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*Extended Abstract*

## **The role of information and values in the participatory analysis of social-ecological systems**

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### **Introduction**

Objectivism, supposing that information is ‘out there’ and can be accessed through appropriate research methods, is a valuable and unavoidable initial stance in field work. However, even within an objectivist paradigm, information gathered from field work can never be accepted uncritically, however rigorous the research methodology, since each step of the process from the choice of methodology onwards is driven and circumscribed by the values and beliefs of the participants.

In response to the growing threat of climatic change researchers are increasingly utilising social surveys to access information on human-environment interactions or the operation of “social-ecological” systems, in order to preserve key functions into the future. This paper explores the sources of uncertainty which emerge as simple environmental data transfers from participant to researcher. In particular, it considers the role that values can play in determining the quality of participant-reported quantitative environmental data, presented within the framework of Shannon’s standard communication model.

### **Gathering information from interviews and surveys**

Survey participants have a theory of the world. The knowledge they possess is dependent on this theory [1]. In the philosophy of information, the information exists in a specific level of abstract [2]. Participants’ theories encompass the values – ethical, political, social, and religious – they have developed in their life and work.

The researcher has a different theory of the world. He/she too comes with a framework equally embedded within a set of values, different from those of the participants.

In qualitative research, an interpretative stance recognises the context-dependence of knowledge: *“Interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researchers. Thus there is no objective reality which can be discovered by researchers and replicated by others, in contrast to the assumptions of positivist science”* [3]

What about accessing numbers through interviews and surveys? If an interviewed farmer tells a researcher “my yield was 8.5 tonnes”, what is the status of the “8.5 tonnes”?

To explore the status of apparently simple numerical data we model the data acquisition using the standard communication model due to Shannon [4], consisting of: a message source; encoder; noisy channel; decoder and message destination. Although the validity of using the Shannon model outside its origin in the engineering of telecommunication systems has been contested (see for example [5] and [6]), it provides a convenient structure to explore issues with research data which would need to be addressed, whatever the model.

The supposed ‘perfect’ data exists as the message generated at the source, and we explore what becomes of this message as it travels to the destination where the data is embedded in the work of the researcher.

- Issues with the source (the participants) and the destination (the researcher), including a mismatch between their respective theoretical frameworks, so that the numbers in one can never have the same meaning in the other.
- Issues with the encoding (framing, writing and talking) and decoding (extracting, reading, listening), including the use of different languages, both metaphorically and literally.
- The channel is unreliable.

Our case study is a field study conducted in the Vietnamese portion of the Mekong Delta, which aimed at quantifying the benefits local farmers receive from an environmental service, the deposition of nutrient-rich fluvial sediments during the annual monsoon.

### **A case study: rice farmers in Vietnam**

Accessing quantitative, environmental, data through social surveys has, as a methodology, seen rapid growth in recent years, particularly as a result of approaches such as the Sustainable Livelihoods Framework [7] which are used to evaluate the success of human adaptations to environmental change (see [8], [9] and [10]) by measuring the capital - natural, human, social, and economic - at the disposal of the participant. The work considered here was an expedition to Vietnam aiming to access information on the impact of climate change and changing farming practices on the farmers of the Mekong Delta. In April and May 2014 a native English speaking researcher teamed up with five native Vietnamese speaking researchers to conduct 434 interviews spread across 19 villages and two provinces of the Delta. The interviews were conducted in Vietnamese, with the enumerator asking closed quantitative questions, recording the response in Vietnamese, and later translating and converting it into digital format, before forwarding it to the English-speaking researcher for processing.

Among the information sought from the interviews were: farm size, amount of fertilizer used; depth of sediment following the annual flooding; and crop yields.

We can explore where and how the numbers degrade at each stage of the communication model.

1 Issues with the source (the farmer). The farmer might be thinking of the wrong number for various reasons.

- Estimation factually inaccurate due to misperceiving/mismeasuring quantity at first attempt (e.g. farmers do not have accurate weight measuring instruments, and the rice they measure will not be pure)
- Thinking of the wrong number due to misunderstanding the question. The interviewers were asking questions using technical language common to an academic environment. In some cases farmers would not have been sufficiently familiar with this language and may have purely misunderstood what they were being asked.
- Estimation warped by exaggeration of the past (e.g. when farmers remember rates of change which have negatively affected them they tend to exaggerate when their answers are compared with the government's own data (which of course could be wrong))

2 Issues with coding. The farmer might know the correct number but report it incorrectly for various reasons.

- deliberately increased to 'save face' in front of peers
- deliberately decreased to gain additional 'handouts' from the government
- deliberately altered to impress researcher
- deliberately altered because they think they know what answer the researchers 'really wants'
- deliberately altered to serve a personal agenda they are pursuing
- deliberately made controversial to enhance self-importance
- deliberately altered because the participant doesn't like researcher

3 Noise in the communication channel. The farmer might report the right number but the researcher might receive it incorrectly for various reasons such as mishearing an answer, errors in transcription (a common issue was that survey enumerators would write the answer in the wrong answer box, or not in a box at all), or errors in translation

4 Issues with the decoding or mismatch between the coding/decoding including misunderstanding units. For example, two different units of land area are used, both called Cong. One is the 'new' 1000m<sup>2</sup> and the other is the 'old' 1300m<sup>2</sup> but both are still in use. Also, misunderstanding of what the number signifies. For example, some farmers reported rice in dry weight, as opposed to wet, which substantially reduces the number.

5 Issues with the destination (the researcher). For example, asking the wrong person and/or at the wrong location – perhaps made a mistake when sampling, or just poor understanding of the issue being investigated.

### **Influence of the location of the interviews**

In this section we go in-depth into one error formed during the farmer's coding process. A challenge of overseas fieldwork is that it is not always possible to maintain full control over the execution of the project, and this is particularly the case in Vietnam where the political context can have a strong

influence. The initial aim of this fieldwork project was to run all farmer interviews individually at the farmer's homestead however, due to preferences of the local authority, more than half the interviews were ultimately conducted in large groups. The group setting meant farmers were subject to greater peer scrutiny while reporting their data, but perhaps less governmental scrutiny. This introduced a new potential avenue for the farmer's values to create errors in their reported data.

In order to probe further into the impact of these particular values, some statistical analysis was conducted on the reported data. After controlling for some key factors affecting the yield achieved by rice farmers we found that the binary variable of either an individual or group setting had a significant ( $p < 0.01$ ) correlation with yield, with the group setting increasing the mean yield reported by 0.26 ( $\pm 0.13$ ) tonnes (around 3%).

### **The role of values**

While at first sight, at least, some of the sources of error are accidental (such as mishearing a number), many are also a consequence of value.

The extent to which such sources of error affect the farmer's reported data depends on the difference between what he/she values compared to the researcher values: do they prioritise: honesty/scientific advancement (an ethical concern), fear of authority (political), personal feelings towards the researcher (including racial biases), general pride, or social standing (social).

The difference in values reported in home interviews compared to group discussions demonstrates a second-order impact of values: the data reported by the farmer depends on the farmer's perception of the values of the witnesses.

Almost all of the researcher's errors can be reduced through increasing the time/diligence with which the interviews are conducted. Hence, the magnitude of the error on the researcher's side is dependent on what they value more: accuracy of the data (less interviews but more accurate data) which ensures work will stand up to scrutiny of peers, or statistical operability (more interviews but less accurate data) which may affect whether the work is publishable.

### **Discussion**

Numbers are never value-free. Numbers only have meaning by virtue of their context, and the decision to select one parameter over another already entails implicit or explicit value judgments. The decision to investigate rice farming in the Mekong Delta was embedded in a set of values of the geography department of the University of Southampton, itself embedded in the values of several wider communities. The researcher then identifies the need for numbers, but these numbers have meaning within the abstraction of the research. They do not have the same meaning in the minds of the farmers.

This paper attempts to explore the consequences of the fact that the numbers are embedded in values. Given that the research requires specific data (amount of fertilizer used; depth of sediment; crop yields), it is suggested that the data acquired is unavoidably influenced by the values of the farmers and the society in which they live and work, by the values of the research team, and by the interaction of values of all the actors involved.

In the present context of intensifying environmental change, the use of numbers reporting on human-environment interactions accessed through quantitative surveys is only likely to increase as a

fast and cost-efficient method of garnering information covering large geographical regions and populations. Furthermore those numbers are likely to be utilized by policy makers designing large-scale, expensive and often irreversible, hard and soft interventions in social-ecological systems ('adaptations'). An appreciation of the effect of values on the reliability of the numbers (information) being examined is essential, to avoid catastrophic 'maladaptations'. The communication model implemented above provides a valuable framework, or lens, through which to view the potential sources of bias brought about by values and indeed other factors during the number collection process.

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