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Analysis

Eat Your Fish and Sell It, Too – Livelihood Choices of Small-Scale Fishers in Rural Cambodia

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ABSTRACT

Our paper assesses the effects of environmental income deriving from small-scale capture fishery on household food security in Cambodia. We extend the sustainable livelihood framework to depict the complex relationship between rural livelihood portfolios and food security by (i) distinguishing between in-kind income and cash income from all important household activities, and (ii) considering protein and calorie intake along with anthropometric data to shed light on all four dimensions of food security. The analysis is based on survey data from 600 households in rural Cambodia. Our results underline the importance of fishing for food security across all income quartiles. Furthermore, we establish a positive connection between small-scale capture fishery and child anthropometrics. Against the background of potentially declining fish stocks we find that there are currently hardly any alternatives to fishing for poorer households, who are most dependent on capture fishery. We hence urge policy makers to support livelihood activities that supplement fishing income. This would help to enhance sustainable fish stock management, conserve natural resources and simultaneously prevent growing food insecurity.

1. Introduction

Fishing, a form of environmental extraction, is an important livelihood activity for many households around the world. It is considered especially important for the food security of the poor because fish is easily accessible and rich in proteins and micronutrients (Hortle, 2007; Aiga et al., 2009; Kawarazuka and Béné, 2010, 2011; Belton and Thilsted, 2014). However, in many regions worldwide there is concern if fish will continue to play this role in the future: demand for fish is increasing and natural fish stocks are under pressure. Important factors are overexploitation of fish resources, climate change and changing ecosystems, e.g. due to the construction of dams (Cowx et al., 1998; Welcomme et al., 2010; Grote, 2014; Béné et al., 2016). Particularly small-scale capture fishery communities in Africa and Asia could suffer from declining fish stocks (Welcomme et al., 2010). Thorough understanding of livelihoods in these communities and their relation to food security is needed to adapt fishers' livelihoods to the situation. Alternative livelihood strategies may not completely replace fishing, but combined with other resource management practices they may support existing rural livelihoods and help conserve environmental resources (Martin et al., 2013). By supporting livelihood activities that supplement fishing income, policy makers could enhance sustainable fish stock management and simultaneously prevent growing food insecurity.

The title of our paper reflects that there are theoretically two channels through which fishing as an income-earning strategy may influence household food security: (1) through in-kind income[1] which is equivalent to the home consumption of fish caught, and (2) through cash income from selling fish (Kawarazuka and Béné, 2010). About the first channel, in-kind income, we know that small-scale fishing households consume more fish, that their macronutrient intake is higher and that they are less likely to experience times of lower food intake during the year (Ahmed et al., 1999; Gomna and Rana, 2007; Hartje et al., 2016). However, Fiorella et al. (2014) report that fishing is not associated with higher fish consumption or food security. Instead, they find that fish consumption and food security is related to higher cash income, the second channel. Aiga et al. (2009) also show that higher aquaculture income and higher oil consumption both reduce the risk of child underweight. They conclude that the increased income leads to higher oil intake and thus to reduced underweight. However, this hypothesis has not been tested any further. Also, they do not find a significant relationship between fish consumption and underweight. Béné

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[1] We define in-kind income to be all non-pecuniary income components, i.e. income that is received in goods rather than money, such as payments in rice, or goods consumed from own production.

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et al. (2016) confirm that the evidence on the connection between household fishery and anthropometric data is scarce.

We believe that the validity of previous findings on the impact of fishing on food security could be improved for two further reasons: Firstly, the existing studies normally define households as fishing households if at least one member reports fishing to be a main occupation. However, in rural areas of developing countries fishing needs to be viewed as part of a portfolio of livelihood strategies because livelihood diversification is common (Allison and Ellis, 2001; Allison and Horemans, 2006; Smith et al., 2005). This means that many more households supplement their livelihoods with fishing than those defined as fishing households in previous studies. Secondly, fishing often supplements certain other livelihood activities, such as agriculture (Béné and Friend, 2011; Martin et al., 2013). If activities commonly associated with fishing are not controlled for, resulting estimates may be biased. If other income sources which are typically associated with fishing, such as hunting and collecting activities, are omitted from the regression, the fishing variables pick up this effect.

Our study region lies in Cambodia. The country is cut in half by the Mekong River and as many as 39% of its households have at least one member engaged in fishing (Ahmed et al., 1998; Israel et al., 2007). According to Baran (2005), Cambodia is the most intensive inland fishery in the world with about 20 kg of fish caught per capita annually. Fish plays an essential role in ensuring food security for many rural households through fish consumption and sale. Small-scale fishers in Cambodia sell > 50% of their catch (Hori et al., 2006; Navy and Bhattarai, 2009).

Our paper assesses the effects of environmental income from small-scale capture fishery on household food security in northern Cambodia. Specifically, we answer the following questions: (i) What is the effect of in-kind income from fishing on household food consumption after controlling for all other sources of in-kind income and cash food expenditure? (ii) What is the effect of cash income from fishing on household food expenditure after controlling for all other sources of cash income? (iii) Which livelihood activities complement fishing income-wise and which substitute for fishing? (iv) Is there a connection between income from capture fishery and child anthropometrics? (v) How does the statistical effect of fishing vary across different quartiles of the income distribution? By considering protein and calorie intake along with anthropometric data we shed light on the four dimensions of food security.[2] Furthermore, we depict the complex relationship between in-kind and cash income from fishing and all other activities in the rural livelihood portfolio. Our data allows us to test the hypothesis by Aiga et al. (2009) that fishing does not only affect food security through fish consumption but also through cash income from sale. We also distinguish between effects in different income quartiles to gain more detailed insights into the importance of fish along the income distribution.

We extend the Sustainable Livelihood Framework (SLF) by explicitly modeling the relationship of different forms of income (in-cash and in-kind) to food security. This approach provides a holistic understanding of the role of small-scale capture fishery in food security beyond the scope of previous papers that only relate food security and fishing (Aiga et al., 2009; Fiorella et al., 2014; Kawarazuka and Béné, 2010). Our results improve the validity of the previous results as we control for the outputs of all other livelihood activities that are relevant to the households. Additionally, we gain valuable insights into the current role of the other livelihood activities in food security. Finally, we identify and discuss possible strategies to adapt fishers' livelihoods to reduced fishery outputs maintaining or improving their food security. We use a novel panel dataset of 600 households that we collected in 2013 and 2014 in the province of Stung Treng in northern Cambodia. Our rich dataset combines detailed information on nutrition and food security with comprehensive data on the complete set of livelihood activities of households.

The remainder of the paper is structured as follows: Section 2 deals with the role of fishing in the SLF and its connection to food security. Section 3 describes the study area and the dataset and explains our econometric strategy. Section 4 introduces the results, Section 5 discusses them and Section 6 concludes.

2. Conceptual Framework

The SLF, as portrayed by Ashley and Carney (1999), can be used to describe how households in rural areas of developing countries make decisions about their portfolio of income-earning activities, referred to as livelihood activities. A portfolio of livelihood activities is called a livelihood strategy. The livelihood strategy chosen by a household leads to outputs in terms of cash and in-kind income (e.g. rice from own agriculture). These outputs consequently lead to livelihood outcomes, such as income level or food security, as well as stability or seasonality of these outcomes.

In the SLF a household is endowed with different kinds of capital, such as human, social, physical or natural capital. It decides how to make use of these assets to generate income from different sources, like agriculture, off-farm employment or natural resource extraction. Its choice of livelihood activities is constrained by transforming structures and processes, such as the local government, and by changes in the household's surroundings, for example technological change. When aspects of the SLF, such as natural capital, change, livelihood strategies have to be adapted to generate similar livelihood outcomes.

Yet, the SLF remains unspecific about how exactly livelihood activities are connected to livelihood outcomes, in this case food security. To understand this connection it is important to realize that the outputs of households' livelihood activities, both in-kind and in-cash, are equivalent to household income which is then consumed to reach food security. If a livelihood strategy is adapted to declining natural capital, e.g. fish stocks, and is expected to produce a similar livelihood outcome, i.e. food security, the output of other livelihood activities successful in ensuring food security has to be increased. Alternatively, new activities have to be taken up.

We present a general concept for the connection between livelihood activities and food security based on the ideas formulated by Aiga et al. (2009) and Kawarazuka and Béné (2010) in Fig. 1 and exemplarily apply it to fishing. Small-scale fishers generate a higher level of food security by consuming the fish they catch (paths 1 and 2) (Ahmed et al., 1999; Gomna and Rana, 2007). This means that declining fishing outputs directly affect household food consumption as there is less in-kind income from fish which can be consumed. Additionally, even small-scale fishers may sell a large part of their catch to generate cash (path 3) (Hori et al., 2006; Navy and Bhattarai, 2009). Hence, declining fishing outputs lead to a loss of cash income which could have a negative effect on food spending (path 4), thereby decreasing food consumption (path 5) and consequently reducing food security (path 2). However, since cash income from fish does not necessarily translate into food expenditure (path 6) the effects of cash income on food security are not clear-cut.

Food security only exists when all of its four dimensions are fulfilled: access, availability and use & utilization of food as well as stability of these dimensions over time (Food and Agriculture Organisation (FAO), 1996). Food needs to be accessible so that it can become available through livelihood activities. The first two dimensions can be considered by measuring food intake (FAO, 1996; Maxwell et al., 2014). Beyond food intake, use and utilization of food need to be appropriate: household members may not benefit from food if their bodies cannot absorb its nutrients e.g. due to health issues. Lastly, households depending on agriculture and natural resources need to smoothen their

[2] The four dimensions of food security are availability of food, access to food, use and utilization of food and temporal stability of the former three dimensions (Food and Agriculture Organisation (FAO), 1996).