Effects of a coordinated farmland bird conservation project on farmers' intentions to implement nature conservation practices – evidence from the Swedish Volunteer & Farmer Alliance

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Abstract

To increase the efficacy of agri-environmental schemes (AES), as well as farmers' environmental engagement, practitioners are increasingly turning to collective forms of agri-environmental management. As yet, empirical evidence from such approaches is relatively scarce. Here, we examined a farmland bird conservation project coordinated by BirdLife Sweden, the Swedish Volunteer & Farmer Alliance (SVFA). The key features of the SVFA were farmland bird inventories from volunteering birdwatchers and on-farm visits to individual farmers from conservation advisors for guidance on AES as well as unsubsidised practices. Using an *ex-post* application of the theory of planned behaviour across project participants and a randomly sampled control group of farmers we assessed how SVFA affected behavioural intentions relating to AES and unsubsidised conservation, and how the behaviour was affected by attitudes, perceived social norms and perceived behavioural control. We also included a measure of self-identity as a conservationist to assess its importance for behavioural intentions, and if SVFA stimulated this self-identity. SVFA farmers reported greater commitment to implementing AES and unsubsidised conservation, as compared to the control group. However, greater commitment was associated with more positive attitudes for unsubsidised conservation only and not for AES, underlining the inability of existing AES to prompt intrinsic motivation. There were also differences between farmers within SVFA, where farmers applying to the project were motivated by social influences, while farmers recruited by project managers were motivated by their personal beliefs regarding nature conservation. Finally, farmers' self-perceived ability to perform practices (i.e. perceived behavioural control) was important for their commitment to implementing AES as well as unsubsidised practices. Therefore, increasing farmers' awareness regarding the availability and, not least, practicability of available conservation options may be the key to successful biodiversity conservation in agricultural systems.

Keywords: common agricultural policy; sustainable farming; nature-friendly farming; landscape-scale conservation; evidence-based conservation; advisory visits

1. Introduction

The adverse effects of agricultural intensification on farmland biodiversity and other natural resources demand wide-reaching mitigative action (Krebs et al. 1999; Benton et al. 2003). Agri-environmental schemes (AES) are in place in many parts of the world – including the European Union, USA, Australia, and other OECD countries (Vojtech 2010) – but have so far failed to attenuate negative biodiversity trends (Kleijn & Sutherland 2003; Batáry et al. 2011). From an ecological view, poor design of management options leads to schemes that fail to provide sufficient resources at appropriate spatial and temporal scales (Whittingham 2007). A second limitation is the low frequency of AES agreements, particularly in highly intensified landscapes where adaptation costs and forgone profits are potentially higher than reimbursements (Kleijn & Sutherland 2003; Quillérou & Fraser 2010).

Further, top-down administration of most present-day AES may reduce their potential to generate cultural and social capital in farming communities (cf. Bourdieu 1986), therefore restricting them from becoming embedded in farming communities (Burton et al. 2008; Burton & Paragahawewa 2011; Herndl et al. 2011). Adoption of these practices primarily depends on payments for lost income and less on intrinsic motives (Lokhorst et al. 2011; Ahnström et al. 2013), which make their permanence vulnerable to production-oriented reforms. Clearly, farmers' decision-making about nature-friendly practices determines the fate of the agri-environment (Tilman et al. 2002; de Snoo et al. 2012).

Collaborative and coordinated approaches are increasingly advocated in order to resolve the described disadvantages of conventional AES (Oerlemans & Assouline 2004; Franks & Emery 2013; Prager et al. 2015). Broadly, collaboration refers to situations where land managers work together and maintain a dialogue regarding a shared objective, while in coordinated projects land managers work towards the same objective but without direct cooperation (Boulton et al. 2013). Collaborative as well as coordinated projects can be initiated and operated top-down (e.g. by government agencies or non-governmental organisations, NGOs) or bottom-up (by land managers). However, when benefits are primarily public, as in conservation of habitats or biodiversity, projects tend to be initiated top-down. When benefits mainly accrue to participants, as in management of resources with shared private interest or novel technology development in on-farm research ventures, projects are often bottom-up initiated (for a summary of collaboration models, see Prager et al. 2015).

Landscape-scale ecological networks are important for the many species in agri-ecosystems that depend on spatial scales larger than individual fields or farms (cf. Dutton et al. 2008). Many farm holdings are relatively small and often fragmented, and therefore the ecologically relevant scale and the scale of AES administration are often mismatched. Here, collective approaches can engage several farmers in coordinated action over larger areas, which is essential for successful biodiversity conservation (Whittingham 2007; Batáry et al. 2011). While collective approaches to AES applications are generally lacking (but see Franks & Emery 2013; McKenzie et al. 2013; van Dijk et al. 2015), many initiatives organised by e.g. conservation groups operate outside the umbrella of traditional AES and promote practices that are currently not compensated through policy (Boulton et al. 2013; Prager et al. 2015). In the light of diminished biodiversity protection subsidies in the 2014-2020 reform of the EU Common Agricultural Policy (see e.g. Pe'er et al. 2014 and Erjavec & Erjavec 2015), such unsubsidised nature conservation practices are likely to be essential for biodiversity protection on agricultural land in the near future. Further, unsubsidised conservation may be driven more by intrinsic motivational factors as compared to AES (Lokhorst et al. 2011), but knowledge regarding the main determinants of adoption of these practices is still poor. Beyond ecological effects, collaborative management may also aid farmers' understanding and perceived ownership of agri-environmental issues, in turn stimulating manifestation of conservationist identities and social capital (Beedell & Rehman 2000; McGuire et al. 2015), leading to socio-ecological resilience of agricultural landscapes (Burton & Paragahawewa 2011).

In spite of these optimistic statements empirical support of environmental and social outcomes from collective biodiversity conservation is still scarce (Lubell 2004; Koontz & Thomas 2005). In this study, we examine the Swedish Volunteer & Farmer Alliance (SVFA): a farmland bird conservation project coordinated by BirdLife Sweden that connects farmers, volunteer birdwatchers and advisors from the Rural Economy and Agricultural Societies (see Section 2.1). We use concepts from social psychology and identity theory to study how project participation affects farmers' motivations for subsidised as well as unsubsidised nature conservation practices, as well as the proliferation of conservationist ideals.

1.1 The theory of planned behaviour

In the debate on the future management of the agri-environment, farmers' environmental decision-making is increasingly in focus (e.g. Tilman et al. 2002; de Snoo et al. 2012). In rural studies, the previous over-emphasis on the attitude-behaviour relationship has been questioned, accentuating the significance of normative influences, perceived self-efficacy and self-identity in decision-making (Burton 2004a). In this study we use the theory of planned behaviour (TPB) to investigate how intentions to implement nature conservation practices are formed (cf. Ajzen 1991). The TPB has been used to describe farmers' environmental decision-making across many socio-economic and geographic contexts (e.g. Beedell & Rehman 2000; Borges et al. 2014; Lalani et al. 2016), including AES (Wauters et al. 2010; van Dijk et al. 2015) and unsubsidised conservation (Lokhorst et al. 2011; van Dijk et al. 2016). In the TPB, three key components jointly determine behavioural intention, namely: attitudes towards the behaviour (a personal evaluation whether the behaviour is positive/negative), subjective norms (the perceived social pressure to engage in the behaviour), and perceived behavioural control (the extent to which the individual perceives it possible to perform the behaviour).

The TPB is flexible to the inclusion of additional predictors if "it can be shown that they capture a significant proportion of the variance in intention or behaviour after the theory's current variables have been taken into account" (Ajzen 1991). Here, self-identity has been demonstrated to play a significant role for behavioural intentions across a range of contexts (cf. Burton & Wilson 2006; Ajzen 2011), including farmers' decision-making about nature conservation practices (Conner & Armitage 1998; Sparks 2000; Lokhorst et al. 2011, 2014; van Dijk et al. 2015, 2016). The influence of self-identity on intention stems from identity theory (Stryker 1968), which proposes that the self consists of multiple identities based on the different social roles that a person may have. Different identities may be more or less salient in affecting distinctive behaviours in different social contexts (Burke & Stets 2009; McGuire et al. 2013). Collaborative conservation could potentially stimulate manifestation of farmers' conservationist identities (cf. McGuire et al. 2015), but to our knowledge there are no studies evaluating this.

1.2 Study aims

The overall aim was to describe and assess effects of a collaborative bird preservation project in Sweden, the Swedish Volunteer & Farmer Alliance (SVFA), on farmers' decision-making about nature conservation practices. This information can be used to improve existing and future collaborative projects, but also provides insights that can aid design of innovative AES that embed in farming culture.

Explicitly, we addressed two questions: 1. Do SVFA farmers have a greater commitment to engage in nature conservation compared to a randomly sampled control group of farmers? 2. What is driving such differences in commitment, with special consideration given to attitudes, subjective norms, perceived behavioural control and self-identity? These questions were addressed independently for measures connected to AES and to unsubsidised nature conservation.

2. Methods

2.1 The Swedish Volunteer and Farmer Alliance (SVFA)

In this study we assess how a BirdLife Sweden-coordinated project aimed at farmland bird conservation affected farmers' decision-making concerning implementation of nature conservation practices. Between 2006 and 2014, the Swedish Volunteer & Farmer Alliance (SVFA) engaged almost 300 farmers across Sweden's most intensively farmed regions. The project also included volunteer birdwatchers from BirdLife Sweden's network and agricultural advisors from the Rural Economy and Agricultural Societies.

SVFA started as a pilot project funded by Stockholm County Council in 2006 and continued at full-scale from 2007–2014 with 50/50 funding from the Swedish Board of Agriculture (SBA) and the Swedish Environmental Protection Agency (SEPA), providing a yearly budget of 100 000 EUR. SBA funding covered advisors' wages and was coupled to "Support for training" in the 2007–2013 Swedish Rural Development Program. SEPA funding covered costs relating to bird inventories and administrative tasks including project management.

Each participating farm was surveyed three times during spring, when birdwatchers recorded numbers of individuals from a subset of 29 farmland bird species on approximately 80 ha of the farm property (time restraints prevented full-farm surveys). A list of the inventoried species is available in Josefsson et al. (2016). Next, a project-employed assistant generated standardised territory maps used by advisors in farm-wise advisory visits completed later in the season. During the on-farm visits the farmer and advisor met to discuss measures to benefit the farm's community of farmland birds, given agri-ecological conditions and the farmer's specific situation. Among the handful of practices that advisors concentrated on promoting, some were eligible for support within the Swedish Rural Development Program (i.e. AES), while others were unsubsidised (e.g. erecting nest boxes, creating in-field flower strips and beetle banks, or using nature-friendly field management practices). A full list of the practices promoted in SVFA is presented in Table S1. After the visit a memorandum from the meeting was drafted and sent to the farmer.

2.2 Main study respondents and design

According to their recruitment SVFA comprised two participant groups: i) SVFA applicants (N = 154) contacted project managers after seeing project advertisements in trade media; ii) SVFA recruits (N = 128) were called by managers and asked to join (rejection rate < 1%). Farmer selection in the recruited group was unsystematic, but did include farmers located e.g. in the same watershed as other participants and farmers that were neighbours to a volunteering birdwatcher.

All data in this study were collected after the project ended, which unfortunately prevented a regular before-after design of the study. To resolve this caveat we acquired a sample from Statistics Sweden's directory of farms (N = 299), stratified to have the same geographical and farm size distribution as SVFA farms (see Tables 1 and S2 for a detailed presentation of the sample distributions). This sample was used as a control group to assess effects of SVFA participation on the TPB variables. We infer that unsystematic selection and very low rejection rate of SVFA recruits resulted in a group with a baseline interest for conservation comparable to the control group. This is important as differences between the control group and SVFA applicants may merely indicate that SVFA applicants had an initially high conservation interest. Differences between the control group and the recruited SVFA farmers are, however, for the purpose of our study understood to be indicative of changes attributed to SVFA.

Another consequence of our study's *ex-post* nature was that, while information regarding farmers' actual implementation of measures are available, this could not be included in our analyses as incorporation of actual behaviour in the TPB requires a chronological study design where motivational variables are measured first, and subsequently behaviour. Thus, here we only analysed self-reported intentions here.

2.3 Questionnaire

After the SVFA project ended in 2014 we mailed a survey and an enclosed return envelope to all respondents and after two weeks, a reminder to non-respondents. Response rate was 48% (57%, 56% and 40% for applicants, recruits and control group, respectively). 246 of the 278 answers were complete enough to be included in analyses (n = 79, 60 and 107 for applicants, recruits and control group, respectively). To maximise response rate we used modified scales (i.e. fewer measurement items) to shorten our questionnaire (see e.g. Lokhorst et al. 2011; van Dijk et al. 2015). Generally, each TPB variable was quantified using two different items (i.e. questions), measured on seven-point Likert-type numerical scales. The measurement items, provided in Table S3, were taken from earlier research (Ajzen & Fishbein 1980; Sparks et al. 1997; Terry et al. 1999; Lokhorst et al. 2014), and modified for AES and unsubsidised nature conservation. In our questionnaire self-identity related to the extent that conservation practices were considered part of the self (Terry et al. 1999). The questionnaire also included items for farmer age, farm size, and farming regime (conventional or organic farming), which we used to ensure that there were no differences in these variables between the farmer groups.

2.4 Analysis

We analysed responses using multi-group Partial Least Squares Path Modelling (PLS-PM) with plspm version 0.4.7 (Sanchez 2013), in R version 3.0.2 (R Development Core Team 2011). This approach is appropriate when sample size is comparatively small (Hair et al. 2011). PLS-PM is a multivariate method that contains two distinct models: i) a measurement model evaluating relationships between measurement items and their latent variables, and ii) a structural model producing standardised regression coefficients between variables. Here, latent variables refer to the TPB variables, namely: attitude, subjective norm, perceived behavioural control, self-identity and intention. We fitted discrete models for each farmer group and for AES and unsubsidised nature conservation separately, in order to derive and compare variable scores across farmer groups and to assess the relative importance of the different variables in explaining intention to implement the two forms of nature conservation.

2.4.1 Measurement model validation

Using a two-stage approach (cf. Chin 2010), we first confirmed measurement model accuracy and subsequently examined variable relationships. Measurement model validation was based on convergent and discriminant validity, ensuring that measurement items adequately reflected their underlying variables. We examined variance overlap with average variance extracted, AVE, and also measured internal consistency using composite reliability, ρ_c. AVE and ρ_c for AES and unsubsidised conservation (Tables 2 and 3, respectively) were above recommended thresholds ($\rho_c >$ 0.7 and AVE > 0.5; Chin 2010). We also confirmed that the square root of AVE was greater than inter-variable correlations for all items, showing that items shared larger variance within than between variables (Tables 2 and 3; Table S4 exhibits the individual item loadings).

2.4.2 Behavioural variable scoring and structural model evaluation

Next, we assessed behavioural variable scores and relationships from structural models. First, we compared TPB variable scores between the control group and SVFA applicants and recruits, respectively. For each variable we fitted a generalised linear model using the respondent-level score as the response variable and a factor variable with three levels, corresponding to control/applicants/recruits, as the independent variable. These models were fitted using iteratively reweighted least squares and gaussian error distribution. Finally, we assessed the importance of attitudes, subjective norms, perceived behavioural control and self-identity for behavioural intention. Again, steps were repeated for the three farmer groups and for AES and unsubsidised nature conservation. We performed bootstrapping with 5000 resamples to obtain standardised regression coefficients and 95% confidence intervals and also examined mediation of the added self-identity variable (cf. Lokhorst et al. 2011; van Dijk et al. 2015). Here, mediation occurs when effects of attitudes, subjective norms or perceived behavioural control on intention are explained through influence on self-identity. To test for mediation we first ran standard TPB models without self-identity. Next, we fitted models including self-identity and observed if regression estimates were affected. If such effects occurred we refitted models with pathways between affected variables and self-identity. For a more detailed explanation of mediation analysis in PLS-PM, see Chin (2010).

3. Results

3.1 Between-group comparisons of demographics and behavioural variable scores

Demographics (farmer age, farm size, and conventional/organic farming ratio) were similar across the different farmer groups except gender, where SVFA was composed of a somewhat higher proportion of women compared to the control group (Table 1). Regarding the TPB variables, SVFA applicants had higher intention, attitude, perceived behavioural control and self-identity scores for AES as well as for unsubsidised nature conservation as compared to the control. For the SVFA recruits, scores of intention, perceived behavioural control and self-identity for both conservation categories were again higher than the control group, while attitude scores were higher only for unsubsidised conservation. Finally between farmers within SVFA, variable scores were generally higher among SVFA applicants than among the recruits (Table 1).

3.2 Structural model evaluation

3.2.1 Intention to implement AES

Across farmer groups, perceived behavioural control and self-identity were consistently important predictors of intention to implement AES (Figure 1 and Table S5), but there were also noticeable differences between the groups. Attitudes to AES were important for intention in the control group, but not for SVFA farmers. Further, subjective norm (i.e. the perceived social pressure) was only important among SVFA applicants, where the effect was partly mediated by self-identity and perceived behavioural control. This suggests a social aspect to AES participation among SVFA applicants that was absent in the other farmer groups (Figure 1).

3.2.2 Intention to implement unsubsidised nature conservation

As for AES, perceived behavioural control was the only consistent predictor of behavioural intention for unsubsidised conservation across the farmer groups (Figure 1 and Table S4). Again, subjective norm was important for behavioural intention for SVFA applicants only and related positively to self-identity. Attitude to unsubsidised conservation was important for behavioral intention for the control and SVFA recruits groups, but again did not explain behavioural intention for SVFA applicants (Figure 1).

4. Discussion

Collective approaches are increasingly proposed as alternatives to centralised administration of the agri-environment (Oerlemans & Assouline 2004; Franks & Emery 2013; Prager et al. 2015), yet evidence of how collaboration aids in instigating attitudinal, normative and behavioural changes among farmers is largely lacking. We show that Swedish arable farmers in a farmland bird conservation project coordinated by BirdLife Sweden, the Swedish Volunteer & Farmer Alliance (SVFA), had a greater commitment to implementing AES and unsubsidised conservation compared to farmers outside of the project.

We believe that our results are valid also in intensive arable regions in other economically developed countries, where agricultural development and farm subsistence have historically relied largely on production oriented subsidies and, as a consequence, productivist norms are predominant (Burton 2004b; Mills et al. 2011; Burton & Schwarz 2013; Herndl et al. 2011; McGuire et al. 2013). However, we also acknowledge that farmers' self-identities possibly may vary between regions in different countries due to biophysical and socio-economic conditions across these landscapes (Jongeneel et al. 2008; Boonstra et al. 2011; O'Rourke et al. 2012; Ahnström et al. 2013; McGuire et al 2015).

Boulton et al. (2013) suggests that coordination may be enough to attain environmental goals, but that realisation of other outcomes (e.g. social and/or economic) often require collaborative management. SVFA's impact on intrinsic aspects of decision-making, including attitudes and self-identity, might relate to the contribution of the advisors. From their experience with Rural Economy and Agricultural Societies, they were accustomed to working closely with farmers and could establish the connection and trust needed to incite attitudinal changes (see e.g. Emery & Franks

2012). In support of this notion, several farmers in the project asserted the value of a biodiversity conservation project run by persons that understand farmers' livelihood instead of by "green-wavers" (i.e. dogmatic environmentalists with no real insight into the realities of rural communities).

We contend that means to support collective environmental networks must be provided across both space and time for efforts to successfully produce expected social and environmental benefits. As an example, SVFA was partly funded through *Support for training* subsidies in the Rural Development Program 2007-2013. In 2014, the CAP reform 2014–2020 and the contemporaneous formation of a new government in Sweden created a period of uncertainty where no funds were available to sustain the project. We cannot yet say how farmers' attitudes (and other aspects of decision-making) may change, or how bird communities will fare after the project ended. However, there is a great risk that the trust, social capital and collective knowledge, which took time and effort to generate, will be lost (cf. Mills et al. 2011).

Environmental monitoring is necessary for outcome evaluation in collective approaches (e.g. Lubell 2004; Koontz & Thomas 2005; Prager et al. 2015), as well as to more controlled agri-environmental management (Kleijn & Sutherland 2003; Whittingham 2007). Yet, monitoring is generally overlooked due to time/money constraints, but using such information to report back to collective members may increase their engagement, thus increasing the value of collecting monitoring data (Lokhorst et al. 2010; Boulton et al. 2013; Burton & Schwarz 2013). While we were not evaluating environmental outcomes here (see Methods), the SVFA inventory data are currently being prepared in a separate and more ecologically aimed study (Josefsson et al. 2015).

Focusing on the evaluation of farmers' decision-making, the higher R^2 values and generally larger regression coefficients for models of unsubsidised conservation compared to AES models support the notion of a greater applicability of the TPB for unsubsidised conservation than for AES (Steg & Vlek 2009; Lokhorst 2011; van Dijk et al. 2016). We also found differences in farmers' decision-making about AES and unsubsidised conservation measures. Generally, attitudes were more influential for unsubsidised conservation than for AES. Further, compared to the control, recruited SVFA farmers had a more positive attitude towards unsubsidised conservation, but not for AES. Together, these observations support the idea that *payments* in themselves, by reducing the costs of actions, may inhibit development of intrinsic motivation (Herzon & Mikk 2007). Also, Burton & Paragahawewa (2011) note that restricting possibilities for farmers to display learned skills and knowledge (i.e. social capital) in AES could further limit intrinsic motivation. Here several authors suggest that positive attitudes to environmental management may be stimulated among famers by providing such possibilities, e.g. by replacing area-based payments with payments based on performance (Gibbons et al. 2011; Burton & Schwarz 2013; McGuire et al. 2013).

There exist many agri-environmental practices of benefit to farmland birds as well as overall biodiversity (such as planting bushes and solitary trees, erecting nest boxes, and winter-feeding of birds) that are currently unsubsidised in rural policies, at least in Sweden (cf. Swagemakers et al. 2009; Dicks et al. 2013). Yet outside the scope of economic incentives there is little academic and political interest to identify key factors that motivate conservation practices (however see Boonstra et al. 2011; Lokhorst et al. 2011; van Dijk et al. 2016). That being said there is still a need for agri-environmental management, including AES design, to be more evidence-based (Sutherland et al. 2004). Here, initiatives like the Centre for Evidence-Based Conservation (CEBC) and Collaboration for Environmental Evidence (CEE) advance the development and use of such methods, which still need to be adopted in agri-environmental policy-making on a wider scale (Pe'er et al. 2014).

Subjective norms have hitherto not been found to be important for farmers' conservation behaviour (Lokhorst 2011; 2013; van Dijk et al. 2015), possibly due to the fact that productivist norms are widely established in intensive arable farming communities e.g. in Europe (Burton 2004b; Mills et al. 2011; Burton & Schwarz 2013), and the USA (Herndl et al. 2011; McGuire et al. 2013). Still, the social influence on decision-making among SVFA applicants found here implies that a considerable subset of farmers exist, who engage in nature conservation on a more social basis, and therefore may be more likely to apply to collaborative projects such as SVFA.

Our results also provide insights into the role of self-identity for farmers' conservation behaviour, where higher self-identity appraisals in relation to AES and unsubsidised conservation caused by SVFA participation can be understood as manifest conservationist identities (cf. McGuire et al. 2013; 2015). Interestingly, while identification with conservation practices was generally a good predictor of intention to engage in nature conservation, self-identity among farmers that actively contacted SVFA was positively related to the perceived norm whether or not to engage in such practices. Conversely, the attitude towards practices did not influence behavioural intentions among these farmers, but was important for the control and recruits groups. Thus, we can distinguish different decision-making rationales between the applicant farmers who engaged in conservation mainly on a social basis, and the recruited farmers who were motivated by their personal beliefs regarding nature conservation (Cheek & Briggs 1982; Michel-Guillou & Moser 2006).

Finally, we found strong and persistent positive associations between farmers' self-perceived ability (i.e. perceived behavioural control) and their intention to implement nature conservation practices. This highlights that the availability of information about different conservation practices and their feasibility positively affects farmers' willingness to engage in nature conservation (Lokhorst et al. 2010). In collaborative projects, knowledge can be transferred not only via project advisors, but also by facilitating knowledge sharing between farmers (Steyaert et al. 2007; Haenn et al. 2014).

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References

Ahnström, J., Bengtsson, J., Berg, Å., Hallgren, L., Boonstra, W. J., and J. Björklund. 2013. Farmers' interest in nature and its relation to biodiversity in arable fields. International Journal of Ecology, vol. 2013, Article ID 617352, 9 pages. doi:10.1155/2013/617352

Ajzen, I. 1991. The theory of planned behaviour. Organizational Behaviour and Human Decision Processes 50:179-211.

Ajzen, I. 2011. The theory of planned behaviour: reactions and reflections. Psychology & Health 26(9):1113-1127.

Ajzen, I., & M. Fishbein 1980. Understanding attitudes and predicting social behaviour. Prentice Hall, Englewood Cliffs.

Batáry, P., A. Báldi, D. Kleijn, and T. Tscharntke. 2011. Landscape-moderated biodiversity effects of agri-environmental management: a meta-analysis. Proceedings of the Royal Society B: Biological Sciences 278:1894-1902.

Beedell, J., and T. Rehman. 2000. Using social-psychology models to understand farmers' conservation behaviour. Journal of Rural Studies 16:117-127.

Benton, T. G., J. A. Vickery, and J. D. Wilson. 2003. Farmland biodiversity: is habitat heterogeneity the key? Trends in Ecology & Evolution 18:182-188.

Boonstra, W. J., J. Ahnström, and L. Hallgren. 2011. Swedish Farmers Talking about Nature – A Study of the Interrelations between Farmers' Values and the Sociocultural Notion of Naturintresse. Sociologia Ruralis 51:420-435.

Borges, J. A. R., A. G. J. M. Oude Lansink, C. Marques Ribeiro, V. Lutke. 2014. Understanding farmers' intention to adopt improved natural grassland using the theory of planned behavior. Livestock Science 169:163-174.

Boulton, A., Lockett, R., and T. Seymour. 2013. A review and evaluation of collaborative landscape-scale management initiatives. Scottish Natural Heritage Commissioned Report No. 598.

Bourdieu, P. 1986. The forms of capital. In: Richardsun, J.E. (Ed.), Handbook of Theory of Research for the Sociology of Education. Greenwood Press, pp. 46-58.

Burke, P. J., and J. E. Stets. 2009. Identity theory. Oxford Press, New York.

Burton, R. J. F. 2004a. Reconceptualising the "behavioural approach" in agricultural studies: a socio-psychological perspective. Journal of Rural Studies 20:359-371.

Burton, R. J. F. 2004b. Seeing Through the 'Good Farmer's' Eyes: Towards Developing an Understanding of the Social Symbolic Value of 'Productivist' Behaviour. Sociologia Ruralis 44:195-215.

Burton, R. J. F., and G. A. Wilson. 2006. Injecting social psychology theory into conceptualisations of agricultural agency: towards a post-productivist farmer self-identity? Journal of Rural Studies 22:95-115.

Burton, R. J. F., C. Kuczera, and G. Schwarz. 2008. Exploring farmers' cultural resistance to voluntary agri-environmental schemes. Sociologia Ruralis 48:16-37.

Burton, R. J. F., and U. H. Paragahawewa. 2011. Creating culturally sustainable agri-environmental schemes. Journal of Rural Studies 27:95-104.

Burton, R. J. F., G. Schwarz. 2013. Result-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change. Land Use Policy 30:628-641.

Cheek, J. M., and S. R. Briggs. 1982. Self-consciousness and aspects of identity. Journal of Research in Personality 16:401-408.

Chin, W. W. 2010. How to write up and report PLS analyses. Pages 665-690 in Esposito Vinzi V., et al. Handbook of Partial Least Squares, Springer Handbooks of

Computational Statistics. Springer-Verlag, Berlin Heidelberg.

Conner M., and C. J. Armitage. 1998. Extending the theory of planned behaviour: a review and avenues for further research. Journal of Applied Social Psychology 28:1429-1464.

de Snoo, G. R., et al. 2012. Toward effective nature conservation on farmland: making farmers matter. Conservation Letters 6:66-72.

Dicks, L. V., I. Hodge, N. P. Randall, J. P. W. Scharlemann, G. M. Siriwardena, H. G. Smith, R. K. Smith, and W. J. Sutherland. 2013. A transparent process for "evidence-informed" policy making. Conservation Letters 0:1-7.

Dutton, A., G. Edwards-Jones, R. Strachan, and D. W. Macdonald. 2008. Ecological and social challenges to biodiversity conservation on farmland: reconnecting habitats on a landscape scale. Mammal Review 38:205-219.

Emery S. B., and J. R. Franks. 2012. The potential for collaborative agri-environment schemes in England: can a well-designed collaborative approach address farmers' concerns with current schemes? Journal of Rural Studies 28:218-231.

Erjavec, K., and E. Erjavec. 2015. 'Greening the CAP' – Just a fashionable justification? A discourse analysis of the 2014-2020 CAP reform documents. Food Policy 51: 53-62.

Franks, J. R., and S. B. Emery. 2013. Incentivising collaborative conservation: lessons from existing environmental stewardship scheme options. Land Use Policy 30:847-862.

Gibbons, J. M., E. Nicholson, E. J. Milner-Gulland, and J. P. G. Jones. 2011. Should payments for biodiversity conservation be based on action or results? Journal of Applied Ecology 48:1218-1226.

Haenn, N., B. Schmook, Y. Reyes, and S. Calmé. 2014. Improving conservation outcomes with insights from local experts and bureaucracies. Conservation Biology 28:951-958.

Hair, J. F., C. M. Ringle, and M. Sarstedt. 2011. PLS-SEM: Indeed a Silver Bullet. Journal of Marketing Theory and Practice 19:139-152.

Herndl, C., J. Goodwin, L. Honeycutt, G. Wilson, S. Graham, and D. Niedergeses. 2011. Talking sustainability: Identification and division in an Iowa community. Journal of Sustainable Agriculture 35:436-461.

Herzon, I., and M. Mikk. 2007. Farmers' perceptions of biodiversity and their willingness to enhance it through agri-environment schemes: a comparative study from Estonia and Finland. Journal for Nature Conservation 15:10-25.

Jongeneel, R. A., N. B. Polman, and L. H. Slangen. 2008. Why are Dutch farmers going multifunctional? Land Use Policy 25:81-94.

Josefsson, J. 2015. Biodiversity conservation in agricultural landscapes. Doctoral thesis. Acta universitatis Agriculturae Sueciae 2015:100. Swedish University of Agricultural Sciences.

Josefsson, J., Å. Berg, M. Hiron, T. Pärt, and S. Eggers. 2016. Sensitivity of the farmland bird community to crop diversification in Sweden: does the CAP fit? Journal of Applied Ecology. doi: 10.1111/1365-2664.12779

Kleijn, D., and W. Sutherland. 2003. How effective are European agri-environment schemes in conserving and promoting biodiversity? Journal of Applied Ecology 40:947-969.

Koontz, T. M., and C. W. Thomas. 2005. What do we know and need to know about the environmental outcomes of collaborative management? Public Administration Review 66: 111-121.

Krebs, J., J. Wilson, R. Bradbury, and G. Siriwardena. 1999. The second silent spring? Nature 400:611-612.

Lalani, B., P. Dorward, G. Holloway, E. Wauters. 2016. Smallholder farmers' motivations for using Conservation Agriculture and the roles of yield, labour and soil fertility in decision making. Agricultural Systems 146:80-90.

Lokhorst, A. M., J. van Dijk, H. Staats, E. van Dijk, G. de Snoo. 2010. Using Tailored Information and Public Commitment to Improve the Environmental Quality of Farm Lands: An Example from the Netherlands. Human Ecology 38:113-122.

Lokhorst, A. M., H. Staats, J. van Dijk, E. van Dijk, and G. de Snoo. 2011. What's in it for me? Motivational differences between farmers' subsidized and non-subsidized conservation practices. Applied Psychology 60:337-353.

Lokhorst, A. M., C. Hoon, R. le Rutte, and G. de Snoo. 2014. There is an I in nature: the crucial role of the self in nature conservation. Land Use Policy 39:121-126.

Lubell, M. 2004. Collaborative environmental institutions: all talk and no action? Journal of Policy Analysis and Management 23:549-573.

McGuire, J. M., L. Wright Morton, A. D. Cast. 2013. Reconstructing the good farmer identity: shifts in farmer identities and farm management practices to improve water quality. Agriculture and Human Values 30:57-69.

McGuire J. M., L. Wright Morton, J. G. Arbuckle Jr., and A. D. Cast. 2015. Farmer identities and responses to the social-biophysical environment. Journal of Rural Studies 39:145-155.

McKenzie, A. J., S. B. Emery, J. R. Franks, and M. J. Whittingham. 2013. Landscape-scale conservation: collaborative agri-environment schemes could benefit both biodiversity and ecosystem services, but will farmers be willing to participate? Journal of Applied Ecology 50:1274-1280.

Michel-Guillou, E., and G. Moser. 2006. Commitment of farmers to environmental protection: from social pressure to environmental conscience. Journal of Environmental Psychology 26:227-235.

Mills, J., D. Gibbon, J. Ingram, M. Reed, C. Short, and J. Dwyer. 2011. Organising collective action for effective environmental management and social learning in Wales. Journal of Agricultural Education & Extension 17:69-83.

O'Rourke, E., N. Kramma, and N. Chisholm. 2012. The influence of farming styles on the management of the Iveragh uplands, southwest Ireland. Land Use Policy 29:805-816.

Oerlemans, N., and G. Assouline. 2004. Enhancing farmers' networking strategies for sustainable development. Journal of Cleaner Production 12: 469-478.

Pe'er, G., L. V. Dicks, and P. Visconti. 2014. EU agricultural reform fails on biodiversity. Science 344:1090-1092.

Prager, K. 2015. Agri-environmental collaboratives for landscape management in Europe. Current Opinion in Environmental Sustainability 12:59-66.

Quillérou, E., and R. Fraser, R. 2010. Adverse selection in the environmental stewardship scheme: does the higher level stewardship scheme design reduce adverse selection? Journal of Agricultural Economics 61:369-380.

R Development Core Team. 2011. R: A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria, ISBN: 3- 900051-07-0, http://www.R-project.org/

Sanchez, G. 2013. PLS Path Modeling with R. Trowchez Editions. Berkeley. http://www.gastonsanchez.com/PLS_Path_Modeling_with_R.pdf

Sparks, P., C. A. Guthrie, and R. Shepherd. 1997. The dimensional structure of the perceived behavioural control construct. Journal of Applied Social Psychology 27:418-438.

Sparks, P. 2000. Subjective expected utility-based attitude–behaviour models: the utility of self-identity. Pages 31-46 in Terry, D. J., and M. A. Hogg. Attitudes, behaviour, and social context: the role of norms and group membership. Lawrence Erlbaum, Hillsdale.

Steg, L., and C. Vlek. 2009. Encouraging pro-environmental behaviour: An integrative review and research agenda. Journal of Environmental Psychology 29:309-317.

Steyaert, P., M. Barzman, J. P. Billaud, H. Brives, B. Hubert, G. Ollivier, and B. Roche. 2007. The role of knowledge and research in facilitating social learning among stakeholders in natural resources management in the French Atlantic coastal wetlands. Environmental Science & Policy 10:537-550.

Stryker, S. 1968. Identity salience and role performance – relevance of symbolic interaction theory for family research. Journal of Marriage & Family 30:558-564.

Sutherland, W. J., A. S. Pullin, P. M. Dolman, and T. M. Knight. 2004. The need for evidence-based conservation. Trends in Ecology and Evolution 19:305-308.

Swagemakers, P., H. Wiskerke, J. D. van Der Ploeg. 2009. Linking birds, fields and farmers. Journal of Environmental Management 90:185-192.

Terry, D. J., M. A. Hogg, and K. M. White. 1999. The theory of planned behaviour: self-identity, social identity and group norms. British Journal of Social Psychology 38:225-244.

Tilman, D., K. G. Cassman, P. A. Matson, R. Naylor, and S. Polasky. 2002. Agricultural sustainability and intensive production practices. Nature 418:671-677.

van Dijk, W. F. A., A. M. Lokhorst, F. Berendse, and G. R. de Snoo. 2015. Collective agri-environment schemes: How can regional environmental cooperatives enhance farmers' intentions for agri-environment schemes? Land Use Policy 42:759-766.

van Dijk, W. F. A., A. M. Lokhorst, F. Berendse, and G. R. de Snoo. 2016. Factors underlying farmers' intentions to perform unsubsidised agri-environmental measures. Land Use Policy 59:207-216.

Vojtech, V. 2010. Policy Measures Addressing Agri-environmental Issues. OECD Food, Agriculture and Fisheries Papers, No. 24, OECD Publishing.

Wauters, E., C. Bielders, J. Poesen, G. Govers, E. Mathijs. 2010. Adoption of soil conservation practices in Belgium: an examination of the theory of planned behaviour in the agri-environmental domain. Land Use Policy 27:86-94.

Whittingham, M. J. 2007. Will agri-environment schemes deliver substantial biodiversity gain, and if not why not? Journal of Applied Ecology 44:1-5.

Figures

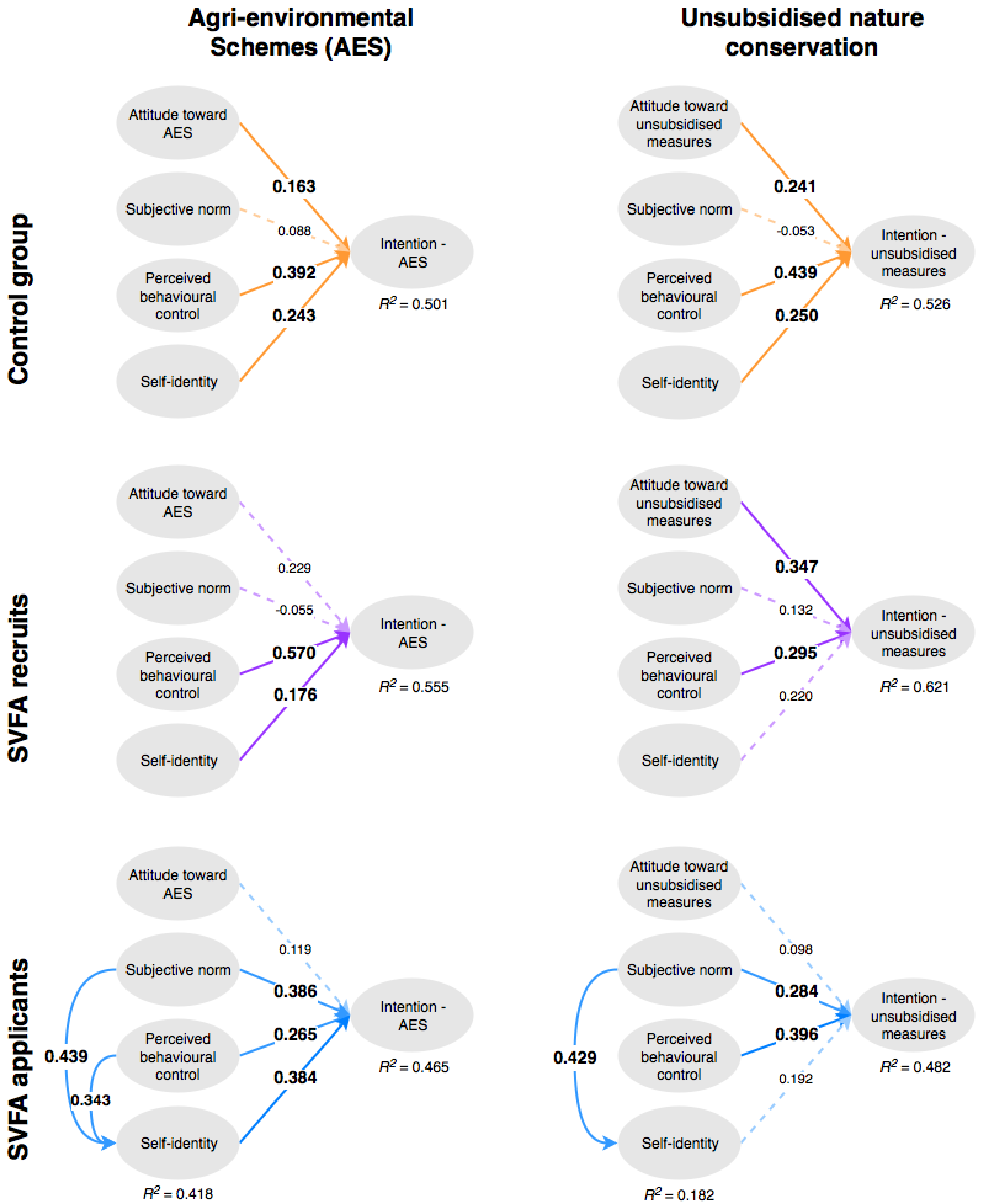

Figure 1. Results from structural models for three farmer groups, evaluating farmers' decision-making regarding AES (left panel) and unsubsidised nature conservation (right panel). Arrows present standardised parameter estimates between behavioural variables, where solid/dotted lines are used to indicate whether 95% confidence intervals did/did not overlap with zero.

Tables

Table 1. Descriptive demographic statistics and behavioural variable scores are presented for the three farmer groups. Between-group differences in variable scores were tested with generalised linear models using the control group as reference level. The SVFA recruits and applicants' significance levels refer to differences to the control group.

	Farmer group				
	Control group	SVFA recruits		SVFA applicants	
Farm characteristics					
Sample size, n	107	60		79	
Proportion of females	0.03	0.07		0.13	
Farmer age, years (mean)	55	58		57	
Farm size, ha (mean)	197.5	187.7		214.1	
Proportion of organic farms	0.27	0.33		0.34	
Behavioural variables	*Mean*				
Agri-environmental schemes (AES)					
Attitude	5.36	5.54	ns	5.91	**
Subjective norm	4.18	4.20	ns	4.63	ns
Perceived behavioural control	4.92	5.35	*	5.51	***
Self-identity	3.52	4.07	*	4.30	**
Intention	4.45	5.40	**	5.07	*
Unsubsidised nature conservation					
Attitude	4.38	4.90	*	5.28	***
Subjective norm	3.71	3.42	ns	3.96	ns
Perceived behavioural control	4.08	4.59	**	5.95	***
Self-identity	3.50	4.01	*	4.78	***
Intention	4.10	4.80	*	4.91	**

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ns, not significant,

Table 2. Composite reliability (ρ_c), convergent validity (average variance extracted, AVE) and discriminant validity (square root of AVE) for partial least squares path models (PLS-PM) of intention to implement agri-environmental schemes (AES) is presented across the three farmer groups. ATT, attitude; SJN, subjective norm; PBC, perceived behavioural control; SID, self-identity; INT, intention.

Behavioural variables AES	ρ_c	AVE	Pairwise correlations*				
			ATT	SJN	PBC	SID	INT
Control group							
Attitude	0.954	0.909	**0.953**				
Subjective norm	1.000	1.000	0.484	**1.000**			
Perceived behavioural control	0.898	0.801	0.419	0.416	**0.895**		
Self-identity	0.969	0.940	0.469	0.492	0.525	**0.970**	
Intention	0.971	0.943	0.484	0.450	0.624	0.568	**0.971**
SVFA recruits							
Attitude	0.843	0.729	**0.854**				
Subjective norm	1.000	1.000	0.492	**1.000**			
Perceived behavioural control	0.937	0.878	0.346	0.265	**0.937**		
Self-identity	0.947	0.897	0.102	0.306	0.414	**0.947**	
Intention	0.958	0.918	0.424	0.261	0.704	0.408	**0.958**
SVFA applicants							
Attitude	0.976	0.953	**0.976**				
Subjective norm	1.000	1.000	0.477	**1.000**			
Perceived behavioural control	0.858	0.748	0.177	0.358	**0.865**		
Self-identity	0.976	0.953	0.451	0.564	0.498	**0.976**	
Intention	0.948	0.901	0.416	0.538	0.422	0.629	**0.949**

*Diagonal elements present the square root of the AVE, while off-diagonal elements show pairwise correlations between constructs

Table 3. Composite reliability (ρ_c), convergent validity (average variance extracted, AVE) and discriminant validity (square root of AVE) for partial least squares path models (PLS-PM) of intention to implement unsubsidised nature conservation is presented across the three farmer groups. Abbreviations as in Table 2.

Behavioural variables unsubsidised nature conservation	ρ_c	AVE	Pairwise correlations				
			ATT	SJN	PBC	SID	INT
Control group							
Attitude	0.891	0.803	**0.896**				
Subjective norm	1.000	1.000	0.506	**1.000**			
Perceived behavioural control	0.938	0.879	0.459	0.384	**0.938**		
Self-identity	0.963	0.928	0.474	0.306	0.471	**0.963**	
Intention	0.981	0.962	0.526	0.308	0.643	0.551	**0.981**
SVFA recruits							
Attitude	0.920	0.850	**0.922**				
Subjective norm	1.000	1.000	0.405	**1.000**			
Perceived behavioural control	0.928	0.864	0.588	0.399	**0.930**		
Self-identity	0.966	0.934	0.457	0.394	0.468	**0.966**	
Intention	0.965	0.932	0.683	0.470	0.650	0.576	**0.965**
SVFA applicants							
Attitude	0.965	0.930	**0.964**				
Subjective norm	1.000	1.000	0.434	**1.000**			
Perceived behavioural control	0.921	0.853	0.539	0.365	**0.924**		
Self-identity	0.951	0.906	0.536	0.426	0.531	**0.952**	
Intention	0.981	0.962	0.492	0.474	0.611	0.535	**0.981**

Supplementary material: Effects of advisory visits on farmers' intention to implement nature conservation practices – evidence from the Swedish Volounteer & farmer Alliance

Table S1. List of AES practices in the Swedish Rural Development Program 2007-2013 and the unsubsidised conservation actions promoted within the Swedish Volunteer & Farmer Alliance (SVFA).

Practice	Description
Practices in the Swedish Rural Development Program 2007-2013[a] (AES)	
Pasture	Payments to maintain well-grazed, permanent open grasslands without successional plant species
Ley	Payments for leys in crop rotations where these are relatively rare
Uncultivated pasture	Payments as for leys, but where signs of use as pasture were present
Organic production	Payments for restricted use of agro-chemicals in annual crop fields
Nature and culture environments	Payments to maintain landscape elements with nature or cultural value
Buffer zone	Payments to leave/create grass strips to minimize agricultural run-off into waterways
Wetlands	Payments to manage wetlands to improve already existing wetlands.
Reduced nitrogen-leakage	Payments for cultivation of catch crops and employing spring tilling
Reduced pesticide use	Payments for exercising precautionary pesticide usage according to guidelines and for employing nutrient retention strategies
Unsubsidised nature conservation practices promoted in SVFA	
Winter-feeding	Winter-feeding of birds and giving access to grain stock rooms
Game and pollinator habitat	Cultivating cover crops or strips of flowering plants
Bushes and trees	Planting and managing hedgerows, bushes and solitary trees
Bare patches	Create bare, uncultivated patches and leave existing bare patches from water-loggin over the winter
Untreshed patches	Save untreshed patches and/or strips of cereal and clover crops
Nest boxes	Erecting nest boxes at farmsteads and in environments such as groves and gardens
Bird adapted field management	Timing of field management activities (fertilizer and pesticide applications, harrowing and harvesting) to ensure chick survival
Embankments ("beetle banks")	Creating non-crop habitat by establishing in-field embankment strips
In-field islands	Managing in-field islands, *e.g.* by clearing overgrown vegetation

[a]Descriptions of AES practices are adapted from Hiron et al. 2013

Table S2. Presentation of the distribution of the main study respondents across Sweden's six southern-most production regions. This partitioning refer to Sweden's administrative production regions, *i.e.* relatively homogeneous areas regarding agri-ecological characteristics such as climate, topography and soil structure. The random sample was geographically stratified to include the same proportion of respondents, in each production region, as the SVFA sample of farmers.

	Farmer group (n)		
Production region	SVFA applicants	SVFA recruits	Random sample*
1	28	10	35 (1663)
2	12	8	45 (1776)
3	40	24	66 (2401)
4	48	73	86 (3233)
5	18	8	54 (2434)
6	8	5	13 (943)
Σ	154	128	299 (12450)

*Numbers within parentheses show, for each production region, the total number of farm enterprises in Statistics Sweden's directory of farms, from which the random selection was drawn from

Table S3. Presentation of the questionnaire items used to operationalise the behavioural variables/constructs in theory of planned behaviour, including self-identity. All questionnaire items were assessed separately for AES and unsubsidised nature conservation.

Behavioural variable	Questionnaire item	Code	Scale measurement			Source
			1	4	7	
Attitude	I think that AES/unsubsidised nature conservation is:	ATT1	Negative	Neutral	Positive	Ajzen & Fishbein 1980
	I think that AES/unsubsidised nature conservation is:	ATT2	Unimportant	Neutral	Important	
Subjective norm	Most people that are important for me think it is important that I implement AES/unsubsidised nature conservation:	SJN1	Disagree	Neutral	Agree	Ajzen & Fishbein 1980
Perceived behavioural control	For me to implement AES/unsubsidised nature conservation would be:	PBC1	Easy	Neutral	Difficult	Sparks et al. 1997
	How certain are you that you could implement AES/unsubsidised nature conservation?	PBC2	Uncertain	Neutral	Certain	
Self-identity	AES/unsubsidised nature conservation is part of who I am:	SID1	Disagree	Neutral	Agree	Terry et al. 1999
	AES/unsubsidised nature conservation is typical for me:	SID2	Disagree	Neutral	Agree	
Intention	I plan to implement AES/unsubsidised nature conservation in the next two years:	INT1	Disagree	Neutral	Agree	Lokhorst et al. 2014
	I intend to implement AES/unsubsidised nature conservation in the future:	INT2	Disagree	Neutral	Agree	

Table S4. Factor loadings and cross-loadings for behavoural variable items from theory of planned behaviour (TPB) models of farmers' intentions to implement agri-environmental schemes (AES) and unsubsidised nature conservation (UNC). ATT, attitude; SJN, subjective norm; PBC, perceived behavioural control; SID, self-identity; INT, intention.

	Loadings and cross-loadings for items and behavioural variables in multi-group PLS-PM measurement models														
Item	Control group behavioural variables					SVFA recruits behavioural variables					SVFA applicants behavioural variables				
AES	**ATT**	**SJN**	**PBC**	**SID**	**INT**	**ATT**	**SJN**	**PBC**	**SID**	**INT**	**ATT**	**SJN**	**PBC**	**SID**	**INT**
ATT1	**0.970**	0.506	0.468	0.490	0.505	**0.855**	0.475	0.308	0.055	0.314	**0.980**	0.469	0.158	0.434	0.442
ATT2	**0.937**	0.400	0.304	0.389	0.403	**0.853**	0.365	0.282	0.121	0.412	**0.973**	0.462	0.191	0.447	0.366
SJN1	0.484	**1.000**	0.416	0.492	0.450	0.492	**1.000**	0.265	0.306	0.261	0.477	**1.000**	0.358	0.563	0.538
PBC1	0.275	0.301	**0.829**	0.466	0.473	0.364	0.242	**0.916**	0.352	0.600	0.265	0.457	**0.821**	0.468	0.351
PBC2	0.439	0.421	**0.957**	0.486	0.620	0.297	0.254	**0.957**	0.416	0.707	0.073	0.205	**0.907**	0.409	0.379
SID1	0.453	0.449	0.511	**0.965**	0.505	0.046	0.311	0.315	**0.932**	0.303	0.460	0.514	0.482	**0.976**	0.601
SID2	0.457	0.502	0.507	**0.974**	0.591	0.135	0.276	0.451	**0.962**	0.451	0.420	0.587	0.492	**0.976**	0.628
INT1	0.469	0.438	0.623	0.527	**0.967**	0.397	0.243	0.662	0.411	**0.947**	0.471	0.526	0.433	0.607	**0.946**
INT2	0.471	0.435	0.592	0.574	**0.975**	0.415	0.256	0.686	0.377	**0.969**	0.324	0.497	0.370	0.588	**0.952**
UNC	**ATT**	**SJN**	**PBC**	**SID**	**INT**	**ATT**	**SJN**	**PBC**	**SID**	**INT**	**ATT**	**SJN**	**PBC**	**SID**	**INT**
ATT1	**0.893**	0.469	0.384	0.388	0.437	**0.941**	0.340	0.503	0.322	0.651	**0.975**	0.405	0.513	0.504	0.488
ATT2	**0.899**	0.438	0.439	0.461	0.506	**0.903**	0.419	0.595	0.549	0.606	**0.954**	0.439	0.530	0.536	0.457
SJN1	0.506	**1.000**	0.384	0.306	0.308	0.405	**1.000**	0.399	0.394	0.470	0.434	**1.000**	0.365	0.426	0.474
PBC1	0.491	0.360	**0.916**	0.384	0.554	0.552	0.412	**0.915**	0.445	0.622	0.536	0.375	**0.917**	0.521	0.593
PBC2	0.390	0.362	**0.959**	0.486	0.642	0.544	0.338	**0.944**	0.428	0.591	0.462	0.303	**0.930**	0.462	0.538
SID1	0.484	0.312	0.472	**0.969**	0.515	0.408	0.337	0.437	**0.961**	0.495	0.534	0.444	0.491	**0.956**	0.519
SID2	0.426	0.276	0.433	**0.957**	0.549	0.471	0.418	0.466	**0.972**	0.610	0.484	0.365	0.521	**0.948**	0.500
INT1	0.547	0.328	0.623	0.503	**0.979**	0.658	0.454	0.591	0.547	**0.961**	0.493	0.470	0.567	0.509	**0.979**
INT2	0.489	0.278	0.630	0.574	**0.983**	0.661	0.454	0.661	0.564	**0.969**	0.473	0.461	0.627	0.540	**0.983**

Table S5. Standardised estimates, bootstrapped 95% confidence intervals and model fit statistics for multi-group PLS-PM models of intention to implement agri-environmental schemes (AES) and unsubsidised nature conservation (UNC).

	Control group model			SVFA recruits model			SVFA applicants model		
Regression path	Estimate	2.5%	97.5%	Estimate	2.5%	97.5%	Estimate	2.5%	97.5%
AES (Goodness of Fit)		0.671			0.689			0.627	
Attitude → Intention	0.163	0.034	0.319	0.229	−0.059	0.485	0.119	−0.101	0.357
Subjective norm → Intention	0.088	−0.091	0.266	−0.055	−0.273	0.158	0.386	0.132	0.632
Subjective norm → Self-identity	–	–	–	–	–	–	0.439	0.232	0.637
PBC → Intention	0.387	0.197	0.567	0.570	0.344	0.763	0.265	0.010	0.512
PBC → Self-identity	–	–	–	–	–	–	0.343	0.133	0.544
Self-identity → Intention	0.242	0.0826	0.403	0.176	0.010	0.356	0.384	0.106	0.638
UNC (Goodness of Fit)		0.686			0.745			0.550	
Attitude → Intention	0.241	0.089	0.395	0.347	0.078	0.568	0.098	−0.092	0.279
Subjective norm → Intention	−0.053	−0.192	0.090	0.132	−0.057	0.330	0.284	0.061	0.505
Subjective norm → Self-identity	–	–	–	–	–	–	0.426	0.223	0.604
PBC → Intention	0.437	0.267	0.620	0.295	0.050	0.601	0.396	0.129	0.645
Self-identity → Intention	0.244	0.034	0.435	0.215	−0.042	0.470	0.192	−0.112	0.490