CASE STUDY
Category: ICTs and Agricultural Adaptation to Climate Change

Climate Change, Innovation & ICTs Project

Centre for Development Informatics (CDI), University of Manchester, UK
With the support of the International Development Research Centre (IDRC)

e-Adaptation within Agricultural Livelihoods in Colombia's High Mountain Regions

Author: Angelica Valeria Ospina

Initiative Overview

The increasing manifestations of climate change – extreme weather events and greater climatic variability – are posing serious challenges to agricultural livelihoods in developing contexts. In countries such as Colombia, the increased frequency and intensity of climatic phenomena such as El Niño and La Niña have caused devastating socio-economic and human damage (RI, 2011). This has demonstrated the need for innovative strategies to strengthen the capacity of vulnerable communities to better prepare, respond and adapt to these effects.

Colombia's agricultural communities have been severely affected by the impacts of climatic uncertainty and volatility. These communities operate within contexts characterised by multiple resource constraints (e.g. lack of economic resources, low levels of education and skills, precarious infrastructure), social and political marginalisation; challenges that are intensified by the geographic remoteness and complex topography of mountainous regions.

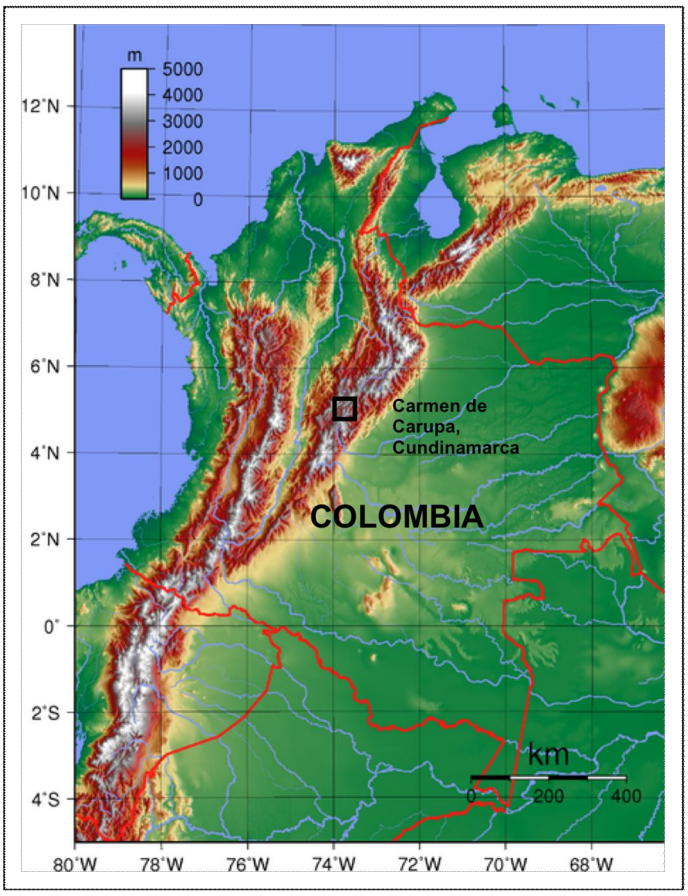

Figure 1: Topographic Map of Colombia. Source: Sadalmelik (2007)

Recognising the need to foster innovative approaches to climate change adaptation within these contexts, the Colombian Corporation of Agricultural Research (in Spanish: Corporación Colombiana de Investigación Agropecuaria, CORPOICA) implemented a pilot project aimed at exploring the role and potential of information and communication technologies (ICTs) to strengthen the adaptation capacity of agricultural communities to climatic variability.

The six-month pilot project was conducted in Carmen de Carupa, a municipality located in the Andes mountain range and thus, characterised by high altitude terrain from 2,600 to 3,400 meters above sea level (Figure 1). Local livelihoods are highly dependent on potato production, and to a second extent on cattle farming for milk production, activities that are highly vulnerable to the impacts of climate change and variability. Potato production in the area has been particularly affected by changing seasonality, more frequent and severe frost episodes, as well as by prolonged drought periods associated with El Niño weather patterns, which affect agricultural productivity.

The selection of the project area was based on criteria that included: the local production system (agriculture-based), the availability of local experience working with participatory research projects, a high degree of community organisation (e.g. active producers' associations), a low degree of impact by the 2011 La Niña weather event but heightened awareness of climatic effects and future uncertainty, previous CORPOICA experience in the region, as well as the accessibility of the location, among others. The project tested and analysed the use of radio and Internet based applications in Carmen de Carupa, and introduced the role of local Youth Promoters of ICT tools for climate change adaptation.

Application Description

In terms of ICT applications, the approach of this pilot initiative was two-fold, as it tested the use of both traditional and emergent ICTs through a combination of community radio and Internet-based applications.

- Four community meetings and a survey conducted among 150 respondents at the start of the pilot's implementation suggested that **radio** was one of the most widespread ICT tools in the region, due to its low cost, high penetration and easy access (particularly by older generations, who constitute the majority of local producers), as well as the flexibility of its use (e.g. potato producers and collectors are used to listen to the radio while they are working in the fields). Further to this, the use of the radio is deeply embedded in the local culture due to the presence of a local station called 'Cristal FM Stereo' that covers the entire area of the municipality, as well as adjacent municipalities (e.g. Ubaté, Cucunubá, Tausa).

  Local municipal authorities provided support in order to secure a space for the transmission of a series of bi-weekly programmes called "On Air With The Fields" (in Spanish: "Al Aire con el Campo") in the local radio station. Each programme had an average duration of 20 minutes. The themes covered during each broadcast were demand-driven, that is, selected based on the issues raised by community members during the four meetings that were held, through an initial in-depth interview survey, and two follow-up surveys that were focused on getting feedback from the radio programme. The contents of each broadcast were prepared collaboratively by local stakeholders and the project team, in non-technical language, and integrating humour and practical examples that producers could relate to.

  Issues covered by the programmes include the concept and impacts of climate change and variability at the local level, agricultural best practices, cattle-farming best practices, as well as the concept and potential of ICTs within the context of the municipality. These topics were addressed by different 'invitees', including agricultural researchers, representatives of local producers' associations, producers and Youth Promoters (Figure 2).

  Project stakeholders (e.g. Youth Promoters, representatives of producers' associations, and

CORPOICA researchers) worked together in the production of a musical 'jingle' for 'On Air with the Fields' (composing a melody that was memorable for the listeners), as well as in dissemination activities. In order to complement the issues addressed through the radio programme and to broaden the reach of the messages, the broadcasts were documented through a set of hard-copy booklets, written in user-friendly formats and images, and distributed in the area.

Figure 2: Youth Promoter Broadcasting the Programme 'On Air With The Fields'

- The use of the **Internet** was also identified as a key component of the pilot's approach, based on the increasing availability of computers in local schools, as well as the high interest and motivation of youth in using these technologies. The integration of Internet-based applications was done mainly through the "Youth Promoters", a team of local youth that was trained, among other skills, in the management of Web-based information, the use of e-mail, the use of the Web as a repository of information, as well as basic aspects of Web design and video production. As a result of the training provided by CORPOICA, the Youth Promoters created and managed a project e-mail address used to coordinate activities and exchange information with team members, and designed a project Web page (https://sites.google.com/site/procarupa/) describing the main objectives and activities of the project, the context of implementation, and their role as 'promoters' (group pictured in Figure 3). The Web site allows visitors to download "On Air With The Fields" programmes, and provides a link to a YouTube channel (http://www.youtube.com/user/CarmenDeCalupa) created by the Youth Promoters to share local experiences and raise awareness on the impacts of climate variability in Carmen de Carupa.

Figure 3: Group of 'Youth Promoters' Accompanied by the Leader of a Local Producers' Association

Formal Drivers

Sources in the field suggest that, especially during the last decade, hydro-meteorological hazards of small and medium magnitude have increased in countries such as Colombia (Ruiz Murcia, 2010; RI, 2011). Given its geographical location, prevailing development challenges and high heterogeneity in terms of topography, climate, ecosystems and biodiversity, this country is at the forefront of the effects of interannual climatic variability. These effects include changes in the length, frequency and severity of dry and rainy seasons, as well as the occurrence of extreme events (Baethgen, 1997, IDEAM, 2010). While in the past local producers could identify with a high degree of certainty the months of the year when they could expect higher levels of precipitation or drought, testimonials gathered through community meetings and surveys indicate that the occurrence, duration and strength of those periods are increasingly uncertain.

At the same time, longer term climatic manifestations such as the loss of snow-covered areas and moorlands, temperature increase and changes in patterns and volumes of precipitation, among others, are posing serious challenges to the country's adaptation capacity (WB, 2009; IDEAM, 2010). With approximately 39% of its land dedicated to agriculture (WB, 2009), Colombia's rural livelihoods are particularly vulnerable to these fluctuations, as periods of unusually intense or unpredictable floods and drought have devastating impacts on crop productivity and food security.

In mountain communities such as Carmen de Carupa, the occurrence of more frequent and intense El Niño periods has negatively affected the production of potatoes (e.g. due to the erosion of the soil, the loss of nutrients, the spread of plant diseases, among others) as well as cattle farming activities (e.g. due to decreased pasture and increased disease among the animals, among others), ultimately

weakening local livelihoods. Within most rural areas, particularly those located in high mountain regions, the availability and access to relevant information and knowledge to cope with these impacts is very limited, and the provision of connectivity is still precarious.

While an increasing number of climate change adaptation initiatives is being implemented in the country, the use of ICTs has been, for the most part, secondary to other tools and approaches, not acknowledged or integrated explicitly into the projects' strategies. Thus, this pilot project emerged as a response to the need of addressing the increasing challenges posed by climatic variability within vulnerable agricultural contexts in Colombia from an innovative perspective, one that explores the role of ICTs as part of an integral approach to address challenges related to the creation, management and dissemination of information that is relevant to the adaptation of local livelihoods.

Objectives/Purpose for ICT Usage

The aim of the pilot project was to contribute to the design and implementation of innovative strategies to strengthen the adaptive capacity of Colombia's agricultural sector to the impacts of climatic variability, through the use of ICTs. The specific objectives were:

1. To identify the information needs of the selected location, in order to focus the project's implementation on content and applications that help strengthen local perceptions on the challenges posed by climatic variability.

2. To test and analyse the use of selected ICT applications, including their role in the creation, dissemination and appropriation of relevant information.

3. To identify the challenges faced within local production systems, as well as the potential role and contribution of ICTs.

The role of ICTs was closely linked to addressing the prevailing information needs and priorities of local agricultural livelihoods, more specifically in regards to the effects of climate variability on production systems, as well as perceptions on the need to adjust and adapt to those effects.

Stakeholders

The stakeholders that participated in the project's implementation can be categorised around three main axes:

a. Lead Organisation: CORPOICA, a national research organisation linked to Colombia's Ministry of Agriculture and Rural Development.

b. Local Youth Promoters (Knowledge Infomediaries): The "Youth Promoters of Adaptation to Climatic Variability Using ICTs" (in Spanish: "Promotores Juveniles de Adaptación a la Variabilidad Climática Mediante el Uso de TICs") consisted of a group of local youth (ranging from 18 to 23 years old) that implemented and fostered the project in Carmen de Carupa, interacted with local stakeholders on a continuous basis, collected information (e.g. via surveys, interviews, videos and photographs) and promoted the use of ICT tools to adapt to the impacts of climatic variability at the local level. The selection of these knowledge infomediaries was conducted through an open call for applicants in the municipality, followed by a competitive selection process that involved two stages of practical tests and interviews. In addition to their age, selection criteria included having a high-school diploma, being originally from and residing in Carmen de Carupa, having experience of and being able to demonstrate engagement in community-based activities, and having strong communication and leadership skills, among others.

The candidates selected were engaged in the project through a contractual agreement for the duration of the pilot. They received basic training by CORPOICA experts in the three key areas that intersect

the project, namely (a) productive systems, agricultural and cattle farming best practices, (b) climate change and variability, and (c) ICTs (radio and Internet-based applications). The group also received training in basic research skills (e.g. survey design and application, and analysis of findings) and in the preparation and delivery of radio programmes and public presentations.

c. Local Stakeholders: These included local producers' organisations (Asoagroalizal), the local radio station, the Mayor of the Municipality, potato producers (land owners or tenants of productive land) and field workers (i.e. potato collectors, working on a daily basis for producers), cattle farmers, traders of agricultural inputs (e.g. fertilisers, seeds), as well as other actors interested in environmental issues (including representatives from the Local Committee for the Prevention and Attention to Emergencies and Disasters, CLOPAD, and the Municipal Unit of Agricultural Technical Assistance, UMATA, and the local priest, who participated in some of the meetings).

The project stakeholders and the main activities involved in their two-way interactions are reflected in Figure 4.

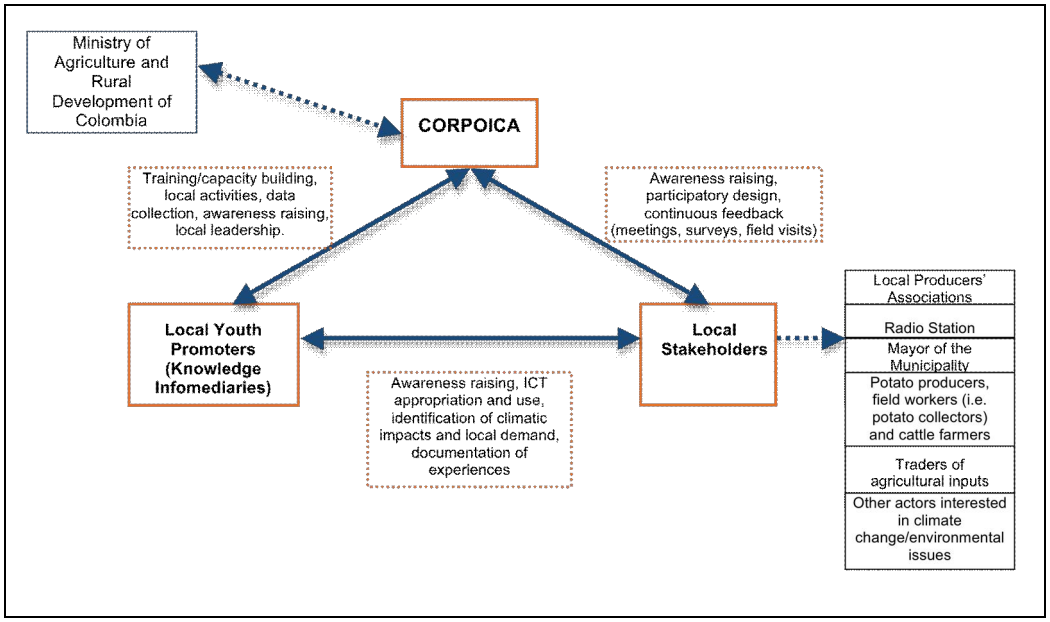

Figure 4: Map of Project Stakeholders. Source: Author

Impact: Cost and Benefits

The primary investment by CORPOICA, the implementing organisation, was approximately US$30,000. This amount does not include the proportional salaries of the senior research staff from CORPOICA who were involved in the project (e.g. project leader and main investigator), but it covers the support staff (e.g. junior researcher), the cost of local meetings with community stakeholders and field visits, the training and monthly stipend of the Youth Promoters, the implementation of two surveys in the municipality, as well as the engagement of an external project advisor. There were no costs associated with the radio programmes, given that there was a partnership with the local radio station and the production was conducted with the support of CORPOICA's communication experts.

The assessment of this initiative is based on that fact that it was designed as a *pilot* experience, with a very limited implementation period (six months), and therefore, a limited scope in terms of expected impacts. While the timeline and exploratory nature of the experience did not allow a conclusive identification of changes in the adaptive capacity of the target community, the pilot was successful in terms of providing useful lessons that can be considered by future projects at the intersection of climate change/variability and ICTs within rural agricultural contexts.

The pilot provided a series of methodological guidelines for the design and implementation of projects

in this field, which can be adapted and used in future initiatives (including criteria for the selection of the project's location, methods for the identification of local climate change priorities, information needs and ICT tools, as well as a training module for Youth Promoters at the intersection of agricultural practices, climate variability and ICTs).

The project also opened new and strengthened existing communication channels between key actors from the macro, meso and micro levels that are already working or are interested in climate change/variability related topics in the municipality (e.g. CORPOICA, several producer associations, producers and community members).

The active engagement of producers' associations and local stakeholders through meetings and events, as well as the role played by the local Youth Promoters evidenced the importance of knowledge sharing and networking. But it also evidenced that further efforts need to be made in order to improve inter-scale communication channels (between macro, meso and micro level stakeholders) as well as inter-generational knowledge exchange between the local elders and youth, particularly around climate variability and the improvement/adjustment of agricultural practices.

Data gathered throughout the project (e.g. through two surveys focused on the usefulness of the radio programmes conducted among three hundred respondents, feedback gathered at four community meetings, key stakeholder interviews and two final workshops to disseminate the pilot's results, one in Carmen de Carupa and one in Bogotá) suggests that project activities were successful in raising awareness on the importance of implementing innovative approaches to tackle the challenges posed by climatic variability within agricultural contexts, integrating ICTs and productive priorities.

Figure 5: Group of Potato Workers of Carmen de Carupa

In terms of its specific objectives, the project was helpful in giving visibility and generating discussion around the use of ICT tools within agricultural livelihoods impacted by more frequent and intense climate events. It also helped in identifying information needs related not only to meteorological and

climate-related information, but also to best productive practices in order to prepare and adjust local livelihoods facing increasing climatic uncertainty. The project tested and analysed the use of two ICT applications (i.e. combining traditional tools such as the radio, with more 'modern' ones such as the Internet), as well as the creation and dissemination of appropriate content at the local level.

Through a series of participatory meetings and events, and particularly through the role of the Youth Promoters, the project was able to identify the key challenges faced by the local production system (including those intensified by climatic variability), raise awareness and identify needs in regards to good agricultural and cattle farming practices, as well the main areas where ICTs could contribute to adaptation.

Additionally, the implementation of the pilot helped consolidate CORPOICA's strategy for technology transfer, as well as to test communication channels and methodologies to reach new audiences (i.e. field workers and small potato producers, pictured in Figure 5). It also helped strengthen CORPOICA's collaboration with the local municipal authorities (i.e. the Mayor and his team of advisors), fostering future interactions in the design of the municipal development plan in regards to agricultural issues.

At the time of writing, CORPOICA was exploring the possibility of funding a multi-year project integrating ICTs and climate change variability in rural agricultural regions, based on the results and experiences derived from this pilot.

Enablers/Critical Success Factors

- The role of local **Youth Promoters** or knowledge infomediaries was key to ensure the appropriation of project activities at the local level. Being from the municipality, the youth had an 'insider's' understanding of local actors and challenges, were familiar with local customs and the local language, and had the trust of local actors, which facilitated the process of data collection (through surveys and interviews) as well as the provision of support with the use of ICT tools. Their role was supported locally by leaders of key producers' associations who helped foster the role of the promoters and facilitated access to information.

- The adoption of a **productive systems perspective** throughout the project's implementation ensured a close link between the local productive system/agricultural livelihoods of Carmen de Carupa, the impacts of climatic variability at the local level, and the use of ICTs. This approach facilitated the understanding of the project by local stakeholders and the engagement of a wide set of actors, who felt that the project responded to concrete issues and needs related to their livelihoods.

- The production of **relevant content** (e.g. addressing local needs and priorities, using user-friendly language and formats) was a constant priority throughout the project's implementation. Community meetings, workshops and surveys were conducted in order to gather local inputs on key priorities and concerns, which were then used as the basis for the radio programmes and the design of the project's Web page. In terms of content, the pilot's approach was bi-directional, providing and disseminating information but also training and supporting the role of Youth Promoters in the creation of local content and in the dissemination of their experiences through the Web page and the radio programmes.

- The use of a **multi-stakeholder approach** was very valuable in order to ensure local support for the pilot's activities, as well as for integrating different views and priorities in the design of the project activities. This approach was reflected in the partnership with the local radio station, the fact that the themes covered by the radio programmes were based on the producers' demand gathered through surveys, the continuous support of local producers' associations, and the participation of a varied set of community members in each of the meetings and events that took place during the project. The fact that the project's approach was not limited to potato producers (as most agricultural projects implemented in the region) but also engaged associations, youth, field workers, the radio station and other actors

interested in environmental issues, constituted a novel approach that generated interest and community engagement.

- The **trust and credibility** of the lead organisation, CORPOICA, and the fact that it already had experience working in the region, were critical factors in the project's implementation, particularly considering the short timeframe available to conduct the activities. CORPOICA is a respected actor in the municipality, with a solid reputation in agricultural research and technology transfer, which contributed to the support and engagement from local actors.

Constraints/Challenges

- From the ***operational*** point of view, one of the main constraints faced by the project was the **limited timeframe** for implementation. Ensuring community awareness and understanding of the project, and gathering local feedback required more time than initially projected, given that the topic of ICTs for development and climate change were very new to the community. As the initial stage of building the project's foundation and partnerships at the local level was extended, less time was left for the testing and assessment of ICT applications.

- From the ***strategic*** point of view, the **management of multi-stakeholder** relations is complex, and can divert valuable time away from implementation activities. A careful balance has to be reached between the establishment of partnerships with key actors, and preventing project activities being politicised or used in favour of individual agendas. Building local partnerships required weekly visits to Carmen de Carupa by CORPOICA staff, which is approximately three hours by car from the organisation's headquarters. The need for continuous travel sometimes became challenging for team members, whose work agendas included other projects and responsibilities.

- From the ***implementation*** point of view, the project faced challenges in terms of the lack of **connectivity** in the area selected for the pilot, as well as in the lack of **local capacity** in the use of certain applications (such as the Internet), which ultimately limited the extent to which some ICTs could be tested during the timeframe of the project. For example, the absence of Internet connectivity in the local school limited the possibility of providing capacity building sessions or practical demonstrations of Internet-based applications for community members. At the same time, low levels of literacy and the basic use of mobile applications (in most cases limited to making and receiving calls) restricted the viability of using text messages to disseminate project information. While the use of the **radio** allowed a broad dissemination of project activities, real-time two-way interactions with the audience did not take place during the programmes' broadcasting. This was related to the fact that most programmes had to be pre-recorded due to time or travel constraints of the weekly invitees. Additionally, while the Youth Promoters continuously gathered feedback from the community on key issues and priorities to be addressed during the radio programmes, the limited time for implementation did not allow a measurable contribution of these programmes to local adaptive capacity or skills.

Recommendations/Lessons Learned

The key lessons learned and recommendations from the project for future initiatives in the field are:

1. Local productive systems are the starting point for livelihoods' adaptation. The adaptive capacity of the agricultural sector to climatic variability is closely linked to the ability of local producers to adjust their productive activities, in terms of changing the production inputs (e.g. fertilisers, disease control mechanisms, seed varieties) or outputs (e.g. market insertion and product distribution), or even the re-location of their productive activities to more favourable locations. Thus, acknowledging the flow and needs of the local productive systems, as well as the impacts of climate change and variability (among other stressors) in those systems, constitutes the starting point for the design of e-adaptation strategies (Ospina & Heeks, 2010).

2. The active engagement of a trusted institution(s) is critical in the promotion of ICTs' role in the adaptation field. The role of institutions (from national level research institutions like CORPOICA, to local producers' associations) in projects at the intersection of the ICT, climate change and development fields is multi-fold: on the one hand, they enable access to key resources required for adaptive actions (e.g. capacity building of infomediaries, access to new information on agricultural practices, access to traditional knowledge from community elders), and on the other, they strengthen their own institutional capacity to deal with the challenges posed by climate change (e.g. through new skills/expertise on climatic impacts and ICTs, increased flexibility and understanding of local contexts, new partnerships and channels of communication/networking). Thus, the design and assessment of projects in the e-adaptation field should aim at building not just the adaptive capacity of the target population/community, but also the adaptive capacity of the implementing organisation(s).

3. The implementation of e-adaptation projects involves multi-scale interactions (i.e. between actors at the macro, meso and micro levels), **multi-sectoral interactions** (i.e. inter and intra sectoral interactions), as well as **multi-temporal interactions** (i.e. between new and traditional knowledge sources).

Therefore, **e-adaptation practitioners** should aim at integrating the role of ICTs at three levels:

(a) Information and knowledge exchange between actors at the international, the national and the local level.

(b) Information and knowledge exchange between actors from different sectors (e.g. between the Ministry of Agriculture and universities or private sector firms), as well as collaboration and exchange among actors from the same sector (e.g. between the Ministry of the Environment and the Ministry of ICTs).

(c) Covering the impacts of climate change and variability in the short and the long term (e.g. acute impacts such as floods or extreme frost, as well as chronic impacts such as temperature rise); as well as inter-generational dialogue (i.e. between elders and youth) in order to foster more inclusive and sustainable approaches to adaptation, facilitated by knowledge infomediaries, and based on the use of new and traditional knowledge.

These interactions are reflected in Figure 6.

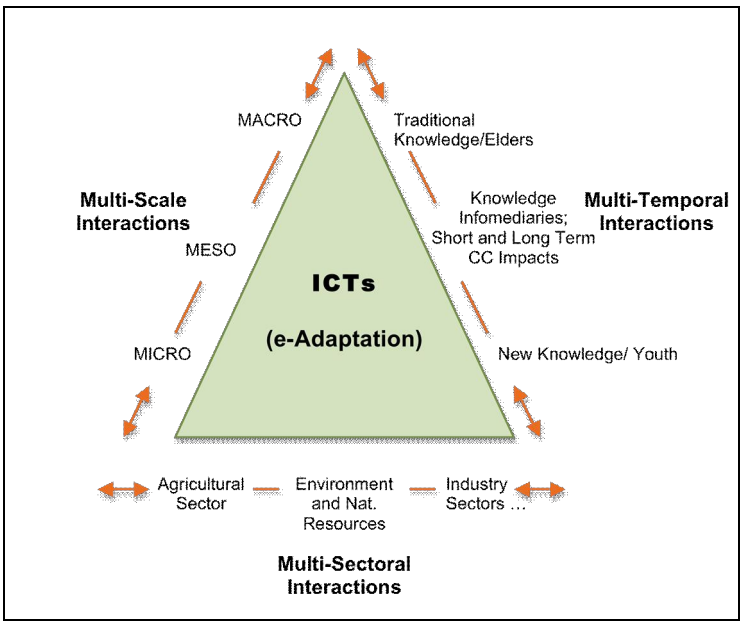

Figure 6: Interactions Involved in ICT-Enabled Adaptation (e-Adaptation). Source: Author

4. A flexible approach for selecting and combining new and traditional ICTs (e.g. radio and Internet-based applications) is key for the success and the sustainability of e-adaptation projects within vulnerable settings. Practical approaches should build upon partnerships with local organisations that have ICTs (e.g. radio stations, schools, telecentres) in order to benefit from the potential of available infrastructure and contribute to the sustainability of activities (post-project implementation). e-Adaptation projects should also consider the integration of interactive, bi-directional applications that allow for real-time exchange among project stakeholders (e.g. mobile-based applications and Web 2.0 tools).

Data Sources & Further Information

The case study is based on the experience of the project titled "The Role of ICTs in the Strengthening of Adaptation Capacity to Climate Variability in Colombia's Agriculture", a pilot initiative implemented by CORPOICA (a public institution, responsible for generating scientific knowledge and technological solutions through research, innovation, technology transfer and capacity building, in benefit of Colombia's agricultural sector. http://www.corpoica.org.co).

The author was engaged in the project in an advisory capacity. The preparation of the case study was based on review of project documents, key informant interviews, observation and community meetings in Carmen de Carupa, the analysis of two surveys conducted among local stakeholders, as well as feedback provided by the CORPOICA project team.

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For further information:
- Author: Angelica Valeria Ospina, University of Manchester, UK: angelica.v.ospina@gmail.com
- Guillermo Carvajal Rojas, Corpoica, Bogota: gcarvajal@corpoica.org.co

References

Baethgen, W. E. (1997) 'Vulnerability of the Agricultural Sector of Latin America to Climate Change', *Climate Research,* 9:1-7.

CORPOICA. (2012). *Colombian Corporation of Agricultural Research* [Corporación Colombiana de Investigación Agropecuaria] CORPOICA, Bogotá, Colombia. http://www.corpoica.org.co

IDEAM. (2010) *Second National Communication to the United Nations Framework Convention on Climate Change* [Segunda Comunicación Nacional ante la Convención Marco de las Naciones Unidas sobre Cambio Climático]. Institute of Hydrology, Meteorology and Environmental Studies [Instituto de Hidrología, Meteorología y Estudios Ambientales], IDEAM, Bogotá, Colombia http://www.cambioclimatico.gov.co/

Ospina, A. V. & Heeks, R. (2010) *Linking ICTs and Climate Change Adaptation: A Conceptual Framework for e-Resilience and e-Adaptation*. Centre for Development Informatics (CDI), Institute for Development Policy and Management (IDPM), University of Manchester, Manchester, UK. http://www.niccd.org/ConceptualPaper.pdf

RI. (2011) *Surviving Alone: Improving Assistance to Colombia's Flood Victims*. Refugees International (RI), Washington DC. http://www.refintl.org/sites/default/files/Surviving_Alone_FINAL2.pdf

Ruiz Murcia, J. F. (2010) *Climate Change in Temperature, Precipitation and Relative Humidity for Colombia Using High Resolution Meteorological Models* [Cambio Climático en Temperatura, Precipitación y Humedad Relativa para Colombia Usando Modelos Metereológicos de Alta Resolución], Institute of Hydrology, Meteorology and Environmental Studies [Instituto de Hidrología, Meteorología y Estudios Ambientales] IDEAM, Bogotá, Colombia.

Sadalmelik (2007). Topographic Map of Colombia. http://en.wikipedia.org/wiki/File:Colombia_Topography.png

WB. (2009) *Country Notes on Climate Change Aspects in Agriculture*: World Bank (WB), Washington DC. www.worldbank.org/lacagccnotes

EDITOR:
Richard Heeks

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

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