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OPINION

Driving behavior change among farmers & fishers: Do social networks matter?

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Introduction

Understanding the psychological and economic drivers for human behaviour is important for addressing environmental problems, as human actions play a significant role in causing and exacerbating many environmental issues. For example, overconsumption and waste generation, pollution, and deforestation are all driven, at least in part, by human behaviour. By understanding the underlying factors that influence human behaviour, we can develop targeted strategies for addressing these issues and encouraging individuals to adopt more sustainable practices. Additionally, understanding human behaviour can help us predict how individuals and communities are likely to respond to different environmental policies and interventions, which can inform the design and implementation of effective solutions. Ultimately, a better understanding of human behaviour is crucial for effectively addressing the environmental challenges of the 21st century.

Frequently, behaviour is often seen through the lens of economic considerations where financial gain is seen as one of the main incentives that drive human decisions. While financial gains (or losses) undoubtedly play a significant part in shaping behaviour, other considerations may equally impact behaviour. Adherence with social norms or concerns for personal reputation may yield behaviours that are financially sub-optimal, but reasonable given the socio-cultural context. For example, a person living in a small, tight-knit community may forego profit in favour for maintaining personal standing in the community or a person may be more willing to adopt a certain type of behavior if she/he observes several members of their social network behaving in a specific way, regardless of the cost of that choice. To illustrate this point, we consider human behaviour in two contexts: a) fisheries management and b) water management among farmers. Bio economic models often disregard human heterogeneity and decision-making by assuming that fishers and farmers are perfectly informed rational profit-maximisers [e.g. 1]. From psychological, sociological, and anthropological perspectives, these assumptions may be queried.

Focus on fisheries management

In the context of fisheries, on the information level, one of the fundamental challenges for fishers is to learn the spatial whereabouts of fish stocks and how best to catch or avoid them (depending on quotas). However, perfect information assumes away the problem of finding fish. Exemplifying this issue, Carrella and colleagues [2] show that agents with perfect information behave in very different ways compared with observable data. When building models that capture how people will adapt their behaviour for interventions [3], information is a critical part, as knowledge frames what people are able to do. As such, it is paramount that we understand how people seek out and use information for environmental problems.

On profit maximisation, several studies contextualises this assumption and calls it into question. For example, consistency, sustainability, and neighbourliness may be as important as income when describing motivations for fisher behaviour [4], social forces are important drivers for behaviour in small-scale fisheries [5], and Madsen and colleagues [6] show that fishers consider income, social norms, and their own social reputation when considering where to fish. Fishers have been shown to forego profit due to compliance with social norms [7]. That is, a fisher may reasonably choose to behave in an economically sub-optimal way if it means that they gain respect (or do not lose personal standing) in the social network to which they belong. This makes sense, as social exclusion (especially in smaller communities) can be devastating for a person's life. Thus, maximisation of profit may be a trade-off with competing considerations and might not be a straightforward mechanism. As such, it is paramount that we understand how what considerations drive behaviour for environmental problems.

Focus on water management in agriculture

In the context of farmers, the literature tends to focus on price incentives for enhancing water use efficiency through technology adoption in irrigated systems [8]. Extensive work by Francois Molle, however, has shown that price-based regulation of water demand by farmers in large-scale public surface irrigation schemes has largely failed to reduce water demand [9]. As investments in on-farm irrigation technologies are primarily the choice of farmers themselves, the importance of learning from the behaviour of other farmers within the farming community and whether this influences farmers to invest in irrigation technologies has been largely overlooked beyond the focus on financial incentives [10]. For instance, in India, to incentivise more 'efficient' on-farm crop water use, national and state governments have introduced financial subsidy policies to reduce the cost of purchasing micro-irrigation equipment (e.g. sprinklers, drip, and other technologies) for farmers [11]. However, recent work has found that when farmers learned about the benefits of sprinklers or drip systems from their neighbors, friends, family (both in close physical proximity as well as in more remote locations to their farms) they chose to adopt despite limited access to public subsidies for purchasing irrigation equipment, and other financial and socio-economic constraints [12]. The study argues that social dynamics surrounding the technology choices of farmers is particularly important in the context of irrigation technology adoption. This complements the earlier work of Conley and Udry [13], who presented evidence that farmers adopt surprisingly successful neighbors' practices, conditional on many potentially confounding factors including common growing conditions, credit arrangements, clan membership, and religion.

The role of social networks

In both the farming and fishing cases, social dynamics are critical to understanding how people behave and how they might respond to interventions. Social learning can be defined as processes of "collective learning, reflexive practice, and action" [14]. Pande and Savenije [15], argue for the need to view smallholder systems from a "socio-hydrological" perspective where humans and their environments are inherently "coupled systems" that are dynamic and bidirectional, constantly learning from one another. As future programs begin to consider how to incentivize behavior change around improved climate practices or adoption of more nature-based solutions among rural communities–the role of social networks among farmers cannot be ignored. The challenge, however, both in the case of fishers and farming communities is how do practitioners and scientists alike assess whether a social network effect is present within a community BEFORE they roll out a new intervention (e.g., solutions like Nature based solutions (NBS), technology incentives, fishery permits, etc.)? And if communities of fishers and farmers are highly networked and do learn and adopt behaviors based on their personal networks, how do policymakers integrate this reality into future climate adaptation or NBS programs aiming to change behaviors at scale?

The way forward

To gauge the effect and impact of an intervention, it is critical to understand the interplay between individual characteristics, social dynamics, and contextual features. Models such as Agent Based Models can be useful tools to support policymakers in better understanding how farmers and fishers respond to diverse incentives for technology adoption and related measures to manage growing water scarcity, increasing demand for water in agriculture, as well as in fisheries management. Agent-Based Models are computational models that can simulate complex human-environment systems through explicit functions related to individual actors (e.g. their beliefs about the world and how they make decisions), social interactions (e.g. looking to culturally influential people to guide one's behaviour or learning from others), and environmental features (e.g. socio-political or economic constraints and affordances as well as the physical environment such as biomass location and abundance in fisheries models in or farmland quality and distribution in farming models). They can be used to test the appropriateness of behavioural characteristics [16]. Conceptually, modelers and researchers need to integrate social behavior into modelling and during research application, and validate models based on the ground feedback. Policy design also needs to consider multiple factors driving behavior change that are far more complex than simply economic incentives. For instance, one may consider phasing and scaling information about new technologies and programs through trusted community groups instead of delivering projects directly through public sector agencies, NGOs, or external firms and consultants. These nuanced approaches may then catalyse higher rates of technology adoption among farmers, or the way fishermen and women are incentivized to reduce overfishing, and other related practices by focusing on the diffusion of knowledge through trusted social networks.

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