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76. Social learning and climate change adaptation in Thailand

by
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The Community Climate Center in Thailand aims to bridge the awareness gap between local people, especially farmers, and experts such as climate scientists, helping them to understand each other's view of the weather and how it is changing. The results include better farming practices, and more understanding by scientists of how climate information is appreciated and used.

Global climate change is often associated with unexpected and extreme events in locally managed socio-ecological systems. Social learning can help us cope with uncertainties, build resilience, and ensure a system's ability to retain its functions when faced with shocks and disturbances (Holling, 1973). Under such complex conditions, the ability of a system to adapt depends partly on access to resources (Smit and Wandel, 2006), but also on its understanding of information: in this case, on the climate and related subjects (Folke et al., 2005). Of particular importance – mostly not addressed in the literature – is the role of cognitive and cultural factors that underpin individual and societal adaptation to climate change (Grothmann and Patt, 2005; Strauss and Orlove, 2003).

The emphasis on human cognition and culture in social learning assumes that social groups vary in their appreciation of what is happening to the climate and themselves. Climate scientists model climate, taking a long-term, globally dynamic, essentially objective perspective. Farmers, on the other hand, conceptualise local weather subjectively and adapt to it within a shorter seasonal or annual timeframe (Hansen, Marx and Weber, 2004). This is why integrating science with local knowledge through social learning is viewed as a valuable exercise (Raymond et al., 2010). However, the cross-cultural differences in perceptions of uncertainty (Wynne, 1992) could themselves shape social learning processes and outcomes. The following sections elaborate on this argument by examining the links between cognition, culture and climate adaptation as they unfold in the Community Climate Center initiative in Thailand.

Community Climate Center: A platform for social learning

Since 2011, the Community Climate Center has served as a platform for collaborative learning between scientists and farmers, and informs their individual and collective responses to climate change. It enables three stages of social learning: generating and verifying local weather information from general circulation models, interpreting and disseminating weather data to farmers, and adapting this information and hybridising it with local systems and practices.

Learning for more accurate prediction

Climate scientists have long struggled to provide predictions of climate change at higher resolution, to inform adaptation at the local level. The Center of Excellence for Climate Change Knowledge Management (CCKM) – an expert climate-modelling organisation in Thailand – has generated local weather forecasts based on weather research and forecasting models. These models use local geographical data to localise the low-resolution forecast data from general circulation models. In addition, the scientists have used the inverse modelling technique to incorporate local data into their weather research and forecasting models, yielding better local estimates. The model forecasts are distributed to the local farmers yearly and weekly via text messages, along with news of special weather events. In return, selected farmers have provided the scientists with information such as weather observations and their level of satisfaction. This information is used as feedback to verify predictions and improve the communication of the modelling results.

Through its interactions with farmers, the CCKM has established practices that differ from scientific norms in a number of ways. The scientists experimented with various data sources and specifications for climate models, and chose between them on the basis of the farmers' evaluation. For instance, they adopted a 10 km resolution that received the highest satisfaction score from the farmers, although the models allow more accurate predictions at higher resolution. Moreover, the scientists have recently changed from the inverse model, which local observations verified, back to the old downscaled model. This is because the farmers found the inverse model's estimations less accurate. According to the scientists, the inaccuracy in these forecasts resulted from errors in the initial observational data.

When communicating with the farmers, the scientists have chosen simplified and deterministic predictions instead of conventional probabilistic terms. For instance, "heavy rainfall expected at the weekend" replaced "60 per cent chance of moderate to heavy rain, a high of 28-30 degrees Celsius expected at the end of the week". However, the scientists run the risk of providing incorrect predictions by specifying levels of uncertainty. If there are too many failed forecasts, the farmers' trust could be undermined. In order to minimise this risk, the scientists have learned, for example, not to use the "moderate" category in predictions, because the farmers only recognise "light" and "heavy" rainfall.

Learning for better adaptation

Farmers have long experienced and adapted to climate change, even without knowing how the climate will change. For example, an increase in buffers against climate change, such as the available water and seed, has allowed rice farming to continue despite unusually dry weather. In rice-based farming communities in north-eastern Thailand, farmers also make short-term weather predictions based on natural weather indicators such as ground lizards and dragonflies. However, the changing landscape of modern agriculture makes it increasingly difficult for farmers to rely on their conventional knowledge. Climate models' predictions have therefore impressed farmers and changed their ways of adapting. They use the annual weather summaries to plan their rice cultivation cycle, and the weekly forecasts to confirm their planned activities. However, not all farmers have access to the forecast data. Their lack of knowledge of mobile short message service (SMS) technology and the disorganisation of the farmer networks have prevented the majority of them from obtaining this information about the weather.

The introduction of climate-related information has led to the resurrection of farmers' knowledge about weather predictions in a new form. This knowledge relies on their objective understanding of climate change by means of observations on a longer timescale and in a restricted, private domain. Those farmers whose task it is to observe and record weather data have started to deduce information from their own graphical representation of the annual rainfall patterns or by collecting figures on these patterns. This is information that they believe is accurate. Their predictions also involve different observations, such as the first day of rain or winter wind in the year, which farmers believe occur in predictable, cyclical patterns over a long period of time.

Information-based learning has also contributed to reducing the adaptability of these cultivation systems. Because the farmers observe that there is a high degree of informational certainty, they follow a specific adaptation that optimises the trade-off between production and survival. Such a planned adaptation diverts their attention from improving their systems' resilience, and away from coping with the remaining uncertainty. This has the consequence that incorrect predictions have caused great damage to their production. An example is the unexpected November 2012 rainfall, which decreased the quality of the harvested rice. Similarly, unpredicted long droughts have caused farmers to bear unnecessary losses from transplanted seedlings.

Conclusion

The example of the Community Climate Center reveals important phenomena whereby science and local knowledge have been integrated through social learning and adaptation. The co-production of knowledge has perversely altered both scientists' and farmers' learning practices, and their perceptions of uncertainty. This has resulted in adaptations that increase their vulnerability to climate change.

Scientists have ignored uncertainty in probabilistic decision-making in order to obtain socially desirable results. Their focus on the subjective accuracy of weather prediction has resulted in the climate information that they provide to farmers being increasingly uncertain. Farmers have not taken this informational uncertainty into consideration in their decision-making. Instead they have shifted to planned adaptation, making them even more vulnerable to the effects of climate change.

Through their planned adaptation, the farmers have inevitably underestimated the risk associated with uncertain information and overestimated their adaptive capacity. The more accurate predictions become, the more inaccurately farmers perceive their risk and adaptive capacity, choosing to depend instead on the highest-probability prediction, and the more adversely they are affected by unexpected climate events.

These findings emphasise the cognitive and cultural gaps in social learning at the interface between scientists and local communities. In facilitating social learning for climate change adaptation, the main challenge is to manage perceived uncertainties in scientific and other learning systems. For example, scientists and farming communities could work mutually to interpret the results derived from climate models. Mutual understanding, rather than the linear communication of climate-related information, is necessary to close these perception gaps and facilitate social learning for climate change adaptation.

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