CASE STUDY
Category: ICTs, Climate Change and Disaster Management

Climate Change, Innovation & ICTs Project

Centre for Development Informatics (CDI), University of Manchester, UK
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Using Mobile Phones to Reduce the Adversities of Climate Change in Rural Nepal

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Initiative Overview

The initiative described in this case is part of a disaster risk reduction project implemented by Practical Action in Nepal, financially supported by the UK's Department for International Development. The initiative aims to build resilience by improving the livelihood assets of vulnerable communities, and the work reported here focuses on the rural communities around Kirtipur in Nawalparasi District in South-Central Nepal.

The villagers rely mainly on agriculture, supplemented by seasonal migration for work. But the lack of technical and other inputs mean that agricultural outputs are limited to subsistence level. Inhabitants report signs of climate change including greater variation in precipitation and higher temperatures in both summer and winter, which is affecting agricultural use patterns and productivity. In addition, the area has a fragile geography, with agricultural and other land subject to flooding; a phenomenon that has been increasing in recent years. With a growing number of mobile phones coming into the area, this initiative sought ways to use these new ICTs to reduce vulnerabilities, including the vulnerability to climate-related disasters, and more generally to improve agricultural livelihoods. It did this by developing a phone-based early warning system allowing upstream and downstream communities to exchange information on flood signs and occurrences. It also developed a list of service providers and traders with whom the farmers could communicate for agricultural and value chain information.

Application Description

In this fragile and climate change-impacted environment, mobile phones have been making a contribution through their role as data communication devices to provide information on three critical areas:

i) **Agricultural practices:** alongside the typical problems of low-productivity agricultural practices and poor access to inputs, farmers in the villages are also reporting – with a presumed link to climate change – the arrival of new pests and diseases about which they have limited knowledge. This has affected the level of outputs because of the novelty of these challenges and the lack of availability of local agricultural technicians. The project provides the farmers with the phone contacts of technical service providers, which they have then used to get advice about treating crops and livestock. They also use this service for more general advice on seed varieties, planting times and methods with the aim of raising incomes and thus reducing vulnerabilities.

ii) **Market prices:** in order to reach the nearest market, farmers in Kirtipur have to walk 10km along a trail and then travel a further 5km by bus. Because of the higher costs of reaching other markets and the complete uncertainty about prices in those markets, farmers would always sell in the nearest market at whatever price the local traders would offer. With climate change and flooding potentially suppressing the level of outputs they could achieve, this was a severe threat to income levels. The project therefore also provided the farmers with a phone contact list of agricultural traders in a number of nearby markets. As a result, not only are they better informed about reasonable market price levels for their outputs, they can also compare prices between traders and justify journeys to whichever trader is offering them the best price.

iii) **Disaster early warning:** flooding – particularly the recent growth in occurrences and severity which is assumed to be linked to climate change – causes problems to the farmers in loss of crops and livestock, inability to access markets when there are landslides, and more general dangers to life and property. The project provided a phone list of key contacts in both upstream and downstream communities. When there is continuous heavy rain, those in the upstream areas phone and warn those in the downstream communities, who are then able to prepare and evacuate livestock, property, family, etc. They also warn about landslides that may block planned transport routes. In return, those in the downstream – more populated, better connected and more commercial – areas, provide information on markets, agricultural practice and development opportunities.

Of course the mobile phones are also used for other purposes – for contact with family and friends, including contact that enable money transfers; and for more formal contacts to government and private sector goods/services providers.

Formal Drivers

Paddy-wheat-maize was the dominant annual crop cycle of the farmers in Kirtipur but it was highly reliant on water for irrigation. Existing irrigation challenges were exacerbated by the recently-changing climate scenario. Longer periods of dry weather between November and May, greater flooding during the monsoon season, and erratic rainfall at other times of the year have all made irrigation problems worse, and have thus reduced crop yields. Villagers reporting all this during a participatory vulnerability assessment (PVA) conducted by Practical Action noted that some farmers were having to leave their land while they waited for rain.

The PVA also exposed the problems of the existing slash and burn system in which land was cleared of natural vegetation, farmed for some time, and then abandoned in favour of new cleared land. This increased the extend of landslides in upstream areas, of destruction by rocks and other debris carried down, and of flooding in downstream areas. Set alongside the problems of market pricing, it became clear from the PVA that there was an important lack of information around the three key areas already identified – agricultural practices, market prices, and disasters. This need coinciding with the growing incidence of mobile phones was the driver behind the project reported here.

Objectives/Purpose for ICT Usage

The project recognised that it was not possible to separate out the role of climate change within either agriculture or disaster management. But, recognising that the effects of climate change will be worse for those with weak livelihood asset bases, the project sought to more generally build the resilience of the communities involved by strengthening their access to information and, in turn, strengthening their productivity and income generation. Along with other interventions, the project promoted the use of ICTs to reduce vulnerabilities – including climate change vulnerabilities – and to help the communities avoid, mitigate and cope with the effects of climate-related disasters, and to adapt to the longer-term changes in the local climate. It aimed to do this by using mobile phones to provide greater access to information on (1) the production and marketing of vegetables, other crops and livestock; and (2) disaster risks.

Stakeholders

The leading actor to this initiative is the local community who were facing challenges to their livelihoods. The work was coordinated at local level by village development committees (the lowest level of local government in Nepal) and was led by "agriculture groups": groups of farmers affiliated with the District Agriculture Office. The international NGO, Practical Action, was the main project motivator, acting as the nodal point for all other stakeholders, and helping to identify and establish the various phone contacts points among the communities, traders, etc. It was supported financially by the UK's Department for International Development. Other than key community members, the main contact points were government-run agricultural and livestock service centres, private vets, and small shopkeepers and traders located in local markets. Contacts with the government agencies were facilitated by officials in the Nawalparasi District Development Committees and District Agriculture Development Office. Implicitly, the telecom service providers are also stakeholders since they provide the mobile phone services utilised.

Impact: Cost and Benefits

One thing the project did not pay for was either the mobile phones or call charges. In general, farmers paid something like Rs.3000-4000 (c.US$40-55) for a mobile phone with GSM/CDMA SIM card. Penetration rates increased to something like one phone per household once the mobile providers had – as part of their already-planned roll-out – placed the area within network coverage.

The project not only provided contact lists but also arranged interactions between the farmers and those they would call: in other communities, traders, agricultural service providers. As noted above, other community members would call and answer calls for free, on a kind of quid-pro-quo basis. Traders were willing to provide information on prices since it sometimes led to sales. Government-owned agricultural service staff made no charge since providing information and advice was part of their job; they also saved considerably through not having to visit Kirtipur, which was almost two hours travel from the district headquarters. Finally, private providers, such as vets, also made no specific charge because they could link this to selling other services to the farmers and could also save on travel time.

In terms of benefits, mobiles therefore helped by providing information that improved agricultural and disaster-related decision-making. They saved money and time significantly in terms of journeys foregone – carrying warnings between communities (not that this happened much in practice before mobile phones); bringing agricultural technical staff to the village; taking the farmers to markets. They also enabled broader benefits – higher yields, higher prices and less wastage of produce – that have lead to income growth. Downstream communities now have a lead time of one-two hours in warning against floods, which has enabled households to save not just valuable documents, belongings, animals, etc but also – and most importantly – lives.

Some wider benefits can also be seen. For example, patterns of farming have changed with more growth of crops overall and particular growth in planting of vegetables and cereals. Again, it has raised incomes particularly thanks to growth of cash crops like vegetables. The use of slash and burn has reduced, which is helping to maintain and regenerate forest cover, increase watershed health, and reduce landslide and flood hazards. In large part these benefits should be attributed to other project components such as the restoration of a dilapidated irrigation channel and direct advice and training sessions from visiting agricultural experts. However, by providing agricultural and market price information, the mobile phones have contributed.

Evaluation: Failure or Success

It seems appropriate to categorise this initiative as a success in terms of benefit obtained from investment. The linkages established last beyond the lifetime of the project and provide more opportunities and enable farmers to build more confidence and social capital. Income from agriculture has been increased particularly from vegetables. Increase in incomes and strengthened livelihood options have paved the way to resilience. Slash and burn has been decreased giving the watershed an opportunity to improve its health. Risk of life and other loss from flooding has been decreased. Of course, the ICT is just one among a raft of elements but it does appear to be helping these vulnerable communities not just avoid and recover from disasters, but also build a deeper adaptive capacity (particularly in relation to information, skills and income) that will enable them to cope better with the longer-term challenges of climate change.

Enablers/Critical Success Factors

The key to understanding success or failure of any project involving ICTs and climate change, is to **understand the motivations of the people** involved. This project has worked well – and seems likely to sustain in future – because virtually all the stakeholders involved derive some benefit from it.

Of course, the hardships faced the communities due to poor agricultural productivity and the damage done by flooding were a strong motivator for the prime beneficiaries and, as seen, the delivery of higher outputs, income generation and some protection from climate-related disasters ensure continued motivation and participation. However, motivating core beneficiaries in a project is relatively easy. Harder is to motivate the secondary stakeholders on whom success of the project still, nonetheless, rests. But in this case, the project does seem to have created a win-win because those other stakeholders – other community members, traders, agricultural service providers, even the mobile providers – find themselves gaining something in return for their involvement: information and/or direct income and/or savings due to foregone journeys.

Technology itself was an important enabler: the project would most likely not have worked if farmers could only get mobile network coverage when they travelled to nearby towns. But more important was the role of technology within the project. Unlike many ICT projects in development, this one **did not invent or introduce anything new**. Instead, it relied on a technology – mobile phones – that were already (albeit quite recently) in quite widespread use within the project area. Instead of the "inorganic" project approach that brings in a new technology from outside, we can therefore call this an "organic" approach that built from the existing foundations. It did not seek to innovate technologically; instead it innovated socially and commercially using the base already present. It did not require a project intervention to cause mobiles to be used in this rural area. But it need require Practical Action's intervention to cause the mobile to be used in a way that facilitated disaster management, agricultural productivity, and longer-term building of resilience to climate change.

Constraints/Challenges

Notwithstanding the point above about mobiles now being an "organic" technology within many developing country villages, the timing of this project just as mobiles were diffusing into the community did present challenges. **Most users were new to mobiles and unfamiliar with them**. The majority of Kirtipur's citizens were illiterate and the phone fascia and any related text were in English, further lengthening the learning curve. Being without electricity, villagers had no access to television – which ran informational broadcasts about using ICTs. Thus it took some time for those involved to become familiar and then confident with using mobiles.

And, notwithstanding the point above motivation of participants, the **validity of some of the information provided was sometimes questionable** but hard for the villagers to assess due to their limited broader knowledge on issues. Information on market prices was not always reliable (for example, sometimes traders did not wish to buy items and so were not motivated to provide a correct price), though comparison across traders could help avoid this problem. And there were concerns about false positives in the reporting of flood dangers. There could be a number of instances of flood warnings being given and leading to households, etc being moved but then no flood ensuing; particularly as there was no objective measurement of rainfall by the upstream communities. Such instance would eventually lead to flood warnings being ignored.

Recommendations/Lessons Learned

The following lessons were learned from this case study:

1) **Mobile phones can form a key foundation** for ICTs' contribution to climate change adaptation generally, including disaster management more specifically. In very many – and an increasing number – of developing country locations, mobile phones are already in place and in use. The work of disaster and adaptational projects therefore becomes not the introduction of a new technology, but the introduction of new ways of using the technology.

2) **Simple applications can still be effective**. At root, this project did little more than providing a mini-phone book for project participants. Yet, given their lack of social capital and their lack of broader knowledge, this had quite a significant impact in providing disaster and agricultural information which then had broader knock-on impacts on livelihoods that strengthened resilience and capacity to adapt longer-term to climate change.

3) The ability to avoid and cope with disasters, and the ability to adapt to climate change depend on many components – assets, institutions, structures – etc. However, **money remains critical**; likely to most important single prophylactic against the vulnerabilities that climate change can intensify. Adaptational projects can therefore benefit if they incorporate income-raising and income-diversifying components, as this one did in relation to agricultural productivity and sales.

4) There are many success factors in a project, but **human motivation** is arguably the most important. If ICT and disaster/climate change projects can provide a good answer to the question, "What's in it for me?" for the key stakeholders, it will be far more likely to succeed. In turn, understanding what will answer that question will often depend on a detailed and participative initial assessments of needs, wants and values.

Data Sources & Further Information

Published and unpublished reports (monthly, quarterly and annually) from the field were the major source of data for this case study. Baseline information was collected using a participatory vulnerability assessment conducted at the start of engagement with Kirtipur. Field verification of the information was done when community meetings and focus group discussion were organised.

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Further information about the project and related resources can be found at: http://www.niccd.org