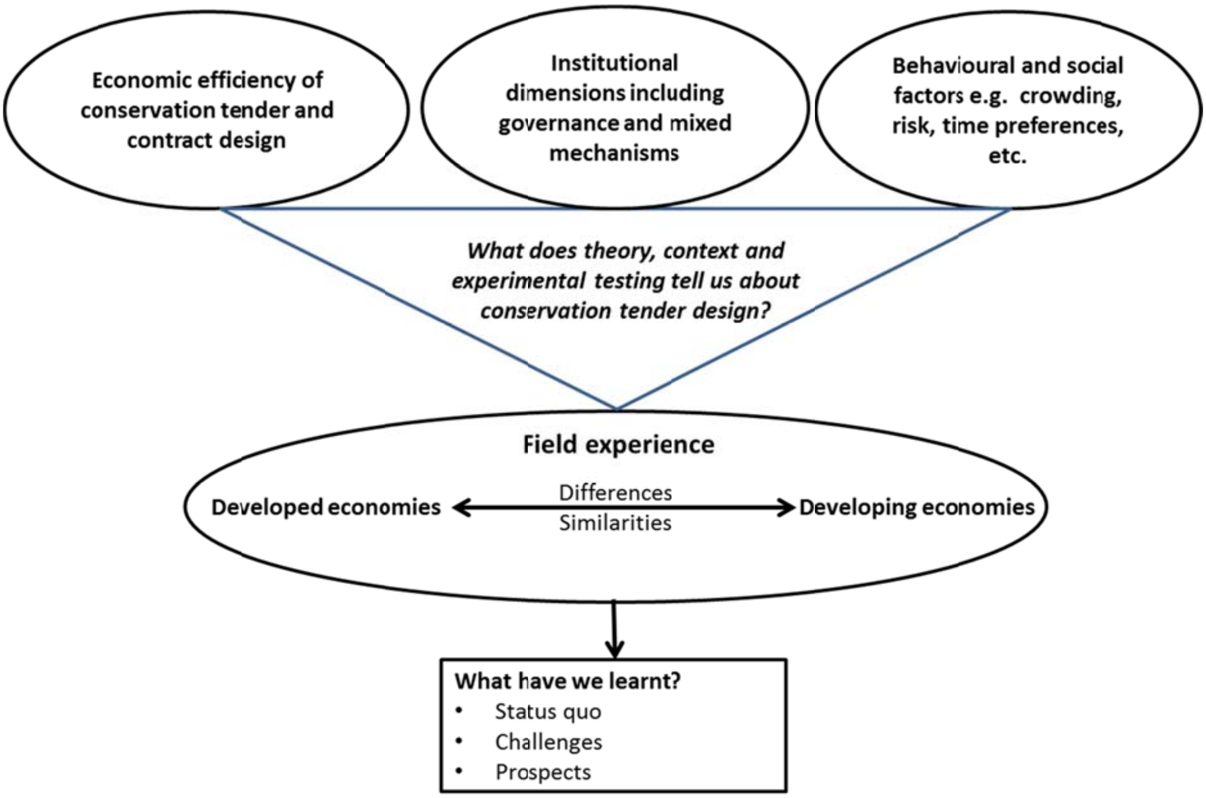

Figure 1: Overview of conservation tender literature and linkages

In build this review around a series of papers from a two-day workshop, soon to be published in a special issue of Land Use Policy, which pull together the best state of the art evidence on how tenders have actually worked around the planet – across developed and developing country contexts.[1] In Section 2, we describe the design, institutions, and implementation context and the social/behavioral aspects of conservation tenders. In Section 3, we assess the status quo and prospects for conservation tenders. We find that 1) Conservation tender performance has been robust; 2) Developed – developing country conservation tender differences are modest; 3) Conservation tender prospects are dependent on political and institutional support; and 4) Optimal conservation tender design is circumstance specific. We conclude that the economists were right — the existing evidence supports conservation tenders as robust, practical policy instruments which can improve the delivery of cost-effective conservation on private lands. Aligning political and institutional drivers toward cost-effectiveness, alongside reducing the institutional frictions from the status quo and costs of change, are the key to greater adoption.

2 Challenges of design, context and implementation

In this section we discuss, in turn, the three top circles of Figure 1, namely economic efficiency of auction and contract Design, institutional dimensions including governance and mixed mechanisms, and behavioral and social factors. Field experience as well as differences and similarities between developed and developing countries (middle circle) allow us to illustrate and identify the differences between theory and design and practical outcomes.

2.1 Economic efficiency of auction and contract design

Conservation tenders are designed markets. Economists draw on the theoretical power of the revenue equivalence theorem in helping set these rules. This theorem posits that different auction designs, on average, deliver equivalent revenue (cost in the reverse auction context) under five conditions: (i) risk neutral bidders (tenderers), (ii) bidders have independent private values, (iii) purchase of a single unit of homogeneous commodity, (iv) a single payment, and (v) zero transaction costs (as summarised by McAfee and McMillan 1987). Unfortunately conservation tenders may violate all five conditions. First, evidence on whether landholders are risk neutral is mixed (Latacz-Lohmann and van der Hamsvoort 1997). Second, while landholders are presumed to know their own cost of contracting and these to be independent of others costs (private values), the option values associated with possible future land uses may be valued differently across landholders (common values) (Hellerstein et al. 2015). Third, real-world conservation tenders target the purchase of multiple units of a heterogeneous commodity. Fourth, payments may be divided between an

[1] A two day workshop on ‚Conservation Tenders in Developed and Developing Countries - Status Quo, Challenges and Prospects, was held in September 2013 at Hotel Jakobsberg, Boppard, Germany (http://www.zef.de/auction_workshop.html).

upfront component and progress payments throughout the duration of the contract. Finally, transaction costs of participation are non-zero (Whitten et al. 2013).

The real world is messier than the revenue equivalence theorem suggests. There is a gap between the theory and the available evidence which confounds our assessment of individual behavior in tenders and complicates assessment of the efficiency of different design options. In practice the purchaser establishes a set of rules for the auction which are then used to procure conservation management, the most important of which are set out in Table 1. First-price (discriminatory), sealed-bid, single round tender formats predominate, although in the subsequent discussion we identify a range of conditions that may favor alternative design options.

Table 1: Core conservation tender design features

Tender design feature	Explanation
Discriminatory (pay-as-bid) vs. uniform auctions	In discriminatory auctions the winning bidders are paid their own winning offer prices while in uniform auctions the winning bidders are all paid the same price. This price may be the highest winning offer price or, more typically, the lowest rejected offer price.
Sealed tender vs. open bids	In sealed bid auctions bidders make offers without being able to observe competitors' offer prices while in open bid auctions bidders can see competitors' offer prices when formulating their own offers.
Single round vs. multiple rounds	In single round auctions each bidder makes offers only once, while in multiple round auctions each bidder has the opportunity to revise his or her offers.
Target vs. budget constrained	In target constrained auctions the buyer offers contracts until (and sometimes only if) a pre-determined target (amount of goods or services) is reached while in budget constrained auctions contracts are offered until a pre-determined budget is exhausted.
Bid cap (reserve price) vs. no bid cap	A bid cap is the maximum payment a buyer is willing to make for a single bidding unit[1].
Revealing auction relevant information to bidders vs. keeping it private	Auction relevant information includes the existence and level of the target/budget constraint or the bid cap. Revealing this information to bidders can influence their bidding behaviour.
Repeated vs. one-time auctions	In a repeated auction the auction is repeated over a sequence of time periods. The results are binding for each time period, but there will be future opportunities to tender offers on the same or similar units. In a one-time auction the auction is conducted once and will not be repeated (i.e., the same units will not be procured again in the future).
Pre-defined management plan vs. management plan as part of the bid.	The buyer may pre-define a management plan or land use for the delivery of the good or service. In this case the bids are composed of a price only. Buyers may instead ask bidders to formulate a bid which includes an individual land use management plan.

[1] A bidding unit: In the case of PES auctions, the relevant bidding units are contracts that specify, for a period of time, a level of environmental services or an observable set of land uses that are offered in exchange for a payment. Landowners may be allowed to offer single or multiple units, which may be divisible or indivisible, homogenous or heterogeneous.

Source: Adapted from Ferraro (2008)

Risk behavior of bidders is an important aspect to consider in auction design, and the exact way to deal with it remains unresolved. Rousseau and Moons (2008) draw on (Riley and Samuelson 1981) to argue that the relatively standard first-price (discriminatory), sealed-bid auction format for multiple units becomes more robust under risk-aversion. The first-price auction is further supported when private values dominate (Myerson 1981). However both Ferraro (2008)and Ajayi et al (2012) suggest that common values (landholder cost estimates are not independent of their peers) may prevail under uncertainty about costs of management actions (but suppose them to be similar across landholders) or uncertainty around profits from farming. Schlizzi (2015 this issue) reviews the experimental literature. Schlizzi concludes that although first-price (discriminatory) auctions conducted in the laboratory are consistent with theory, these results may not be robust. They are likely influenced by bid shading, heterogeneous costs, extent and heterogeneity of bidder risk aversion, post compliance behavior, and other factors.

Many conservation tenders employ a bid cap or reserve price of some form which sets the maximum price payable to avoid poor value investments. Boxall et al. (2015 this issue) present experimental evidence of the presence of a bid cap reducing bidder premiums in target constrained auctions. Hellerstein (2015 this issue) discusses the implications of parcel specific bid caps (which are effectively differential reserve prices applied to bids). Hellerstein argues that bid caps which are set too low may be more detrimental to tender outcomes than those set too high, because they may dissuade submission of bids from parcels with good ecosystem values that also have underestimated opportunity costs.

Most auctions to date have been budget constrained and employed a confidential reserve (maximum price). Target constrained auctions, however, perform well in experimental settings and show potential as an alternative approach. Boxall et al. (2015 this issue) experimentally examine the relative efficiency of target constrained auctions, where no contracts are offered unless a predetermined and announced minimum level of environmental services is supplied, compared to budget constrained auctions, where contracts are offered until the budget is exhausted. Both tender formats are in operation; for example the CRP in the US operates under an acreage cap, while the major tenders in the Australian context have all been designed as budget constrained. Boxall et al. find that target constrained auctions outperform budget constrained auctions but also raise difficulties of practical implementation. The use of preparatory bidding rounds has also been canvassed in an effort to enhance learning and efficiency (Leimona and Carrasco 2015 this issue). These appear to be areas warranting further research along with a number of other areas such as communication and trust within tender mechanisms, the potential for collusion, and the need in some settings for cooperation where agglomerations are necessary to deliver the desired environmental benefits (see Reeson *et al.* 2011; Rolfe *et al.* 2015).

Auction design also affects the transaction costs associated with both participation in the auction itself and the subsequent contractual arrangements. These transaction costs are present on both the purchaser and seller side of the market (Latacz-Lohmann and Van der Hamsvoort 1998). For purchasers they include the various organizational aspects and skills needed to design and implement an auction (Primmer 2015; Rolfe, Whitten et al. 2015; Whitten 2015; Wunscher and Wunder 2015). For sellers they include the obvious costs of learning about an unfamiliar mechanism, submitting bids, and dealing with contract formation and compliance. Transaction costs are tied closely to the organizational and institutional context.

There are another set of design issues which extend beyond conservation tenders and are relevant to contract design and allocation for PES in general, including tendered PESs. The knowledge and status quo for some of these issues is set out in Table 2. They include the metrics for the ranking of benefits, single versus multiple payments, contract compliance and enforcement, individual or group contracts. In this review, these issues have been addressed within the context of auctions and are discussed below.

Table 2 Design issues in PES (incl. tendered PES), their status quo and emerging issues

Conservation tender design issue	**Status quo**	**Emerging issues (some are challenges)**
Ranking metrics (accounting for heterogeneity)	Benefit indices or scoring approaches are common but many tenders use area or other simple metrics.	Balancing the cost and complexity of more complex measures with practical implementation. Calibrating benefit estimates with purchaser values.
Single or multiple payments	Both forms are common depending on context and funding arrangements.	Evidence for effectiveness of differing approaches is needed to improve future tender design.
Contract compliance and enforcement	Almost no discussion. Presumed similar to agri-environmental schemes more generally.	Opportunity for future research.
Individual or group contracts	Individual dominant with emerging evidence of group contract effectiveness in developing country settings.	Are group contracts only effective in developing countries and for specific outcomes or are there opportunities in other settings?
Payments in cash or kind	Cash payments are most common.	Exceptions using materials or vouchers exist with unknown efficiency implications.

Terminology between papers may slightly differ.

No synthesis research exists on how to deal with heterogeneity of environmental benefits in conservation tenders. Despite the need for comparability (fungibility) to underpin assessment of relative investment values across heterogeneous offers, analysis is lacking. Related PES literature has tended to focus on spatial targeting as reviewed by Wünscher and Engel (2012). Recent contributions by Schomers and Matzdorf (2013) and Duke et al. (2013) critique the weak focus on cost-effectiveness in most PES approaches. Duke et al. call for increased focus on benefit estimates. This challenge is taken up by Whitten (2015 this issue) offering twelve core lessons for how to incorporate benefit heterogeneity in conservation tender design.

Conservation tender payments typically award contracts for several years of payments. For example, Conservation Reserve Program (CRP) contracts in the United States (US) are typically for ten years, although many programs are for much shorter terms. The multiple payment aspect is not unique to conservation tenders as many forms of procurement auctions and standard PES will involve multiple payments conditional on performance. Nevertheless compliance and enforcement likelihood and penalties will most likely interact with the desired payment plan (Choe and Fraser 1998; Ferraro 2008). Moreover, costs of compliance are uncertain. Leimona and Carrasco (2015 this issue) indicate costs of compliance were on average twice the final bid. Contracts often involve promises about actions beyond the life of the contract through easements and other legal instruments. Although this will interact with costs it has been little explored in the literature to date.

Narloch et al. (2015 this issue) raise a different design option around awarding contracts to groups or individuals. They argue that group contracts may offer opportunities to reduce rent seeking and potentially compliance costs through within group peer social pressure. Narloch et al. (2015) conclude that the effectiveness of group contracts is partly dependent on the robustness of cooperation within groups. A further consideration is whether cash or in-kind payments are more effective. Narloch et al. (2015) point out many conservation tenders already employ a combination of cash payments and access to other benefits (such as information, training, land titles and access to physical capital). Furthermore such payments may be directed to the contracted individuals or group or to the community in which they are situated (Sommerville et al. 2010) and combined with individual payments (Connor et al. 2008). Narloch et al. (2015 this issue) add richness by exploring preferences for quasi-individual group payments (seeds, fertilizer, construction materials) compared to indivisible assets. They found indivisible assets were preferred by groups with higher levels of cooperation in bid formation.

2.2 Institutional dimensions

Conservation tenders are implemented within a pre-existing institutional and organisational environment. This means that conservation tenders are one element of a wider governance arrangement that may employ a variety of instruments (Muradian and Gómez-Baggethun 2013). Even tenders themselves can be implemented in hybrid formats. For example, Hellerstein (2015) in this issue identifies the continuous signup element of the CRP to act as a high eligibility fixed price payment scheme (contrary to the competitive character of an auction), with yet to be analysed implications for the efficiency of the CRP overall.

Here we are interested in the interaction between the wider institutional environment and the design, implementation and performance of conservation tenders. We focus on three broad questions: (1) What is the influence of organisational competencies on tender performance? For example, are the key skills, data sets and operational procedures available to support tender design and implementation? (2) Is there evidence of particular interactions between mechanisms which impact on conservation tender efficiency or efficacy? (3) Are there wider contextual issues which influence implementation or effectiveness, such as organisational mandate or efficiency in the use of public funds?

First, consider the question of competencies. Several papers address the issue of the necessary skills and capacities to effectively deliver conservation tenders. The number of conservation tenders implemented to date suggest that concerns about technical capabilities in auction design, assessing the biophysical outcomes of proposals, and difficulties for landholders in constructing bids can be overcome (see for example Rolfe, Whitten et al. 2015 this issue). Even in the Finnish setting where a tendering approach was planned for implementation but eventually abandoned, technical constraints were not the apparent reason. Rather it was institutional inertia as detailed in Primmer (2015 this issue). That is not to say technical skills will not be an issue. Wünscher and Wunder (2015 this issue) argue auction design, communication infrastructure and ability to manage a bidding process are likely to be lower in developing country settings. Nevertheless, evaluation evidence from Leimona and Carrasco (2015 this issue) suggests tendering approaches can be successfully communicated in developing country settings.

Second, Barton et al. (2013) argue that cost-effectiveness of the overall mix of instruments is likely to be determined as much by instrument interaction as by individual instrument performance. Consistent with this theme Whitten (2015 this issue) reinforces the need for consistency between the policy objective, how it is measured, and the metric applied in a conservation tender. Holmes (2015 this issue) takes up the challenge more directly by experimentally testing the effectiveness of a regulatory threat (regulation being an alternative instrument) on efficiency in conservation tender design. Efficiency outcomes were mixed: the regulatory threat reduced bid inflation yet was insufficient to deliver the target outcome in a significant minority of cases, which imposed regulatory costs on all participants. Wünscher and Wunder (2015 this issue) suggest small scale tenders may provide valuable information to support wider program design using non-tendered approaches. Along this theme (Clements *et al.* 2010) emphasise the importance of supporting local organisations as brokers in delivering benefits from PES. Instrument interaction is an area which should receive more attention from researchers despite the difficulty of analysis.

Third, despite efficiency arguments for auction approaches their use has been limited. Primmer (2015) and Rolfe et al. (2015) suggest that public choice issues are an important factor in preventing wider adoption. Primmer presents an in-depth evaluation of a proposed tendering approach which was never implemented. Perhaps the most pervasive impediment to implementation was a combination of organisational mandate and organisational practice. While there was a clear mandate to implement a tendering approach the responsibility for implementation was never clearly delineated. Furthermore, existing organisational practices and competencies mitigated the support for a tendering approach. These include incentives to use up the budget rather than worry about efficiency criteria, assisting landholders on a first-come first-served basis, and treating forest owners equally rather than ranking. Rolfe et al. identified similar impediments stemming from evaluation on input measures and risk aversion around loss of process control.

2.3 Behavioural and social factors

Following Greiner's (2013) special edition, we view social dimensions in three ways: (i) some schemes may be designed to incorporate (or avoid damaging) specific social objectives; (ii) there may be unintended interaction between tenders and society such as leakage or slippage and 'crowding out' additionality; and (iii) social norms and expectations feedback into tender performance including participation and the likelihood of delivering the targeted environmental benefits. Again, we consider each factor in turn.

First, Wünscher and Wunder (2015 this issue) address the commonly expressed goal of PES to improve the welfare of payment recipients, especially in developing country settings. They argue that conservation tenders may support welfare or income transfer objectives better than anticipated, despite their aim to reduce overall surpluses (the net benefit to landholders). Conservation tenders are unlikely drive surpluses to zero and they may spread individual surpluses over a larger number of contracted landholders than a fixed payment scheme. More importantly, surplus distribution in a tendered PES may be more equitable between landholders.

Second, turning to unintended social interactions of conservation tenders, there are well founded concerns around leakage or slippage. Slippage effects in the CRP and Mexico's national payments for hydrological services program have been established but their impact on efficiency remains debated (Wu 2000; Roberts and Bucholz 2006; Alix-Garcia *et al.* 2012; Fleming 2014). Jack and Cardona Santos (2015 this issue) address the critical question of whether tenders impact adversely on target communities in developing countries via a field experiment. Although there are caveats about the generalisation of their results, they find that, contrary to the above concern, targeted allocation via an auction process mitigates the adverse outcomes of leakage and livelihoods when compared to a take-it-or-leave-it contract offer. Narloch et al. (2015 this issue) build on previous work (Sommerville et al. 2010) and find that use of group level contracts and collective payments may promote social interaction and trust between community members.

Third, a related concern is that payments, independent of whether they are determined via tendered or non-tendered approaches, may not be additional because they 'crowd out' voluntary or already intended provision by landholders. Schilizzi (2015 this issue) finds limited laboratory evidence that crowding out may eventuate. Field evidence reported by Rolfe et al. (2015 this issue) suggests that landholders often use tendering approaches to undertake actions sooner than they would otherwise be able to; but that crowding out remains a significant rationale for why grant programs are preferred over tendering approaches by scheme administrators.

There has been some debate about unintended equity and fairness implications of conservation tenders, particularly in developing countries, given their competitive nature (Muradian, Corbera et al. 2010). The perception of fairness comes in different forms, and if a tendering approach is socially contested it is unlikely to succeed (Narloch *et al.* 2013). Primmer (2015 this issue) extends this argument, suggesting one reason for institutional reticence to implement tendering approaches is a desire to treat individuals equally. Leimona and Carrasco (2015 this issue) illustrate some of the challenges in understanding fairness, demonstrating the perception of fairness was related to understanding the auction process. They conclude that while the auction overall was regarded as a fair process, unsuccessful bidders regarded the auction as unfair.

As tendering approaches are reliant on participation to drive competition, community acceptance underpins their success. Schilizzi's (2015 this issue) review of laboratory research suggests risk aversion reduces participation, noting the laboratory format makes it difficult to test for generalised participation impacts. This conclusion is supported by Hellerstein's (2015 this issue) suggestion that ambiguity about CRP's environmental benefit index scores could impact participation. Rolfe et al's (2015 this issue) review of the Australian experience suggests ambiguity and risk aversion are likely to have been at least partly present in most applications but concludes that participation has not been an impediment. Rolfe et al. caution however, that small budgets in many applications may imply greater participation issues in larger schemes.

Narloch et al. (2015 this issue) suggest that the form in which the tender is implemented may also feedback into likelihood of compliance. Their results suggest that group-level contracts may effectively 'crowd-in' compliance, reducing monitoring costs and increasing outcomes. Leimona and Carrasco (2015 this issue) speculate that poor compliance in their case came from a lack of leadership or coordination among farmer group members. Leimona and Carrasco also demonstrate the impact of labour availability on compliance indicating that overall success is dependent on factors beyond auction and contract design.

3 Status quo and prospects

We now synthesise the results from the papers reviewed and wider discussions and conclusions from workshop participants. Where relevant we also identify knowledge gaps in this section. Four high level lessons emerge: 1) Conservation tender performance has been robust; 2) Developed – developing country conservation tender differences are modest; 3) Conservation tender prospects are dependent on political and institutional support; and 4) Optimal conservation tender design is circumstance specific.

3.1 Lesson 1: Conservation tender performance has been robust

Conservation tender performance has been robust in real world settings. There is now evidence of successful implementation of conservation tenders across scales, applications, countries and contexts. Pilot projects have proven concept and large scale applications delivered policy objectives. Failures can generally be explained by poor design or implementation. Most conservation tenders can be considered successes – at least in delivering to the objectives set. Three broad forms of tender are apparent: research focused tenders; national scale programs; and regional or relatively boutique or small scale applications. Each of these forms provide differing streams of evidence to support or contradict the practical potential of tendering approaches as policy tools. The questions which remain tend to be around specific design features and long term effectiveness (see Lesson 4).

Research focused tenders are explicitly implemented to test an aspect of design, implementation or response. Three types of research focused tenders were identified with some overlap. First, a set of contextualised laboratory experiments explicitly focused on testing theoretical aspects of mechanism design, usually with the intent of informing a known or upcoming policy need (in this issue see for example Boxall, Perger et al. 2015; Holmes 2015). Next, a class of tenders which are essentially field experiments intended to support underpinning knowledge (in this issue Jack and Cardona Santos 2015). Finally, a set of what may be regarded as field tests which are intended sometimes as pilots of larger proposed initiatives, or to directly inform future applications with similar stakeholder groups (in this issue see Leimona and Carrasco 2015; Narloch, Drucker et al. 2015). In part this last class may be viewed as capacity development exercises (see Lesson 3).

National scale tendering programs are the major means of allocating funds towards a particular policy objective. Examples of these schemes are limited to the US (the CRP) and Australia (Environmental Stewardship Program (ESP) and Forest Conservation Fund). Published evidence suggests that these schemes have largely been successful in achieving their set objectives (see for example Hellerstein 2015 this issue). Although some critiques and potential improvements have been suggested, for example in measurement and allocation of contract offers (Whitten 2015 this issue). The relative paucity of such programs at the national scale suggests a lack of emphasis on efficiency in the allocation of public funds to agri-environmental programs (Primmer 2015; Rolfe, Whitten et al. 2015 this issue, see Lesson 3).

Regional or relatively small scale programs may be spatially limited even though they are long-term ongoing investment strategies (such as BushTender and Nature Assist in Australia) and repeat strategic investments (such as the Catchment and Habitat Tenders in Wimmera in Australia) (Rolfe *et al.* 2004). Alternatively they may be intended as once-off boutique applications with relatively small scale funds and targeted objectives (this issue Narloch, Drucker et al. 2015 partly meets this definition).

Evidence of cost-effectiveness, such that there is, suggests robust performance when compared against alternative approaches (Feather and Hellerstein 1997; Stoneham, Chaudri et al. 2003; Claassen *et al.* 2008; Windle and Rolfe 2008; Wang *et al.* 2012). Consensus around the cost-effectiveness of conservation tenders is partly confounded because tenders with different intents and scale are being described and in some cases directly compared or extrapolated from within the literature. Furthermore, most academic literature has compared the cost-effectiveness of alternative tender designs, or against optimal but practically infeasible policy approaches (Kirwan *et al.* 2005 usefully illustrates both).

3.2 Lesson 2: Developed – developing country conservation tender differences are modest

There are differences in both the types of opportunities to apply conservation tenders and in design between developing and developed countries. These differences are modest – the dominant format remains first-price (discriminatory), sealed-bid, single round tender format. Tighter budget constraints and greater focus on outcomes are seen to be driving greater experimentation with alternative formats through field trials and boutique programs. Design differences are spelt out by Wünscher and Wunder (2015 this issue) who identify lower initial design capacity, a greater requirement for implementation support, and less data to assess bids as potentially important differences. Ownership of the policy by potential participant communities may be more important in developing countries than in developed country settings. Conclusions from small scale applications suggest that group payment type approaches may be both possible and appropriate in at least some developing country settings and for some outcomes (Sommerville, Jones et al. 2010; Narloch, Drucker et al. 2015). Strong local group pressure can aid in the delivery of the desired outcomes. Tenure clarity and security is also important in reducing transaction costs. Although a common issue with PES type approaches generally, lack of tenure in developing country settings tends to be widespread and severe.

The scale at which any individual conservation tender can be effectively implemented appears to be limited by organisational and communication constraints in many developing country settings (Wunscher and Wunder 2015). Any large scale tender is likely to be a series of relatively local rollouts. Although this may mirror developed countries in any case, for example the BushTender approach used in Australia was implemented in a differing region each round, often with several rounds per year. Emerging but inconclusive evidence exists that tender design may also need to be systematically varied in developing country settings. For example, multiple bidding rounds appeared to perform well in Indonesia (Leimona and Carrasco 2015 this issue).

3.3 Lesson 3: Conservation tender prospects are dependent on political and institutional support

Realising the potential of conservation tenders as public policy tools requires a policy environment that is driven by efficiency objectives. Not only must the appropriate efficiency drivers be in place at the political level, but also strong policy-maker support to overcome negative perceptions or misconceptions. Although experiences have been broadly positive, uptake beyond the flagship examples – such as the CRP in the US and the ESP and BushTender in Australia – is much more limited. The CRP, for example, has not translated into tendering approaches in other US programs. Similarly, active adoption appears to have peaked in Australia; although recent implementation of a major carbon reduction tender (the Emissions Reduction Fund) alongside regional experimentation with the Reef Trust Tender suggest interest remains (Rolfe, Whitten et al. 2015). Evidence of the difficulty of the challenge in moving from intent to implementation is shown by Primmer (2015 this issue) as well as from United Kingdom, German and Costa Rican perspectives during the workshop.

An underpinning prerequisite is a policy proponent or organisation who is interested in buying contracts in the most cost effective way (Primmer 2015 this issue; Rolfe, Whitten et al. 2015 this issue). Without this critical driver for efficiency (motivated by scarcity of funding, the demand of tax payers to use public funds in the most effective way, or other reasons) there are likely to be factors which support approaches other than conservation tenders. In some cases, tender implementation means that existing agri-environmental schemes with running contracts and long established organisational set up need to be converted into tendered schemes posing institutional frictions and reluctance. Efficiency drivers have to be strong to overcome these impediments.

Similarly, practical tender implementation requires clarity and measurability of objectives. For conservation outcomes the linkage between activities, outputs, and finally outcomes can be hard to define. This is an issue which equally applies to non-tendered approaches. Yet, the central argument for effectiveness gains in tenders is more easily contested in settings where the objectives are difficult to measure. The lack of effective targeting through reliable indicators (metrics) may therefore be an impediment to conservation tenders emerging (see Whitten 2015 this issue). Tenders for easily measured outcomes, transparent desired actions and demonstrable success are more easily implemented and accepted.

Prospects will also be improved by efforts to reduce the costs of shifting instruments (institutional transaction costs), reduce uncertainty and build trust in new approaches, and build capability requirements. Transaction costs are incurred in design of potentially unfamiliar tendering approaches, in implementation and management, and finally by participants through bid construction, submission and contracting. There is an increasing literature on transaction costs of agri-environmental instruments (see for example Garrick *et al.* 2013) but no clear evidence of whether transaction costs of conservation tenders are likely to be higher or lower than for other instruments. More importantly, there is no evidence on whether changes in transaction costs are likely to be offset by increases in cost-effectiveness. Transaction costs may also be an impediment for tender participation. For example, if landholders have to bear the cost of measuring environmental improvements or supplying full environmental information on bids these costs may be prohibitive to entry.

Landholder contracting to deliver conservation services in a market with potentially high levels of uncertainty also requires trust. The use of trusted intermediaries can reduce the scepticism of outsiders otherwise likely to be present. Trust can also be addressed through capacity building for potential bidders and the implementing agency, as well as for the auctioneer (who may or may not identical with the implementing agency) using awareness-raising campaigns, community workshops, and field visits. For potential participants capacity building generates familiarity with the desired outcomes or land management options as well as the bidding process so as to make a considered estimate of their participation costs (although this may be a challenge under any instrument). Further, there may be opportunities to build trust among potential bidders by including them in participatory baseline and monitoring activities (i.e. not just supply of environmental services but also the underlying support activities), an approach which also helps to gain ownership over tender outcomes. Similarly, implementing agency staff and the auctioneer need to understand tender mechanisms and associated requirements in order to feel comfortable with the process (e.g. basic requirements surrounding probity of bidding arrangements, data assembly, processing and recording, and in informing successful and unsuccessful bidders). For some organisations these requirements may be new or much tighter than existing requirements.

3.4 Lesson 4: Optimal tender design is circumstance specific

As a rule of thumb, designers of conservation tenders tend to start with first-price (discriminatory), sealed-bid, single round tender formats – a mechanism which is thought to perform robustly across many settings. In actual practice, there is much experimentation and departure from this core model when tenders are applied in real world settings. The apparent noise around tender design arises from two overlapping themes: 1) conservation tender design and implementation should take into account application context, which will naturally lead to some differences in practice – there is no optimum model; and 2) there is always much to learn, and all the more so when the instrument debated is relatively new!

First, the prospects for greater use of conservation tenders would benefit from assembling information around best practice, key skills and processes to support implementation – that is, how to design a conservation tender that delivers the desired outcome while meeting the specific needs of the implementation context. The numerous design options coupled with partly inconclusive evidence on how these perform under which circumstances likely contribute to hesitation among policy makers and other ecosystem service buyers. To date there is no practical handbook that can guide interested agencies in selecting case specific design options and planning implementation processes. Factors that will need to be considered beyond the core design elements discussed previously include market scale, scope and participation. The available pool of bidders will usually be limited by spatial targeting or other criteria depending on the goals intended to be achieved through the tender. Willingness to participate will also be shaped by the existing policy context including alternative support options available to landholders, compatibility with existing enterprises, interactions with other activities, previous market experience and so on. Furthermore, participants need to be able to effectively formulate a bid that meets the performance needs of the auction. Probability of bidding will also be partly conditional on likelihood of success and the scale of payments involved.

Second, experimental evidence and practical experience continue to identify new design options. Experimental approaches, both laboratory and field based, offer a relatively inexpensive and low risk approaches to test and evaluate auction theory and context specific design elements and should be encouraged. The potential is illustrated by Schlizzi (2015 this issue) who offers some emerging lessons from recent experimental approaches. Nevertheless, negative perceptions and uncertainty can partly be linked to the extent of active experimentation around design options and effectiveness. Assembling best practice design information would help contextualise new knowledge and distinguish between generalizable recommendations and context specific outcomes.

4 Concluding comments

Evidence of conservation tender performance in existing applications, and over a long period is useful for policy makers and others to have confidence in tendering approaches. This review summarizes the debate over the power of conservation tenders to explore the performance, potential, pitfalls, and challenges. Four high level lessons emerge: 1) Conservation tender performance has been robust; 2) Developed – developing country conservation tender differences are modest; 3) Conservation tender prospects are dependent on political and institutional support; and 4) Optimal conservation tender design is circumstance specific.

Turning to each in turn. First, most assessments to date have been favorable and signal the potential for conservation tenders to both (1) improve the cost-effectiveness of limited public and private funds, and (2) to provide support for other complementary mechanisms. Yet critics still question their technical performance, partly because tenders are implemented within a mix of instruments which confounds the counterfactual. Thus designing better methods and benchmarks to judge success is a key challenge for the future. Second, more similarities than differences are seen in conservation tenders across developed and developing country settings. Divergences are in detail rather than substance, often due to contexts, and there is evidence of greater experimentation in developing country settings. Third, as long as other policy objectives such as income transfers to landholders are dominant drivers in agriculturally related policy instruments, conservation tenders will find it difficult to play a more prominent role in conservation. Changing conditions in the economic environment and increasingly scarce conservation budgets may, however, contribute to accelerated interest. Fourth, pragmatic, context driven choices make for sensible variety in tender design. A guide to best practice, key skills and processes to help guide these choices is both possible and desirable. Ongoing experimentation and growing practical experience will undoubtedly change best practice into the future – as it should.

The basic challenge to widespread adoption was summed up by this workshop observation: “one good trader can make a market, but one bad gamer can ruin the game”, crystallising the need for willing volunteer participants in conservation tenders alongside “effective rules of the game”. It is not just the “rules of the game” that matter in conservation tenders but also context – ‘where and for what the game is played’ in both developed and developing countries. Institutional fit, compatibility with other arrangements, and reception by communities are all important.

Overall, we conclude that conservation tenders are a smart but underutilized tool to get good conservation returns for money spent. Procurement auctions are very successful in other spaces and although there are specific conditions when they are applied to conservation, it is surprising we do not see broader application. While research can support further uptake by addressing some of the remaining knowledge gaps, adoption eventually hinges on whether policy makers develop sufficient interest in cost-effective conservation.

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