Climate Change as a Strategic Priority for ICT4D Organisations:
Current Attitudes, Responses and Needs

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Executive Summary

This paper considers the extent to which climate change has become a strategic priority for information and communications technology for development (ICT4D) organisations. Through a survey of 30 ICT4D organisations primarily from developing countries, as well as an overview of the thematic interests of authors participating in a recent publication on ICTs and environmental sustainability, it shows that there is a predominant interest in adaptation strategies in developing contexts. However, it also supports the argument that widespread, tangible ICT interventions at the local level are not yet being felt. This is due to many reasons, including capacity issues in organisations, the fact that many organisations are still positioning themselves appropriately in the field of ICTs and climate change, and unsupportive institutional contexts.

The paper argues that while ICT4D organisations can leverage past competencies in addressing climate change in developing countries, climate change presents an atypical advocacy scenario, which makes direct engagement in the field difficult for some and may affect decisions around strategic interventions. It goes on further to tentatively suggests that while adaptation strategies in the most vulnerable contexts are critical, interventions in the field that support ICT4D organisations should guard against overdetermining strategic engagement, given the heterogeneous nature of ICT4D organisations, and the fluidity of their engagement across different fora and platforms, from the local to the global level. In this regard, the most effective strategic response to climate change from ICT4D organisations is likely to be specific to their key competencies and organisational strategies and mandates generally, rather than geographically predetermined.

1. Introduction

The recent literature review of information and communications technologies (ICTs), climate change and development by Angelica Ospina and Richard Heeks[1] points to a clear role for civil society organisations at many levels of climate change response, including advocacy, information dissemination, helping local communities adapt, and providing a voice for affected people. Something of the 'communications response' by organisations that use ICT for development (ICT4D) specifically in the context of climate change has been documented in publications like *Planting the Knowledge Seed*.[2] This includes case stories that share the potential for interactive community radio to bridge the divide between scientific knowledge and local communities; using Web 2.0 tools to create 'knowledge systems' aimed to "increase community resilience through increased awareness";[3] using telecentres as information key points in the struggle for food security in Peru; online campaigns to raise awareness amongst media practitioners about climate change issues; and introducing ICTs to small-scale farmers. As Kalas points out,[4] many of the best practices learned in ICT4D interventions over the years can be applied to climate change, and this experience is seen as the main contribution of ICT4D practitioners to the complex and myriad responses to climate change currently being felt at most levels and across institutions and sectors.

Many ICT4D organisations have been active at the interstice of ICTs and environmental sustainability at least for the past three decades. The pioneering role organisations across the globe – such as GreenNet in the United Kingdom, Pegasus Networks in Australia, and SANGONeT in South Africa – played in the early Internet in those countries, meant that many served a critical historical function in linking up social and environmental activists, some as far back as the 1980s. Instituto Nupef offers this account of the development of the Internet in Brazil:

> Few people know that the origins of the Brazilian Internet are deeply connected to the environmental movement and that its use has played a key role contributing to the growth and strengthening of networks of NGOs working in the field of environmentalism and sustainable development. In fact, the access to the Internet was made possible to a wider public in the country during the preparatory process for the Earth Summit in 1992 – before that moment, Internet access was restricted to some academic centers or via Ibase's Alternex project, in both cases just for exchanging messages, as permanent links were not yet available.[5]

Over the years, other ICT4D engagements close to the field of environmental sustainability have included experiments with technologies such as solar panels or wind-up radios in communities that lacked infrastructure (lessons that now can be applied in energy-saving practices), and a groundbreaking role in the use of refurbished computers in education and community access. This in turn led to practitioners being amongst the first to advocate on the issue of e-waste dumping in developing countries in the 1990s, and to begin to call for multi-national vendors

[1] 2010
[2] Kalas and Finlay, eds. 2009
[3] ibid. p25
[4] ibid. p10
[5] Instituto Nupef, 2010

to take responsibility for the safe recycling of discarded computers in those countries. All of this was prior to the interest shown by programmes such as those financed by the Swiss government in setting up e-waste management frameworks in countries like South Africa, India and China,[6] and before vendors, such as Hewlett Packard and Nokia, launched their recycling responses in developing regions. The historical importance – and thematic significance – of environmental issues to the ICT4D sector is highlighted by the 2003 World Summit on the Information Plan of Action, where "e-environment" (C7, 20) is one of the activity areas alongside e-government, e-learning and e-health, amongst others.[7]

Yet while a number of ICT4D activists played a pioneering role in the field of ICTs and the environment, there is also a sense that for many this early relationship was not sustained. Over the years, with the growth and specialisation of the ICT4D sector, environmental issues have become less and less of a concern for practitioners. The urgency of climate change provokes the need for it to be mainstreamed in everyday discourse and activities – a mainstreaming which is now not necessarily in line with the function of ICT4D organisations, even though environmental activism, in one way or another, has been an important historical cousin to that function. Engagement in environmental causes is not systemic to ICT4D activities in the way that gender or advocating for open source have been, and in many contexts environmental issues have failed to impact on ICT4D organisations in practice. This perspective is made clear in a recent report by Frederic Sultan on ICTs and environmental sustainability in France, where he argues that "[t]he management of e-waste, and the environmental consequences of the use of ICTs is rarely singled out by French organisations combating the digital divide. Most activists of the information society ignore this face of ICTs".[8]

Not all ICT4D organisations feel that engaging on issues of ICTs and environmental sustainability is appropriate to their strategic imperative, which some believe is more generally about bringing about systemic socio-political change and transformation. In this context, environmental causes are seen to be ideologically embedded, and not seen as a way to leverage that systemic change. They are seen, rather, to ultimately confirm the status quo. A version of this argument is captured in an informal e-mail exchange between the author and Parminder Singh, a director of the Bangalore-based ICT4D organisation IT for Change,[9] on the topic of ICTs and environmental sustainability generally:

> ICT manufacturers, energy policy-makers etc. may need to be addressed on this issue much more than those in development policy and practice, which is the area we work in. We understand the major issue for environmental sustainability to be of unsustainable consumerism, and the increasing hold on our lives by, let me say the bad word, neo-liberal ideology – not only through our economic, but also, increasingly, social and political systems, which can only thrive with ever increasing rates of consumption, which we all know is unsustainable. The real issue *vis-à-vis* ICTs and environment then is the relationship between ICTs and consumerism, and ICTs and the spread of neo-liberal ideology. On the

[6] http://www.ewaste.ch/
[7] WSIS, 2003
[8] Sultan, 2010
[9] http://www.itforchange.net

other hand, the counter-possibility is whether ICTs can help construct alternative social, economic and political paradigms – or at least possibly contribute towards these directions.

It is with this as background that this paper aims to better understand current attitudes, responses and needs in the context of climate change amongst a sample set of ICT4D organisations. It looks to better understand if climate change is, or will become, a strategic priority for ICT4D organisations working across the world, as well as understanding inhibitors to mainstreaming climate change responses in organisations.

There are two components to the paper. The first involves an overview of perspectives on climate change offered by authors who contributed to a publication called Global Information Society Watch (GISWatch) during 2010, published annually by the Association for Progressive Communications (APC) and Humanist Institute for Cooperation with Developing Countries (Hivos).[10] GISWatch 2010 sought to offer a civil society perspective on the growing global focus on ICTs and the environment as a way of entering the debates and of building capacity and interest amongst participating civil society organisations to engage in policy advocacy. The GISWatch report offers a useful sense, at this juncture, of ICT4D organisations' interest in ICT and environmental sustainability issues broadly, as well as advocacy areas that lie ahead.

The second component of this paper reports on a follow-up survey conducted amongst largely the same organisations specifically on the topic of climate change. The survey aimed to ask questions of the organisations using Ospina and Heeks' overview model of ICTs, climate change and development as a starting point.[11] In their review of literature on ICTs and climate change, Ospina and Heeks note that much of the technological exploration in connection with climate change has focused on the mitigation needs of developed countries, and there have been fewer concrete learning experiences on the "potentially innovative approaches to respond, prepare for, and adapt to climate change impacts"[12] in the most vulnerable contexts. Using this perspective as a starting point, and while trying to draw out issues such as the level of priority respondents give climate change in their organisations, how climate change issues are situated in organisations, as well as barriers to engagement in the climate change field, the survey tries to build on the Ospina and Heeks model by asking respondents to define their strategic interest in the areas – as defined by the model – of mitigation, adaptation, monitoring, and strategy.[13]

[10] As editor of this publication, my perspectives and summary of the contents should be considered embedded.
[11] Ospina and Heeks, 2010. p21
[12] ibid. p3
[13] ibid. pp 15-23

2. Overview of GISWatch Reports

2.1. Fields of Interest and Enquiry

53 authors responded to a call for country reports on ICTs and environmental sustainability for GISWatch 2010.[14] Of these, nine (17%) can be considered reports from developed countries,[15] with the remaining covering developing countries across the globe. Not all of the authors were civil society organisations: some were ICT4D consultants, and at least one was a journalist. However, the majority of the authors worked in the ICT4D sector. As a result, the perspective of the GISWatch authors can be said to strongly represent the perspective of ICT4D practitioners in developing countries, and their choice of topic suggestive of their expertise and interests in the broad field of ICTs and environmental sustainability.

A number of authors who had written authoritatively for previous reports felt that the specific focus of this year's report – "ICTs and environmental sustainability", which included but was not limited to issues to do with climate change and e-waste – was outside of their field of expertise. While some said they could not do the report, others sought partners with experience in the area to help them write on the issue. This is significant to the extent that it diverged from previous editions of GISWatch which focused on what may be seen as more 'traditional' ICT4D concerns, such as "participation", "access to infrastructure" and "access to online information and knowledge", and was an indication that the field of ICTs and environmental sustainability was one relatively new for the participating authors. Despite this, it is worth noting that the 53 reports is a higher number of reports than previous years, indicating that the topic is seen by ICT4D organisations as one that is important to their work.

As Table 1 below shows, of the 53 authors, 24 took e-waste as the primary focus of their discussion, 12 focused on ICTs and climate change, and 15 on both topics. This can be taken to reflect – but should not be taken to over-determine – areas of competency.

	No. of reports	%
E-waste (including issues of production)	24	45
Both	15	28
ICTs and climate change	12	23
Mixed/other	2	4
Total	**53**	

Table 1: Fields of Interest and Enquiry

[14] For a list of organisations, see Appendix 1.1.

[15] The use of terms 'developing' versus 'developed' is based on the International Monetary Fund's (IMF) list of emerging and developing economies (2010). In this paper South Korea, an advanced economy according to the IMF, is considered a developed country.

2.2. Positioning and Perspectives

Reading across the reports, responses amongst authors on the issue of ICTs and the environment can be broken down into at least four categories, which suggest different ways of engaging (or not) and mandates. These are not absolute positions, and inevitably any one organisation might adopt more than one position at any given time. It does nevertheless offer useful insight into how ICT4D organisations frame the field of ICTs and environmental sustainability, and therefore are likely to frame the evolving field of ICTs and climate change specifically.

Non-engagement

Environmental issues are one of many development issues that require attention. However given basic development imperatives and the core focus areas of ICT4D organisations – poverty, disease, and rampant economic and other inequalities – it is not first on the list of issues that need immediate attention.

As mentioned in the Introduction, some organisations feel that environmental concerns are not specifically the mandate of ICT4D practitioners. A similar perspective is expressed in the opening remarks of the Iran country report, where authors Sohrab Razaghi and Hojatollah Modirain (who work for an organisation called Arseh Sevom) point to the immediacy of more urgent issues in that context:

> Without human rights, sustainable development cannot happen. It should be noted that human rights is not only confined to freedoms, such as freedom of speech and prohibiting torture, but also covers some basic rights such as water, health, food, eliminating poverty, education, as well as freedom of information and access to the internet …The political uncertainty in the country and harsh suppression of civil society has resulted in less attention being given to environmental issues and climate change.[16]

Political

Environmental issues are an opportunity to concretise historical concerns such as rampant consumerism, global economic inequalities, and exploitation of developing markets by powerful multi-national businesses and governments. They offer way of refocusing demands.

This is perhaps the mirror image of the first position, where concerns with consumerism and economic inequalities are also referred to. Here, addressing technology-driven consumerism is a critical aspect of addressing the interstice of ICTs and environmental sustainability, which can also be leveraged to address the ongoing political confrontation with power. This implies engaging big business and governments and decoding the marketing agendas of business ("green washing"):

> As "green" products are proving a successful model for marketing, ICT vendors stress the fact that their newest products are greener and that is why customers should buy them, even if their old equipment satisfies

[16] Razaghi and Modirain, 2010

their needs. This is a business practice that eventually leads to a commodity-driven lifestyle that directly contradicts the logic of green ICTs: saving nature's resources.[17]

Mainstreaming

Environmental issues are cross-cutting concerns and need to be mainstreamed in the development process.

This is a broad position, which may include advocacy, awareness raising in different sectors, networking, and influencing consumer behaviour (such as "buying green"), amongst other activities. An advocacy imperative lies in conscientising ICT civil society organisations on the issues of ICTs and environmental sustainability, including climate change. As Rozália Klára Bakó (2010) suggests in her report on Romania, this position implies an awareness of an "environmental divide" where "key stakeholders in policy making – governmental agencies, business organisations and civil society activists – are not aware of the issues at stake; that is, the link between ICTs and environmental issues" (Bakó, 2010). This perspective is also alert to an apparent disconnect between environmental organisations and ICT4D organisations, and, within the ICT4D sector, a lack of awareness or even concern with environmental imperatives.

Practical/opportunistic

Environmental issues can be used to attend to other development concerns, such as job creation and workers' rights.

"Opportunistic" here is used in its non-pejorative sense of seizing an opportunity as it presents itself for a public or other good. For example, the practical implication of ICTs and environmental concerns is expressed in the potential of e-waste to create employment for poor people. However, more generally, a focus on ICTs and the environment is also an opportunity to attend to issues such as the work conditions of waste-pickers, workers rights and safety in factories, as well as the skills and access to infrastructure in marginalised communities. Environmental causes offer an opportunity for practical interventions, and to mobilise funds around interventions that would be seen to be of benefit to development and rights imperatives more generally. In the context of climate change, interventions at the grassroots level, including economic and health and educational interventions, set up developmental channels that are of benefit to affected communities in the long-term and in other, sometimes unintended, ways.

2.3. Climate Change Advocacy Priorities for ICT4D Organisations

Separating out the reports that dealt with e-waste from those that looked at climate change, several advocacy priorities to do specifically with climate change are listed in the reports. These are summarised in Table 2.

[17] Staevska, 2010

	No. of mentions	%
Awareness raising and advocacy	16	31
Policy advocacy	12	23
Monitoring: data capture, indicators	6	11
Review of legislation	6	11
Building capacity in local communities	5	10
Co-operative actions	5	10
Developing infrastructure for interventions	2	4

Table 2: Advocacy Priorities

This summary should be taken as suggestive, given than the advocacy priorities were often discursive and not always so easily compartmentalised. They have also not been mapped onto the Ospina and Heeks model – which was used as a framework for the survey (see below). Rather they are to be taken to indicate the kinds of activities ICT4D organisations see themselves as most likely engaging in in the field of ICTs and climate change. It is also inevitable that many organisations would agree that interventions on several of these levels would be necessary, even if only one or two were highlighted.

Awareness-raising and advocacy concerns all sectors, and includes developing information programmes and projects, and engaging the media. In India, for instance, there is a need to expand knowledge platforms to build capacity in villages in "variability assessment and on adaptation to climate change".[18] In Japan there is a need to push for government leadership in the region on the issue of climate change, so that there is "the adoption and spread of environmental values in international trade and currency dealings",[19] and using ICTs to share methodologies for mitigating climate change regionally. *Policy advocacy* includes calling for policies dealing with mitigation interventions such as smart buildings and transport in a country like Ethiopia, where there is an "increasing energy use as a result of the expansion in ICT infrastructure, real estate development and transportation infrastructure, as well as the increase in the number of motor vehicles".[20]. In Venezuela there is a need to legislate the transition to e-government at all administrative levels, as well as the use of ICTs in environmental responses in order to ensure sustainable development.

Monitoring is different to 'information programmes' and should be taken to be a more technical and structural activity, including 'participatory sensing' using mobile phones (in the Democratic Republic of the Congo). In the case of Egypt, multi-lateral partnerships are proposed for sharing the costs of running expensive GIS data systems, given the regional implications of climate change on critical resources like the Nile. *Legislative review* (including regulations) is taken to be

[18] Manzar and Das, 2010
[19] Shiino and Aizu, 2010
[20] Chekol, 2010

different to policy development, and in instances may include ensuring that current regulation is implemented properly (i.e. attending to accountability). In one case (Bulgaria) which has a bearing on the monitoring of climate change and accountability of institutions, there was a call that "[i]nnovative online action tools for green causes need to be formally recognised by state institutions, and NGO online alerts…to be treated as administrative documents, submitted by citizens".[21]

Capacity development includes developing skills in communities and the general public, amongst civil society organisations and in government (for instance, to strengthen engagement in regional and global climate negotiations). *Co-operative actions* defines the need for, amongst other things, cross-sectoral networking, and encouraging or facilitating inter-regional co-operation, as in the case of managing the Nile as a critical water resource in North Africa or in co-ordinating the adaptation interventions of civil society, the government and the private sector in order to prevent duplication and to "maximize the efficient use of limited resources".[22] *Infrastructure* refers specifically to access to the Internet in under-served communities (so that people can receive and share information), and, in one instance (Benin), the need to stabilise electricity supply in order to make climate change interventions using ICTs possible.

This overview of GISWatch country reports suggests a number of things: firstly, that climate change presents a new learning curve for many organisations, and that ICT4D organisations position themselves differently on the issue of environmental activism. Even though there may be shared concerns on issues such as consumerism and the global structures of socio-economic power, the political strategic imperative to attend to ICTs and environmental concerns is not necessary shared. The summary of advocacy priorities also conforms with the argument that ICT4D organisations are likely to draw on historical competencies and fields of engagement in addressing climate change (such as awareness raising, advocacy, and policy development, and at different levels – the community, national and global).

3. Survey Results

3.1. Overview of Survey Respondents

With this understanding as a basis, a survey was conducted primarily to further understand their interest and engagement specifically on ICTs and climate change issues. 30 organisations responded to the survey, mostly via GISWatch authors.[23] The respondents were diverse geographically, with organisations based in Asia, Central America, Latin America and the Caribbean, Africa and Europe. A number of the respondents worked in more than one country, and in this regard country-level experiences in more than 56 countries are accounted for here: several respondents working regionally, as in "CARICOM countries", "partly Europe", and "Southern Africa and East Africa".[24]

[21] Staevska, 2010
[22] Habumuremyi, 2010
[23] See Appendix 1.2. Only one of the organisations that responded was not involved in producing a report for GISWatch (although it had been involved in previous years).
[24] The breakdown of regions where the respondents have country-level experience is shown in Appendix 1.3.

As Table 3 shows, despite the presence of respondents working in highly developed contexts such as Japan, the Netherlands, and the United Kingdom, the majority of the respondents (81%) are based, and work primarily in developing countries. The survey results can therefore be taken on the whole to reflect the perspectives and practices of ICT4D organisations working in contexts where the impact and implications of climate change are expected to be magnified.[25]

	No. of organisations	%
Developing countries	24	81
Developed countries	6	19

Table 3: Engagement in Developing versus Developed Countries

3.2. Climate Change as a Strategic Priority

A consideration of the individual survey responses does not suggest any firm pattern of why an organisation might consider climate change of more strategic importance than any other issue. There are several factors that contribute to any single issue being taken up by development organisations generally, which may include organisational focus and historical interest in the field, donor agendas, and capacity in an organisation, amongst them.

As Table 4 shows, half of the respondents give climate change a "medium" priority in their organisational work. The remaining respondents are roughly evenly split between a "high" priority and a "low" priority given to climate change.

	No. of organisations	%
High	7	23
Medium	15	50
Low	8	27

Table 4: Priority of Climate Change in Organisational Work

Of the seven organisations that give climate change a high strategic priority, all of them work in developing contexts. Four of them work in Africa (Kenya, Uganda, Tanzania, Zimbabwe, Zambia, Nigeria and Egypt), one in Asia (its spread of countries being Nepal, India, Pakistan, Sri Lanka, Bangladesh, Bhutan and Afghanistan), and two in Latin America and the Caribbean (Venezuela, Colombia, Ecuador, Peru, Bolivia, Argentina, Chile, Jamaica, Trinidad and Tobago, and Barbados). Three of the respondents are still in the planning stages of interventions in the field, showing that at this point in time, climate change as a strategic concern is still new to many organisations, and has not necessarily translated into projects on the ground.[26]

[25] Kalas, 2009. p9
[26] For examples of projects or work that organisations are involved in, see Appendix 1.4.

Of the four organisations that are already involved in projects, these involve research, documentation and information dissemination at the local level. Some of these projects suggest a substantial engagement in the field. For example, one organisation is involved in documenting knowledge, practices and policy regarding climate change in the tropical Andes, an evaluation of land use and cover change in the Andes over the last 30 years, and a project that is assessing how rural communities perceive climate change. Another organisation is involved in making useful and practical information on climate change adaptation practices available to local communities using traditional publishing and Web 2.0 tools. A third respondent is involved in "sensitisation" initiatives on the causes of changes in rainfall patterns in Nigeria, as well as on the long-term consequences of farmland destruction and deforestation for domestic fuel. Six out of seven of the organisations that give a high strategic priority to climate change also consider it a cross-cutting concern in their organisation.

Five of the six respondents based in developed countries (Japan, UK and the Netherlands, Spain and Switzerland)[27] attach a "medium" strategic priority to climate change in their work. Again, the disconnect between the recognition of climate change as a strategically important area to engage and projects on the ground is felt. Four of the five respondents either were not involved in climate change work at all, described their engagement as "spontaneous involvement in some projects", or were indirectly involved in mitigation projects such as fuel-efficient transport and sustainable housing (in the latter case the organisation also worked in India and Ghana). This perhaps surprising lack of current engagement with projects in developed contexts may reflect the widespread concern with climate change as an issue in those countries, and a low incentive or even need to be engaged in projects when many other sectoral organisations already are. This can be contrasted to the range of opportunities for engagement in climate change in developing countries.

Of the remaining nine organisations that work in developing countries and give climate change a medium strategic priority in their work, only two are not involved in any projects at this point in time. Many of these projects involve the communications function, drawing on their historical competencies. Projects that the organisations are engaged in include running sustainable development networks and environmental observatories, preparing content on climate change for community radio, disseminating information about local climate change projects to the media, raising awareness amongst indigenous people in the Congo around environmental conservation and supporting income-generating activities for these communities, providing a platform for civil society activities involving the environment, and working as a content partner on climate change and health issues.

Nine out of the 15 respondents giving climate change a medium strategic priority consider it a cross-cutting concern in that organisation, rather than a discrete project.

Of the eight respondents who gave climate change a "low" priority, only one was involved in a climate change project, which involved "collaborating with other civil

[27] The sixth, based in South Korea, attaches a low priority to climate change.

society initiatives". One respondent had submitted a funding proposal which was rejected, and other projects are in the pipeline. Another respondent described its engagement as "aspirational". All except one of the respondents (South Korea) are based in developing countries. Only one saw climate change as a cross-cutting concern.[28]

Table 5 below shows that all together 61% of the respondents consider climate change a cross-cutting concern in their organisation, rather than a issue particular to a single project. This suggests that even if an organisation gives climate change a "medium" priority in its work, it nevertheless is a concern that filters across different projects, and informs strategic discussions in the organisation generally. As the above analysis also suggests, although it will not be the case in all instances, there is a match between considering climate change a high strategic priority, and a cross-cutting concern in an organisation, and considering it a "low" priority and discrete project. This can be taken to indicate the extent to which climate change is mainstreamed in an organisation's work, even if the interest in the field is at the planning stage.

	No. of organisations	%
Cross-cutting	16	53
Single project	11	37
No response	3	10

Table 5: Influence of Climate Change in Organisation

It is clear from the above that the organisations that are engaged in climate change are engaged in several different kinds of projects, ranging from communications, to networking, education, monitoring and research, and in areas such as health at the local level. Some also appear to be engaged in technically-complex projects. However, the results also suggests that there is little common ground amongst organisations in developing countries as to the strategic priority that ought to be afforded to climate change.

In total 15 out of the 30 (50%) organisations surveyed are not currently involved in climate change initiatives, a percentage which is high and which can be contrasted with the observation that most respondents saw the need to be involved in climate change issues, some with a sense of clarity of commitment: "[I]n truth, it is now that we realise the issues, and day-to-day projects are born to address these issues". Only one organisation said it would not be involved in climate change issues "for the foreseeable future".

Overall this suggest the influence both the global focus on climate change is having on local strategic priorities – climate change is now firmly on the development agenda – as well as, possibly, the felt need to respond at the local level where the impact of climate change is most visible.

[28] As is to be expected, given the low strategic priority given to climate change, three did not answer the relevent question in this regard.

3.3. Specific Areas of Focus

The literature review conducted by Ospina and Heeks shows how the initial focus on ICTs and climate change in developed countries was on mitigation, with a gradual shift towards the potential of ICTs to play an important role in adaptation efforts in developing contexts. Their review also suggests how much of the experience of the potential for ICTs to play an adaptation role in developing contexts at this point is anecdotal, and that few "assessments [are] available in terms of their social and economic impacts" (p26).

Drawing on the Ospina and Heeks model of climate change engagement, respondents were asked what their specific areas of focus was in their climate change work. As Table 6 below suggests, although, as argued by Ospina and Heeks, the trend is towards focusing on adaptation efforts in developing countries, a number of respondents are involved – or see their strategy involving – mitigation efforts. As the results indicate, within the category of "mitigation", the majority of organisations focus on moving towards a knowledge economy generally, with a strong emphasis on using ICTs to modify consumption habits, and improve energy efficiency.

	No. of organisations	% of total orgs
Mitigation: Physical production (using ICTs to shift to the knowledge economy and reduce the impact of production on the environment)	11	37
Mitigation: Physical consumption (using ICTs to modify consumption habits)	8	27
Mitigation: Energy use (the role of ICTs in energy efficiency from a user's perspective – e.g. smart buildings; use of Green IT)	8	27
Mitigation: Energy generation and distribution (using ICTs for better energy management – e.g. smart grids)	2	7
TOTAL	**29**	

Table 6: Strategic Interest in Mitigation

All except one (South Korea) of the respondents based in developed countries have a strategic interest in mitigation efforts (in one notable instance this entails indirect involvement in fuel-efficient transport and sustainable housing). Three out of the six have an interest in adaptation interventions (based in South Korea, Netherlands and Switzerland), with the respondent based in South Korea exclusively interested in adaptation strategies. In the case of the organisation based in the Netherlands, its organisational work extends to India and Ghana, potentially accounting for its interest in adaptation. In the case of the organisation based and working in Switzerland (and partly in other countries in Europe), its interest in adaptation is specifically on socio-political inclusion and capacity building. This does begin to suggest that a framework which considers adaptation of interest primarily to developing countries, and mitigation an interest for developed countries, should be

a tentative framework that helps to focus interventions but not necessarily limit them.

Table 7 suggests a number of respondents based and working in developing countries take monitoring as a key strategic focus area. Only one of the six organisations based in developed countries (Japan) saw monitoring as important, which could reflect the high level of monitoring and data capture already operational in those countries. The dearth of good climate data in the developing context has been widely noted, which could account for the interest in this field, including an interest in using technology such as mobile phones to develop community monitoring frameworks and projects. As has already been suggested, in some instances the monitoring projects undertaken appear substantial, as in the evaluation of land use and cover change in the Andes.

	No. of organisations	% of total orgs
Monitoring: Data capture (using ICTs to gather information on changes to the environment or climate)	9	30
Monitoring: Data presentation and dissemination (using ICTs to present, distribute or share the data that has been captured)	7	23
Monitoring: Data processing (using ICTs to record and analyse data that has been captured)	6	20
TOTAL	**22**	

Table 7: Strategic Interest in Monitoring

As Table 8 shows, respondents have a high strategic interest in adaptation interventions (in particular socio-political adaptation). This may be for several reasons, including the bias of this survey which would capture the perspectives of ICT4D organisations working in developing countries where adaptation efforts take primacy and where, in many instances, the tangible effects of climate change on local communities and the environment (e.g. the Andes) and unsustainable grassroots practices (e.g. the Congo) are apparent and more likely to provoke action.

It is also the case that adaptation issues – which include capacity building, awareness-raising, using community radio to share grassroots information, building inclusiveness, and so on – are traditional functions of many ICT4D organisations, as opposed to often more technical and specialised fields of monitoring and mitigation. This would suggest that climate change adaptation strategies, as with the communications function, can most readily be incorporated into current developmental interventions (e.g. an organisation working with local communities on sharing health information using mobile phones can easily begin to think about extending that to include issues of climate change and health). More specific, and technical interventions using ICTs to adapt to climate change, which may be

specific to climate change, however, may prove more difficult for the ICT4D organisations to deliver, and would be dependent on external resources from donors or other partners.

	No. of organisations	% of total orgs
Adaptation: Socio-political (using ICTs for inclusiveness, and capacity building etc.)	17	57
Adaptation: ICTs, livelihoods and finance	5	17
Adaptation: ICTs and health	5	17
Adaptation: ICTs and water security	5	17
Adaptation: Habitat (e.g. using ICTs in dealing with human settlements, and population displacement)	3	10
Adaptation: ICTs and food security	3	10
TOTAL	**38**	

Table 8: Strategic Interest in Adaptation

Historically ICT4D organisations have played a supportive role in developmental processes that are already unfolding. Of the four areas of engagement identified by Ospina and Heeks, the strategic function – such as advocacy, awareness-raising and capacity development – of civil society actions is the easiest to identify. Table 9 shows that the majority of the respondents (77%) take their strategic focus area as awareness-raising and capacity building. A high number (60%) show an interest in policy advocacy and networking, with some already engaging in the field despite it being relatively new to them.[29] Few show an interest in carbon markets.

	No. of organisations	% of total orgs
Awareness and capacity building	23	77
Policy networks and advocacy	18	60
Technology transfer (including to communities)	10	33
Supporting or engaging in decision-making processes	9	30
Carbon markets	1	3

Table 9: Overview of Strategic Focus Areas

It is important to remember when considering the above results that a large number of the respondents (50%) are not currently involved in the implementation of climate change projects. The strategic interest of the organisations, in a number of instances, is therefore hypothetical.

[29] For a breakdown of policy advocacy activities, please see the Appendices.

3.4. Barriers to Engagement

Finally, respondents were asked what were the key barriers to their further engagement in climate changes issues. These have been summarised in Table 10.

Barriers	No. of mentions
Capacity strengthening	12
Unsupportive context	8
Funding	7
Access to relevant information	5
Strengthening of networks	1

Table 10: Barriers to Engagement

As the table shows, capacity strengthening was the most frequently mentioned need from respondents. This included training opportunities ("There are not enough training opportunities in the country on climate change and how to get involved"), the "skills for fundraising and research", and the need to engage volunteers to boost an organisation's capacity to engage on climate change issues.

The category of access to relevant information refers both to the need for information that can assist in making strategic decisions ("still a need for more information and orientation on the issues to see what could be our most strategic role in ICTs and climate change"), and the application of information at the local level ("There is not enough relevant information that can be shared with the majority of rural Nigerians.") This suggests a strong need for the translation of climate science and the role of ICT application at the local level.

The lack of a supportive context is an unexpected result in terms of a barrier to engagement. Clearly the context that the ICT4D organisations engage plays a strong part in determining the success of their advocacy efforts, and other needs, such as fundraising. The lack of a supportive context includes a low awareness amongst stakeholders about climate change issues ("Key stakeholders are not yet aware of the issues involved and how they can engage with the processes of climate change mitigation"/ "Limited number of professionals regard this as an important issue"), difficulty in securing funding for climate change projects, and a weak policy context that inhibits engagement. While serving as a cause for advocacy, the latter also points to an environment where the importance of ICTs and climate change is not recognised, which has the inverse effect of making policy advocacy difficult, and maybe even impossible in some countries. The challenge in implementing climate change projects in a 'weak' context was described by one respondent as a "conceptual barrier".

Conclusions

This paper began from the point of view that there is a practical need for ICT4D organisations in developing contexts to attend to climate change adaptation initiatives in the most vulnerable contexts. Through an overview of contributions to GISWatch on the theme of ICTs and environmental sustainability, and a survey of primarily GISWatch organisations, it sought to understand better how climate change is being taken up as a strategic priority in those organisations and what the barriers to engagement might be.

In doing so, a number of general findings are apparent. Firstly, there is a predominant strategic interest in adaptation strategies in ICT4D organisations working in developing contexts. In particular, there is an interest in using ICTs for inclusiveness and capacity building, which concurs with a general historical function of ICT4D organisations. However, this survey supports the reading offered by Ospina and Heeks that despite several significant interventions on the whole this interest is nascent and that a lot more concrete work needs to be done on the ground to fully realise the potential of ICTs to help with adaptation in communities.

Secondly, climate change is new to a notable number of ICT4D organisations surveyed here, which are still trying to properly understand how it fits into their organisational agendas. Although many have identified the broad areas of strategic engagement, and in doing so have a sense of their strategic priorities, this has not yet translated to projects on the ground. There are a number of reasons for this, including what appears to be an historical split between environmental concerns and ICT4D concerns (with some ICT4D organisations now playing catch-up), internal deliberations about whether or not environmental concerns are in fact important to the ICT activist's agenda, capacity in organisations, the new policy and technical terrain presented by the field, and a lack of an institutional context, including access to funding, to support innovative initiatives on the ground or to be receptive to advocacy drives.

As Kalas argues[30] the lessons and frameworks established in ICT4D communications practice (the "strategic tools")[31] can be applied to climate change. To the extent that traditional nodes and frameworks of engagement with institutions and other stakeholders can be leveraged in order to engage on issues of ICTs and climate change, climate change can be said to present a typical model of engagement for the ICT4D sector. Outside of the potential to implement adaptation strategies, this feels particularly important when it comes to policy advocacy, where, as far as climate change impacts the ICT4D sector at a policy level, the long-standing experience ICT4D advocates have developed in the policy arena can be leveraged in climate change causes. This experience in engaging in national and global fora in a crucial sense should prove invaluable. Kalas points out that climate change magnifies development inequalities; to the extent that these inequalities provoke political engagement and disagreement, political faultlines (such as North versus South; the plight of developed versus developing countries) are likely to be magnified too.

[30] Kalas, 2009. pp9-21
[31] ibid. p10

However, the climate change arena is atypical in at least the following respects:

Non-traditional Partners

For many, and in a practical and concrete way, it involves 'non-traditional' partners such as environmental organisations and institutions, some of which have already engaged quite substantially in issues of ICTs in the context of climate change. Despite the historical engagement of ICT4D organisations in environmental issues, environmental causes have not necessarily continued to be systemic to ICT4D concerns. This is suggested in the process of editing the GISWatch report, where a number of organisations were either new to the issues being discussed, or partnered with other authors with experience. This relative inexperience in the specific field of climate change has arguably created a disconnect between the agendas of environmentalists and key focus areas for ICT4D practitioners. This to the extent that environmental organisations (for example, the World Wildlife Fund) have in some instances engaged substantially in the potential of ICTs in the context of climate change – suggesting that there is something of an advocacy lag with the current status of ICT4D organisations playing 'catch-up' to the ICT policy imperatives that have already been developed by others. In this engagement with non-traditional partners, there is a need for clarity on the key learning experiences and expertise that ICT4D organisations bring to the partnership: their *usefulness*. This will, of course, differ from organisation to organisation and context to context. In some instances, ICT4D organisations can provide the technical expertise in these associations. Nevertheless, the argument provided by Kalas is one step in that direction, and there is a sense that this could be expanded on.

Unfamiliar Policy Contexts

Climate change is also atypical in that it engages unfamiliar policy contexts – that is, environmental policy, which has its own sets of actors, drivers, politics and institutions. One of the critical questions policy advocates around ICTs and climate change need to ask is where exactly to locate policy advocacy: in ICT policy, or environmental policy or elsewhere? This challenge is exacerbated when its comes to adaptation, given that the areas of focus are cross-cutting, and including things like local economics, health, education, agriculture, community safety (i.e. in the event of disasters) and the environment generally. At the level of mitigation, one might clearly see an advocacy strategy in working with traditional ICT policy partners – one can, for instance, clearly advocate for a policy on green ICT procurement – but when it comes to adaptation, it is more a case that ICT advocacy and awareness-raising needs to happen across a number of sectors. The strategic decision of where to locate advocacy drives may vary from country to country and may imply engaging with different stakeholders, in different fora – some of which require years of experience to engage fruitfully. In other words, in the absence of establishing strong cross-sectoral advocacy partnerships – where mutual agendas can be advocated for – questions of capacity in terms of time and resources can be raised in connection with the effectiveness of ICT4D organisations in engaging in policy advocacy generally in the environmental sphere.

In this regard, one can see how some organisations are ambivalent about engaging in the field of ICTs and environmental sustainability. The atypical nature of climate change suggests that a significant shift in advocacy behaviour is necessary in order to create a systemic response, at least at the policy level. This to the extent that

one could argue that while associations with environmental agendas may be productive, a focus on climate change specifically may only happen on a superficial level (at the level of 'moral support' or 'support in principle') for some individual ICT4D organisations rather than at the detailed engagements seen in other policy advocacy drives, such as those at the Internet Governance Forum or World Summit on the Information Society. Given this, anything other than 'engagement in principle' (which one survey respondent called the "well-wisher level") might detract from current ICT4D agendas and strategies which still require attention unless an appropriate multi-stakeholder engagement forum can be created.

Thirdly, while there is a predominant strategic interest in adaptation in the developing context, the responses also highlight there is an interest *across* the field of climate change response, and at many levels: local, national, regional and global. This much is suggested by one respondent, whose survey comment is worth quoting in full to get an idea of the kind of textured response ICT4D organisations can offer in the field:

> ICTs and climate change is a junction with few impacts in Mexico. Even climate change advocacy is a new field for Mexican civil society groups. From the three traditional sectors talking about climate change (government, industry and civil society) I can identify groups with different perspectives and visions. In the civil sector there are three perspectives at least. The position of one initiative is about being independent of official governments at both levels, national and international. This initiative congregates several small collectives and groups in rural and urban areas. Its work is starting, and it is deeply intense. They try to deal with climate change through direct community actions. The second initiative groups NGOs and international organisations like Oxfam, Greenpeace etc. They are interested in public policy advocacy related to governments, but keep a critical position. They also develop community actions. And there is a third initiative, which is working in areas very related to governments and its projects. The strategy of [the respondent's organisation] is to keep and develop relationships with most of the civil society initiatives.

The heterogeneous nature of ICT4D organisations, and their relatively fluid framework of engagement suggests that an institutional agenda (e.g. donor or government) should not seek to overdetermine the strategic emphasis of ICT4D organisations in relation to climate change in the developing context. Rather, their role should be conceptualised as relatively fluid, operating at many levels, and engaging horizontally at many points, and that in this sense the strategic focus of ICT4D organisations should be self-determined, and shaped by interests and competencies. ICT4D actors themselves, who are intimately engaged in their own work, would most readily see these opportunities.

Similarly, it does seem that ICT4D organisations in general have a broad appreciation and interest in ICTs and environmental sustainability, and that interventions in different fields, like e-waste and climate change, overlap. While climate change interventions may be specific, there is a sense that there is value in encouraging (or at least better understanding) the growing broader environmental consciousness in the sector. There is a sense here where the *urgency* to

mainstream climate change concerns, and the felt sense of a need to prioritise adaptation interventions in the developing context, needs to be balanced by the perhaps longer-term value of conceptualising the interstice of ICTs and the environment more broadly. For instance, it makes little sense to advocate for climate change response, but then to ignore waste practices in a project or organisation or even at a government policy level. And as has been well documented, besides the impact that production, 'disposable' technology, and waste incineration has on carbon emissions, in many instances vulnerable communities are equally vulnerable to improperly managed and recycled e-waste, and in some instances more so.

While this paper does not explore this point, it tentatively suggests that a sustainable long-term response to climate change by ICT4D organisations implies a broader conceptualisation of environmental sustainability, and a framework where strategies can be understood in a way that does not unnecessarily create a discrete compartamentalisation of concerns, whether this entails a strategic focus on climate change in line with the Ospina and Heeks model, or an emphasis across various fields of environmental sustainability.

It is important to stress that this is a sample survey and overview, and therefore should be taken to yield illustrative results. A more comprehensive survey clearly might show something different. At the same time, the field of ICTs and climate change is a rapidly changing one, with important drivers at play, including donors, and global institutions like the International Telecommunication Union and Organisation for Economic Co-operation and Development (OECD). This means that attitudes, and engagement in the issues at this point in time, may change in the medium or even short term.

Priorities for Future Research

The survey suggests a number of strands for interventions that are needed in order to support the engagement of ICT4D organisations on climate change issues. These include capacity building, knowledge sharing, and documenting innovative examples, resources and tools that will increase their understanding and ability to strategically engage in the area.

A number of these interventions might have research components. For instance, a possible research priority could include distilling, in a systematic way, the learning experiences of ICT4D organisations that have been involved in the monitoring and documenting of the experiences of local communities, so that a clear picture of methodologies and practices can begin to unfold. (Some best practices suggested by the survey are presented in Appendix 1.5.) Given the specificities and complexities of the different sectoral responses when it comes to adaptation, these experiences may need to be structured according to specific sectors, rather than from the perspective of ICTs generally. Systematic information collection on the topic of ICTs and climate change and the translation of concepts for the local level would be useful, as would an analysis of ICT tools and practices that can be used to mitigate or adapt to climate change, and their appropriateness given the limitations and possibilities of different contexts.

There does appear to be a general need for the development of capacity building and training modules suited to local contexts that can be used to raise awareness and change behaviour amongst communities and organisations. These would have an element of research to them given the relative newness of the field – they may, for instance, involve focus group studies in order to properly pitch training interventions, while considering issues such as skills levels and appropriate technology. There also appears to be a need to better understand donor agendas in the field of ICT adaptation to climate change more generally, and some forward-looking mapping of these agendas would be useful. Research into the specific country institutional contexts that enable (or disable) a climate change response would also help shape and sharpen ICT-related interventions.

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ANNEX 1. List of GISWatch Country Report Authors

Country	Organisation
Argentina	Nodo TAU
Australia	EngageMedia
Bangladesh	Bytes for All
Benin	GOREeTIC
Bolivia	NETWORKS Foundation
Bosnia and Herzegovina	oneworld – platform for southeast europe (owpsee) foundation
Brazil	GPOPAI
Bulgaria	BlueLink
Cameroon	PROTEGE QV
Chile	Centro de Investigación de la Inclusión Digital y Sociedad del Conocimiento/Mujeres en Conexion; ONG Derechos Digitales
Colombia	Colnodo
Congo, Democratic Republic of (DRC)	Alternatives; University of Cape Town
Congo, Republic of	AZUR Développement
Costa Rica	Sulá Batsú
Croatia	ZaMirNET
Ecuador	IMAGINAR
Egypt	ArabDev
Ethiopia	Ethiopian Free & Open Source Software Network (EFOSSNet)
France	VECAM
India	Digital Empowerment Foundation
Iraq	Arab Knowledge and Management Society
Iran	Arseh Sevom
Jamaica	Telecommunications Policy and Management Programme (TPM), University of the West Indies, Mona
Japan	Institute for InfoSocionomics, Tama University; Nomura Research Institute (NRI)
Jordan	Alarab Alayawm
Kazakhstan	Andrew Beklemishev
Kenya	KICTANet
Korea, Republic of	Korean Progressive Network Jinbonet
Kyrgyzstan	Civil Initiative on Internet Policy (CIIP)
Mexico	LaNeta
Morocco	DiploFoundation
Nepal	Panos South Asia
Netherlands	Enviu
Nigeria	Fantsuam Foundation
Occupied Palestinian Territory	Applied Information Management
Pakistan	Bytes for All
Peru	Consorcio para el Desarrollo Sostenible de la Ecorregión Andina
Philippines	Foundation for Media Alternatives (FMA)

Romania	StrawberryNet
Rwanda	Media High Council
Saudi Arabia	Saudi Arabian Strategic Internet Consulting (SASIc)
Senegal	GOREeTIC
South Africa	groundwork
Spain	Pangea; Tecnologia per Tothom (TxT)
Sweden	APC
Switzerland	comunica-ch
Syria	Anas Tawileh
Uganda	Women of Uganda Network (WOUGNET)
United Kingdom	GreenNet
Uruguay	ObservaTIC, Universidad de la República
Uzbekistan	GIPI Uzbekistan
Venezuela	EsLaRed
Zimbabwe	e-Knowledge for Women in Southern Africa (EKOWISA)

ANNEX 2. List of Survey Respondents

Respondent organisation	Countries in which the organisation works
Korean Progressive Network Jinbonet	South Korea
Bytes for All and Bangladesh Open Source Network	Bangladesh
UNECA	All of Africa
Telecommunications Policy and Management Programme, University of the West Indies, Mona Campus, Jamaica	Jamaica, Trinidada and Tobago, Barbados and other CARICOM countries
Foundation for Media Alternatives	Philippines mainly
ONG ORIDEV	République of BENIN
LaNeta	Mexico
Nodo TAU	Argentina
AZUR Development	Republic of Congo
Comunica-ch	Switzerland and partly Europe
ArabDev	Egypt
PROTEGE QV	Cameroon
Owpsee	Western Balkans
ZaMirNET	Croatia
Colnodo	Colombia
Centro de Investigación de la Inclusion Digital y Sociedad del Conocimiento Research Center for the Digital Inclusion and Knowledge Society	Chile
SANGONet	Southern Africa, East Africa
Pangea	Spain
Ekowisa	Zimbabwe, Zambia
StrawberryNet Foundation	Romania
Fantsuam Foundation	Nigeria
Enviu	Netherlands, India, Ghana
Digital Empowerment Foundation	India, Sri Lanka, Bangladesh
Women of Uganda Network (WOUGNET)	Uganda
GreenNet	UK
CONDESAN	Venezuela, Colombia, Ecuador, Perú, Bolivia, Argentina and Chile
NGO Derechos Digitales	Chile
ALIN	Kenya, Uganda and Tanzania
Panos South Asia	Nepal, India, Pakistan, Sri Lanka, Bangladesh, Bhutan and Afghanistan
Institute for InfoSocionomics, Tama University	Japan

ANNEX 3. Geographic Areas of Work of Survey Respondents

Region	No. of organisations working in region
Africa	
Eastern Africa	8
Central and Western Africa	6
Northern Africa	2
Southern Africa	2
	18
Asia	
South-central and South-eastern Asia	13
Eastern Asia	2
Western Asia	0
	15
Europe	
Eastern and Southern Europe	4
Western and Northern Europe	3
	7
America	
Latin America and the Caribbean	15
Central America	1
North America	0
	16
Oceana	
Oceana	0
TOTAL	56

ANNEX 4. ICTs and Climate Change Projects and Initiatives

Examples of awareness-raising projects/work surveyed organisations were involved in		Examples of policy advocacy work surveyed organisations were involved in
Desktop research and document review; interviews and report writing		Workshops (e.g. a post-Copenhagen workshop on climate change involving scientists and policy-makers; helping institutions like the ITU organise workshops on ICTs and climate change)
Industrial and academic research		Developing policy frameworks (e.g. the African Innovation Framework, which advocates for low-carbon growth and development strategies)
Content development and access to information and knowledge (e.g. one organisation is a content partner of a project called "Climate change and health"; projects in Africa using web 2.0 tools; printed briefings, accessible summaries of research and community case studies)		Engaging regional policy bodies/institutions (e.g. National Information and Communication Infrastructure (NICI) in Africa)
Working with the youth (e.g. one organisation was involved in a high-school essay competition on ICTs and climate change and a young researchers competition on the same topic)		Engaging telecoms providers (e.g. trying to get telecoms operations in the Caribbean to consider mitigation and reduction in non-renewable energy consumption)
Collaborations with other initiatives (such as www.dialogoclimatico.org)		Engaging the academic community
Engaging the media (e.g. distributing information to the media)		Engaging governments (e.g. looking to get non-renewable energy consumption on the national policy agenda in the Caribbean)
Working with local communities (including indigenous communities around forest preservation, income generation, water security, the destruction of farmland by illegal miners, and assessments of perceptions in rural communities around climate change)		Support of initiatives that focus on the reduction of energy consumption and the adoption of green ICTs
Working with community radio (content development);		Conducting research to highlight policy gaps
Running environmental initiatives (such as the Sustainable Development Network in Colombia)		Engaging in policies focused on the prevention of violent conflict (e.g. that might occur as a result of water shortages caused by climate change)
Projects that involve fuel-efficient		Technological policy (e.g. advocating

transport and sustainable housing		the use of open source software, and refurbished computers)
Documentation of knowledge, practices and policy regarding climate change (e.g. in the Andes)		Participating in policy advocacy networks (e.g. GreeningIT network started by APC)
Long-term evaluations of land use and cover change (e.g. in Andes)		Advocating for the inclusion of climate change as a topic in school curricula (e.g. primary schools and rural schools)
Running online information nodes		Information dissemination and developing "accurate" information (as one respondent put it, "policies on climate change are mostly based on inaccurate information.")
		To promote the application of technology (e.g. in Nepal, encouraging villagers to use technology to get connected, and to monitor the glacier lake level at Imja Lake)
		Promoting research (e.g. on smart grids)

ANNEX 5. Best Practices

Several best practices for ICT4D organisations in their strategic engagement in the area of climate change were suggested by the respondents, summarised below.

Best Practice	Example Quotes
Lead by example: apply best-practices within the organisation	"Look within: Promote change at the individual level to create the moral authority to promote change at the institutional and other levels." "Involve the entire work team in an initial unit or company carbon audit."
Awareness-raising and capacity building	"Plan regular open discussions about local and global contributors to climate change, including by the ICT sector itself." "Strengthen capacity of the communities on the strategic use of ICT for reducing climate change." "Use traditional media to sensitise rural people on climate change." (Multimedia approaches were also suggested) "The deployment of environmental observatories. We believe is very important to facilitate the access to information about the environment to the community as a basic step to start a policy advocacy around climate change." "Encourage children (in rural area in particular) to be connected to the Internet; this will also let field experts (teachers, doctors etc.) in the village obtain knowledge and services from any part of the world. These will eventually evolve into the efficient use of resources and reduce consumption."
Reviews of available literature and practice	"Clarify risks of consumption models of the technology that produce high GHGs [Green house gas] levels." "The EU's strict and proactive climate change policies; some telecommunication companies' initiatives for greening ICTs, such as British Telecom and T-Systems."
Basic data gathering of climate change impact at the local level	"Transforming data into future scenarios based on local conditions and presented it in an innovative ways will be a huge contribution."
Networking to ensure collective advocacy	"That civil society organisations get engaged in working on climate change and ICTs, and not limited to ICT organisations only." "Multi-stakeholders networks, which could act as multidisciplinary resources nodes."
A bottom-up approach	"Room for bottom-up involvement, not blind technology push; use ICT in 'developed' countries to enable change anywhere; look at reverse innovation to achieve spin backs of efforts."
Others: Advocacy; support for scientific initiatives; research; promote the roll-out of green technology / roll-out green technology	