The economic contribution of a recreational fishery in a remote rural economy

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Abstract

This paper evaluates the scale of local economic benefits arising from recreational angling tourism in a rural community. The analysis is carried out using survey data of recreational anglers in the remote, coastal village of Waterville in Co. Kerry, south-west Ireland. This region is a popular tourist angling destination as it offers diverse angling opportunities including freshwater angling for species such as salmon and sea-trout as well as sea angling for species like bass and pollack. The analysis estimates the impact of anglers' expenditure on incomes in the Waterville area. The estimated contribution of angling tourism to the local economy in the Waterville area was between €41–58 per trip or €8–11 per angler day. Angler trips, on average, contributed between 0.1–0.15% of mean household income to the local economy during 2015. Regression analysis of angler expenditures indicated that while slight, anglers exhibited higher expenditures in the local area if they were long time repeat visitors and opted for hotel/B&B type accommodation arrangements rather than a privately owned holiday home or camping/self-catering type accommodation arrangement. The expenditure of tourists solely engaged in freshwater game angling was higher than other anglers including those that engage in other local cultural and sporting activities.

Keywords: rural development, trout fishery, angling, economy

1. Introduction

It is commonly assumed that the rural economy is inextricably linked to agriculture, especially in the context of employment and incomes (Hynes et al., 2009). In rural coastal areas fishing as enterprise is also woven into the socio-economic fabric of local communities (Reed et al., 2013). For instance, the European Union's (EU) rural development policy, known as the "second pillar" of the Common Agricultural Policy (CAP), places priority focus on the agriculture and forestry sectors, with negligible reference to other rural based economic activity (European Commission, 2010). Employment in agriculture and forestry account for less than 5%[1] of EU employment and while these sectors may play more important roles in rural economies, neither are necessary precursors for sustainable rural development. For example, in recent research on smart rural development (Naldi et al., 2015) and the resilience of rural communities (Steiner and Atterton, 2015) neither agriculture nor forestry are discussed. The regional growth literature is increasingly of the conclusion that a one-size-fits-all policy for smart regional growth is not effective and that policies need to be both place- and knowledge-based (Tödtling and Trippl, 2005; Barca et al., 2012; Camagni and Capello, 2013; Boschma, 2014), which is consistent with the EU Commissions's 'Barca Report' that policy mechanisms should act on local competences, established regional advantages, knowledge, and innovation (Barca, 2009). It is reasonable to assume that similar conclusions are applicable to small rural areas within a wider region.

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[1]Source: Eurostat Labour Force Survey, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=lfsa_egan2&lang=en

Utilising local competences, knowledge and competitive advantage (which in rural areas are often associated with landscape and natural resources), communities have the means to aid their own rural development (Garrod et al., 2006). Increasingly, farmers and landowners are aware of complementary uses of their land through the provision of hiking access and walkways, with mutually beneficial outcomes to hikers and landowners (Hynes et al., 2007; Buckley et al., 2009; Doherty et al., 2013). Similarly forestry and upland landscapes provide socio-cultural benefits to local communities (Bernués et al., 2014; Grilli et al., 2014; De Meo et al., 2015), as do coastal areas (Barry et al., 2011; Ghermandi and Nunes, 2013; Czajkowski et al., 2015). There is an extensive literature on the economic benefit of recreational fisheries (e.g. Lawrence (2005); Lew and Larson (2012); Raguragavan et al. (2013); Hutt et al. (2013); Yamazaki et al. (2013); Melstrom et al. (2015)) but relatively few studies examine a fishery's contribution to the local economy. Studies assessing economic contribution (e.g. Almaden (2016); Barnes-Mauthe et al. (2013)) generally focus on commercial and artisanal rather than recreational fisheries. du Preez and Lee (2010) is a notable exception, which assesses the economic impact of a recreational trout fishery to the small village of Rhodes, Eastern Cape, South Africa. With a population of approximately 600, the fishery is a tourist angler destination and supports 39 direct jobs within the community. While the economic contribution of each locality-fishery pairing will be unique, such knowledge serves a number of useful purposes. First, it provides the local community with a valuation for the fishery resource. An understanding of the value of a resource is often critical to successfully negotiate for its protection or enhancement. For example, in recognition of the significant income generating potential, the Rhodes fishery study was used to argue for a zoning exemption to national legislation for the eradication of alien trout from South African waters. Second, it provides a metric and example for other communities to develop their own natural resources as a mechanism for rural development. It is not usually feasible to value all recreational amenities but through a benefits transfer methodology (either formal or informal) other rural communities can gauge the value of their own local fisheries. It is also worth noting that highlighting the economic benefits of a resource may help justify its development on monetary grounds but there may be many benefits arising for the community or society at large that are non-market. For example, recent policy documents have stressed the need to include recreational angling target species in Annex I or II of the Habitats Directive species list, or failing this, the designation of waters important to key species as National Heritage Areas (NHAs) (IFI, 2014), reflecting the importance of non-market ecosystem services, such as biodiversity and heritage value, that are associated with certain key species.

This paper aims to contribute to the literature by assessing the economic contribution of a recreational fishery in a remote rural economy. Weithman (1999) provides a review the socio-economic benefits associated with recreational fishing. Benefits include a private benefit to recreational anglers as well an economic contribution to commercial activities associated with the fishery (e.g. tackle shops, guides, accommodation providers). Many studies focusing on the private benefit estimate anglers' consumer surplus (e.g. Shrestha et al. (2002); Pyo et al. (2008); du Preez and Hosking (2011)), whereas the economic importance of recreational fishing is often assessed through anglers' expenditure (Toivonen et al., 2004), as well as its contribution to employment (Radford et al., 2009). It is unusual to find recreational fisheries, such as the Rhodes fishery, where both the contribution to the local economy, as well as, estimates of the anglers' private consumer surplus benefit are assessed (du Preez and Lee, 2010; du Preez and Hosking, 2011). Most other existing economic assessment studies of recreational fisheries, such as Pérez-Bote and Roso (2014) and Morales-Nin et al. (2015), or similar studies of commercial fisheries (e.g. Surís-Regueiro et al. (2014); Sigfusson et al. (2013)), examine the impacts at national, regional or city level, unlike the current analysis where the study area is geographically small, rural and with a population of approximately 1,400 persons. The Rhodes fishery is also located in a small, rural community and similar to the analysis here uses an expenditure survey of tourist anglers to assess the contribution of the fishery to the local economy (du Preez and Lee, 2010).

2. Materials and Methods

Waterville, Co. Kerry is a small village situated in a remote, coastal, and rural landscape in south-west Ireland (N51°50' W10°10'). The nearest large town, Killarney, is more than of 60 kilometres away and 75 minutes travel time. The population of Waterville and surrounding area is approximately 1,400 persons across 535 households (CSO, 2011a). Approximately 58% of the population is in the 18-64 age category with the balance roughly equally

split between children and people aged 65 plus. Just above one-third of the population are in gainful employment, of which 32% work in the agriculture, construction and manufacturing sectors; 21% in commerce, trade, and transport; 21% in professional services and public administration; and the balance of 26% in other activities. Waterville is situated on the 'Ring of Kerry', a well recognised scenic drive around the Iveragh Peninsula and the associated tourist traffic is important to the local economy. Angling is one of Waterville's tourist attractions and includes sea fish angling for bass, pollack, mullet, etc., as well as lake and river angling for salmon, sea trout and brown trout.

The primary data in our analysis comes from a survey of recreational anglers undertaken by Waterville Lakes and Rivers Trust, which is a charitable trust dedicated to the conservation and enhancement of the angling resource in the Waterville area. The survey was administered between late February and early June 2015. Respondents were recruited on-site at various locations across the fishery and requested to complete an on-line survey at a convenient time. The survey was also advertised on several angling websites, including the Waterville Lakes and Rivers Trust's own website. A number of survey biases potentially arise, including issue of endogenous stratification, because the likelihood of being sampled is positively related to the number of trips and duration of trips.[2] However, we cannot control for the biases in the analysis and we do not claim that the sample is representative of all tourist anglers to the Waterville area. The survey includes tourists where the sole focus of the trip to Waterville is angling but for many respondents angling is only one component of a trip that included other tourist activities. Consequently, the survey reflects these different types of visitor to Waterville. In total there were 207 survey respondents, which represents a small but unknown fraction of anglers that visit the fishery during a year. The survey elicited information on frequency and duration of visits, expenditure on angling visits to Waterville, other activities undertaken in the area, and respondent's views on various issues. The analysis here will focus on the expenditure data and particularly expenditure that largely occurs in the Waterville area. While the survey elicited information on all trip expenses, including for example, air fares and other transport costs, the analysis specifically focuses on expenses that benefit businesses in the local economy, which include accommodation, food, and drink, as well as angler related expenses such as guide/ghillie, boat hire, or tackle. A common approach to assess economic impact is to extrapolate survey mean expenditures to the population (e.g. du Preez and Lee (2010); Morales-Nin et al. (2015). Unfortunately, our survey had neither a sampling frame nor is there data on the total number of angler trips per annum so it is not possible to reasonably estimate total angler expenditure within the local economy. Instead, our approach is to use the survey data to estimate mean tourist angler expenditures within the Waterville area. Allowing a margin for labour costs as a share of total expenditure we can estimate the contribution to local incomes on a per angler basis. In large grocery retailers McKinsey & Company (2013) estimate gross margins of 15–20%, with roughly half associated with labour costs. We assume a 7–10% margin for labour costs across all businesses serving tourist anglers in the Waterville area.

As a small, rural location there are no official statistics on the scale of the local Waterville economy so it not directly feasible to compare angler expenditures to local incomes. Instead, we use a spatial microsimulation model to estimate mean incomes for the Waterville area. SMILE (Simulation Model for the Irish Local Economy) is a spatial microsimulation model designed to analyse the impact of policy change and economic development on rural areas in Ireland (O'Donoghue et al., 2012). The model provides projections for population growth, spatial information on incomes and models farm activity at the electoral division level, which is the smallest legally defined administrative area in Ireland. The datasets underpinning the simulated income estimates for Waterville are the Small Area Population Statistics from the census (CSO, 2011a) and the Survey of Income and Living Conditions (CSO, 2011b), which contains income and employment information at the individual and household level. SMILE has been used previously to examine a range or rural policy issues including differences in general practice (GP) medial doctor utilisation rates between urban and rural areas (Morrissey et al., 2008); the impacts of decoupling farm payment under CAP on rural development (Ballas et al., 2006); spatial distribution of family farm income at the small area level (Hynes et al., 2009); and determinants of market income at the small area level (Morrissey and ODonoghue, 2011).

Our angler survey dataset contains 207 survey respondents. We excluded 21 observations comprising anglers that travel home each night on the basis that these potentially include local anglers resident in the community. The

[2] Haab and McConnell (2002) discuss endogenous stratification further detail (p.175).

survey elicited expenditure data via two questions. The first requested non-angling related expenditure and the categories that we used in the analysis include: 'Accommodation', 'Food and drink consumed in cafes/pubs/restaurants', 'Groceries (food and drink purchased and consumed elsewhere)', 'Gifts & souvenirs', and 'Other non-angling related expenditures'. The second question related to angling expenditures and the categories included in the analysis include: 'Angling guide or Ghillie', 'Boat hire/Engine hire/Fuel & oil', 'Purchase of Rods/Reels', 'Purchase of Line/hooks/flies/lures, etc.', 'Natural Bait (worms, squid, frozen fish, etc.)', and 'Purchase of other Angling Related items'. We excluded 'Purchase of Angling Clothing' from the analysis as the question did not specifically exclude items that were purchased prior to travelling to Waterville. Throughout the remainder of the paper expenditure refers to the sum of the expenditure items above, which are expenditures incurred locally in the Waterville area.

Given that angling tourism has the potential increase growth in the local economy, determining the angler characteristics most associated with high trip expenditures may be useful from a policy or marketing perspective. For instance, if higher levels of expenditure are associated to a greater extent with anglers from Great Britain, a marketing strategy for the fishery might wish to focus on those anglers. To undertake this analysis we run an ordinary least squares (OLS) regression of tourist angler's expenditure (per person, per day) on a number of angler characteristic variables. The regression results show which factors are statistically important in explaining the level of angler expenditure in the local area. One of the variables we considered was whether the angler is a repeat visitor, as repeat customers are sometimes considered more valuable to a business. If the associated coefficient is significant and positive it would suggest that they spend more as well. We also control for accommodation and expect that anglers that stay in hotels and guest-houses, for example, spend more than anglers staying in camp sites or hostels. During their to Waterville, anglers also participate in other tourist activities such as sports (e.g. golf, hiking, cycling, horse riding or water sports), cultural attractions (e.g. visiting heritage/archaeological sites, national parks, bird watching), or other activities, which include shopping. The regression results should highlight whether specific activities are associated with higher expenditures among anglers. The final two variables in the regression analysis are the angler's country of origin and their target species. While overseas anglers might be expected to spend more travelling to Waterville, we have no *a priori* expectation on how expenditure in the Waterville area itself might vary by angler country of origin. Waterville's game fishery possibly has a greater reputation among visiting anglers but whether game anglers spend more than others is an empirical question. Summary statistics for the variables used in the regression analysis are reported in the bottom half of Table 1 and the analysis itself is confined to the 168 respondents that had positive expenditures (i.e. anglers reporting no expenditure are excluded).

3. Results

3.1. Mean tourist angler expenditure and local incomes

Survey results of mean tourist angler expenditure in the Waterville area are reported in Table 1. We first review the data on a per trip basis. Mean angler expenditure is €581, comprising 70% non-angler expenditure. What is notable is that the standard deviation is greater than the mean, indicating the wide variation in expenditures. Tourism Development International (2013) (TDI) undertook a national survey of angler expenditures in 2012 but they do not report tourist expenditure per angler in the local economy, as defined in section 2, so it is difficult to compare how expenditures in Waterville compare with national averages. Without being able to control for tourist anglers or for average trip length it is not very useful for comparison.

A more useful metric is to consider expenditure per angler, per day, which controls for varying trip lengths but is not readily available from the TDI study. Expenditure per angler day should be easier to extrapolate to the population, when total angler days is known, as counting angler-days is easier than counting angler trips. With 19 item non-responses on trip duration our estimate of mean angler expenditure is €114/day based on 168 respondents. This estimate of mean expenditure reflects all types of anglers, from dedicated game anglers hiring boat and ghillie services to an occasional sea fish angler casting from the beach. The histograms of mean tourist angler expenditure in Figure 1 illustrate the variance in expenditure across anglers.

Figure 1: Tourist Angler Expenditure, per trip and per fishing day

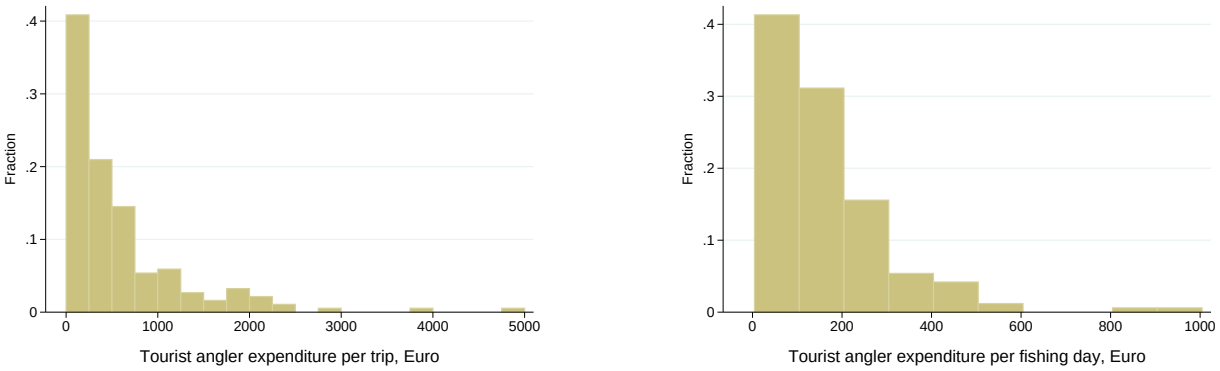

Table 1: Angler Expenditure in Waterville area and other variables

	N	Mean	Standard Deviation	Minimum	Maximum
Total expenditure (per trip)	186	581.8	702.6	0	4825
Non-angling expenditure	186	407.7	543.5	0	4225
Angling expenditure	186	174.1	230.5	0	1500
Variables used in multivariate analysis reported in Table 2					
Expenditure per angler per day	168	113.8	101.4	3	825
Number of visits	168	13.2	8.3	1	22
Years visiting Waterville					
First time visitor	168	0.11	0.32	0	1
Up to 5 years	168	0.18	0.38	0	1
6–15 years	168	0.32	0.47	0	1
16+ years	168	0.39	0.49	0	1
Angler Origin, %					
Ireland/Northern Ireland	168	0.71	0.46	0	1
Great Britain	168	0.21	0.41	0	1
Europe	168	0.06	0.24	0	1
Elsewhere	168	0.02	0.13	0	1
Species targeted, %					
Game species	168	0.93	0.26	0	1
Sea fish	168	0.40	0.49	0	1
Accommodation type, %					
Camping/Caravan/Hostel/Self-catering	168	0.24	0.43	0	1
Guesthouse/B&B/Hotel	168	0.65	0.48	0	1
Own holiday home	168	0.11	0.31	0	1
Trip activities, %					
Angling only	168	0.37	0.48	0	1
Sporting activities	168	0.04	0.20	0	1
Cultural activities	168	0.18	0.39	0	1
Other activities	168	0.40	0.49	0	1

Assuming a margin of 7–10% for labour costs, we estimate the contribution to incomes in the Waterville area to be between €41–58 per trip or €8–11 per angler day. Output from the SMILE model suggests mean income per person in the Waterville area of €15,253 and mean household income 2.6 times higher at €39,458.[3] Calculating ratios this means, on average, that each angler trip contributed between 0.1–0.15% of mean household income during 2015.[4] This relatively large estimate of the contribution to local incomes reflects the fact that this is small community of just over 500 households, with about one-third of the population in employment, and where the size of the local economy is relatively small. Considering the estimate in terms of angler-days, roughly 1,600 angler days are necessary to generate incomes in the area equivalent to mean income per person from the SMILE model. Without data on the quantity of tourist angler trips or days it is not feasible to draw explicit conclusions on the scale of economic impact of the recreational fishery. However, as noted earlier the survey is not necessarily representative of all tourist anglers visiting the Waterville fisheries and therefore caution should be exercised in extrapolating the results beyond the sample.

3.2. Multivariate analysis

The regression estimates of angler's expenditure per person per day is reported in Table 2. The dependent variable is conditional on staying at least one night away from home in the Waterville area and therefore effectively excludes anglers that live locally. Three broadly similar linear models are estimated, using different variable specifications to control for repeat visitors. In model (1) we use number of visits, whereas in models (2) and (3) we use a categorical variable for the number of years an angler has been visiting Waterville. We find that spending increases, as anglers re-visit the Waterville area by about 2% per visit.[5] However, the specification in model (2) suggests that the higher spending is confined to anglers that are long time repeat visitors, of 16 years and longer. With a coefficient of 0.484 in model (2) we can say that such long-time repeat visitors spend roughly 0.5% more than other visitors. We find no statistical difference in variables for other tourist activities, which indicates that anglers who participated in other sports or cultural activities did not spend any more or less than tourists that were solely focussed on angling. The policy implication here is that specialist anglers do not spend any differently than tourists that engage in angling as one of several activities they undertake in the area, *ceteris paribus*. Obviously, in terms of local economic impact the recipients of that spending will vary depending on whether they provide angling or other tourist services. Other specifications of the models (not shown) included an income variable but was not statistically significant. So we found no evidence that high income anglers spend significantly more than others.

Model (3) in Table 2 is a parsimonious model only containing variables that had statistical significance in the models (1) and (2). Across all three models the coefficient estimates on these variables are relatively stable. The statistically significant coefficient estimate 0.401 on the Guesthouse/B&B/Hotel variable indicates that visitors in fully serviced accommodation spend more locally than visitors in camping/caravan/hostel/self-catering accommodations, which is as expected. The unexpected result is that visitors staying in their own holiday home in the locality spend less than visitors staying in camping/caravan/hostel/self-catering accommodations. This result may reflect the possibility that visitors staying in their own holiday home are more inclined to purchase groceries and other supplies prior to travelling to Waterville. The magnitude of difference in both instances is small at roughly 0.5% per person per day suggesting that there are only negligible practical differences in the local spending of anglers staying at different accommodation types in the area. Of the sample, about one-third of anglers targeted freshwater and marine species combined. Those that targeting only freshwater games species spend 0.8% more per day than other anglers. While 0.8% may be relatively small, i.e. €0.91/day, on average across many angler-days it could be substantial for individual businesses, such as tackle shops for example.

[3] We have not adjusted the 2011 income estimates to 2015 values, as the inflation rate was very low during this period and incomes growth negligible.

[4] Our implicit assumption is that income earned in the locality belongs to people that also live in the locality

[5] With the dependent variable expressed in natural logarithms, the coefficients can be interpreted as percentage changes for discrete changes in the explanatory variables.

Table 2: Overnight tourists' expenditure per person per day

Dependent variable/Model: log(expenditure per person per day)	(1)		(2)		(3)	
Number of visits	0.0228**	(2.85)				
Previous visits (Ref: first time visitor)						
Up to 5 years			0.279	(1.13)	0.246	(1.04)
6–15 years			0.302	(1.34)	0.326	(1.50)
16+ years			0.484*	(2.21)	0.507*	(2.37)
Accommodation type (Ref:Camping/Caravan/Hostel/Self-catering)						
Guesthouse/B&B/Hotel	0.373*	(2.44)	0.363*	(2.30)	0.401**	(2.65)
Own holiday home	-0.669**	(-2.79)	-0.539*	(-2.30)	-0.504*	(-2.21)
Trip activities (Ref: Angling only)						
Sporting activities	-0.0142	(-0.08)	-0.0662	(-0.37)		
Cultural activities	-0.110	(-0.73)	-0.148	(-0.97)		
Other activities	-0.0301	(-0.10)	-0.00218	(-0.01)		
Angler Origin (Ref: Ireland/Northern Ireland)						
Great Britain	0.198	(1.28)	0.180	(1.13)		
Europe	0.175	(0.68)	0.201	(0.75)		
Elsewhere	0.574	(1.23)	0.664	(1.41)		
Species targeted (Ref:Both game & sea fish angler)						
Game species	0.766**	(2.98)	0.762**	(2.87)	0.804**	(3.12)
Sea fish	0.243	(1.70)	0.243	(1.66)	0.199	(1.43)
Constant	3.110***	(10.43)	3.096***	(9.86)	3.025***	(10.28)
N	168		168		168	
R^2	0.232		0.219		0.198	

t statistics in parentheses, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4. Discussion

Following the argument of Garrod et al. (2006) that using local competences and competitive advantage is the means for communities to aid their own rural development, as well as, adapting policies to suit local circumstances (Tödtling and Trippl, 2005; Barca et al., 2012), further development of the Waterville fisheries could be a fulcrum against which growth in the local economy is achieved. While the existing survey data provides valuable insight, more data is required, especially on the scale of the tourist fishery, to better inform any decisions on development of the fisheries. Existing research from elsewhere is also relevant and useful. A frequent counter argument to expanding recreational fisheries is that such expansion may be biologically unsustainable but evidence suggests that this is not necessarily so (Greiner et al., 2013; Gupta et al., 2016). The un-sustainability argument usually refers to increased harvest from the existing resource but other eco-friendly actions like natural habitat development, as well as sustainable management and stakeholder practices are also feasible. An expansion in a fishery does not have to equate with higher harvest levels. Waldo and Paulrud (2012) cite lack of fish and lack of large fish to be a primary obstacle to further development of recreational fishing in Sweden. One means to achieve larger and more fish is to introduce 'catch and release' regulations but there is mixed evidence on its efficacy for stock management (Gargan et al., 2015; Detar et al., 2014) as well as on angler behaviour and satisfaction (Olaussen, 2016; Detar et al., 2014; Cardona and Morales-Nin, 2013; Wallmo and Gentner, 2008)

Rather than focusing on catches of large fish and/or many fish an alternative approach is to develop an ecotourism fishery, which takes a broader perspective on fish within their ecosystem. Zwirn et al. (2005) offer guidelines for developing angling ecotourism. Key elements of being an ecotourism fishery is planning and operating within biological limits, and following angling practices that limit fish injury and mortality to sustainable levels. The ecotourism concept includes the need to actively support conservation efforts as well as local economies (Blamey, 2001). Conservation efforts can be funded through fees or permits, as well as business or client donations.

Experience at other Irish fisheries is relevant to fisheries wishing to develop. Solon and Brunt (2006) discuss recreational fisheries on Lough Derg and Lough Corrib and their future prospects and conclude that greater levels of conservation, as well as 'catch and release', are needed to ensure the long term sustainability of the fisheries. The decline in indigenous species in particular has caused a significant diminution in the fisheries' unique selling point to tourist anglers. The issue of water pollution was also of concern to anglers (Solon and Brunt, 2006), which is reflected in reduced game angling demand at sites with poorer water quality (Curtis and Stanley, 2016). Also of critical importance for the development of the fishery is the provision of angler services, especially where anglers vary in target species or skill levels (Solon and Brunt, 2006; Curtis and Breen, 2016).

Looking at the data specific to Waterville we can say that long-term repeat visitors; those targeting game species; and those staying in full service accommodation spend the most locally. Waterville has a number of activities potentially of interest to tourists, including angling, sporting and cultural pursuits. The insignificant coefficients on the sporting and cultural activity variables in the regression model do not imply that these are not important for tourists. Tourists engage in these pursuits, therefore, they are of value to them. The regression only indicates that anglers who engage in these activities do not spend more, *ceteris paribus*, than tourists whose only pursuit is angling. This suggests that 'specialist' anglers spend more on angling than tourists that include angling among a number of pursuits. Waterville has many repeat visitors, with 40% of respondents having visited for 20 years or more. Repeat customers are valuable for any business but the analysis also suggests that these anglers also spend more than other anglers.

5. Conclusions

This paper assesses the economic contribution of a recreational fishery in a remote rural economy. The usual approach for such an analysis is to extrapolate survey results on economic activity to the wider economy. Unfortunately, that was not possible in this instance because the survey data is largely drawn from an intercept survey and did not have a sampling frame. As an alternative approach we compare mean expenditure data with estimates of local area incomes from a spatial microsimulation model. Allowing for a labour margin the analysis finds that, on average, one

day's fishing by a tourist angler contributes €8–11, on average, to incomes in the local economy. Roughly 1,600 angler days are necessary to provide incomes in the area equivalent to mean income per person in the locality, as simulated using the SMILE spatial simulation model. The angler survey underlying these results is not representative of all tourist anglers visiting the Waterville fisheries so an extrapolation of the results requires prudence.

The analysis found that game anglers that are long-term visitors to Waterville and those that stay in full service accommodation spend the most locally. Angling is one of many tourist attractions in the area and the analysis suggests that visitors expenditure does not differ significantly with the number of activities undertaken. Some angling visitors focusing solely on fishing while others engage in a range of local tourist offerings, including sporting and cultural activities. The policy implication is that the level of spending among specialist anglers is not substantially different than tourists who engage in angling as one of multiple activities they undertake in the area. If angling is promoted as a rural development strategy it does not matter the type of angler that is targeted (i.e. passionate versus occasional angler), in terms of their levels of expenditure in the local economy though the recipients of that spending will vary depending on whether they provide angling or other tourist services.

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