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Analysis

Hungry Birds and Angry Farmers: Using Choice Experiments to Assess "Eco-compensation" for Coastal Wetlands Protection in China

Michael T. Bennett[a,*], Yazhen Gong[b], Riccardo Scarpa[c,d,e]

[a] 555 9th Street, Apt. 1, Brooklyn, NY 11215, United States of America
[b] School of Environment and Natural Resources, Renmin University of China, No 59, Zhoongguancun Street, Beijing 100872, China
[c] Durham University Business School, Durham University, Mill Hill Lane, Room 178, DH1 3LB, UK
[d] Waikato Management School, University of Waikato, New Zealand
[e] Department of Business Economics, Università di Verona, Italy

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ABSTRACT

The JYNNR – a Ramsar Site, Biosphere Reserve and important wintering ground for 15–18% of the world's Red Crowned Cranes – faces major pressure from regional development. This paper uses choice experiments to assess farmer preferences for an "eco-compensation" program targeting pesticide use by rural communities in and near the Jiangsu-Yancheng Coastal Wetlands Rare Birds National Nature Reserve (JYNNR). "Eco-compensation" is a China-specific term encompassing many incentive-based environmental management approaches. To identify options to reconcile rural welfare improvement with conservation, data was collected from 311 rural households in and near the JYNNR assessing perceptions of the JYNNR, wetland birds, use and impact of pesticides, and preferences for contracts to mitigate pesticide impacts. Results suggest that conflict with the JYNNR is growing, and that pesticide management could be an effective entry-point for engagement. The analysis finds several options for cost-effective contracts: granting rights to leave the program without penalty and increasing share of household land enrolled significantly reduce willingness-to-accept-payment (WTA), while longer contracts and larger reductions in pesticide use increase WTA, which interact meaningfully with farmer characteristics. Providing communities with training and technical support on proper pesticide use could, under specific contract structures, be sufficient to induce 100% enrollment without subsidies.

1. Introduction

Though critical for addressing climate change and nourishing the world's fisheries, effective protection of coastal wetlands remains challenging in face of economic growth pressures, which fall disproportionately on coastal regions. More than one-third of the world's population lives along coasts and small islands – only 4% of the Earth's total land area – with population densities almost triple those of inland regions and fast-paced population growth set to continue (UNEP, 2006; MEA, 2005). The associated land-use and development pressures have led to significant wetlands losses.[1] Human activity directly related to agriculture has been a major contributor to global wetlands loss. The ongoing intensification of agricultural production to feed a growing world population will continue to escalate pressure on coastal ecosystems via nutrient enrichment and other human pressures (Elofsson et al., 2003; Forsberg, 1994; Turner et al., 1999).

* Corresponding author.
E-mail addresses: bennett.michaelt@gmail.com (M.T. Bennett), ygong.2010@ruc.edu.cn (Y. Gong), riccardo.scarpa@durham.ac.uk (R. Scarpa).

[1] An estimated 62–63% of natural coastal wetlands have been lost since the beginning of the 20th century – with Asia having the highest estimated rate of coastal wetlands loss globally – while the rate of loss for coastal wetlands has surpassed that for inland wetlands since 1990 onwards (Davidson, 2014). Some 35% of mangroves are estimated to have been lost (with some countries experiencing losses > 80%), while remaining coastal wetlands area suffers from substantial degradation, alteration or loss of estuaries, intertidal habitats and deltas, seagrass beds and saltmarshes globally (UNEP, 2006).

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At the same time, wetlands are important sources of rural livelihoods in the developing world.[2] Developing approaches that jointly target coastal wetlands conservation, rural livelihood improvement and regional agricultural and economic development is thus necessary for effective conservation (Tilman et al., 2002; MEA, 2005; Brandon et al., 2005).

We explore these issues in the context of the Jiangsu-Yancheng Coastal Wetlands Rare Birds National Nature Reserve in China, a Ramsar site and UNESCO Biosphere Reserve (Ma et al., 2009). The wetlands complex – located in Yancheng municipality of Jiangsu Province on China's east coast – is an important wintering ground for numerous migratory waterfowl along the East Asian-Australasian Flyway. Of particular note, it is one of the two wintering grounds in China for around 15%–18% of the world population of the Red-crowned Crane (*Grus japonensis*) (Su and Wang, 2010; Lee and Yoo, 2010; Q. Wang, 2008).[3] This is an iconic, flagship species for China that is rated as endangered in the IUCN's Red List of Threatened Species (BirdLife International, 2013). Ongoing regional development, rural land-use transformation and climate change are placing significant and growing pressure on this wetlands habitat, and are creating conflict between the nature reserve and nearby rural communities (Ma et al., 2009). Local officials have reported increasing complaints from farmers denouncing encroachment and damage to crops by feeding wetlands bird populations, which are being displaced by development elsewhere along the coast.[4]

To address this, local conservation authorities have been keen to explore subsidy-based policy mechanisms. The goal is to engender a more proactive and collaborative relationship between farmers and the nature reserve by jointly addressing community livelihood issues and land-use impacts.[5] To implement such a policy farmers' preferences need to be explored. This paper thus presents the results of a choice experiment administered to rural land users in and around the reserve to explore options for mitigating the impacts of nearby agriculture on the wetlands ecosystem and bird populations.[6] Households were asked to assess various contracts for a potential agri-environmental scheme targeting household pesticide use in agriculture.

Choice experiments have grown in popularity as an effective tool to elicit farmer preferences for agri-environmental payment schemes in both developed-world and, increasingly, developing-world contexts. Earlier applications in the context of rural development include studies aimed at livestock evaluation by pastoralists and subsistence farmers (Scarpa et al., 2003; Ruto et al., 2008; Roessler et al., 2008). Recent applications include assessment of different contract configurations under the EU's Common Agricultural Policy (Ruto and Garrod, 2009; Espinosa-Godad et al., 2010; Christensen et al., 2011; Broch et al., 2013; Schultz et al., 2014; Lienhoop and Brouwer, 2015; Santos et al., 2015; Beharry-Borg et al., 2013; Greiner et al., 2014), and elicitation of rural land-user and agricultural producer preferences for schemes targeting a range of different environmental impacts in developing world contexts (see, for example, Pienaar et al., 2014; Selassie and Kountouris, 2010; Barton and Bergland, 2010; Cranford and Mourato, 2014; Blazy et al., 2011; Kaczan et al, 2013).[7]

Our choice experiment application is novel for several reasons. First, the results are directly used for policy simulations, which are both to inform the design of a potential subsidy scheme and to educate local conservation officials on the value of community consultation by, for example, revealing the significant savings in subsidy rates achievable if the scheme is made voluntary. Secondly, while the choice experiments are fundamentally to assess farmer willingness-to-accept payment (WTA) for targeted land-use change, they were also used as a formalized initial engagement and consultation with these communities, envisioned as a first-step towards engendering an adaptive co-management framework for wetlands conservation and the mitigation of agricultural impacts. As such, this is one of the few works to highlight the value of choice experiments as a community engagement tool.

Finally, this research also feeds into China's ongoing experimentation with incentive-based approaches to conservation, under the broad heading of “ecological compensation” (“eco-compensation” for short), since the choice experiments were conducted to inform the design of an eco-compensation pilot for wetlands conservation, and were presented to households as such. “Eco-compensation” is a term specific to China that is becoming an important policy component of its evolving environmental management regime (Zhang and Crooks, 2012; Zhang and Bennett, 2011). It encompasses a growing range of incentive-based approaches at various levels, including interregional fiscal transfer mechanisms targeting specific environmental outcomes, such as improved management of shared watersheds, and Payments for Ecosystem Services (PES) approaches that directly engage with rural land users to incentivize environmentally-friendly land uses and land-use change (Bennett, 2008; Zhang et al., 2010a).[8] Our research concerns two priority areas for the development of eco-compensation pilots as per the China's Ministry of Environmental Protection – nature reserves and key ecological function zones (MEP, 2007b).[9] It thus hopes to provide seminal insights for China's evolving eco-compensation policy developments.

Section 2 below describes in more detail the context and conservation challenges of Jiangsu's coastal wetlands and of coastal wetlands in China overall, details of the survey, and presents results

[2] At least 90% of Ramsar sites (i.e. wetlands designated as being of international importance under the Ramsar Convention) in Africa and Asia directly support human welfare (McCartney et al., 2010).

[3] The wintering population in China totals around 400–500 birds (Su and Wang, 2010). There are another 1000–1050 birds at four locations in North and South Korea, while there is a non-migratory resident population in Japan of around 1200 birds (Su and Wang, 2010; Lee and Yoo, 2010; Q. Wang, 2008).

[4] This is from several discussions with local officials during survey fieldwork.

[5] In several discussions during exploratory fieldwork local officials expressed serious reservations about directly raising the topic of bird-related crop damage with rural households in the survey, suggesting that this would only serve to reinforce a victim-offender dynamic between these communities and the reserve.

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[7] This includes conservation-contingent rural development programs in Botswana (Pienaar et al., 2014), fishing permits for wetlands conservation in Ethiopia (Selassie and Kountouris, 2010), irrigation water in India (Barton and Bergland, 2010), credit-based agroforestry Payment for Ecosystem Services in Ecuador (Cranford and Mourato, 2014), agri-environmental innovations in banana production in the Caribbean (Blazy et al., 2011), and Payments for Ecosystem Services to reduce deforestation in Tanzania (Kaczan et al., 2013). Table 1 of Lizin et al. (2015) provides an excellent summary of the literature on discrete choice experiments for valuing land use restrictions.

[8] Over the past decade China has been witness to a growing diversity of national and provincial-level experiments in environmental policy under this broad heading (Bennett, 2008; Zhang et al., 2010b). This has led to national uptake in the goal of creating an effective regulatory framework governing eco-compensation, and encouragement of provincial pilots to inform how to operationalize the concept (Zhang and Crooks, 2012). Both the current and previous national 5-year plans of China have placed strong emphasis on the promotion of eco-compensation programs and policies, and the National Development and Reform Commission has been tasked with the development of a national eco-compensation ordinance (Zhang et al., 2010a; Zhang and Bennett, 2011).

[9] These priority areas are: watersheds, mineral development areas, key ecological function zones and nature reserves (MEP, 2007b).