Research paper

Adaptation and mitigation estrategies to climatic change on the University Unidades Tecnológicas de Santander

Estrategias de adaptación y mitigación al cambio climático de las Unidades Tecnológicas de Santander

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Received: 15 June 2017

Accepted: 31 July 2017

Abstract

Educational institutions as integral training spaces have in their mission to articulate the creation and application of environmental solutions to contribute positively to the control of environmental pollution and the mitigation of climate change. Linked concepts such as sustainable development, climate variability, clean energy are introduced within the academic programs and faculties of the different universities, in addition to comprehensive management plans and environmental strategies. These are territorial strategies to significantly contribute to the agreements established in the International summits of the environment. The Santander Technology Units, UTS, as a regional reference for quality, well-being and development, have a special social position to encourage practical communities and processes that help to mitigate the effect of global warming. In order to make this reference more effective, the institution must, from its own institutional life dynamics, demonstrate transformations that aim to minimize nascent damages, and from that example, serves as a multiplier of information and actions, so that the community of influence UTS, Popularizes Practices that help control the current dynamics of climate change. The proposal of institutional programs for mitigation and adaptation to climate change in the Technological Units of Santander was developed through thematic axes that refer to the general aspects that are sought to promote with the implementation of the plan. It is proposed to the UTS, the implementation of five programs, and with each one of them actions and goals to be achieved, to demonstrate in the future, to proactive respond institutionally by the processes of mitigation and adaptation to climate change in the city, region and country.

Keywords: *University, Programs, Actions, Academic Community, Institutional Commitment*

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Amaya-Corredor C.A., Hernández-Contreras C., Pedroza-Rosas N. and Cáceres-Quintero R.S. 2017.Adaptation and mitigation estrategies to climatic change on the university Unidades Tecnológicas de Santander. Revista CINTEX. Vol. 22 nº2, pp. 89-109

Resumen

Las instituciones educativas como espacios de formación integral tienen en su misión, articular la creación y aplicación de soluciones medioambientales para aportar positivamente al control de la contaminación ambiental y la mitigación del cambio climático. Vinculación de conceptos como desarrollo sostenible, variabilidad climática, utilización de energías limpias son introducidos dentro de los programas académicos y facultades de las diferentes universidades, además de planes de gestión integral y estrategias medioambientales, son estrategias territoriales para aportar significativamente a los acuerdos establecidos en las cumbres internacionales del medio ambiente. Las Unidades Tecnológicas de Santander UTS, como referente regional de calidad, bienestar y desarrollo, tiene una especial posición social para incentivar en las comunidades, prácticas y procesos que ayuden a atenuar el efecto de calentamiento global. Para hacer más efectiva esta referencia, la institución debe desde su propia dinámica de vida institucional, evidenciar trasformaciones que apunten a minimizar los daños nacientes, y desde ese ejemplo, servir de multiplicador de información y acciones, para que la comunidad de influencia UTS, popularice prácticas que ayuden a controlar la dinámica actual de cambio climático. La propuesta de programas institucionales de mitigación y adaptación al cambio climático en las Unidades Tecnológicas de Santander se desarrolló por medio de ejes temáticos que hacen referencia a los aspectos generales que se buscan impulsar con la implementación del plan. Se propone a las UTS, la implementación de cinco programas, y con cada uno de ellos acciones y metas a alcanzar, que evidencien a futuro, una respuesta proactiva institucionalmente por los procesos de mitigación y adaptación al cambio climático en la ciudad, región y país.

Palabras clave: *Universidad, Programas, Acciones, Comunidad Académica, Compromiso institucional.*

1. Introduction

Human beings nowadays confront a great challenge to understand and act on the planetary transformations and the environmental impacts on the local territories. Weather it is a dynamic parameter that serves to monitor climatic change and the impact that production models and the society's way to live are exercising into the environment. Societies divided land into territories with more or less growth and economic development expectations, and in front of this, it is important to recognize the climatic change scenarios to plan activities. The impacts associated to the climatic variability affect the different dimensions of the development and above all, to the population and the vulnerable socioeconomical sectors. The planning and development of the adaptation processes have to be focused into the small lands and sectors dynamically, going from the specifics to the general aspects and with a collective effort with institutional and social work that allow to build responses (plans and strategies) to those changing processes.

Technology evolution, cultural and demographic changes over last several decades have improved life quality around the world but also have involved social and ecological impacts, involving an acceleration of climatic change due to the an uncontrolled use of natural resources [1]. These situations have alerted governments, environmental groups, scientists, academics and economists about generating a global environmental conscience that leads to a behavior change.

On this scenario, the universities have an important role because of their duties: research, teaching and social projection, which has to generate actions and critical thinking that allow to become aware of environmental problems and to initiate actions to mitigate them.

As an initial strategy, universities, included into their academic courses, the Environmental sciences as a key element or as a transversal subject on the undergraduate contents. The continuous environmental learning is a key element to achieve environmental goals generating attitudes and behaviors that contribute to the protection of natural resources and the environment [2].

Universities and educational institutes have the goal to articulate and apply environmental solutions to contribute to mitigate and control climatic change. University academic programs are including concepts as climatic variability, sustainable development, clean energies as well as quality management plans and environmental strategies to contribute significantly to the established international agreements on environment.

Global warming concerns the gradual increase of temperatures of the atmosphere and oceans, as well as the predicted trend to temperature growth. The melting of the poles, droughts, and climatic variations are consequences of global warming, due to the average earth temperature increase [3]. Climate warming was originally a natural earth process, promoted by anthropogenic processes that lead to environmental impacts [4]

From the industrial revolution until nowadays, burning fossil fuels (oil, gas, carbon) used to produce energy that liberated greenhouse gas emissions (CO_2) to the atmosphere, which due to the incident of energy retention, increased the earth temperature and perverted the climatic system globally [4]. Scientists [5] are advising that if global temperature exceeds

2°C the consequences will be catastrophic, with economic, social, political, cultural and environmental impacts.

National Governments on the climatic change summit in Paris, France, 2015, tried to unify strategies, programs and criteria worldwide to avoid climatic change, but due to regional planning conflicts, climatic variability and the policies interests it has been difficult to come to an agreement Summit participating countries agree to adopt the first agreement for the anthropic global warming due to greenhouse gases [6].

Climatic change, is a social fact, due to its causes, which can also be solved by means of human activities. Additionally because humans are the final receivers that suffer the direct or indirect consequences of the biogeophisical modifications derived from the climatic change [7].

UTS (Unidades Tecnológicas de Santander) University as a quality, welfare and development, has a special social role to encourage the community about several processes and practices that help to reduce the global warming effect. To optimize this influence, the university has to do and make evident transformed dynamics that contribute to minimize and control climatic change.

UTS University builds tools that conduce to create an environmental identity, contributing to the society with applied environmental knowledge by means of several researches of grade thesis conduced at UTS. This paper summarizes and outlines all the environmental research realized with an analysis, conclusions and a proposal to work on environmental strategies and actions that will help a sustainable answer to the climatic change acting locally but viewing globally.

2. Materials and methods

The construction of an UTS institutional proposal, to appropriate strategies of mitigation and adaptation to the climate change, has been thought from the description of the world and national referents in the subject, going through the recognition of the institutional conditions in order to respond or to follow the referents, to make an appropriation of the theme to the institutional reality, in a way that a proposal of adaptation and mitigation can be constructed, from the endogenous conditions that reinforce prospectively refocused institutional processes with sustainability vision.

Methodologically the project was built under the following approaches:

Analyzing the reality of the study, based on the transversal method approach, understanding it as a research design that collects data from a single moment and in a single time [8]. The purpose of this method is to describe variables and to analyze their incidence and interrelation at a given moment.

In the construction of institutional strategies of mitigation and adaptation, the descriptive transversal design aims to inquire into the incidence and values in which one or more variables are manifested, transcendental in the light of climate change, and at the time of development to reorient future processes in the short, medium and long term.

This proposal allows the identification of institutional conditions that establish restrictions or limitations to build an identity and what to do, about the object of study of the project: the institution and the climate change. This management of tasks is called management with critical chain [9], which allows the development of sequenced and orderly stages for the completion of the project, which is essential to identify the reality and to propose possibilities for its transformation, reorganization or refocus.

The conjugation between transversal method and critical chain management, allow to formulate methodological stages of work, intended towards a result: adaptation and mitigation.

The stages developed were constructed as follows:

Stage 1: Document Reference Information. It is necessary to know the international, national, state and municipal contexts, as territorial referents; and referring to institutional experiences at the level of Universities or Educational Institutions, the existence of documentation that allows establishing the dimension and scope of information related to adaptation and mitigation to climate change. In the institutional aspect, it is necessary to establish the panorama of agreements, policies or norms in general that have been established as paths of common work, for the management of global climate change; from the institutionalization of education, information on the experiences applied in the relationship between Universities and climate change is collected, which serve as a starting point to build, through repetition and adaptation, a specific proposal for the UTS. Here, the critical chain approach

is applied, because through the territorial and institutional referents, the thematic and work focus of the project is defined, thus a specific purpose.

Stage 2: Institutional conditions for adaptation and mitigation. Understanding the level of information to be worked on, one must have clarity of the reality to intervene, in such a way that strengths and weaknesses are identified within the life processes of the institution, in which the due territorial reference and institutional experiences will be applied. This identification of endogenous characteristics will allow us to adapt the general vision to the particularity of the UTS, in order to fulfill the environmental premise: act locally, think globally [10]. Here one work under the idea of multidimensionalism where reality is analyzed and prospected to provide integral solutions. For the UTS this application from a transversal consideration allows to identify conditions and institutional actors such as: population characteristics, physical infrastructure, environmental, social and urban environment in which the institution is immersed, including economic possibilities of support for the proposal and identification of allies, among others, for the construction of a proposal.

Stage 3: Formulate adaptation and mitigation guidelines and strategies. Here is established the purpose of the Santander Technology Units as a public university in face of the territorial guidelines of adaptation and mitigation to climate change in Colombia. Given the prior knowledge of the institutional processes, strategies of global institutional action can be proposed, which transform customs, attitudes and behaviors that respond to mitigation interest. The construction of strategies is integrated, and at a later stage, it can be implemented and executed. Here it is proposed, through a transversal view and analysis from a critical path, to formulate the transformations, additions or subtractions, from the daily purpose of the UTS, that focus their daily life towards recognition of climate change, mitigation and adaptation to this.

Once the three previous moments have been constructed, a socialization material of the experiences and processes constructed for the UTS should be elaborated, that takes the information to the institutional communities, to start working from the cause to the problem and intervene the moments that are deriving in lack of adaptation and mitigation to climate change.

In 2001, in Bogotá, the IDEAM held the first National Communication before the United Nations Framework Convention on Climate Change, where the consequences of climate change were debated and its results are a valuable contribution to decision making, both national and international, which will contribute to counteract the adverse effects of climate change [11]. With this first communication the national concern about climate change began to be seen.

In 2007, the Intergovernmental Group of Experts on Climate Change or the Intergovernmental Panel on Climate Change, known by the acronym IPCC, collects the formally agreed statements regarding the key conclusions and uncertainties contained in the contributions of the Groups of work on the Fourth Evaluation Report at the 25th plenary meeting of the IPCC (Valencia, Spain, November 12 to 17, 2007) [12] through this summary, the commitments proposed by the IPCC of the South American countries can be contextualized.

Later in 2011, research projects such as "Adaptation to Variability and Climate Change: Intersections with Risk Management" analyze from the increase in the frequency of extreme hydro meteorological events, associated with climatic variability and/or climate change, and the greater vulnerability of human societies to these threats, as there is a greater interest in reducing greenhouse gasses by the scientific community. This article highlights the importance of adaptation for the reduction of disaster risk associated with time, climate and its intersections with risk management. It is concluded that adaptation and the risk management should be integrated with a holistic vision in order to reduce the vulnerability of society, in addition to articulating mitigation initiatives to reduce the causes that generate climate change, reducing the existing risk and avoiding social construction of new risk factors [13].

In the same year, the document State and Prospective of the Possibilities of Mitigation of the Impact of Climate Change in the Atlantic Coast Region, proposed, among other objectives, to know the mitigating conditions of the impacts of change that may be present in vulnerable populations and its disposition to prevention; as well as, to describe the risk mitigation actions developed at the state and private levels [14].

In 2011 an Analysis of the Public Policies of Climate Change was carried out in Colombia, where the preliminary analysis of Colombian environmental public policies was concluded, evidencing that there has been a process where, although there was participation of different actors, economic interests have finally prevailed over the environmental ones, and participation has tended to become a formalism [15]. This research project gives a clear idea of the approach that should be taken into account when creating institutional policies framed in national ones without falling into the vice of formalism **or** economic benefit.

In 2012, UNICEF in its manual on Adaptation to climate change and disaster risk reduction in the education sector, offers guidance on policies and planning for sustainable development throughout the education sector, both in school institutions and non-school, and from the national level to the local level [16].

In 2014, the Center for Research in Environment and Development CIMAD and the Master's Program in Sustainable Development and Environment, of the University of Manizales, in development of the project "State and prospective of the possibilities of adaptation and mitigation of the impact of change climate change in different regions of the country", elaborated the document "Climate Change and adaptation for the Santander's region: perceptions and considerations from the legal framework". In this, applying a holistic method, they identified the perception of different public and private actors of the process of climate change in the region [17].

In the direct scenario of study of this project, in the Technology Units of Santander UTS, the studies close to the subject have been carried out in Comprehensive Risk Management, from which one topic is climate change. In 2013, the University of Manizales through the Master's Degree in Sustainable Development and Environment, which ellaborated the document "Analysis of the conditions of the surrounding environment, which makes possible the occurrence of causal factors of disasters, case of analysis: Technology Units of Santander in the city of Bucaramanga", from which the conditions of the urban area are exposed around the UTS that urgently demand an objective look at the area, the risk conditions to which it may be exposed, and that there is an instrument of judgment that contributes to the decision making and the reorganization of its current dynamics [18].

In 2014, the research group on Environment and Territory GRIMAT, of the UTS, built the document Model of Calculation of Natural and Socio-Natural Threats in Educational Environments, Case Study of Technological Units of Santander, in Bucaramanga, Colombia, from which the description of generating risk conditions is continued on the institution. The topic of climate change appears linked to this analysis, and within the considerations of the document, the institutional need of having tools that, within the integral risk management is recognized, consider its responsibilities in the face of climate change [19].

In 2015, the research group on Environment and Territory GRIMAT, of the UTS built the project "The Islands of Urban Heat and its Impact in the Territories: an Analysis in the Royal Citadel of Mines of the City of Bucaramanga", from which it is made a description of the territorial conditions of environment of the UTS, which have modified the climatic conditions of this sector of the city of Bucaramanga. Within its considerations, climate change is a present agent that requires predominant attention in this area of the city [20].

In 2015, the University of the Andes, through the project Governance of Climate Change: Case Study Integral Regional Plan for Climate Change, Capital Region, Bogotá Cundinamarca, PRICC, makes an important presentation of mechanisms of incorporation of the different actors of the climate change management process; it exposes the dynamics of construction of strategies to adapt to climate change, through a case study. Here it is determined both the modes of governance and the types of concertation against these measures to face the impacts of climate variability in the region [21].

However, the two fundamental point of reference supports of the project have been presented as territorial and institutional, from which it has been possible to identify the management of the topic of climate change, to articulate it to the institutional reality of the UTS.

From the territorial point of view, there were identified the elements of climate change institutionally oriented from:

- National Plan of Adaptation to Climate Change, PNACC. Formulated inter-institutionally between the National Planning Department, the Ministry of Environment and the Institute of Hydrology, Meteorology and

Environmental Studies IDEAM, among others, in which "the ultimate objective of the PNACC is to reduce the risk and socio-economic and ecosystem impacts associated with climate change and variability in Colombia. For this, the national government intends to provide a series of methodological inputs [22].

- The Comprehensive Territorial Climate Change Management Plan (PIGCCTS), for the department of Santander, formulated by the Ministry of Environment and Sustainable Development, was viewed from a positive perspective in 2030, whose objective is to help the Department improve its ability to adapt to the increase in average temperature and the variation in rainfall as a consequence of climate change, in accordance with the commitments of Colombia acquired by the signing of the Paris Agreement [23].
- Although the Municipality of Bucaramanga, the main headquarters of the UTS, does not have a Municipal Plan for Climate Change, in its development plan, the environmental component considers the issue as a fundamental axis of work for the sustainability of the city. In the Development Plan 2016 - 2019 - p. 209, the subprogram is established 3.3.3 Environmental Quality and Adaptation to Climate Change [24].
- The North Andean Node of Climate Change. They are national, regional, state, local and interdisciplinary, inter-institutional work agencies that promote actions of adaptation to climate change and mitigation of national emissions of greenhouse gases that are consistent with national plans and strategies [25].

Different universities were known to incorporate the topics of global warming **into** their processes and daily life. From these, concepts were adapted for the endogenous characteristics of the UTS:

- The Javeriana University, from its function of Social Projection, has established through Consultancies the academic-technical space to contribute to the adaptation and mitigation of climate change, for this they have formulated the area of Environmental Sustainability and Climate Change [26], for working on the climate change from the perspective of earth sciences.

- The University of Santander UDES, does not directly refer to the topic of climate change, but in its institutional environmental strategy it incorporates associated elements, as it is presented on its website as an educational institution which assumes responsibility for the incorporation of environmental ethics in institutional policy, works in the training of professionals with criteria of sustainability and human solidarity, as well as in the execution of actions to prevent pollution; framed in the fulfillment of the world pacts, environmental legal framework and other requirements related to its environmental aspects [27].
- The Technological University of Pereira UTP, has a valuable experience in university environmental management, from which, by fully recognizing its environmental responsibility, develops processes aimed at managing climate change. On its website it is presented as a pillar institution of the region and a highly dynamic territory; the University must respond to a series of socio-environmental responsibilities [28].
- The Industrial University of Santander UIS, through its Environmental Management System, assumes an environmental commitment, from which the processes incorporate aspects of Climate Change management. In the environmental policy of the university, the will and commitment of the entire university community with the generation of a culture of sustainable development that includes the protection of the environment, the efficient use of resources and the prevention of contamination are included [29].
- The newspaper El Tiempo presents a compilation of the general conditions highlighted by five Colombian universities as sustainable universities, according to the 2014 GreenMetric international ranking, which evaluates **619 universities** around the world based on their environmental indicators. The National University, the University of the Andes, the University of Santander UDES, the Industrial University of Santander UIS and the Technological University of Pereira UTP stand out [30].
- There are no direct references from universities to build institutional plans for Climate Change, efforts have focused on comprehensive environmental plans, where climate change is a topic, and universities have participated in government initiatives to adapt and mitigate climate

change, from which is contributed according to the interests of each institution.

Conceptual Approach

In view of the fact that climate change represents a threat to human and biophysical ecosystems, letting the fate of the earth lie in how society responds efficiently to the environmental catastrophe, response actions started around the topic**.**

For the project it is fundamental to understand the conceptual moments that propitiate the analysis of the reality to intervene and from which to formulate processes that refocus the daily life of the institution, in such a way that climate change is managed as a variable of life to be managed. To do this, appropriating the concept of Vulnerability, Resilience, Mitigation and Adaptation is a bulwark of the project and an essential basis for its sustainability.

To develop this proposal, the transversal methodology is considered [31, 32], as research design that collect data in a unique time. The proposal of this methodology is to describe variables and analize his incidence and interrelation in a punctual moment [33].

The methodology design, focused on the descriptive transversal concepts, has as aim to explore the incidence of values present on each considered variable. The determined phases allow to identify the university conditions, from which are established the environmental restrictions at UTS. The sequence development is named administration with critical chain where the phases are orderly and by sequence to culminate in the project [34].

3. Results and discussion

The proposal of the university program of mitigation and adaptation to climatic change in UTS was realized by means of thematic axis that refer to the general aspects to promote. The following environmental information was considered: Plan to adapt to climatic change of Santiago de Cali city [35], due to his topographic and environmental resemblance; Climatic change adaptation Plan of the Bogota city [36], as reference of city and the Development of Santander Department Plan, [37], from which the Plan of Santander Climatic Change 2030 was structured [38].

Based on this and the collected data, the following five programs with associated aims are proposed, which make a proactive response of the university evident to mitigate and be adapted to the climatic change.

1 UTS Eco friendly. It is designed for the strategies directed towards the green technologies (eco friendly) used to develop the adaptation and mitigation processes to climatic changes. It is needed to promote innovation and the implementation of environmental technologies (table 1)

TABLE 1. PROGRAM N° 1 CONTENT AND PROSPECTS

STRATEGY		ACTIONS	EXPECTED RESULTS
1	Green Technologies	Led light bulb installation	Save 88% of electric energy consumption on lighting [39].
2	Green areas	Increase the presence of Green areas, establish new Green covers, vertical gardens and Green roofs	Decrease the average temperature, increase CO_2 drains and improve the air quality [40].
3	Greenhouse gases decrease	Optimum administration of solid wastes, decrease of generation and implementation of recycling campaigns	Decrease of emission of greenhouse emission gases associated to solid waste generation [41].
4	Sustainable mobility and air quality	Implement pedestrian streets, promote bicycle use, organization of collective cars, improve the signposting inside the university.	Improve the mobility associated to the university, reduce the greenhouse gases emission. Contribute to improve the air quality by means of reducing the particle emission as well as noise minimize into the student streets. Dynamics to implement an evacuation program in case of emergencies.

2 Tidy UTS. An important feature to consider to prevent climatic change is to reduce the student vulnerability to hydro meteorological events and the associated risks. The idea is to integrate the university actions to the Bucaramanga municipality plan to have a fast response in front a climatic eventuality (Table 2).

TABLE 2. PROGRAM N° 2 CONTENT AND PROSPECTS

STRATEGY		ACTIONS	EXPECTED RESULTS
1	Water efficient use	Installation of faucets with sensors and soap regulators. Low water consumption WC installation. Efficient use of water campaigns.	Decrease 60% of water consumption, mitigate the hydric resource contamination [42].
2	Improve the administration response	Emergencies and rescue team strengthening. Signposting of emergency routes. Ecoefficient plant maintenance. Emergency drill education.	Decrease the risk associated to environmental accidents. Improve the response capacity. Improve the attention to disability citizens. Education.
3	Improve environmentally and socially the catchment and the influenced area.	Environmental education to promote green areas and water bodies treatments on the UTS influence zone	Fauna and flora conservation, increase of biodiversity. Integral education of the students, involving an environmental respect. Contribution to the hydric regulation.

3 Supportive UTS. It is a priority to undertake processes to be adapted to environmental, social and economic dynamics, that generates risks and vulnerability to the university community. This program includes several strategies to mitigate and be adapted to climatic change from a social and participative point of view (Table 3).

TABLE 3. PROGRAM N° 3 CONTENT AND PROSPECTS

STRATEGY		ACTIONS	EXPECTED RESULTS
1	Informative strategies	Use of university press media to promote the climatic change adaptation. Promote the UTS commitment as well as the influence area of the university. Support the neighboring schools and colleges to be adapted to climatic change	Improve the relations between UTS and colleges and schools. Contribute to raise student awareness to climatic change.
2	Hydric security	Develop social campaigns to protect hydric resources as well as the regional biodiversity.	Social contribution to protect biodiversity and hydric resources on the city. Support the communities to be adapted to climatic change

4. Adaptable UTS. This program considers the strategies to be adapted in front of phenomena related to climatic change. The adaptative capacity to the student community is the main resource to increase the resilence and decrease the vulnerability to the climatic variability (organization capacity, knowledge appropriation, environment comprehension and conflicts resolution). It is a major priority to manage climatic change (Table 4).

Table 4. Program n° 4 content and prospects

STRATEGY		ACTIONS	EXPECTED RESULTS
1.	Illnesses prevention	Education campaigns to promote healthy lifestyle. Prevention programs to mitigate skin, respiratory illnesses as well as solar radiation effects.	Promote the articulation between the university programs and the city programs to educate the population on prevention measures to improve the health status of the students [35].
2	Support to the hydrometeorological monitoring system of the city	Develop research programs to contribute with data to the monitoring climatic system existent on the city	To generate environmental monitoring data, from UTS research programs that help to the municipality to understand the meteorological trend of the city [35]. Contribute with scientific knowledge to make clever decisions considering the adaptability to climatic change of the city.

5 Sovereign UTS. the capacity to be governed is considered by means of channeling the students interests and the possibility to control and adopt decisions and strategies that will mitigate and adapt the university democratically following the statutes of the university (Table 5)

Table 5. Program n° 5 content and prospects

STRATEGY		ACTIONS	EXPECTED RESULTS
1	Interinstitutional coordination	Activities undertaken inside and outside of the university that link the internal and external actors to improve the execution of the intervention of environmental adaptation.	UTS University workers that have knowledge and participate in the environmental adaptation.

	STRATEGY	ACTIONS	EXPECTED RESULTS
2	Founding sources of founding and economical tools	To generate the compromise from the university direction to assign economical resources that support the needed activities to be adapted to climatic change.	Budget item to support the environmental processes of adaptation to climatic change.
3	Generation and use of information	Establish information diffusion mechanisms that make it easier for UTS to know the results of environmental research projects focused to mitigate climatic change	Scientific publications to promote the university and his influence area as well as divulgate the obtained results of climatic change adaptation

4. Conclusions

From the compilation of information about the University and Climate Change relationship, no tacit results are evident. The university environmental dimension is developed on the environmental management systems on several environmental issues linked to climate change but not directly related to climatic change. It would be important to impulse specific researches where universities demonstrate how the work undertaken by the environmental management systems contribute to mitigate and adapt to climatic change. The environmental indicators would be specified to the goals; commitment of the country is being extended internationally, on the premise that acting locally, the benefit is global.

It is important to underline the Colombian government efforts to socially appropriate the climatic change from the understanding of the generating agents and the consequences of it. These efforts have allowed institutional actors to take a position related with the climatic change, that contribute and complement to the government actions. In Colombia, since the developing of the Plan Nacional de Cambio Climatico, the participative style has reached a huge repercussion on the government plans and local strategies. On all those authorities the universities participation has been outstanding even if the climatic change adaptation and mitigation instruments are not appropriated.

Compiling information of universities and climatic change, it gives results from thesis degrees at all university levels, from the technological undergra-

duate until magister or doctoral studies. Thesis degrees are important since they represent conceptual framework to understanding the subject matter, but isn't evident on the institutional appropriation of the universities as policies or relevant universities guidelines on environmental management.

The university "Unidades Tecnológicas de Santander" has started academic processes that orientate the university to environmental adjustments, but those performances are untied, focused only as degree thesis, which doesn't help to recognize the results towards adaptation to climatic change. Consequently, it is important to gather all the information collected from mitigation and adaptation programs on a formal structure divided into thematic axes of the proposed programs with an approach that could allow the university to show the climatic change adjustments.concisely and orderly.

The Institutional Plan UTS of climatic change, constitutes an environmental tool directed not only to the environmental management of the university but it would also affect the surrounding actors as: influences on the processes and daily dynamics concerning attitudes or habits that results on environmental results (paper consumption, alternative energies, more efficient water consumption or better profiting of open spaces). Another aspect is that due to the UTS inhabitants (20000), the strategies and actions scope will have a huge territorial and social influence, as long as each worker will spread those concepts and will apply to all the living spaces, impacting on the city and region

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